REVISIONS 1495 2					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		REPLACED WITH CHANGE BY REV. B PER TDRR 16821	—	4 MAR 65	JJJ / PJ

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ~~VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.~~

Ⓐ REPLACED WITH CHANGE BY REV B

	QUANTITY REQUIRED				EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
				011				
				☒			1010031	SCHEMATIC, PRECISION RES. ALIG.
				1			1008276	BRACKET
				1			1010704	TERMINAL, FEED THRU, INSULATED
				5			1007113	TERMINAL LUG ASSEMBLY
~~SEE NOTE 2~~				AR			1006757-1	WIRE, ELECTRICAL
~~SEE NOTE 2~~				1			1010333	TRANSFORMER
~~SEE NOTE 2~~				3			1010469-2	RESISTOR, VARIABLE
~~SEE NOTE 2~~				AR			1006776-20	INSULATION SLEEVING
				1			1008008	SPACER
				1			1008278-011	HOUSING ASSEMBLY

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1000205	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN J Zwinger DATE 10 DEC 64
CHECKED M. Manning 11 DEC 64
APPROVAL L W Hymmes 11 DEC 64
APPROVAL L Hensley 11 DEC 64
NASA APPROVAL [illegible]
MIT APPROVAL W Kupfer 16 Feb 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PRECISION RESOLVER ALIGNMENT ASS'Y
GIMBAL MOUNTED

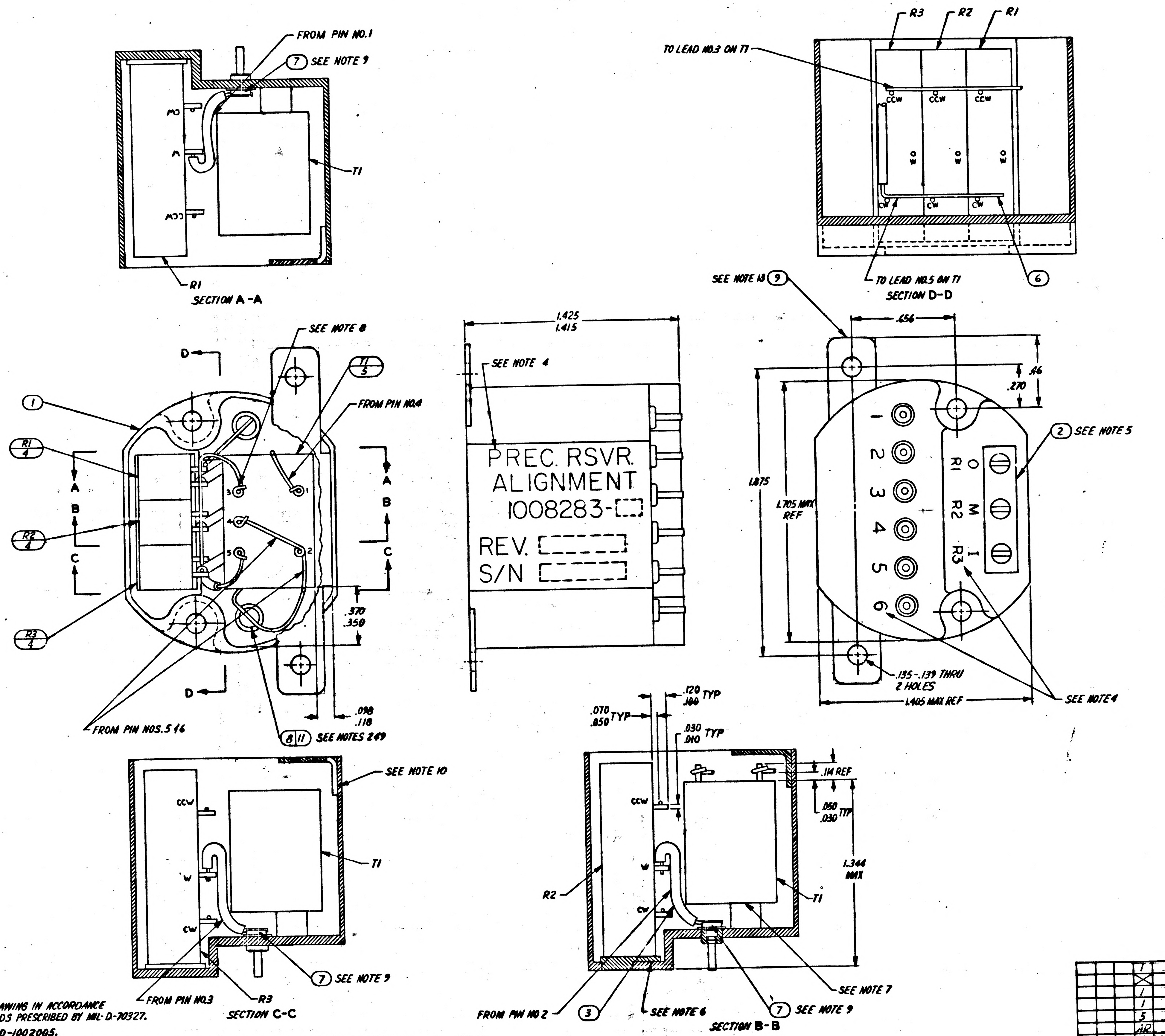
CODE IDENT NO. —
SIZE C
1008283
SCALE —
SHEET 1 OF 1

1008283 A

<B

MIL 1077C—P

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APP'D.
B		REPLACES REV. A WITH CHANGE PER TDRR 16821		6 JAN 65	JWP / V.M.


FROM PIN NO.1
7 SEE NOTE 9
CW
W
CCW
T1
R1
SECTION A-A
R3
R2
R1
TO LEAD NO.3 ON T1
CCW
W
CW
TO LEAD NO.5 ON T1
6
SECTION D-D
SEE NOTE 8
T1 5
FROM PIN NO.4
1
R1 4
R2 4
R3 4
A
B
C
D
.370
.350
.098
.118
FROM PIN NOS. 5 & 6
8 11 SEE NOTES 2 & 9
1.425
1.415
SEE NOTE 4
PREC. RSVR.
ALIGNMENT
1008283-
REV.
S/N
SEE NOTE 13 9
.656
.46
.270
2 SEE NOTE 5
1.875
1.705 MAX REF
1 2 3 4 5 6
O R1
M R2
I R3
.135-.139 THRU 2 HOLES
1.405 MAX REF
SEE NOTE 4
SEE NOTE 10
T1
CCW
W
CW
FROM PIN NO.3
R3
SECTION C-C
7 SEE NOTE 9
.120
.100 TYP
.070
.050 TYP
.030
.010 TYP
.14 REF
.050
.030 TYP
1.344 MAX
R2
T1
FROM PIN NO 2
3
SEE NOTE 6
7 SEE NOTE 9
SEE NOTE 7
SECTION B-B

Ⓑ REPLACES REV A WITH CHANGE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. WELD PER ND-1002005.
3. UNLESS OTHERWISE SPECIFIED, ALL WIRING SHALL BE IN ACCORDANCE WITH ND 1002069.
4. MARK .100-.140 HIGH YELLOW PER ND-1002019 & SERIALIZE PER ND-1002023.
5. BOND ITEM ④ TO ITEM ② PER ND-1002004, TYPE I.
6. BOND ITEM ② TO ITEM ① PER ND-1002004, TYPE I.
7. BOND ITEM ⑤ TO ITEM ① PER ND-1002004, TYPE I.
8. SOLDER PER ND-1002071.
9. INSTALL TERMINAL, PRESS INTO ITEM ①.
10. BOND ITEM ⑨ TO ITEM ① PER ND 1002004, TYPE I
11. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET ALL THE REQUIREMENTS OF P.S. 1007004
12. ENCAPSULATE PER ND 1002002

MASTER

			1		11	1010704-2	BUSHING, INSULATOR
			X		10	1010031	SCHEMATIC DIAGRAM, ELECTRICAL
			1		9	1008276	BRACKET
			1		8	1010704-1	TERMINAL, STUD
			5		7	1007113	TERMINAL LUG ASSY
			AR		6	1008757-1	WIRE, ELECTRICAL
			1		5	1010333	TRANSFORMER
			3		4	1010469-2	RESISTOR, VARIABLE
			AR		3	1006776-20	INSULATION, SLEEVING, ELECTRICAL
			1		2	1008008	SPACER
			1		1	1008278-011	HOUSING (INSEP ASSY)
			011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
QUANTITY REQUIRED					LIST OF PARTS AND MATERIALS		

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1000205		-011
APPLICATION		

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ ___	± .005	+ ___
−	± .03	−

DO NOT SCALE THIS DRAWING

MATERIAL ___

CONTRACT NAS 9-497

AC SPARK PLUG DIVISION GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN J. Kelvinger 8 DEC 64 DATE
CHECKED J. BRIED 29 DEC 64
APPROVAL 29 DEC 64
APPROVAL R.S. Koppe 29 Dec 64
NASA APPROVAL 2/4/65
MIT APPROVAL 24 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

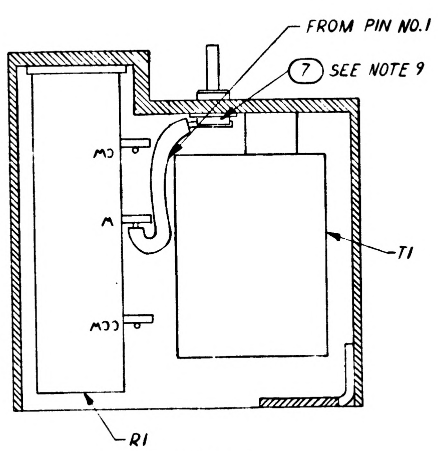
PRECISION RESOLVER
ALIGNMENT ASSEMBLY
GIMBAL MOUNTED

CODE IDENT NO. | SIZE E | 1008283
SCALE 4:1 | SHEET 1 OF 1

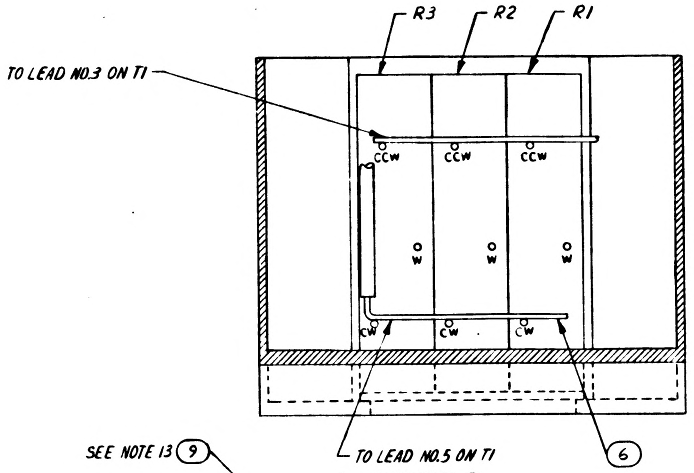
1008283 B

Charles
29 DEC 64

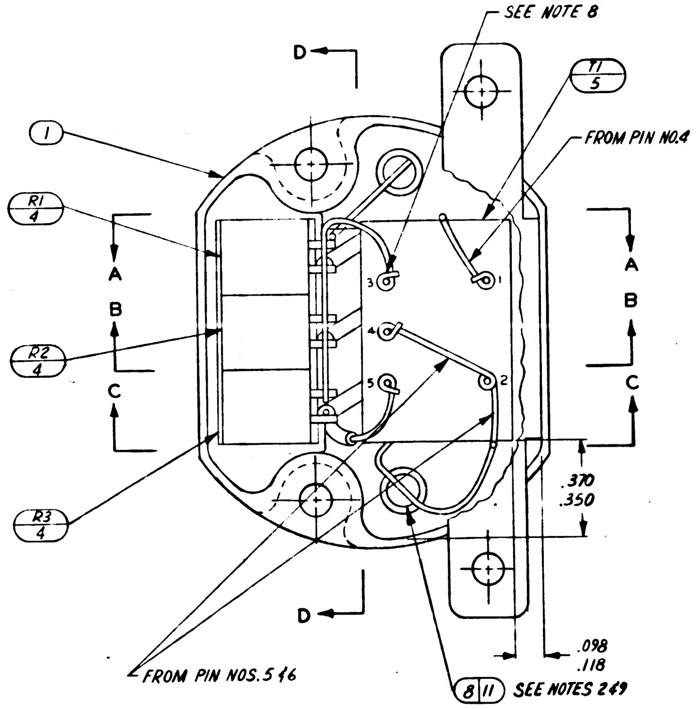
REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPROVED
B		REPLACES REV. A WITH CHANGE PER TDRR [illegible]		6 JAN 65	JWP / J.M.
C		REVISED PER TDRR 23516		1 NOV 65	[illegible] / RWH

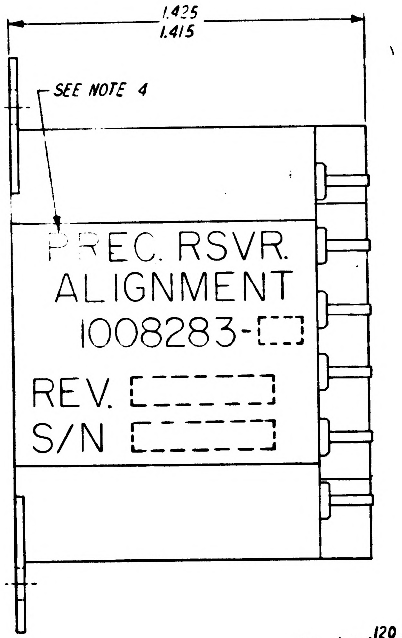

FROM PIN NO.1
⑦ SEE NOTE 9
CCW
W
CW
T1
R1

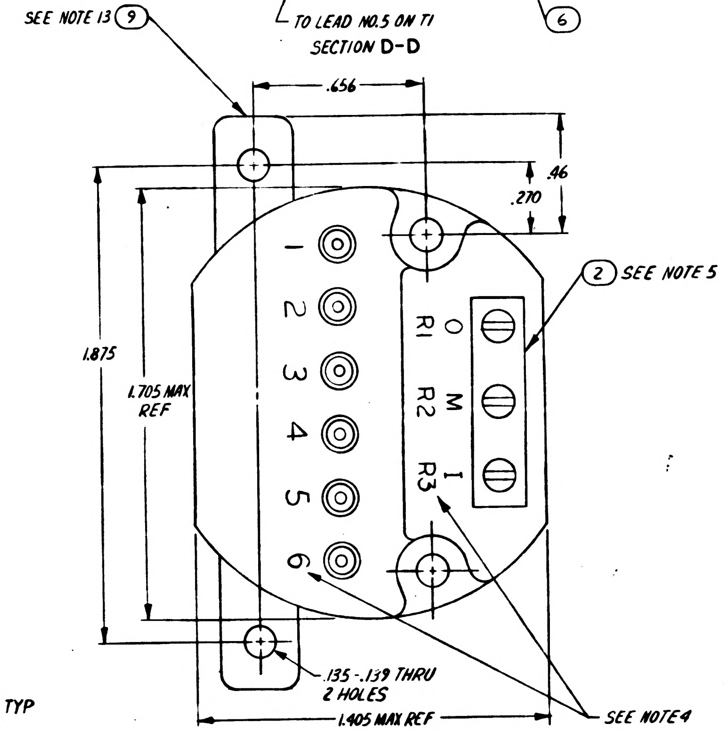
SECTION A-A


R3
R2
R1
TO LEAD NO.3 ON T1
CCW
CCW
CCW
W
W
W
CW
CW
CW
TO LEAD NO.5 ON T1
⑥

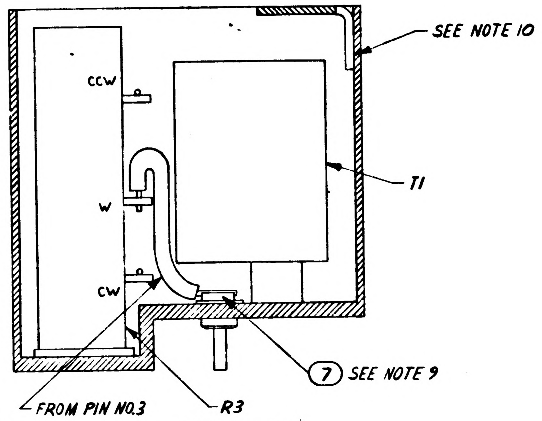
SECTION D-D


SEE NOTE 8
T1/5
FROM PIN NO.4
D
①
R1/4
R2/4
R3/4
A
B
C
A
B
C
3
1
4
5
2
.370
.350
D
.098
.118
FROM PIN NOS.5 & 6
⑧⑪ SEE NOTES 2 & 9

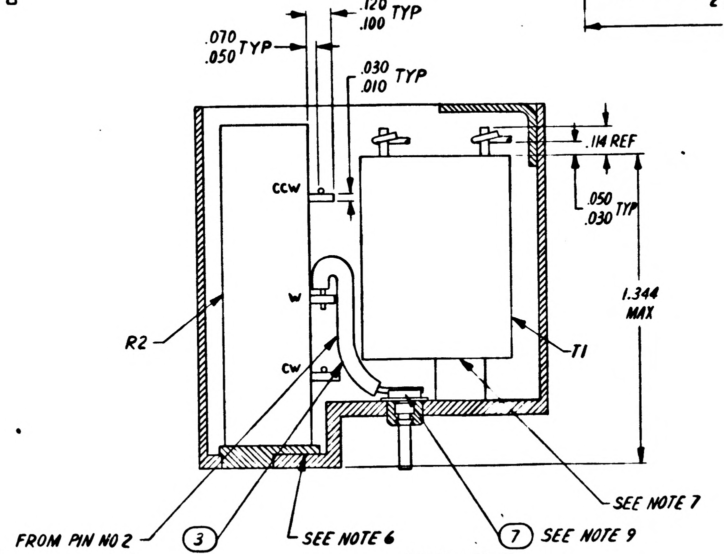

1.425
1.415
SEE NOTE 4
PREC. RSVR.
ALIGNMENT
1008283-
REV.
S/N


SEE NOTE 13 ⑨
.656
.46
.270
② SEE NOTE 5
1
2
3
4
5
6
0 R1
M R2
I R3
1.875
1.705 MAX REF
.135-.139 THRU 2 HOLES
1.405 MAX REF
SEE NOTE 4

Ⓑ REPLACES REV A WITH CHANGE


SEE NOTE 10
CCW
W
CW
T1
⑦ SEE NOTE 9
FROM PIN NO.3
R3

SECTION C-C


.070
.050 TYP
.120
.100 TYP
.030
.010 TYP
.114 REF
.050
.030 TYP
1.344 MAX
CCW
W
CW
R2
T1
SEE NOTE 7
FROM PIN NO.2
③
SEE NOTE 6
⑦ SEE NOTE 9

SECTION B-B

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. WELD PER ND-1002005.
3. UNLESS OTHERWISE SPECIFIED, ALL WIRING SHALL BE IN ACCORDANCE WITH ND 1002069.
4. MARK .100 -.140 HIGH, WHITE PER ND-1002019 & SERIALIZE PER ND-1002023.
5. BOND ITEM ④ TO ITEM ② PER ND-1002004, TYPE I.
6. BOND ITEM ② TO ITEM ① PER ND-1002004, TYPE I.
7. BOND ITEM ⑤ TO ITEM ① PER ND-1002004, TYPE I.
8. SOLDER PER ND-1002071.
9. INSTALL TERMINAL, PRESS INTO ITEM ①.
10. BOND ITEM ⑨ TO ITEM ① PER ND 1002004, TYPE I
11. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET ALL THE REQUIREMENTS OF P.S. 1007004
12. ENCAPSULATE PER ND 1002002

			011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
			1		11	1010704-2	BUSHING, INSULATOR
			☒		10	1010031	SCHEMATIC DIAGRAM, ELECTRICAL
			1		9	1008276	BRACKET
			1		8	1010704-1	TERMINAL, STUD
			5		7	1007113	TERMINAL LUG ASSY
			AR		6	1006757-1	WIRE, ELECTRICAL
			1		5	1010333	TRANSFORMER
			3		4	1010469-2	RESISTOR, VARIABLE
			AR		3	1006776-20	INSULATION, SLEEVING, ELECTRICAL
			1		2	1008008	SPACER
			1		1	1008278-011	HOUSING (INSEP ASSY)
QUANTITY REQUIRED					LIST OF PARTS AND MATERIALS		

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1000205		-011
APPLICATION		

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ±.005 ±.03 ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ___
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE WISCONSIN
ACSP PN
DRAWN [illegible] DATE 18 DEC 64
CHECKED J. GRIEB 29 DEC 64
APPROVAL [illegible] 29 DEC 64
APPROVAL [illegible] 29 DEC 64
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PRECISION RESOLVER
ALIGNMENT ASSEMBLY
GIMBAL MOUNTED

CODE IDENT NO
SIZE E
1008283
SCALE 4:1
SHEET 1 OF 1

C 1008283

29 DEC 64

REVISIONS 1495.2

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ~~VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.~~

	QUANTITY REQUIRED			011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
				☒			1010031	SCHEMATIC, PRECISION RES. ALIG.
				1			1008276	BRACKET
				1			1010704	TERMINAL, FEED THRU, INSULATED
				5			1007113	TERMINAL LUG ASSEMBLY
~~SEE NOTE 2~~				AR			1006757-1	WIRE, ELECTRICAL
~~SEE NOTE 2~~				1			1010333	TRANSFORMER
~~SEE NOTE 2~~				3			1010469-2	RESISTOR, VARIABLE
~~SEE NOTE 2~~				AR			1006776-20	INSULATION SLEEVING
				1			1008008	SPACER
				1			1008278-011	HOUSING ASSEMBLY

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1000205	

APPLICATION

MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN J. Zehringer DATE 10 DEC 64
CHECKED M. Manning 11 DEC 64
APPROVAL 11 DEC 64
APPROVAL Hensley 11 DEC 64
NASA APPROVAL 14/1/64
MIT APPROVAL 16 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PRECISION RESOLVER ALIGNMENT ASS'Y
GIMBAL MOUNTED

CODE IDENT NO.
SIZE C
1008283
SCALE
SHEET 1 OF 1

MIL 1077C—P

<B

REVISIONS 14952					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		REPLACED WITH CHANGF BY REV. B PER TDRR 16821	—	4 MAR 65	JJJ / P7

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
~~2. VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.~~

Ⓐ REPLACED WITH CHANGE BY REV B

				X			1010053	SCHEMATIC
~~SEE NOTE 2~~				AR			1006757-1	WIRE, ELECTRICAL
~~SEE NOTE 2~~				AR			1006776-22	INSULATION, SLEEVING, ELEC
~~SEE NOTE 2~~				AR			1006787-2	WIRE, ELECTRICAL
				1			1008262	INSULATOR, BOTTOM
~~SEE NOTE 2~~				3			1010363	RESISTOR
~~SEE NOTE 2~~				6			1006750-58	RESISTOR
~~SEE NOTE 2~~				6			1006750-15	RESISTOR
~~SEE NOTE 2~~				3			1010364-769	RESISTOR
~~SEE NOTE 2~~				3			1010364-635	RESISTOR
~~SEE NOTE 2~~				6			1010364-501	RESISTOR
~~SEE NOTE 2~~				3			1006750-63	RESISTOR
~~SEE NOTE 2~~				3			1006750-52	RESISTOR
~~SEE NOTE 2~~				3			1006750-32	RESISTOR
~~SEE NOTE 2~~				3			1010359-23	CAPACITOR
~~SEE NOTE 2~~				3			1010359-17	CAPACITOR
~~SEE NOTE 2~~				3			1010372-15	DIODE
~~SEE NOTE 2~~				3			1010633-2	TRANSISTOR, MATCHED PAIR
~~SEE NOTE 2~~				3			1010252-1	TRANSISTOR
				3			1007080	TRANSFORMER, SHIELDED ASSY
~~SEE NOTE 2~~				3			1010291-1	TRANSFORMER
~~SEE NOTE 2~~				1			1010472-1	CONNECTOR, RECEP, ELECTRICAL
				3			1008053	SPACER
				1			1008061	WIRING BOARD, BOTTOM
				1			1008060	WIRING BOARD, TOP
				1			1008281-011	HOUSING, INSEPARABLE ASSEMBLY
				011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
	QUANTITY REQUIRED					LIST OF PARTS AND MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ —	+ —	+ —
− —	− —	− —

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN G. Murray DATE 10 DEC 64
CHECKED M. Mommer 11 DEC 64
APPROVAL W Plummer 11 DEC 64
APPROVAL A Stanley 11 DEC 64
NASA APPROVAL 12/10/64
MIT APPROVAL W Keefer 16 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

IRIG PREAMPLIFIER ASSEMBLY

CODE IENT NO. —
SIZE C
1008284

SCALE NONE
SHEET 1 of 1

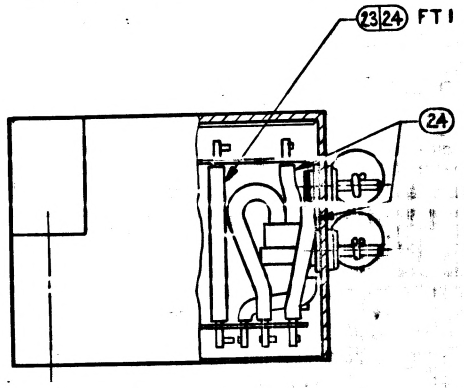
1008284 A

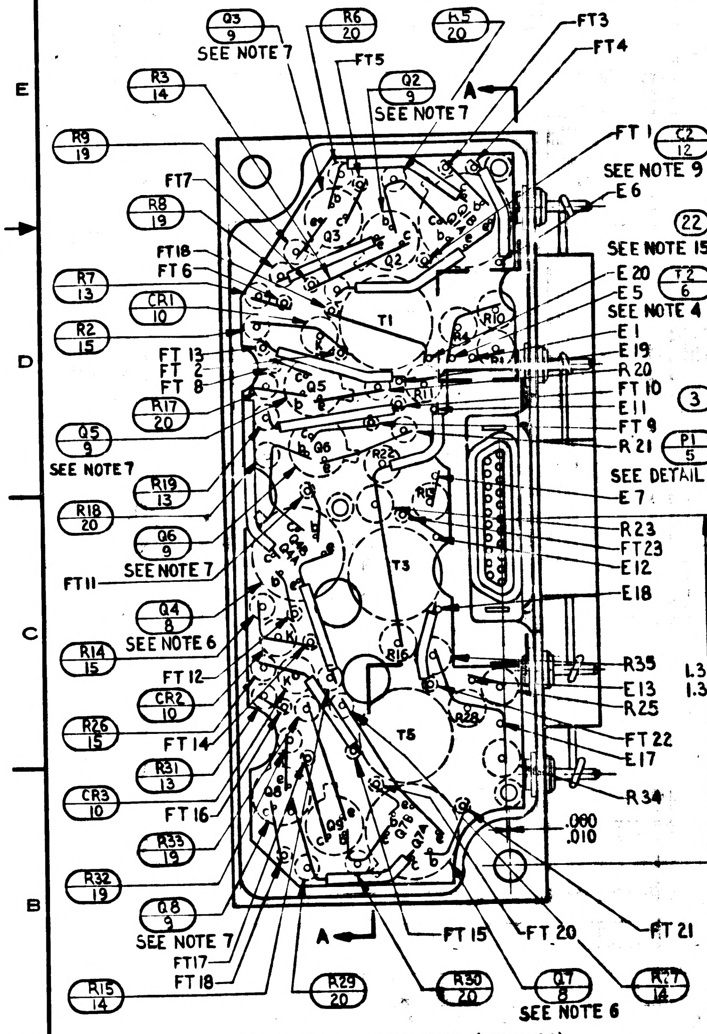
MIL 1077C—F

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
B		REPLACES REV. A WITH CHANGE PER TDRR 16821		6 JAN 65	JH F J.M.

NOTES:

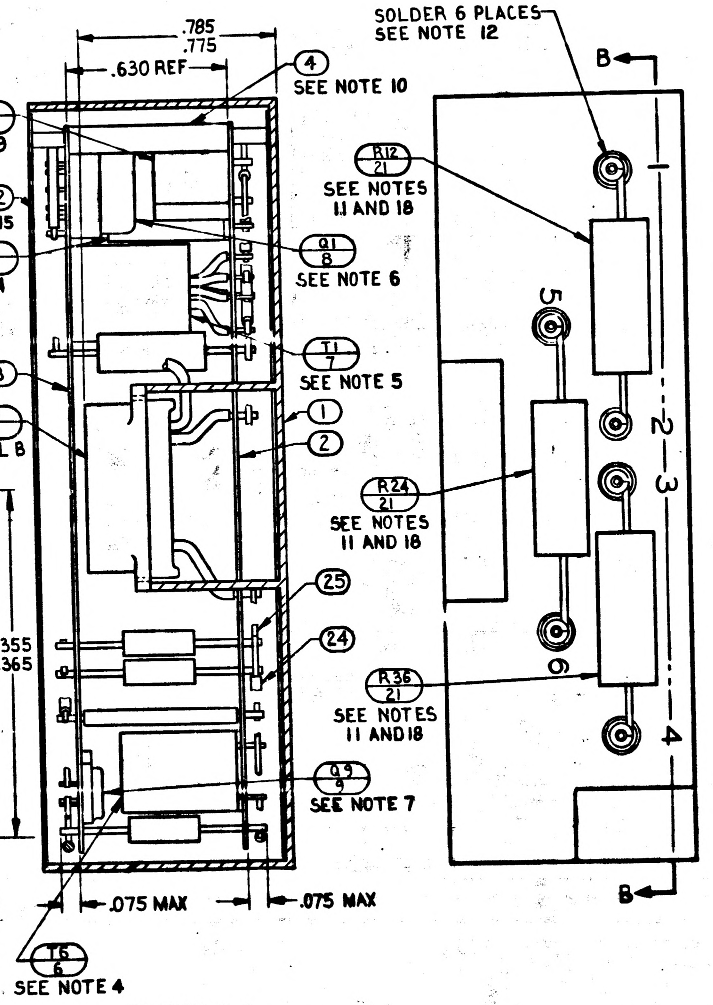
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL WELDS TO BE PER ND 1002005.
3. UNLESS OTHERWISE SPECIFIED ALL WIRING SHALL BE IN ACCORDANCE WITH ND 1002069.
4. BOND ITEM ⑥ TO ITEM ② PER ND 1002004 TYPE I.
5. BOND ITEM ⑦ TO ITEM ③ PER ND 1002004 TYPE I.
6. BOND ITEM ⑧ TO ITEM ③ PER ND 1002004 TYPE I.
7. BOND ITEM ⑨ TO ITEM ③ PER ND 1002004 TYPE I.
8. BOND ITEM ⑪ TO ITEM ② PER ND 1002004 TYPE I.
9. BOND ITEM ⑫ TO ITEM ② PER ND 1002004 TYPE I.
10. BOND ITEM ④ TO ITEM ② AND ③ PER ND 1002004 TYPE I.
11. BOND ITEM ㉑ TO ITEM ① PER ND 1002004 TYPE I.
12. SOLDER PER ND 1002071.
13. TRIM LENGTH OF ITEM ④ AT ASSEMBLY.
14. ENCAPSULATE MODULE PER ND 1002002.
15. ITEM ㉒ TO BE HELD IN PLACE BY ENCAPSULANT AND TO BE FLUSH WITH BOTTOM OF ITEM ① WITHIN -.015 +.005.
16. MARK .100/.140 HIGH YELLOW PER ND 1002019 AND SERIALIZE PER ND 1002023, CENTRALIZE AS SHOWN
17. AR DENOTES AS REQUIRED.
18. R12, R24 AND R36 TO BE SELECTED BY ELECTRICAL TEST, PER ATP 1007024 (SEE TABLE A)
19. K DENOTES CATHODE SIDE OF DIODE.
20. SPARE LEADS FROM ITEM ⑤ TO BE CUT TO .030 TO .090 LENGTH.
21. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET ALL THE REQUIREMENTS OF P.S. 1007031





Q3 9 SEE NOTE 7
R6 20
R5 20
FT3
FT4
FT5
Q2 9 SEE NOTE 7
A
R3 14
R9 19
FT17
R8 19
FT18
FT6
R7 13
CR1 10
R2 15
FT13
FT2
FT8
R17 20
Q5 9 SEE NOTE 7
R19 13
R18 20
Q6 9 SEE NOTE 7
FT11
Q4 8 SEE NOTE 6
R14 15
FT12
CR2 10
R26 15
FT14
R31 13
CR3 10
FT16
R33 19
R32 19
Q8 9 SEE NOTE 7
FT17
FT18
R15 14
R29 20
R30 20
Q7 8 SEE NOTE 6
R27 14
A
FT15
FT20
FT21
FT1
C2 12 SEE NOTE 9
E6
22 SEE NOTE 15
E20
E5
T2 6 SEE NOTE 4
E1
E19
R20
FT10
E11
FT9
R21
P1 5 SEE DETAIL B
E7
R23
FT23
E12
E18
R35
E13
R25
FT22
E17
R34
.080
.010
1.355
1.365
T1
T3
T5

VIEW WITH INSULATOR (ITEM 22) REMOVED



.785
.775
.630 REF
4 SEE NOTE 10
Q1 8 SEE NOTE 6
T1 7 SEE NOTE 5
3
1
2
25
24
Q9 9 SEE NOTE 7
T5 6 SEE NOTE 4
.075 MAX
.075 MAX
SOLDER 6 PLACES SEE NOTE 12
B
R12 21 SEE NOTES 11 AND 18
R24 21 SEE NOTES 11 AND 18
R36 21 SEE NOTES 11 AND 18
1
2
3
4
5
6
B

SECTION A-A WITH ENCAPSULATION REMOVED

Ⓑ REPLACES REV A WITH CHANGE

QUANTITY REQUIRED 011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
X		26	1010053	SCHEMATIC DIAGRAM, ELECTRICAL
AR		25	1006757-1	WIRE, ELECTRICAL
AR		24	1006776-22	INSULATION, SLEEVING, ELEC
AR		23	1006787-2	WIRE, ELECTRICAL
1		22	1008262	INSULATOR, BOTTOM
3		21	1010363	RESISTOR (SEE NOTE 18)
6		20	1006750-58	RESISTOR
6		19	1006750-15	RESISTOR
3		18	1010364-769	RESISTOR
3		17	1010364-635	RESISTOR
6		16	1010364-501	RESISTOR
3		15	1006750-63	RESISTOR
3		14	1006750-52	RESISTOR
3		13	1006750-32	RESISTOR
3		12	1010359-23	CAPACITOR
3		11	1010359-17	CAPACITOR
3		10	1010372-15	DIODE
3		9	1010633-2	TRANSISTOR, MATCHED PAIR
3		8	1010252-1	TRANSISTOR
3		7	1007080	TRANSFORMER SHIELDED ASSY.
3		6	1010291-1	TRANSFORMER
1		5	1010472-2	CONNECTOR, RECEP, ELECTRICAL
3		4	1008053	SPACER
1		3	1008061	WIRING BOARD, BOTTOM
1		2	1008060	WIRING BOARD, TOP
1		1	1008281-011	HOUSING, INSEPARABLE ASSY.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1000005		-011

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + — − DECIMALS + — − ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Linda Munro DATE 10 DEC 64
CHECKED J. GRIEB 11 DEC 64
APPROVAL 11 DEC 64
APPROVAL 11 DEC 64
NASA APPROVAL 2/24/65
MIT APPROVAL W Kupfer 2/24/65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

IRIG PREAMPLIFIER
ASSEMBLY

CODE IDENT NO.
SIZE E
1008284
SCALE 4:1
SHEET 1 OF 2

1008284 B

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
B		THIS SHEET ADDED PER TDRR 16821		6 JAN 65	UWP / Y.M.

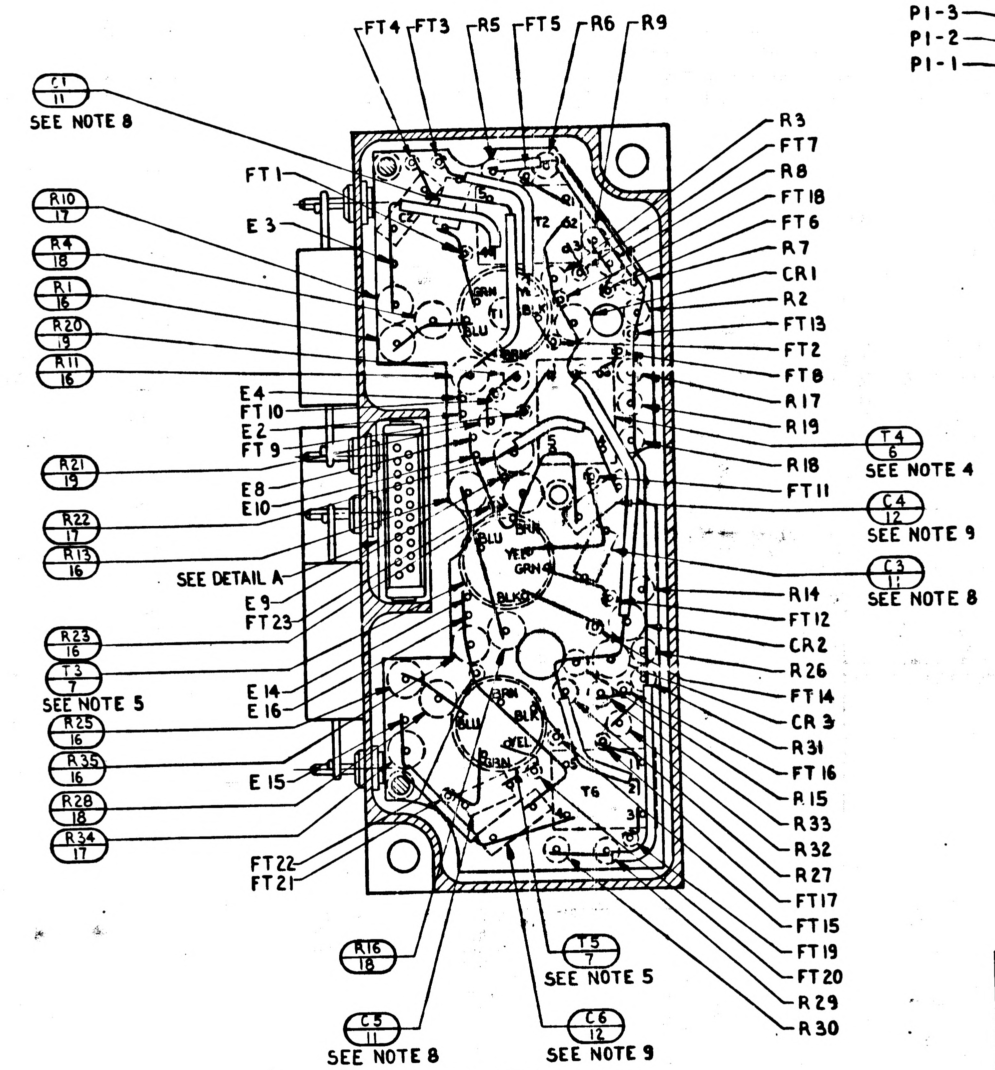
WIRING DATA

FROM CIRCUIT POINT	TO CIRCUIT POINT	CIRCUIT FUNCTION
P1-1	E14	GYRO INPUT
P1-2	E15	GYRO ERROR SIG
P1-3	SPARE	SPARE
P1-4	SPARE	SPARE
P1-5	SPARE	SPARE
P1-6	SPARE	SPARE
P1-7	SPARE	SPARE
P1-8	SPARE	SPARE
P1-9	SPARE	SPARE
P1-10	E20	OV DC. COMMON
P1-11	E3	GYRO ERROR SIG
P1-12	E13	GYRO INPUT
P1-13	E16	GYRO ERROR SIG
P1-14	E9	GYRO ERROR SIG
P1-15	E10	GYRO ERROR SIG
P1-16	E7	GYRO INPUT
P1-17	E8	GYRO INPUT
P1-18	E4	GYRO ERROR SIG
P1-19	E19	27.5 V DC. COMMON
P1-20	E2	GYRO INPUT
P1-21	E1	GYRO INPUT
1	E6	EXTERNAL SELECT
2	E5	EXTERNAL SELECT
3	E18	EXTERNAL SELECT
4	E17	EXTERNAL SELECT
5	E11	EXTERNAL SELECT
6	E12	EXTERNAL SELECT

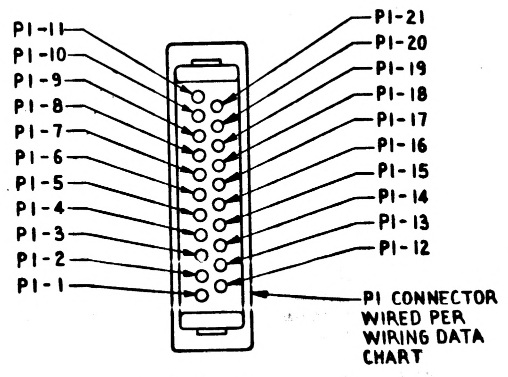
TABLE A

SELECTION CHART FOR R12, R24 AND R36

PART NUMBER	VALUE	PART NUMBER	VALUE
1010363 -444	10 K	1010363 -658	130K
-502	20 K	-662	137K
-536	30.1K	-666	143K
-560	40.2K	-670	150K
-578	49.9K	-674	158K
-592	59 K	-678	165K
-604	68.1K	-682	174K
-614	76.8K	-686	182K
-622	84.4K	-690	191K
-628	90.9K	-694	200K
-634	97.6K	-698	210K
-640	105 K	-700	215K
-646	113 K	-702	221K
-650	118 K	-704	226K
1010363 -654	124 K	1010363 -706	232K


FT4
FT3
R5
FT5
R6
R9
C1 11
SEE NOTE 8
FT1
E3
R10 17
R4 18
R1 16
R20 19
R11 16
E4
FT10
E2
FT9
R21 19
E8
E10
R22 17
R13 16
SEE DETAIL A
E9
FT23
R23 16
T3 7
SEE NOTE 5
E14
E16
R25 16
R35 16
E15
R28 18
R34 17
FT22
FT21
R16 18
C5 11
SEE NOTE 8
T5 7
SEE NOTE 5
C6 12
SEE NOTE 9
R3
FT7
R8
FT18
FT6
R7
CR1
R2
FT13
FT2
FT8
R17
R19
T4 6
SEE NOTE 4
R18
FT11
C4 12
SEE NOTE 9
C3 11
SEE NOTE 8
R14
FT12
CR2
R26
FT14
CR3
R31
FT16
R15
R33
R32
R27
FT17
FT15
FT19
FT20
R29
R30
C2
T1
T2
T6
GRN
BLU
BLK
BRN
YEL

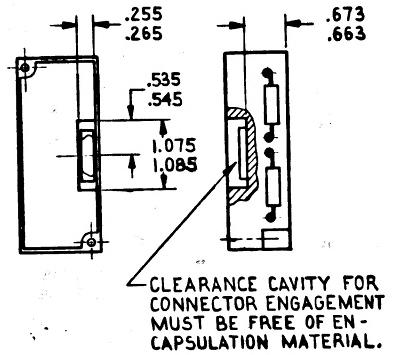
SECTION B-B


P1-11
P1-10
P1-9
P1-8
P1-7
P1-6
P1-5
P1-4
P1-3
P1-2
P1-1
P1-21
P1-20
P1-19
P1-18
P1-17
P1-16
P1-15
P1-14
P1-13
P1-12
P1 CONNECTOR WIRED PER WIRING DATA CHART

DETAIL A

CONNECTOR TERMINATION IDENTIFICATION VIEW

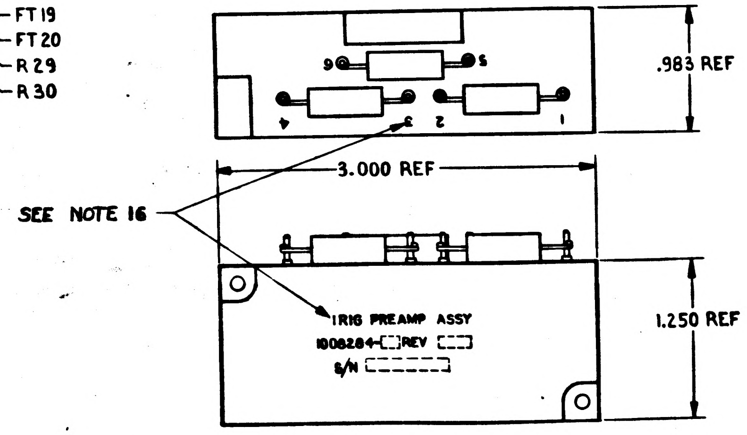
SCALE: NONE


.255
.265
.673
.663
.535
.545
1.075
1.085
CLEARANCE CAVITY FOR CONNECTOR ENGAGEMENT MUST BE FREE OF ENCAPSULATION MATERIAL.

DETAIL B

ENCAPSULATION CONFIGURATION DATA

SCALE: 1:1


.983 REF
3.000 REF
1.250 REF
SEE NOTE 16
IRIG PREAMP ASSY
1008284-REV
S/N

MARKING VIEWS

SCALE 2:1

Ⓑ THIS SHEET ADDED

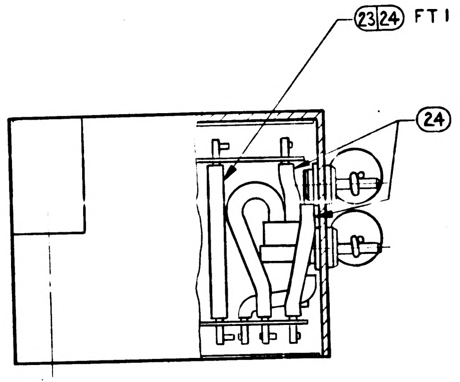
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	ACSP PN	
	DRAWN DATE 16 DEC 64	IRIG PREAMPLIFIER ASSEMBLY
	CHECKED J. GRIEB 28 DEC 64	
	APPROVAL 29 DEC 64	
DO NOT SCALE THIS DRAWING	APPROVAL R.S. 31 DEC 64	
MATERIAL —	NASA APPROVAL	CODE IDENT NO. — SIZE E — 1008284
CONTRACT NAS 9-497	MIT APPROVAL 24 Feb 65	SCALE 4:1 — SHEET 2 OF 2

MASTER

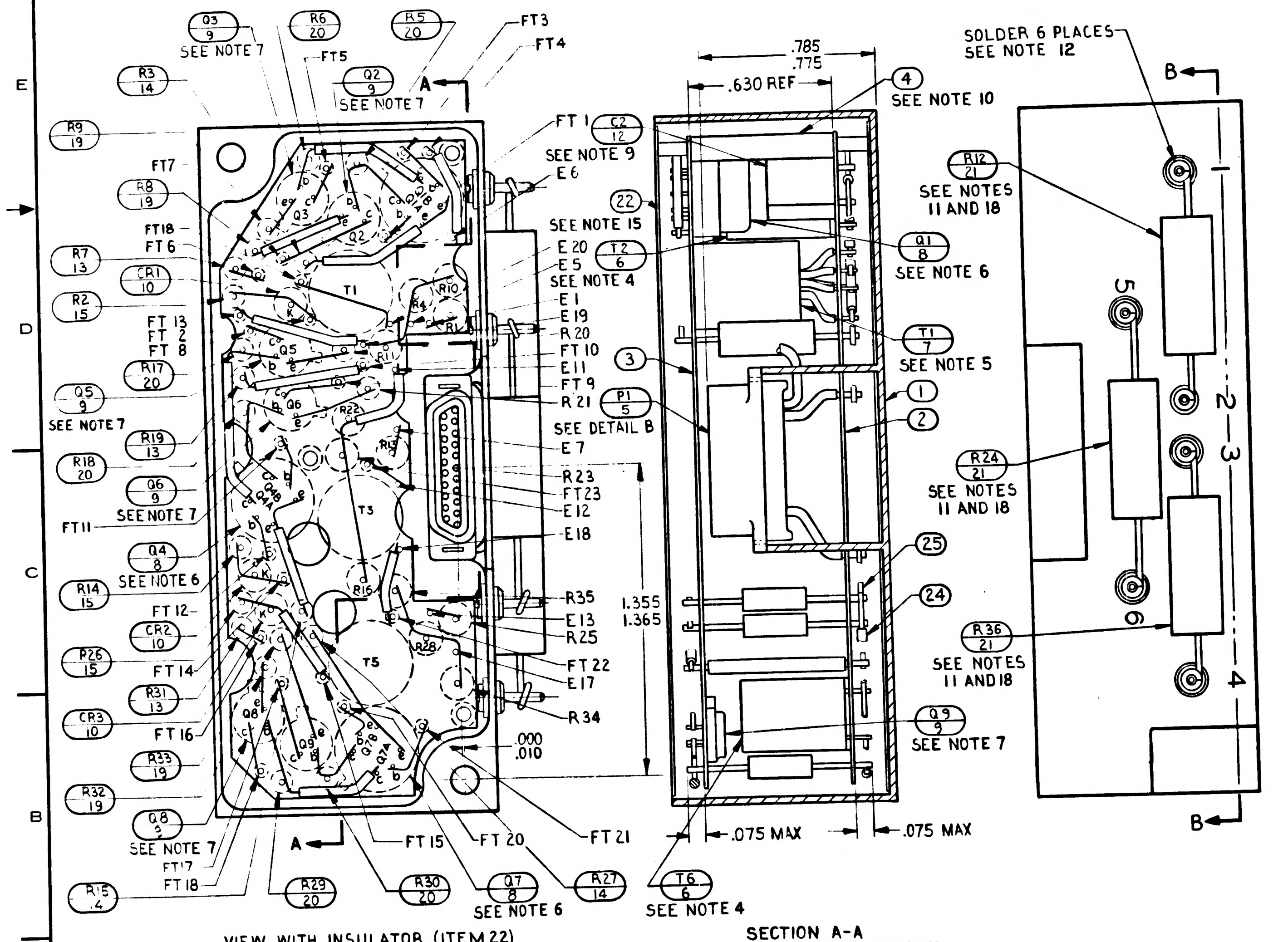
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
B		REPLACES REV A WITH CHANGE PER TDRR		JAN 65	
C		REVISED PER TDRR 23516		NOV 65	RWH

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL WELDS TO BE PER ND 1002005.
3. UNLESS OTHERWISE SPECIFIED ALL WIRING SHALL BE IN ACCORDANCE WITH ND 1002069.
4. BOND ITEM ⑥ TO ITEM ② PER ND 1002004 TYPE I.
5. BOND ITEM ⑦ TO ITEM ③ PER ND 1002004 TYPE I.
6. BOND ITEM ⑧ TO ITEM ③ PER ND 1002004 TYPE I.
7. BOND ITEM ⑨ TO ITEM ③ PER ND 1002004 TYPE I.
8. BOND ITEM ⑪ TO ITEM ② PER ND 1002004 TYPE I.
9. BOND ITEM ⑫ TO ITEM ② PER ND 1002004 TYPE I.
10. BOND ITEM ④ TO ITEM ② AND ③ PER ND 1002004 TYPE I.
11. BOND ITEM ㉑ TO ITEM ① PER ND 1002004 TYPE I.
12. SOLDER PER ND 1002071.
13. TRIM LENGTH OF ITEM ④ AT ASSEMBLY.
14. ENCAPSULATE MODULE PER ND 1002002.
15. ITEM ㉒ TO BE HELD IN PLACE BY ENCAPSULANT AND TO BE FLUSH WITH BOTTOM OF ITEM ① WITHIN -.015 +.005.
16. MARK .100/.140 HIGH, WHITE PER ND 100 2019 AND SERIALIZE PER ND 1002023, CENTRALIZE AS SHOWN
17. AR DENOTES AS REQUIRED.
18. R12, R24 AND R36 TO BE SELECTED BY ELECTRICAL TEST, PER ATP 1001024 (SEE TABLE A)
19. K DENOTES CATHODE SIDE OF DIODE.
20. SPARE LEADS FROM ITEM ⑤ TO BE CUT TO .030 TO .090 LENGTH.
21. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET ALL THE REQUIREMENTS OF P.S. 1007031



Ⓑ REPLACES REV A WITH CHANGE



Q3 9 SEE NOTE 7
R6 20
R5 20
FT3
FT4
FT5
Q2 9 SEE NOTE 7
A
R3 14
R9 19
FT7
R8 19
FT18
FT6
R7 13
CR1 10
R2 15
FT 13
FT 2
FT 8
R17 20
Q5 9 SEE NOTE 7
R19 13
R18 20
Q6 9 SEE NOTE 7
FT11
Q4 8 SEE NOTE 6
R14 15
FT 12
CR2 10
R26 15
FT 14
R31 13
CR3 10
FT 16
R33 19
R32 19
Q8 3 SEE NOTE 7
FT17
FT 18
R15 4
R29 20
R30 20
Q7 8 SEE NOTE 6
R27 14
FT 15
FT 20
FT 21
T1
T3
T5
FT 1
C2 12 SEE NOTE 9
E6
㉒ SEE NOTE 15
E 20
E 5
T2 6 SEE NOTE 4
E 1
E 19
R 20
FT 10
E 11
FT 9
R 21
P1 5 SEE DETAIL B
E 7
R 23
FT 23
E 12
E 18
R 35
E 13
R 25
FT 22
E 17
R 34
1.355
1.365
.000
.010
.785
.775
.630 REF
④ SEE NOTE 10
R12 21 SEE NOTES 11 AND 18
Q1 8 SEE NOTE 6
T1 7 SEE NOTE 5
③
①
②
R24 21 SEE NOTES 11 AND 18
㉕
㉔
R36 21 SEE NOTES 11 AND 18
Q9 9 SEE NOTE 7
T6 6 SEE NOTE 4
.075 MAX
.075 MAX
SOLDER 6 PLACES SEE NOTE 12
B
1
2
3
4
5
6

VIEW WITH INSULATOR (ITEM 22) REMOVED

SECTION A-A WITH ENCAPSULATION REMOVED

			X		26	1010053	SCHEMATIC DIAGRAM, ELECTRICAL	
			AR		25	1006757-1	WIRE, ELECTRICAL	
			AR		24	1006776-22	INSULATION, SLEEVING, ELEC	
			AR		23	1006787-2	WIRE, ELECTRICAL	
			1		22	1008262	INSULATOR, BOTTOM	
			3		21	1010363	RESISTOR (SEE NOTE 18)	
			6		20	1006750-58	RESISTOR	
			6		19	1006750-15	RESISTOR	
			3		18	1010364-769	RESISTOR	
			3		17	1010364-635	RESISTOR	
			6		16	1010364-501	RESISTOR	
			3		15	1006750-63	RESISTOR	
			3		14	1006750-52	RESISTOR	
			3		13	1006750-32	RESISTOR	
			3		12	1010359-23	CAPACITOR	
			3		11	1010359-17	CAPACITOR	
			3		10	1010372-15	DIODE	
			3		9	1010633-2	TRANSISTOR, MATCHED PAIR	
			3		8	1010252-1	TRANSISTOR	
			3		7	1007080	TRANSFORMER, SHIELDED ASSY.	
			3		6	1010291-1	TRANSFORMER	
			1		5	1010472-2	CONNECTOR, RECEP, ELECTRICAL	
			3		4	1008053	SPACER	
			1		3	1008061	WIRING BOARD, BOTTOM	
			1		2	1008060	WIRING BOARD, TOP	
			1		1	1008281-011	HOUSING, INSEPARABLE ASSY.	
			011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	
QUANTITY REQUIRED					LIST OF PARTS AND MATERIALS			

1000005		-011
NEXT ASSY	USED ON	APPLICABLE DASH NO.
APPLICATION		

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN 10DEC64
CHECKED J. GRIEB 11DEC64
APPROVAL 11DEC64
APPROVAL 11DEC 64
NASA APPROVAL
MIT APPROVAL 24 Feb

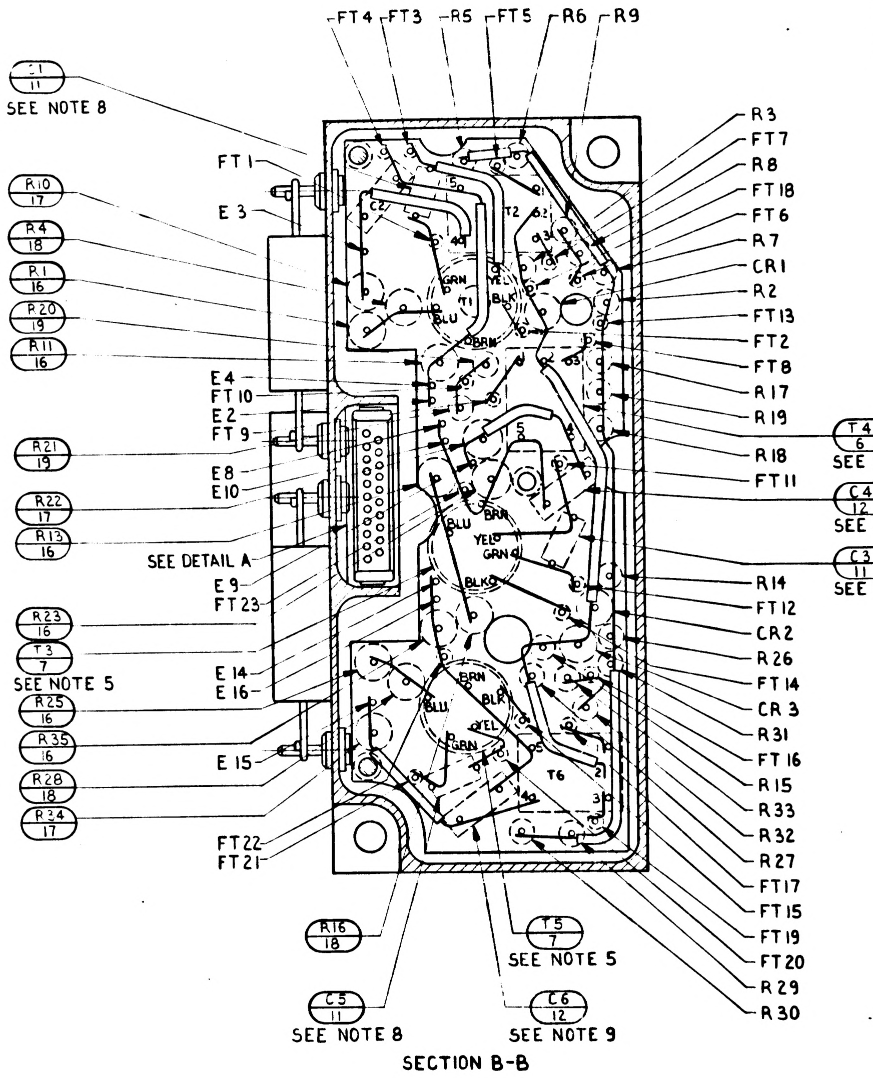
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

IRIG PREAMPLIFIER
ASSEMBLY

CODE IDENT NO
SIZE E
1008284
SCALE 4:1
SHEET 1 OF 2

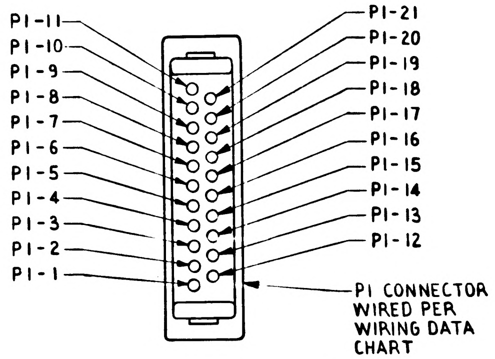
1008284 C

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
B		THIS SHEET ADDED PER TDRR 16821		6 JAN 65	
C		REVISION STATUS CHANGED		1 NOV 65	RWH



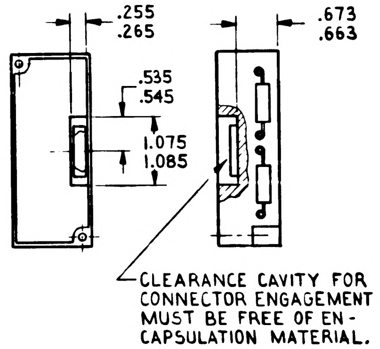
FT4
FT3
R5
FT5
R6
R9
C1 11
SEE NOTE 8
FT1
R10 17
E3
R4 18
R1 16
R20 19
R11 16
E4
FT10
E2
FT9
R21 19
E8
E10
R22 17
R13 16
SEE DETAIL A
E9
FT23
R23 16
T3 7
SEE NOTE 5
E14
E16
R25 16
R35 16
E15
R28 18
R24 17
FT22
FT21
R16 18
C5 11
SEE NOTE 8
T5 7
SEE NOTE 5
C6 12
SEE NOTE 9
R3
FT7
R8
FT18
FT6
R7
CR1
R2
FT13
FT2
FT8
R17
R19
T4 6
SEE NOTE 4
R18
FT11
C4 12
SEE NOTE 9
C3 11
SEE NOTE 8
R14
FT12
CR2
R26
FT14
CR3
R31
FT16
R15
R33
R32
R27
FT17
FT15
FT19
FT20
R29
R30
T1
T2
T6
GRN
YEL
BLU
BRN
BLK

SECTION B-B



P1-11
P1-10
P1-9
P1-8
P1-7
P1-6
P1-5
P1-4
P1-3
P1-2
P1-1
P1-21
P1-20
P1-19
P1-18
P1-17
P1-16
P1-15
P1-14
P1-13
P1-12
P1 CONNECTOR WIRED PER WIRING DATA CHART

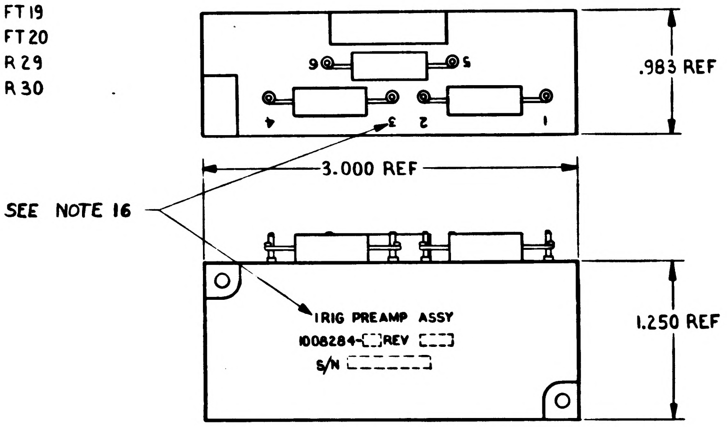
DETAIL A
CONNECTOR TERMINATION IDENTIFICATION VIEW
SCALE: NONE



.255
.265
.673
.663
.535
.545
1.075
1.085

CLEARANCE CAVITY FOR CONNECTOR ENGAGEMENT MUST BE FREE OF ENCAPSULATION MATERIAL.

DETAIL B
ENCAPSULATION CONFIGURATION DATA
SCALE: 1:1



.983 REF
3.000 REF
1.250 REF
SEE NOTE 16
IRIG PREAMP ASSY
1008284-[ ]REV [ ]
S/N [ ]
1
2
3
4
5
6

MARKING VIEWS
SCALE 2:1

WIRING DATA

FROM CIRCUIT POINT	TO CIRCUIT POINT	CIRCUIT FUNCTION
P1-1	E14	GYRO INPUT
P1-2	E15	GYRO ERROR SIG
P1-3	SPARE	SPARE
P1-4	SPARE	SPARE
P1-5	SPARE	SPARE
P1-6	SPARE	SPARE
P1-7	SPARE	SPARE
P1-8	SPARE	SPARE
P1-9	SPARE	SPARE
P1-10	E20	0V DC. COMMON
P1-11	E3	GYRO ERROR SIG
P1-12	E13	GYRO INPUT
P1-13	E16	GYRO ERROR SIG
P1-14	E9	GYRO ERROR SIG
P1-15	E10	GYRO ERROR SIG
P1-16	E7	GYRO INPUT
P1-17	E8	GYRO INPUT
P1-18	E4	GYRO ERROR SIG
P1-19	E19	27.5 V DC. COMMON
P1-20	E2	GYRO INPUT
P1-21	E1	GYRO INPUT
1	E6	EXTERNAL SELECT
2	E5	EXTERNAL SELECT
3	E18	EXTERNAL SELECT
4	E17	EXTERNAL SELECT
5	E11	EXTERNAL SELECT
6	E12	EXTERNAL SELECT

TABLE A
SELECTION CHART FOR R12, R24 AND R36

PART NUMBER	VALUE	PART NUMBER	VALUE
1010363 -444	10 K	1010363 -658	130K
↑ -502	20 K	↑ -662	137K
-536	30.1K	-666	143K
-560	40.2K	-670	150K
-578	49.9K	-674	158K
-592	59 K	-678	165K
-604	68.1K	-682	174K
-614	76.8K	-686	182K
-622	84.4K	-690	191K
-628	90.9K	-694	200K
-634	97.6K	-698	210K
-640	105 K	-700	215K
-646	113 K	-702	221K
↓ -650	118 K	↓ -704	226K
1010363 -654	124 K	1010363 -706	232K

Ⓑ **THIS SHEET ADDED**

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	ACSP PN	
MATERIAL —	DRAWN DATE 6 DEC 64 CHECKED J. GRIEB 28 DEC 64 APPROVAL 29 DEC 64 APPROVAL 29 DEC 64	IRIG PREAMPLIFIER ASSEMBLY
CONTRACT NAS 9-497	NASA APPROVAL MIT APPROVAL 24 Feb 65	CODE IDENT NO — SIZE E — 1008284 SCALE 4:1 — SHEET 2 OF 2

REVISIONS 14952					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ~~VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.~~

	QUANTITY REQUIRED				EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
				011				
				X			1010053	SCHEMATIC
~~SEE NOTE 2~~				AR			1006757-1	WIRE, ELECTRICAL
~~SEE NOTE 2~~				AR			1006776-22	INSULATION, SLEEVING, ELEC
~~SEE NOTE 2~~				AR			1006787-2	WIRE, ELECTRICAL
				1			1008262	INSULATOR, BOTTOM
~~SEE NOTE 2~~				3			1010363	RESISTOR
~~SEE NOTE 2~~				6			1006750-58	RESISTOR
~~SEE NOTE 2~~				6			1006750-15	RESISTOR
~~SEE NOTE 2~~				3			1010364-769	RESISTOR
~~SEE NOTE 2~~				3			1010364-635	RESISTOR
~~SEE NOTE 2~~				6			1010364-501	RESISTOR
~~SEE NOTE 2~~				3			1006750-63	RESISTOR
~~SEE NOTE 2~~				3			1006750-52	RESISTOR
~~SEE NOTE 2~~				3			1006750-32	RESISTOR
~~SEE NOTE 2~~				3			1010359-23	CAPACITOR
~~SEE NOTE 2~~				3			1010359-17	CAPACITOR
~~SEE NOTE 2~~				3			1010372-15	DIODE
~~SEE NOTE 2~~				3			1010633-2	TRANSISTOR, MATCHED PAIR
~~SEE NOTE 2~~				3			1010252-1	TRANSISTOR
				3			1007080	TRANSFORMER, SHIELDED ASSY
~~SEE NOTE 2~~				3			1010291-1	TRANSFORMER
~~SEE NOTE 2~~				1			1010472-1	CONNECTOR, RECEP, ELECTRICAL
				3			1008053	SPACER
				1			1008061	WIRING BOARD, BOTTOM
				1			1008060	WIRING BOARD, TOP
				1			1008281-011	HOUSING, INSEPARABLE ASSEMBLY

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN G. Murray DATE 10 DEC 64
CHECKED 11 DEC 64
APPROVAL 11 DEC 64
APPROVAL 11 DEC 64
NASA APPROVAL 12/16/64
MIT APPROVAL 16 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

IRIG PREAMPLIFIER ASSEMBLY

CODE IDENT NO. —
SIZE C
1008284
SCALE NONE
SHEET 1 of 1

28

MASTER

MIL 1077C—P

REVISIONS 14552					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		REPLACED WITH CHANGE BY REV. B PER TDRR 16821	—	4 MAR 65	J J J / PJ

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ~~VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.~~

Ⓐ REPLACED WITH CHANGE BY REV B

				☒			1010006	SCHEMATIC
				1			1008290	INSULATOR, BOTTOM
~~SEE NOTE 2~~				2			1010761	DIODE
~~SEE NOTE 2~~				AR			1006757-1	WIRE, ELECTRICAL
~~SEE NOTE 2~~				AR			1006787-2	WIRE, ELECTRICAL
~~SEE NOTE 2~~				AR			1006776-22	INSULATION, SLEEVING, ELECTRICAL
~~SEE NOTE 2~~				2			1006755-45	CAPACITOR
~~SEE NOTE 2~~				1			1010393-037	CAPACITOR
~~SEE NOTE 2~~				1			1010317-1	CAPACITOR
~~SEE NOTE 2~~				2			1006755-69	CAPACITOR
~~SEE NOTE 2~~				4			1010639-95	RESISTOR
~~SEE NOTE 2~~				2			1010311-097	RESISTOR
~~SEE NOTE 2~~				2			1010311-023	RESISTOR
~~SEE NOTE 2~~				2			1010311-001	RESISTOR
~~SEE NOTE 2~~				2			1006750-50	RESISTOR
~~SEE NOTE 2~~				3			1006750-48	RESISTOR
~~SEE NOTE 2~~				1			1006750-49	RESISTOR
~~SEE NOTE 2~~				2			1006750-1	RESISTOR
~~SEE NOTE 2~~				2			1010376-1	TRANSISTOR
~~SEE NOTE 2~~				1			1010318-2	CONNECTOR, RECP., ELECTRICAL
~~SEE NOTE 2~~				2			1010292-1	TERMINAL, FEED THRU
				2			1008026	SPACER
				1			1008034	WIRING BOARD, BOTTOM
				1			1008033	WIRING BOARD, TOP
				1			1008277	HOUSING ASSEMBLY
				011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
	QUANTITY REQUIRED					LIST OF PARTS AND MATERIALS		

NEXT ASSY	USED ON
1000205	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + — − DECIMALS + — − ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL ———
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Deschke DATE 10 DEC 64
CHECKED M. Manning 11 DEC 64
APPROVAL 11 DEC 64
APPROVAL 11 DEC 64
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PIP PREAMP ASSEMBLY

CODE IDENT NO. ——— SIZE C 1008285
SCALE —— SHEET 1 of 1

1008285 A B

MIL 1077C—P

<B

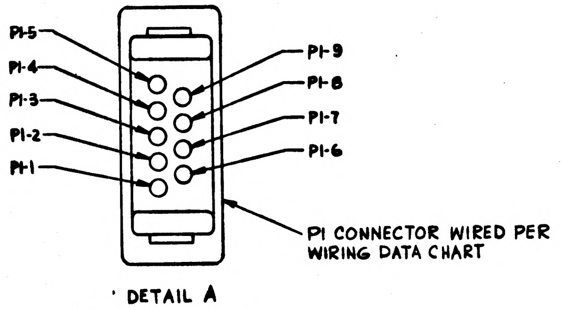
REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
B		REPLACES REV. A WITH CHANGE PER TDRR / 652		5 JAN 65	JWP / Y.M

NOTES:

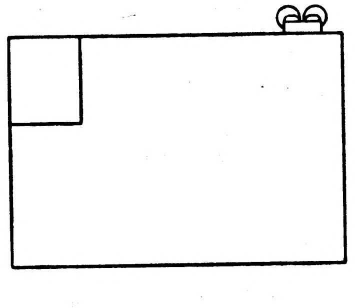
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED ALL WIRING TO BE IN ACCORDANCE WITH ND 1002069
3. ALL WELDS TO BE PER ND 1002005
4. BOND ITEM ⑦ (Q2) TO ITEM ② PER ND1002004 TYPE I
5. BOND ITEM ⑦ (Q1) TO ITEM ③ PER ND1002004 TYPE I
6. BOND ITEM ⑰ TO ITEM ③ PER ND 1002004 TYPE I
7. BOND ITEM ④ TO ITEM ② AND ③ PER ND 1002004 TYPE I
8. BOND ITEM ⑤ TO ITEM ① PER ND1002004 TYPE I. ADHESIVE TO BE FLUSH WITH OR ABOVE OUTSIDE SURFACE OF ITEM ①
9. *SOLDER PER ND 1002071*
10. *ENCAPSULATE PER ND 1002002*
11. FILL TOOLING HOLES WITH ADHESIVE PER ND 1002004 TYPE I
12. ITEM ㉔ TO BE HELD IN PLACE BY ENCAPSULANT AND TO BE FLUSH WITH BOTTOM OF ITEM ① WITHIN -.015+.005
13. MARK .060-.100 HIGH YELLOW PER ND 1002019 AND SERIALIZE PER ND 1002023, *CENTRALIZE AS SHOWN*
14. BOND ITEMS ㉓ TO ITEM ① PER ND 1002004 TYPE I
15. APPLY ITEM ⑳ TO ALL CONNECTOR LEADS
16. *COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET ALL THE REQUIREMENTS OF P.S. 1007015*

WIRING DATA

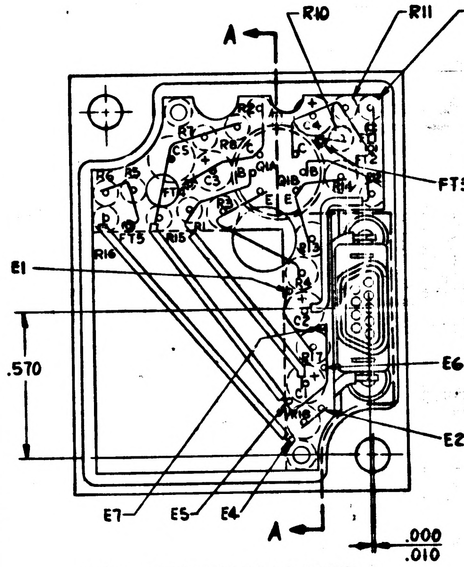
IDENTIFICATION	FROM CIRCUIT POINT	TO CIRCUIT POINT
GRD	P6	E5
28 VDC	P7	E4
INPUT HI	P8	E1
OUTPUT NO.1	P9	E8
INPUT LO	P1	E2
SHIELD	P2	E6
INPUT C.T.	P3	E7
SPARE	P4	SPARE
OUTPUT NO.2	P5	E8
HI	TP1	E9
LO	TP2	E10


P1-5
P1-4
P1-3
P1-2
P1-1
P1-9
P1-8
P1-7
P1-6
P1 CONNECTOR WIRED PER WIRING DATA CHART

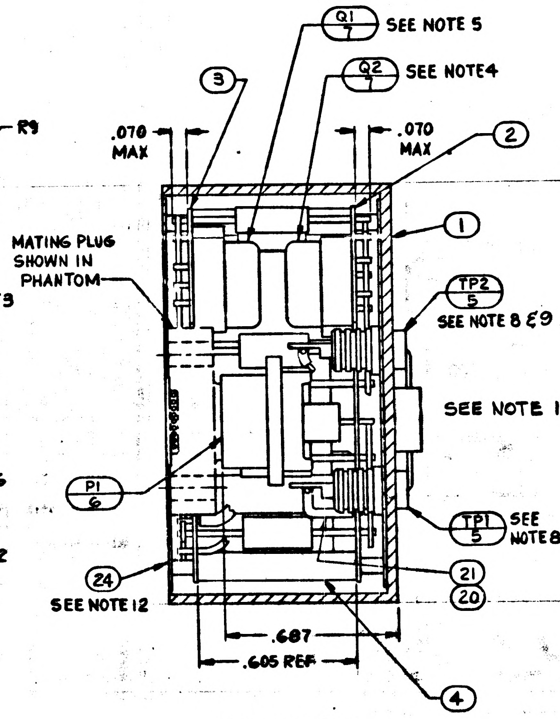
DETAIL A
CONNECTOR TERMINAL IDENTIFICATION VIEW
NO SCALE



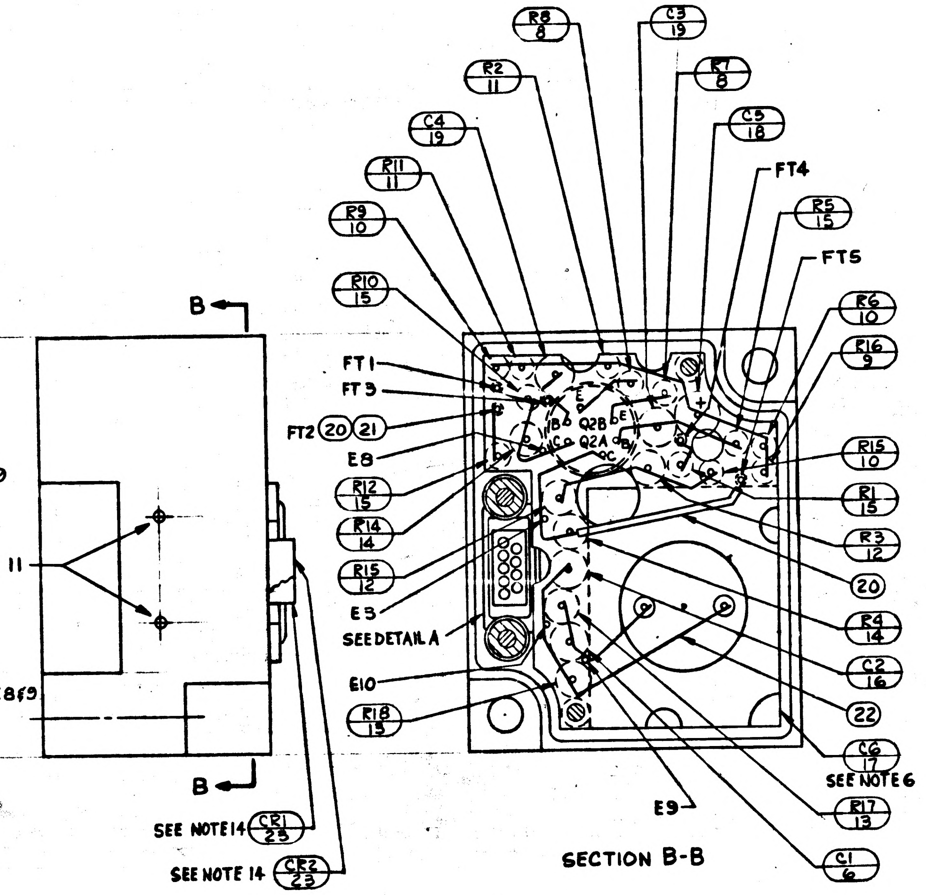
Ⓑ REPLACES REV A WITH CHANGE


A
R10
R11
R9
FT3
E1
.570
E6
E2
E7
E5
E4
A
.000
.010

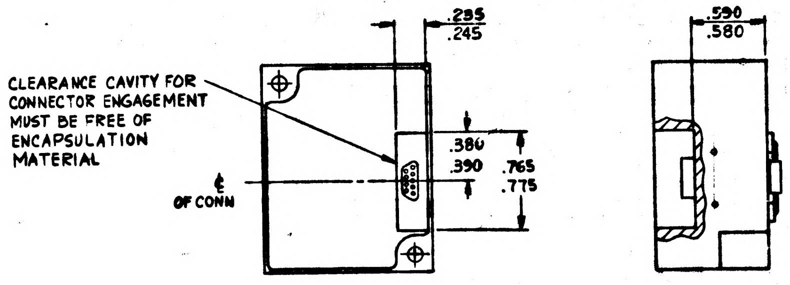
VIEW WITH ITEM 24 REMOVED


Q1 7 SEE NOTE 5
Q2 7 SEE NOTE4
3
.070 MAX
.070 MAX
2
1
MATING PLUG SHOWN IN PHANTOM
TP2 5 SEE NOTE 8 & 9
P1 6
TP1 5 SEE NOTE8&9
24 SEE NOTE 12
21
20
.687
.605 REF
4

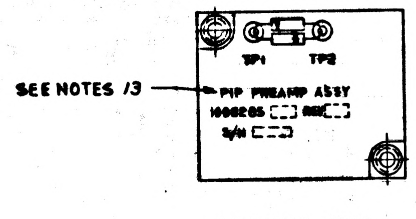
SECTION A-A


B
SEE NOTE 11
B
SEE NOTE14 CR1 23
SEE NOTE 14 CR2 23
R8 8
C3 19
R2 11
R7 8
C4 19
C5 18
R11 11
FT4
R9 10
R5 15
FT5
R10 15
R6 10
FT1
FT3
R16 9
FT2 20 21
E8
R15 10
R12 15
R1 15
R14 14
R3 12
R15 12
20
E3
SEE DETAIL A
R4 14
E10
C2 16
R18 13
22
C6 17
SEE NOTE 6
E9
R17 13
C1 6

SECTION B-B


.235
.245
.590
.580
CLEARANCE CAVITY FOR CONNECTOR ENGAGEMENT MUST BE FREE OF ENCAPSULATION MATERIAL
℄ OF CONN
.380
.390
.765
.775

VIEW SHOWING MOLD CAVITY
SCALE - 2:1


SEE NOTES 13
TP1
TP2
PIP PREAMP ASSY
1008285
REV
S/N

MARKING VIEW
SCALE - 2:1

LIST OF PARTS AND MATERIALS

QUANTITY REQUIRED			011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
			X		25	1010006	SCHEMATIC DIAGRAM, ELECTRICAL
			1		24	1008290	INSULATOR, BOTTOM
			2		23	1010761	DIODE
			AR		22	1006757-1	WIRE, ELECTRICAL
			AR		21	1006787-2	WIRE, ELECTRICAL
			AR		20	1006776-22	INSULATION, SLEEVING, ELECTRICAL
			2		19	1006755-45	CAPACITOR
			1		18	1010393-037	CAPACITOR
			1		17	1010317-1	CAPACITOR
			2		16	1006755-69	CAPACITOR
			4		15	1010369-95	RESISTOR
			2		14	1010311-097	RESISTOR
			2		13	1010311-023	RESISTOR
			2		12	1010311-001	RESISTOR
			2		11	1006750-50	RESISTOR
			3		10	1006750-48	RESISTOR
			1		9	1006750-49	RESISTOR
			2		8	1006750-1	RESISTOR
			2		7	1010376-1	TRANSISTOR
			1		6	1010318-2	CONNECTOR RECEPTACLE, ELEC.
			2		5	1010292-1	TERMINAL, FEEDTHRU
			2		4	1008026	SPACER
			1		3	1008034	WIRING BOARD, BOTTOM
			1		2	1008033	WIRING BOARD, TOP
			1		1	1008277-011	HOUSING-PIP PREAMP (INSEP ASSY)

NEXT ASSY	USED ON
1009905	-011

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Goecke DATE 10-DEC 64
CHECKED J. GRIEB 11 DEC 64
APPROVAL 11 DEC 64
APPROVAL R.E. 11 DEC 64
NASA APPROVAL
MIT APPROVAL 24 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PIP PREAMP
ASSEMBLY

CODE IDENT NO.
SIZE E
1008285
SCALE 4:1
SHEET 1 OF 1

1008285 B

Charleston 29 Dec 64

NOTES:

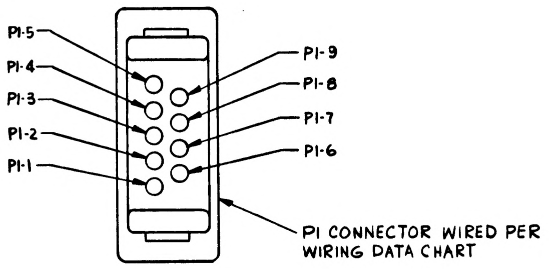
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED ALL WIRING TO BE IN ACCORDANCE WITH ND 1002069
3. ALL WELDS TO BE PER ND 1002005
4. BOND ITEM ⑦ (Q2) TO ITEM ② PER ND1002004 TYPE I
5. BOND ITEM ⑦ (Q1) TO ITEM ③ PER ND1002004 TYPE I
6. BOND ITEM ⑰ TO ITEM ③ PER ND1002004 TYPE I
7. BOND ITEM ④ TO ITEM ② AND ③ PER ND 1002004 TYPE I
8. BOND ITEM ⑤ TO ITEM ① PER ND1002004 TYPE I. ADHESIVE TO BE FLUSH WITH OR ABOVE OUTSIDE SURFACE OF ITEM ①
9. SOLDER PER ND 1002071
10. ENCAPSULATE PER ND 1002002
11. FILL TOOLING HOLES WITH ADHESIVE PER ND 1002004 TYPE I
12. ITEM ㉔ TO BE HELD IN PLACE BY ENCAPSULANT AND TO BE FLUSH WITH BOTTOM OF ITEM ① WITHIN -.015+.005
13. MARK .060-.100 HIGH, WHITE PER ND 1002019 AND SERIALIZE PER ND 1002023, CENTRALIZE AS SHOWN
14. BOND ITEMS ㉓ TO ITEM ① PER ND 1002004 TYPE I
15. APPLY ITEM ⑳ TO ALL CONNECTOR LEADS
16. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET ALL THE REQUIREMENTS OF P.S. 1007015

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
B		REPLACES REV. A WITH CHANGE PER TDRR		[illegible]	[illegible]
C		REVISED PER TDRR 23516		1 NOV 65	

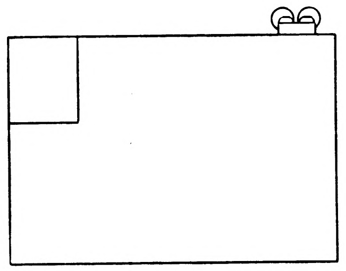
WIRING DATA

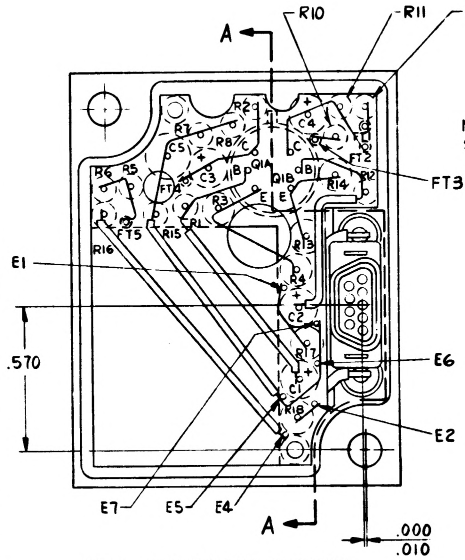
IDENTIFICATION	FROM CIRCUIT POINT	TO CIRCUIT POINT
GRD	P6	E5
28 VDC	P7	E4
INPUT HI	P8	E1
OUTPUT NO. 1	P9	E3
INPUT LO	P1	E2
SHIELD	P2	E6
INPUT C.T.	P3	E7
SPARE	P4	SPARE
OUTPUT NO. 2	P5	E8
HI	TP1	E9
LO	TP2	E10


P1-5
P1-4
P1-3
P1-2
P1-1
P1-9
P1-8
P1-7
P1-6
P1 CONNECTOR WIRED PER WIRING DATA CHART

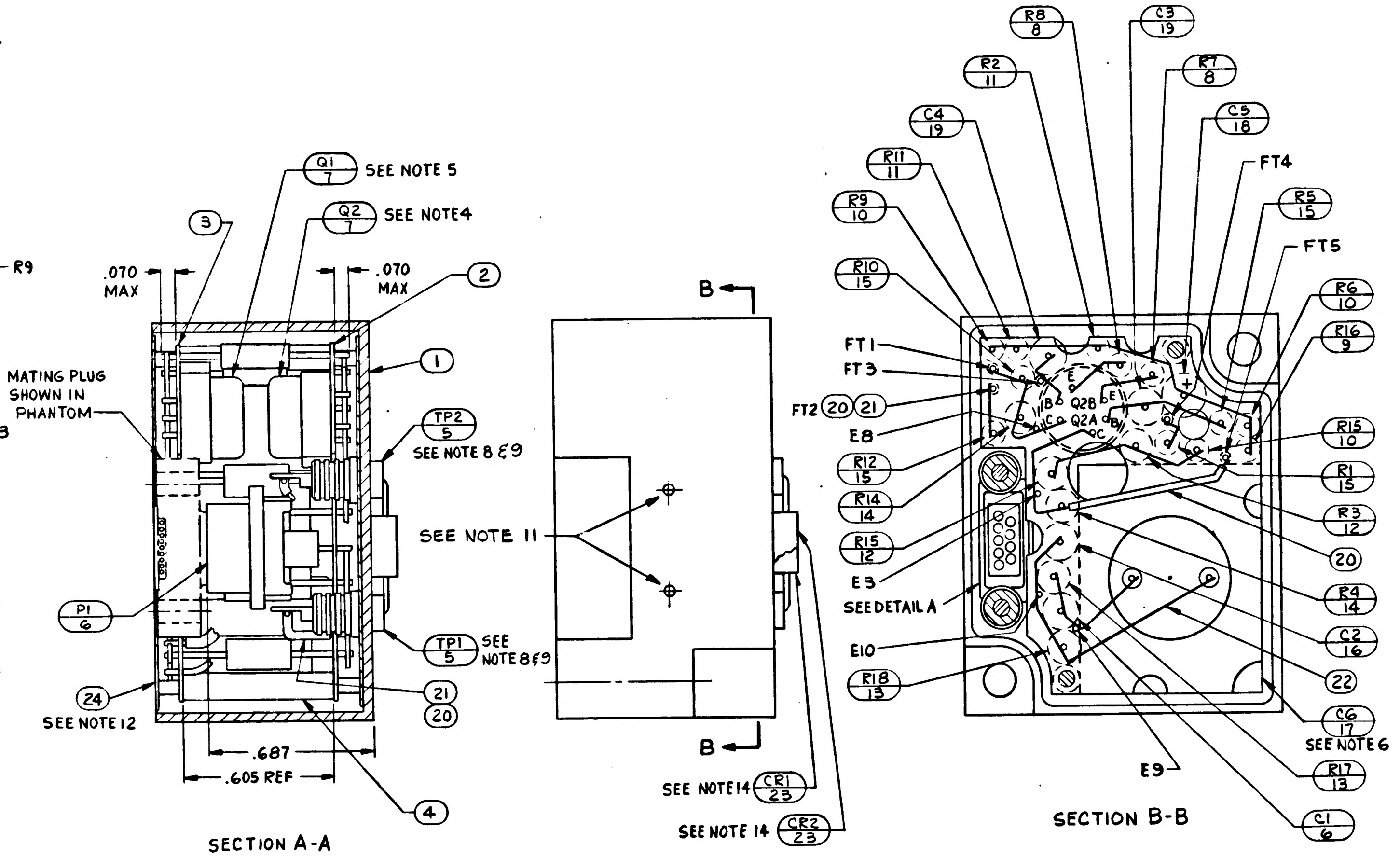
DETAIL A
CONNECTOR TERMINAL IDENTIFICATION VIEW
NO SCALE

Ⓑ REPLACES REV A WITH CHANGE



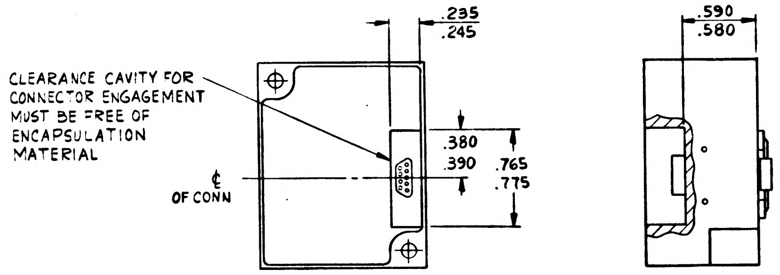

A
R10
R11
R9
FT3
E1
.570
E6
E2
E7
E5
E4
A
.000
.010

VIEW WITH ITEM 24 REMOVED

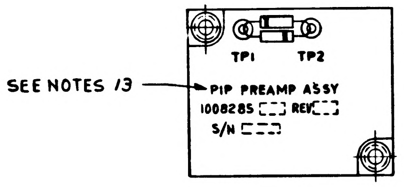

Q1 7 SEE NOTE 5
Q2 7 SEE NOTE 4
3
.070 MAX
.070 MAX
2
1
MATING PLUG SHOWN IN PHANTOM
TP2 5 SEE NOTE 8 & 9
P1 6
TP1 5 SEE NOTE 8 & 9
24 SEE NOTE 12
21
20
.687
.605 REF
4
B
SEE NOTE 11
B
SEE NOTE 14 CR1 23
SEE NOTE 14 CR2 23
R8 8
C3 19
R2 11
R7 8
C4 19
C5 18
R11 11
FT4
R9 10
R5 15
FT5
R10 15
R6 10
R16 9
FT1
FT3
FT2 20 21
E8
R12 15
R14 14
R15 12
E3
SEE DETAIL A
E10
R18 13
R15 10
R1 15
R3 12
20
R4 14
C2 16
22
C6 17
SEE NOTE 6
R17 13
E9
C1 6

SECTION A-A

SECTION B-B


.235
.245
.590
.580
CLEARANCE CAVITY FOR CONNECTOR ENGAGEMENT MUST BE FREE OF ENCAPSULATION MATERIAL
℄ OF CONN
.380
.390
.765
.775

VIEW SHOWING MOLD CAVITY
SCALE - 2:1


SEE NOTES 13
TP1
TP2
PIP PREAMP ASSY
1008285 ▭ REV ▭
S/N ▭

MARKING VIEW
SCALE - 2:1

LIST OF PARTS AND MATERIALS

QUANTITY REQUIRED				EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
			011				
			X		25	1010006	SCHEMATIC DIAGRAM, ELECTRICAL
			1		24	1008290	INSULATOR, BOTTOM
			2		23	1010761	DIODE
			AR		22	1006757-1	WIRE, ELECTRICAL
			AR		21	1006787-2	WIRE, ELECTRICAL
			AR		20	1006776-22	INSULATION, SLEEVING, ELECTRICAL
			2		19	1006755-45	CAPACITOR
			1		18	1010393-037	CAPACITOR
			1		17	1010317-1	CAPACITOR
			2		16	1006755-69	CAPACITOR
			4		15	1010369-95	RESISTOR
			2		14	1010311-097	RESISTOR
			2		13	1010311-023	RESISTOR
			2		12	1010311-001	RESISTOR
			2		11	1006750-50	RESISTOR
			3		10	1006750-48	RESISTOR
			1		9	1006750-49	RESISTOR
			2		8	1006750-1	RESISTOR
			2		7	1010376-1	TRANSISTOR
			1		6	1010318-2	CONNECTOR, RECEPTACLE, ELEC.
			2		5	1010292-1	TERMINAL, FEEDTHRU
			2		4	1008026	SPACER
			1		3	1008034	WIRING BOARD BOTTOM
			1		2	1008033	WIRING BOARD, TOP
			1		1	1008277-011	HOUSING-PIP PREAMP (UNSEP ASSY)

NEXT ASSY	USED ON
1000005	-011

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Sachke DATE 10-DEC 64
CHECKED J. GRIEB 11 DEC 64
APPROVAL 11 DEC 64
APPROVAL 11 DEC 64
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PIP PREAMP
ASSEMBLY

CODE IDENT NO
SIZE E
1008285
SCALE 4:1
SHEET 1 OF 1

29 DEC 64

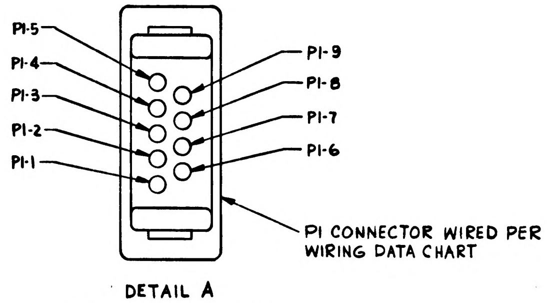
NOTES :

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED ALL WIRING TO BE IN ACCORDANCE WITH ND 1002069
3. ALL WELDS TO BE PER ND 1002005
4. BOND ITEM (7) (Q2) TO ITEM (2) PER ND1002004 TYPE I
5. BOND ITEM (7) (Q1) TO ITEM (3) PER ND1002004 TYPE I
6. BOND ITEM (17) TO ITEM (3) PER ND 1002004 TYPE I
7. BOND ITEM (4) TO ITEM (2) AND (3) PER ND 1002004 TYPE I
8. BOND ITEM (5) TO ITEM (1) PER ND 1002004 TYPE I. ADHESIVE TO BE FLUSH WITH OR ABOVE OUTSIDE SURFACE OF ITEM (1)
9. *SOLDER PER ND 1002071*
10. *ENCAPSULATE PER ND 1002002*
11. FILL TOOLING HOLES WITH ADHESIVE PER ND 1002004 TYPE I
12. ITEM (24) TO BE HELD IN PLACE BY ENCAPSULANT AND TO BE FLUSH WITH BOTTOM OF ITEM (1) WITHIN -.015+.005
13. MARK .060-.100 HIGH, WHITE PER ND 1002019 AND SERIALIZE PER ND 1002023, *CENTRALIZE AS SHOWN*
14. BOND ITEMS (23) TO ITEM (1) PER ND 1002004 TYPE I
15. APPLY ITEM (20) TO ALL CONNECTOR LEADS
16. COMPLETED ASSEMBLY SHALL BE TESTED IN ACCORDANCE WITH AND SHALL MEET ALL THE REQUIREMENTS OF P.S. 1007015

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
B		REPLACES REV. A WITH CHANGE PER TDRR		JAN 65	
C		REVISED PER TDRR 23516		1 NOV 65	
D		REVISED PER TDRR 27502		4 APR 66	

WIRING DATA

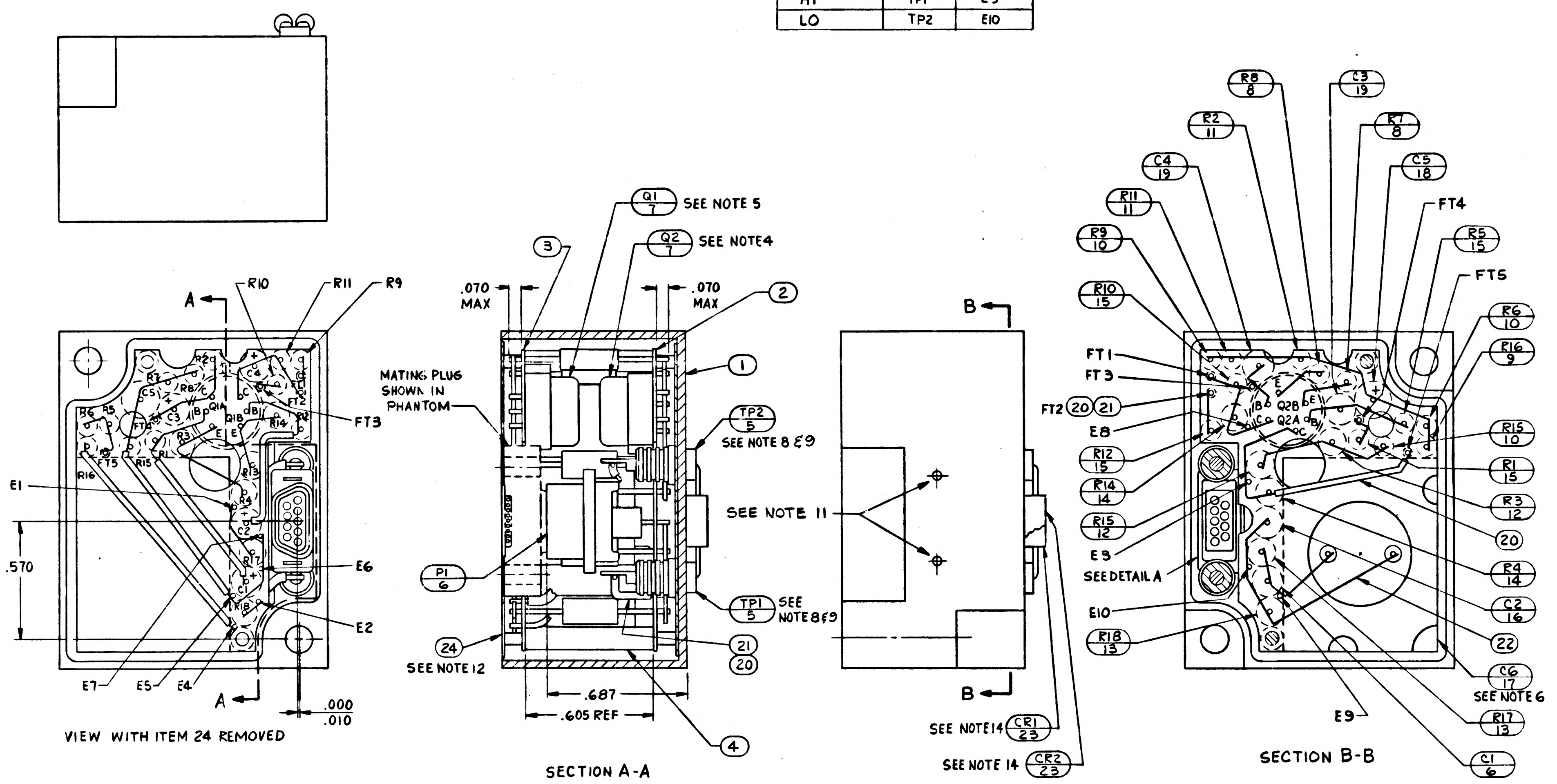
IDENTIFICATION	FROM CIRCUIT POINT	TO CIRCUIT POINT
GRD	P6	E5
28 VDC	P7	E4
INPUT HI	P8	E1
OUTPUT NO.1	P9	E3
INPUT LO	P1	E2
SHIELD	P2	E6
INPUT C.T.	P3	E7
SPARE	P4	SPARE
OUTPUT NO.2	P5	E8
HI	TP1	E9
LO	TP2	E10



P1-5
P1-4
P1-3
P1-2
P1-1
P1-9
P1-8
P1-7
P1-6
P1 CONNECTOR WIRED PER WIRING DATA CHART

DETAIL A
CONNECTOR TERMINAL IDENTIFICATION VIEW
NO SCALE

Ⓑ REPLACES REV A WITH CHANGE

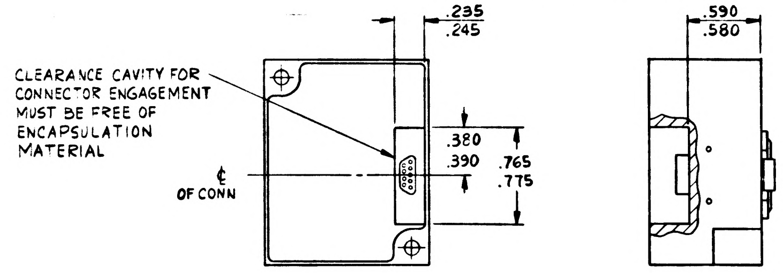


A
R10
R11
R9
FT3
E1
.570
E6
E2
E7
E5
E4
.000
.010
(Q1) 7 SEE NOTE 5
(Q2) 7 SEE NOTE4
3
2
1
.070 MAX
.070 MAX
MATING PLUG SHOWN IN PHANTOM
TP2 5 SEE NOTE 8 E9
TP1 5 SEE NOTE 8 E9
P1 6
24 SEE NOTE 12
21
20
.687
.605 REF
4
B
SEE NOTE 11
SEE NOTE 14 CR1 23
SEE NOTE 14 CR2 23
R8 8
C3 19
R2 11
R7 8
C4 19
C5 18
R11 11
FT4
R9 10
R5 15
FT5
R10 15
R6 10
FT1
FT3
R16 9
FT2 20 21
E8
R15 10
R12 15
R1 15
R14 14
R3 12
R15 12
20
E3
R4 14
SEE DETAIL A
C2 16
E10
22
R18 13
C6 17 SEE NOTE 6
E9
R17 13
C1 6

VIEW WITH ITEM 24 REMOVED

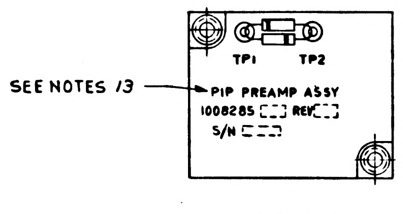
SECTION A-A

SECTION B-B



CLEARANCE CAVITY FOR CONNECTOR ENGAGEMENT MUST BE FREE OF ENCAPSULATION MATERIAL
℄ OF CONN
.235
.245
.380
.390
.765
.775
.590
.580

VIEW SHOWING MOLD CAVITY
SCALE - 2:1



SEE NOTES 13
TP1
TP2
PIP PREAMP ASSY
1008285 [ ] REV [ ]
S/N [ ]

MARKING VIEW
SCALE - 2:1

QUANTITY REQUIRED				EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
			011				
			X		25	1010006	SCHEMATIC DIAGRAM, ELECTRICAL
			1		24	1008290	INSULATOR, BOTTOM
			2		23	1010761	DIODE
			AR		22	1006757-1	WIRE ELECTRICAL
			AR		21	1006787-2	WIRE, ELECTRICAL
			AR		20	1006776-22	INSULATION, SLEEVING, ELECTRICAL
			2		19	1006755-45	CAPACITOR
			1		18	1010393-037	CAPACITOR
			1		17	1008848-001	CAPACITOR
			2		16	1006755-69	CAPACITOR
			4		15	1010369-95	RESISTOR
			2		14	1010311-097	RESISTOR
			2		13	1010311-023	RESISTOR
			2		12	1010311-001	RESISTOR
			2		11	1006750-50	RESISTOR
			3		10	1006750-48	RESISTOR
			1		9	1006750-49	RESISTOR
			2		8	1006750-1	RESISTOR
			2		7	1010376-1	TRANSISTOR
			1		6	1010318-2	CONNECTOR, RECEPTACLE, ELEC.
			2		5	1010292-1	TERMINAL, FEEDTHRU
			2		4	1008026	SPACER
			1		3	1008034	WIRING BOARD BOTTOM
			1		2	1008033	WIRING BOARD TOP
			1		1	1008277-011	HOUSING-PIP PREAMP (INSEP ASSY)

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1000005	-011

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT NAS9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN [illegible] DATE 10-DEC 64
CHECKED J. GRIEB 11 DEC 64
APPROVAL [illegible] DEC 64
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

PIP PREAMP
ASSEMBLY

CODE IDENT NO 80230
SIZE E
1008285
SCALE 4:1
SHEET 1 OF 1

REVISIONS 14952					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ~~VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.~~

	QUANTITY REQUIRED				EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
				011				
				☒			1010006	SCHEMATIC
				1			1008290	INSULATOR, BOTTOM
~~SEE NOTE 2~~				2			1010761	DIODE
~~SEE NOTE 2~~				AR			1006757-1	WIRE, ELECTRICAL
~~SEE NOTE 2~~				AR			1006787-2	WIRE, ELECTRICAL
~~SEE NOTE 2~~				AR			1006776-22	INSULATION, SLEEVING, ELECTRICAL
~~SEE NOTE 2~~				2			1006755-45	CAPACITOR
~~SEE NOTE 2~~				1			1010393-037	CAPACITOR
~~SEE NOTE 2~~				1			1010317-1	CAPACITOR
~~SEE NOTE 2~~				2			1006755-69	CAPACITOR
~~SEE NOTE 2~~				4			1010639-95	RESISTOR
~~SEE NOTE 2~~				2			1010311-097	RESISTOR
~~SEE NOTE 2~~				2			1010311-023	RESISTOR
~~SEE NOTE 2~~				2			1010311-001	RESISTOR
~~SEE NOTE 2~~				2			1006750-50	RESISTOR
~~SEE NOTE 2~~				3			1006750-48	RESISTOR
~~SEE NOTE 2~~				1			1006750-49	RESISTOR
~~SEE NOTE 2~~				2			1006750-1	RESISTOR
~~SEE NOTE 2~~				2			1010376-1	TRANSISTOR
~~SEE NOTE 2~~				1			1010318-2	CONNECTOR, RECP., ELECTRICAL
~~SEE NOTE 2~~				2			1010292-1	TERMINAL, FEED THRU
				2			1008026	SPACER
				1			1008034	WIRING BOARD, BOTTOM
				1			1008033	WIRING BOARD, TOP
				1			1008277	HOUSING ASSEMBLY

LIST OF PARTS AND MATERIALS

MASTER

APPLICATION	
NEXT ASSY	USED ON
1000205	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Deschke DATE 10 DEC 64
CHECKED M. Manning 11 DEC 64
APPROVAL L.A. Plummer 11 DEC 64
APPROVAL A. Hensley 11 DEC 64
NASA APPROVAL V. Michael 12/14/64
MIT APPROVAL W.K. 14 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PIP PREAMP ASSEMBLY

CODE IDENT NO. —
SIZE C
1008285
SCALE —
SHEET 1 of 1

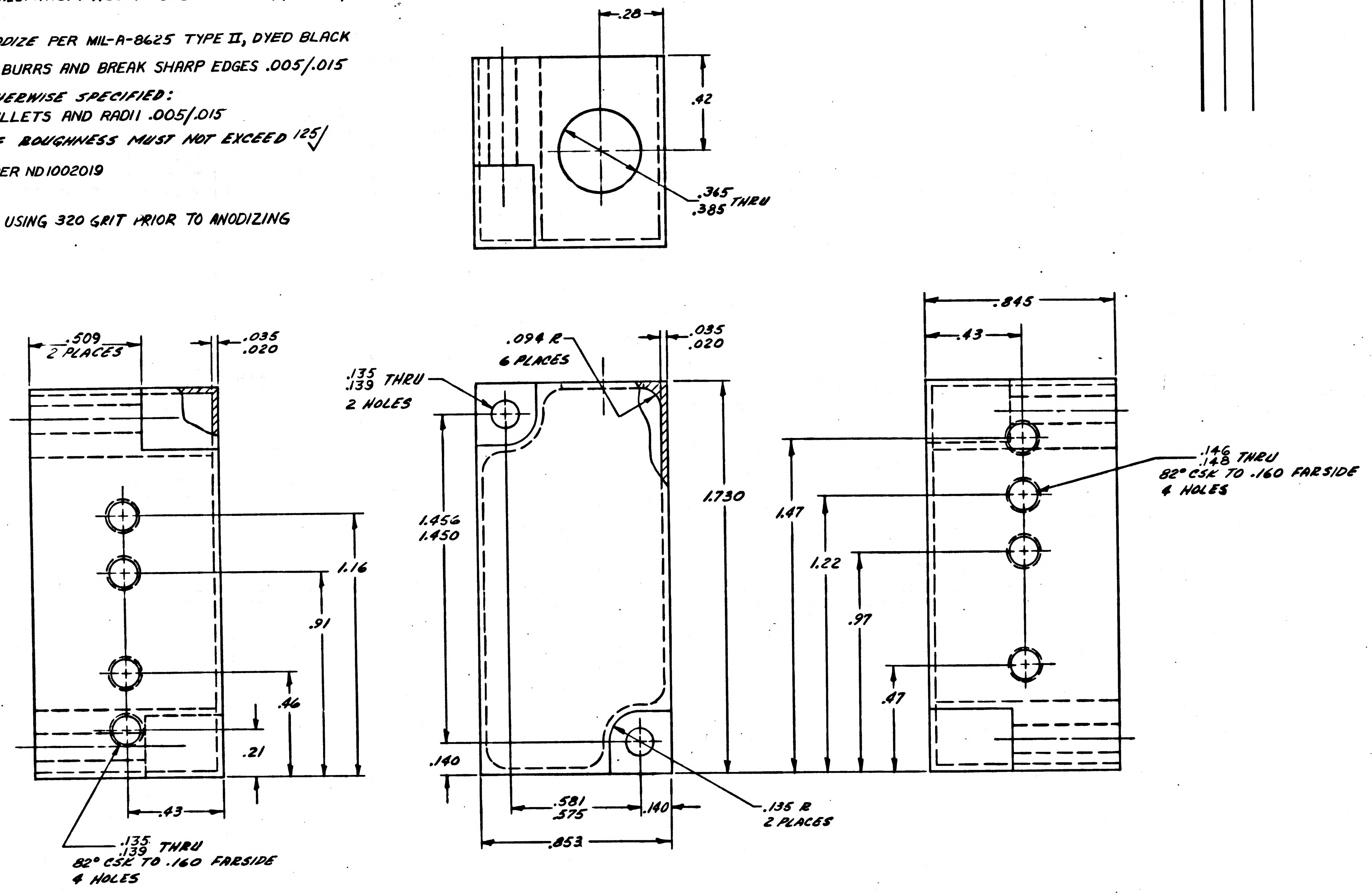
MIL 1077C—P

1008289 2

REVISIONS 14552					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

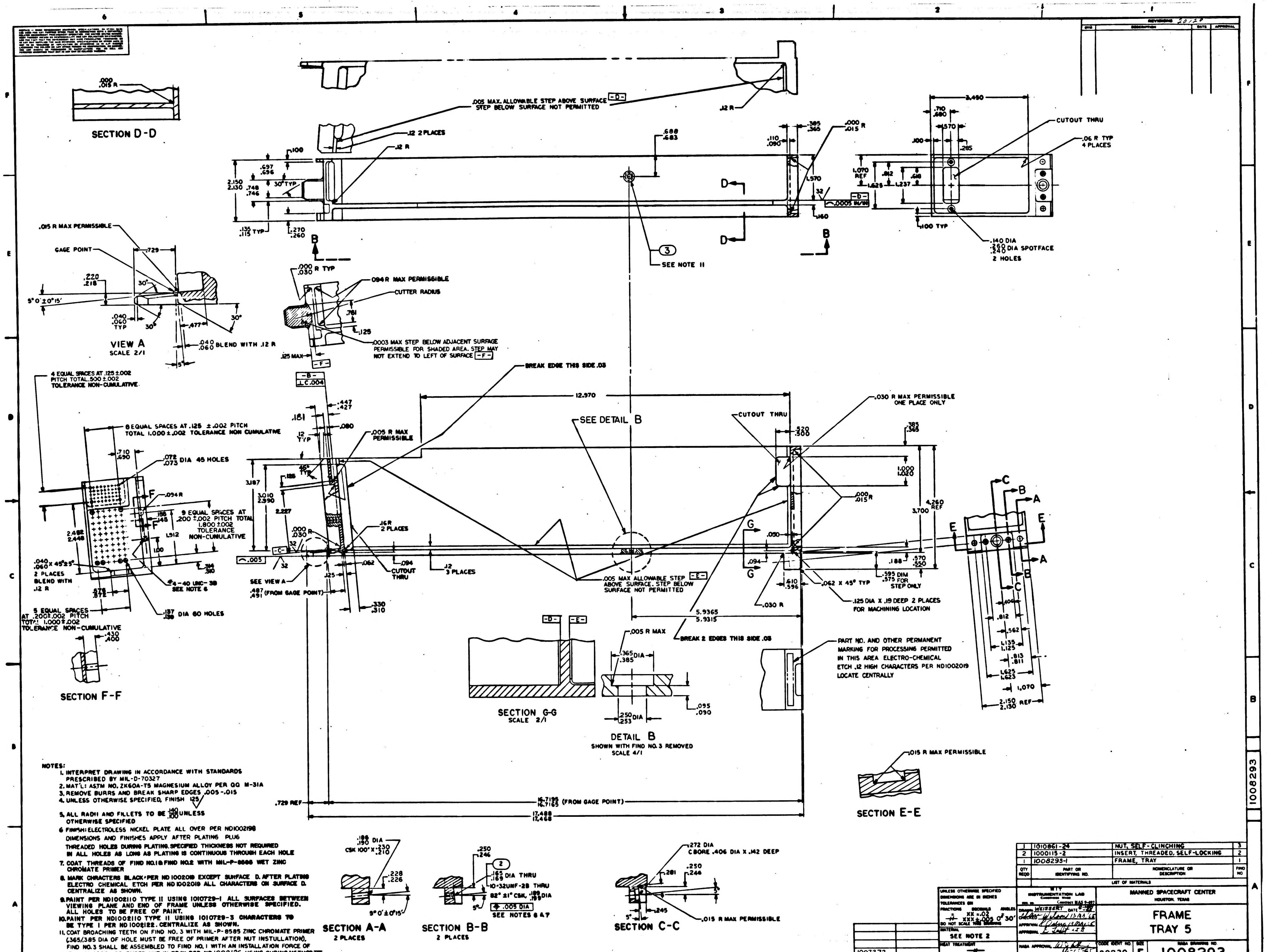
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: ALUMINUM ALLOY 6061-T6 PER QQ-A-200/8
3. FINISH: ANODIZE PER MIL-A-8625 TYPE II, DYED BLACK
4. REMOVE ALL BURRS AND BREAK SHARP EDGES .005/.015
5. UNLESS OTHERWISE SPECIFIED:
   ALL FILLETS AND RADII .005/.015
   SURFACE ROUGHNESS MUST NOT EXCEED 125√
6. IDENTIFY PER ND1002019
7. VAPOR BLAST USING 320 GRIT PRIOR TO ANODIZING


.28
.42
.365
.385 THRU
.509
2 PLACES
.035
.020
1.16
.91
.46
.21
.43
.135
.139 THRU
82° CSK TO .160 FARSIDE
4 HOLES
.094 R
6 PLACES
.135
.139 THRU
2 HOLES
.035
.020
1.456
1.450
1.730
.140
.581
.575
.140
.853
.135 R
2 PLACES
.845
.43
.146
.148 THRU
82° CSK TO .160 FARSIDE
4 HOLES
1.47
1.22
.97
.47

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		FRACTIONS DECIMALS ANGLES ± — ±.005 ±2° ±.01	ACSP PN DRAWN C.M. Kufo DATE 28 NOV 64 CHECKED 1 DEC 64 APPROVAL 1 DEC 64 APPROVAL 1 DEC 64	HOUSING, ADA PREAMP (STABLE MEMBER)
		DO NOT SCALE THIS DRAWING		
1008279		MATERIAL SEE NOTE 2	NASA APPROVAL 12/14/64	CODE IDENT NO. — SIZE D 1008289
NEXT ASSY	USED ON	CONTRACT NAS-9-497	MIT APPROVAL 16 Dec 64	SCALE 4:1 SHEET 1 OF 1
APPLICATION				

Charleston 1 Dec 64 B


SECTION D-D
.000
.015 R
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
CUTOUT THRU
.06 R TYP 4 PLACES
2.490
.140 DIA
.250
.240 DIA SPOTFACE
2 HOLES
.100 TYP
SEE NOTE 11
VIEW A
SCALE 2/1
GAGE POINT
.015 R MAX PERMISSIBLE
.040
.060 BLEND WITH .12 R
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
BREAK EDGE THIS SIDE .03
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.072
.073 DIA 45 HOLES
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.137
.139 DIA 60 HOLES
.040
.060 X 45° ±5° 2 PLACES BLEND WITH .12 R
SECTION F-F
12.970
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.005 R MAX PERMISSIBLE
.16 R 2 PLACES
.12 3 PLACES
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.005 MAX ALLOWABLE STEP ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED -E-
5.9365
5.9315
.062 X 45° TYP
.595 DIM
.575 FOR STEP ONLY
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
BREAK 2 EDGES THIS SIDE .03
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION G-G
SCALE 2/1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
SECTION E-E
.015 R MAX PERMISSIBLE
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
.729 REF
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
10-32UNF-2B THRU
SEE NOTES 6 & 7
SECTION C-C
.272 DIA
CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHRACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTULLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS, EMBED NUT IN TRAY PER ND 1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008293-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007272	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± -/- DECIMALS XX ±.02 XXX ±.005 ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT -/-
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN WEISSERT DATE 5-20-65
CHECKED Wilson 13 MA 65
APPROVAL R Osborne 13 MAY 65
APPROVAL E Tuft
NASA APPROVAL 6-15-65
MIT APPROVAL 15 Jun 65

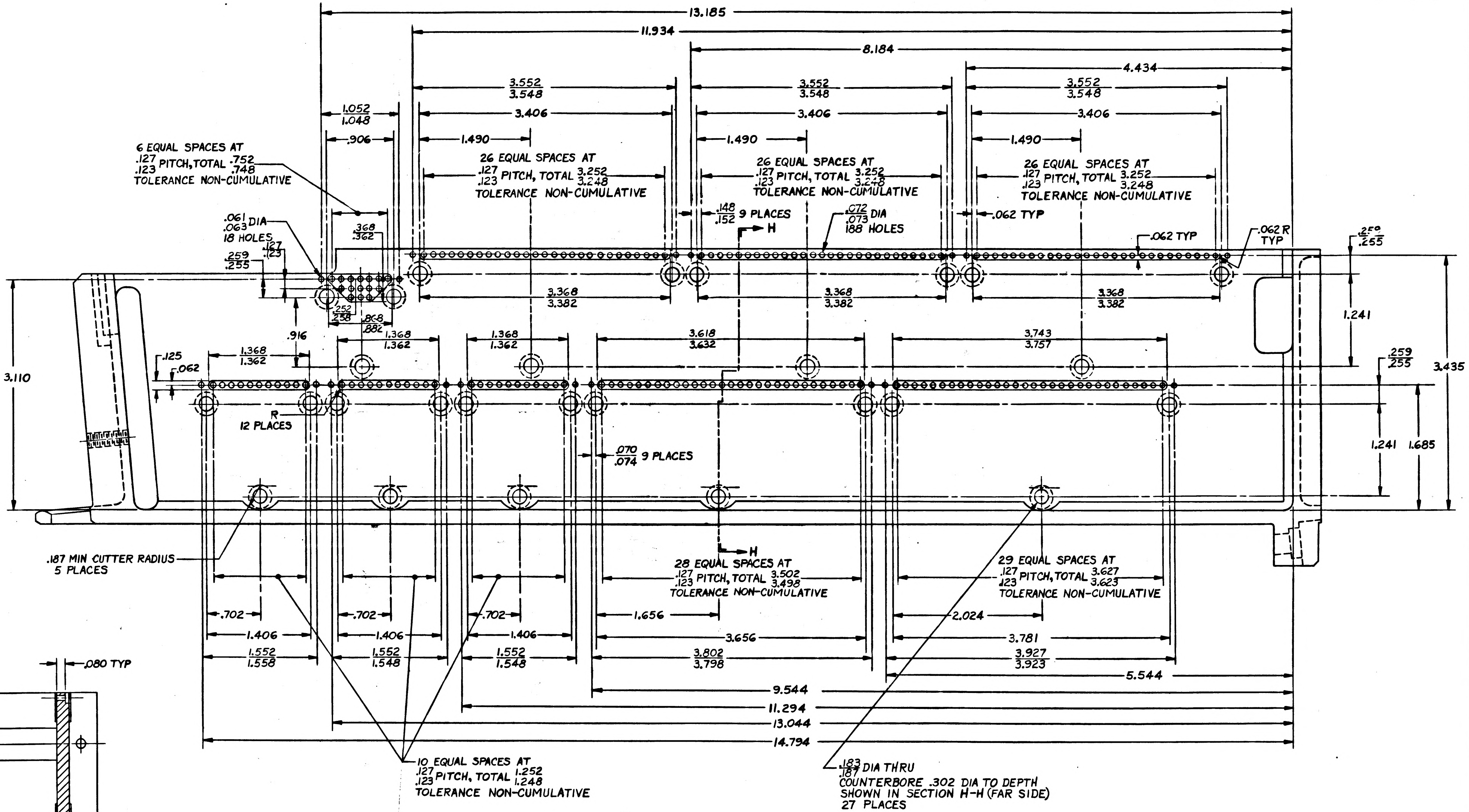
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 5

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008293
SCALE 1/1
WT
SHEET 1 OF 3

REVISIONS 20120

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.



13.185
11.934
8.184
4.434
3.552
3.548
3.406
1.490
1.052
1.048
.906
.368
.362
.061
.063 DIA
18 HOLES
.127
.123
.259
.255
.252
.258
.868
.882
.916
3.368
3.382
.148
.152 9 PLACES
.072
.073 DIA
188 HOLES
.062 TYP
.062 R
TYP
1.241
3.435
3.110
.125
.062
1.368
1.362
3.618
3.632
3.743
3.757
R
12 PLACES
.070
.074 9 PLACES
1.685
H
H
.702
1.406
1.552
1.558
1.548
1.656
3.656
3.802
3.798
2.024
3.781
3.927
3.923
5.544
9.544
11.294
13.044
14.794

6 EQUAL SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE

26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE

.187 MIN CUTTER RADIUS 5 PLACES

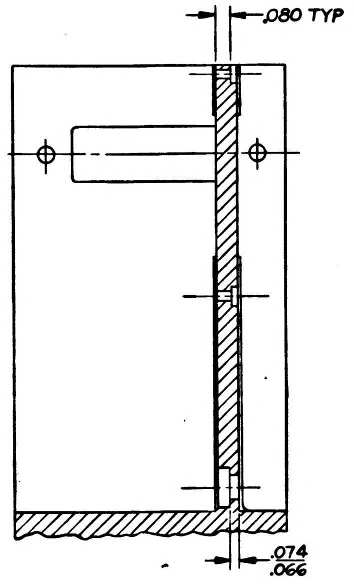
28 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.502 3.498 TOLERANCE NON-CUMULATIVE

29 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.627 3.623 TOLERANCE NON-CUMULATIVE

10 EQUAL SPACES AT .127 .123 PITCH, TOTAL 1.252 1.248 TOLERANCE NON-CUMULATIVE

.183 .187 DIA THRU
COUNTERBORE .302 DIA TO DEPTH
SHOWN IN SECTION H-H (FAR SIDE)
27 PLACES

VIEW B-B



.080 TYP
.074
.066

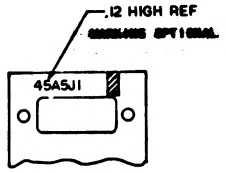
SECTION H-H

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES +— XX ±.02 +0°30' —— XXX ±.005 -0°30' DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DRAWN WEISSERT DATE 10-MAY-65 CHECKED Wilson 13 MAY 65 APPROVAL R Osborne 13 MAY 65 APPROVAL D. Scott	MANNED SPACECRAFT CENTER HOUSTON, TEXAS FRAME, TRAY 5		
MATERIAL —	NASA APPROVAL 6-1-65	CODE IDENT NO. 80230	SIZE E	1008293
CONTRACT NAS9-497	MIT APPROVAL 15 Jun 65	SCALE 2:1		SHEET 2 OF 3

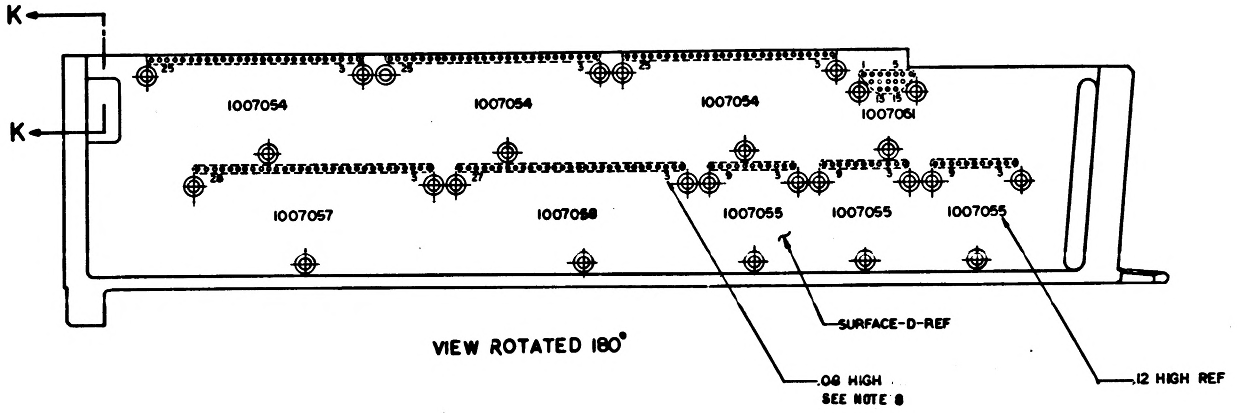
1008293

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

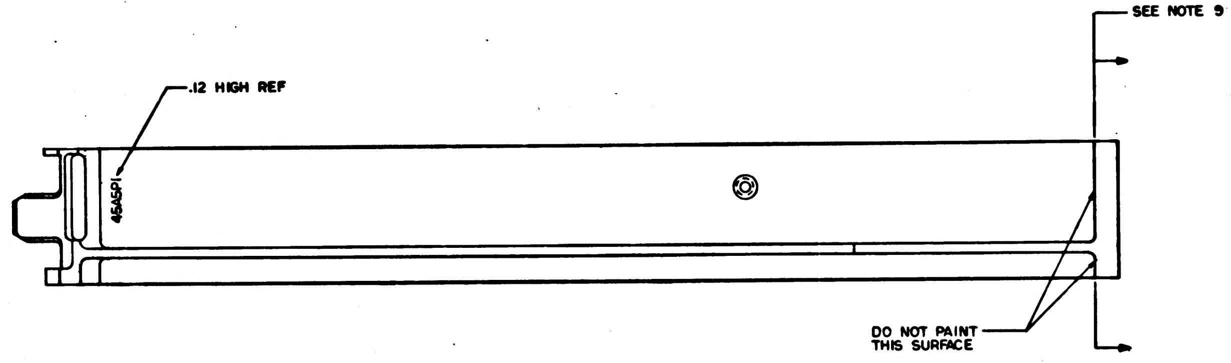
REVISIONS 20129			
SYM	DESCRIPTION	DATE	APPROVAL

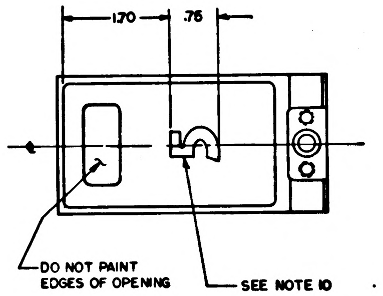

.12 HIGH REF
MARKING OPTIONAL
45A5J1

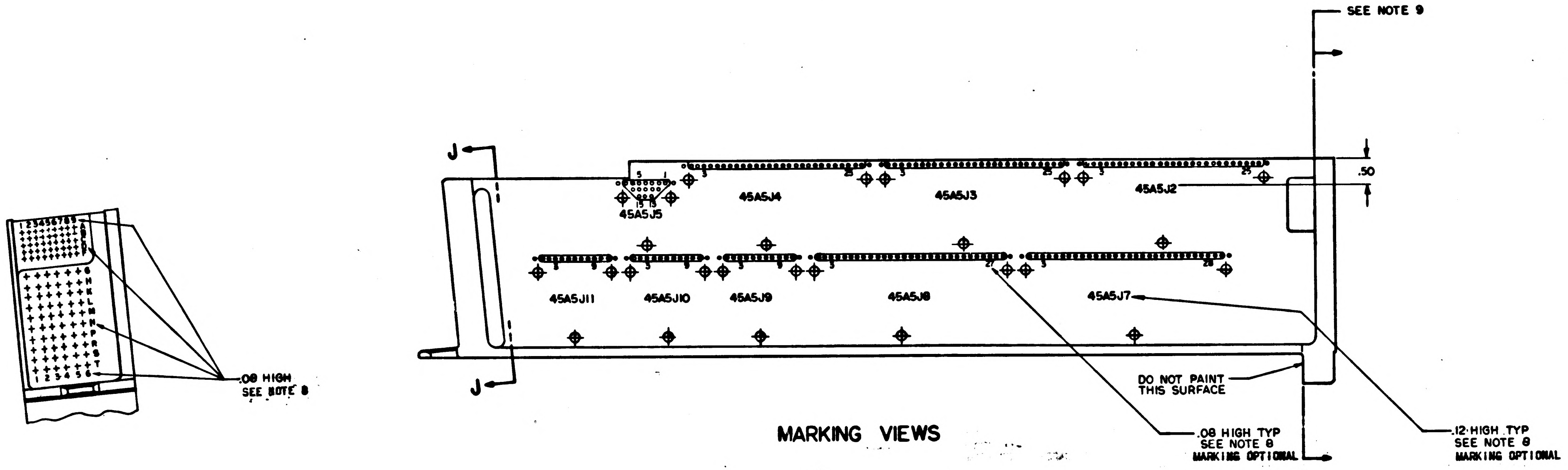
PARTIAL SECTION K-K


K
K
1007054
1007054
1007054
1007051
1007057
1007058
1007055
1007055
1007055
SURFACE-D-REF
.08 HIGH
SEE NOTE 8
.12 HIGH REF

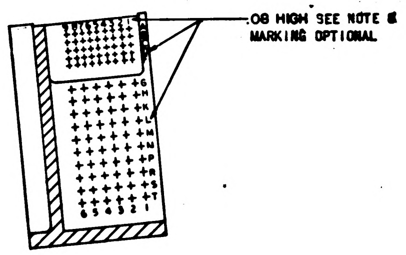
VIEW ROTATED 180°


SEE NOTE 9
.12 HIGH REF
45A5P1
DO NOT PAINT
THIS SURFACE


.170
.76
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10


SEE NOTE 9
J
J
.50
45A5J5
45A5J4
45A5J3
45A5J2
45A5J11
45A5J10
45A5J9
45A5J8
45A5J7
DO NOT PAINT
THIS SURFACE
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.08 HIGH
SEE NOTE 8

MARKING VIEWS


.08 HIGH SEE NOTE 8
MARKING OPTIONAL

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

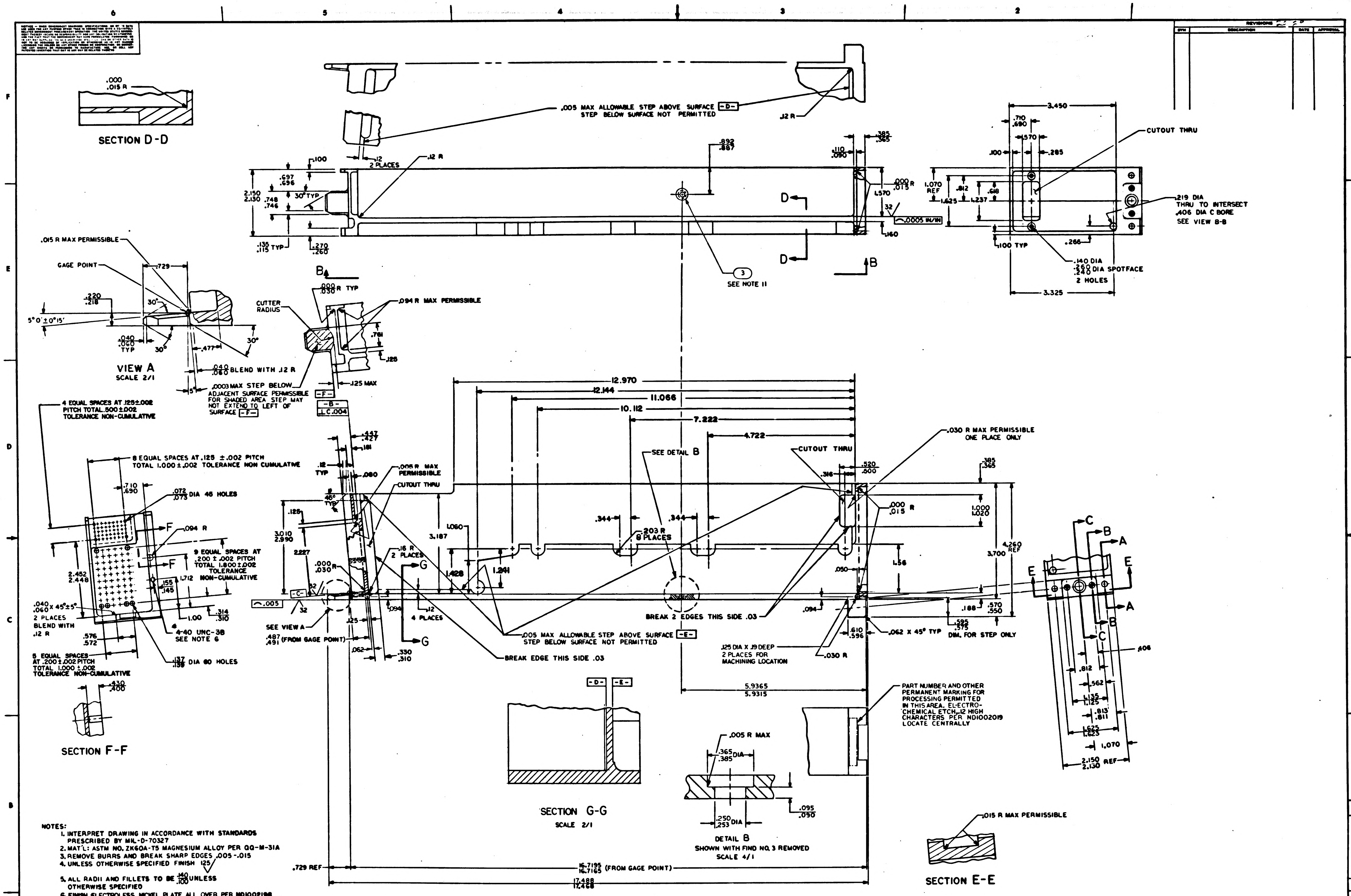
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. Contract NAS 9-497
DRAWN WEISSERT DATE 13 MAY 65
CHECKED Wilson 13 MAY 65
APPROVAL R. Osborn 13 May 65
APPROVAL 6/3/65
NASA APPROVAL 06-11-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

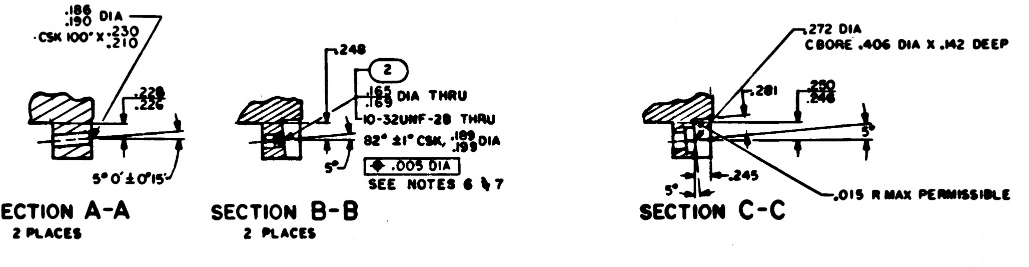
FRAME
TRAY 5

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008293
SCALE 1/1
WT
SHEET 3 OF 3


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.100
2.150 2.130
.697 .696
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.892 .887
.110 .090
.385 .365
.000 .015 R
1.570
.160
.0005 IN/IN
D
B
3
SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
1.625
1.237
.618
.219 DIA THRU TO INTERSECT .406 DIA C BORE SEE VIEW B-B
.266
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE 2 HOLES
3.325
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
5°0' ± 0°15'
.040 .060 TYP
30°
.477
.040 .060 BLEND WITH .12 R
VIEW A
SCALE 2/1
.000 .030 R TYP
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥ C .004
4 EQUAL SPACES AT .125 ± .002 PITCH TOTAL .500 ± .002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710 .690
.072 .075 DIA 45 HOLES
.094 R
9 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.800 ± .002 TOLERANCE NON-CUMULATIVE
2.452 2.448
.155 .145
1.712
.040 .060 X 45° ± 5° 2 PLACES BLEND WITH .12 R
.576 .572
4-40 UNC-3B SEE NOTE 6
.314 .310
1.00
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
12.970
12.144
11.066
10.112
7.222
4.722
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.447 .427
.181
.12 TYP
.080
.006 R MAX PERMISSIBLE
CUTOUT THRU
45° TYP
.125
3.010 2.990
2.227
.000 .030 R
.005
-C-
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.16 R 2 PLACES
.12 4 PLACES
G
.094
.125
.062
.330 .310
1.060
3.187
1.428
1.241
.344
.203 R 8 PLACES
.344
.316
.520 .500
.385 .365
.000 .015 R
1.000 1.020
4.260 REF
3.700
1.56
.050
.094
.610 .596
.062 X 45° TYP
.188
.595 .575 DIM. FOR STEP ONLY
.570 .550
BREAK 2 EDGES THIS SIDE .03
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.030 R
5.9365 5.9315
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
C B A E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D- -E-
SECTION G-G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3. CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CROMATE PRIMER. (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.


.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0' ± 0°15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .199 .189 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
C BORE .406 DIA X .142 DEEP
.281
.250 .246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008294-001	FRAME, TRAY	1

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

NEXT ASSY	USED ON
1007273	

APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497

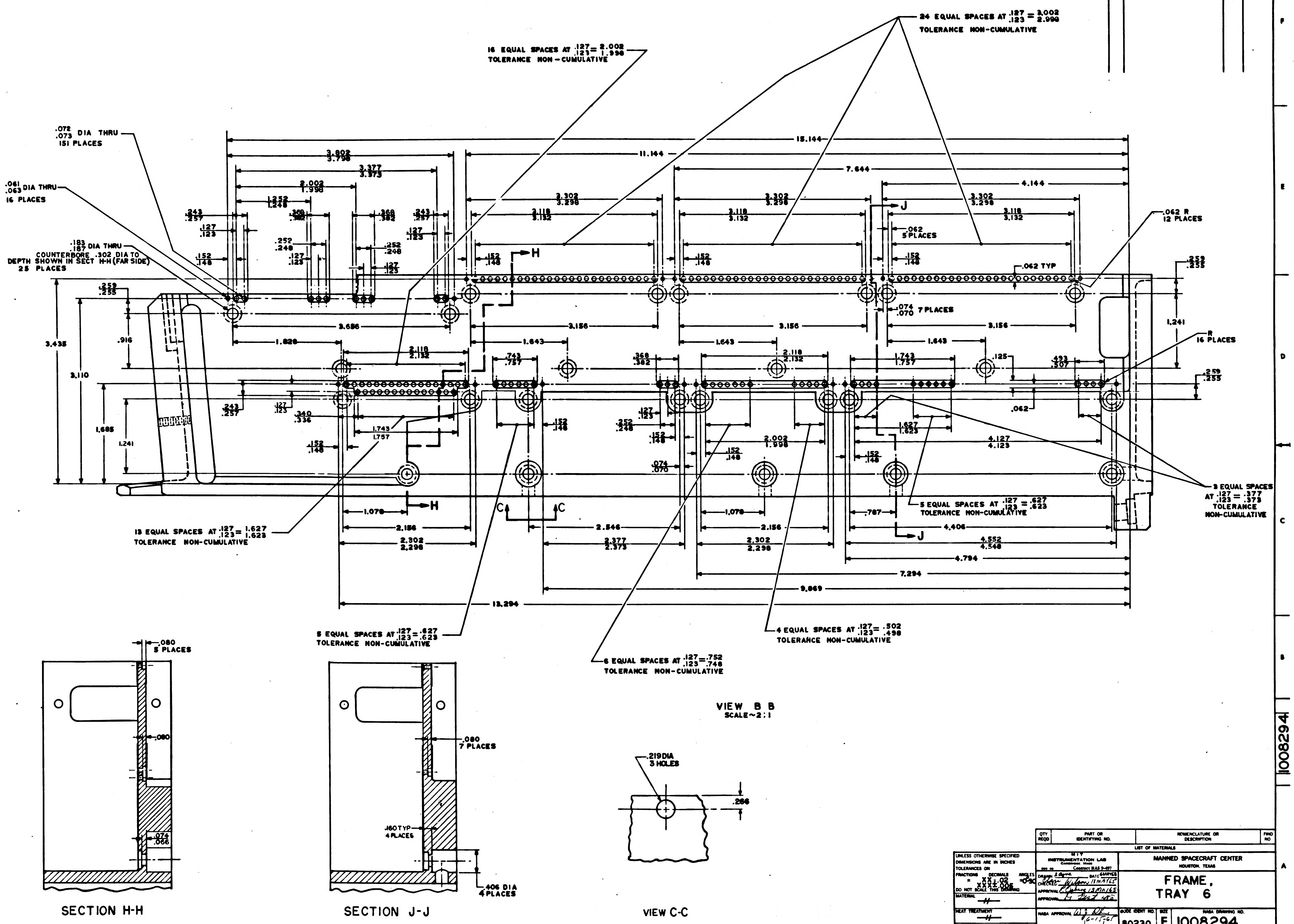
DRAWN S. Agne DATE 7 MAY 65
CHECKED Wilson 13 MAY 65
APPROVAL Dabney 13 MAY 65
APPROVAL LSB
NASA APPROVAL 6-15-65
MIT APPROVAL W Kupfer 15 Jun 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

CODE IDENT NO. 80230 SIZE E NASA DRAWING NO. 1008294
SCALE 1/1 WT SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


REVISIONS
SYM
DESCRIPTION
DATE
APPROVAL
24 EQUAL SPACES AT .127/.123 = 3.002/2.998
TOLERANCE NON-CUMULATIVE
16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
151 PLACES
.061/.063 DIA THRU
16 PLACES
.183/.187 DIA THRU
COUNTERBORE .302 DIA TO
DEPTH SHOWN IN SECT H-H (FAR SIDE)
25 PLACES
15.144
11.144
7.644
4.144
3.802/3.798
3.377/3.373
2.002/1.998
1.252/1.248
3.302/3.298
3.118/3.132
.062 R
12 PLACES
.062
5 PLACES
.062 TYP
.259/.255
.074/.070 7 PLACES
3.696
3.156
1.828
1.643
1.241
R
16 PLACES
3.435
3.110
1.685
.916
2.118/2.132
.743/.757
.368/.382
1.743/1.757
.493/.507
.125
.340/.336
1.627/1.623
4.127/4.123
.062
3 EQUAL SPACES
AT .127/.123 = .377/.373
TOLERANCE
NON-CUMULATIVE
5 EQUAL SPACES AT .127/.123 = .627/.623
TOLERANCE NON-CUMULATIVE
13 EQUAL SPACES AT .127/.123 = 1.627/1.623
TOLERANCE NON-CUMULATIVE
H
J
C
1.079
.787
2.156
2.546
4.406
2.302/2.298
2.377/2.373
4.552/4.548
4.794
7.294
9.869
13.294
5 EQUAL SPACES AT .127/.123 = .627/.623
TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .127/.123 = .502/.498
TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127/.123 = .752/.748
TOLERANCE NON-CUMULATIVE
VIEW B B
SCALE~2:1
.080
5 PLACES
.080
.074/.066
SECTION H-H
.080
7 PLACES
.160 TYP
4 PLACES
.406 DIA
4 PLACES
SECTION J-J
.219 DIA
3 HOLES
.266
VIEW C-C
1008294

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING

MATERIAL —//—

HEAT TREATMENT —//—

FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN *L Agne* DATE *6MAY65*
CHECKED *Wilson 13MAY65*
APPROVAL *R Osburg 13MAY65*
APPROVAL *G Hart*

NASA APPROVAL *6-15-65*
MIT APPROVAL *15 Jun 65*

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

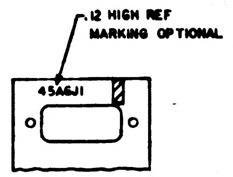
FRAME,
TRAY 6

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008294
SCALE 2:1
WT
SHEET 2 OF 3

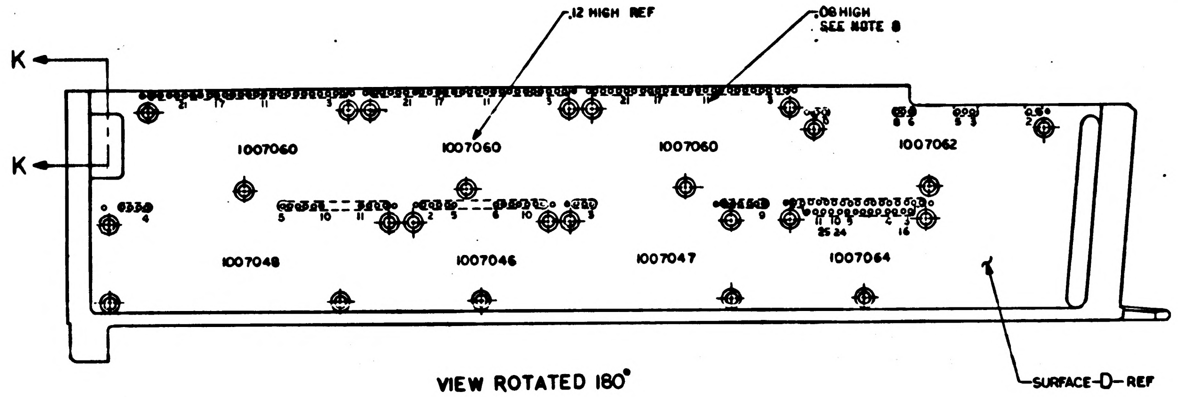
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SHEET 3 OF 3

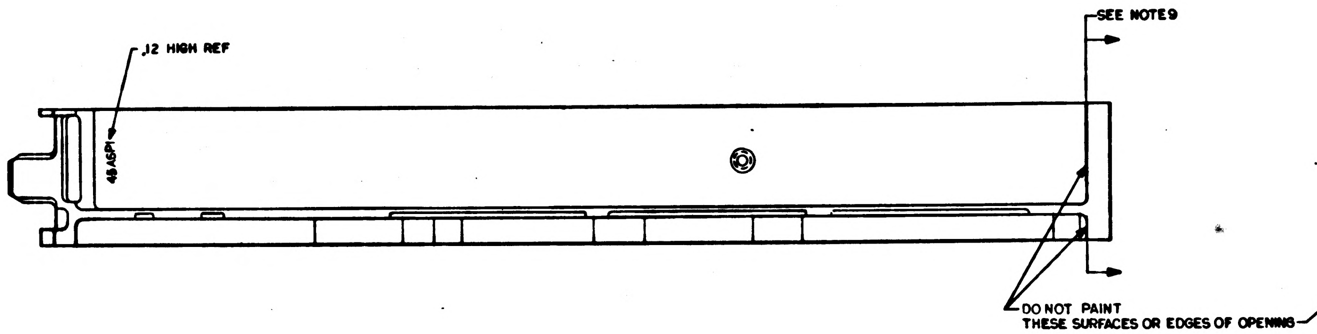
REVISIONS 2017			
SYM	DESCRIPTION	DATE	APPROVAL

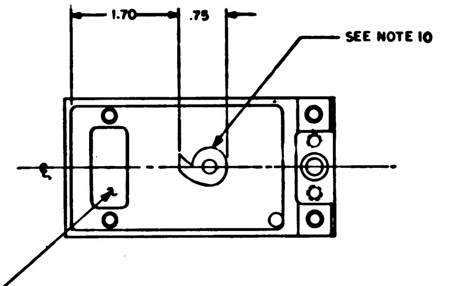

.12 HIGH REF
MARKING OPTIONAL
45A6J1

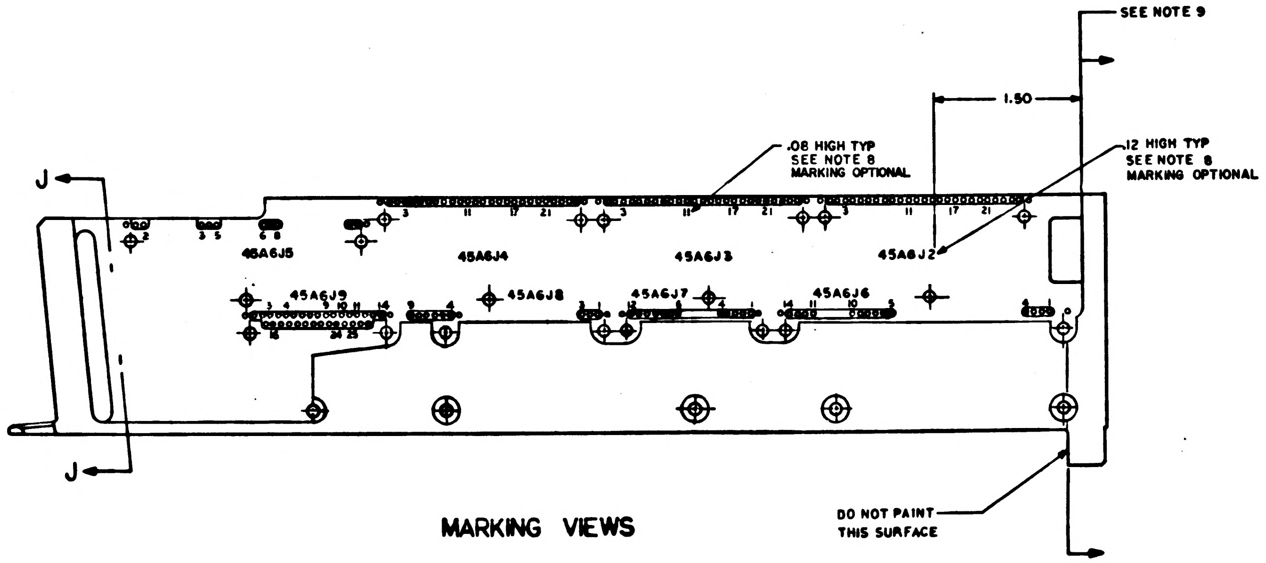
PARTIAL SECTION K-K


.12 HIGH REF
.08 HIGH
SEE NOTE 8
K
K
1007060
1007060
1007060
1007062
1007048
1007046
1007047
1007064
SURFACE-D-REF

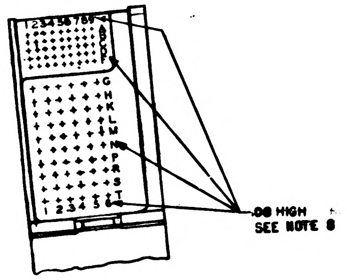
VIEW ROTATED 180°

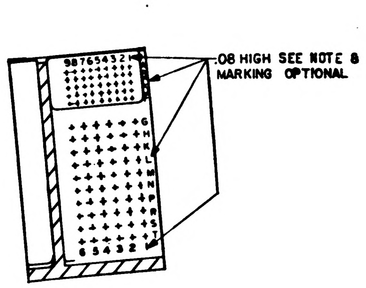

.12 HIGH REF
45A6P1
SEE NOTE 9
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENINGS


1.70
.75
SEE NOTE 10


SEE NOTE 9
1.50
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
DO NOT PAINT
THIS SURFACE

MARKING VIEWS


.08 HIGH
SEE NOTE 8


.08 HIGH SEE NOTE 8
MARKING OPTIONAL

SECTION J-J

1008294

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

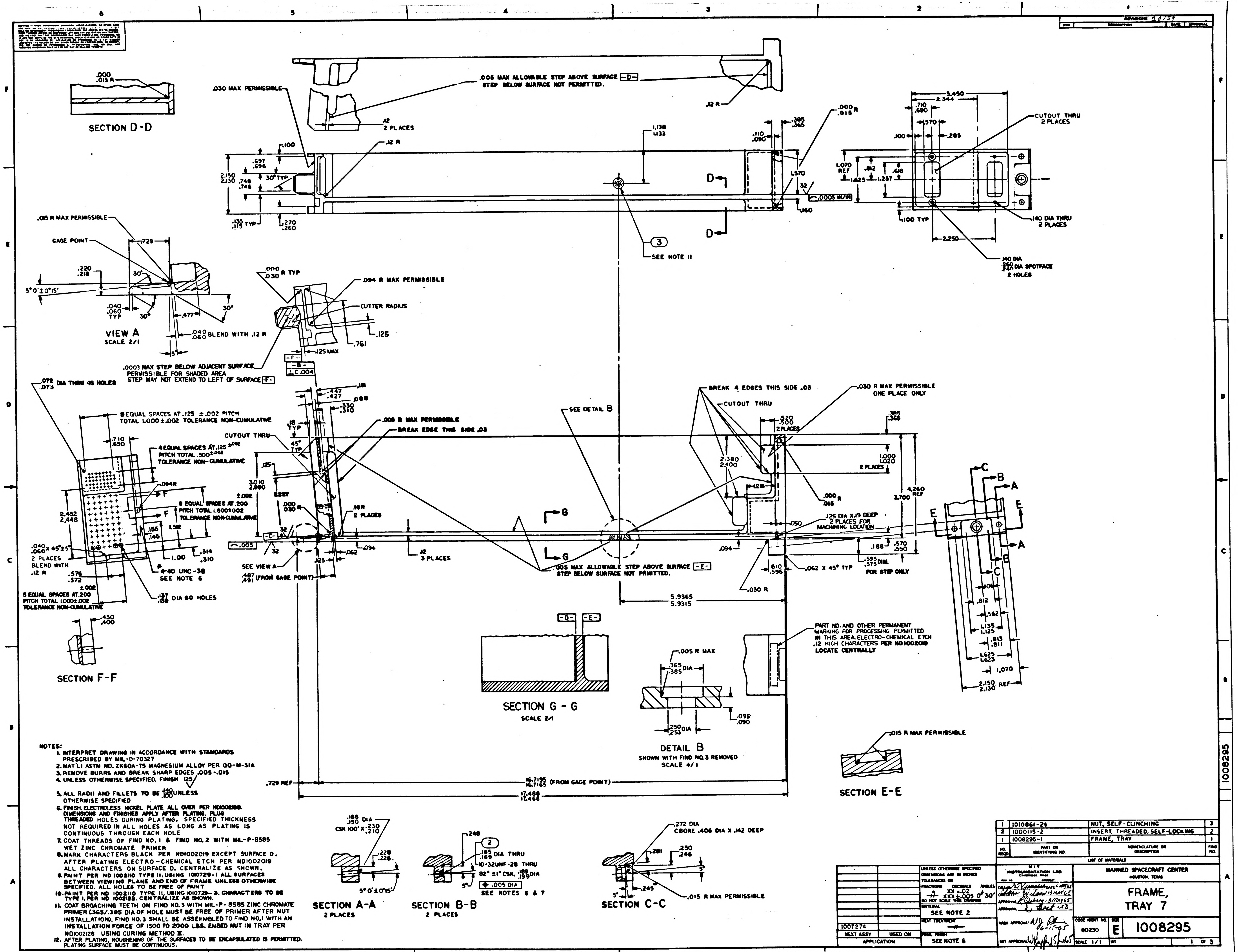
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN S. Byrne DATE 6 MAY 65
CHECKED Chase Wilson 13 MAY 65
APPROVAL K Osberg 13 MAY 65
APPROVAL D Best
NASA APPROVAL 06-15-65
MIT APPROVAL 15 June 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

CODE IDENT NO. 80230 | SIZE E | NASA DRAWING NO 1008294
SCALE 1/1 | WT | SHEET 3 OF 3

SHEET 3 OF 3


REVISIONS 20729
SYM
DESCRIPTION
DATE
APPROVAL
.000
.015 R
SECTION D-D
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12
2 PLACES
.12 R
.100
.697
.696
2.150
2.130
.748
.746
30° TYP
.135
.115 TYP
.270
.260
1.138
1.133
D
.110
.090
.385
.365
.000
.018 R
1.570
32
.0005 IN/IN
.160
3
SEE NOTE 11
3.450
2.344
.710
.690
.570
.100
.285
CUTOUT THRU
2 PLACES
1.070
REF
.812
.618
1.625
1.237
.100 TYP
2.250
.140 DIA THRU
2 PLACES
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5°0'±0°15'
.040
.060
TYP
.477
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.000
.030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125
.761
.125 MAX
-F-
-B-
⊥ C .004
.0003 MAX STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.072
.073 DIA THRU 45 HOLES
8 EQUAL SPACES AT .125 ±.002 PITCH
TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.710
.690
4 EQUAL SPACES AT .125 ±.002
PITCH TOTAL .500 ±.002
TOLERANCE NON-CUMULATIVE
.094R
F
9 EQUAL SPACES AT .200
PITCH TOTAL 1.800±.002
TOLERANCE NON-CUMULATIVE
2.452
2.448
.156
.145
1.512
.040
.060 X 45°±5°
2 PLACES
BLEND WITH
.12 R
1.00
.314
.310
.576
.572
±.002
#4-40 UNC-3B
SEE NOTE 6
5 EQUAL SPACES AT .200
PITCH TOTAL 1.000±.002
TOLERANCE NON-CUMULATIVE
.137
.139 DIA 60 HOLES
.430
.400
SECTION F-F
.181
.447
.427
.080
.330
.310
.18
TYP
CUTOUT THRU
45°
TYP
.005 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
.125
3.010
2.990
±.002
2.227
.000
.030 R
.16R
2 PLACES
-C-
32
.005
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125
.062
.094
.12
3 PLACES
SEE DETAIL B
G
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PRMITTED.
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520
.500
2 PLACES
.385
.365
2.380
2.400
1.000
1.020
2 PLACES
1.218
.000
.015 R
3.700
4.260
REF
.050
.125 DIA X .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.094
.188
.570
.550
.610
.596
.062 X 45° TYP
.595
.575 DIM.
FOR STEP ONLY
.030 R
5.9365
5.9315
C
B
A
E
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
-D-
-E-
SECTION G - G
SCALE 2/1
PART NO. AND OTHER PERMANENT
MARKING FOR PROCESSING PERMITTED
IN THIS AREA. ELECTRO-CHEMICAL ETCH
.12 HIGH CHARACTERS PER ND1002019
LOCATE CENTRALLY
.005 R MAX
.365
.385 DIA
.095
.090
.250
.253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5°0'±0°15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189
.199 DIA
.005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002196. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002128 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008295-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007274	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ‡ DECIMALS XX ±.02 XXX ±.005 ANGLES 0° ±30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—‡—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN [illegible] DATE 6 MAY 65
CHECKED Wilson 13 MAY 65
APPROVAL R Osberg 13 MAY 65
APPROVAL [illegible] 5/18
NASA APPROVAL W J [illegible] 6-15-65
MIT APPROVAL W [illegible] 15 Jun 65

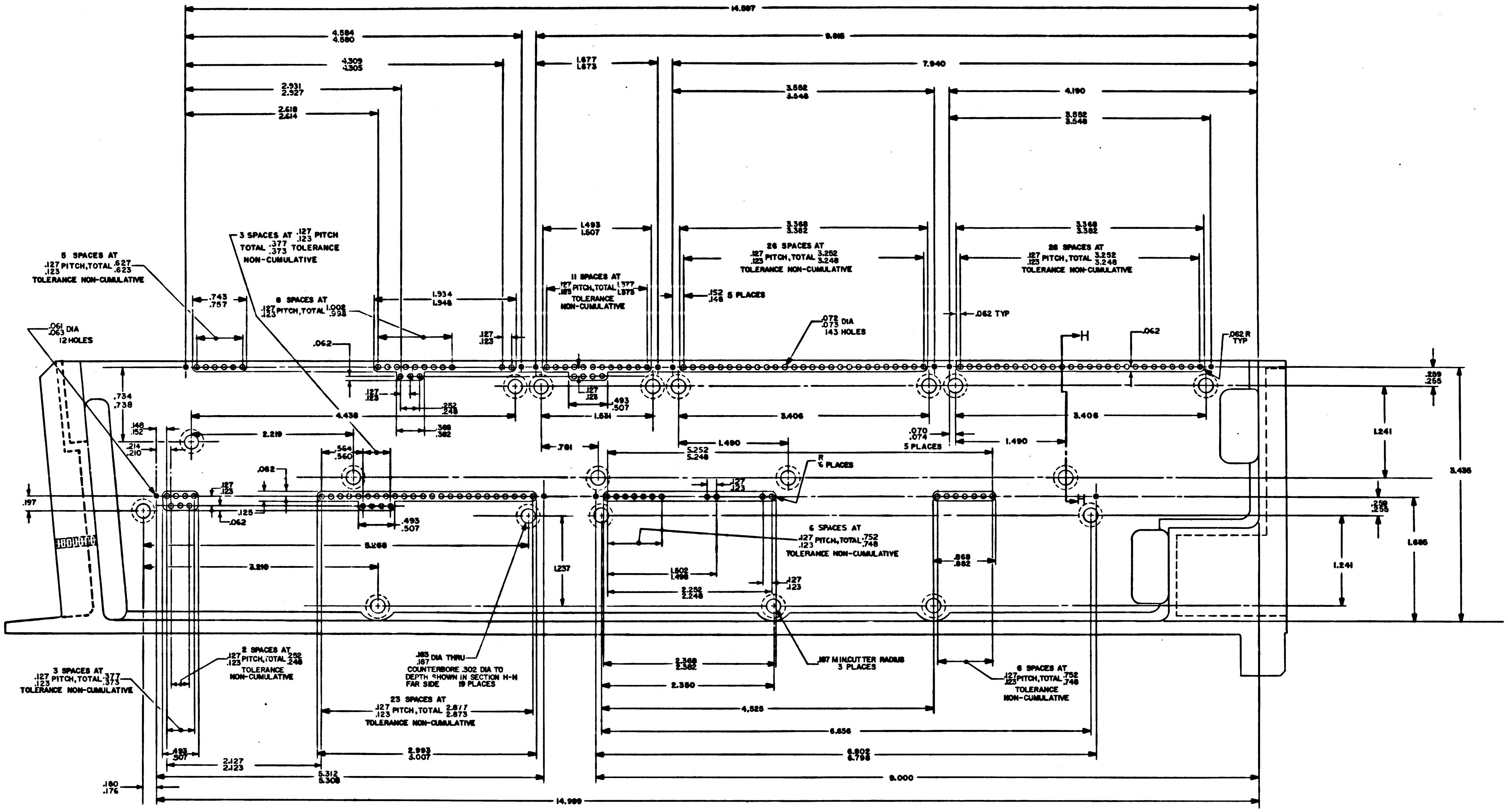
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

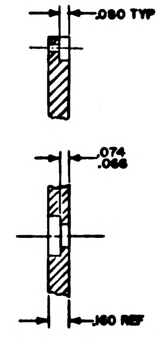
CODE IDENT NO. 80230
SIZE E
1008295
SCALE 1/1
WT
1 OF 3

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS 20129


14.887
4.584
4.580
9.815
4.309
4.305
1.677
1.673
7.940
2.931
2.527
3.552
3.548
4.190
2.618
2.614
1.493
1.507
3.368
3.382
5 SPACES AT .127 .123 PITCH, TOTAL .627 .623 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 .123 PITCH TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
8 SPACES AT .127 .123 PITCH, TOTAL 1.002 .998
11 SPACES AT .127 .123 PITCH, TOTAL 1.377 1.373 TOLERANCE NON-CUMULATIVE
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
.152 .148 5 PLACES
.743 .757
1.934 1.948
.061 .063 DIA 12 HOLES
.062
.127 .123
.075 .073 DIA 143 HOLES
.062 TYP
.062
.062 R TYP
H
.734 .738
.148 .152
.214 .210
2.219
4.438
.252 .248
.368 .382
.564 .560
.493 .507
1.631
3.406
.070 .074 5 PLACES
1.490
5.252 5.248
.781
R 5 PLACES
.259 .255
1.241
3.436
.197
.125
.062
5.268
3.210
1.237
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
1.502 1.498
2.252 2.248
.868 .882
1.685
.187 MINCUTTER RADIUS 3 PLACES
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECTION H-H FAR SIDE 19 PLACES
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
23 SPACES AT .127 .123 PITCH, TOTAL 2.877 2.873 TOLERANCE NON-CUMULATIVE
2.368 2.382
2.350
4.525
6.656
6.802 6.798
9.000
.493 .507
2.127 2.123
2.993 3.007
5.312 5.308
.180 .176
14.999

VIEW B-B


.060 TYP
.074 .066
.160 REF

PARTIAL SECTION
H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX .005 ANGLES ± 0°30′
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN D. [illegible] DATE 6 May 65
CHECKED Wilson 13 MAY 65
APPROVAL R [illegible] 13 MAY 65
APPROVAL
NASA APPROVAL 6-15-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

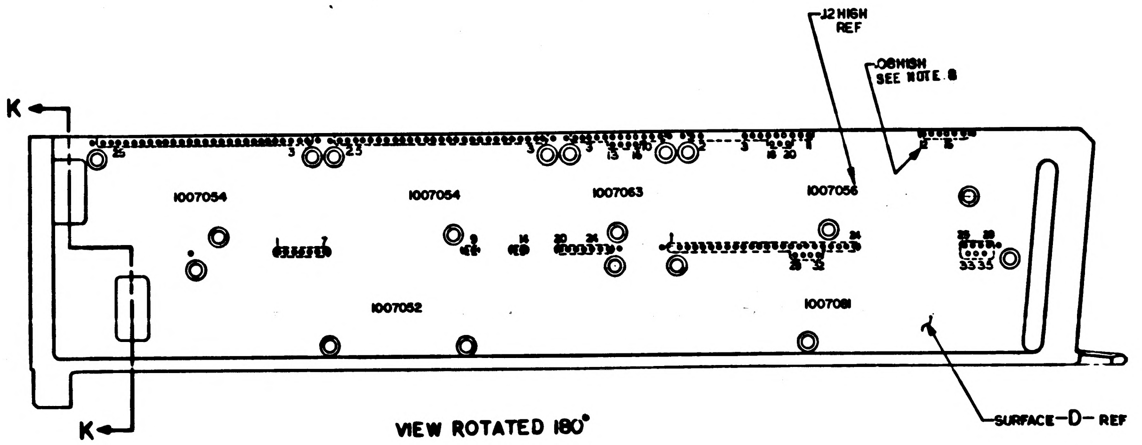
FRAME,
TRAY 7

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008295
SCALE 2/1
WT
SHEET 2 OF 3

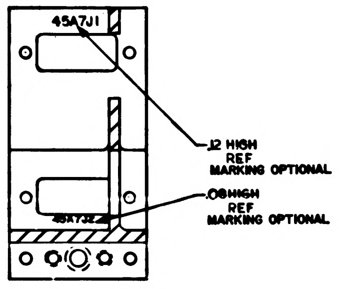
1008295

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

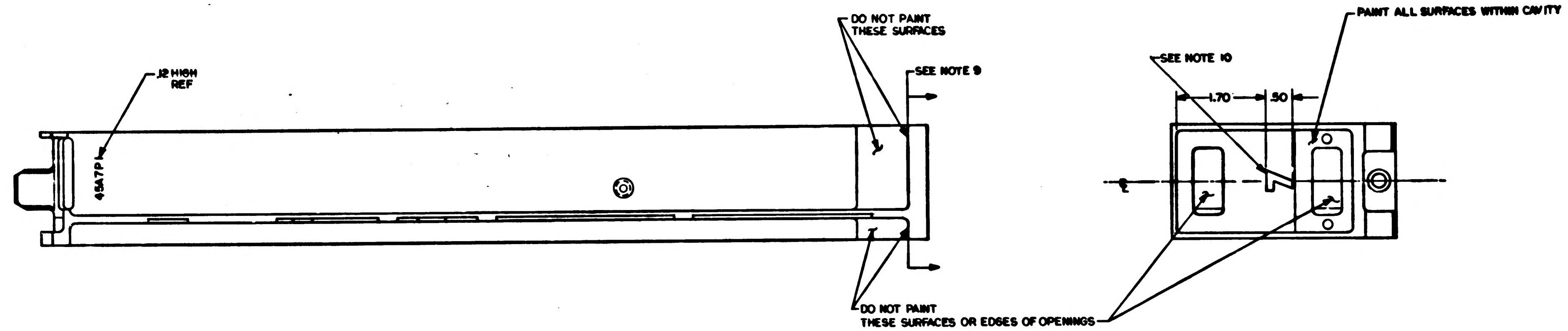
REVISIONS 20129			
SYM	DESCRIPTION	DATE	APPROVAL

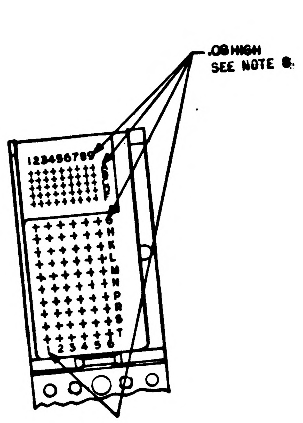

K
K
.12 HIGH REF
.08 HIGH SEE NOTE 8
1007054
1007054
1007063
1007056
1007052
1007081
SURFACE-D- REF
25
3
23
3
3
13
16
10
2
3
16 20
12
15
7
9
16
20
24
24
28
32
28 30
33 35

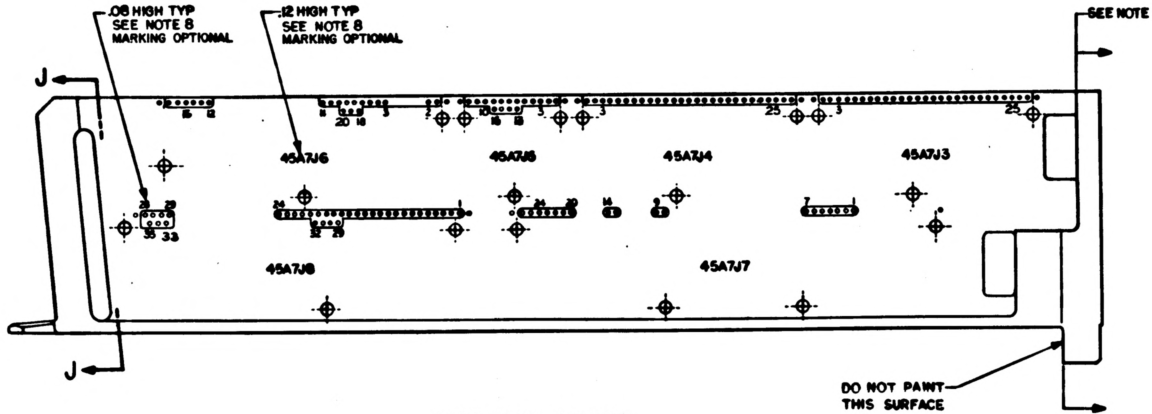
VIEW ROTATED 180°


45A7J1
45A7J2
.12 HIGH REF MARKING OPTIONAL
.08 HIGH REF MARKING OPTIONAL

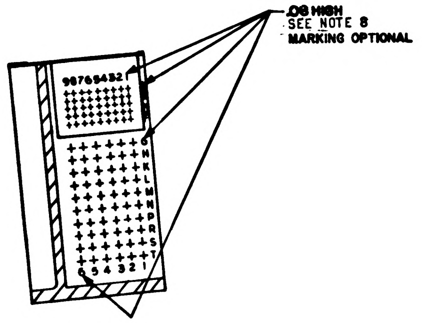
SECTION K-K


.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES
SEE NOTE 9
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS
PAINT ALL SURFACES WITHIN CAVITY
SEE NOTE 10
1.70
.50
℄


.08 HIGH SEE NOTE 8
123456789
H
K
L
M
N
P
R
S
T
2 3 4 5 6


.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
SEE NOTE 9
J
J
45A7J6
45A7J5
45A7J4
45A7J3
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE
15 12
11 20 18 5
2
10 16 18 3
3
25
3
25
28 29
35 33
24
1
32 29
24 20
14
9
7 1

MARKING VIEWS


.08 HIGH SEE NOTE 8 MARKING OPTIONAL
987654321
G
H
K
L
M
N
P
R
S
T
6 5 4 3 2 1

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX .005 — ANGLES ±0°30′
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN N. Yamaguchi DATE 6 MAY 65
CHECKED Cecil Watson 13 MAY 65
APPROVAL R. Oehring 13 MAY 65
APPROVAL E. Fast 128
NASA W. J. Rhine 6-15-65
MIT APPROVAL W. Kupferschmid

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

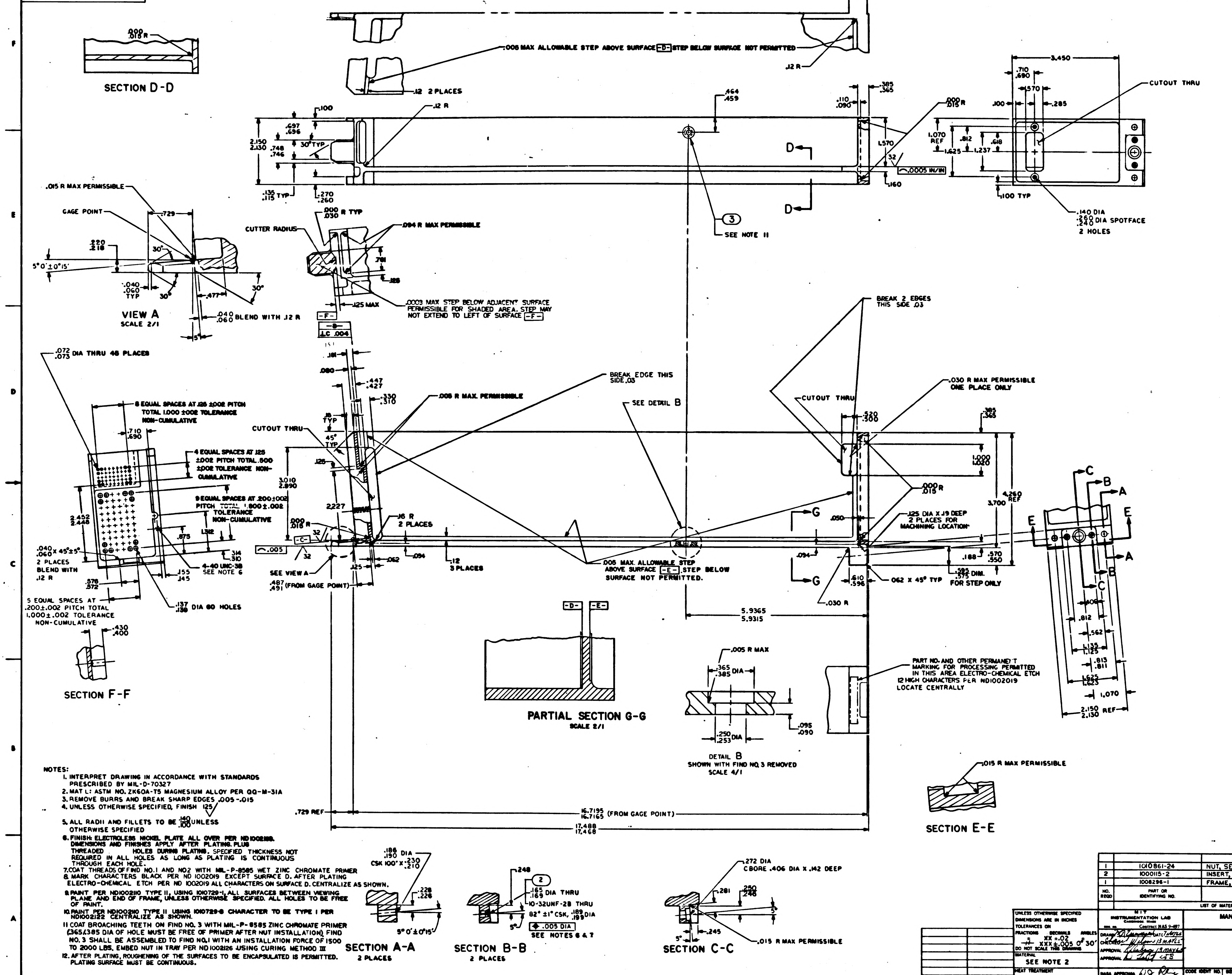
FRAME,
TRAY 7

CODE IDENT NO. 80230
SIZE E
NASA DRAWING I.D. 1008295
SCALE 1/1
WT
SHEET 3 OF 3

1008295

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS



SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.12 R
.100
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.464 .459
.110 .090
.385 .365
.000 .015 R
1.570
32
.0005 IN/IN
.160
D
D
3
SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5° 0' ± 0° 15'
.040 .060 TYP
30°
.477
30°
VIEW A
SCALE 2/1
.040 .060 BLEND WITH .12 R
5°
CUTTER RADIUS
.000 .030 R TYP
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥C .004
.181
.080
.447 .427
.330 .310
.18 TYP
45° TYP
.072 .073 DIA THRU 48 PLACES
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.710 .690
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ± .002 TOLERANCE NON-CUMULATIVE
2.452 2.448
1.312
.875
.040 .060 X 45° ± 5°
2 PLACES
BLEND WITH .12 R
.314 .310
4-40 UNC-3B
SEE NOTE 6
.155 .145
.576 .572
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON-CUMULATIVE
.137 .138 DIA 60 HOLES
.430 .400
SECTION F-F
CUTOUT THRU
.125
3.010 2.990
2.227
.000 .015 R
32
-C-
.005
32
.16 R
2 PLACES
SEE VIEW A
.125
.062
.094
.12
3 PLACES
.487 .491 (FROM GAGE POINT)
.005 R MAX. PERMISSIBLE
BREAK EDGE THIS SIDE .03
SEE DETAIL B
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED.
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
1.000 1.020
.000 .015 R
3.700
4.260 REF
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
G
G
.050
.094
.188
.570 .550
.595 .575 DIM. FOR STEP ONLY
.610 .596
062 X 45° TYP
.030 R
5.9365 5.9315
C
B
A
E
E
A
B
C
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D-
-E-
PARTIAL SECTION G-G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH 12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005 -.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002188. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II, USING 1010729-1, ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME, UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-8 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION) FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002126 USING CURING METHOD III
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

LIST OF MATERIALS

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED SELF-LOCKING	2
1	1008296-1	FRAME, TRAY	1

NEXT ASSY	USED ON
1007275	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

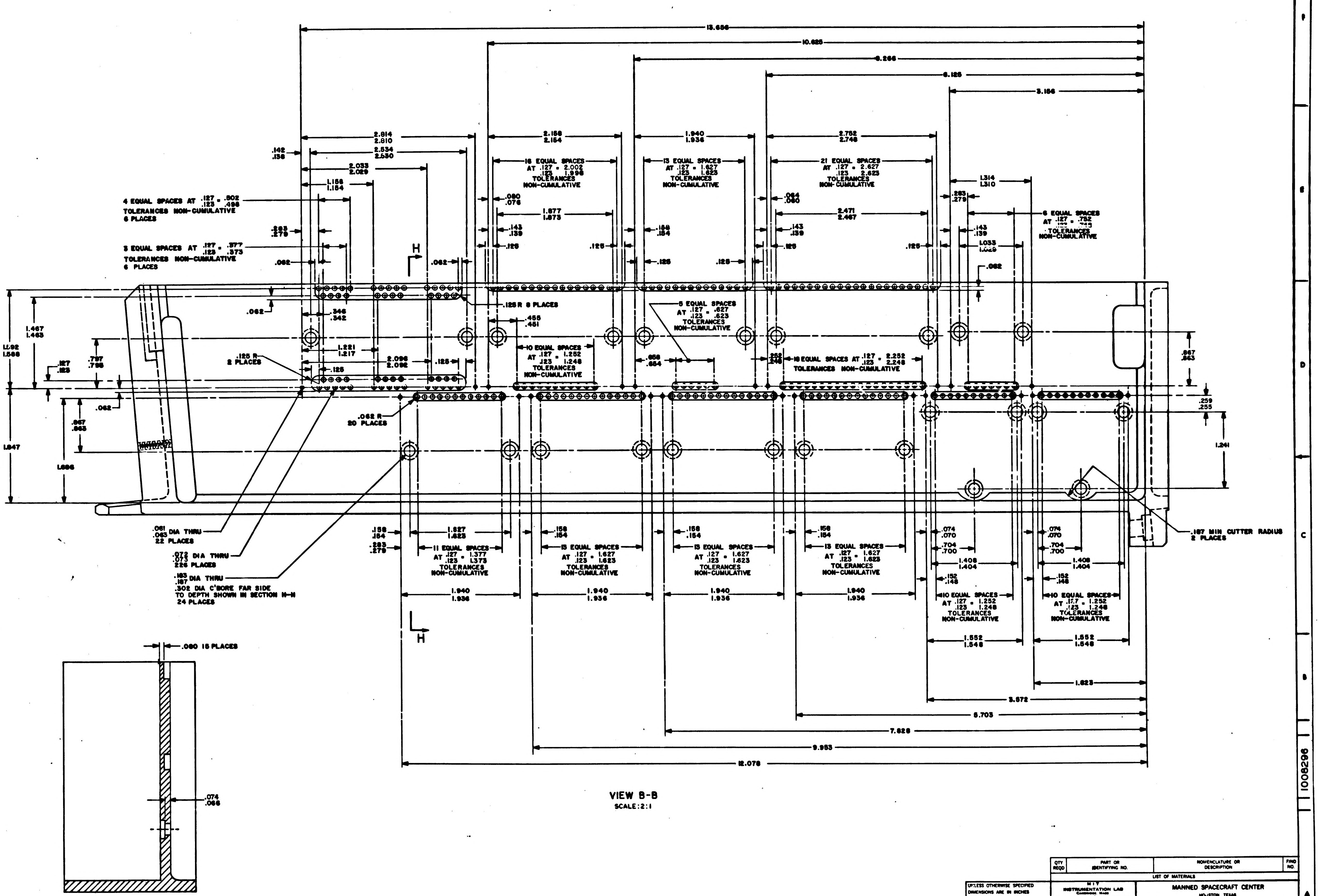
DRAWN DATE 7 MAY 65
CHECKED Wilson 13 MAY 65
APPROVAL 13 MAY 65
APPROVAL
NASA APPROVAL 6-15-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 8

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008296
SCALE 1/1
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO


13.656
10.625
8.266
6.125
3.156
2.814
2.810
2.534
2.530
2.033
2.029
1.156
1.154
.142
.138
4 EQUAL SPACES AT .127/.123 = .502/.498
TOLERANCES NON-CUMULATIVE
6 PLACES
.283
.279
3 EQUAL SPACES AT .127/.123 = .377/.373
TOLERANCES NON-CUMULATIVE
6 PLACES
.062
H
2.158
2.154
16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCES NON-CUMULATIVE
.080
.076
1.877
1.873
.143
.139
.125
1.940
1.936
13 EQUAL SPACES AT .127/.123 = 1.627/1.623
TOLERANCES NON-CUMULATIVE
.158
.154
2.752
2.748
21 EQUAL SPACES AT .127/.123 = 2.627/2.623
TOLERANCES NON-CUMULATIVE
.064
.060
2.471
2.467
1.314
1.310
.283
.279
6 EQUAL SPACES AT .127/.123 = .752/.748
TOLERANCES NON-CUMULATIVE
1.033
1.029
.062
.125 R 8 PLACES
.346
.342
.455
.451
5 EQUAL SPACES AT .127/.123 = .627/.623
TOLERANCES NON-CUMULATIVE
1.592
1.588
1.467
1.463
.797
.793
.127
.123
.125 R
2 PLACES
1.221
1.217
2.096
2.092
10 EQUAL SPACES AT .127/.123 = 1.252/1.248
TOLERANCES NON-CUMULATIVE
.658
.654
.252
.248
18 EQUAL SPACES AT .127/.123 = 2.252/2.248
TOLERANCES NON-CUMULATIVE
.867
.863
.259
.255
.062
.062 R
20 PLACES
1.847
.867
.863
1.686
1.241
.061/.063 DIA THRU
22 PLACES
.072/.073 DIA THRU
226 PLACES
.183/.187 DIA THRU
.302 DIA C'BORE FAR SIDE
TO DEPTH SHOWN IN SECTION H-H
24 PLACES
.187 MIN CUTTER RADIUS
2 PLACES
1.627
1.623
11 EQUAL SPACES AT .127/.123 = 1.377/1.373
TOLERANCES NON-CUMULATIVE
.074
.070
.704
.700
1.408
1.404
.152
.148
10 EQUAL SPACES AT .127/.123 = 1.252/1.248
TOLERANCES NON-CUMULATIVE
1.552
1.548
1.623
3.572
5.703
7.628
9.953
12.078
H

VIEW B-B
SCALE: 2:1

.080 15 PLACES
.074
.066

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS .XX ± .02 .XXX ± .005
ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497
DRAWN [illegible] DATE 7 MAY 65
CHECKED Chase Wilson 13 MAY 65
APPROVAL R Olsen 13 MAY 65
APPROVAL [illegible] 65
NASA APPROVAL [illegible] 6-15-65
MIT APPROVAL W [illegible] 15 June 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 8

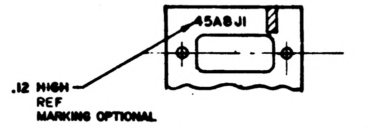
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008296
SCALE 2:1
WT
SHEET 2 OF 3

1008296

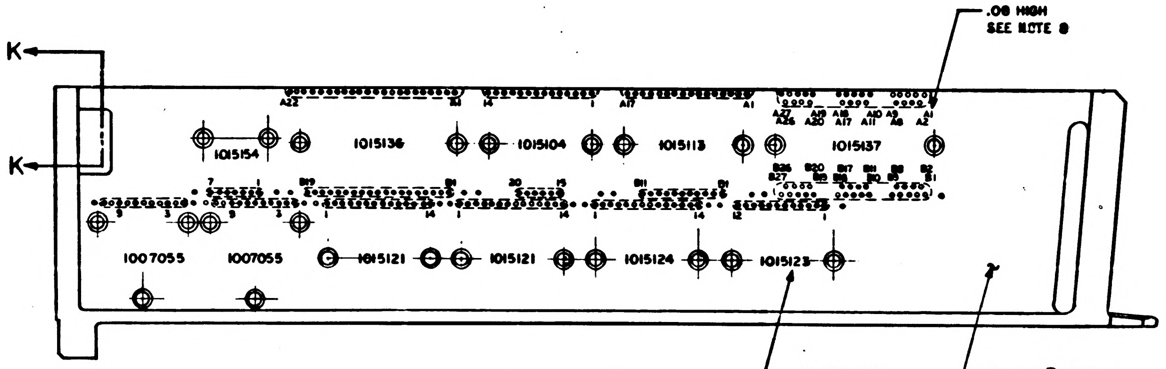
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

SYM	DESCRIPTION	DATE	APPROVAL

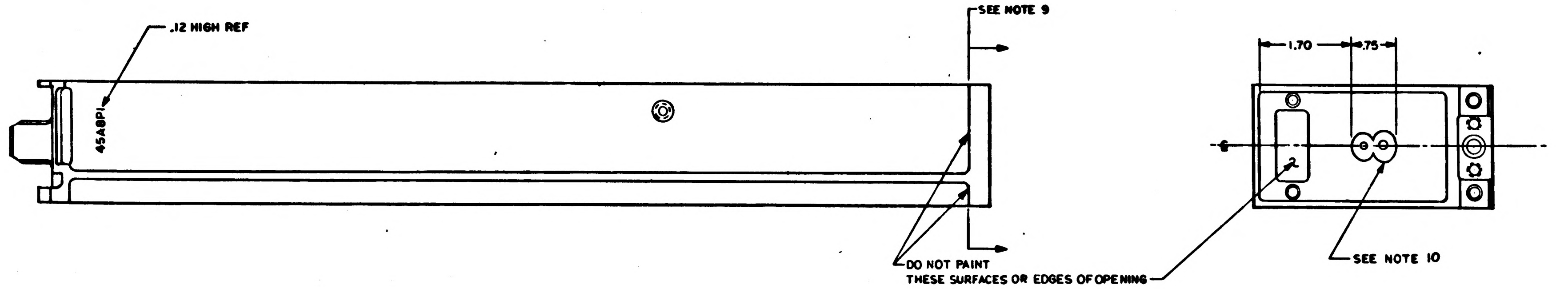
REVISIONS 20729

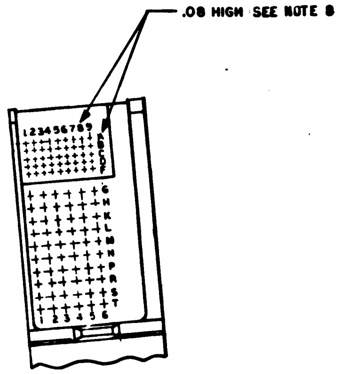

45A8J1
.12 HIGH
REF
MARKING OPTIONAL

PARTIAL SECTION K-K


K
K
.08 HIGH
SEE NOTE 8
A22
A17
A1
A27 A26 A19 A20 A18 A17 A10 A11 A9 A8 A1 A2
1015154
1015136
1015104
1015113
1015137
B26 B27 B20 B19 B17 B18 B11 B10 B8 B5 B2 B1
7
1
B19
B1
20
15
B11
B1
9
3
14
12
1007055
1007055
1015121
1015121
1015124
1015123
2
.12 HIGH REF
SURFACE -D- REF

VIEW ROTATED 180°


.12 HIGH REF
45A8P1
SEE NOTE 9
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENING
1.70
.75
SEE NOTE 10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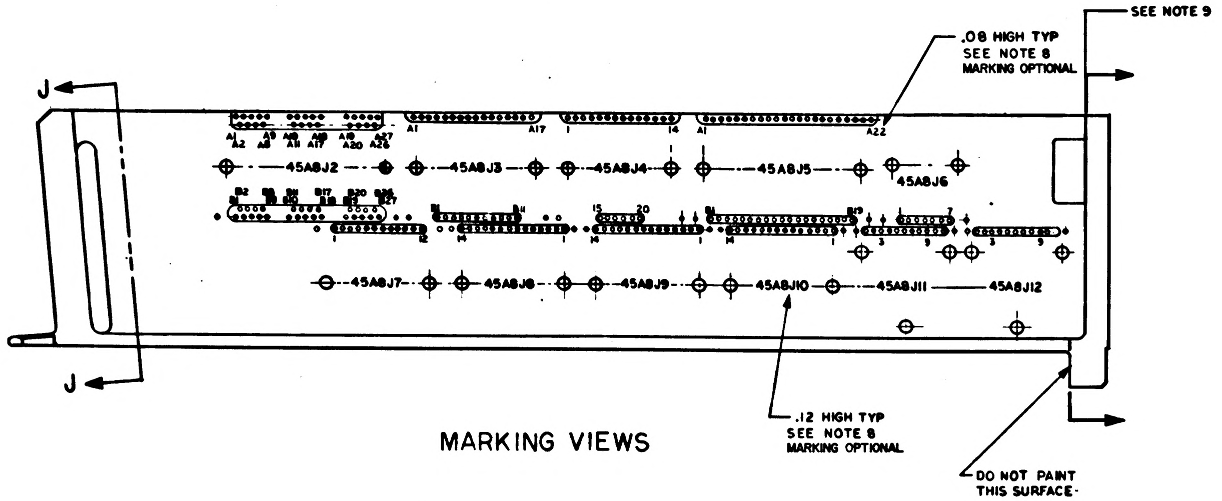
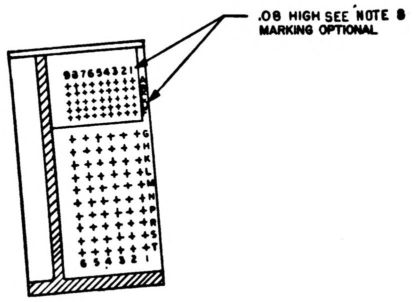
123456789
G H J K L M N P R S T


J
J
SEE NOTE 9
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
A1 A2 A9 A8 A10 A11 A18 A17 A19 A20 A27 A26
A1
A17
1
14
A1
A22
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
B2 B1 B8 B9 B11 B10 B17 B18 B20 B19 B26 B27
B1
B11
15
20
B1
B19
1
7
3
9
12
14
45A8J7
45A8J8
45A8J9
45A8J10
45A8J11
45A8J12
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
DO NOT PAINT
THIS SURFACE

MARKING VIEWS


.08 HIGH SEE NOTE 8
MARKING OPTIONAL
987654321
G H J K L M N P R S T

SECTION J-J

1008296

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —#—
HEAT TREATMENT —#—
FINAL FINISH —#—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN N. Vramerin DATE 7 May 65
CHECKED Clare Wilson 13 May 65
APPROVAL R Oakes 13 MAY 65
APPROVAL D Hoat 65
NASA APPROVAL W J Rhine 6-1-65
MIT APPROVAL W Kupfer 3 Jun 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

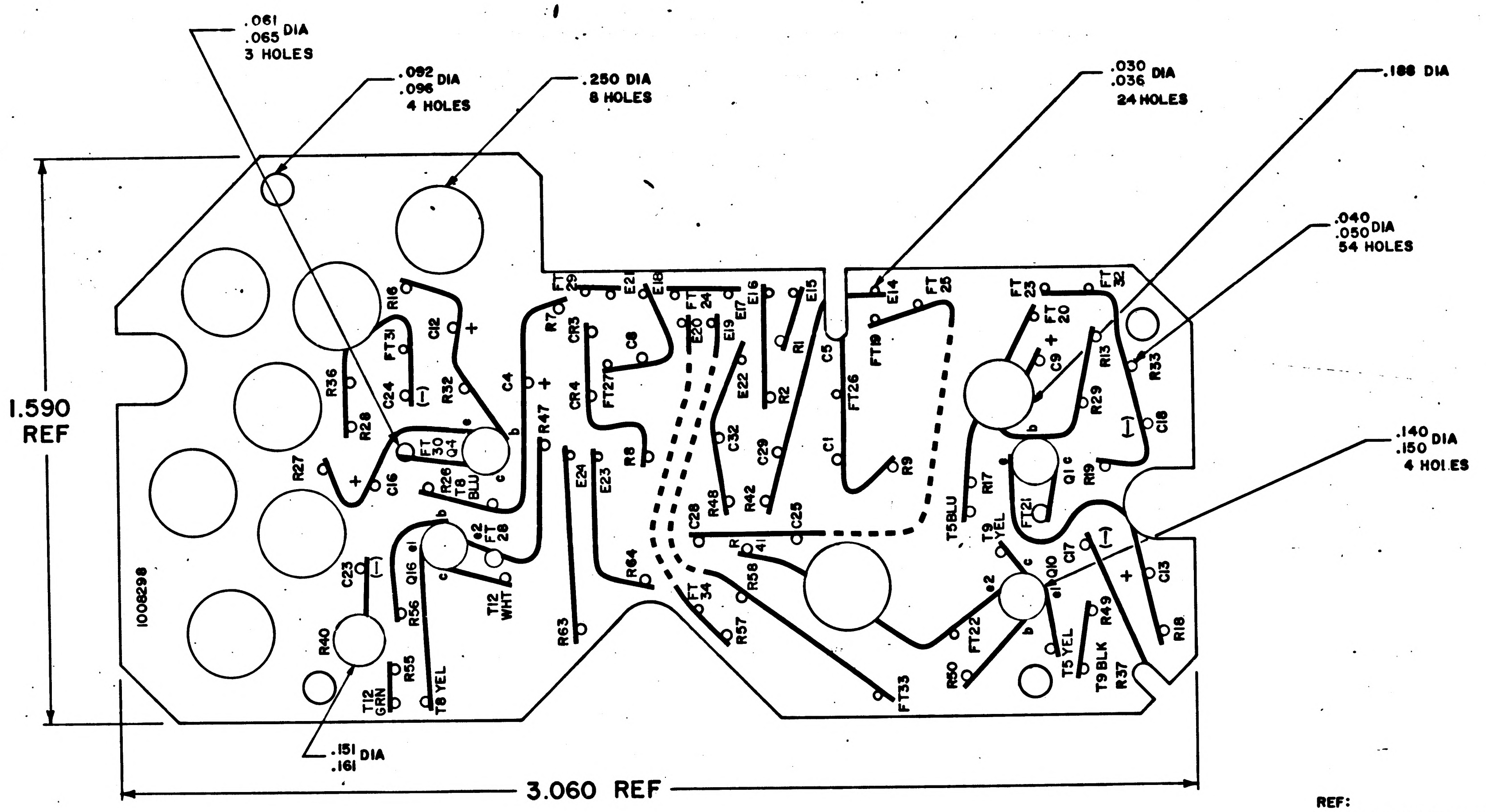
FRAME,
TRAY 8

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008296
SCALE 1/1
WT
SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008298 | 2

REVISIONS 24045					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


.061
.065 DIA
3 HOLES
.092
.096 DIA
4 HOLES
.250 DIA
8 HOLES
.030
.036 DIA
24 HOLES
.188 DIA
.040
.050 DIA
54 HOLES
.140
.150 DIA
4 HOLES
.151
.161 DIA
1.590 REF
3.060 REF
1008298
R16
C12
+
FT31
R36
C24
(−)
R32
C4
R28
FT 30 Q4
b
e
c
R27
C16
R26 T8 BLU
R47
R7
FT 29
E21
E18
FT 24
E20
E19
E17
E16
E15
E14
FT 25
FT 23
FT 20
FT 32
CR3
C8
FT27
CR4
R8
E24
E23
R64
R63
C23
Q16
e1
e2
FT 28
T12 WHT
R56
R55
R40
T12 GRN
T8 YEL
E22
R1
R2
C32
C29
C5
FT19
FT26
C1
R9
R48
R42
C28
C25
R41
R58
R57
FT 34
FT33
C9
R13
R33
R29
C18
Q1
R19
R17
T5BLU
T9 YEL
FT21
Q10
C17
C13
R49
R18
T5 YEL
T9 BLK
R37
FT22
R50

REF:
DRAWING NO. 1008311 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133.
4. MARK BLACK CHARACTERS PER ND1002019.

1007665	1007700
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± .010 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
CONTRACT NAS9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN J. Kilroy DATE 25 OCT 65
CHECKED L. Stelma 2 NOV 65
APPROVAL E. Jinsolik 2 NOV 65
APPROVAL LTB
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD A
SIGNAL CONDITIONER
CDU RESOLVER

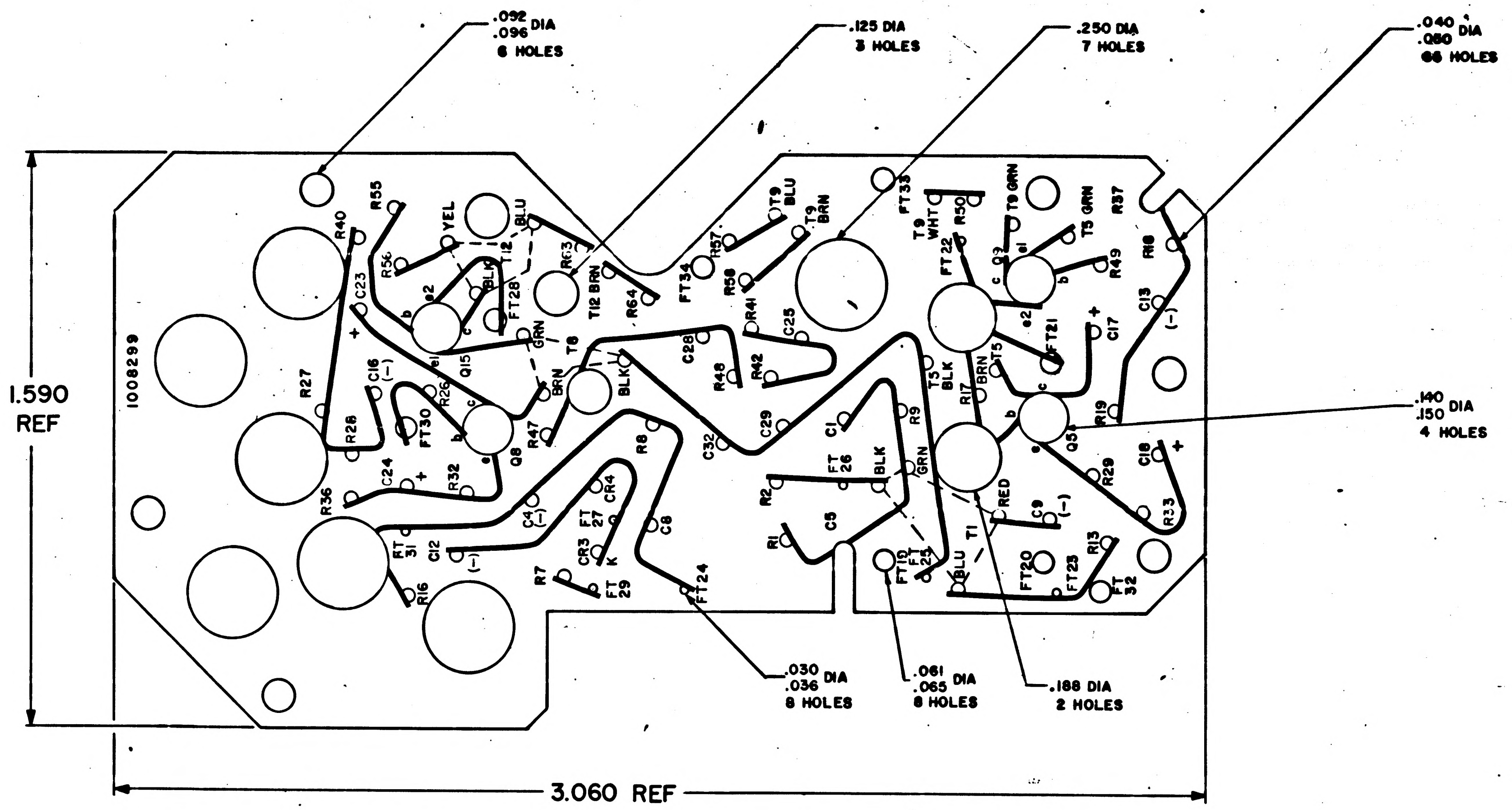
CODE IDENT NO. 80230 SIZE D 1008298
SCALE 5/1 SHEET 1 OF 1

MIL 10770-P

1008299 2

REVISIONS 24045					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



.092
.096 DIA
6 HOLES
.125 DIA
3 HOLES
.250 DIA
7 HOLES
.040
.080 DIA
66 HOLES
.140
.150 DIA
4 HOLES
.030
.036 DIA
8 HOLES
.061
.065 DIA
8 HOLES
.188 DIA
2 HOLES
1.590
REF
3.060 REF
1008299
R40
R55
YEL
BLU
T12
BLK
C23
R56
e2
b
c
FT28
GRN
R63
T12 BRN
R64
FT34
R57
T9 BLU
T9 BRN
R58
R41
C25
FT33
T9 WHT
FT22
R50
T9 GRN
T5 GRN
R37
R49
R16
C13
(-)
C17
FT21
R27
C16
(-)
e1
Q15
R26
FT30
R28
T6
BRN
BLK
R47
Q8
C28
R48
R42
C29
C1
R9
T5 BLK
R17
BRN
T5
e2
Q3
Q5
R19
C18
R29
R33
C24
R32
R36
R8
C32
FT 26
BLK
GRN
RED
C9
(-)
R13
C4
(-)
FT 27
CR4
C8
C5
R2
R1
FT10
FT 25
BLU
T1
FT20
FT23
FT 32
FT 31
C12
(-)
R16
R7
CR3
FT K
FT 29
FT24

REF:
DRAWING NO. 1008312 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

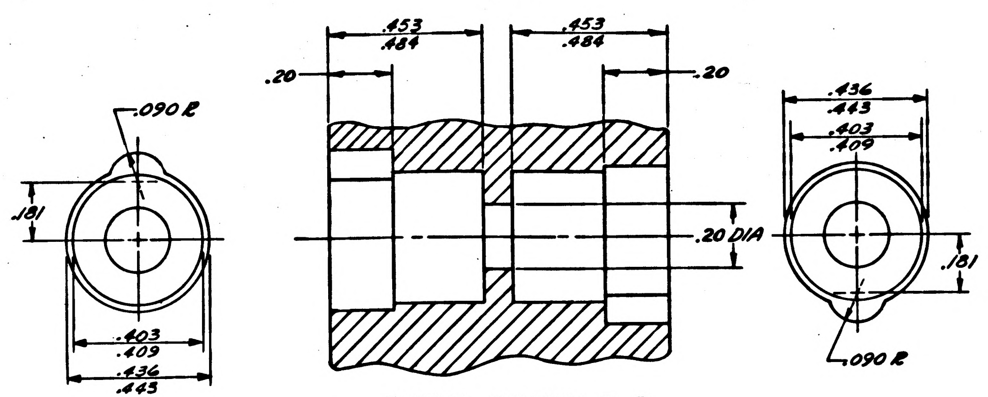
1007665 NEXT ASSY	1007700 USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± .010 ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		DO NOT SCALE THIS DRAWING	DRAWN D. Dobbert 29 Oct 1965 DATE CHECKED J. Stelma 1 NOV 65 APPROVAL E. J. Sinkiewicz 1 NOV 65 APPROVAL	WIRING BOARD B SIGNAL CONDITIONER CDU RESOLVER
		MATERIAL SEE NOTE 2	NASA APPROVAL	CODE IDENT NO. 80230 · SIZE D · 1008299
		CONTRACT NAS 9-497	MIT APPROVAL	SCALE · SHEET

MIL 10770-F

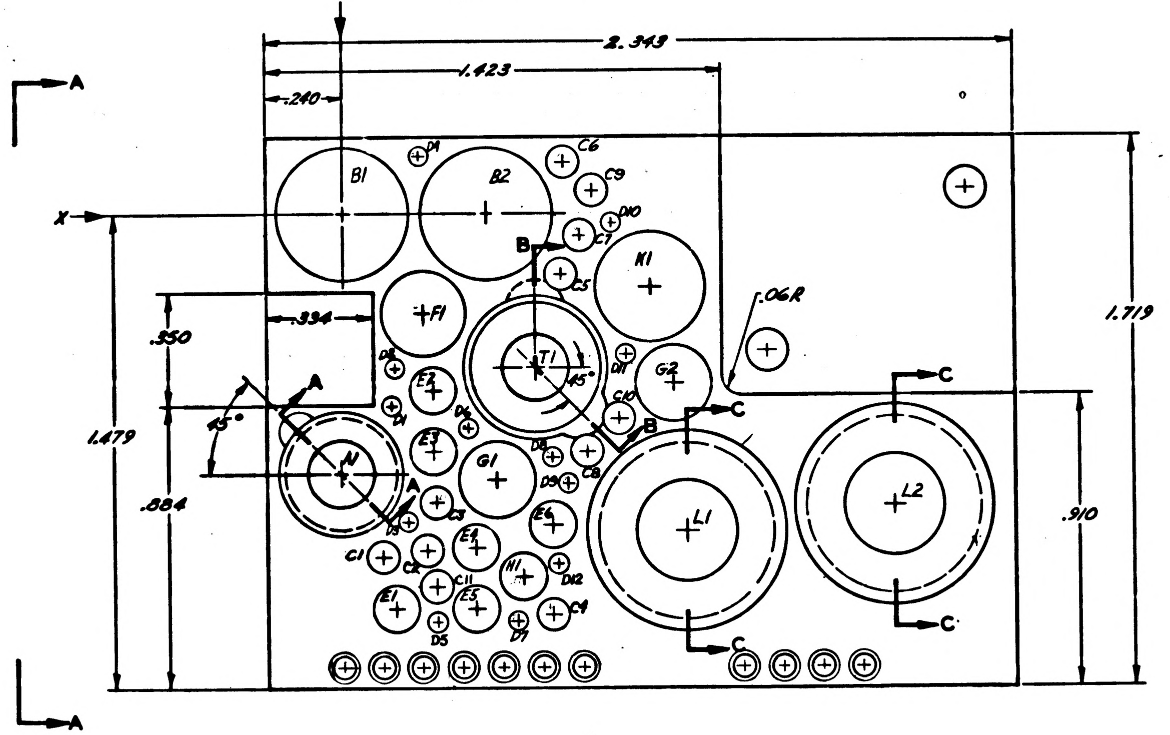
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.

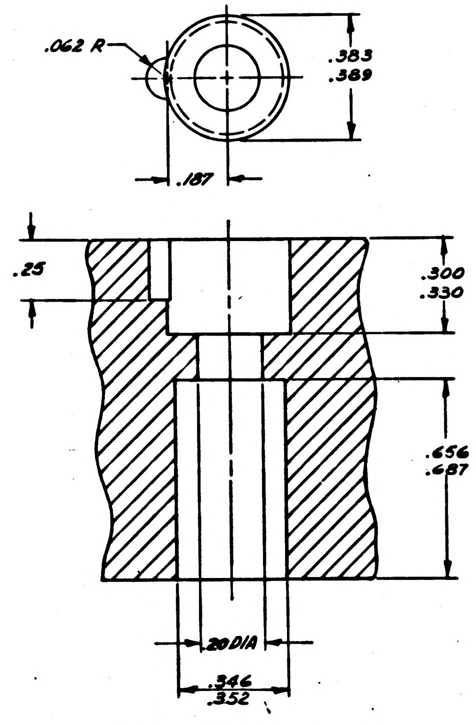
SEE NOTE 8

HOLE NO.	X DIM	Y DIM	HOLE DIA	QTY
A1	-.010	.810	SEE SECTION A-A	1
B1	.000	.000	.419 .426 THRU	2
B2	.450	.000		
C1	.120	1.070	.100 .104 THRU	11
C2	.260	1.050		
C3	.290	.900		
C4	.650	1.250		
C5	.680	.190		
C6	.690	-.160		
C7	.740	.070		
C8	.760	.740		
C9	.780	-.070		
C10	.860	.640		
C11	.290	1.160		
D1	.150	.600	.058 .062 THRU	12
D2	.160	.480		
D3	.200	.960		
D4	.240	-.180		
D5	.290	1.270		
D6	.390	.670		
D7	.540	1.270		
D8	.650	.760		
D9	.700	.840		
D10	.840	.030		
D11	.880	.440		
D12	.670	1.090		
E1	.160	1.230	.146 .150 THRU	6
E2	.280	.550		
E3	.280	.740		
E4	.410	1.040		
E5	.410	1.230		
E6	.650	.970		
F1	.260	.320	.275 .282 THRU	1
G1	.480	.830	.233 .237 THRU	2
G2	1.030	.530		
H1	.560	1.130	.110 .114 THRU	1
J1	.600	.480	SEE SECTION B-B	1
K1	.960	.230	.330 .337 THRU	1
L1	1.070	.990	SEE SECTION C-C	2
L2	1.720	.910		

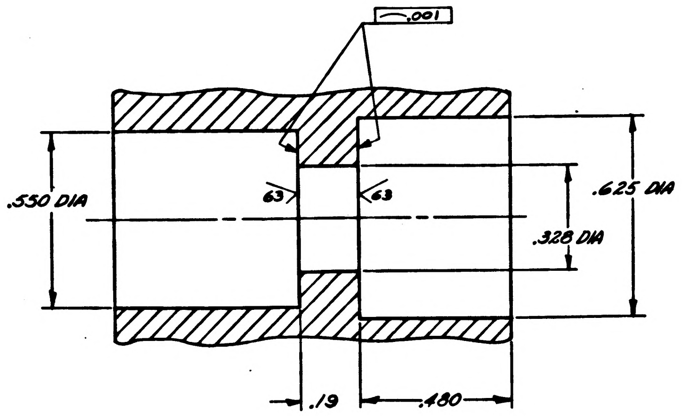


PARTIAL SECTION B-B





PARTIAL SECTION A-A
ROTATED 45° CCW



PARTIAL SECTION C-C
2 PLACES

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: MAGNESIUM ALY PER QQ-M-31 TEMPER T5, (TYPE ZK60A).
3. FINISH:
   a. ANODIZE PER MIL-M-3171, TYPE IV. PLUG INSERT HOLES.
   b. COAT ITEM (2) AND THREADS IN ITEM (1) USING ITEM (3).
4. UNLESS OTHERWISE SPECIFIED:
   a. SURFACE ROUGHNESS MUST NOT EXCEED 125√.
   b. ALL CORNERS TO BE .010 R OR CHAMFER.
   c. ALL FLAT SURFACES TO BE SQUARE AND/OR PARALLEL WITHIN .010.
5. MUST BE FREE FROM BURRS.
6. ARROW INDICATES DIRECTION OF POSITIVE (+) DIMENSION.
7. HOLE NUMBERS ARE FOR MANUFACTURING REFERENCE.
8. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART.
9. INSTALL ITEM (2) PER MS33646. REMOVE TANG.

NECP A31

	ITEM NO.	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
	3	AR	MIL-P-8585	PRIMER
SEE NOTE 3	2	3	MS 21209-C0620	INSERT, SCREW LOCKING
SEE NOTES 2 & 3	1	1	1008300-001	HEATSINK

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1007544	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ —	±.005	+1°
−	±.02	−1°

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C.M. Kolb DATE 11 FEB 65
CHECKED A. Ulrich 17 FEB 65
APPROVAL 11 FEB 65
APPROVAL 19 FEB 65
NASA APPROVAL
MIT APPROVAL W. Kupfer 19 Feb 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

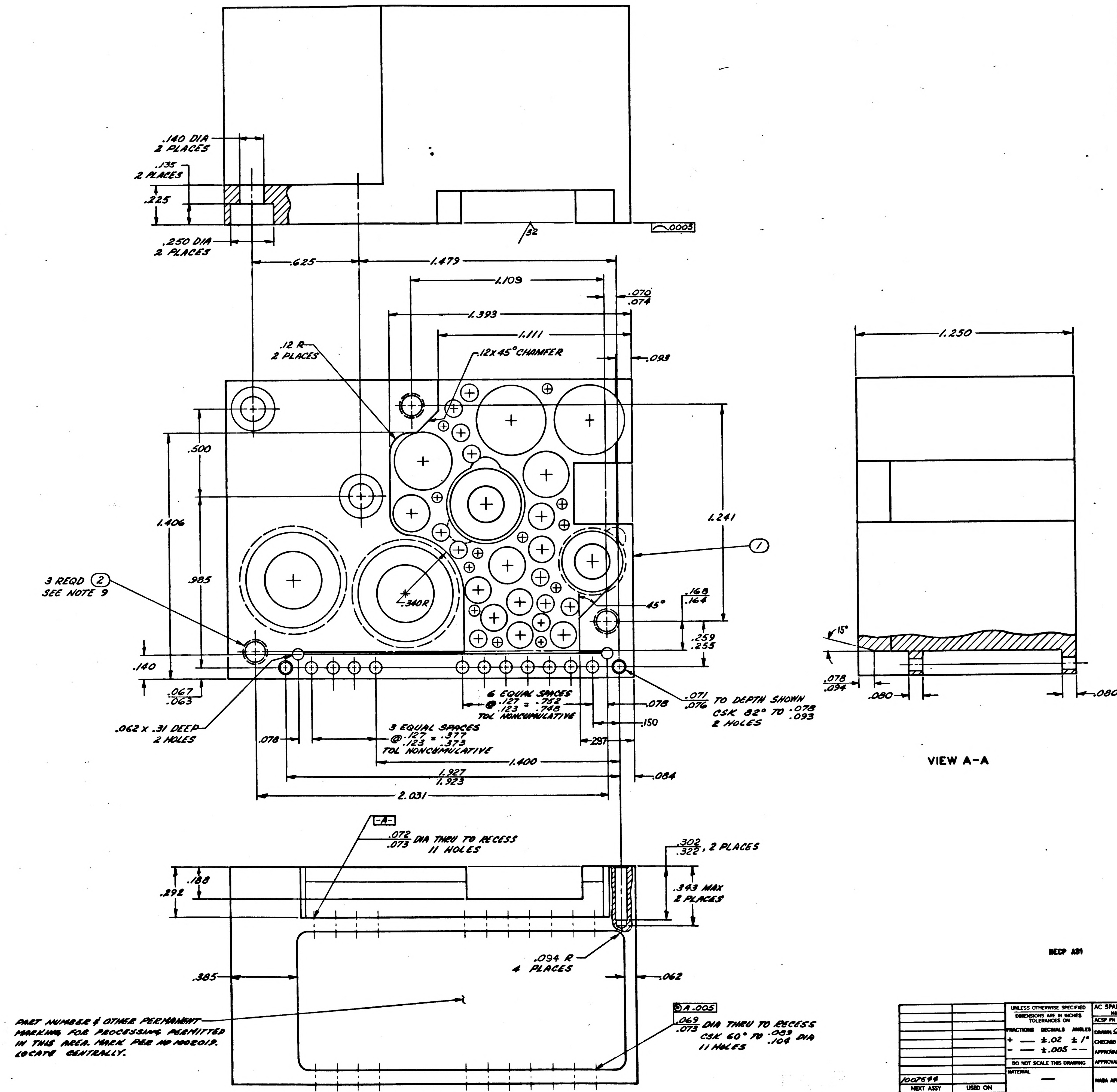
HEATSINK
AMPLIFIER 1% 3200 CPS
(INSEPARABLE ASSEMBLE)

CODE IDENT NO.
SIZE E
1008300
SCALE 5/1
SHEET 1 OF 2

Charleston
18 FEB 65

1008300

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD



.140 DIA 2 PLACES
.135 2 PLACES
.225
.250 DIA 2 PLACES
32
⌒.0005
.625
1.479
1.109
.070 .074
1.393
1.111
.093
.12 R 2 PLACES
.12 X 45° CHAMFER
.500
1.406
.985
1.241
①
3 REQD ② SEE NOTE 9
.340R
45°
.168 .164
.259 .255
.140
.067 .063
.062 X .31 DEEP 2 HOLES
6 EQUAL SPACES @ .127 .123 = .752 .748 TOL NONCUMULATIVE
.078
.071 .076 TO DEPTH SHOWN CSK 82° TO .078 .093 2 HOLES
.150
.078
3 EQUAL SPACES @ .127 .123 = .377 .373 TOL NONCUMULATIVE
.297
1.400
.084
1.927 1.923
2.031
-A-
.072 .073 DIA THRU TO RECESS 11 HOLES
.302 .322, 2 PLACES
.188
.292
.343 MAX 2 PLACES
.094 R 4 PLACES
.385
.062
⊙ A .005
.069 .073 DIA THRU TO RECESS CSK 60° TO .089 .104 DIA 11 HOLES
PART NUMBER & OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. MARK PER MD 1002019. LOCATE CENTRALLY.
1.250
15°
.078 .094
.080
.080
VIEW A-A

NECP A31

1007544	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ —	±.02	± 1°
– —	±.005	– –

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C. M. Kulo DATE 11 FEB 65
CHECKED A. Uldovich 17 FEB 65
APPROVAL 11 FEB 65
APPROVAL 19 FEB 65
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

HEATSINK
AMPLIFIER 1% 3200 CPS
(INSEPARABLE ASSEMBLY)

CODE IDENT NO. | SIZE E | 1008300
SCALE 5/1 | SHEET 2 OF 2

1008300

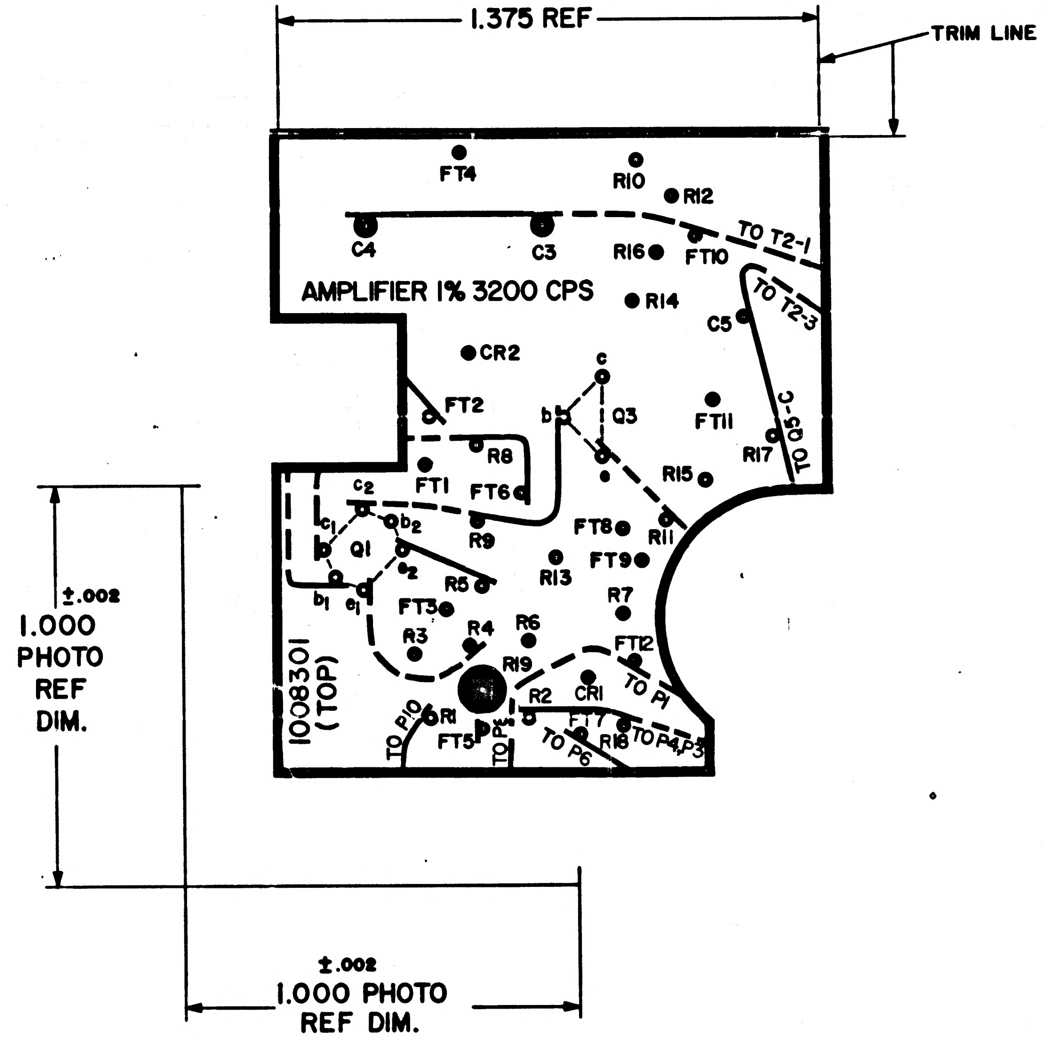
1008301 | 2

REVISIONS 17676

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER FOOT.
3. CUT TO WITHIN .010 OF TRIMLINE.
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN.
5. MATERIAL: FILM .006/.008 THICK PER L-F-340, TYPE IB, CLASS 2, STYLE IA.
6. BROKEN LINES DENOTE SLEEVING.
7. ● .045/.050 DIA
8. ◉ .085/.095 DIA
9. ● .120/.130 DIA


1.375 REF
TRIM LINE
FT4
R10
R12
C4
C3
R16
FT10
TO T2-1
AMPLIFIER 1% 3200 CPS
R14
TO T2-3
C5
CR2
c
FT2
b
Q3
FT11
TO Q5-C
R17
R8
R15
FT1
FT6
c2
c1
b2
Q1
R9
FT8
R11
e2
FT9
R13
b1
e1
R5
FT3
R7
R3
R4
R6
FT12
R19
1008301 (TOP)
R2
CR1
TO P1
TO P10
R1
FT5
TO P
FT7
R18
TO P4,P3
TO P6
±.002
1.000 PHOTO REF DIM.
±.002
1.000 PHOTO REF DIM.

1007544-011	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN DRAWN [illegible] 9 FEB 65 DATE 11 FEB 65 CHECKED APPROVAL [illegible] 10 FEB 65 APPROVAL [illegible] 19 FEB 65	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
NEXT ASSY	DO NOT SCALE THIS DRAWING		INSULATOR PHOTOGRAPHIC MASTER AMPLIFIER 1% 3200 CPS	
USED ON	MATERIAL SEE NOTE 5	NASA APPROVAL [illegible] 3/1/65	CODE IDENT NO.	SIZE D	1008301
APPLICATION	CONTRACT NAS 9-497	MIT APPROVAL W Kupfer 18 Mar 65	SCALE 5:1	SHEET 1 OF 1

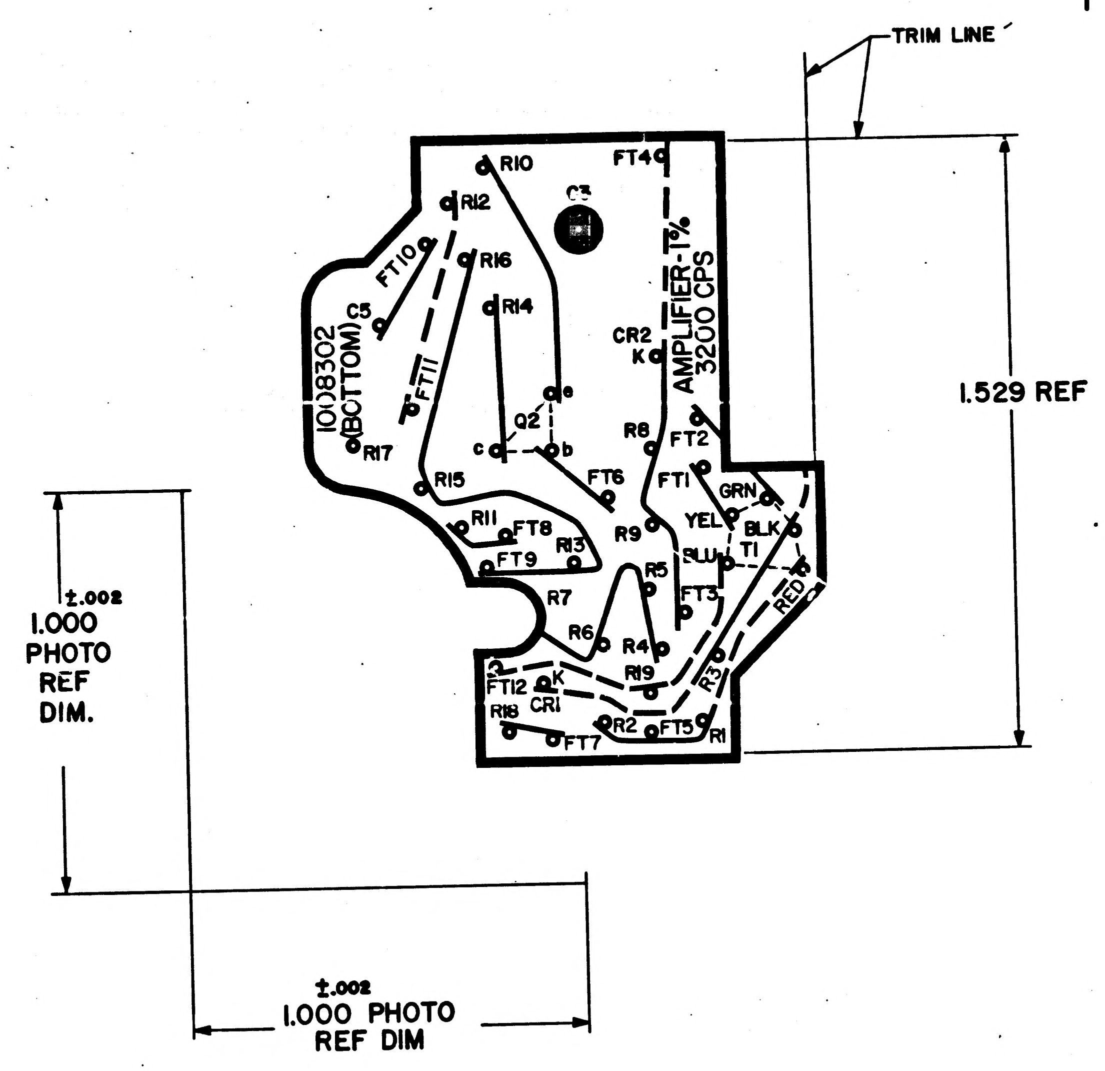
1008302 | 2

REVISIONS 17676

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER FOOT.
3. CUT TO WITHIN .010 OF TRIM LINE.
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN.
5. MATERIAL: FILM .006/.008 THICK PER L-F-340, TYPE IB, CLASS 2, STYLE IA.
6. BROKEN LINES DENOTE SLEEVING.
7. ⊙ .045/.050 DIA
8. ● .120/.130 DIA


TRIM LINE
R10
FT4
C3
R12
FT10
R16
R14
C5
1008302 (BOTTOM)
FT11
AMPLIFIER-1%
3200 CPS
CR2
K
e
Q2
c
b
R17
R8
FT2
R15
FT6
FT1
GRN
R11
FT8
R13
R9
YEL
BLK
BLU
T1
FT9
R5
FT3
R7
RED
R6
R4
R19
R3
FT12
K
CR1
R18
R2
FT5
R1
FT7
1.529 REF
±.002
1.000
PHOTO
REF
DIM.
±.002
1.000 PHOTO
REF DIM

1007544-011	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± __ DECIMALS ± __ ANGLES ± __
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION. GMC
MILWAUKEE. WISCONSIN
ACSP PN
DRAWN A Kauffman DATE 10 FEB 65
CHECKED 11 FEB 65
APPROVAL 19 FEB 65
APPROVAL 19 FEB 65
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR
PHOTOGRAPHIC MASTER
AMPLIFIER 1% 3200 CPS

CODE IDENT NO. SIZE D 1008302
SCALE 5:1 SHEET 1 OF 1

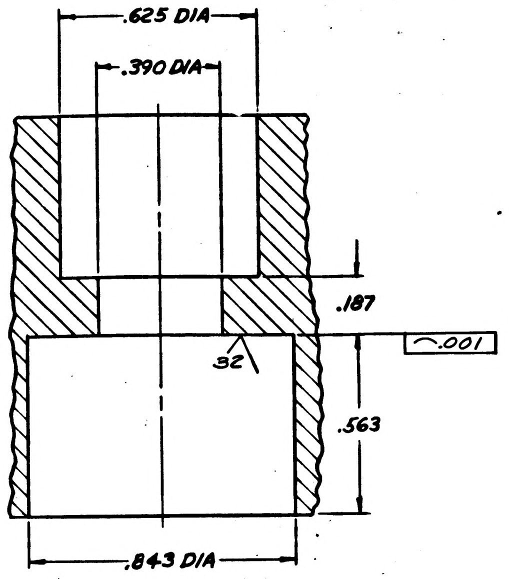
MIL 10770-P

1008302

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.

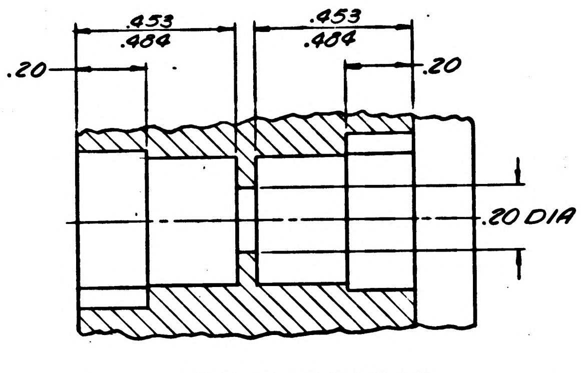
SEE NOTE 8

HOLE NO.	X DIM	Y DIM	HOLE DIA	QTY
A1	-.280	.280	.148 .152 THRU	1
B1	-.150	.200	.100 .104 THRU	5
B2	.760	.720		
B3	.900	.180		
B4	1.000	.060		
B5	.980	.470		
C1	-.080	.860	SEE SECTION A-A	2
C2	3.700	.820		
D1	-.020	.280	.058 .062 THRU	8
D2	.540	.480		
D3	.540	.900		
D4	.840	.060		
D5	.880	.520		
D6	1.120	-.060		
D7	1.310	.540		
D8	.700	.385		
E1	.000	.000	SEE SECTION C-C	1
F1	.480	.100	.584 .594 THRU	2
F2	3.590	.090		
G1	.560	.720	.227 .231 THRU	4
G2	.720	.920		
G3	.720	1.180		
G4	1.300	-.080		
H1	.720	.540	.193 .197 THRU	2
H2	.860	.360		
J1	.820	-.080	.127 .131 THRU	2
J2	1.000	-.120		
K1	1.100	.780	.521 .531 THRU	1
L1	3.300	-.110	SEE DETAIL (ZONE D3)	1
M1	1.200	.280	SEE SECTION B-B	1



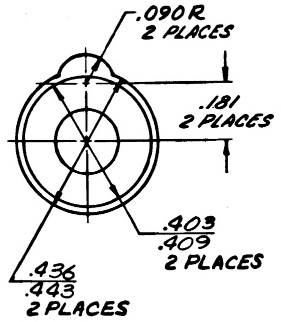
.625 DIA
.390 DIA
.187
.001
32
.563
.843 DIA

PARTIAL SECTION A-A
2 PLACES

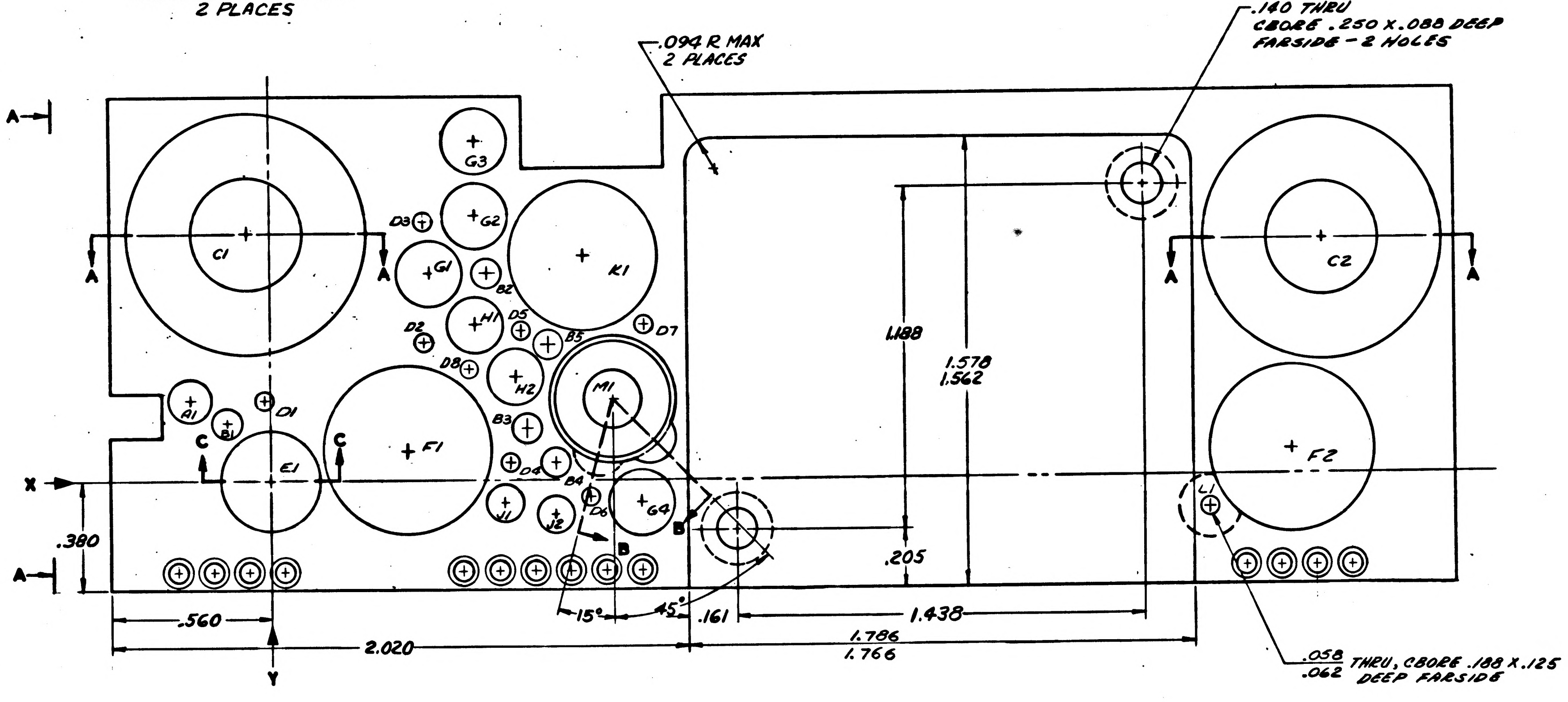


.453
.484
.453
.484
.20
.20
.20 DIA

PARTIAL SECTION B-B



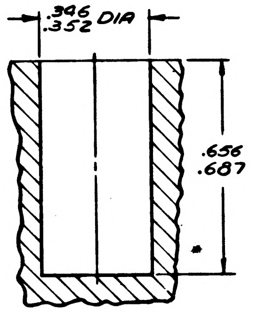
.090 R
2 PLACES
.181
2 PLACES
.403
.409
2 PLACES
.436
.443
2 PLACES



.094 R MAX
2 PLACES
.140 THRU
CBORE .250 X .088 DEEP
FARSIDE - 2 HOLES
A
A
A
A
A
A
C1
C2
G3
G2
G1
D3
B2
K1
H1
D5
D2
B5
D7
D8
H2
M1
A1
B1
D1
F1
F2
B3
C
C
E1
D4
B4
D6
G4
J1
J2
B
B
L1
X
Y
1.188
1.578
1.562
.205
.380
.560
2.020
15°
45°
.161
1.438
1.786
1.766
.058
.062 THRU, CBORE .188 X .125
DEEP FARSIDE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: AL ALY PER QQ-A-225/8 TEMPER T6, (TYPE 6061).
3. FINISH:
   a. ANODIZE PER MIL-A-8625 TYPE II, DYED BLACK. PLUG INSERT HOLES.
   b. COAT ITEM ② AND THREADS IN ITEM ① USING ITEM ③.
4. UNLESS OTHERWISE SPECIFIED:
   a. SURFACE ROUGHNESS MUST NOT EXCEED 125√.
   b. ALL CORNERS TO BE .010 R OR CHAMFER.
   c. ALL FLAT SURFACES TO BE SQUARE AND/OR PARALLEL WITHIN .010.
5. MUST BE FREE FROM BURRS.
6. ARROW INDICATES DIRECTION OF POSITIVE (+) DIMENSION.
7. HOLE NUMBERS ARE FOR MANUFACTURING REFERENCE.
8. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART.
9. INSTALL ITEM ② PER MS33646. REMOVE TANG.



.346
.352 DIA
.656
.687

PARTIAL SECTION C-C

NEOP A31

	ITEM NO.	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
	3	AR	MIL-P-8585	PRIMER
SEE NOTE 3	2	4	MS21209-C0620	INSERT, SCREW LOCKING
SEE NOTES 2 & 3	1	1	1008303-001	HEATSINK

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1007548	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ —	±.02	±1°
−	±.005	—

DO NOT SCALE THIS DRAWING

MATERIAL —

CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. M. Kibo DATE 15 FEB 65
CHECKED 17 FEB 65
APPROVAL 11 FEB 65
APPROVAL 19 FEB 65
NASA APPROVAL
MIT APPROVAL 18 Mar 65

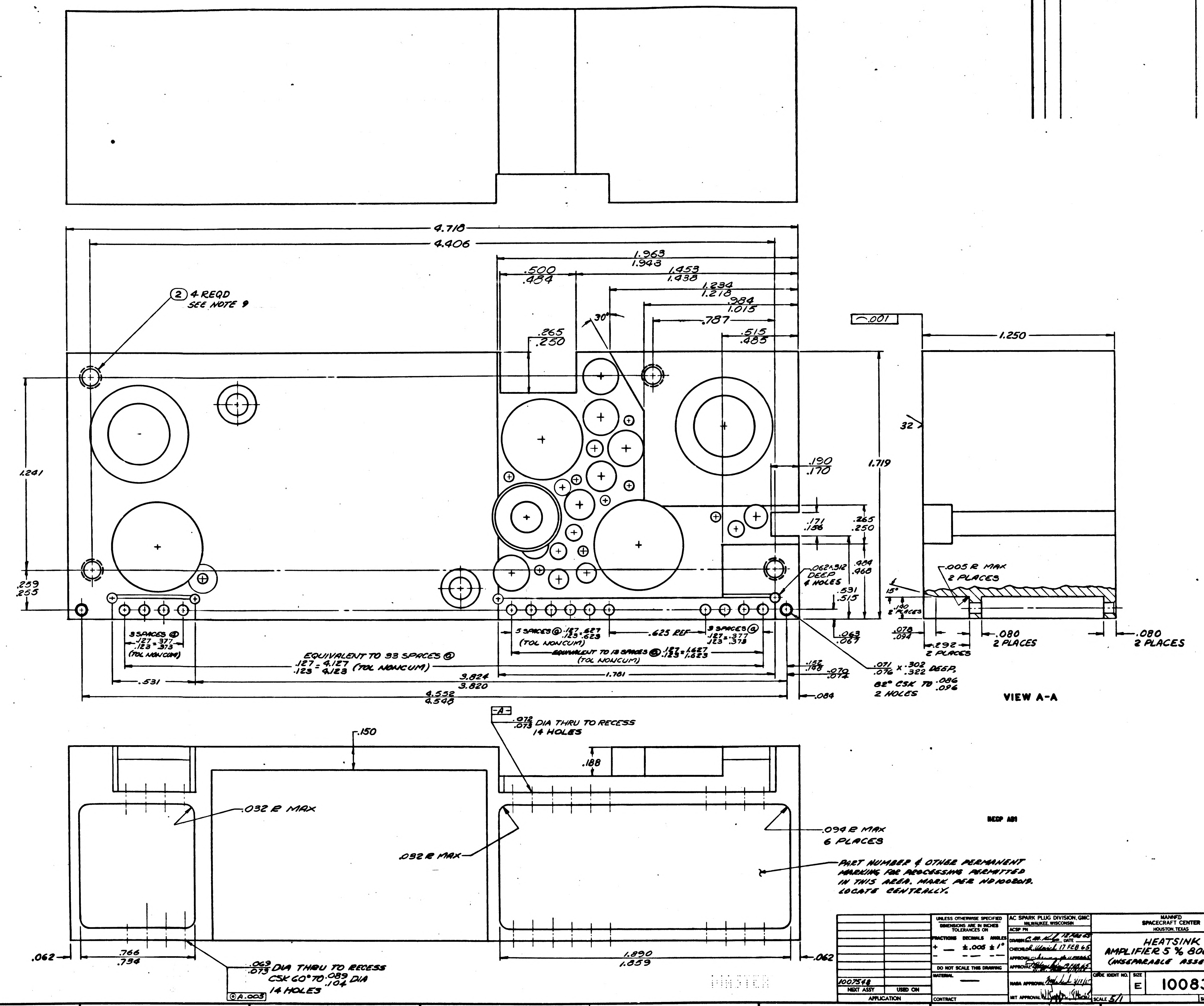
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

HEATSINK
AMPLIFIER.5% 800 CPS
(INSEPARABLE ASSEMBLY)

CODE IDENT NO.
SIZE E
1008303
SCALE 5/1
SHEET 1 OF 2

18 FEB 65

1008303


4.718
4.406
1.963 1.943
.500 .484
1.453 1.438
1.234 1.218
.984 1.015
30°
.787
.265 .250
.515 .485
② 4 REQD SEE NOTE 9
1.241
.259 .255
.190 .170
1.719
.171 .156
.265 .250
.484 .468
.062 x .312 DEEP 4 HOLES
.531 .515
.063 .067
3 SPACES @ .127/.123 = .377/.373 (TOL NONCUM)
EQUIVALENT TO 33 SPACES @ .127/.123 = 4.127/4.123 (TOL NONCUM)
.531
3.824 3.820
4.552 4.548
5 SPACES @ .127/.123 = .627/.623 (TOL NONCUM)
.625 REF
3 SPACES @ .127/.123 = .377/.373
EQUIVALENT TO 13 SPACES @ .127/.123 = 1.627/1.623 (TOL NONCUM)
1.781
.152 .148
.070 .074
.084
.071/.076 x .302/.322 DEEP, 82° CSK TO .086/.096 2 HOLES
.001
1.250
32
.005 R MAX 2 PLACES
15°
.140 2 PLACES
.078 .094
.292 2 PLACES
.080 2 PLACES
.080 2 PLACES
VIEW A-A
-A-
.072/.073 DIA THRU TO RECESS 14 HOLES
.150
.188
.032 R MAX
.032 R MAX
.094 R MAX 6 PLACES
.062
.766 .734
1.890 1.859
.062
.069/.073 DIA THRU TO RECESS CSK 60° TO .089/.104 DIA 14 HOLES
⊚ A .003
PART NUMBER & OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. MARK PER ND1002019. LOCATE CENTRALLY.

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.

1008303

1007548	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + — DECIMALS ±.005 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C. W. Kuhn 12 FEB 65 DATE
CHECKED A. Ulrich 17 FEB 65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

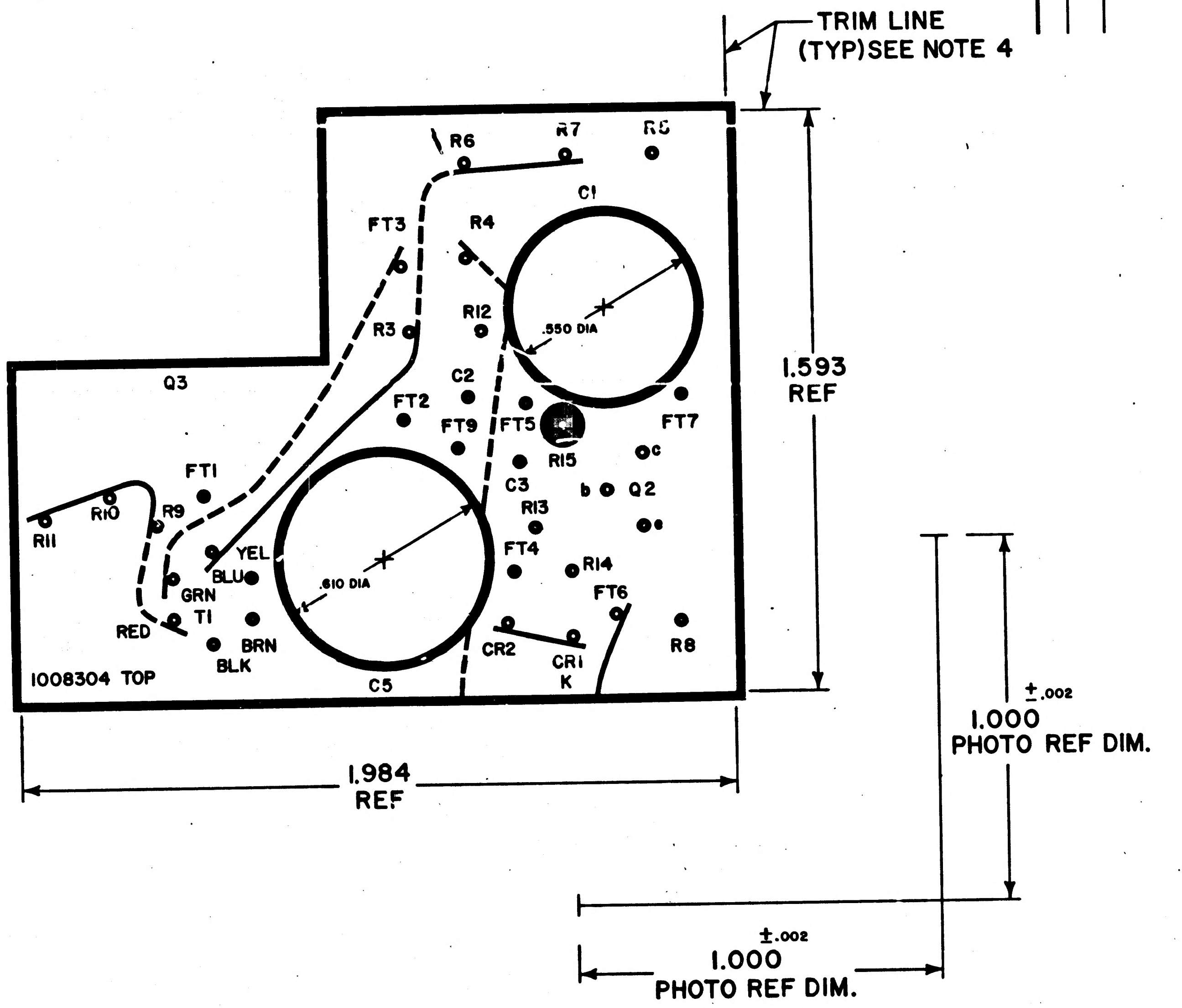
HEATSINK
AMPLIFIER 5 % 800 CPS
(INSEPARABLE ASSEMBLY)

CODE IDENT NO.
SIZE E
1008303
SCALE 5/1
SHEET 2 OF 2

REVISIONS 17676					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: FILM .006/.008 THICK PER L-F-340, TYPE IB CLASS 2, STYLE IA.
3. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER FOOT.
4. CUT TO WITHIN .010 OF TRIMLINE.
5. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN.
6. ⊙ .045/.055 DIA.
7. BROKEN LINES DENOTE SLEEVING.
8. ● .120/.130 DIA.

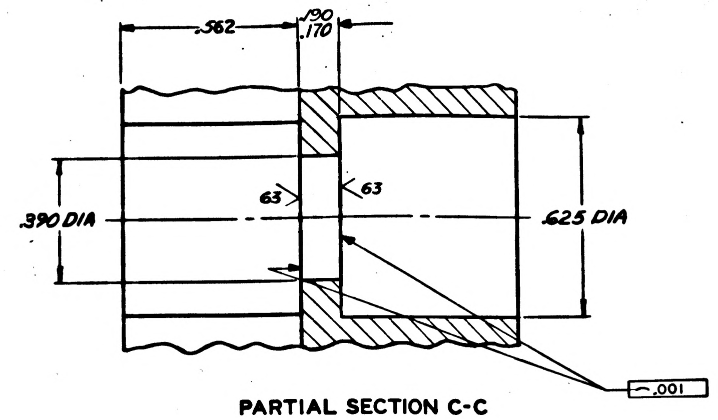

TRIM LINE
(TYP) SEE NOTE 4
R6
R7
R5
C1
FT3
R4
R12
.550 DIA
R3
C2
FT2
FT9
FT5
R15
FT7
Q3
FT1
C3
R13
b
Q2
c
e
R10
R9
R11
YEL
BLU
GRN
T1
RED
BRN
BLK
.610 DIA
FT4
R14
FT6
CR2
CR1
K
R8
1008304 TOP
C5
1.593
REF
1.984
REF
±.002
1.000
PHOTO REF DIM.
±.002
1.000
PHOTO REF DIM.

1007548		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + — − DECIMALS + — − ANGLES + — −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN DRAWN D. Hitchings DATE 9 FEB 65 CHECKED 12 FEB 65 APPROVAL 10 FEB 65 APPROVAL 10 FEB 65	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	DO NOT SCALE THIS DRAWING		INSULATOR PHOTOGRAPHIC MASTER AMPLIFIER 5% 800 CPS
APPLICATION		MATERIAL SEE NOTE 2	NASA APPROVAL	CODE IDENT NO. — SIZE D — 1008304
		CONTRACT NAS9-497	MIT APPROVAL	SCALE 5:1 — SHEET 1 OF 1

REVISIONS 17676				
SYM	ZONE	DESCRIPTION	DATE	APPD

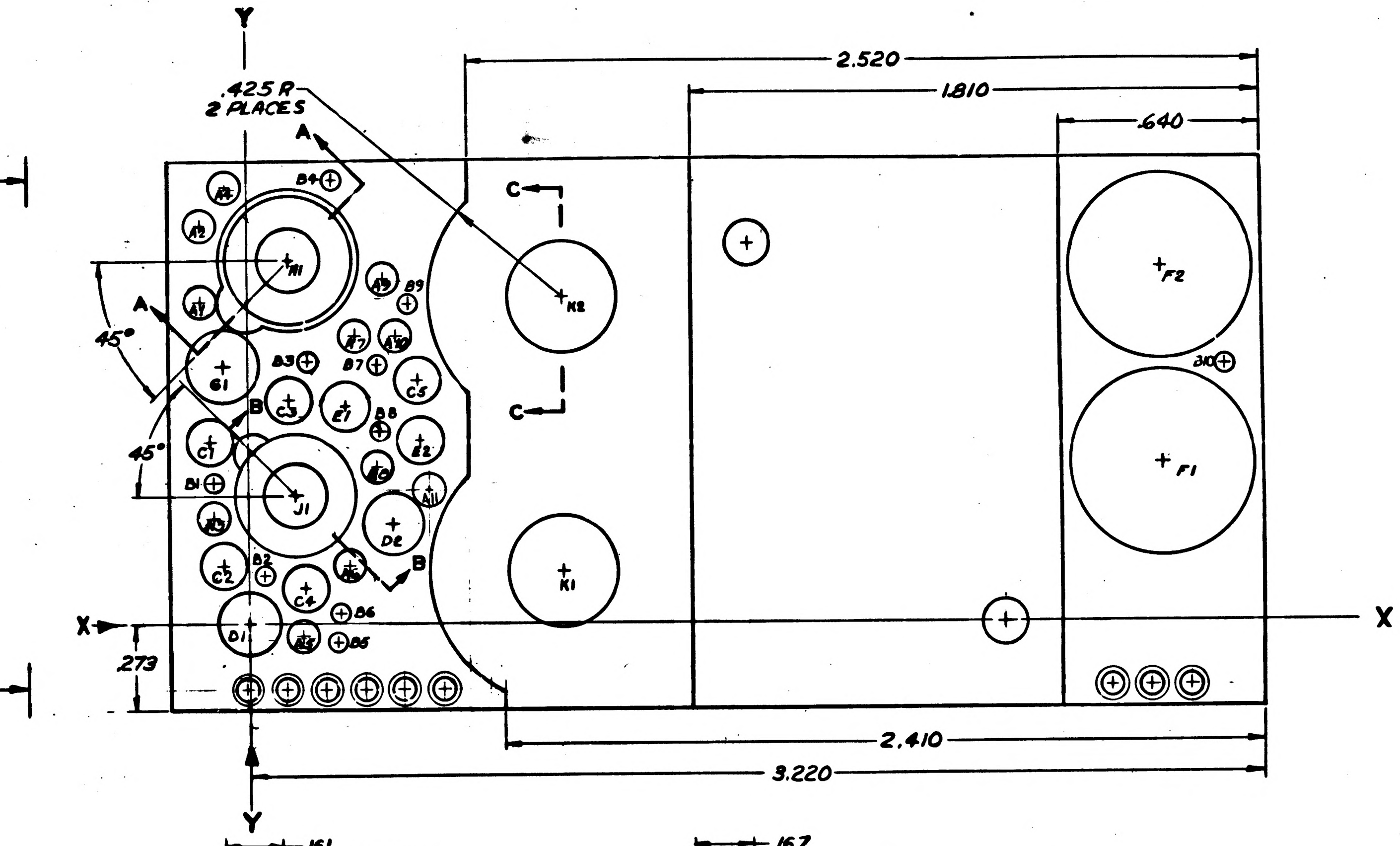
SEE NOTE 8

HOLE NO.	X DIM	Y DIM	HOLE DIA	QTY
A1	-.150	1.010	.100 .104 THRU	11
A2	-.150	1.250		
A3	-.110	.330		
A4	-.070	1.370		
A5	.170	-.040		
A6	.320	.180		
A7	.340	.900		
A8	.410	.490		
A9	.430	1.080		
A10	.470	.900		
A11	.580	.420		
B1	-.110	.440	.058 .062 THRU	10
B2	.050	.150		
B3	.190	.820		
B4	.270	1.390		
B5	.280	-.060		
B6	.290	.030		
B7	.410	.810		
B8	.420	.600		
B9	.510	1.000		
B10	3.100	.800		
C1	-.120	.570	.146 .150 THRU	5
C2	-.080	.180		
C3	.130	.700		
C4	.180	.110		
C5	.540	.760		
D1	.000	.000	.192 .196 THRU	2
D2	.460	.310		
E1	.310	.680	.153 .157 THRU	2
E2	.550	.570		
F1	2.900	.490	.587 .597 THRU	2
F2	2.900	1.110		
G1	-.080	.810	.275 .282 THRU	1
H1	.130	1.140	PARTIAL SECTION A-A	1
J1	.150	.400	PARTIAL SECTION B-B	1
K1	1.000	.160	PARTIAL SECTION C-C	2
K2	1.000	1.020		

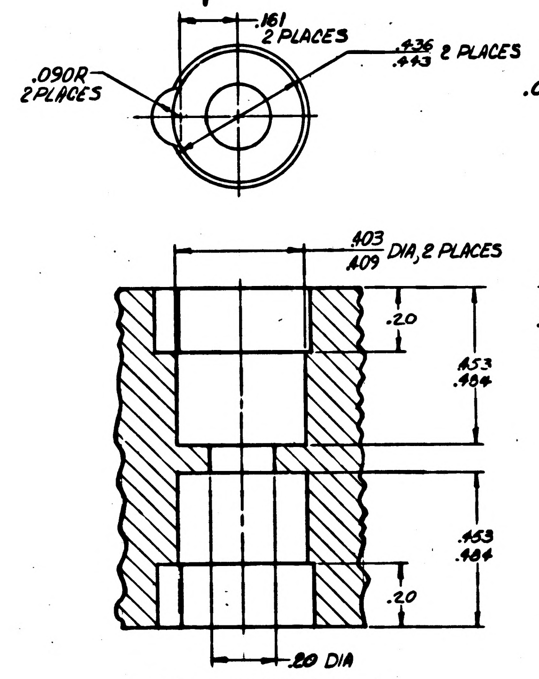


.562
.190
.170
63
63
.390 DIA
.625 DIA
.001

PARTIAL SECTION C-C

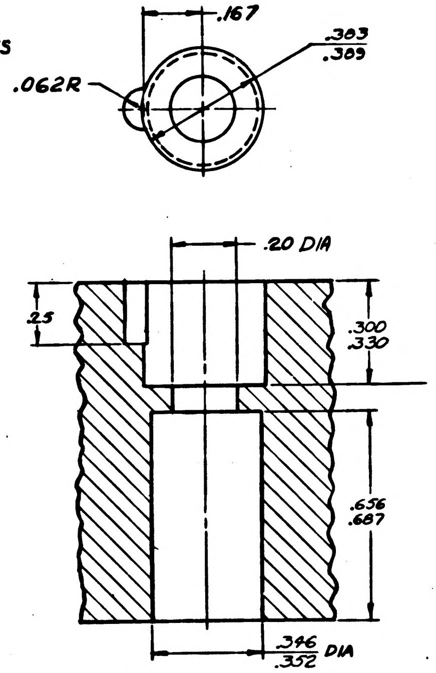


Y
.425 R
2 PLACES
A
B4
A2
A3
H1
A4
A1
A9
B9
A10
K2
C
C
45°
A
G1
B3
C3
E1
B7
C5
B8
E2
45°
B
C1
B1
J1
A8
A11
D2
K1
B2
C2
A6
C4
A5
B6
D1
B5
B6
A
A
X
X
.273
2.520
1.810
.640
F2
3.10
F1
2.410
3.220
Y



.161
2 PLACES
.436
.443
2 PLACES
.090R
2 PLACES
.403
.409
DIA, 2 PLACES
.20
.453
.484
.453
.484
.20
.80 DIA

PARTIAL SECTION A-A



.167
.383
.389
.062R
.20 DIA
.25
.300
.330
.656
.687
.346
.352
DIA

PARTIAL SECTION B-B

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: AL ALY PER QQ-A-225/8 TEMPER T6, (TYPE 6061).
3. FINISH:
   - a. ANODIZE PER MIL-A-8625, TYPE II, DYED BLACK. PLUG INSERT HOLES.
   - b. COAT ITEM ② AND THREADS IN ITEM ① USING ITEM ③.
4. UNLESS OTHERWISE SPECIFIED:
   - a. SURFACE ROUGHNESS MUST NOT EXCEED 125√.
   - b. ALL CORNERS TO BE .010 R OR CHAMFER.
   - c. ALL FLAT SURFACES TO BE SQUARE AND/OR PARALLEL WITHIN .010.
5. MUST BE FREE FROM BURRS.
6. ARROW INDICATES DIRECTION OF POSITIVE (+) DIMENSION.
7. HOLE NUMBERS ARE FOR MANUFACTURING REFERENCE.
8. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART.
9. INSTALL ITEM ② PER MS33646. REMOVE TANG.

	ITEM NO.	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
	3	AR	MIL-P-8585	PRIMER
SEE NOTE 3	2	3	MS21209-C0620	INSERT, SCREW LOCKING
SEE NOTES 2 & 3	1	1	1008306-001	HEATSINK

LIST OF PARTS AND MATERIALS

NEGP A01

1007547	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ ____	±.02	±1°
−	±.005	— —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN S. Agne DATE 11FEB65
CHECKED A. Udrach 19FEB65
APPROVAL 11FEB65
APPROVAL 19FEB65
NASA APPROVAL
MIT APPROVAL 19Mar65

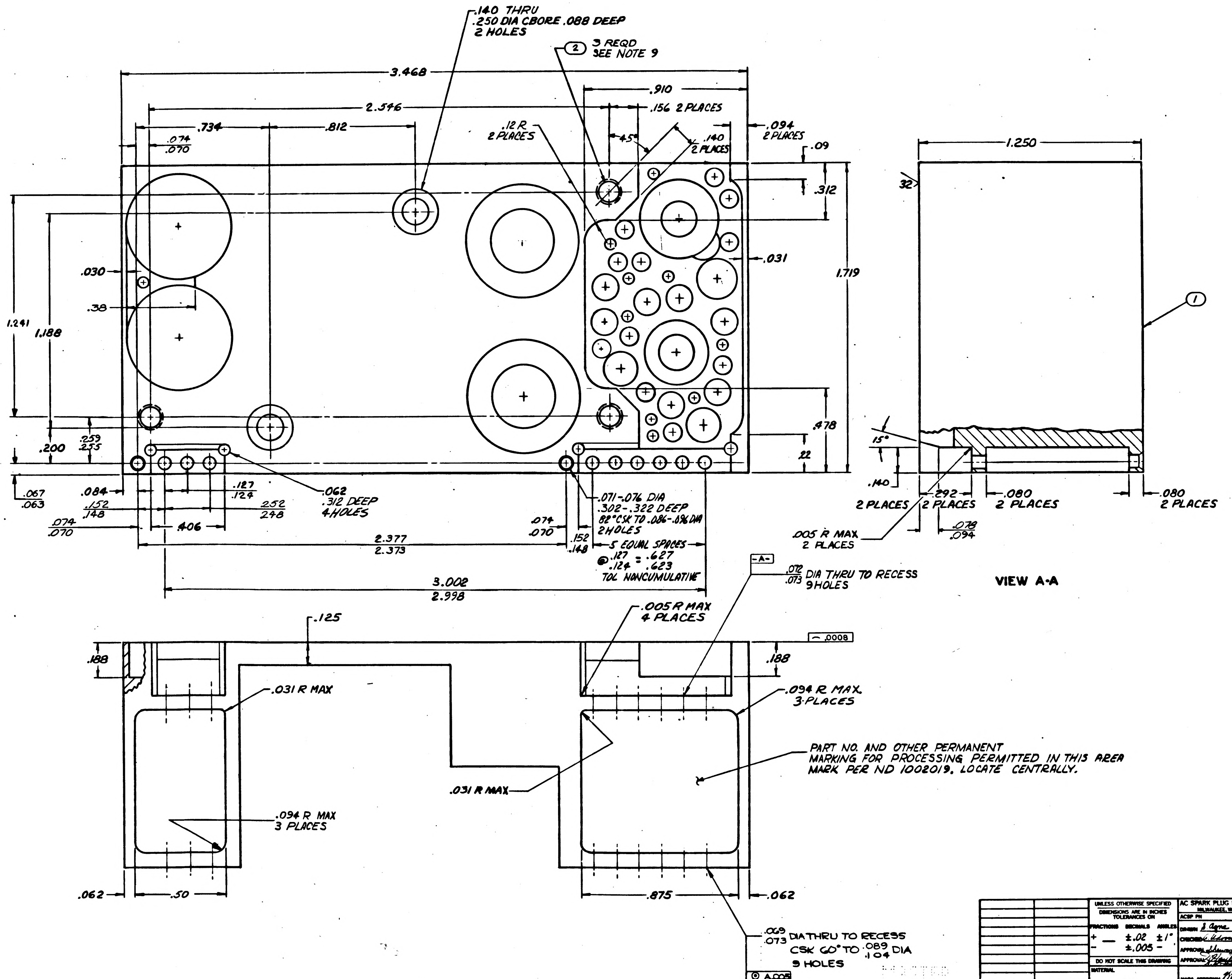
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

HEATSINK
AMPLIFIER 1% - 800CPS
(INSEPARABLE ASSEMBLY)

CODE IDENT NO.
SIZE E
1008306
SCALE 5/1
SHEET 1 OF 2

1008306

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.



.140 THRU
.250 DIA CBORE .088 DEEP
2 HOLES
② 3 REQD
SEE NOTE 9
3.468
2.546
.910
.156 2 PLACES
.734
.812
.074
.070
.12 R
2 PLACES
45°
.140
2 PLACES
.094
2 PLACES
.09
.312
.031
1.719
.030
.38
1.241
1.188
.478
22
.259
.255
.200
.067
.063
.084
.152
.148
.127
.124
.252
.248
.062
.312 DEEP
4 HOLES
.074
.070
.406
2.377
2.373
.074
.070
.152
.148
.071-.076 DIA
.302-.322 DEEP
82°CSK TO .086-.096 DIA
2 HOLES
5 EQUAL SPACES
@ .127/.124 = .627/.623
TOL NONCUMULATIVE
3.002
2.998
-A-
.072/.073 DIA THRU TO RECESS
9 HOLES
1.250
32
①
15°
.140
2 PLACES
.292
2 PLACES
.080
2 PLACES
.080
2 PLACES
.078
.094
.005 R MAX
2 PLACES
VIEW A-A
.125
.005 R MAX
4 PLACES
⌒ .0008
.188
.188
.031 R MAX
.094 R MAX.
3 PLACES
PART NO. AND OTHER PERMANENT
MARKING FOR PROCESSING PERMITTED IN THIS AREA
MARK PER ND 1002019. LOCATE CENTRALLY.
.031 R MAX
.094 R MAX
3 PLACES
.062
.50
.875
.062
.069/.073 DIA THRU TO RECESS
CSK 60° TO .089/.104 DIA
9 HOLES
◎ A .005

NECP A31

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + — − DECIMALS ±.02 ±.005 ANGLES ±1° − DO NOT SCALE THIS DRAWING	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN DRAWN S. Agne 11FEB65 CHECKED A. Udovich 18FEB65 APPROVAL 18FEB65 APPROVAL 19FEB65	MANNED SPACECRAFT CENTER HOUSTON, TEXAS HEATSINK AMPLIFIER 1% - 800 CPS (INSEPARABLE ASSEMBLY)
APPLICATION		MATERIAL — CONTRACT	NASA APPROVAL MIT APPROVAL	CODE IDENT NO. SIZE E 1008306 SCALE 5/1 SHEET 2 OF 2

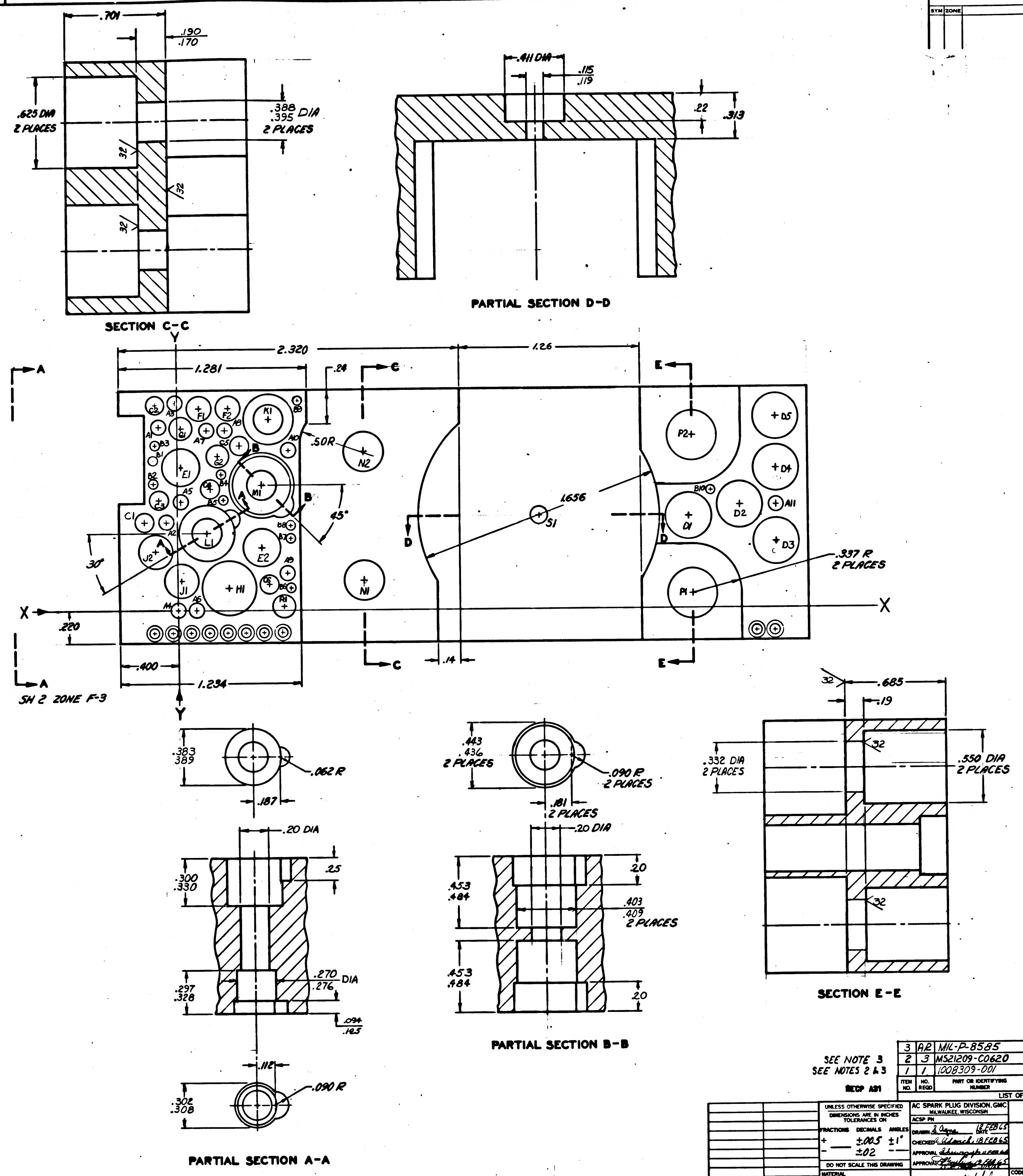
1008306

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD

REVISIONS

SEE NOTE 8

HOLE NO.	X DIM	Y DIM	HOLE DIA	QTY
A1	-.125	1.250	.100 .104 THRU	11
A2	-.075	.600		
A3	-.012	1.412		
A4	.000	.000		
A5	.025	.740		
A6	.125	.000		
A7	.200	1.225		
A8	.325	1.225		
A9	.750	.250		
A10	.762	1.087		
A11	4.100	.700		
B1	-.162	1.025	.058 .062 THRU	10
B2	-.162	.862		
B3	-.150	1.125		
B4	.300	.925		
B5	.315	.750		
B6	.775	.150		
B7	.775	.487		
B8	.775	.575		
B9	.825	1.425		
B10	3.650	.800		
C1	-.225	.600	.129 .131 THRU	6
C2	-.150	1.400		
C3	-.125	.750		
C4	.225	.825		
C5	.425	1.120		
C6	.625	.175		
D1	3.500	.625	.314 .321 THRU	5
D2	3.850	.700		
D3	4.100	.450		
D4	4.100	.950		
D5	4.100	1.300		
E1	.025	.975	.252 .259 THRU	2
E2	.575	.425		
F1	.150	1.375	.161 .165 THRU	2
F2	.350	1.375		
G1	.025	1.240	.146 .150 THRU	2
G2	.275	1.050		
H1	.350	.150	.368 .375 THRU	1
R1	.725	.025	.151 .155 THRU	1
J1	.025	.200	.227 .231 THRU	2
J2	-.150	.400		
K1	.625	1.300	.20 DIA THRU, .345 .352 C'BORE, .593 DEEP	1
L1	.200	.525	PARTIAL SECTION A-A	1
M1	.575	.850	PARTIAL SECTION B-B	1
N1	1.275	.200	SECTION C-C	2
N2	1.275	1.075		
S1	2.475	.637	PARTIAL SECTION D-D	1
P1	3.525	.100	SECTION E-E	2
P2	3.525	1.175		


.701
.190
.170
.625 DIA
2 PLACES
.388
.395 DIA
2 PLACES
32
SECTION C-C
.411 DIA
.115
.119
.22
.313
PARTIAL SECTION D-D
Y
2.320
1.281
.24
C
1.26
E
A
.50R
N2
K1
B9
N1
F1
F2
A3
A1
A7
A8
B3
G1
G2
B1
E1
B4
B2
B5
M1
C2
C4
C3
A5
B
45°
C1
A2
L1
J2
30°
B6
B7
A9
E2
C5
B8
R1
J1
H1
M
A6
A4
X
.220
.400
1.234
SH 2 ZONE F-3
1.656
S1
D
P2
D5
D4
B10
D1
D2
A11
D3
.337 R
2 PLACES
P1
.14
.685
.19
.332 DIA
2 PLACES
.550 DIA
2 PLACES
SECTION E-E
.383
.389
.062 R
.187
.20 DIA
.300
.330
.25
.297
.328
.270
.276 DIA
.094
.125
.112
.302
.308
.090 R
PARTIAL SECTION A-A
.443
.436
2 PLACES
.090 R
2 PLACES
.181
2 PLACES
.20 DIA
.20
.453
.484
.403
.409
2 PLACES
PARTIAL SECTION B-B

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: MAGNESIUM ALY PER QQ-M-31 TEMPER T5, (TYPE ZK60A).
3. FINISH:
   - a. ANODIZE PER MIL-M-3171, TYPE IV, PLUG INSERT HOLES.
   - b. COAT ITEM ② AND THREADS IN ITEM ① USING ITEM ③.
4. UNLESS OTHERWISE SPECIFIED:
   - a. SURFACE ROUGHNESS MUST NOT EXCEED 125√.
   - b. ALL CORNERS TO BE .010 R OR CHAMFER.
   - c. ALL FLAT SURFACES TO BE SQUARE AND/OR PARALLEL WITHIN .010.
5. MUST BE FREE FROM BURRS.
6. ARROW INDICATES DIRECTION OF POSITIVE (+) DIMENSION.
7. HOLE NUMBERS ARE FOR MANUFACTURING REFERENCE.
8. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART.
9. INSTALL ITEM ② PER MS33646. REMOVE TANG.

SEE NOTE 3
SEE NOTES 2 & 3

RECP A31

ITEM NO.	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
3	AR	MIL-P-8585	PRIMER
2	3	MS21209-C0620	INSERT, SCREW LOCKING
1	1	1008309-001	HEATSINK

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1007542	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + — − | DECIMALS ±.005 ±.02 | ANGLES ±1° —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN S. Agne DATE 12 FEB 65
CHECKED A. Udonich 18 FEB 65
APPROVAL 11 FEB 65
APPROVAL 12 FEB 65
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

HEATSINK
-28 VDC POWER SUPPLY
(INSEPARABLE ASSEMBLY)

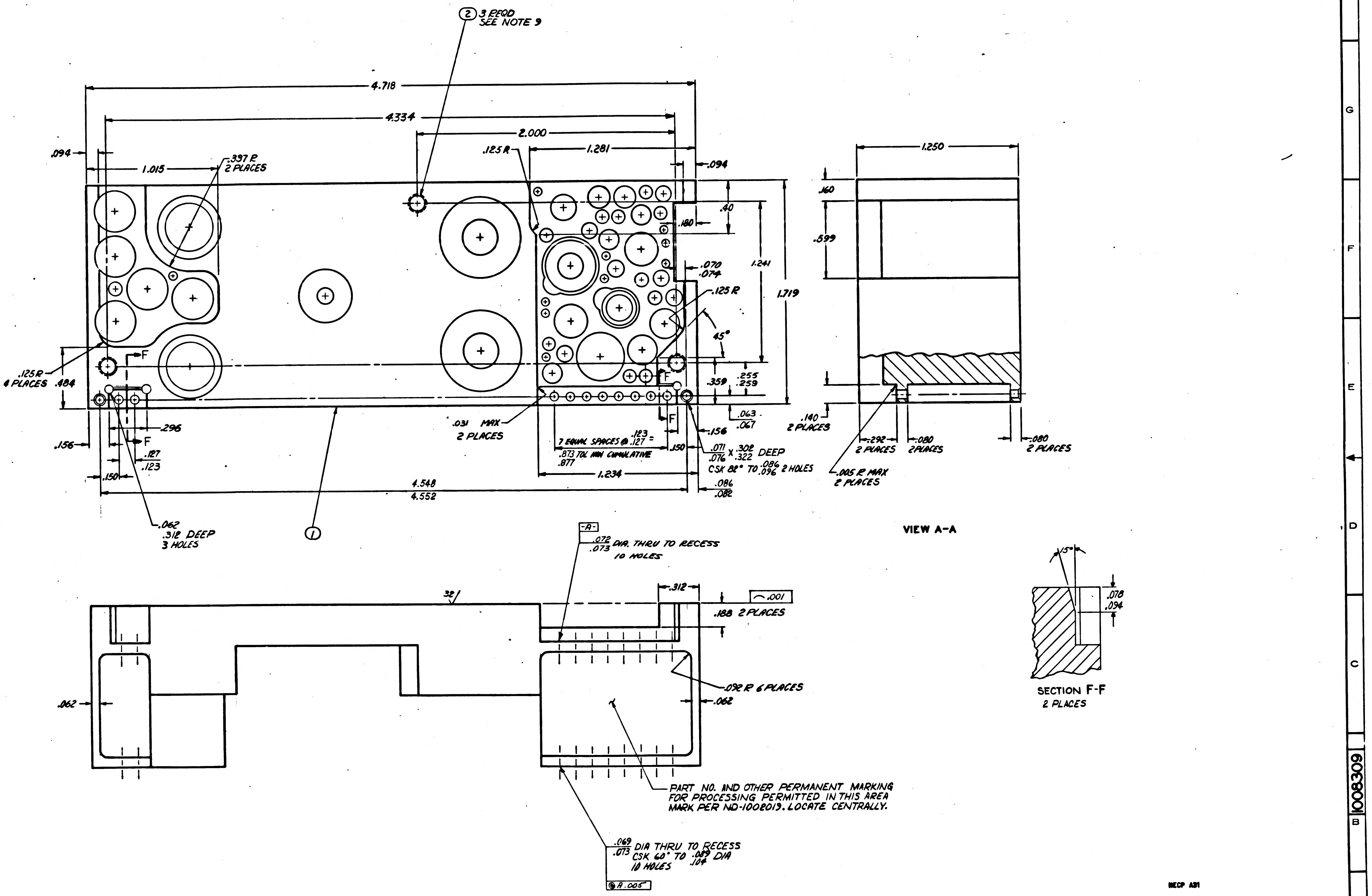
CODE IDENT NO.
SIZE E
1008309
SCALE 4:1
SHEET 1 OF 2

1008309

2 Charbolins 18 FEB 65

LUD

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD



② 3 REQD SEE NOTE 9
4.718
4.334
2.000
1.281
.125 R
.094
.094
1.015
.337 R 2 PLACES
.40
.180
1.241
1.719
.070
.074
.125 R
45°
.359
.255
.259
.063
.067
.156
.125 R 4 PLACES
.484
F
F
F
.296
.156
.127
.123
.150
.031 MAX 2 PLACES
7 EQUAL SPACES @ .123/.127 = .873/.877 TOL NON CUMULATIVE
.150
.071/.076 X .302/.322 DEEP CSK 82° TO .086/.096 2 HOLES
1.234
4.548
4.552
.086
.082
.062 .312 DEEP 3 HOLES
①
1.250
.160
.599
.140 2 PLACES
.292 2 PLACES
.080 2 PLACES
.080 2 PLACES
.005 R MAX 2 PLACES
VIEW A-A
-A-
.072/.073 DIA. THRU TO RECESS 10 HOLES
32
.312
.001
.188 2 PLACES
.062
.092 R 6 PLACES
.062
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA MARK PER ND-1002019. LOCATE CENTRALLY.
.069/.073 DIA THRU TO RECESS CSK 60° TO .089/.104 DIA 10 HOLES
A .005
15°
.078
.094
SECTION F-F
2 PLACES

1008309

NECP A31

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
± —	±.005	±1°
— —	±.02	— —

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

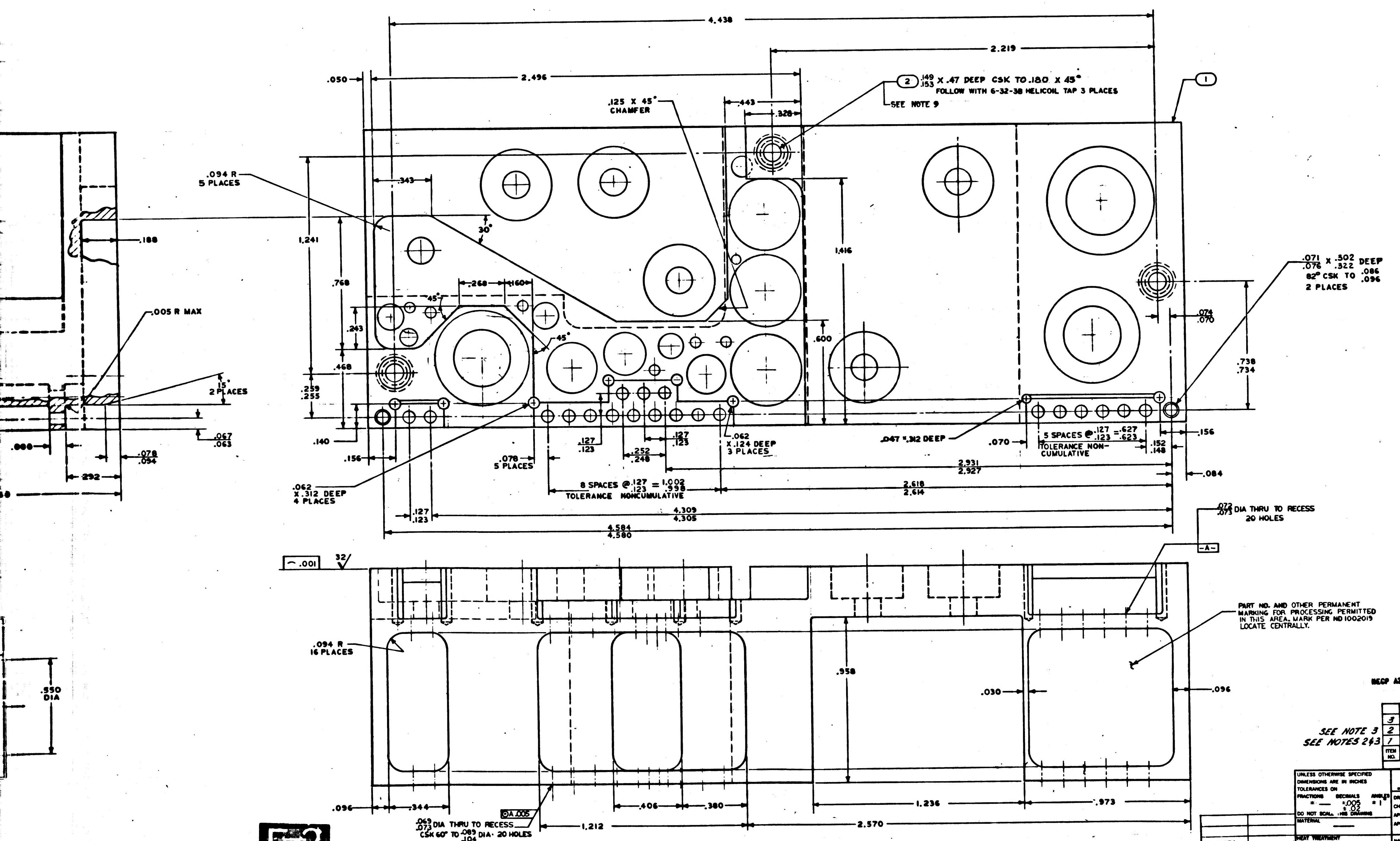
AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN S. Ayres DATE 11 FEB 65
CHECKED 18 FEB 65
APPROVAL 11 FEB 65
APPROVAL 12 FEB 65
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

HEATSINK
-28 VDC POWER SUPPLY
(INSEPARABLE ASSEMBLY)

CODE IDENT NO.
SIZE E
1008309
SCALE 4:1
SHEET 2 OF 2

REVISIONS 7624				
SYM	ZONE	DESCRIPTION	DATE	APPD


4.438
2.219
.050
2.496
.443
.328
.125 X 45° CHAMFER
(2) .149/.153 X .47 DEEP CSK TO .180 X 45° FOLLOW WITH 6-32-38 HELICOIL TAP 3 PLACES
SEE NOTE 9
(1)
.094 R 5 PLACES
.343
30°
.188
1.241
.768
.268
.160
45°
45°
.005 R MAX
.243
1.416
.600
.468
.259/.255
15° 2 PLACES
.067/.063
.140
.156
.088
.078/.054
.292
.062 X .312 DEEP 4 PLACES
.078 5 PLACES
.127/.123
.252/.248
.127/.123
.062 X .124 DEEP 3 PLACES
8 SPACES @ .127/.123 = 1.002/.998 TOLERANCE NONCUMULATIVE
.127/.123
4.309/4.305
4.584/4.580
.071/.076 X .502/.322 DEEP 82° CSK TO .086/.096 2 PLACES
.074/.070
.738/.734
.047 X .312 DEEP
.070
5 SPACES @ .127/.123 = .627/.623 TOLERANCE NON-CUMULATIVE
.152/.148
.156
2.931/2.927
2.618/2.614
.084
.072/.073 DIA THRU TO RECESS 20 HOLES
-A-
⌒ .001
32
.094 R 16 PLACES
.550 DIA
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. MARK PER ND 1002019 LOCATE CENTRALLY.
.958
.030
.096
.096
.344
⊙ A .005
.069/.073 DIA THRU TO RECESS CSK 60° TO .089/.104 DIA · 20 HOLES
1.212
.406
.380
1.236
2.570
.973

MECP A31

	ITEM NO.	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
	3	AR	MIL-P-8585	PRIMER
SEE NOTE 3	2	3	MS21209-C0620	INSERT, SCREW, LOCKING
SEE NOTES 2&3	1	1	1008310-001	HEATSINK

LIST OF PARTS AND MATERIALS

1007556	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ±.02 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M.I.T.
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN C. M. Kuhn DATE
CHECKED Alldrich 17 FEB 65
APPROVAL 11 FEB 65
APPROVAL 19 FEB 65
3/15/65
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

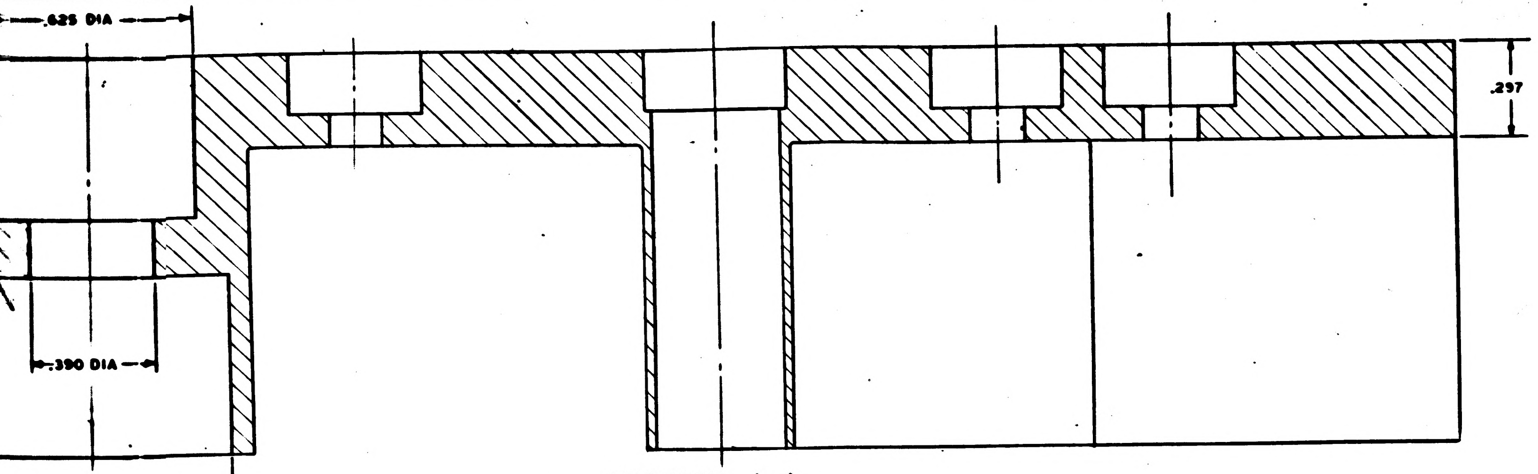
HEATSINK
IMU TEMPERATURE CONTROLLER
(INSEPARABLE ASSEMBLY)

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1008310
SCALE 5:1 | WT | SHEET 1 OF 1

18 Feb 65

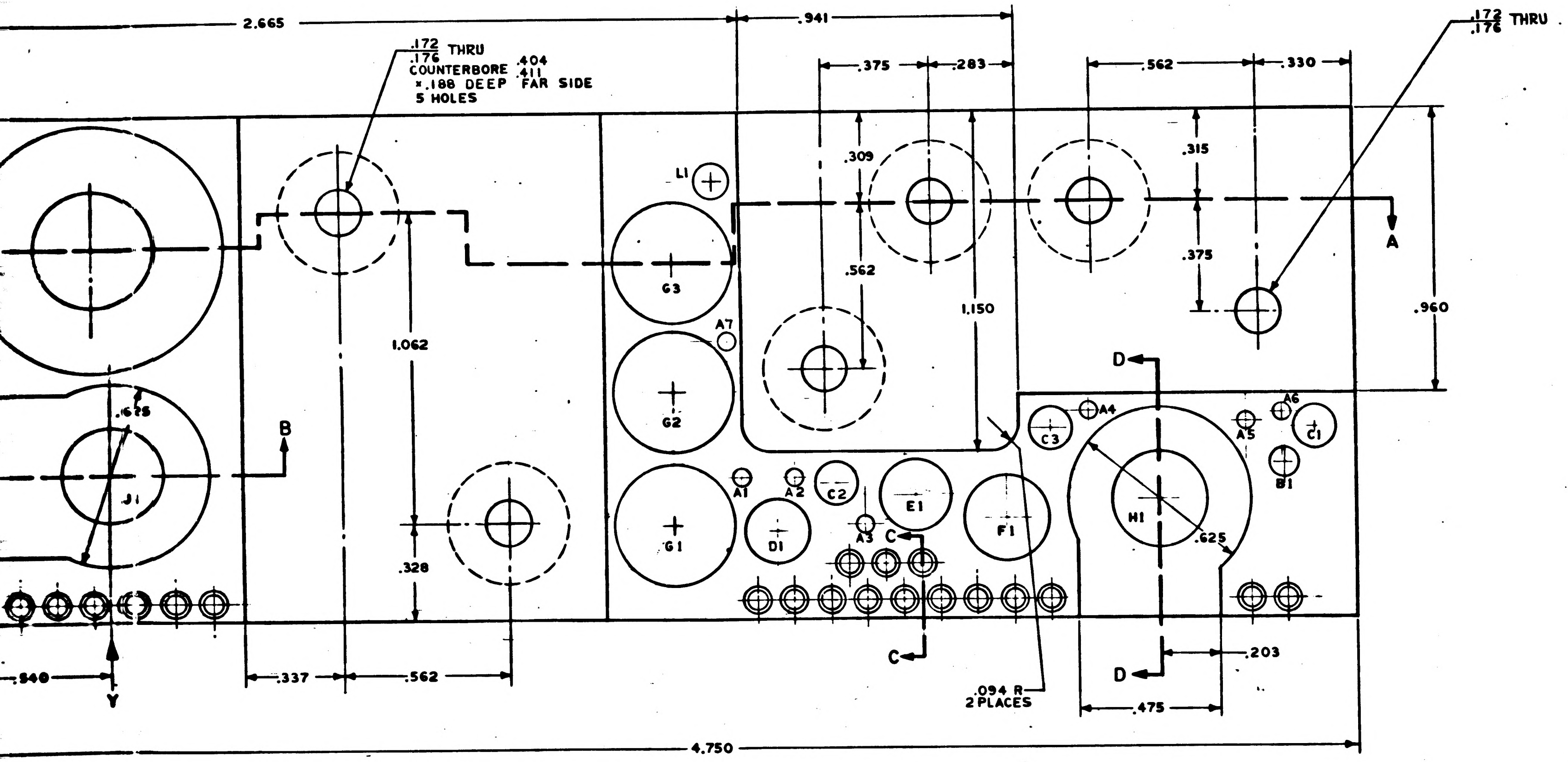
3H

1008310

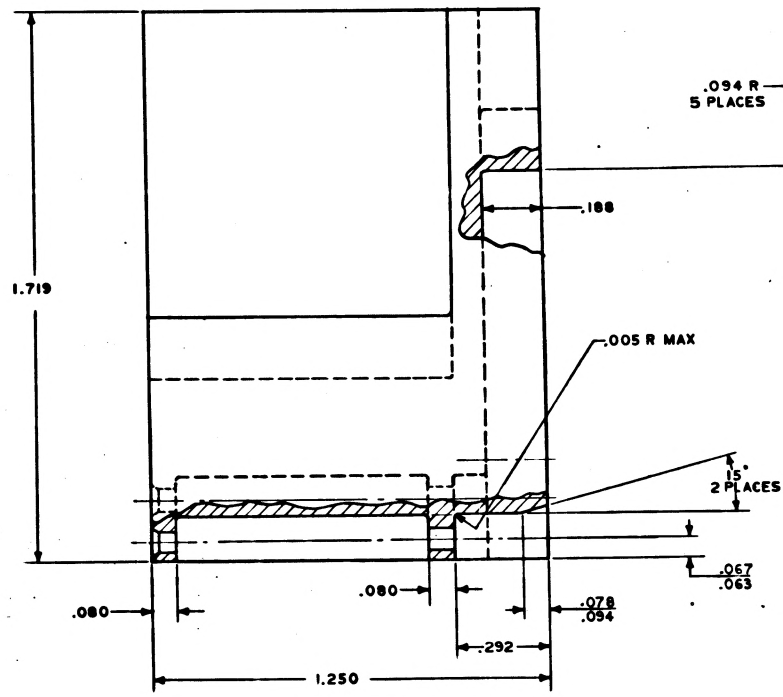


.625 DIA
.297
.390 DIA
.843 DIA

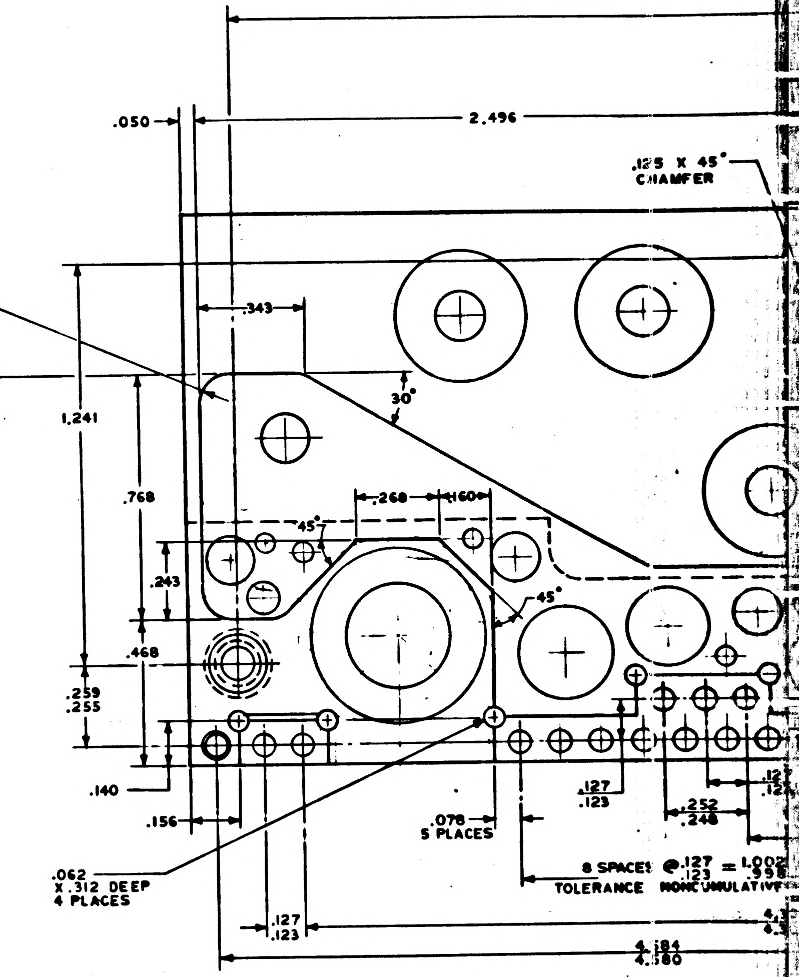
SECTION A-A



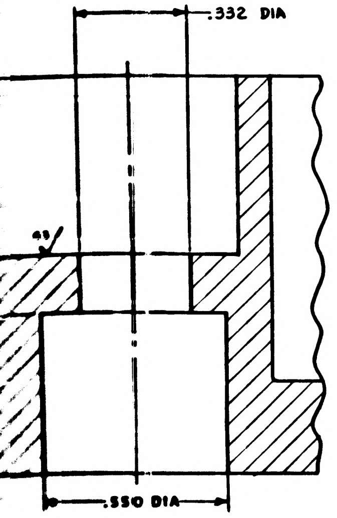
2.665
.941
.375
.283
.562
.330
.172 .176 THRU
COUNTERBORE .404 .411
× .188 DEEP FAR SIDE
5 HOLES
.172 .176 THRU
L1
G3
A7
G2
G1
.309
.562
1.150
.315
.375
.960
A
A
1.062
.328
.675
J1
B
B
D
D
C
C
A1
A2
C2
A3
D1
E1
F1
H1
C3
A4
A5
A6
C1
B1
.625
.094 R 2 PLACES
.203
.475
.337
.562
.840
Y
4.750



1.719
.188
.005 R MAX
15° 2 PLACES
.067 .063
.080
.080
.078 .094
.292
1.250

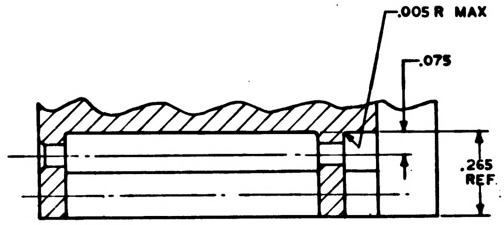


.050
2.496
.125 X 45° CHAMFER
.094 R 5 PLACES
.343
30°
1.241
.768
.268
.160
45°
45°
.243
.468
.259 .255
.140
.156
.078 5 PLACES
.127 .123
.252 .248
8 SPACES @ .127 .123 = 1.002 .998
TOLERANCE NONCUMULATIVE
.062 X .312 DEEP 4 PLACES
.127 .123
4.184 4.180



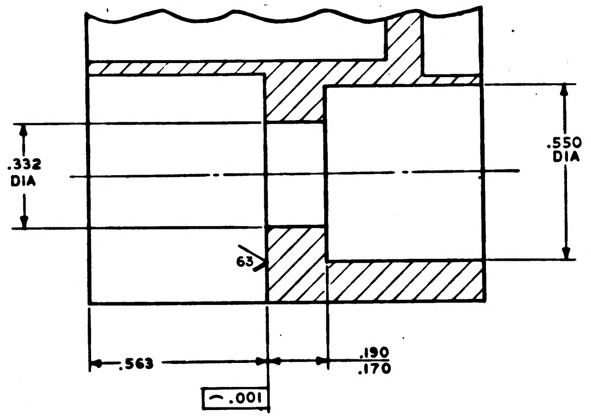
.332 DIA
45°
.550 DIA

PARTIAL SECTION B-B



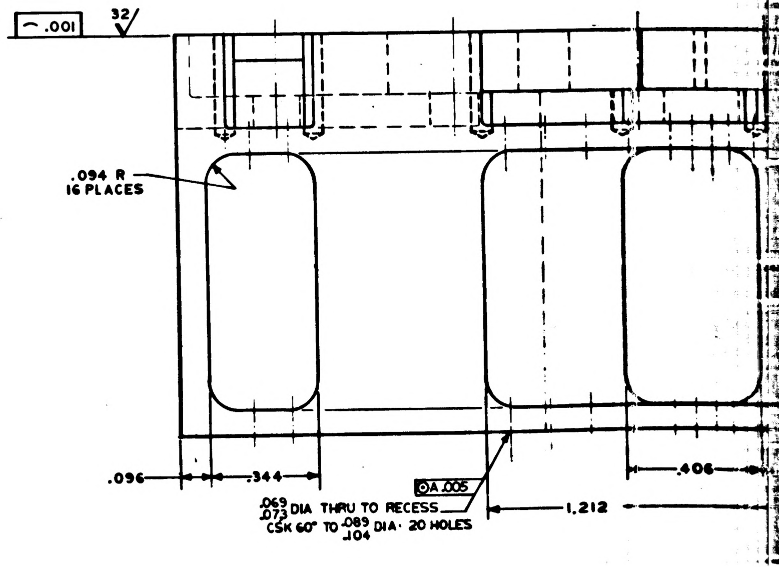
.005 R MAX
.075
.265 REF.

PARTIAL SECTION C-C



.332 DIA
.550 DIA
65°
.563
.190 .170
⌒ .001

PARTIAL SECTION D-D

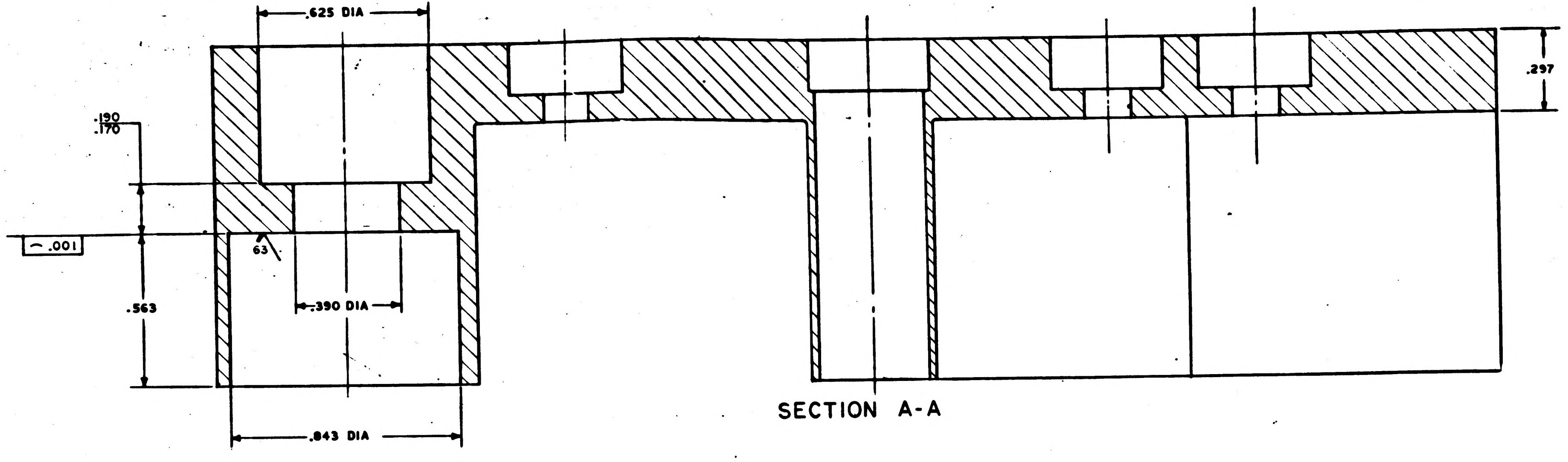


⌒ .001
32
.094 R 16 PLACES
.096
.344
.065 .073 DIA THRU TO RECESS
CSK 60° TO .089 .104 DIA · 20 HOLES
A .005
1.212
.406

F-2

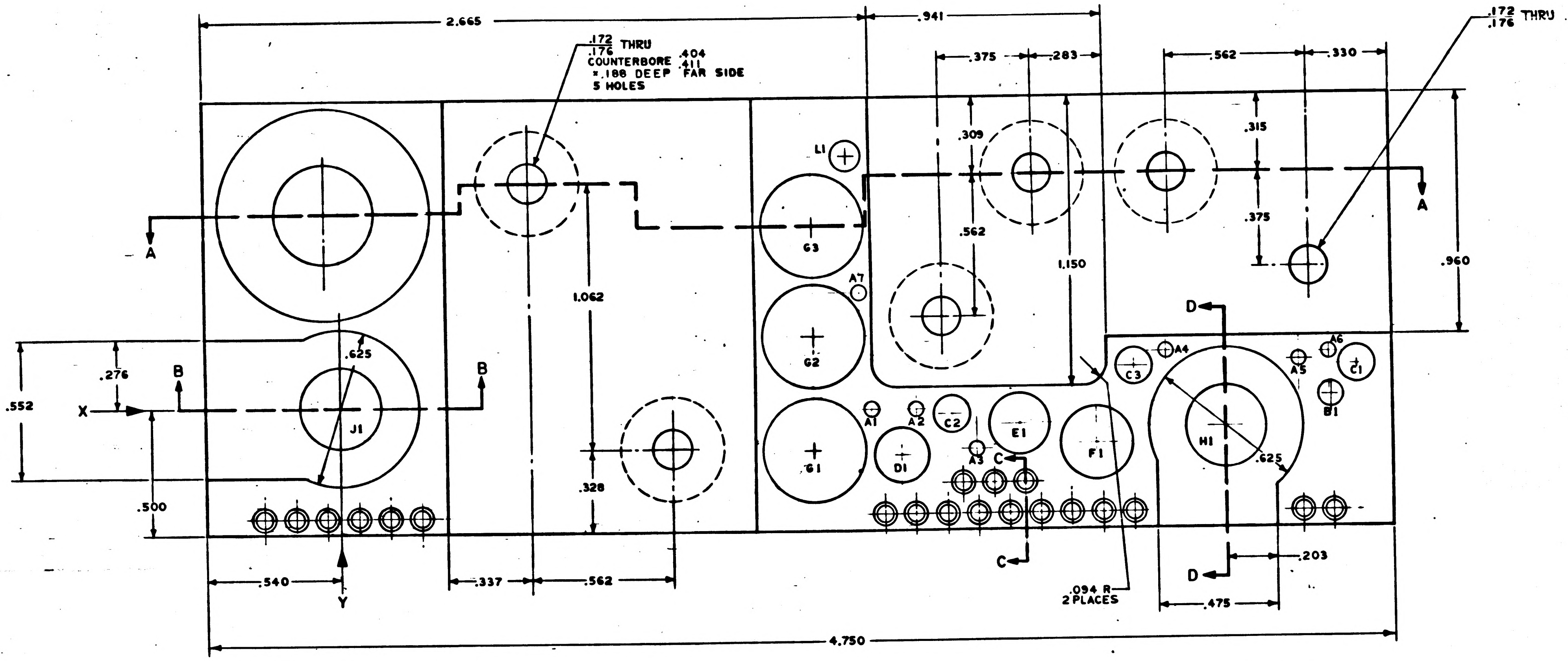
SEE NOTE 8

HOLE NO.	X DIM	Y DIM	HOLE DIA	QTY
A1	2.120	-.020	.058 .062 THRU	7
A2	2.300	-.020		
A3	2.540	-.180		
A4	3.300	.200		
A5	3.840	.160		
A6	3.960	.190		
A7	2.060	.490		
B1	3.970	.020	.100 .104 THRU	1
C1	4.070	.140	.146 .150 THRU	3
C2	2.440	-.040		
C3	3.170	.140		
D1	2.240	-.200	.220 .224 THRU	1
E1	2.710	-.080	.237 .241 THRU	1
F1	3.020	-.160	.288 .295 THRU	1
G1	1.890	-.180	.411 .418 THRU	3
G2	1.890	.270		
G3	1.890	.710		
H1	3.540	.100	SEE SECTION D-D	1
J1	.000	.000	SEE SECTION B-B	1
K1	-.060	.770	SEE SECTION A-A	1
L1	2.030	.985	.127 .131 THRU	1



.625 DIA
.297
.190
.170
.001
63
.563
.390 DIA
.843 DIA

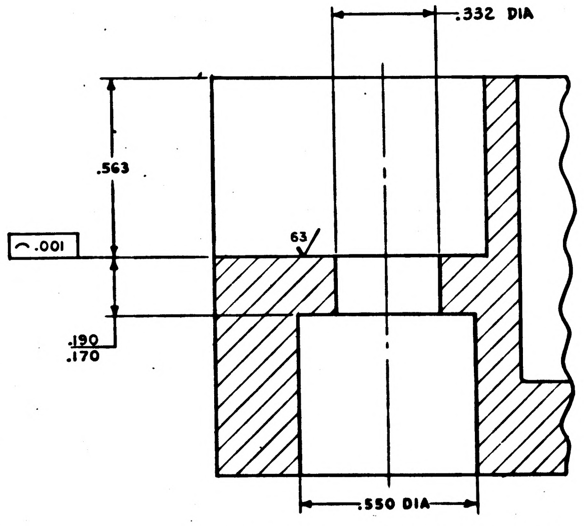
SECTION A-A



2.665
.941
.172
.176 THRU
COUNTERBORE .404
.411
×.188 DEEP FAR SIDE
5 HOLES
.375
.283
.562
.330
.172
.176 THRU
.309
.315
.375
.562
1.150
.960
L1
A
A
G3
G2
G1
A7
1.062
.328
.625
.276
.552
X
B
B
J1
.500
Y
.540
.337
.562
D
D
C3
A4
A5
A6
C1
B1
A1
A2
C2
E1
F1
H1
D1
A3
C
C
.625
.203
.094 R
2 PLACES
.475
4.750

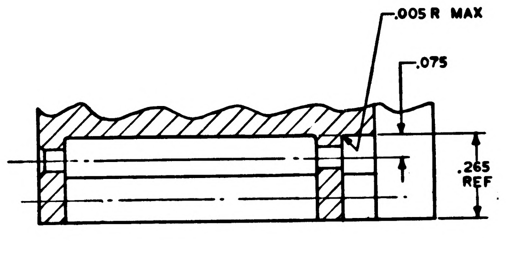
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: MAGNESIUM ALY PER QQ-M-31 TEMPER T5, (TYPE ZK60A).
3. FINISH:
   a. ANODIZE PER MIL-M-3171 TYPE IV. PLUG INSERT HOLES.
   b. COAT ITEM ② AND THREADS IN ITEM ① USING ITEM ③.
4. UNLESS OTHERWISE SPECIFIED:
   a. SURFACE ROUGHNESS MUST NOT EXCEED 125√.
   b. ALL CORNERS TO BE .010 R OR CHAMFER.
   c. ALL FLAT SURFACES TO BE SQUARE AND/OR PARALLEL WITHIN .010.
5. MUST BE FREE FROM BURRS.
6. ARROW INDICATES DIRECTION OF POSITIVE (+) DIMENSION.
7. HOLE NUMBERS ARE FOR MANUFACTURING REFERENCE.
8. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART.
9. INSTALL ITEM ② PER MS3?646. REMOVE TANG.



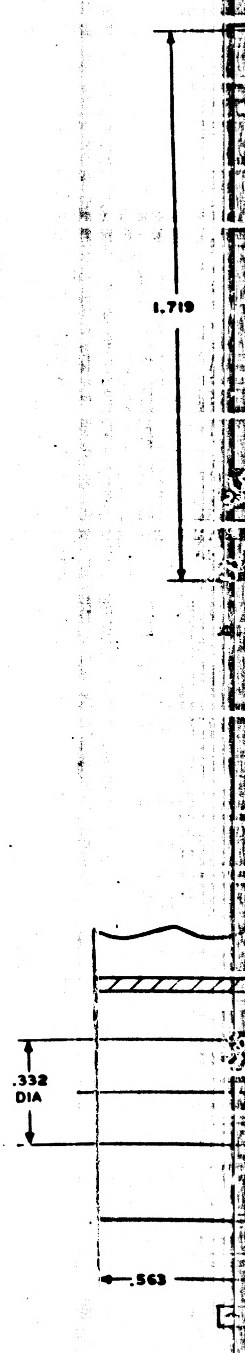
.332 DIA
.563
.001
63
.190
.170
.550 DIA

PARTIAL SECTION B-B



.005 R MAX
.075
.265
REF

PARTIAL SECTION C-C



1.719
.332
DIA
.563

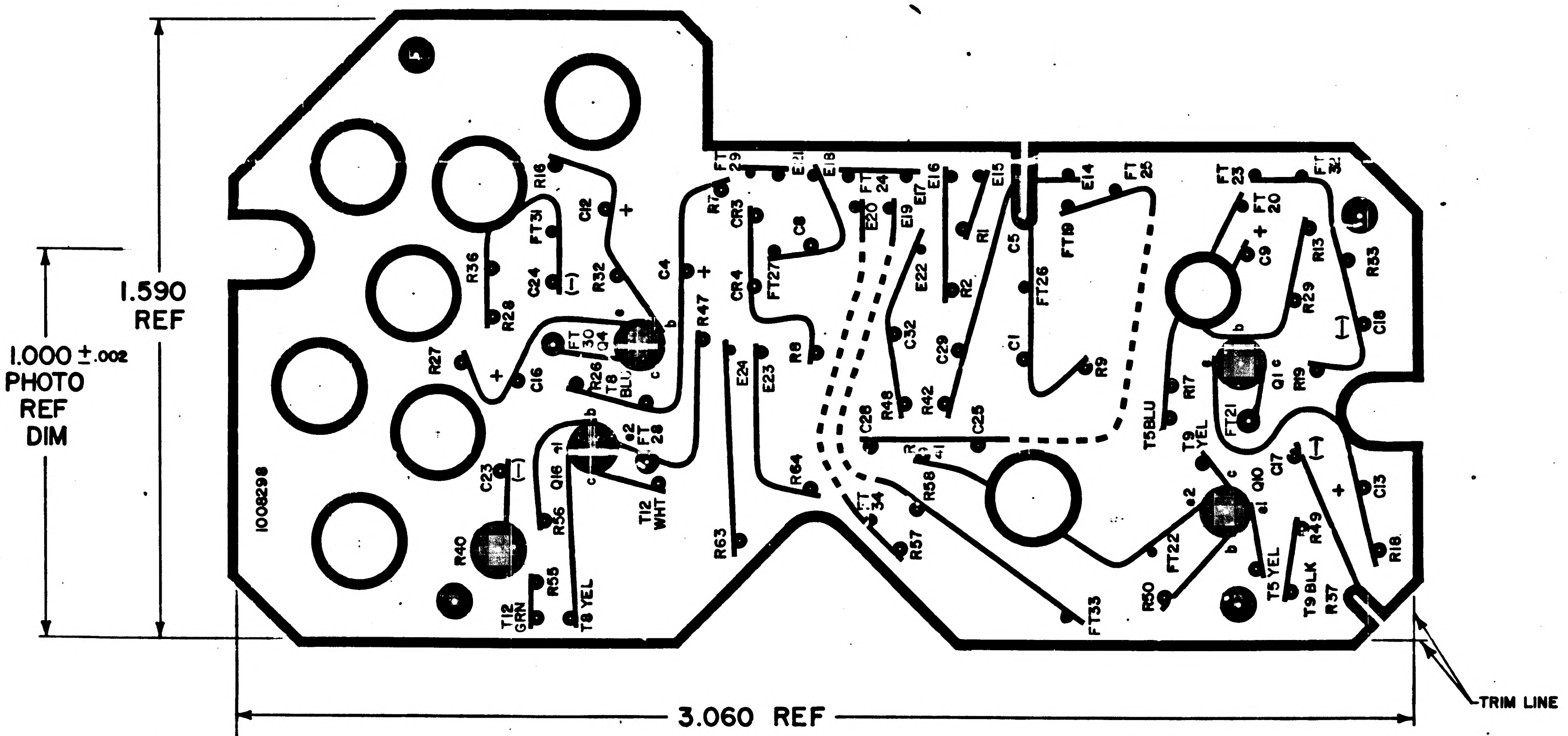
PARTIAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008311 | 2

REVISIONS 24045

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.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REF
1.000 ±.002
PHOTO
REF
DIM
3.060 REF
TRIM LINE
1008298
R16
FT31
C12
+
R36
C24
(−)
R32
C4
R28
R27
+
C16
FT
30
Q4
b
c
R26
T8
BLU
R47
FT
29
R7
CR3
CR4
C8
FT27
E21
E18
FT
24
E20
E19
E17
E16
E15
E22
R1
R2
C5
E14
FT
25
FT18
FT26
E24
E23
R8
C32
C29
C1
R9
R48
R42
C28
C25
R64
R63
R
41
R58
FT
34
R57
FT33
C23
(−)
Q16
e1
e2
b
c
FT
28
R56
T12
WHT
R40
R55
T12
GRN
T8 YEL
FT
23
FT
20
FT
32
C9
+
R13
R33
R29
C18
(−)
R17
Q1
c
R19
FT21
T5BLU
T9
YEL
Q10
c
e1
e2
b
C17
(−)
+
C13
FT22
R49
R18
R50
T5 YEL
T9 BLK
R37

1.000 ±.002 PHOTO. REF. DIM.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH.
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN.
4. CUT TO WITHIN .010 OF TRIM LINE.

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + — − | DECIMALS + — − | ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN J. Kilmingues DATE 25 OCT 65
CHECKED F. Stelma 2 NOV 65
APPROVAL E. Ehrsdol 2 NOV 65
APPROVAL G. Ares LTB
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD A SIGNAL CONDITIONER
CDU RESOLVER

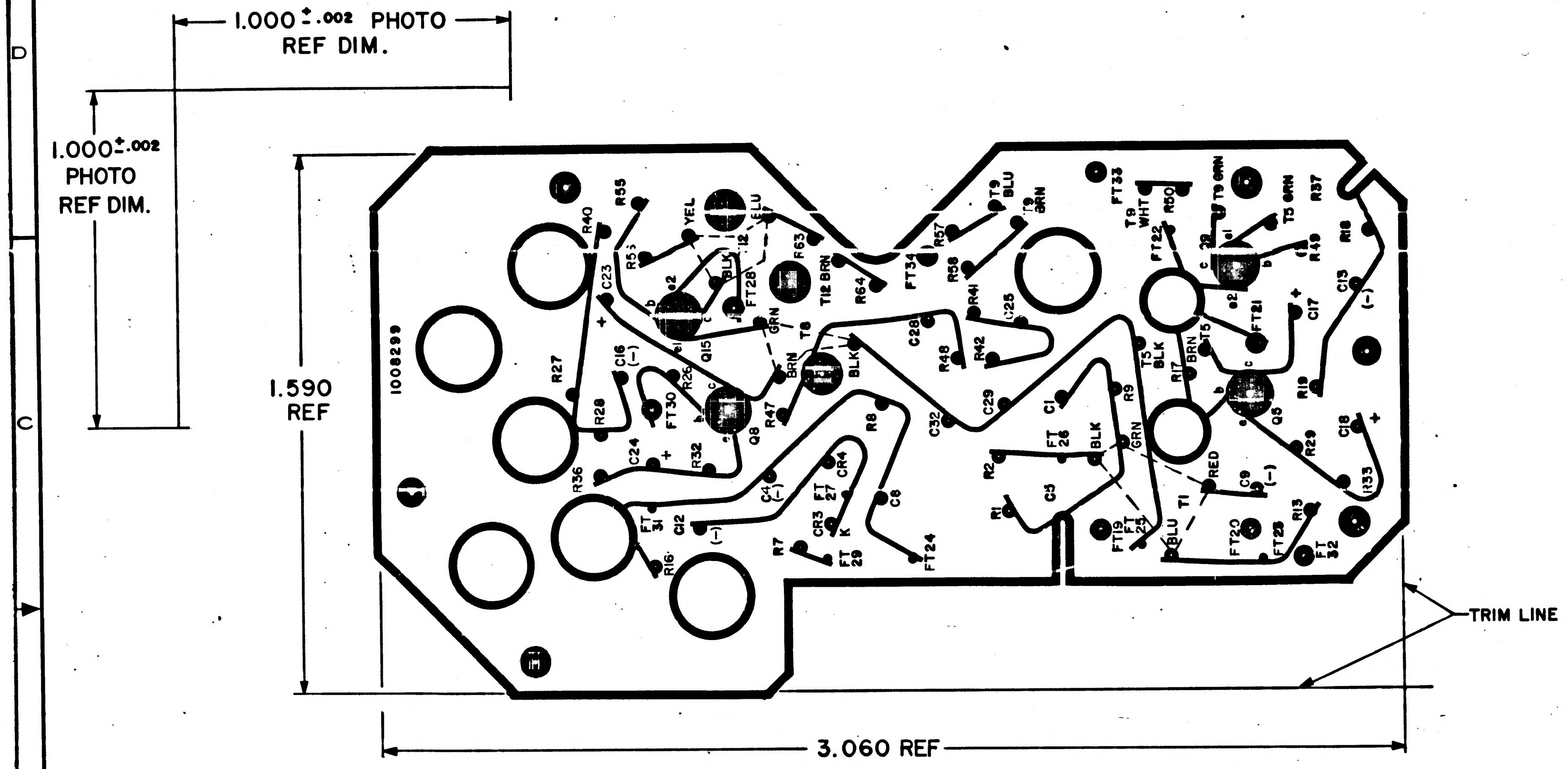
CODE IDENT NO. 80230
SIZE D
1008311
SCALE 5/1
SHEET 1 OF 1

MIL 10770-P

1008312

REVISIONS 24045

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH.
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN.
4. CUT TO WITHIN .010 OF TRIM LINE.

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
CONTRACT NAS 9-497
DRAWN Dzolski DATE 26 OCT 65
CHECKED J. Stelma 1 NOV 65
APPROVAL E. J. Jarolek 1 NOV 65
APPROVAL G. Ha LTB
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD B SIGNAL CONDITIONER
CDU RESOLVER

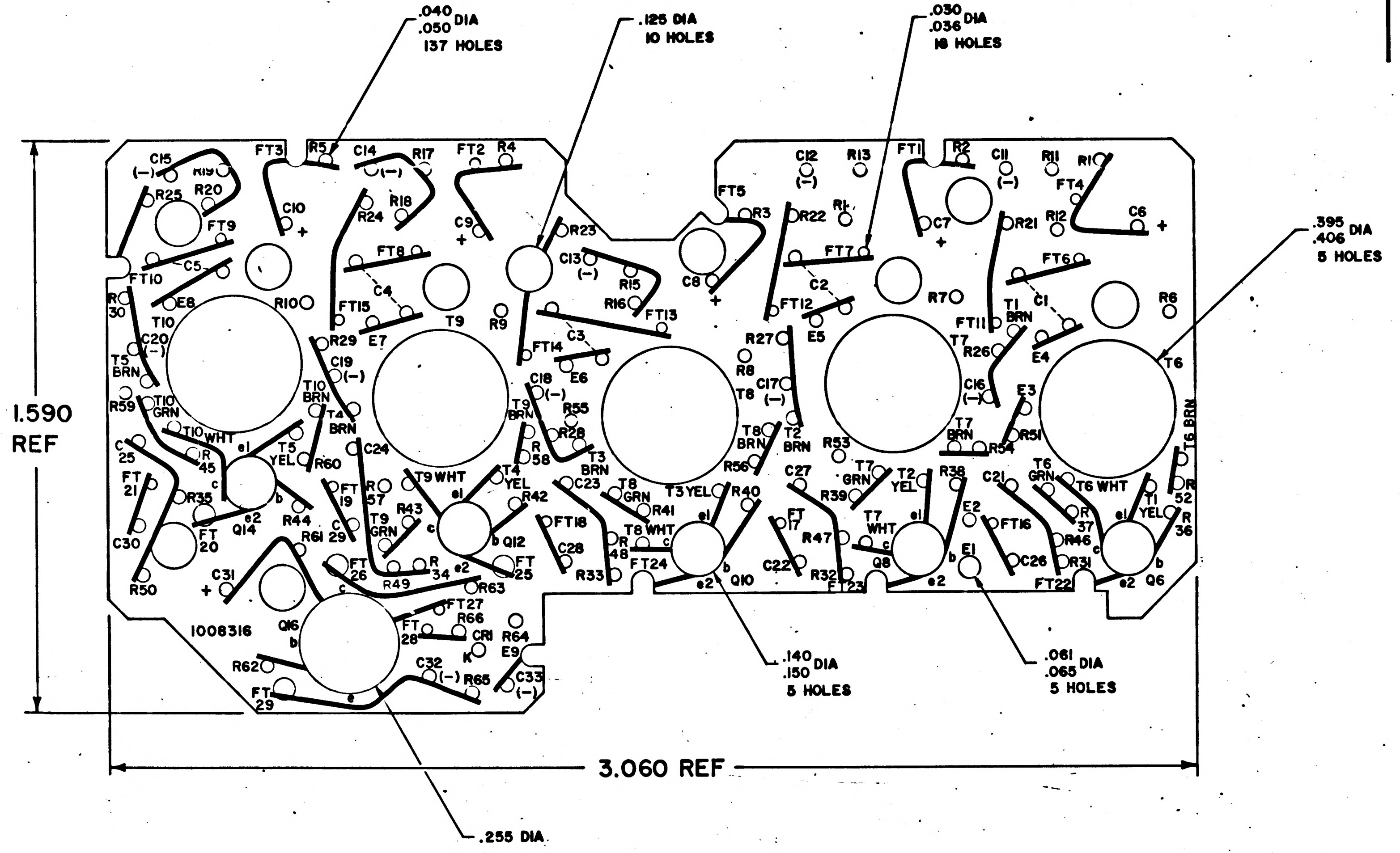
CODE IDENT NO. 80230
SIZE D
1008312
SCALE 5:1
SHEET 1 OF 1

MIL 10770-F

1008316

SYM	ZONE	REVISIONS 24645 DESCRIPTION	CHG NO.	DATE	APPD.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO


.040 DIA
.050
137 HOLES
.125 DIA
10 HOLES
.030 DIA
.036
16 HOLES
.395 DIA
.406
5 HOLES
1.590 REF
3.060 REF
.255 DIA
.140 DIA
.150
5 HOLES
.061 DIA
.065
5 HOLES
1008316
Q16
Q14
Q12
Q10
Q8
Q6
T10 BRN
T9 WHT
T8 WHT
T7 WHT
T6 WHT
T6 BRN
T5 YEL
T3 YEL
T1 YEL

REF:
DRAWING NO. 1008317 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

1007667	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± .010 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
CONTRACT NAS 9-497

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN M. Yamagaki DATE 27 OCT 65
CHECKED Clark Wilson 27 OCT 65
APPROVAL 29 OCT 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD BOTTOM
SIGNAL CONDITIONER ASSEMBLY OPTICS

CODE IDENT NO. 80230
SIZE D
1008316
SCALE 5/1
SHEET 1 OF 1

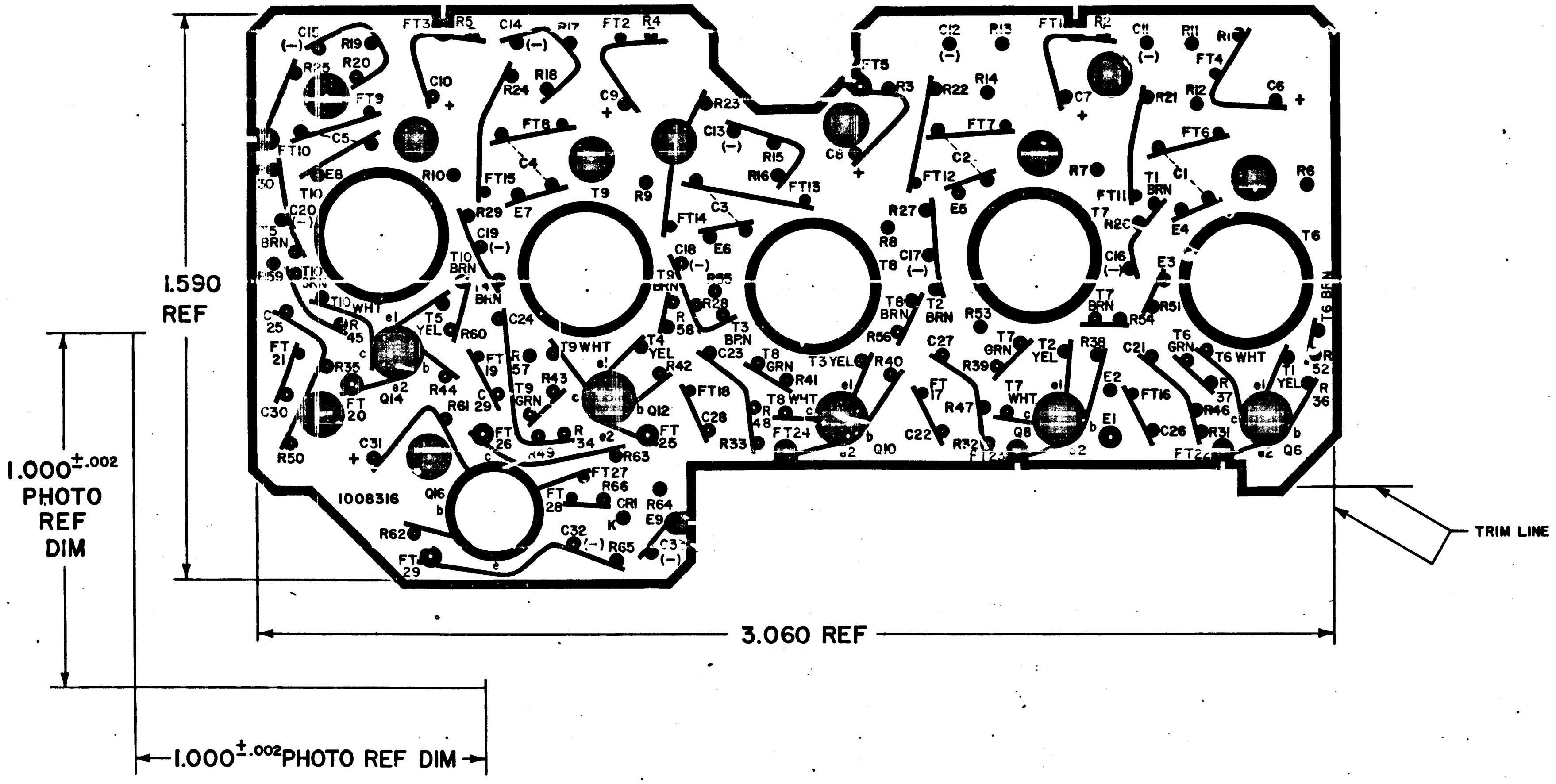
MIL 10770-A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008317 | 2

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.
		CHG NO.		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1.000 ±.002 PHOTO REF DIM
3.060 REF
1.000 ±.002 PHOTO REF DIM
TRIM LINE
1008316
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10
Q6 Q8 Q10 Q12 Q14 Q16
FT1 FT2 FT3 FT4 FT5 FT6 FT7 FT8 FT9 FT10 FT11 FT12 FT13 FT14 FT15 FT16 FT18 FT19 FT20 FT21 FT24 FT25 FT26 FT27 FT28 FT29 FT30
C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30 C31 C32 C33
E1 E2 E3 E4 E5 E6 E7 E8 E9
CR1
BRN WHT YEL GRN

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT

M.I.T.
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN M. Yamazaki DATE 27 OCT 65
CHECKED D.K. Koop 29 OCT 65
APPROVAL [illegible] 29 OCT 65
APPROVAL [illegible]
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

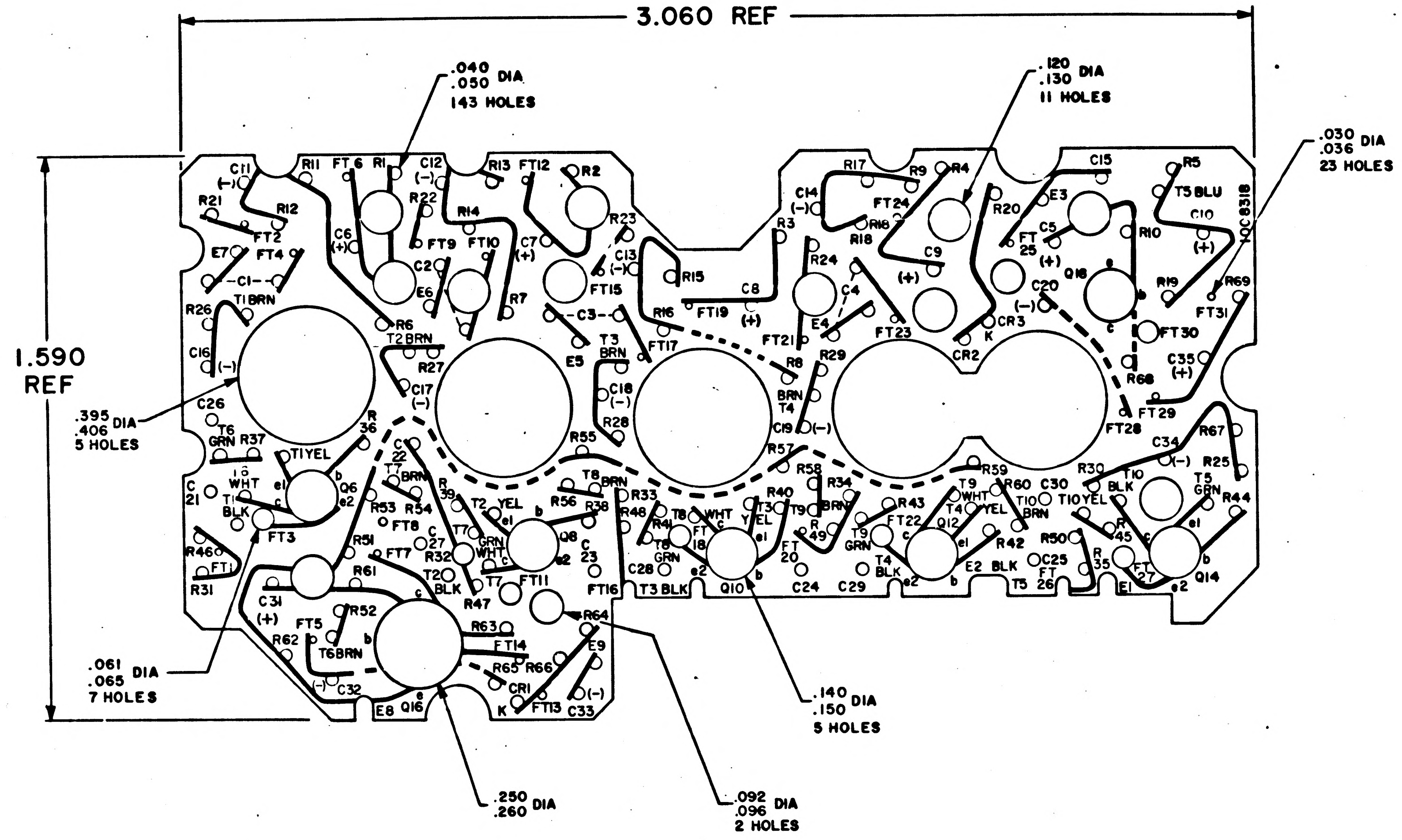
PHOTOGRAPHIC MASTER
WIRING BOARD BOTTOM
SIGNAL CONDITIONER ASSEMBLY OPTICS

CODE IDENT NO. 80230 SIZE D 1008317
SCALE 5/1 SHEET 1 OF 1

MIL 10770-K

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		INITIAL RELEASE CLASS A PER TDRR 2-27		9 NOV 65	J J J / CF


3.060 REF
1.590 REF
.040 .050 DIA 143 HOLES
.120 .130 DIA 11 HOLES
.030 .036 DIA 23 HOLES
.395 .406 DIA 5 HOLES
.061 .065 DIA 7 HOLES
.250 .260 DIA
.092 .096 DIA 2 HOLES
.140 .150 DIA 5 HOLES
1008318
C11 (−) R11 FT6 R1 C12 (−) R13 FT12 R2 R17 R9 R4 C15 R5
R21 R12 R22 C6 (+) R14 FT9 FT10 C7 (+) R23 C14 (−) R3 R16 FT24 R20 E3 T5 BLU C10 (+)
E7 FT2 FT4 C2 E6 R7 C13 (−) FT15 R15 FT19 C8 (+) R24 R18 C9 (+) C4 FT25 (+) C5 Q18 R10 R19 R69
C1 T1 BRN R26 R6 T2 BRN C3 T3 BRN E5 R16 FT17 FT21 E4 FT23 CR3 C20 (−) K CR2 FT30 FT31
C16 (−) R27 C17 (−) C18 (−) R28 R8 R29 BRN T4 C19 (−) R68 C35 (+) FT29 FT28
C26 T6 GRN R37 R36 T1 YEL R55 R57 C34 (−) R67 R25
C21 WHT T1 BLK Q6 e1 e2 b c C22 T7 BRN R39 T2 YEL R56 T8 BRN R33 R58 R34 R40 T9 WHT T4 YEL R59 R60 C30 T10 YEL R30 T10 BLK T5 GRN R44
FT3 R53 R54 FT8 T7 GRN WHT Q8 R38 R48 T8 WHT FT18 T3 YEL T9 BRN R49 R43 FT22 Q12 T10 BRN R42 R50 R45 e1 b
R46 FT1 R51 FT7 C27 R32 C23 R41 T8 GRN C28 FT20 T9 GRN T4 BLK E2 BLK C25 FT26 R35 FT27 Q14
R31 R61 T2 BLK T7 FT11 FT16 T3 BLK Q10 C24 C29 T5 E1
C31 (+) R52 FT5 R47 R63 R64
R62 T6 BRN Q16 FT14 R65 R66 E9
(−) C32 E8 CR1 K FT13 C33 (−)

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE.
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133.
4. MARK BLACK CHARACTERS PER ND1002019.
5. BROKEN LINE DENOTES SLEEVING.

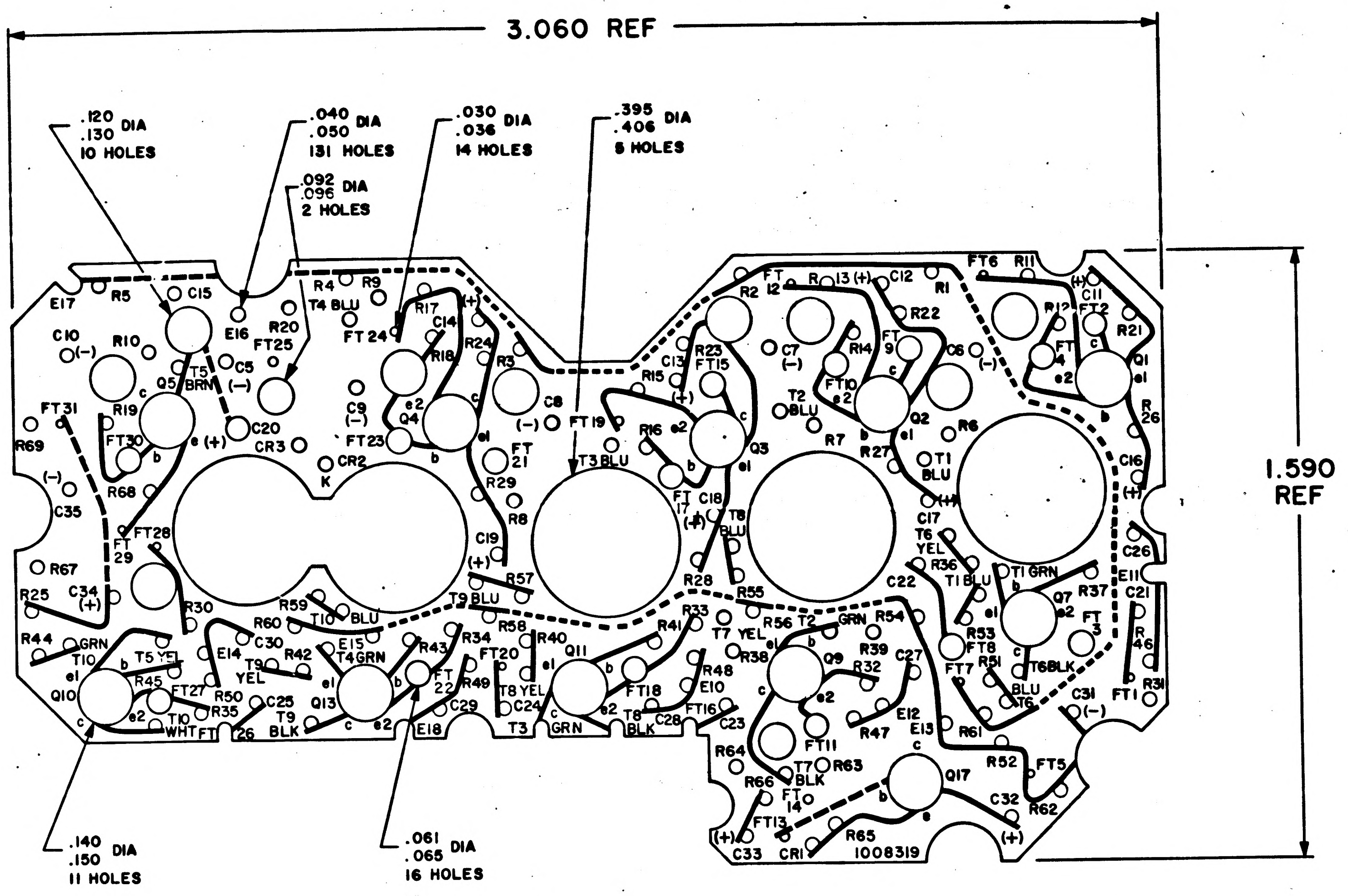
REF:
DRAWING NO. 1008320 FOR PHOTOGRAPHIC MASTER.

1007668		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DRAWN J. Holski 27 OCT 65 CHECKED J. GRIEB 4 NOV 65 APPROVAL 5 NOV 65 APPROVAL 29 Nov 65	MANNED SPACECRAFT CENTER HOUSTON TEXAS WIRING BOARD BOTTOM SIGNAL CONDITIONER ASSEMBLY OPTICS
NEXT ASSY	USED ON	DO NOT SCALE THIS DRAWING		
APPLICATION		MATERIAL SEE NOTE 2	NASA APPROVAL A. C. METZGER	CODE IDENT NO 80230 · SIZE D · 1008318
		CONTRACT NAS 9-497	MIT APPROVAL 30 Nov 65	SCALE 5/1 · SHEET 1 OF 1

Charleston
5 NOV 65

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD.
A		INITIAL RELEASE CLASS A PER TDRR 24378		9 NOV 65	JJJ EF



3.060 REF
1.590 REF
.120 .130 DIA 10 HOLES
.040 .050 DIA 131 HOLES
.092 .096 DIA 2 HOLES
.030 .036 DIA 14 HOLES
.395 .406 DIA 5 HOLES
.140 .150 DIA 11 HOLES
.061 .065 DIA 16 HOLES
E17
R5
C15
E16
R20
FT25
R4
R9
T4 BLU
FT 24
R17
C14
R18
R24
R3
C10
(–)
R10
Q5
T5 BRN
C5
(–)
FT31
R19
FT30
C20
CR3
C9
(–)
FT23
CR2
K
Q4
e2
e1
C8
(–)
FT19
T3 BLU
R16
R15
C13
R23
FT15
FT 12
R2
R13
(+)
C12
R1
R22
FT6
R11
C11
(+)
FT2
R12
R21
Q1
C7
(–)
R14
FT 9
C6
FT 4
FT10
Q2
R6
T2 BLU
R7
R27
Q3
T1 BLU
R 26
C16
(+)
R69
(–)
C35
R68
FT28
FT 29
R67
R25
C34
(+)
R30
R59
T10 BLU
R60
C30
T9 BLU
C19
(+)
R57
R58
R29
R8
FT 21
FT 17
C18
(+)
T8 BLU
R28
R55
C17
T6 YEL
R36
T1 BLU
T1 GRN
Q7
R37
C26
E11
C21
R 46
R31
FT1
FT 3
R44
GRN T10
Q10
T5 YEL
R45
FT27
R50
R35
T10 WHT
FT 26
E14
T9 YEL
R42
C25
T9 BLK
E15
T4 GRN
Q13
R43
FT 22
R49
C29
E18
R34
FT20
R40
Q11
T8 YEL
C24
T3
GRN
FT18
T8 BLK
C28
R41
R33
T7 YEL
R56
T2 GRN
R54
R38
Q9
R39
R32
C27
R48
E10
FT16
C23
R53
FT8
R51
FT7
T6 BLK
T6 BLU
C31
(–)
C22
E12
E13
R47
R61
R64
FT11
T7 BLK
R63
R66
FT 14
Q17
R52
FT5
C32
R62
FT13
(+)
C33
CR1
R65
1008319
(+)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE.
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133.
4. MARK BLACK CHARACTERS PER ND1002019.
5. BROKEN LINE DENOTES SLEEVING.

REF:
DRAWING NO. 1008321 PHOTOGRAPHIC MASTER.

1007668		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS
NEXT ASSY	USED ON	DO NOT SCALE THIS DRAWING	DRAWN J Wolski 30 OCT 65 CHECKED J. GRIEB 4 NOV 65 APPROVAL 5 Nov 65 APPROVAL 29 Nov 65
APPLICATION		MATERIAL SEE NOTE 2	NASA APPROVAL A. C. METZGER
		CONTRACT NAS 9-497	MIT APPROVAL 30 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD TOP
SIGNAL CONDITIONER ASSEMBLY OPTICS

CODE IDENT NO.	SIZE	
80230	D	1008319
SCALE 5/1		SHEET 1 OF 1

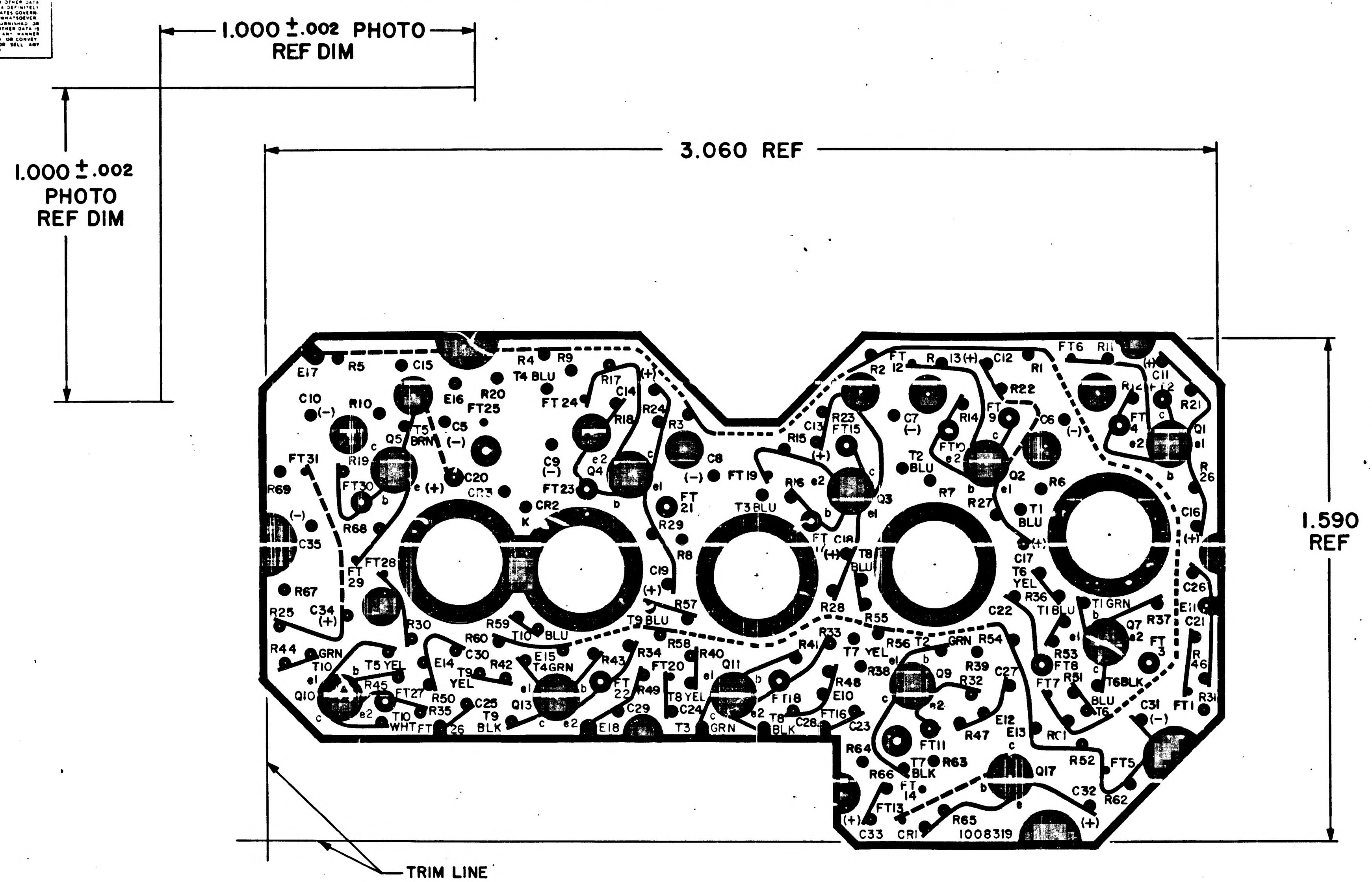
Charleston 5 NOV 65

MIL 10770K

A 1008321 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		INITIAL RELEASE CLASS A PER TDRR 24?7?		9 NOV 65	EF


1.000 ± .002 PHOTO REF DIM
1.000 ± .002 PHOTO REF DIM
3.060 REF
1.590 REF
TRIM LINE
E17
R5
C15
R4
R9
T4 BLU
C10
R10
E16
R20
FT25
FT24
R17
C14
R18
R24
R3
C8
R2
R23
FT15
C13
R15
FT 12
R
13 (+)
C12
R1
R22
C7
R14
FT9
C6
T2 BLU
Q2
R6
FT6
R11
C11
R21
Q1
R26
C16
FT31
R19
Q5
T5 BRN
C5
C20
CR3
C9
Q4
FT23
CR2
FT21
R29
R8
FT19
T3 BLU
R16
Q3
R7
R27
T1 BLU
R69
FT30
R68
C35
FT28
FT 29
R67
C34
R25
R44
T10 GRN
Q10
R45
T5 YEL
E14
FT27
R30
R59
T10 BLU
R60
C30
T9 YEL
R42
E15
T4 GRN
R43
Q13
C25
T9 BLK
R50
R35
T10 WHT
FT 26
C19
R57
T9 BLU
R58
R34
FT20
FT 22
R49
C29
E18
R40
Q11
T8 YEL
C24
T3 GRN
FT18
T8 BLK
C28
FT16
C18
T8 BLU
R28
R55
R33
R41
T7 YEL
R56
T2 GRN
R54
R38
Q9
R39
R32
C27
R48
E10
C23
E12
E13
R47
FT11
R64
T7 BLK
R63
R66
FT 14
FT13
C33
CR1
R65
1008319
Q17
C17
T6 YEL
R36
C22
T1 BLU
T1 GRN
Q7
R37
FT 3
R53
FT8
R51
FT7
T6 BLK
BLU T6
C31
RC1
R52
FT5
C32
R62
FT1
R31
R46
C21
E11
C26
FT 4
R 12
(+)
(−)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH.
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN.
4. CUT TO WITHIN .010 OF TRIM LINE.

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + − DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS
APPLICATION		MATERIAL	DRAWN J. Wolski DATE 30 OCT 65 CHECKED J. GRIEB 4 NOV 65 APPROVAL 5 NOV 65 APPROVAL NASA APPROVAL A. G. METZGER MIT APPROVAL
		CONTRACT NAS 9-497	

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD TOP
SIGNAL CONDITIONER ASSEMBLY OPTICS

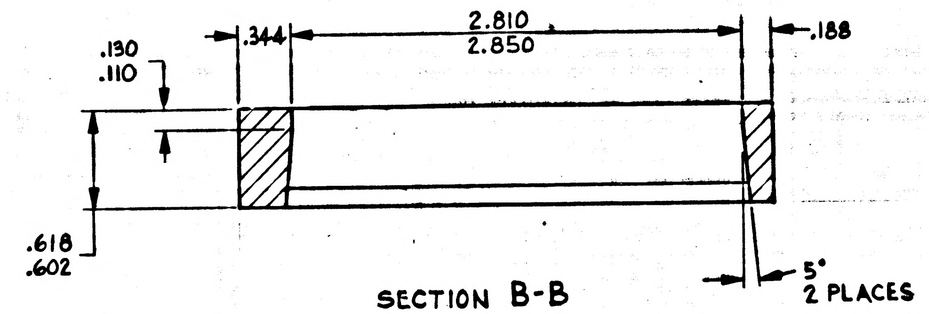
CODE IDENT NO.	SIZE	
80230	D	1008321
SCALE 5/1		SHEET 1 OF 1

J.E.G

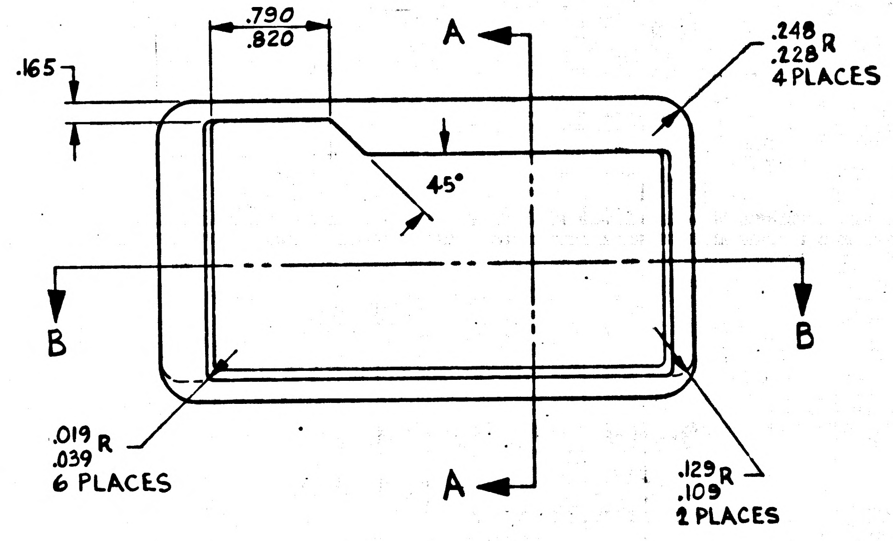
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: ZZ-R-765, RUBBER, CLASS III, GRADE 25.
3. IDENTIFY USING DRAWING NUMBER PER MIL-STD-130.

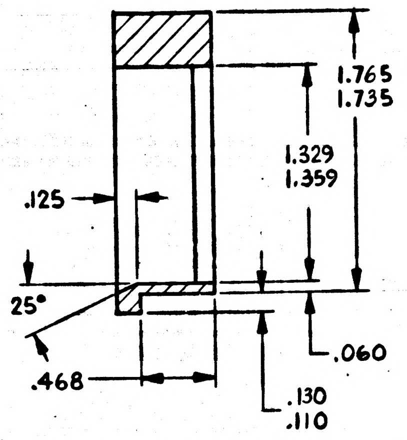
REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER D.Q. 61502		14 JAN 66	RR
	B	INITIAL RELEASE CLASS A PER TDRR 26421		28 JAN 66	


.344
2.810
2.850
.188
.130
.110
.618
.602
5°
2 PLACES

SECTION B-B


.790
.820
A
A
.165
.248 R
.228
4 PLACES
45°
B
B
.019 R
.039
6 PLACES
.129 R
.109
2 PLACES


1.765
1.735
1.329
1.359
.125
25°
.468
.060
.130
.110

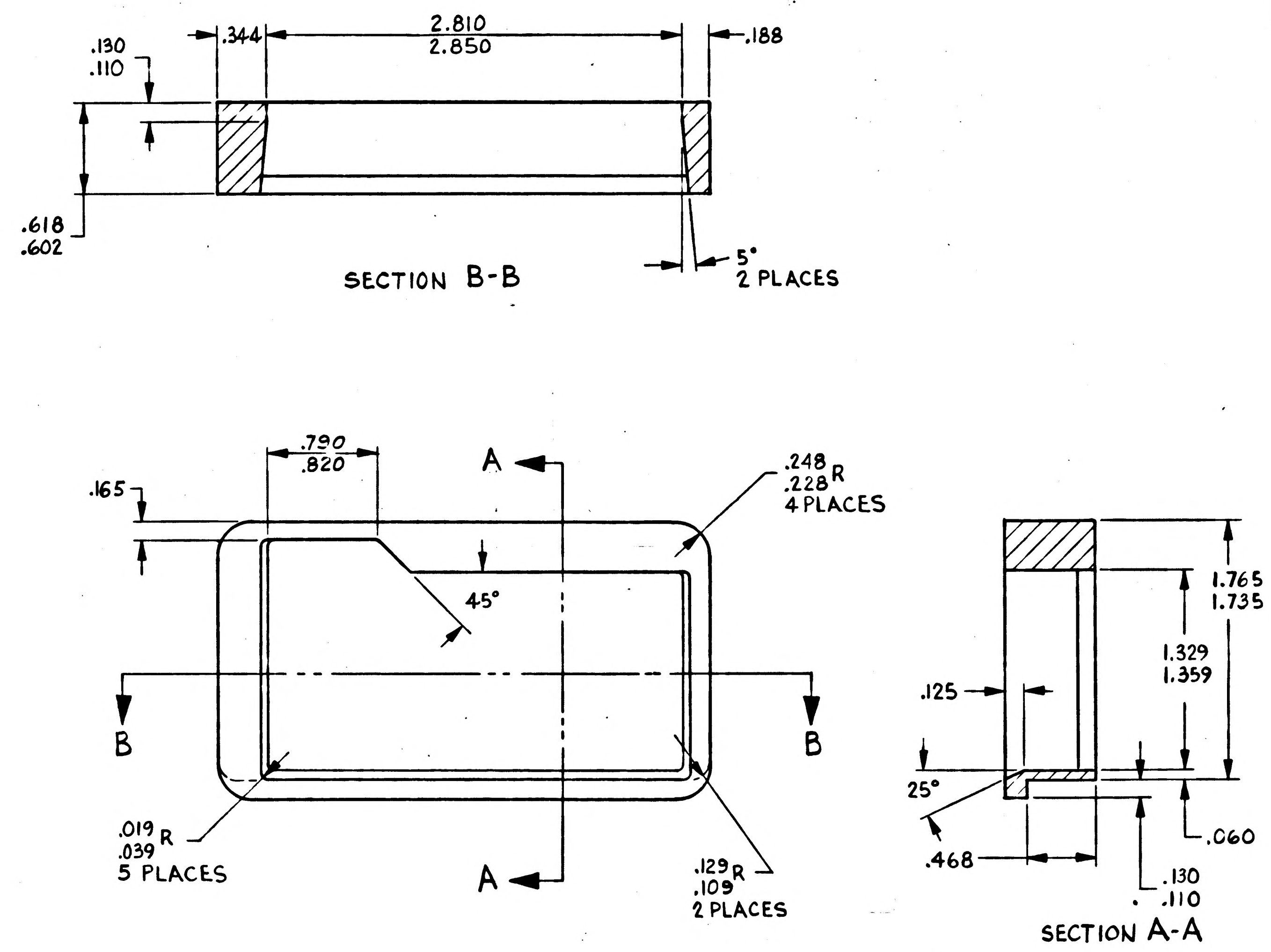
SECTION A-A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± 2°	AC ELECTRONICS DIVISION GENERAL MOTORS CORP. MILWAUKEE WIS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN S PLANE DATE 7 JAN 66 CHECKED 7 JAN 66 APPROVAL 13 JAN 66 4 Feb 66 CONTRACT NAS 9-497	GASKET, WASP
MATERIAL SEE NOTE 2	NASA APPROVAL A. C. METZGER	SIZE D CODE IDENT NO. 99974 1008335
APPROVAL NAS 9 - 497	MIT APPROVAL	SCALE 2/1 SHEET 1 OF 1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: ZZ-R-765 , RUBBER, CLASS III, GRADE 25, RED.
3. IDENTIFY USING DRAWING NUMBER PER MIL-STD-130.

REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER D.O. 61502		14 JAN 66	RK
	B	INITIAL RELEASE CLASS A PER TDRR 26421		28 JAN 66	
	C	REVISED PER TDRR 27820		13 APR 66	J.H.P.



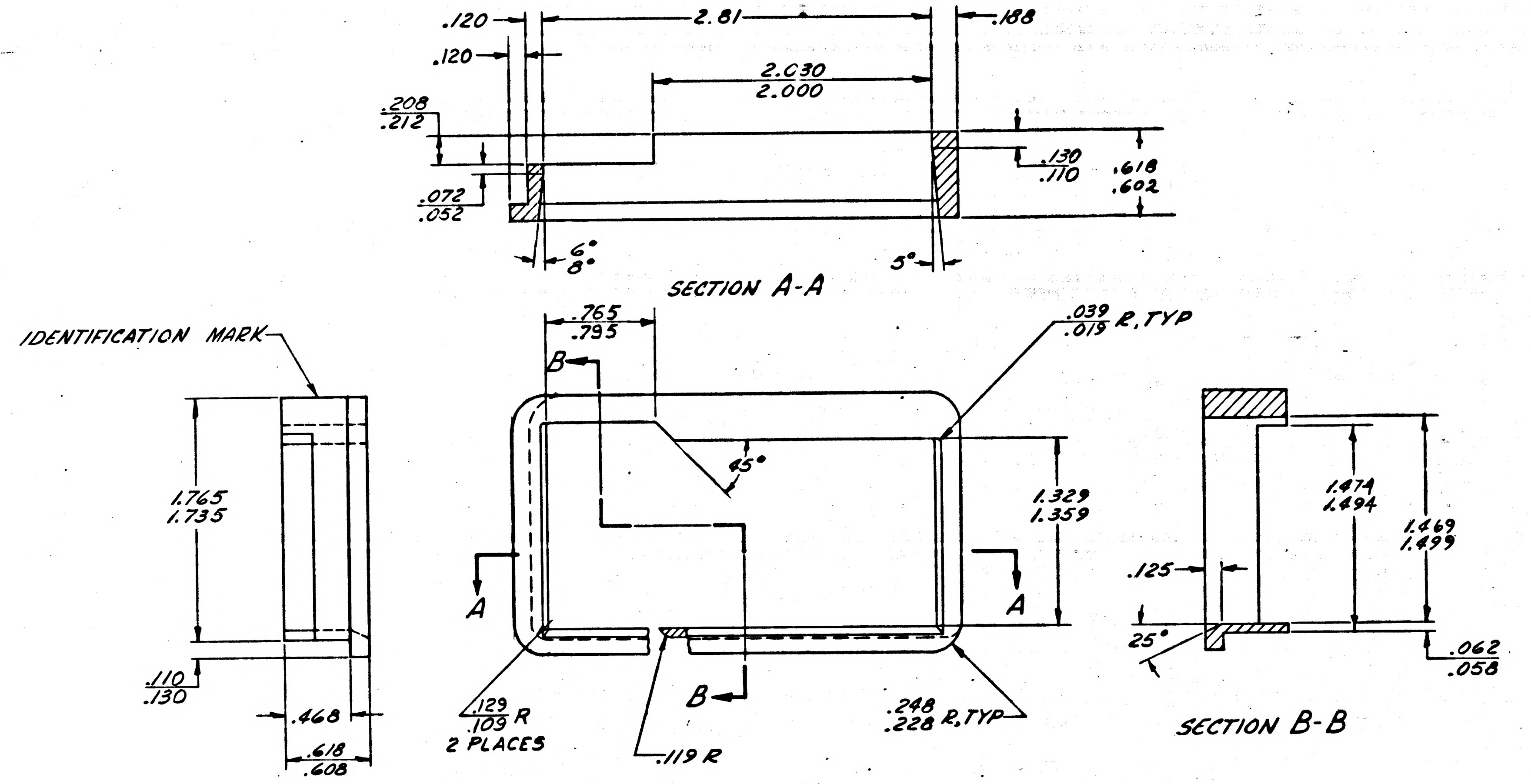
.130
.110
.344
2.810
2.850
.188
.618
.602
5°
2 PLACES
SECTION B-B
.790
.820
.165
A
45°
.248
.228 R
4 PLACES
B
B
.019
.039 R
5 PLACES
A
.129
.109 R
2 PLACES
1.765
1.735
1.329
1.359
.125
25°
.060
.468
.130
.110
SECTION A-A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± 2°	AC ELECTRONICS DIVISION GENERAL MOTORS CORP. MILWAUKEE WIS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN S PLANE DATE 7 JAN 66 CHECKED 7 JAN 66 APPROVAL 4 Feb 66 CONTRACT NAS 9-497	GASKET, WASP
MATERIAL SEE NOTE 2	NASA APPROVAL	SIZE D · CODE IDENT NO. 99974 · 1008335
APPROVAL NAS 9 - 497	MIT APPROVAL	SCALE 2/1 · SHEET 1 OF 1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: RUBBER PER ZZ-R-765, CLASS III, GRADE 25.
3. IDENTIFY USING DRAWING NUMBER PER MIL-STD-130.

REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER D.D. 61502		14 JAN 66	RR
	B	INITIAL RELEASE CLASS A PER TDRR 25421		28 JAN 66	WK


.120
.120
2.81
.188
2.030
2.000
.208
.212
.130
.110
.618
.602
.072
.052
6°
8°
5°
SECTION A-A
IDENTIFICATION MARK
.765
.795
.039
.019 R, TYP
B
45°
1.765
1.735
1.329
1.359
A
A
.110
.130
.468
.618
.608
.129
.109 R
2 PLACES
B
.119 R
.248
.228 R, TYP
1.474
1.494
1.469
1.499
.125
25°
.062
.058
SECTION B-B

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS ±.005 ±.02
ANGLES ± 2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN 7 JAN 66 DATE
CHECKED 7 JAN 66
APPROVAL 7 JAN 66
APPROVAL 4 FEB 66
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET,
MINI-WASP

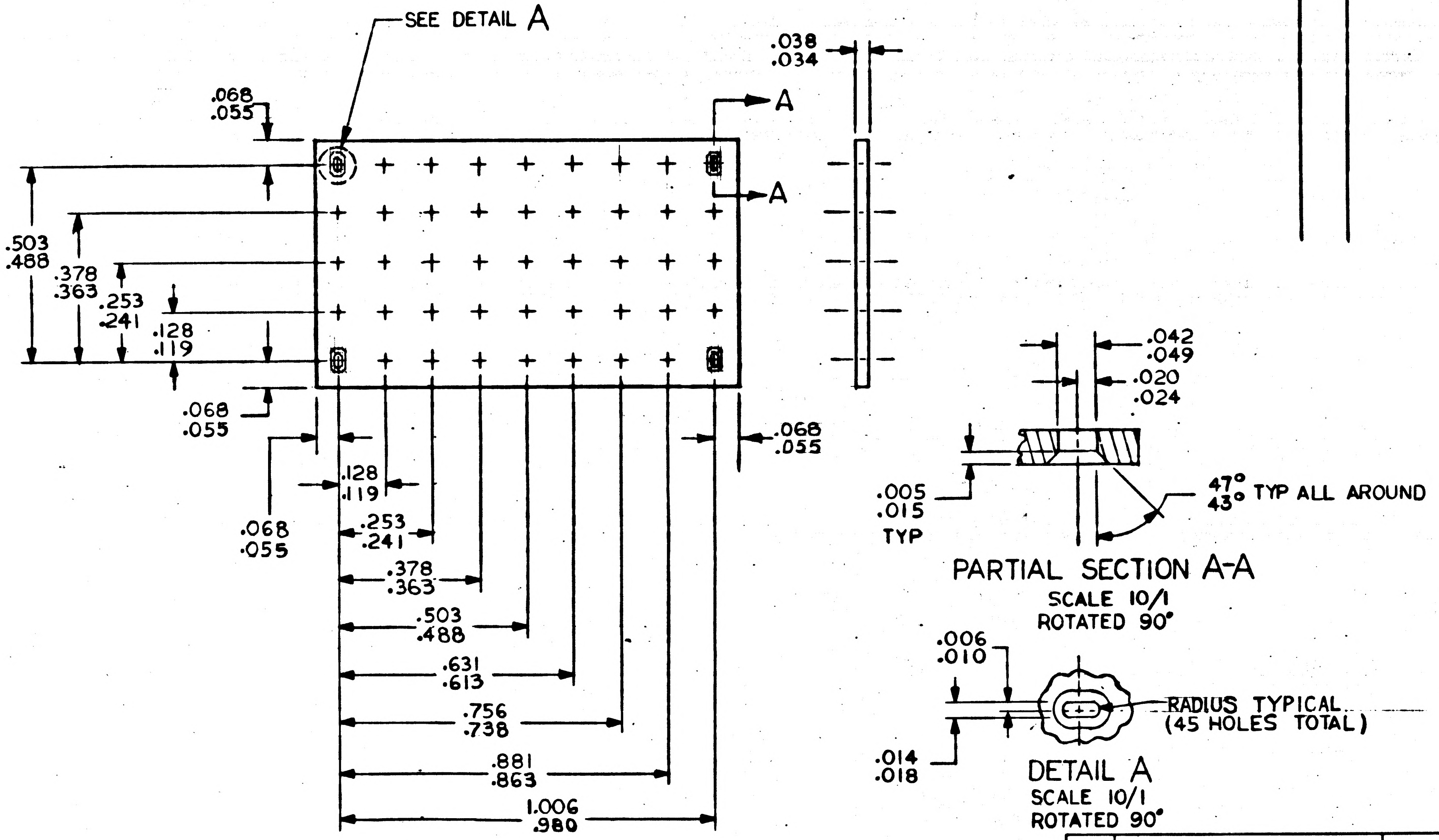
CODE IDENT NO. 99974
SIZE D
1008336
SCALE 2/1
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 1008339

REVISIONS 26421

SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 26421	28 JAN 66	WK



SEE DETAIL A
.068 .055
.503 .488
.378 .363
.253 .241
.128 .119
.068 .055
.068 .055
.068 .055
.128 .119
.253 .241
.378 .363
.503 .488
.631 .613
.756 .738
.881 .863
1.006 .980
A
A
.038 .034
.042 .049
.020 .024
.005 .015 TYP
47° 43° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
ROTATED 90°
.006 .010
RADIUS TYPICAL (45 HOLES TOTAL)
.014 .018
DETAIL A
SCALE 10/1
ROTATED 90°

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER 1008862
3. MOLDING FLASH NOT TO EXCEED .005 X .001 THICK.
4. IDENTIFY PER ND1002019

NEXT ASSY	USED ON
1007530	
1007539	
1007538	
1007537	
1007536	
1007535	
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT NAS 9-497
DRAWN H. Lyiele DATE 7 JAN 65
CHECKED W. Diehl 7 JAN 66
APPROVAL 7 JAN 66
APPROVAL 4 Feb '66
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

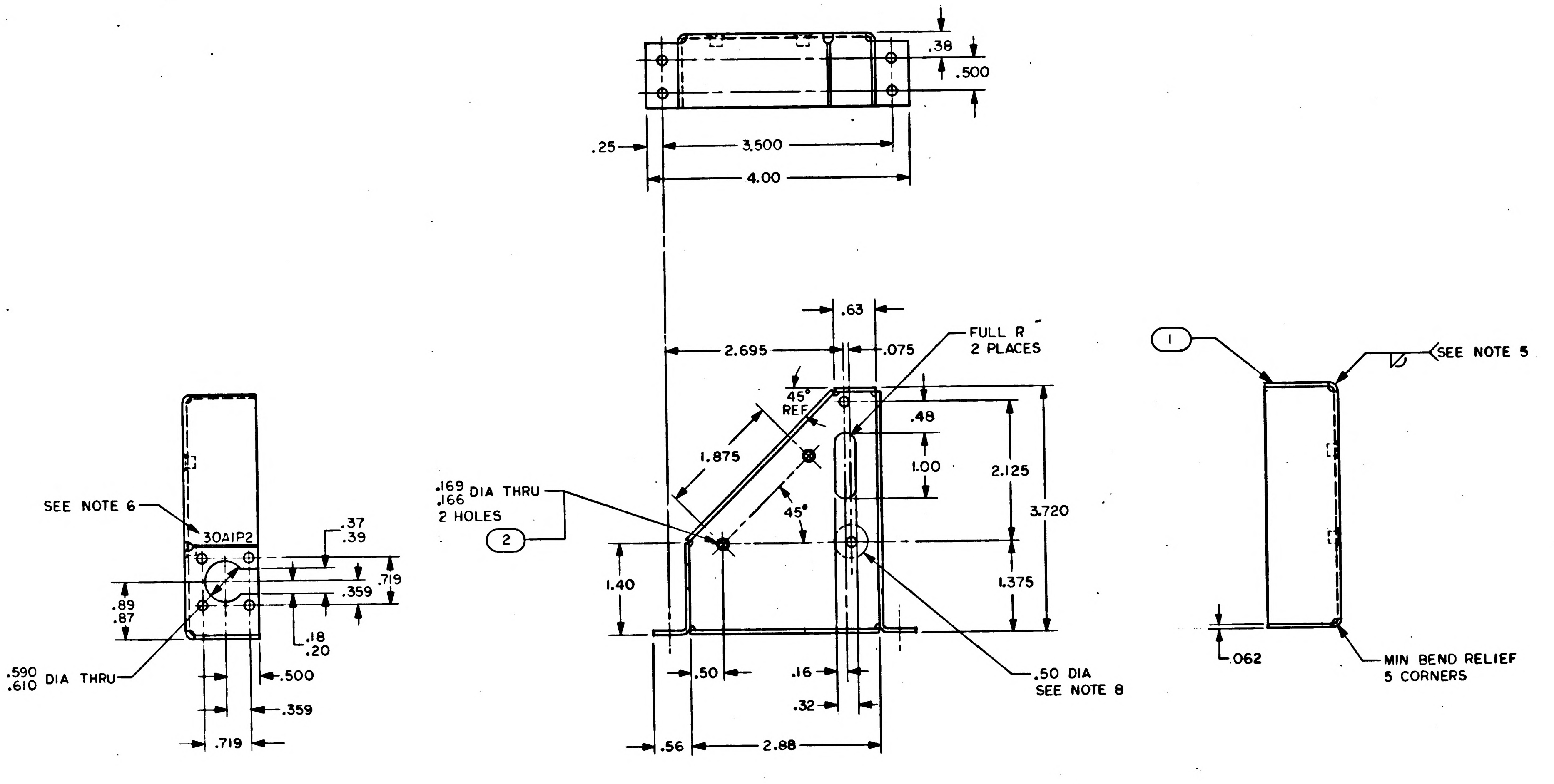
GASKET
CONNECTOR MINIATURE TRAY

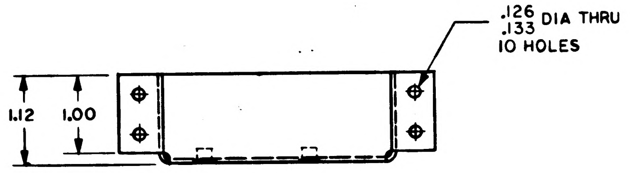
CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008339
SCALE 4/1
WT —
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 23/99

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 24323		RWH	30 NOV 65	


.38
.500
.25
3.500
4.00
SEE NOTE 6
30A1P2
.37
.39
.719
.359
.89
.87
.18
.20
.590
.610 DIA THRU
.500
.359
.719
.63
2.695
.075
FULL R
2 PLACES
45° REF
1.875
.48
1.00
2.125
3.720
.169
.166 DIA THRU
2 HOLES
2
45°
1.40
1.375
.50
.16
.32
.50 DIA
SEE NOTE 8
.56
2.88
1
SEE NOTE 5
.062
MIN BEND RELIEF
5 CORNERS


.126
.133 DIA THRU
10 HOLES
1.12
1.00

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: 5052-H32 AL PER QQ-A-250/8
3. FINISH: ANODIZE PER MIL-A-8625, TYPE II DYED BLACK
4. ALL INSIDE BEND RADII TO BE .06 R
5. WELD PER MIL-W-6858 CLASS B, GROUP A. INCLUDE BEND RELIEF
6. MARK .100/.140 HIGH WHITE CHARACTERS PER ND1002019. CENTRALIZE AS SHOWN
7. IDENTIFY WITH PART NO. PER ND1002019
8. INDICATED AREA TO BE FREE OF ANODIZE. TREAT PER ND1002040 EXCEPT DO NOT APPLY EPOXY COATING
9. REMOVE BURRS AND SHARP EDGES .005/.015

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1012528-002	STANDOFF, THREADED	2
1	1008351-001	BRACKET	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007670	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS .XX ± .02 .XXX ± .005 ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Edw. Gross 20 SEP 65
CHECKED 23 SEP 65
APPROVED 11 OCT 65
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
APPROVED MSC PP7-65-612
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BRACKET, CONNECTOR
INSEPARABLE ASSEMBLY
SIGNAL CONDITIONER

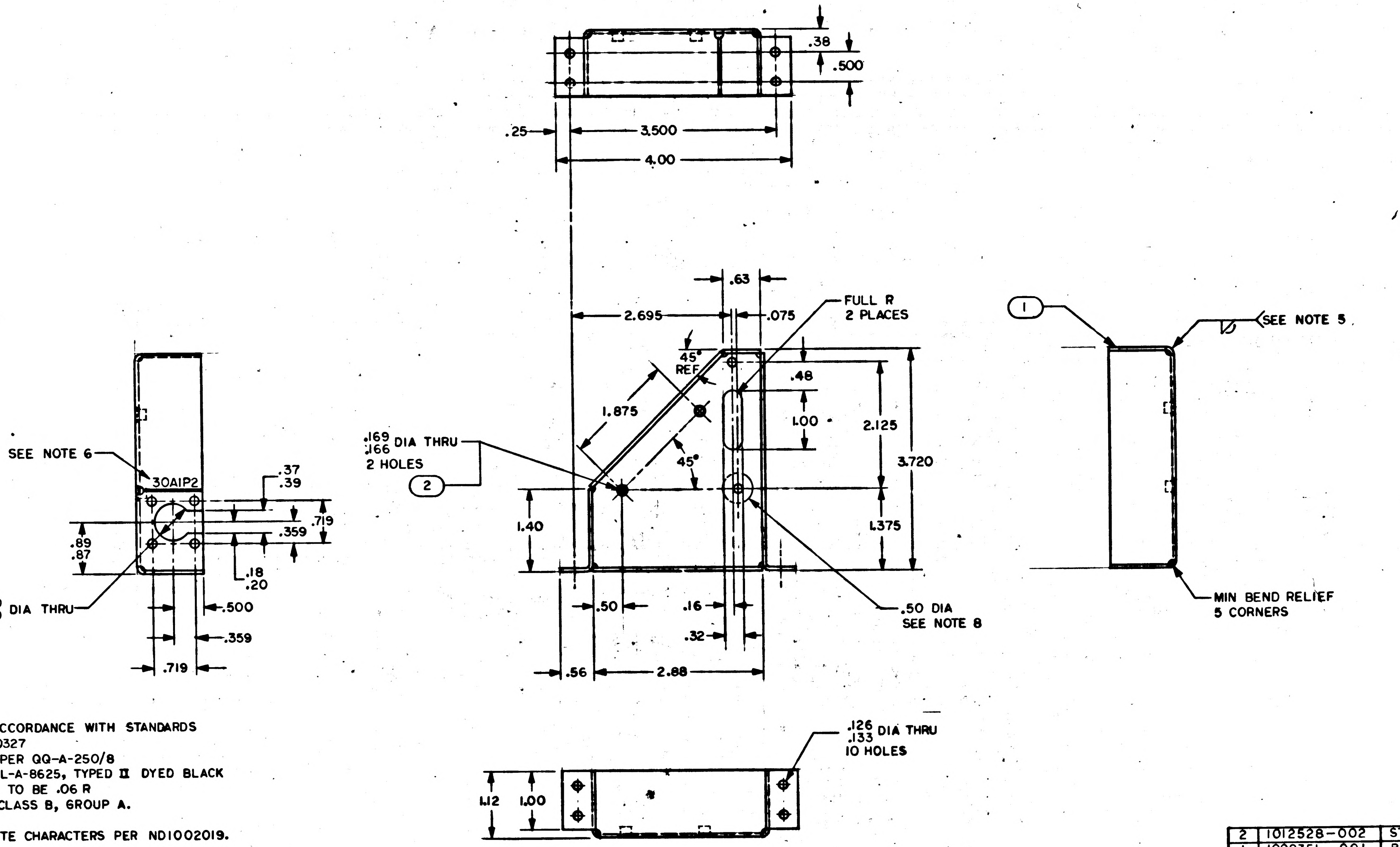
CODE IDENT NO 80230
SIZE D
DRAWING NO. 1008351
SCALE FULL
SHEET 1 OF 1

1008351 A

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 23199

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



.38
.500
.25
3.500
4.00
.63
2.695
.075
FULL R
2 PLACES
45°
REF
.48
1.875
1.00
2.125
3.720
.169
.166 DIA THRU
2 HOLES
2
45°
1.40
1.375
.50
.16
.32
.56
2.88
.50 DIA
SEE NOTE 8
SEE NOTE 6
30A1P2
.37
.39
.719
.359
.89
.87
.18
.20
.590
.610 DIA THRU
.500
.359
.719
1
SEE NOTE 5
MIN BEND RELIEF
5 CORNERS
.126
.133 DIA THRU
10 HOLES
1.12
1.00

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: 5052-H32 AL PER QQ-A-250/8
3. FINISH: ANODIZE PER MIL-A-8625, TYPED II DYED BLACK
4. ALL INSIDE BEND RADII TO BE .06 R
5. WELD PER MIL-W-6858 CLASS B, GROUP A. INCLUDE BEND RELIEF
6. MARK .100/.140 HIGH WHITE CHARACTERS PER ND1002019. CENTRALIZE AS SHOWN
7. IDENTIFY WITH PART NO. PER ND1002019
8. INDICATED AREA TO BE FREE OF ANODIZE. TREAT PER ND1002040 EXCEPT DO NOT APPLY EPOXY COATING
9. REMOVE BURRS AND SHARP EDGES .005/.015

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1012528-002	STANDOFF, THREADED	2
1	1008351 -001	BRACKET	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007670	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 XXX ± .005 ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Edw. Yoon 10 SEP 65
CHECKED 13 OCT 65
APPROVED 13 Oct 65
APPROVED
APPROVED MIT 30 Oct 65
NOT REQUIRED PER LETTER
NASA MSC PP7-65-612
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

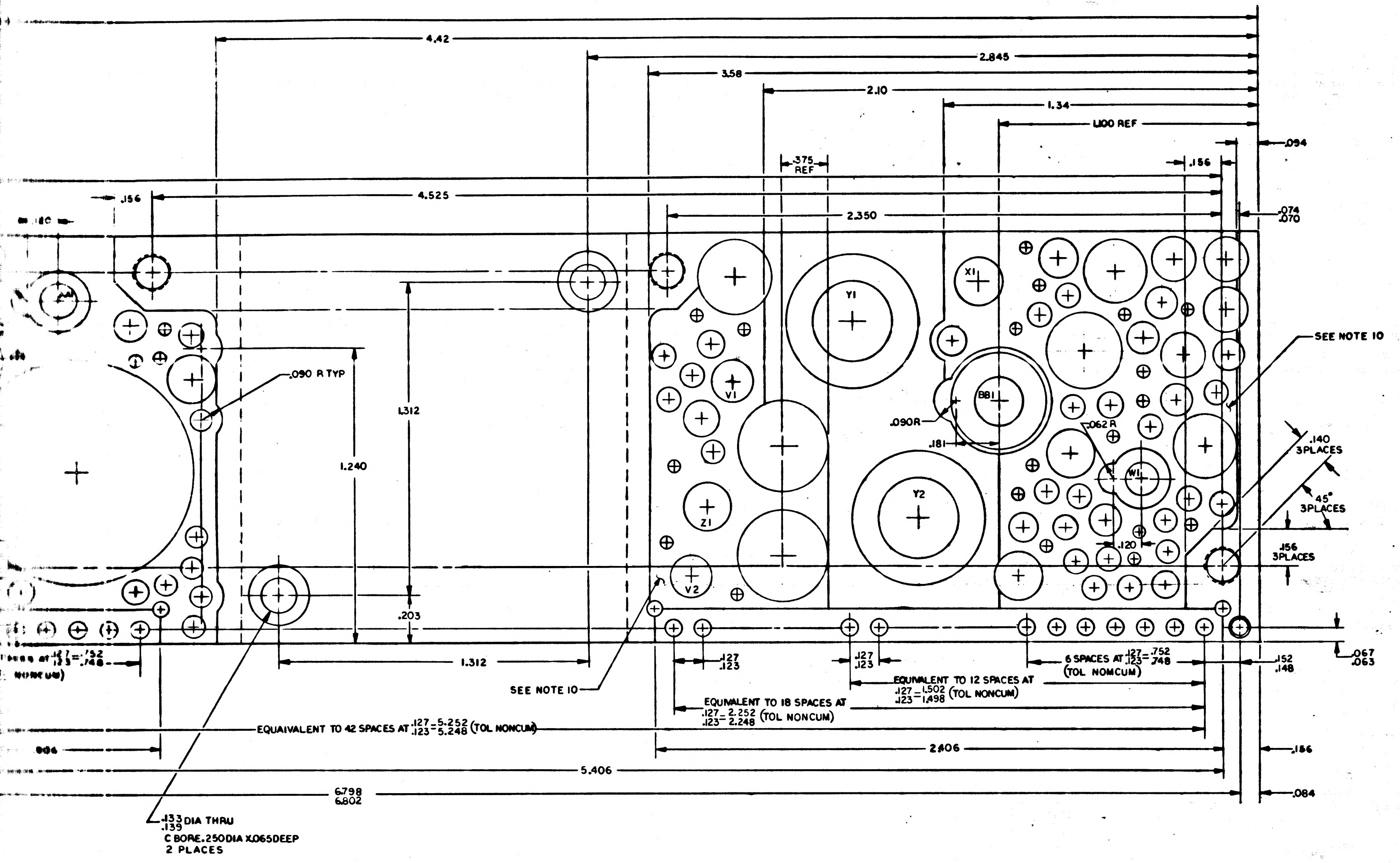
BRACKET, CONNECTOR
INSEPARABLE ASSEMBLY
SIGNAL CONDITIONER

CODE IDENT NO. 80230
SIZE D
DRAWING NO. 1008351
SCALE FULL
SHEET 1 OF 1

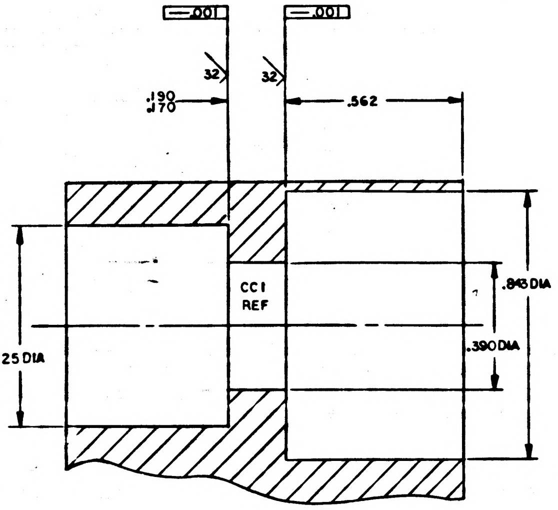
1008351

SYM	ZONE	DESCRIPTION	DR	CHK	DATE

REVISIONS 27186

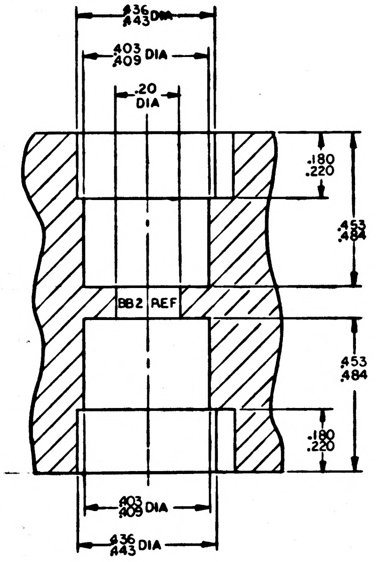


4.42
2.845
3.58
2.10
1.34
1.100 REF
.375 REF
.156
.094
4.525
2.350
.074 .070
.156
Y1
Y2
X1
V1
Z1
V2
BB1
W1
.090 R TYP
1.312
1.240
.203
.090R
.181
.062 R
.120
SEE NOTE 10
.140 3PLACES
45° 3PLACES
.156 3PLACES
1.312
SEE NOTE 10
.127 .123
6 SPACES AT .127 .123 - .752 .748 (TOL NONCUM)
.152 .148
.067 .063
EQUIVALENT TO 12 SPACES AT .127 .123 - 1.502 1.498 (TOL NONCUM)
EQUIVALENT TO 18 SPACES AT .127 .123 - 2.252 2.248 (TOL NONCUM)
EQUIVALENT TO 42 SPACES AT .127 .123 - 5.252 5.248 (TOL NONCUM)
2.806
5.406
6.798 6.802
.186
.084
.133 .139 DIA THRU C BORE .250 DIA X .065 DEEP 2 PLACES



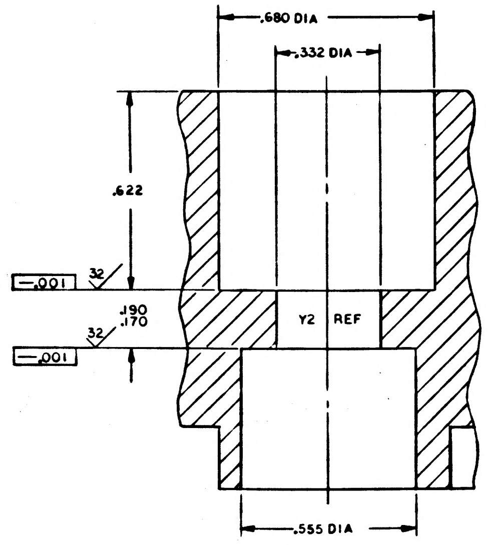
.001
.001
32
32
.190 .170
.562
CC1 REF
.625 DIA
.843 DIA
.390 DIA

PARTIAL SECTION H-H



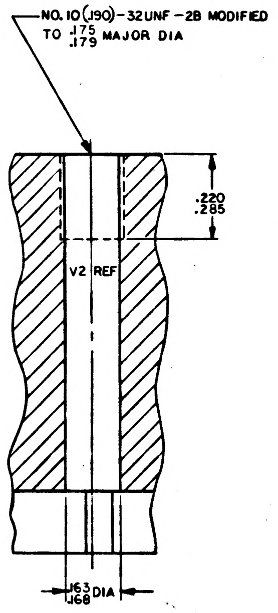
.436 .443 DIA
.403 .409 DIA
.20 DIA
.180 .220
.453 .484
BB2 REF
.453 .484
.180 .220
.403 .409 DIA
.436 .443 DIA

PARTIAL SECTION G-G



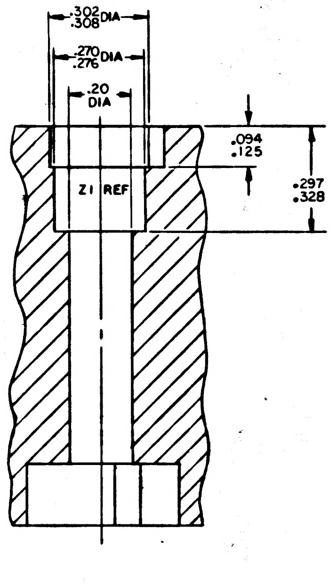
.680 DIA
.332 DIA
.622
.001
32
.190 .170
32
.001
Y2 REF
.555 DIA

PARTIAL SECTION C-C



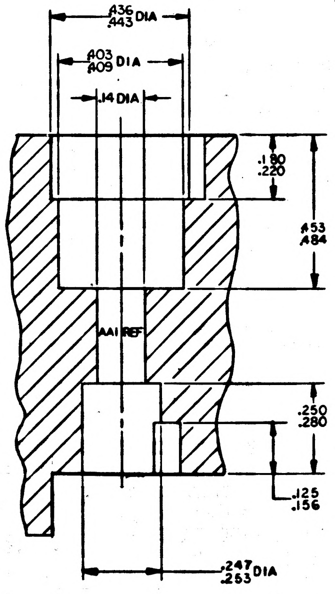
NO. 10 (.190)-32UNF-2B MODIFIED TO .175 .179 MAJOR DIA
.220 .285
V2 REF
.163 .168 DIA

PARTIAL SECTION D-D



.302 .308 DIA
.270 .276 DIA
.20 DIA
.094 .125
.297 .328
Z1 REF

PARTIAL SECTION E-E



.436 .443 DIA
.403 .409 DIA
.14 DIA
.180 .220
.453 .484
AA1 REF
.250 .280
.125 .156
.247 .253 DIA

PARTIAL SECTION F-F

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
4	MS21209-C0620	INSERT, SCREW LOCKING	2
1	1008359-001	HEATSINK	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007370	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS .XXX ± .005 .XX ± .02 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

HEATSINK
INSEPARABLE ASSEMBLY
PULSE TORQUE POWER SUPPLY, REGULATED

CODE IDENT NO. 80230 SIZE J DRAWING NO. 1008359

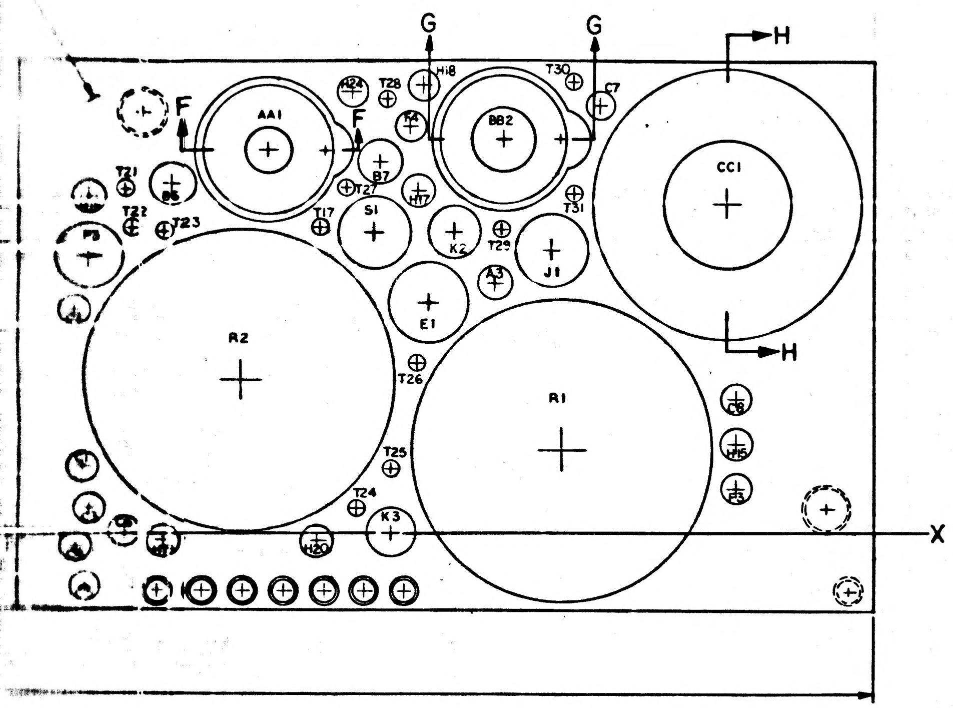
SCALE 5/1 SHEET OF

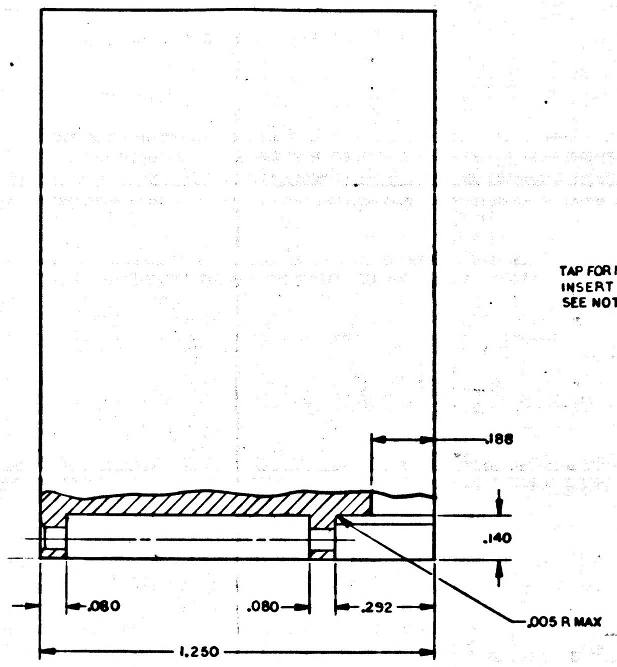
MASTER

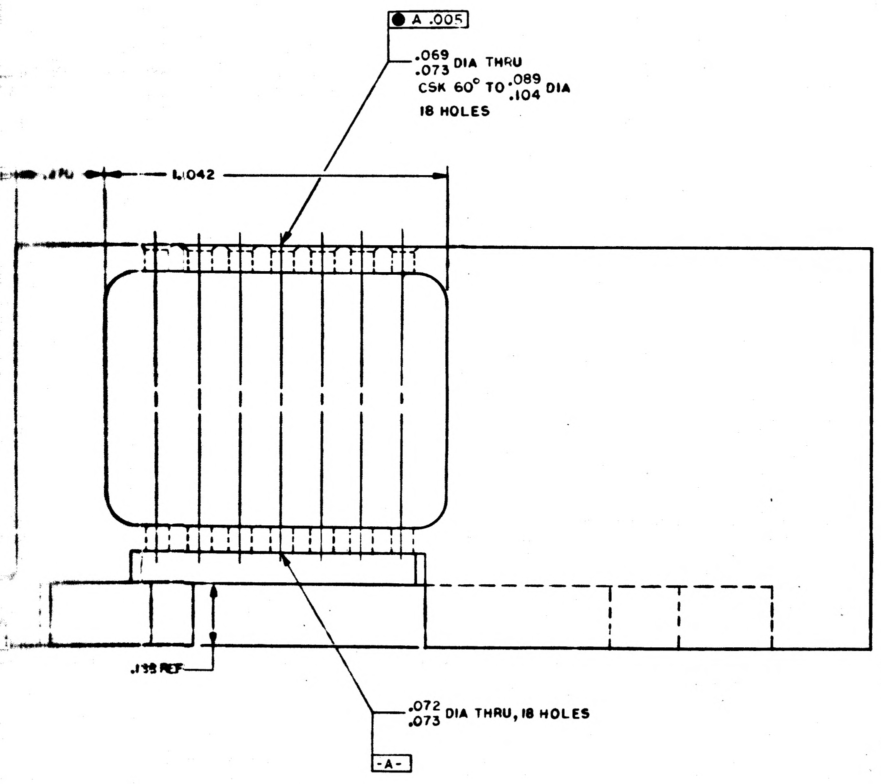
1008359

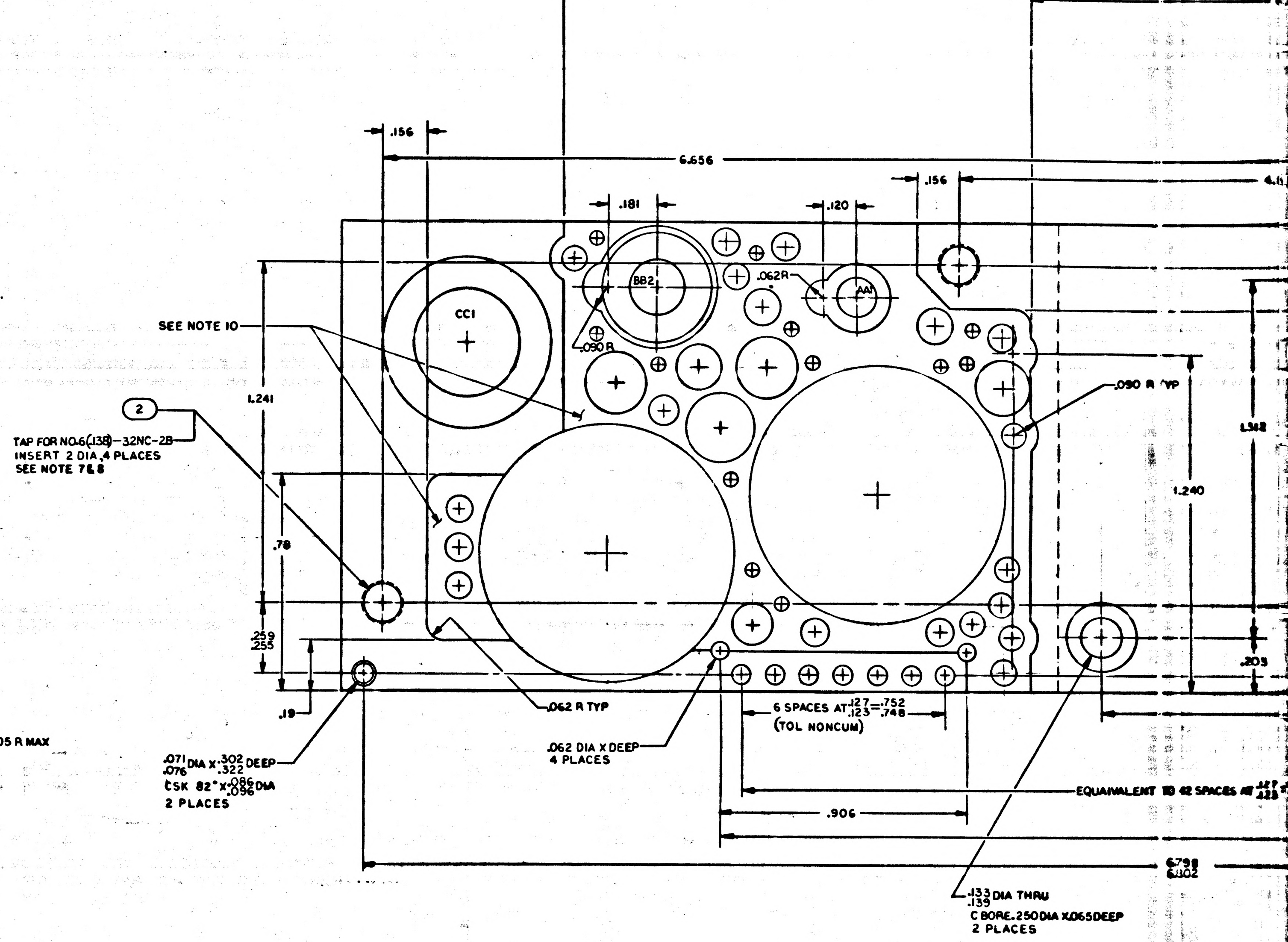
1008359

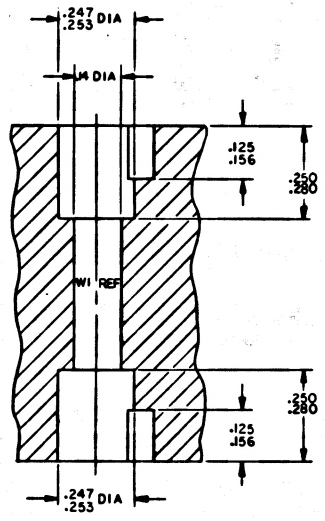
E3


G
G
H
H
F
F
X
AA1
BB2
CC1
H24
T28
H18
T30
C7
F4
B7
T27
H17
T21
T22
B6
T23
T17
S1
K2
T29
T31
J1
A3
E1
P5
R2
R1
T26
T25
T24
K3
C8
H16
P3

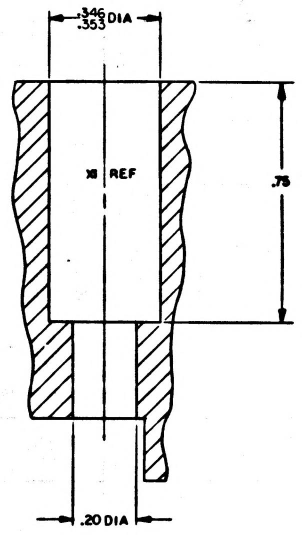

.188
.140
.080
.080
.292
1.250
.005 R MAX


A .005
.069
.073 DIA THRU
CSK 60° TO .089
.104 DIA
18 HOLES
1.1042
.138 REF
.072
.073 DIA THRU, 18 HOLES
-A-

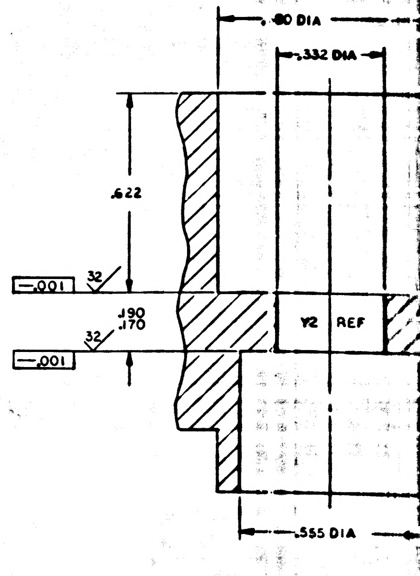

6.14
.156
6.656
.181
.120
.156
CC1
BB2
AA1
.062R
.090 R
SEE NOTE 10
.090 R TYP
1.241
1.348
1.240
2
TAP FOR NO.6(.138)-32NC-2B
INSERT 2 DIA 4 PLACES
SEE NOTE 7 & 8
.78
.259
.255
.19
.203
.062 R TYP
.071
.076 DIA X .302
.322 DEEP
CSK 82° X .086
.096 DIA
2 PLACES
.062 DIA X DEEP
4 PLACES
6 SPACES AT .127
.123 = .752
.748
(TOL NONCUM)
EQUIVALENT TO 42 SPACES AT
.906
6.798
6.802
.133
.139 DIA THRU
C BORE .250 DIA X .065 DEEP
2 PLACES


.247
.253 DIA
.14 DIA
.125
.156
.250
.280
W1 REF
.250
.280
.125
.156
.247
.253 DIA

PARTIAL SECTION A-A


.346
.353 DIA
X1 REF
.75
.20 DIA

PARTIAL SECTION B-B

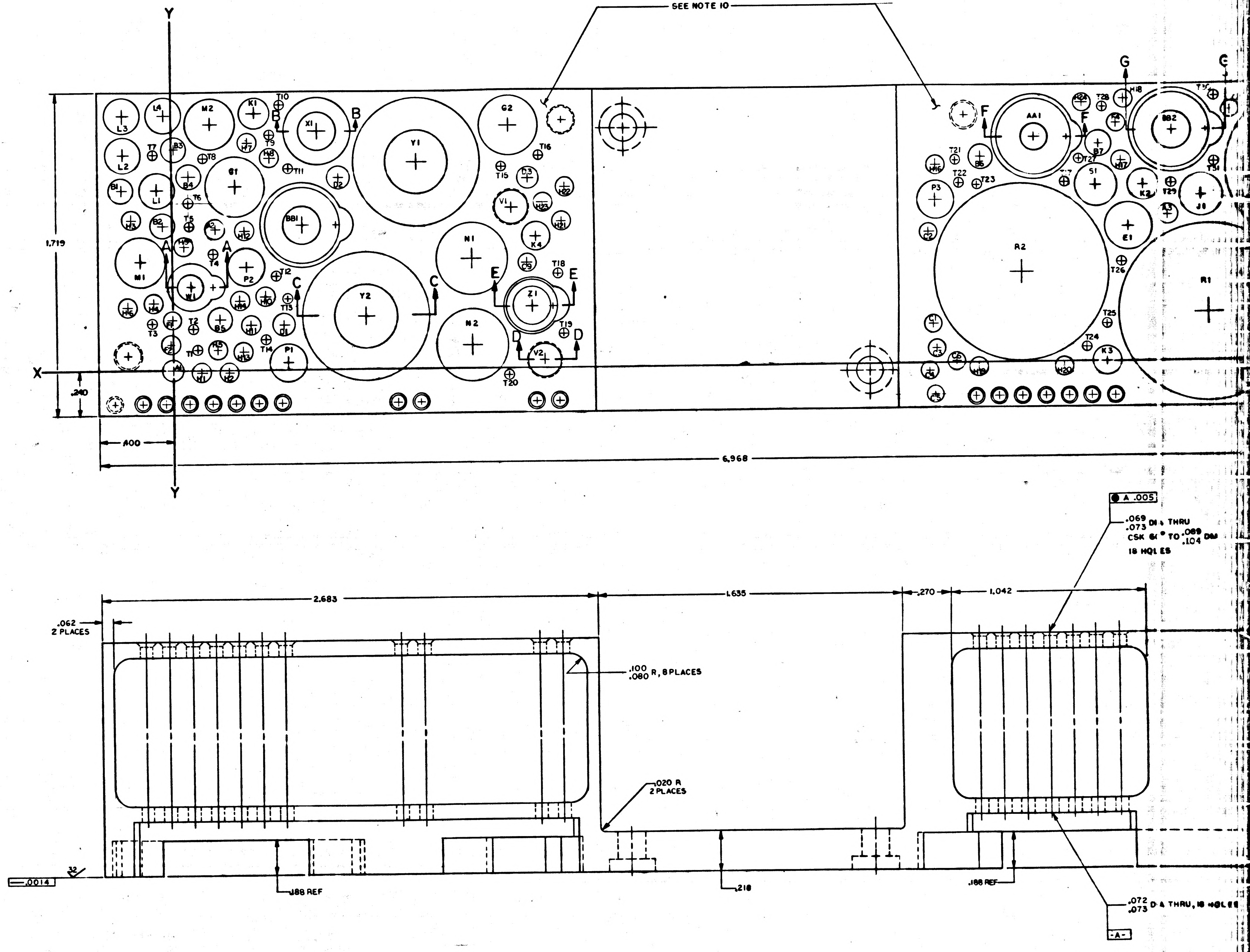

.80 DIA
.332 DIA
.622
32
.001
.190
.170
32
.001
Y2 REF
.555 DIA

PARTIAL SECTIO

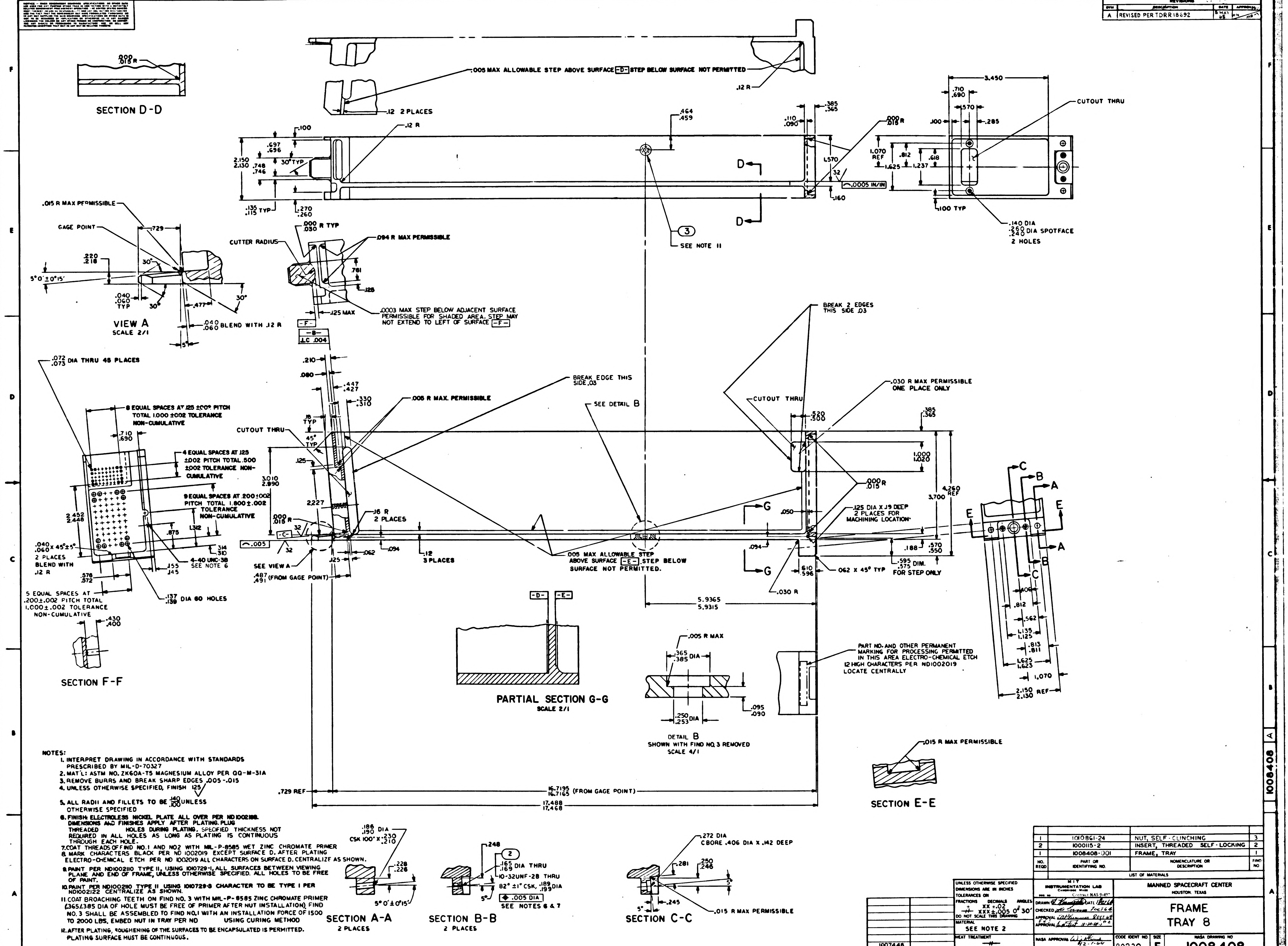
HOLE IDENT	X-DIM	Y-DIM	HOLE DIA	QTY
A1	.000	.000	.106 .110	3
A2	.230	.750		
A3	5.370	.780		
B1	-.270	.960	.127 .131	7
B2	-.050	.770		
B3	.010	1.180		
B4	.090	1.030		
B5	.250	.270		
B6	4.370	1.100		
B7	5.010	1.160		
C1	4.100	.210	.088 .092	9
C2	4.080	.700		
C3	4.120	.080		
C4	4.080	-.040		
C5	4.110	-.170		
C6	4.230	.010		
C7	5.700	1.340		
C8	6.130	.420		
C9	1.890	.560		
D1	.600	.240	.112 .116	3
D2	.900	1.020		
D3	1.920	1.010		
E1	5.160	.720	.241 .245	1
F1	.000	.270	.093 .097	4
F2	-.010	.140		
F3	6.130	.140		
F4	5.100	1.270		
G1	.340	.980	.310 .317	2
G2	1.820	1.290		
H1	.150	-.010	.100 .104	24
H2	.300	-.010		
H3	-.220	.800		
H4	-.100	.360		
H5	.240	.110		
H6	-.240	.340		
H7	.410	1.210		
H8	.530	1.130		
H9	.060	.660		
H10	.500	.390		
H11	.420	.240		
H12	.390	.740		
H13	.380	.100		
H14	.360	.370		
H15	6.130	.280		
H16	4.120	1.060		
H17	5.132	1.074		
H18	5.140	1.400		
H19	4.350	-.020		
H20	4.810	-.020		
H21	2.100	.780		
H22	2.120	.960		
H23	2.000	.880		
H24	4.920	1.380		
J1	5.550	.880	.227 .231	1
K1	.450	1.370	.153 .157	4
K2	5.240	.940		
K3	5.040	.000		
K4	1.960	.700		
L1	-.080	.960	.181 .185	4
L2	-.260	1.150		
L3	-.260	1.360		
L4	-.040	1.360		

HOLE IDENT	X-DIM	Y-DIM	HOLE DIA	QTY
M1	-.170	.580	.255 .262	2
M2	.210	1.310		
N1	1.620	.580	.373 .380	2
N2	1.620	.120		
P1	.620	.040	.202 .206	3
P2	.400	.550		
P3	4.120	.870		
R1	5.580	.260	.936 .943	2
R2	4.580	.480		
S1	4.990	.940	.220 .224	1
T1	.130	.110	.045 .049	31
T2	.110	.220		
T3	-.110	.250		
T4	.220	.620		
T5	.090	.770		
T6	.090	.890		
T7	-.100	1.150		
T8	.170	1.130		
T9	.530	1.250		
T10	.590	1.410		
T11	.630	1.070		
T12	.560	.500		
T13	.620	.380		
T14	.500	.160		
T15	1.780	1.070		
T16	1.980	1.130		
T17	4.820	.980		
T18	2.080	.500		
T19	2.110	.180		
T20	1.810	-.040		
T21	4.230	1.080		
T22	4.250	.980		
T23	4.350	.970		
T24	4.930	.080		
T25	5.040	.200		
T26	5.120	.530		
T27	4.900	1.080		
T28	5.030	1.360		
T29	5.390	.950		
T30	5.620	1.410		
T31	5.620	1.060		
V1	1.820	.850	SEE SECTION D-D	2
V2	2.000	.040		
W1	.100	.450	SEE SECTION A-A	1
X1	.790	1.270	SEE SECTION B-B	1
Y1	1.320	1.100	SEE SECTION C-C	2
Y2	1.040	.280		
Z1	1.940	.330	SEE SECTION E-E'	1
AA1	4.660	1.220	SEE SECTION F-F	1
BB1	.700	.770	SEE SECTION G-G	2
BB2	5.392	1.230		
CC1	6.100	1.030	SEE SECTION H-H	1

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 MATERIAL: MAGNESIUM ZK60A-T5 PER QQ-M-31,TEMP 5
3. REMOVE BURRS AND SHARP EDGES .005/.015
4 ALL SURFACE 125/ UNLESS OTHERWISE SPECIFIED
5. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII TO BE .010 MAX
6. FINISH: PLUG INSERT HOLES AND ANODIZE PER MIL-M-45202 TYPE I,CLASS C
7. INSTALL FIND NO.2 PER MS 33646 BREAK OFF DRIVING TANG
8. COAT THREADS OF FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
9. IDENTIFY WITH PART NO. PER ND1002019
10. APPLY ADHESIVE AND COATING MATERIAL PER ND1002187 TYPE II
TO THE SURFACES INDICATED.


SEE NOTE 10
Y
X
1.719
.240
.400
6.968
A
B
C
D
E
F
G
L1
L2
L3
L4
M1
M2
K1
K2
K3
K4
X1
Y1
Y2
G1
G2
BB1
BB2
N1
N2
P1
P2
P3
V1
V2
Z1
W1
AA1
R1
R2
S1
E1
J1
⊕ A .005
.069
.073 DIA THRU
CSK 60° TO .089
.104 DIA
18 HOLES
2.683
1.635
.270
1.042
.062
2 PLACES
.100
.080 R, 8 PLACES
.020 R
2 PLACES
.0014
32
.188 REF
.218
.188 REF
.072
.073 DIA THRU, 18 HOLES
-A-

SYM	DESCRIPTION	DATE	APPROVED
A	REVISED PER TDRR 18492	5 MAY 65	


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 2 PLACES
.12 R
3.450
CUTOUT THRU
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.100 TYP
SEE NOTE 11
VIEW A
SCALE 2/1
GAGE POINT
.015 R MAX PERMISSIBLE
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
BLEND WITH .12 R
BREAK 2 EDGES THIS SIDE .03
.072 .073 DIA THRU 45 PLACES
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3B SEE NOTE 6
.137 .139 DIA 60 HOLES
.040 .060 X 45° ±5° 2 PLACES BLEND WITH .12 R
CUTOUT THRU
.005 R MAX. PERMISSIBLE
BREAK EDGE THIS SIDE .03
SEE DETAIL B
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.16 R 2 PLACES
.12 3 PLACES
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED.
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
.030 R
5.9365 5.9315
SECTION F-F
PARTIAL SECTION G-G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA CSK 100° X .230 .210
SECTION A-A
2 PLACES
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002188. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO.1 AND NO2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II, USING 1010729-1, ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME, UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO.1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED SELF-LOCKING	2
1	1008408-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007448	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//—
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—//—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN DATE 1 Oct 64
CHECKED 1 Oct 64
APPROVAL 8 OCT 64
APPROVAL 10-21-64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 8

CODE IDENT NO.	SIZE	NASA DRAWING NO
80230	E	1008408

SCALE 1/1 WT SHEET 1 OF 3

1008408 A

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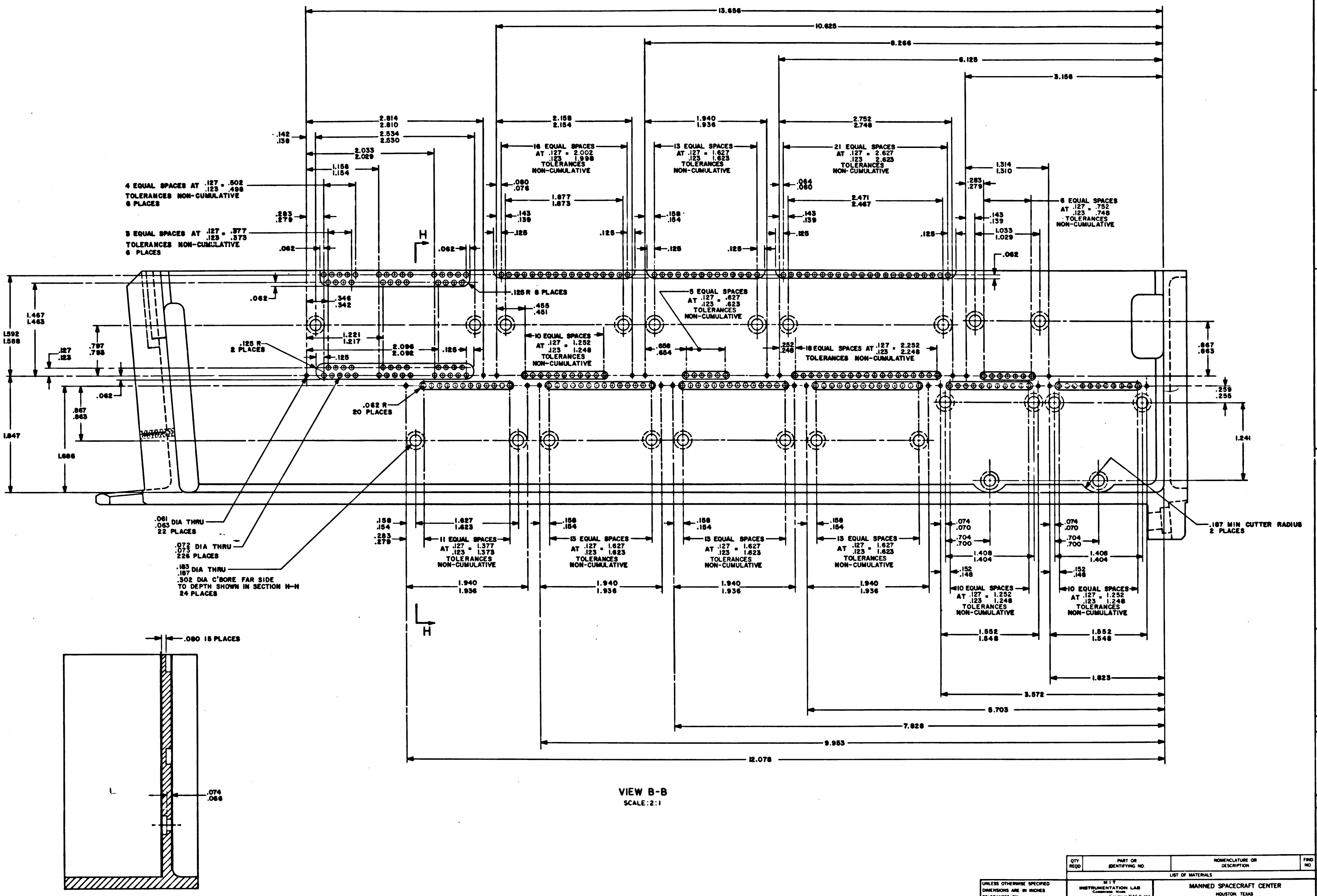
REVISIONS 145			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR18692	5 MAY 65	


13.656
10.625
8.266
6.125
3.156
2.814
2.810
2.534
2.530
2.033
2.029
1.158
1.154
.142
.138
4 EQUAL SPACES AT .127/.123 = .502/.498
TOLERANCES NON-CUMULATIVE
6 PLACES
3 EQUAL SPACES AT .127/.123 = .377/.373
TOLERANCES NON-CUMULATIVE
6 PLACES
.283
.279
.062
H
2.158
2.154
16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCES NON-CUMULATIVE
.080
.076
1.877
1.873
.143
.139
.125
1.940
1.936
13 EQUAL SPACES AT .127/.123 = 1.627/1.623
TOLERANCES NON-CUMULATIVE
.158
.154
.125
2.752
2.748
21 EQUAL SPACES AT .127/.123 = 2.627/2.623
TOLERANCES NON-CUMULATIVE
.064
.060
2.471
2.467
.143
.139
.125
1.314
1.310
.283
.279
6 EQUAL SPACES AT .127/.123 = .752/.748
TOLERANCES NON-CUMULATIVE
.143
.139
1.033
1.029
.062
.125 R 8 PLACES
.346
.342
.455
.451
5 EQUAL SPACES AT .127/.123 = .627/.623
TOLERANCES
NON-CUMULATIVE
1.467
1.463
1.592
1.588
.797
.793
.127
.123
.062
1.221
1.217
.125 R
2 PLACES
.125
2.096
2.092
.126
10 EQUAL SPACES AT .127/.123 = 1.252/1.248
TOLERANCES NON-CUMULATIVE
.658
.654
.252
.248
18 EQUAL SPACES AT .127/.123 = 2.252/2.248
TOLERANCES NON-CUMULATIVE
.867
.863
.259
.255
.062
.867
.863
.062 R
20 PLACES
1.847
1.686
1.241
.061/.063 DIA THRU
22 PLACES
.072/.075 DIA THRU
226 PLACES
.183/.187 DIA THRU
.302 DIA C'BORE FAR SIDE
TO DEPTH SHOWN IN SECTION H-H
24 PLACES
.158
.154
.283
.279
1.627
1.623
11 EQUAL SPACES AT .127/.123 = 1.377/1.373
TOLERANCES NON-CUMULATIVE
13 EQUAL SPACES AT .127/.123 = 1.627/1.623
TOLERANCES NON-CUMULATIVE
.074
.070
.704
.700
1.408
1.404
.152
.148
10 EQUAL SPACES AT .127/.123 = 1.252/1.248
TOLERANCES NON-CUMULATIVE
1.940
1.936
1.552
1.548
1.823
3.572
5.703
7.828
9.953
12.078
.187 MIN CUTTER RADIUS
2 PLACES
H
.080 15 PLACES
.074
.066

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN F. Kenneth DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL
12-1-64
MIT APPROVAL 1 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 8

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008408
SCALE 2:1
WT
SHEET 2 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 195-P			
SYM	DESCRIPTION	DATE	APPROVAL
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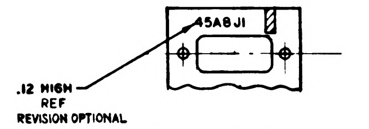
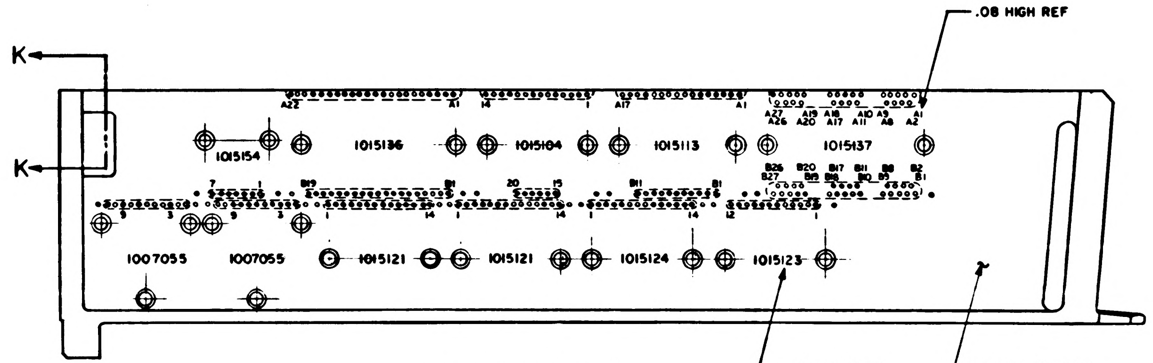
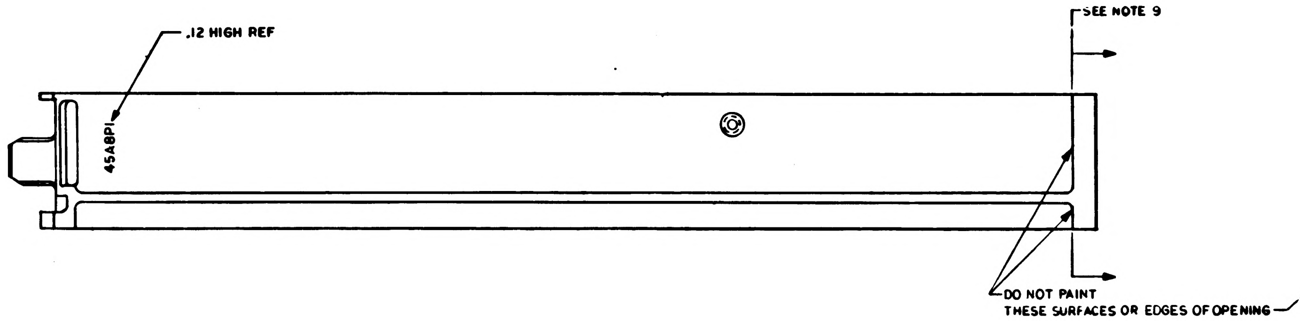
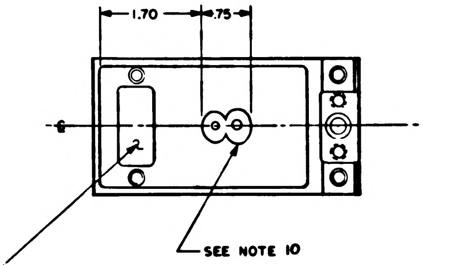

45A8J1
.12 HIGH REF
REVISION OPTIONAL

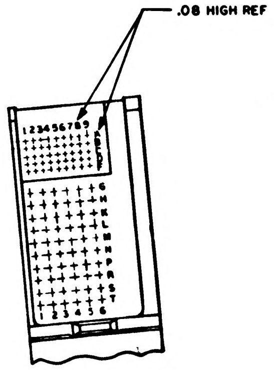
PARTIAL SECTION K-K

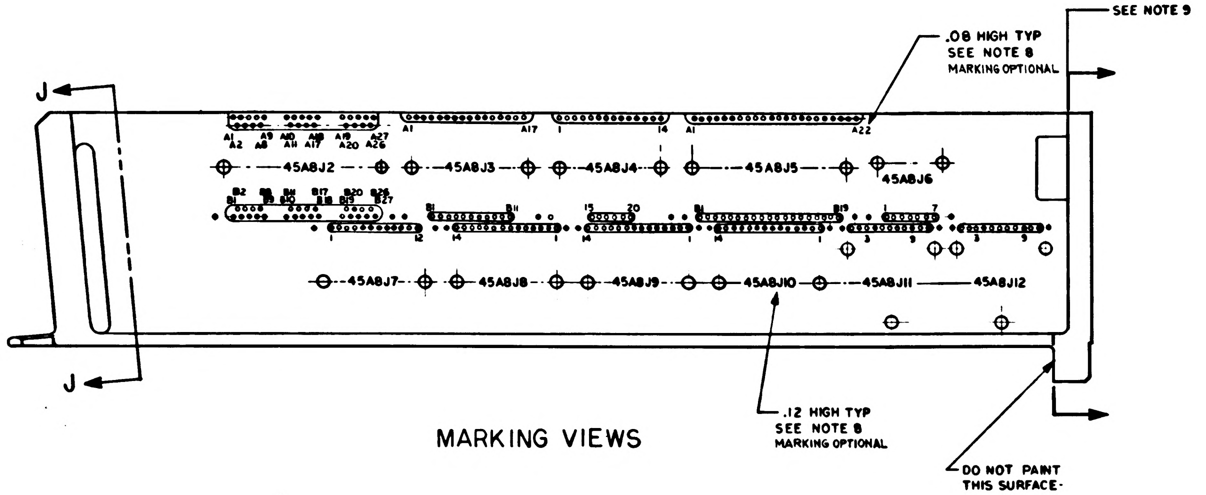

.08 HIGH REF
K
K
A22
A1
14
A17
A1
A27 A26
A19 A20
A18 A17
A10 A11
A9 A8
A1 A2
1015154
1015136
1015104
1015113
1015137
B26 B27
B20 B19
B17 B18
B11 B10
B8 B9
B2 B1
7
B19
B1
20
15
B11
B1
9
3
9
3
1
14
14
14
12
1
1007055
1007055
1015121
1015121
1015124
1015123
.12 HIGH REF
SURFACE –D– REF

VIEW ROTATED 180°

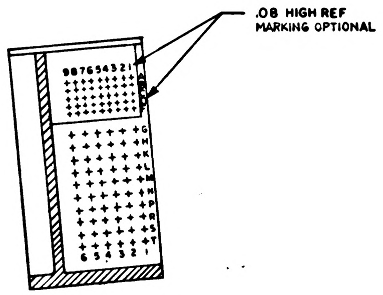

.12 HIGH REF
45A8P1
SEE NOTE 9
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENING


1.70
.75
SEE NOTE 10


.08 HIGH REF
123456789


.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
SEE NOTE 9
J
J
A1 A2
A9 A8
A10 A11
A18 A17
A19 A20
A27 A26
A17
1
14
A1
A22
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
B2 B1
B8 B9
B11 B10
B17 B18
B20 B19
B26 B27
B1
B11
15
20
B1
B19
7
12
14
14
1
3
9
1
3
9
45A8J7
45A8J8
45A8J9
45A8J10
45A8J11
45A8J12
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
DO NOT PAINT
THIS SURFACE

MARKING VIEWS


.08 HIGH REF
MARKING OPTIONAL
987654321

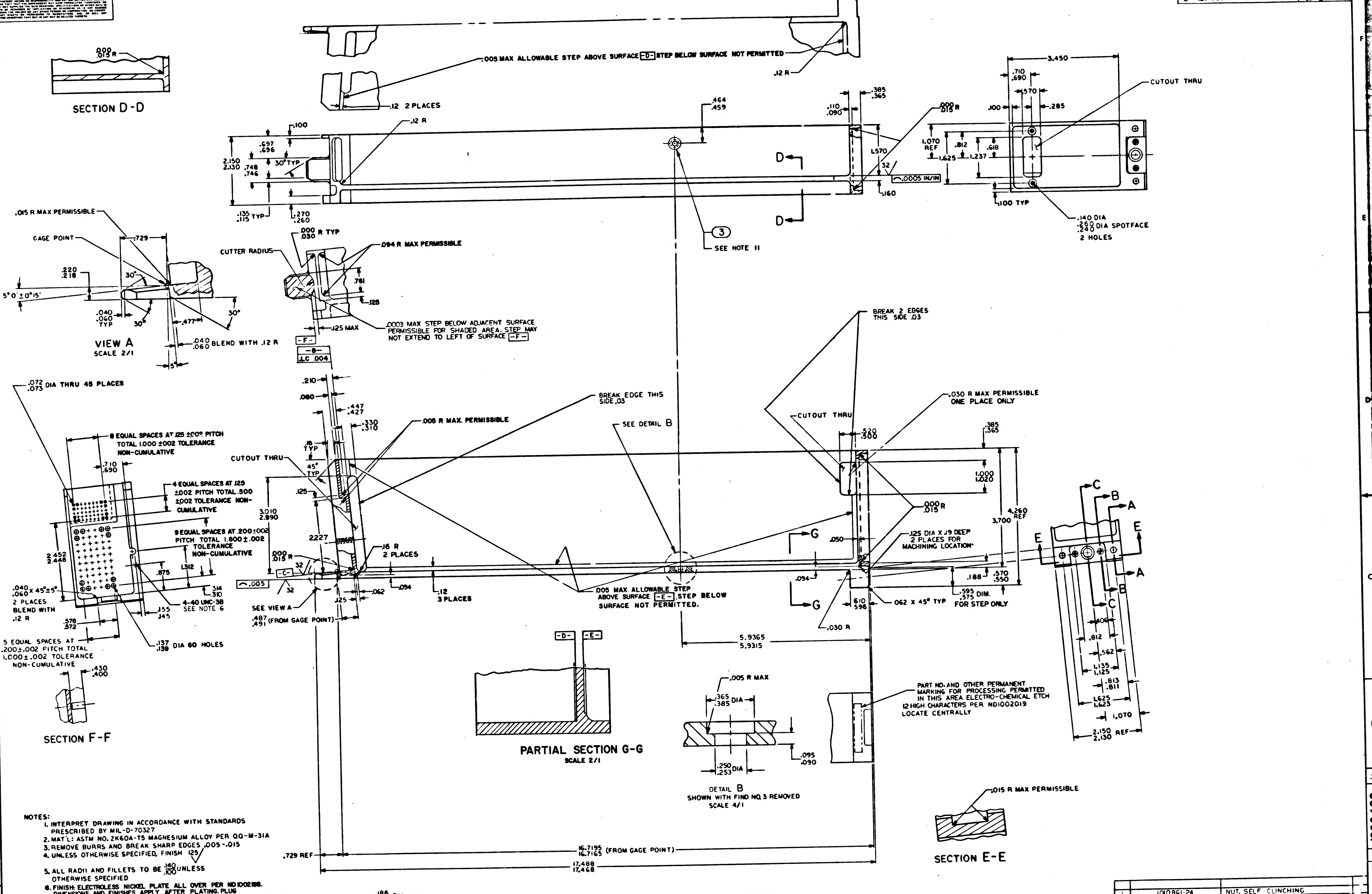
SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS XX±.02 ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS Contract NAS 9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL —#—	DRAWN F. Kennedy DATE 1 Oct 64 CHECKED 7 Oct 64 APPROVAL LA Plummer 8 Oct 64 APPROVAL 11-24-64	FRAME, TRAY 8
HEAT TREATMENT —#—	NASA APPROVAL 12-1-64	CODE IDENT NO. 80230 | SIZE E | NASA DRAWING NO. 1008408
FINAL FINISH —#—	MIT APPROVAL 1 Dec 64	SCALE 1/1 | WT | SHEET 3 OF 3

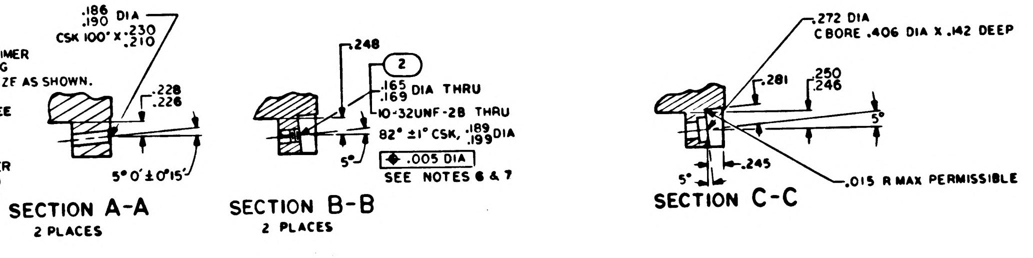
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR [illegible]92	5 MAY 65	[illegible]
B	REVISED PER TDRR 21525	13 AUG 65	[illegible]


SECTION D-D
.000 / .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 2 PLACES
.12 R
.0005 IN/IN
SEE NOTE 11
CUTOUT THRU
.140 DIA
.260 / .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
CUTTER RADIUS
.000 / .030 R TYP
.094 R MAX PERMISSIBLE
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
VIEW A
SCALE 2/1
.040 / .060 BLEND WITH .12 R
.072 / .073 DIA THRU 45 PLACES
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
.040 / .060 X 45° ±5° 2 PLACES BLEND WITH .12 R
4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.137 / .139 DIA 60 HOLES
SECTION F-F
CUTOUT THRU
.005 R MAX. PERMISSIBLE
BREAK EDGE THIS SIDE .03
SEE DETAIL B
.16 R 2 PLACES
SEE VIEW A
.487 / .491 (FROM GAGE POINT)
.12 3 PLACES
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED.
BREAK 2 EDGES THIS SIDE .03
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.062 X 45° TYP
.595 / .575 DIM. FOR STEP ONLY
.030 R
5.9365 / 5.9315
PARTIAL SECTION G-G
SCALE 2/1
.005 R MAX
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH 12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 / 16.7165 (FROM GAGE POINT)
17.488 / 17.468
2.150 / 2.130 REF

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002188. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND NO2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II, USING 1010729-1, ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME, UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.


.186 / .190 DIA
CSK 100° X .230 / .210
.228 / .226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165 / .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 / .199 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
C'BORE .406 DIA X .142 DEEP
.281
.250 / .246
.245
.015 R MAX PERMISSIBLE
SECTION C-C

1	1010861-24	NUT, SELF-CLINCHING	
2	1000115-2	INSERT, THREADED SELF-LOCKING	2
1	1008408-001	FRAME, TRAY	1
NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007448	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN [illegible] DATE 1 Oct 64
CHECKED [illegible] 7 Oct 64
APPROVAL [illegible] 8 Oct 64
APPROVAL [illegible] 10-20-64
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible] Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

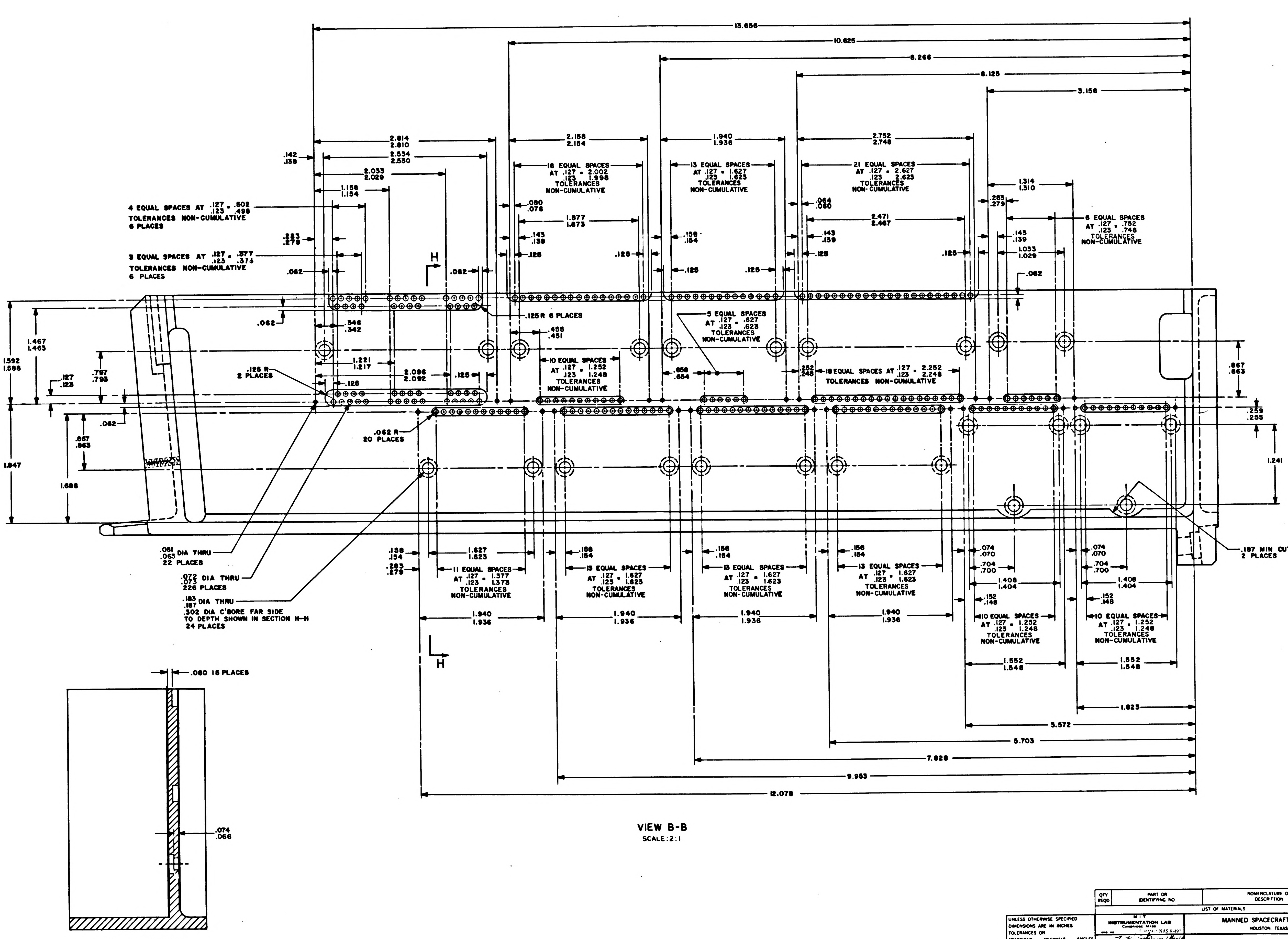
FRAME
TRAY 8

CODE IDENT NO 80230 SIZE E NASA DRAWING NO 1008408
SCALE 1/1 WT SHEET 1 OF 3

1008408 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 13692	5 MAY 65	
B	REVISION STATUS CHANGED	13 AUG 65	



4 EQUAL SPACES AT .127/.123 = .502/.498 TOLERANCES NON-CUMULATIVE 6 PLACES
3 EQUAL SPACES AT .127/.123 = .377/.373 TOLERANCES NON-CUMULATIVE 6 PLACES
13.656
10.625
8.266
6.125
3.156
2.814 2.810
2.534 2.530
2.033 2.029
1.158 1.154
.142 .138
.283 .279
.062
H
16 EQUAL SPACES AT .127/.123 = 2.002/1.998 TOLERANCES NON-CUMULATIVE
2.158 2.154
.080 .076
1.877 1.873
.143 .139
.125
13 EQUAL SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
1.940 1.936
.158 .154
21 EQUAL SPACES AT .127/.123 = 2.627/2.623 TOLERANCES NON-CUMULATIVE
2.752 2.748
.064 .060
2.471 2.467
1.314 1.310
.283 .279
6 EQUAL SPACES AT .127/.123 = .752/.748 TOLERANCES NON-CUMULATIVE
1.033 1.029
.125 R 6 PLACES
.455 .451
.346 .342
1.221 1.217
.125 R 2 PLACES
2.096 2.092
10 EQUAL SPACES AT .127/.123 = 1.252/1.248 TOLERANCES NON-CUMULATIVE
5 EQUAL SPACES AT .127/.123 = .627/.623 TOLERANCES NON-CUMULATIVE
.658 .654
.252 .248
18 EQUAL SPACES AT .127/.123 = 2.252/2.248 TOLERANCES NON-CUMULATIVE
.867 .863
.259 .255
1.241
1.592 1.588
1.467 1.463
.127 .123
.797 .793
1.847
1.686
.062 R 20 PLACES
.187 MIN CUTTER RADIUS 2 PLACES
.061/.063 DIA THRU 22 PLACES
.072/.073 DIA THRU 226 PLACES
.183/.187 DIA THRU .302 DIA C'BORE FAR SIDE TO DEPTH SHOWN IN SECTION H-H 24 PLACES
11 EQUAL SPACES AT .127/.123 = 1.377/1.373 TOLERANCES NON-CUMULATIVE
1.627 1.623
.074 .070
.704 .700
1.408 1.404
.152 .148
1.552 1.548
1.823
3.572
5.703
7.828
9.953
12.078
.080 15 PLACES
.074 .066

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02, XXX ± .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN F. Kenneth DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL 9 Oct 64
APPROVAL 10-28-64
NASA APPROVAL 12-1-64
MIT APPROVAL 1 Dec 64

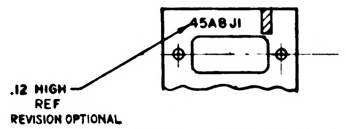
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 8

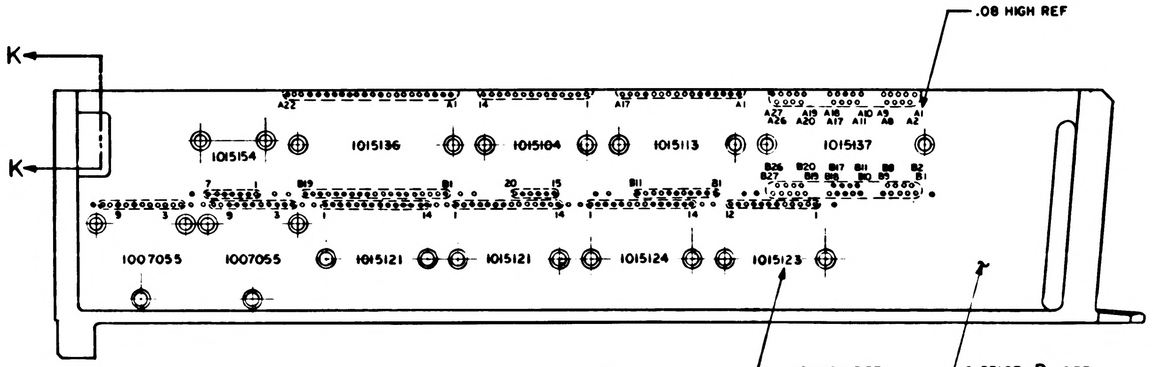
CODE IDENT NO. 80230 SIZE E NASA DRAWING NO 1008408
SCALE 2:1 WT SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

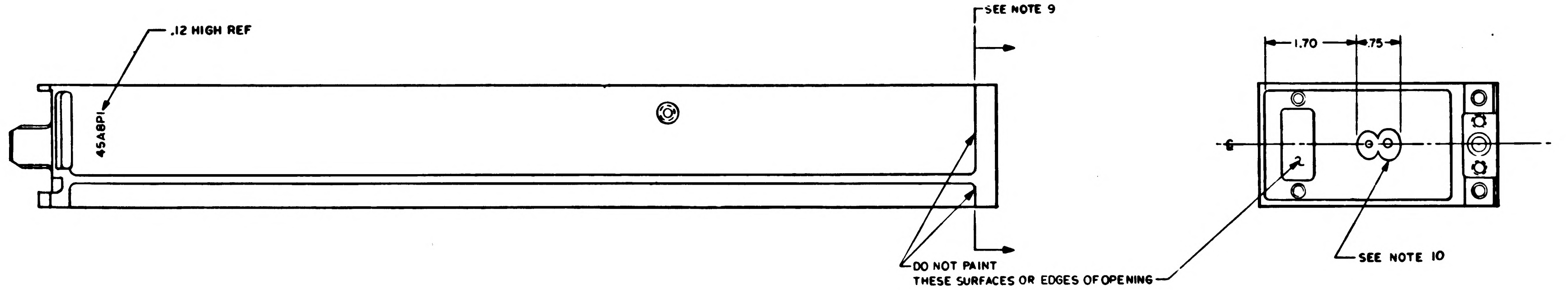
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	5 MAY 65	
B	REVISION STATUS CHANGED	13 AUG 65	

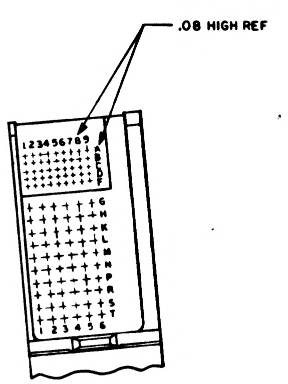

45A8J1
.12 HIGH
REF
REVISION OPTIONAL

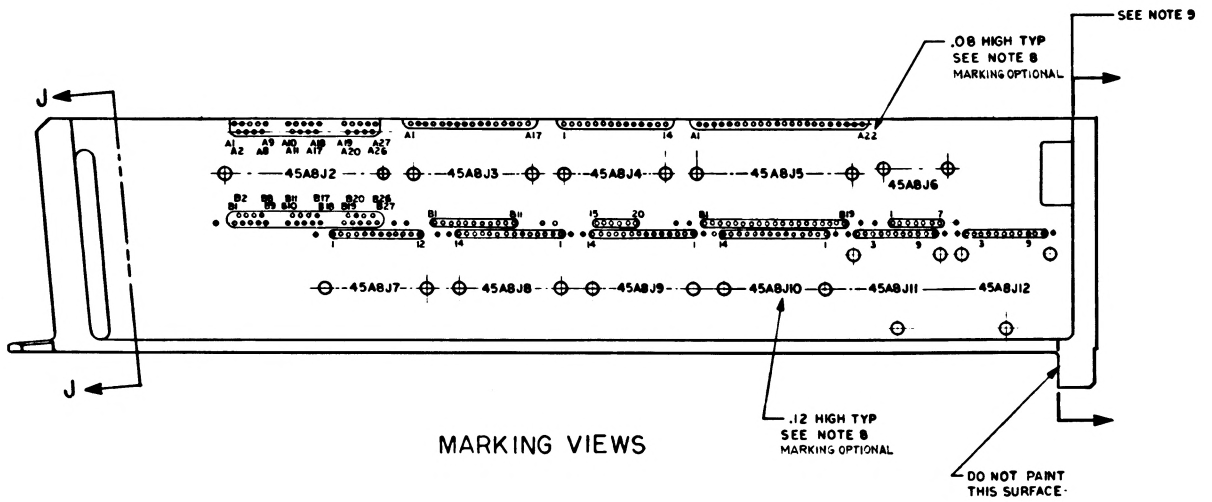
PARTIAL SECTION K-K


K
K
.08 HIGH REF
A22
A1
14
A17
A1
A27 A19 A18 A10 A5 A1
A26 A20 A17 A11 A8 A2
1015154
1015136
1015104
1015113
1015137
B26 B20 B17 B11 B8 B2
B27 B19 B18 B10 B5 B1
B19
B1
20
15
B11
B1
1007055
1007055
1015121
1015121
1015124
1015123
.12 HIGH REF
SURFACE -D- REF

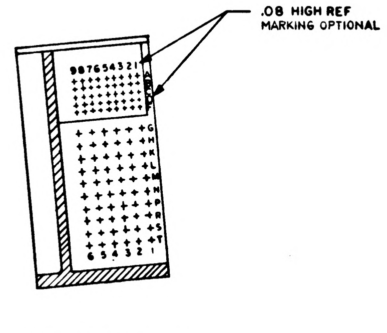
VIEW ROTATED 180°


.12 HIGH REF
45A8P1
SEE NOTE 9
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENING
1.70
.75
SEE NOTE 10


.08 HIGH REF
123456789
G
H
J
K
L
M
N
P
R
S
T
123456


J
J
SEE NOTE 9
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
A1 A9 A10 A18 A19 A27
A2 A8 A11 A17 A20 A26
A17
A22
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
B2 B8 B11 B17 B20 B26
B1 B5 B10 B18 B19 B27
B1
B11
15
20
B1
B19
45A8J7
45A8J8
45A8J9
45A8J10
45A8J11
45A8J12
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
DO NOT PAINT
THIS SURFACE

MARKING VIEWS


.08 HIGH REF
MARKING OPTIONAL
987654321
G
H
K
L
M
N
P
R
S
T
654321

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN F. Kennedy DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL C.A. Plummer 8 OCT 64
APPROVAL 10-29-64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

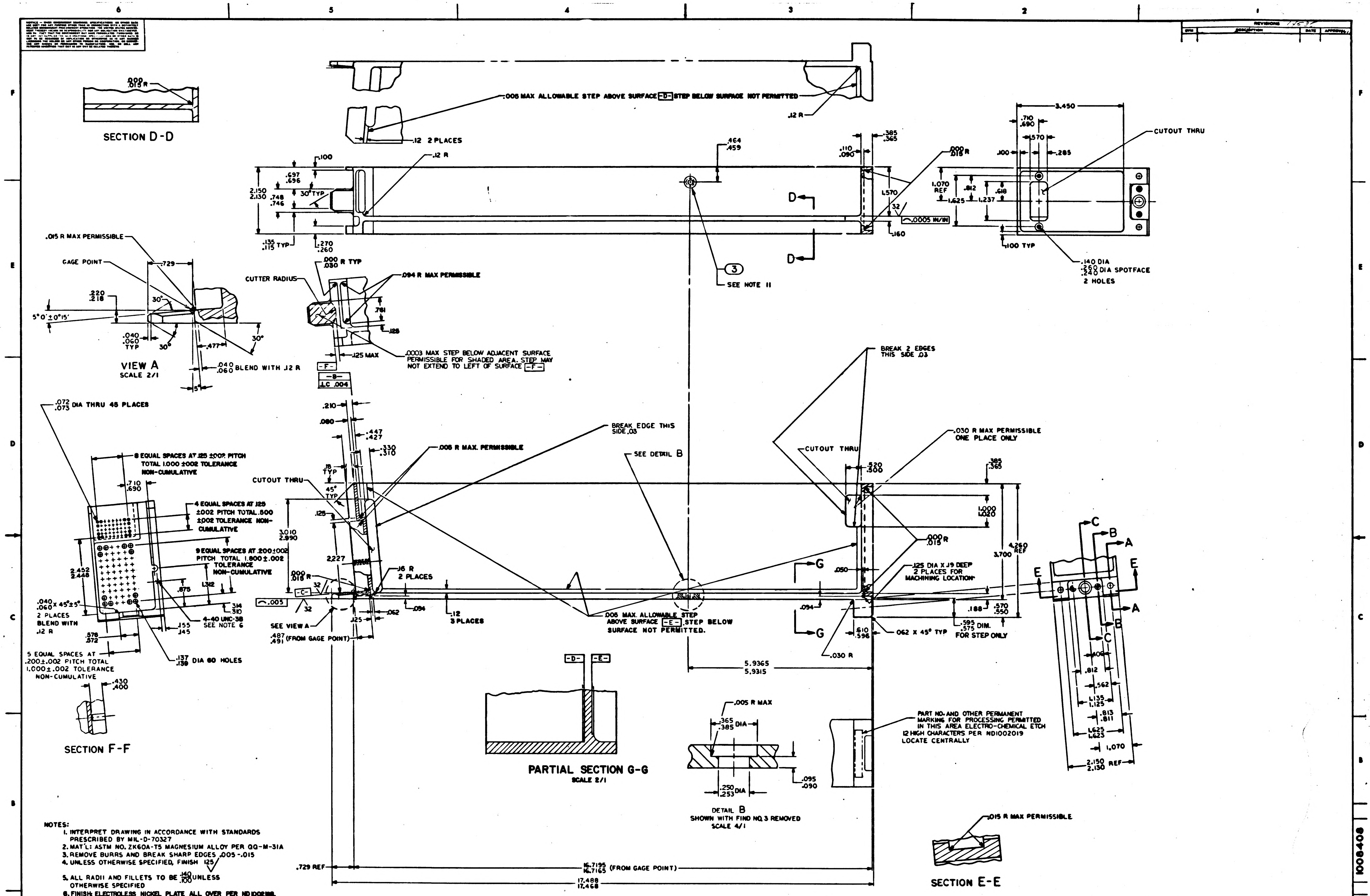
FRAME,
TRAY 8

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008408
SCALE 1/1
WT
SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

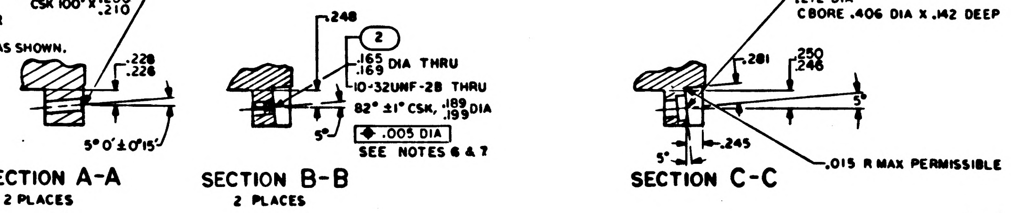
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.100
.12 R
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.464 .459
D
D
③
SEE NOTE 11
.110 .090
.385 .365
1.570
32
.0005 IN/IN
.160
.000 .015 R
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5° 0' ± 0° 15'
.040 .060 TYP
30°
.477
30°
VIEW A
SCALE 2/1
.040 .060 BLEND WITH .12 R
5°
CUTTER RADIUS
.000 .030 R TYP
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥C .004
.072 .073 DIA THRU 45 PLACES
.210
.080
.447 .427
.330 .310
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.710 .690
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
9 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
2.452 2.448
.875
1.312
.314 .310
.040 .060 X 45°±5°
2 PLACES
BLEND WITH .12 R
.155 .145
4-40 UNC-3B
SEE NOTE 6
.578 .572
5 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
.18 TYP
CUTOUT THRU
45° TYP
.125
3.010 2.990
2.227
.000 .015 R
32
-C-
.005
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.16 R
2 PLACES
.125
.062
.094
.12
3 PLACES
.005 R MAX. PERMISSIBLE
BREAK EDGE THIS SIDE .03
SEE DETAIL B
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-. STEP BELOW SURFACE NOT PERMITTED.
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
1.000 1.020
.000 .015 R
4.260 REF
3.700
G
G
.050
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.094
.188
.570 .550
.610 .596
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
.030 R
5.9365 5.9315
C
B
A
E
E
A
B
C
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D-
-E-
PARTIAL SECTION G-G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002188. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO.1 AND NO2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II, USING 1010729-1, ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME, UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-8 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO.1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD


.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
②
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
5°
◆ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED SELF-LOCKING	2
1	1008408-001	FRAME, TRAY	1

LIST OF MATERIALS

1007448	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN DATE 1 Oct 64
CHECKED 7 Oct 64
APPROVAL LaPlumme 8 Oct 64
APPROVAL 10-24-64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

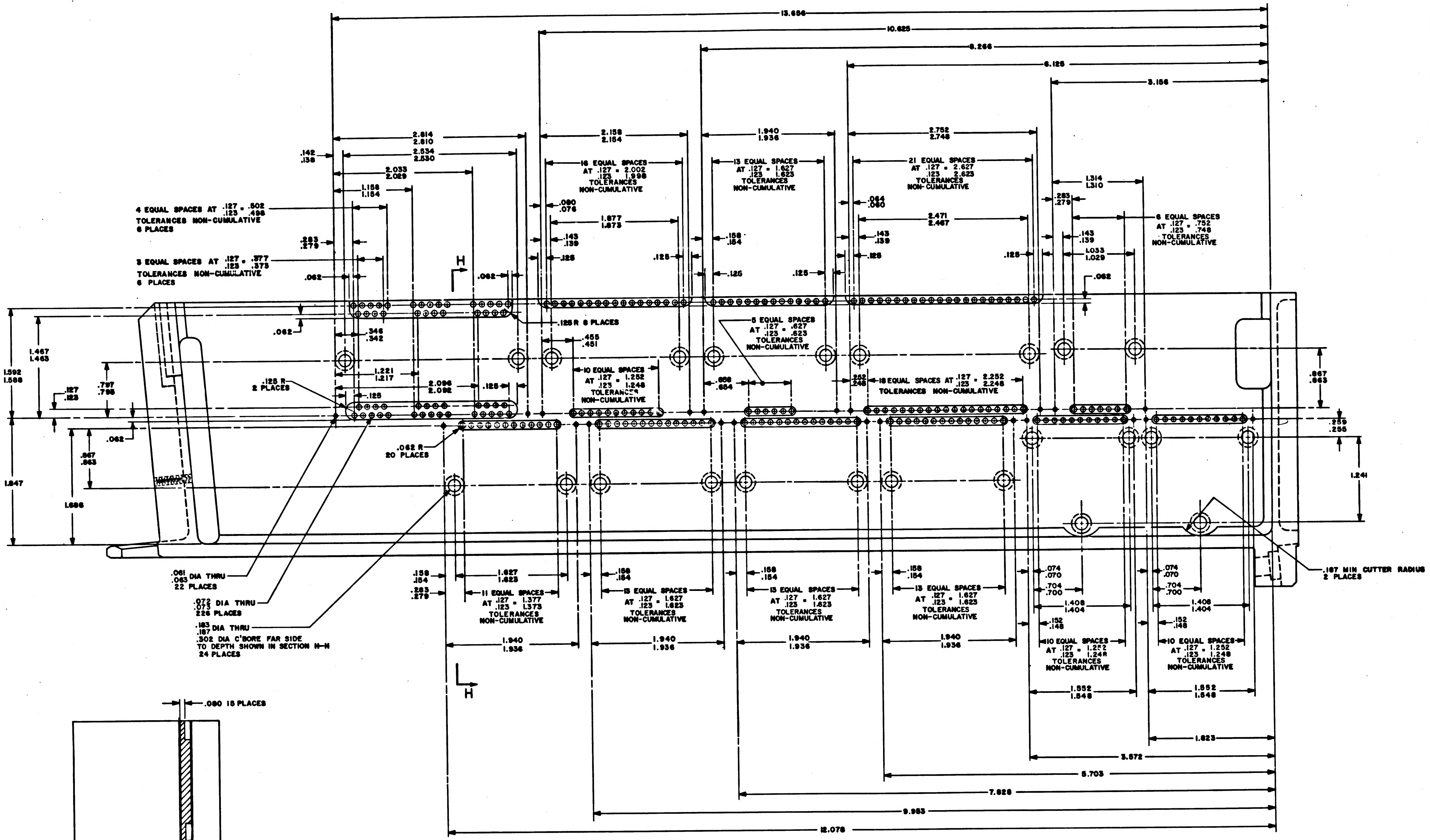
FRAME
TRAY 8

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008408
SCALE 1/1
WT
SHEET 1 OF 3

1008408

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14537			
SYM	DESCRIPTION	DATE	APPROVAL


H
H
13.656
10.625
8.266
6.125
3.156
2.814
2.810
2.534
2.530
2.033
2.029
1.156
1.154
.142
.138
4 EQUAL SPACES AT .127/.123 = .502/.498 TOLERANCES NON-CUMULATIVE 6 PLACES
3 EQUAL SPACES AT .127/.123 = .377/.373 TOLERANCES NON-CUMULATIVE 6 PLACES
.283
.279
.062
2.158
2.154
16 EQUAL SPACES AT .127/.123 = 2.002/1.998 TOLERANCES NON-CUMULATIVE
.080
.076
1.877
1.873
.143
.139
.125
1.940
1.936
13 EQUAL SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
.158
.154
2.752
2.748
21 EQUAL SPACES AT .127/.123 = 2.627/2.623 TOLERANCES NON-CUMULATIVE
.064
.060
2.471
2.467
1.314
1.310
6 EQUAL SPACES AT .127/.123 = .752/.748 TOLERANCES NON-CUMULATIVE
1.033
1.029
.062
.125 R 8 PLACES
5 EQUAL SPACES AT .127/.123 = .627/.623 TOLERANCES NON-CUMULATIVE
.346
.342
.455
.451
10 EQUAL SPACES AT .127/.123 = 1.252/1.248 TOLERANCES NON-CUMULATIVE
.658
.654
.252
.248
18 EQUAL SPACES AT .127/.123 = 2.252/2.248 TOLERANCES NON-CUMULATIVE
1.221
1.217
2.096
2.092
.125 R 2 PLACES
.125
1.592
1.588
1.467
1.463
.797
.793
.127
.123
.062
.867
.863
.259
.255
1.241
.062 R 20 PLACES
.867
.863
1.847
1.686
.187 MIN CUTTER RADIUS 2 PLACES
.061/.063 DIA THRU 22 PLACES
.072/.073 DIA THRU 226 PLACES
.183/.187 DIA THRU .302 DIA C'BORE FAR SIDE TO DEPTH SHOWN IN SECTION H-H 24 PLACES
1.627
1.623
11 EQUAL SPACES AT .127/.123 = 1.377/1.373 TOLERANCES NON-CUMULATIVE
15 EQUAL SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
13 EQUAL SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
.074
.070
.704
.700
1.408
1.404
.152
.148
10 EQUAL SPACES AT .127/.123 = 1.252/1.248 TOLERANCES NON-CUMULATIVE
1.940
1.936
1.552
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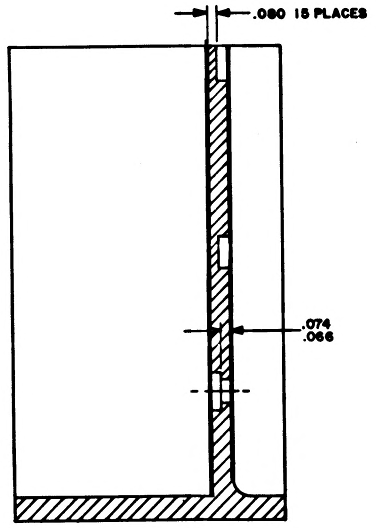
1.623
3.572
5.703
7.828
9.953
12.078

VIEW B-B
SCALE: 2:1


.080 15 PLACES
.074
.066

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS .XX ± .02 .XXX ± .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN F. K. DATE
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL 1 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

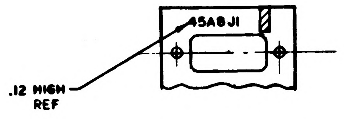
FRAME, TRAY 8

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1008408
SCALE 2:1
WT
SHEET 2 OF 3

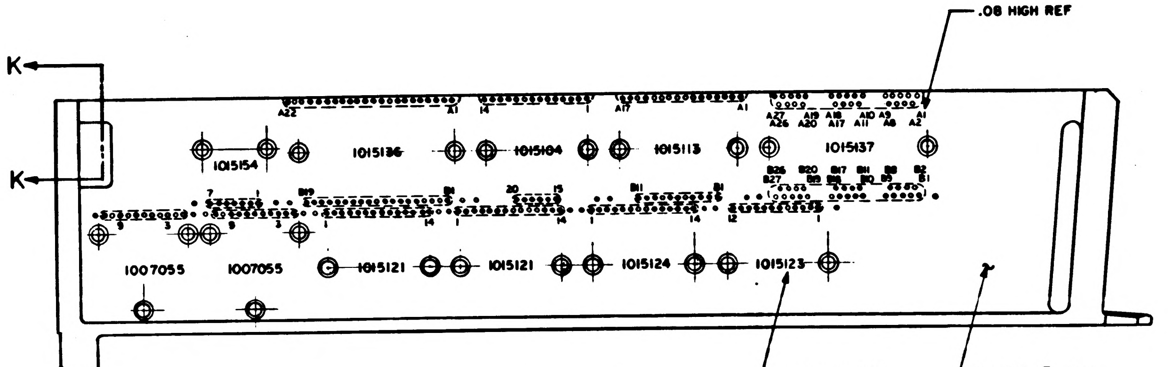
1008408

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

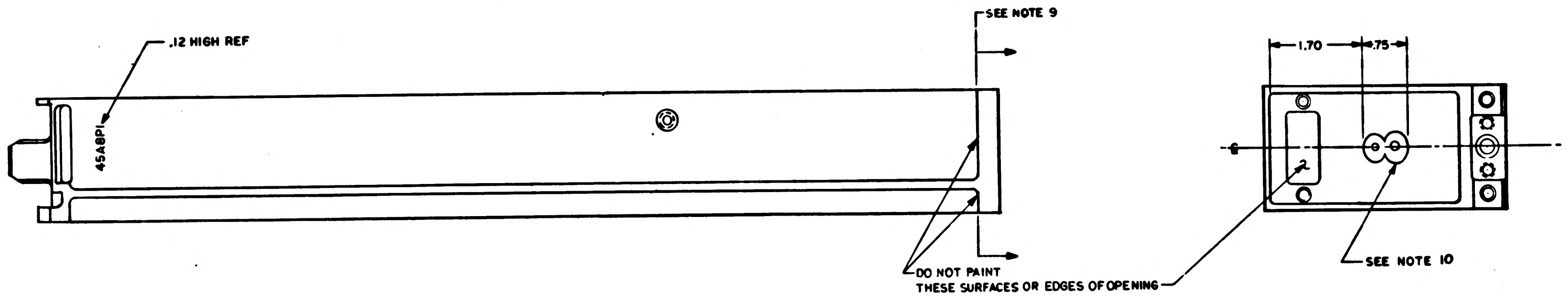
REVISIONS 12537			
SYM	DESCRIPTION	DATE	APPROVAL

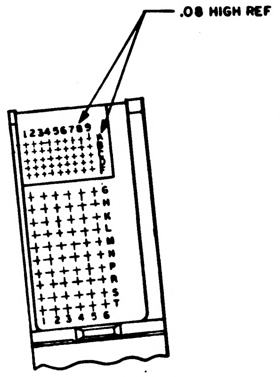

45A8J1
.12 HIGH REF

PARTIAL SECTION K-K


.08 HIGH REF
K
K
1015154
1015136
1015104
1015113
1015137
1007055
1007055
1015121
1015121
1015124
1015123
.12 HIGH REF
SURFACE -D- REF

VIEW ROTATED 180°


.12 HIGH REF
45A8P1
SEE NOTE 9
1.70
.75
SEE NOTE 10
DO NOT PAINT THESE SURFACES OR EDGES OF OPENING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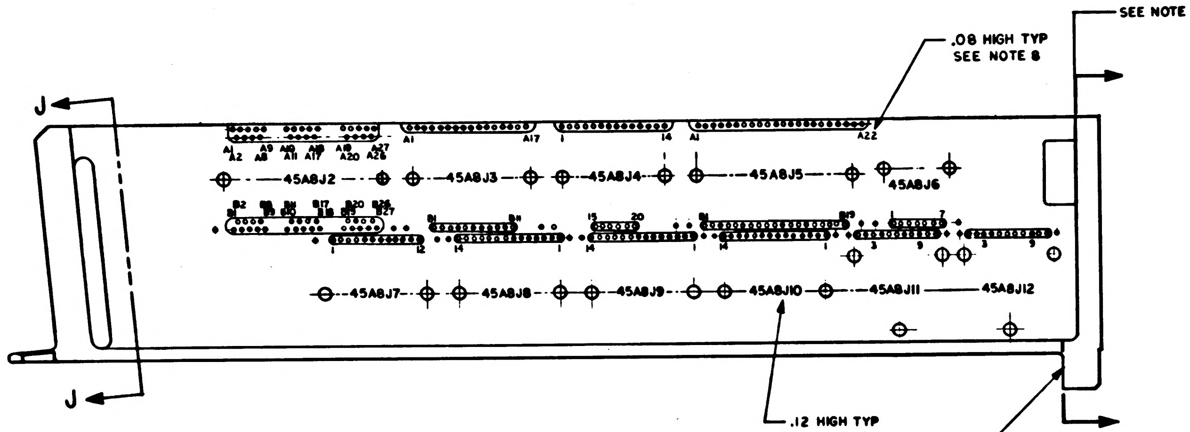
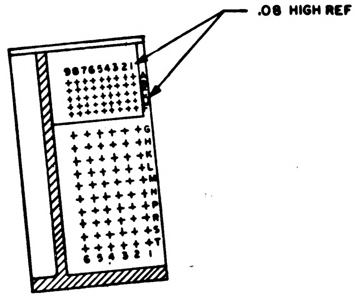
123456789


SEE NOTE 9
.08 HIGH TYP SEE NOTE 8
J
J
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
45A8J7
45A8J8
45A8J9
45A8J10
45A8J11
45A8J12
.12 HIGH TYP SEE NOTE 8

MARKING VIEWS

DO NOT PAINT THIS SURFACE.


.08 HIGH REF
987654321

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN F. Kennedy DATE 1 Oct 64
CHECKED 7 Oct 64
APPROVAL C.A. Blumer 8 Oct 64
EEG APPROVAL 10-29-64
NASA APPROVAL 12-1-64
MIT APPROVAL 1 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

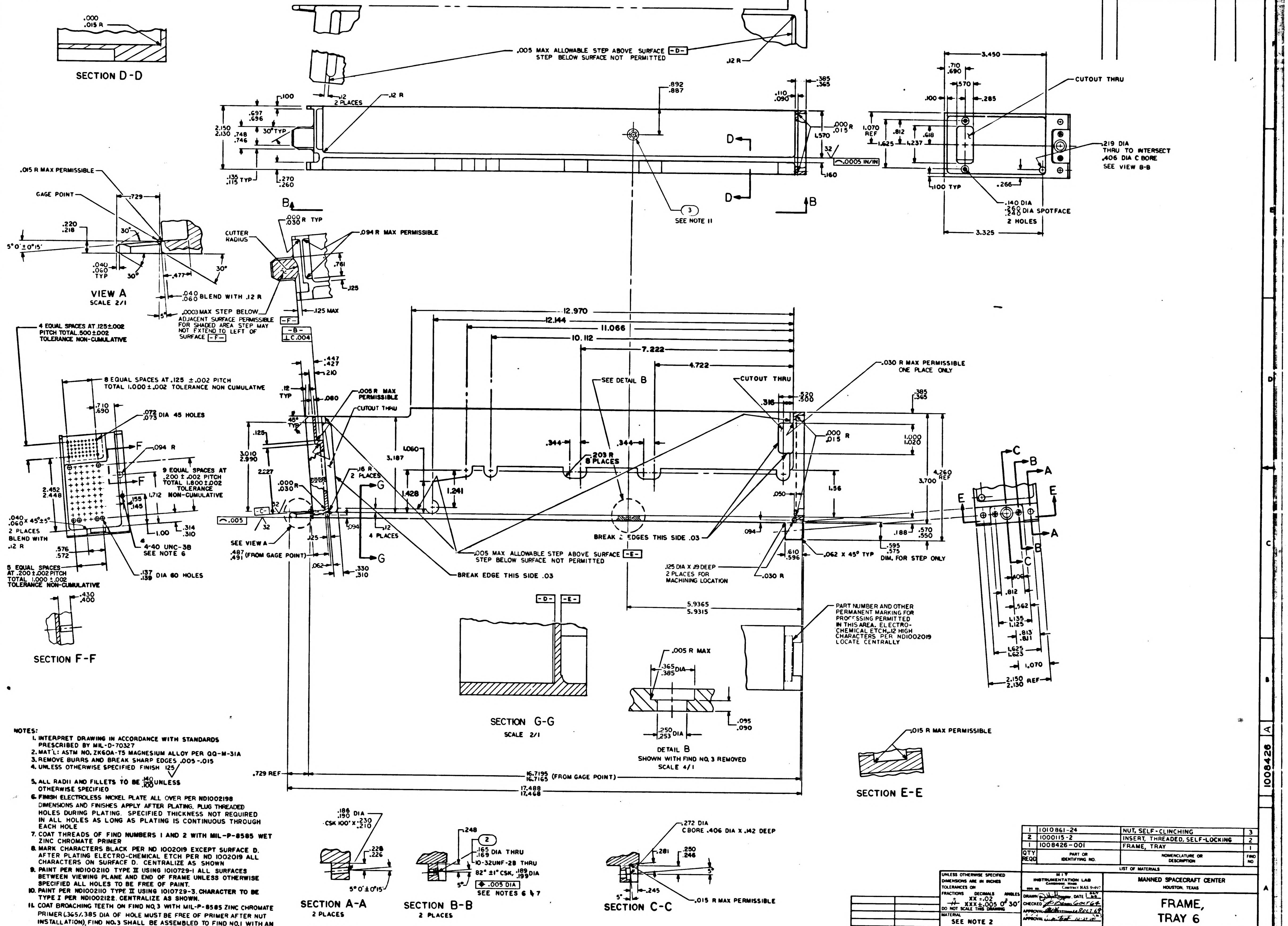
FRAME,
TRAY 8

CODE IDENT NO. SIZE E NASA DRAWING NO. 1008408
SCALE 1/1 WT SHEET 3 OF 3

1008408

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	



SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.100
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.892 .887
.110 .090
.385 .365
.000 R .015
1.570
.160
32
.0005 IN/IN
D
B
③ SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.219 DIA THRU TO INTERSECT .406 DIA C BORE SEE VIEW B-B
.100 TYP
.266
.140 DIA .250 .240 DIA SPOTFACE 2 HOLES
3.325
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5°0' ±0°15'
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
5°
VIEW A
SCALE 2/1
.000 .030 R TYP
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥ C .004
4 EQUAL SPACES AT .125±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.710 .690
.072 .073 DIA 45 HOLES
.094 R
F
9 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
2.452 2.448
.155 .145
1.712
.040 .060 X 45°±5° 2 PLACES BLEND WITH .12 R
1.00
.314 .310
4-40 UNC-3B SEE NOTE 6
.576 .572
5 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
.447 .427
.210
.12 TYP
.080
.005 R MAX PERMISSIBLE
CUTOUT THRU
45° TYP
.125
3.010 2.990
2.227
3.187
.000 .030 R
.16 R 2 PLACES
G
.005
-C-
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.094
.12 4 PLACES
.062
.330 .310
12.970
12.144
11.066
10.112
7.222
4.722
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.316
.520 .500
.385 .365
1.060
1.428
1.241
.344
.203 R 8 PLACES
.000 .015 R
1.000 1.020
4.260 REF
3.700
1.56
.050
BREAK 2 EDGES THIS SIDE .03
.094
.188
.570 .550
.610 .596
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.030 R
C
B
A
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
5.9365 5.9315
-D- -E-
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION G-G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0' ±0°15'
SECTION A-A
2 PLACES
.248
②
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
5°
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA C BORE .406 DIA X .142 DEEP
.281
.250 .246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C
1008426 A

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3. CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008426-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007446	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497
DRAWN DATE 1 OCT 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL 10-29-64
NASA APPROVAL 12-1-64
MIT APPROVAL

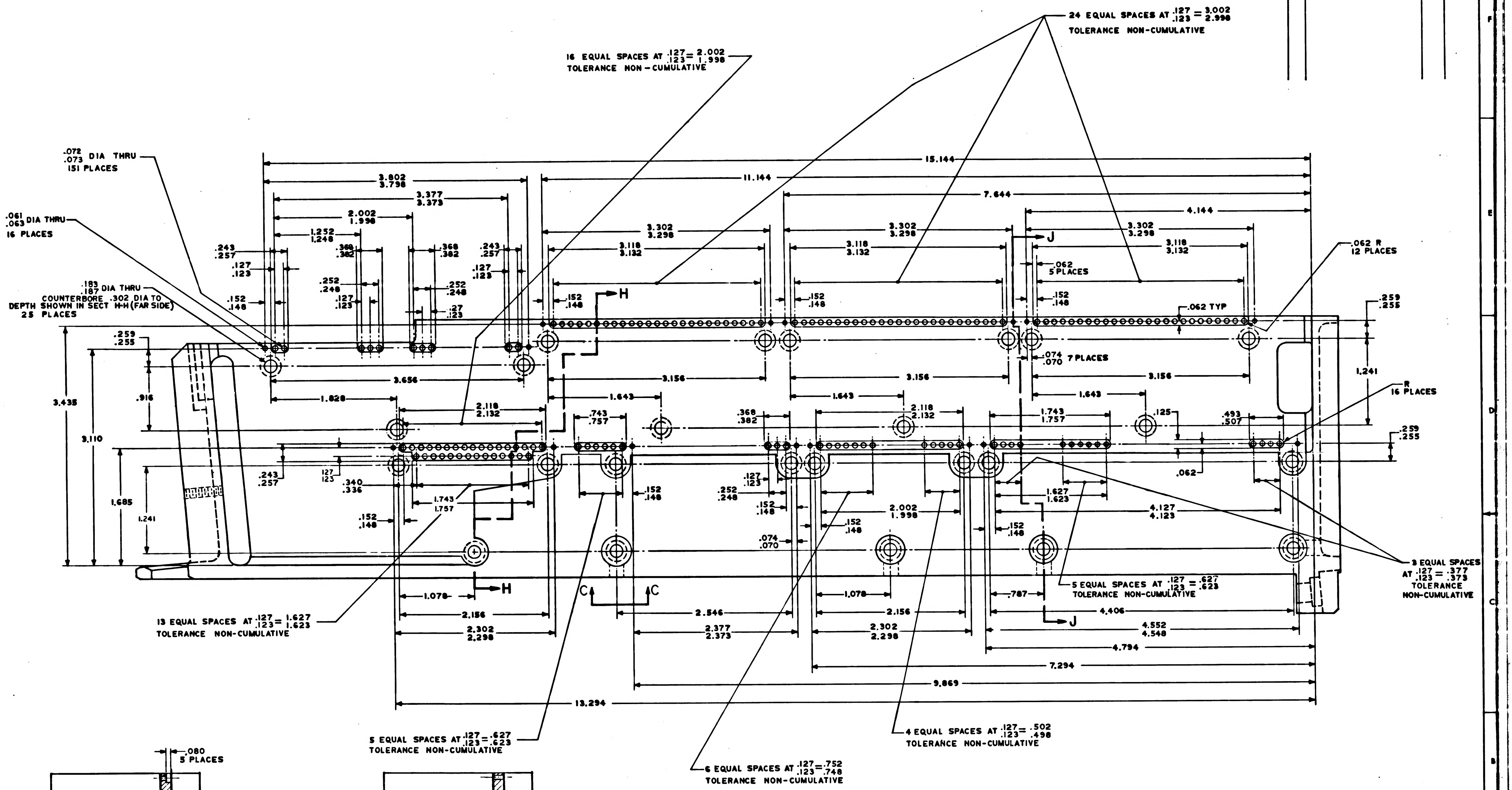
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 6

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO. 1008426
SCALE 1/1
WT
SHEET 1 OF 3

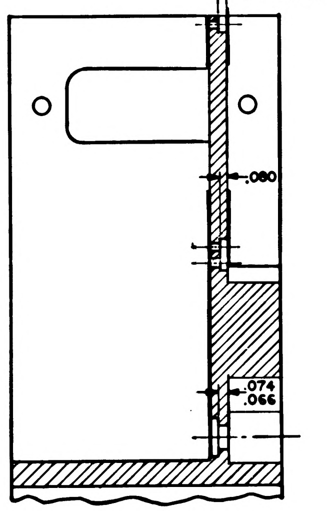
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	



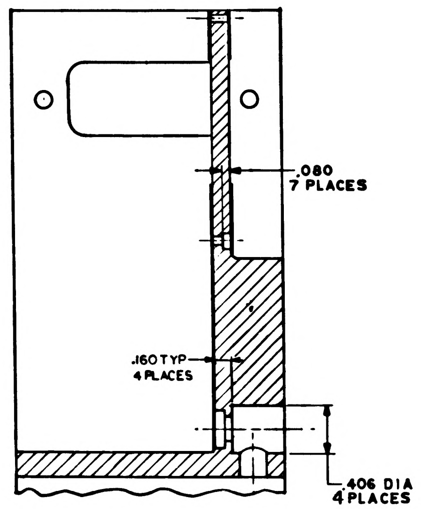
16 EQUAL SPACES AT .127/.123 = 2.002/1.998 TOLERANCE NON-CUMULATIVE
24 EQUAL SPACES AT .127/.123 = 3.002/2.998 TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU 151 PLACES
.061/.063 DIA THRU 16 PLACES
.183/.187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECT H-H (FAR SIDE) 25 PLACES
15.144
11.144
7.644
4.144
3.802/3.798
3.377/3.373
2.002/1.998
1.252/1.248
3.302/3.298
3.118/3.132
.243/.257
.127/.123
.368/.382
.252/.248
.27
.152/.148
H
J
.062 5 PLACES
.062 TYP
.062 R 12 PLACES
.259/.255
1.241
.074/.070 7 PLACES
3.656
3.156
1.828
1.643
2.118/2.132
.743/.757
1.743/1.757
.125
.493/.507
R 16 PLACES
3.435
3.110
.916
1.685
.340/.336
.062
1.627/1.623
4.127/4.123
3 EQUAL SPACES AT .127/.123 = .377/.373 TOLERANCE NON-CUMULATIVE
5 EQUAL SPACES AT .127/.123 = .627/.623 TOLERANCE NON-CUMULATIVE
1.078
2.156
2.302/2.298
2.546
2.377/2.373
.787
4.406
4.552/4.548
4.794
7.294
9.869
13.294
C
13 EQUAL SPACES AT .127/.123 = 1.627/1.623 TOLERANCE NON-CUMULATIVE
5 EQUAL SPACES AT .127/.123 = .627/.623 TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127/.123 = .752/.748 TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .127/.123 = .502/.498 TOLERANCE NON-CUMULATIVE

VIEW B B
SCALE~2:1



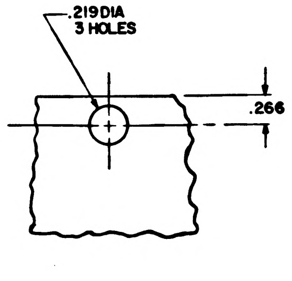
.080 5 PLACES
.080
.074/.066

SECTION H-H



.080 7 PLACES
.160 TYP 4 PLACES
.406 DIA 4 PLACES

SECTION J-J



.219 DIA 3 HOLES
.266

VIEW C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 XXX ± .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN D. [illegible] DATE
CHECKED [illegible] 6 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible] 10-29-64
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

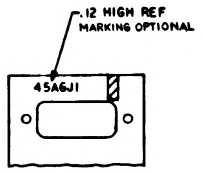
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

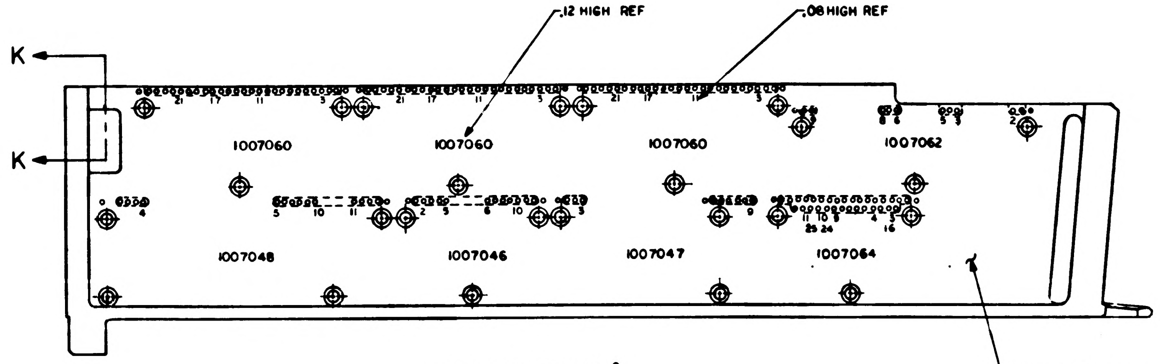
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008426
SCALE 2:1
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

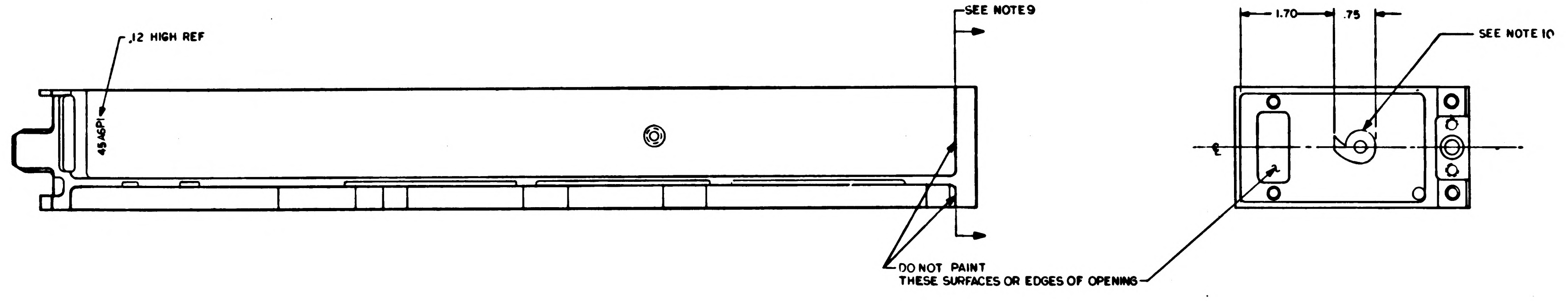
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	A.N.

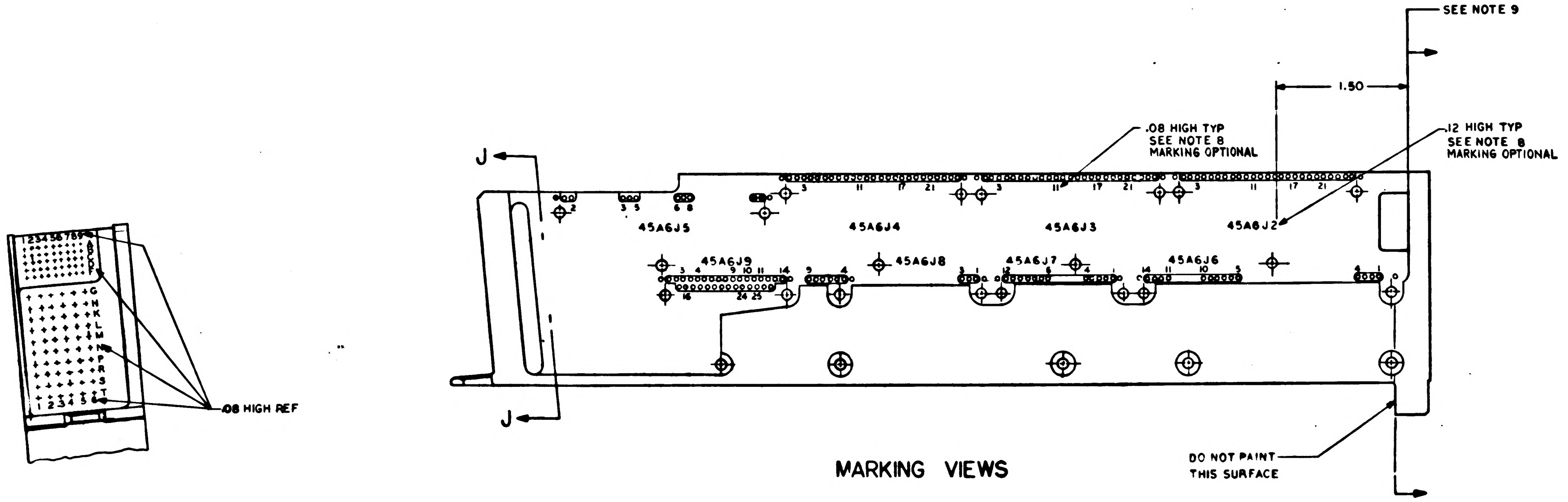

.12 HIGH REF
MARKING OPTIONAL
45A6J1

PARTIAL SECTION K-K

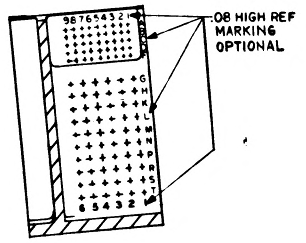

.12 HIGH REF
.08 HIGH REF
K
K
1007060
1007060
1007060
1007062
1007048
1007046
1007047
1007064
SURFACE-D-REF

VIEW ROTATED 180°


.12 HIGH REF
45A6P1
SEE NOTE 9
1.70
.75
SEE NOTE 10
℄
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENING


SEE NOTE 9
1.50
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
.08 HIGH REF
DO NOT PAINT
THIS SURFACE

MARKING VIEWS


.08 HIGH REF
MARKING
OPTIONAL

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DWG NO
DRAWN DATE
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL 10-20-64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

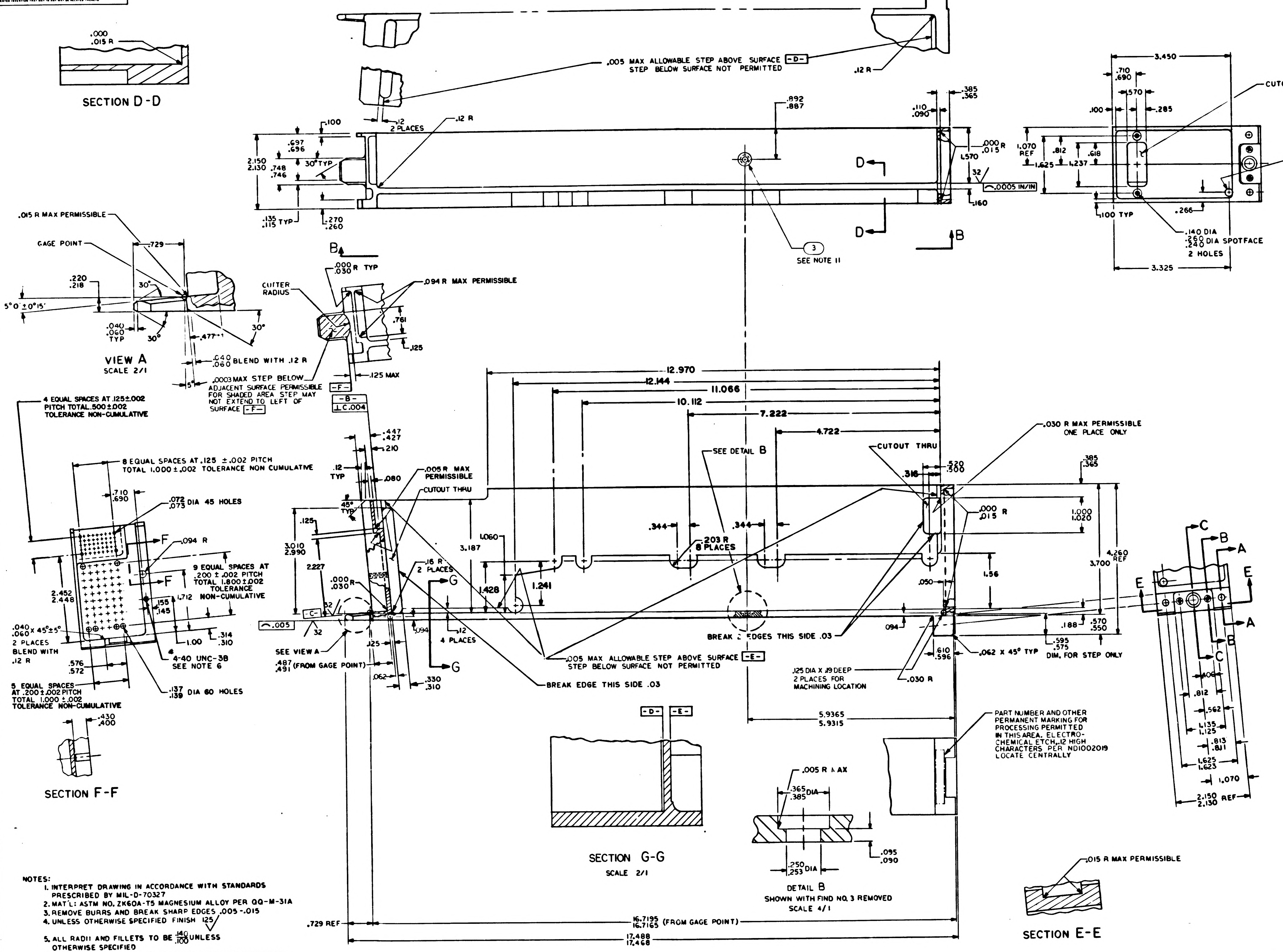
FRAME,
TRAY 6

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008426
SCALE 1/1
WT
SHEET 3 OF 3

1008426

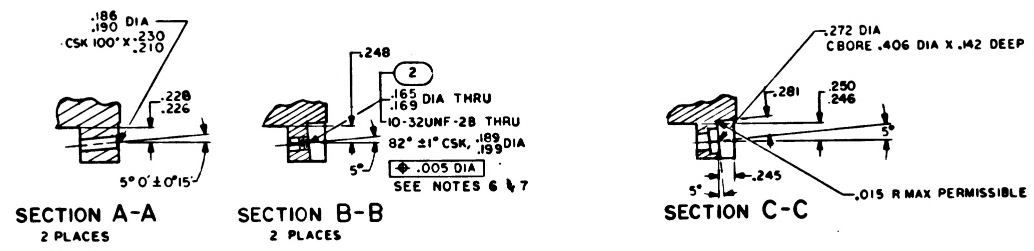
NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 8692	65	
B	REVISED PER TDRR 21525	13 AUG 65	


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.100
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.892 .887
.110 .090
.385 .365
.000 R .015
1.570
32
.0005 IN/IN
.160
D
B
3
SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.219 DIA THRU TO INTERSECT .406 DIA C BORE SEE VIEW B-B
.266
.100 TYP
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
3.325
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5° 0' ±0°15'
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
VIEW A SCALE 2/1
CUTTER RADIUS
.000 .030 R TYP
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B- ⊥ C .004
4 EQUAL SPACES AT .125±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.710 .690
.072 .073 DIA 45 HOLES
.094 R
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
2.452 2.448
.155 .145
1.712
.040 .060 X 45°±5° 2 PLACES BLEND WITH .12 R
1.00
.314 .310
.576 .572
4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
.447 .427
.210
.12 TYP
.080
.005 R MAX PERMISSIBLE
CUTOUT THRU
45° TYP
.125
3.010 2.990
2.227
.000 .030 R
.16 R 2 PLACES
G
.005
C
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.094
.062
.12 4 PLACES
.330 .310
12.970
12.144
11.066
10.112
7.222
4.722
SEE DETAIL B
CUTOUT THRU
.520 .500
.316
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
.000 .015 R
1.000 1.020
4.260 REF
3.700
3.187
1.060
.344
.203 R 8 PLACES
.344
1.428
1.241
1.56
.050
.188
.570 .550
BREAK 2 EDGES THIS SIDE .03
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
.610 .596
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.030 R
5.9365 5.9315
-D- -E-
SECTION G-G SCALE 2/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH, .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B SHOWN WITH FIND NO. 3 REMOVED SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
A
B
C
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125$\surd$
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3. CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND 1002126 USING CURING METHOD III


.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5° 0' ±0°15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
5°
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008426-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007446	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 — ANGLES 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN DATE 1 OCT 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL W Kupfer

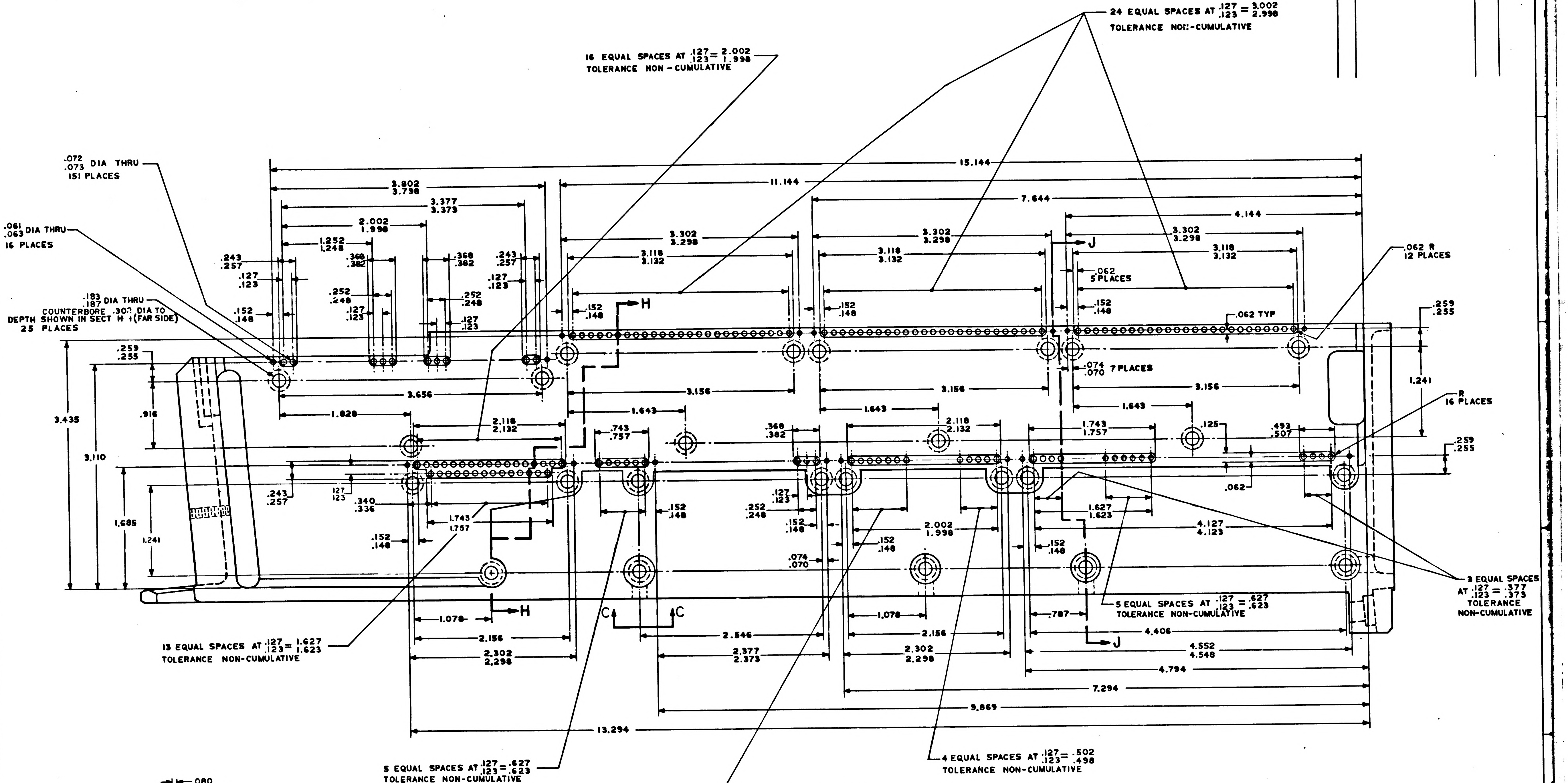
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 6

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008426
SCALE 1/1
WT
SHEET 1 OF 3

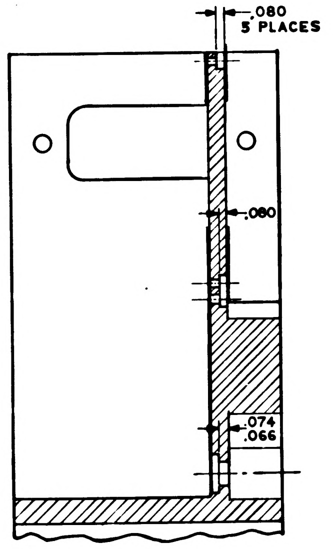
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	MAY 65	
B	REVISION STATUS CHANGED	3 AUG 65	



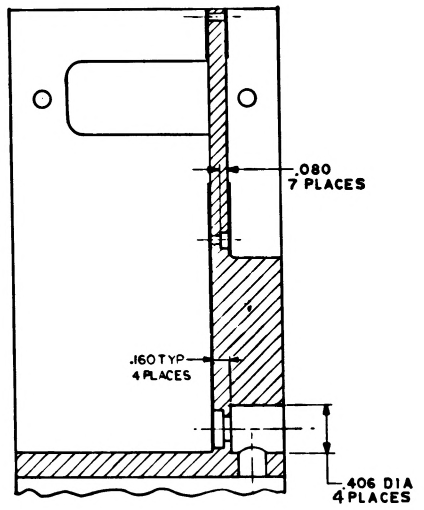
16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCE NON-CUMULATIVE
24 EQUAL SPACES AT .127/.123 = 3.002/2.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
151 PLACES
.061/.063 DIA THRU
16 PLACES
.183/.187 DIA THRU
COUNTERBORE .302 DIA TO
DEPTH SHOWN IN SECT H-H (FAR SIDE)
25 PLACES
15.144
11.144
7.644
4.144
3.802/3.798
3.377/3.373
2.002/1.998
1.252/1.248
.368/.382
.252/.248
.243/.257
.127/.123
.152/.148
3.302/3.298
3.118/3.132
J
H
.062
5 PLACES
.062 TYP
.062 R
12 PLACES
.259/.255
.074/.070
7 PLACES
1.241
R
16 PLACES
3.656
1.828
3.156
1.643
2.118/2.132
.743/.757
.125
.493/.507
1.743/1.757
1.627/1.623
4.127/4.123
.340/.336
2.002/1.998
.062
3.435
3.110
1.685
1.241
.916
.074/.070
1.078
2.156
2.302/2.298
2.546
2.377/2.373
.787
4.406
4.552/4.548
4.794
7.294
9.869
13.294
C
13 EQUAL SPACES AT .127/.123 = 1.627/1.623
TOLERANCE NON-CUMULATIVE
5 EQUAL SPACES AT .127/.123 = .627/.623
TOLERANCE NON-CUMULATIVE
3 EQUAL SPACES
AT .127/.123 = .377/.373
TOLERANCE
NON-CUMULATIVE
5 EQUAL SPACES AT .127/.123 = .627/.623
TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127/.123 = .752/.748
TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .127/.123 = .502/.498
TOLERANCE NON-CUMULATIVE

VIEW B B
SCALE ~ 2:1



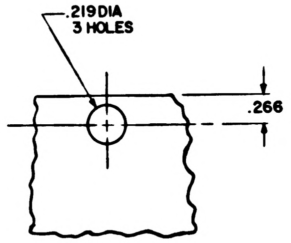
.080
5 PLACES
.080
.074/.066

SECTION H-H



.080
7 PLACES
.160 TYP
4 PLACES
.406 DIA
4 PLACES

SECTION J-J



.219 DIA
3 HOLES
.266

VIEW C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN D. Kirkinge DATE
CHECKED 6 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008426
SCALE 2:1
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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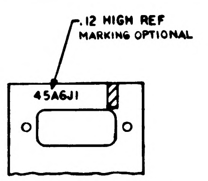
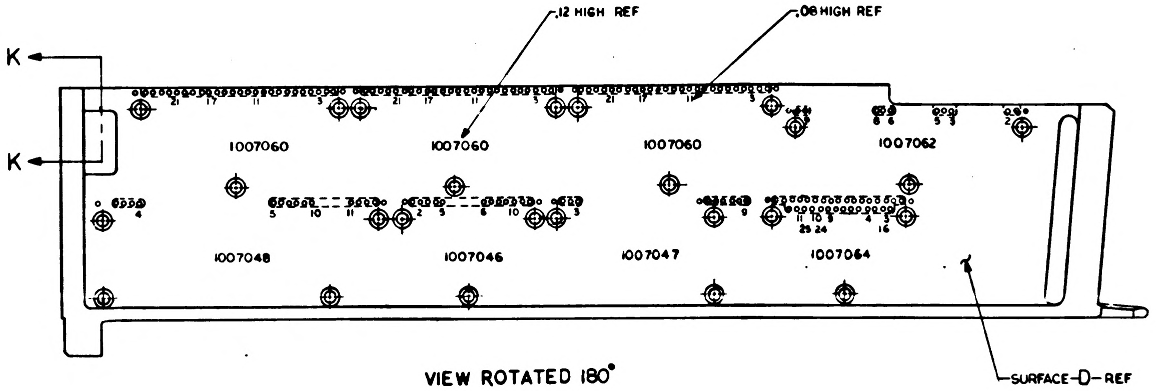
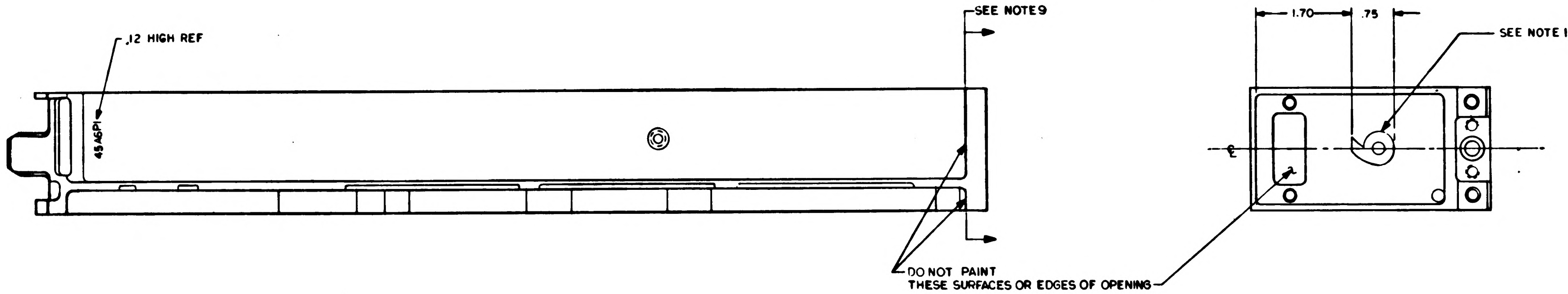
B	REVISION STATUS CHANGED	3 AUG 65	

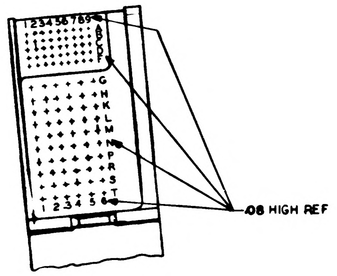

.12 HIGH REF
MARKING OPTIONAL
45A6J1

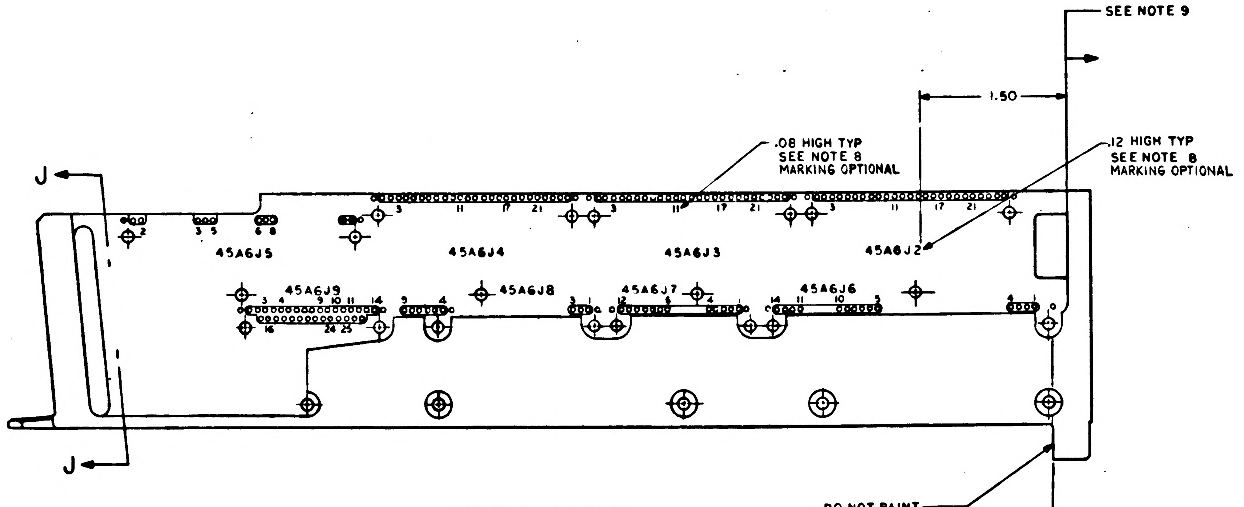
PARTIAL SECTION K-K


K
K
.12 HIGH REF
.08 HIGH REF
1007060
1007060
1007060
1007062
1007048
1007046
1007047
1007064
SURFACE-D-REF

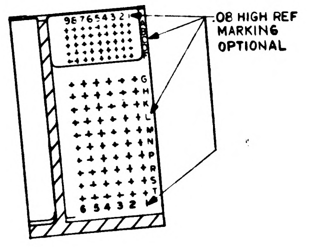
VIEW ROTATED 180°


.12 HIGH REF
45A6P1
SEE NOTE9
1.70
.75
SEE NOTE 10
℄
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENING


123456789
G
H
K
L
M
N
P
R
S
T
12345
.08 HIGH REF


SEE NOTE 9
1.50
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
DO NOT PAINT
THIS SURFACE

MARKING VIEWS


987654321
.08 HIGH REF
MARKING
OPTIONAL

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DWG NO

DRAWN DATE OCT 64
CHECKED 6 OCT 64
APPROVAL 30 OCT 64
APPROVAL 10-30-64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

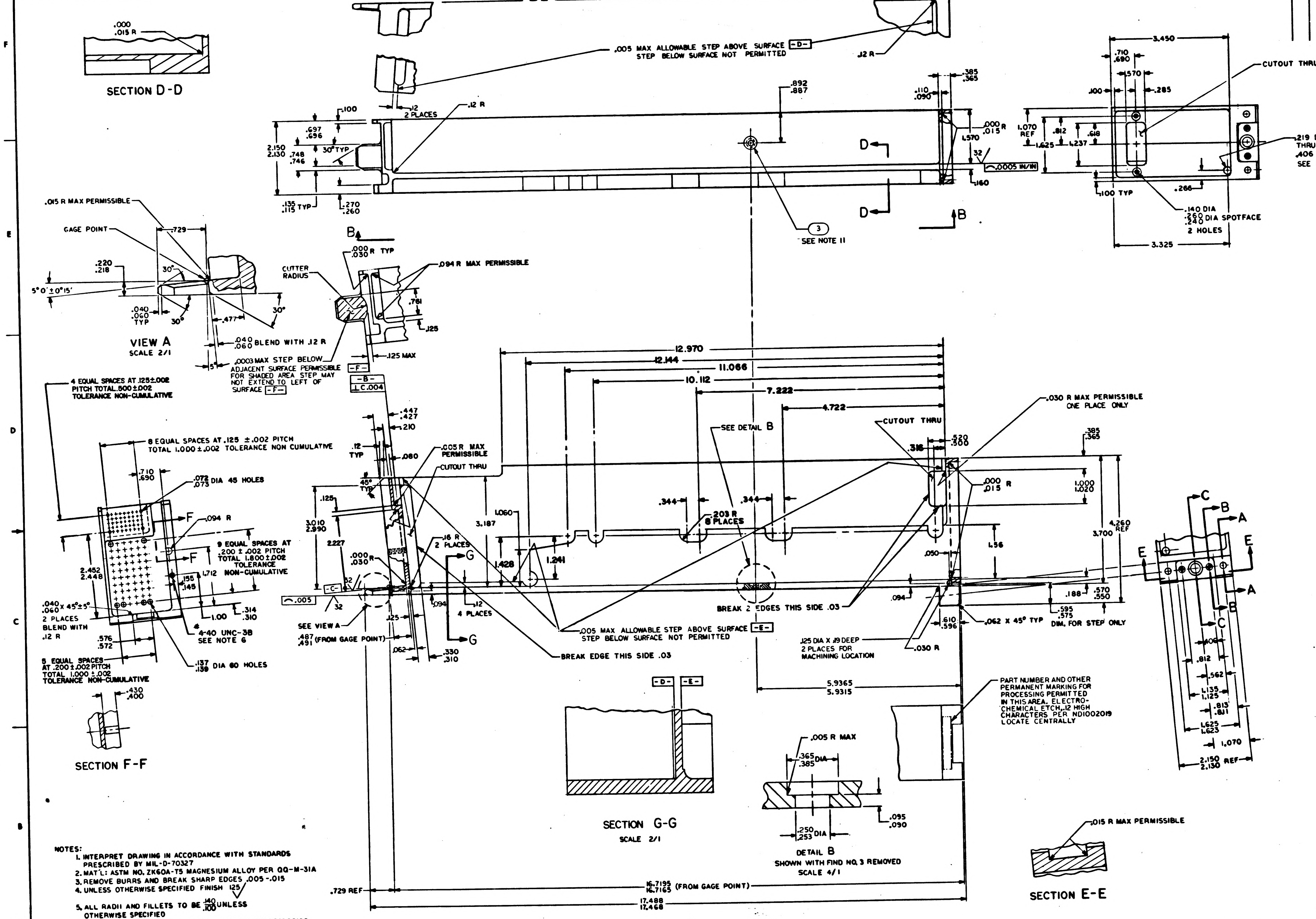
FRAME,
TRAY 6

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008426
SCALE 1/1
WT
SHEET 3 OF 3

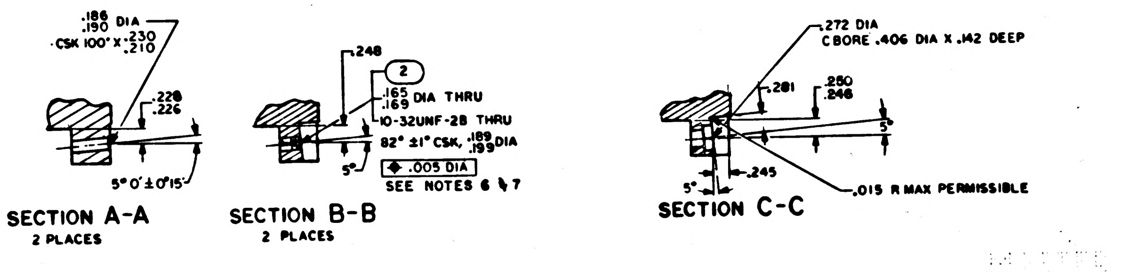
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 10537

SYM	DESCRIPTION	DATE	APPROVAL


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
12 2 PLACES
.12 R
.892 .887
.385 .365
.110 .090
.000 R .015
1.570
.0005 IN/IN
.160
.100
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
D
B
3
SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.219 DIA THRU TO INTERSECT .406 DIA C BORE SEE VIEW B-B
.266
.100 TYP
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
3.325
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5°0' ±0°15'
.040 .060 TYP
30°
.477
30°
VIEW A SCALE 2/1
.040 .060 BLEND WITH .12 R
5°
CUTTER RADIUS
.000 .030 R TYP
.094 R MAX PERMISSIBLE
.761
.125
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
.125 MAX
-B-
⊥ C .004
4 EQUAL SPACES AT .125±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.710 .690
.072 .073 DIA 45 HOLES
F
.094 R
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
2.452 2.448
.155 .145
1.712
.040 .060 X 45°±5° 2 PLACES BLEND WITH .12 R
1.00
.314 .310
.576 .572
4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
.447 .427
.210
.12 TYP
.080
.005 R MAX PERMISSIBLE
CUTOUT THRU
45° TYP
.125
3.010 2.990
2.227
.000 .030 R
-C-
.005
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.062
.330 .310
.094
.12 4 PLACES
.16 R 2 PLACES
G
12.970
12.144
11.066
10.112
7.222
4.722
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
.520 .500
.318
.000 .015 R
1.000 1.020
3.187
1.060
1.428
1.241
.344
.203 R 8 PLACES
.344
1.56
3.700
4.260 REF
.050
BREAK 2 EDGES THIS SIDE .03
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.030 R
.094
.610 .596
.062 X 45° TYP
.188
.570 .550
.595 .575 DIM. FOR STEP ONLY
C
B
A
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
5.9365 5.9315
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
-D-
-E-
SECTION G-G SCALE 2/1
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B SHOWN WITH FIND NO. 3 REMOVED SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3. CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD


.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0' ±0°15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
5°
⊕ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
C BORE .406 DIA X .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008426-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007446	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±— DECIMALS XX ±.02 XXX ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497

DRAWN DATE
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL 10-29-64

NASA APPROVAL W J 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

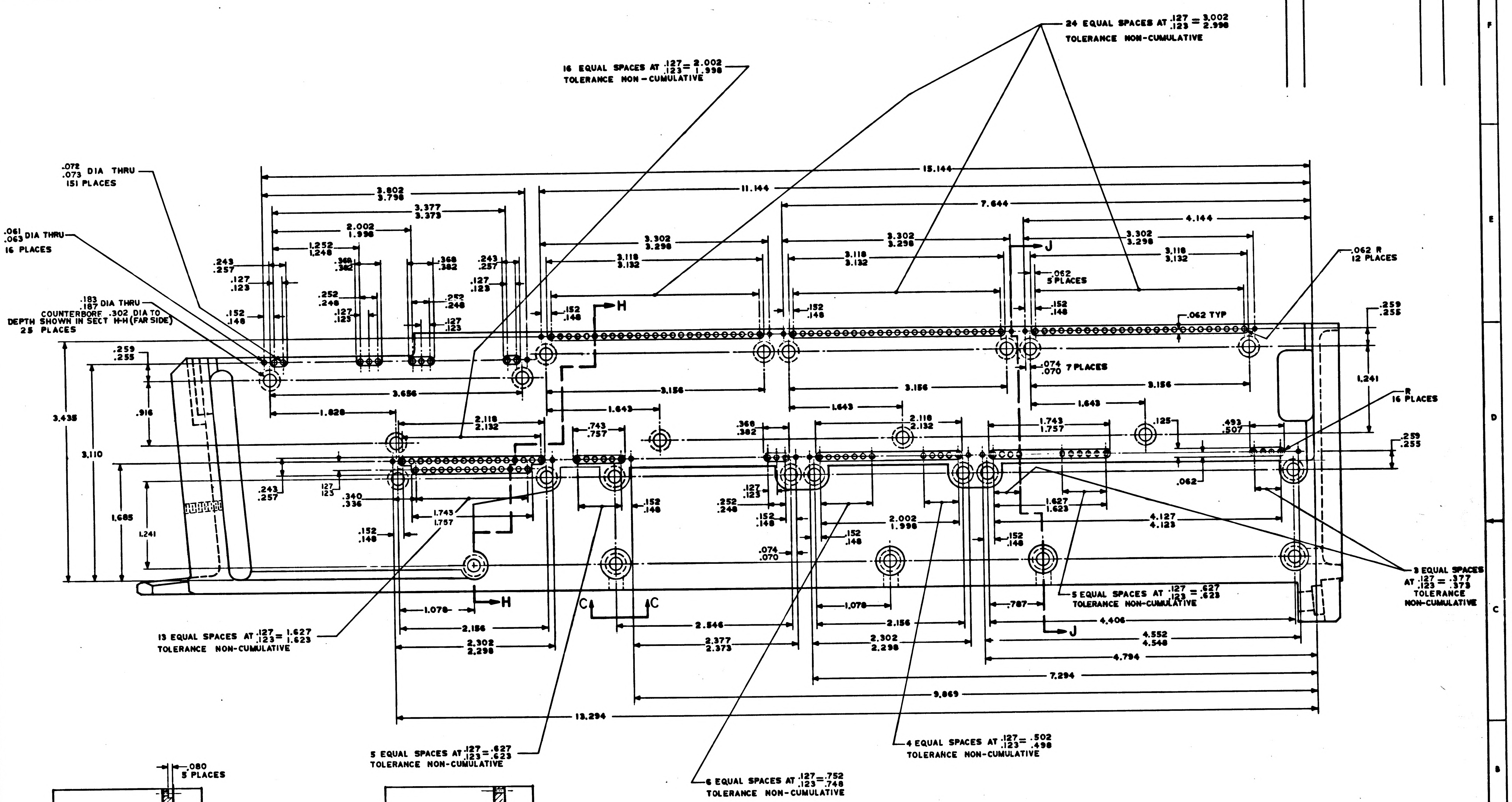
FRAME, TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008426
SCALE 1/1
WT
SHEET 1 OF 3

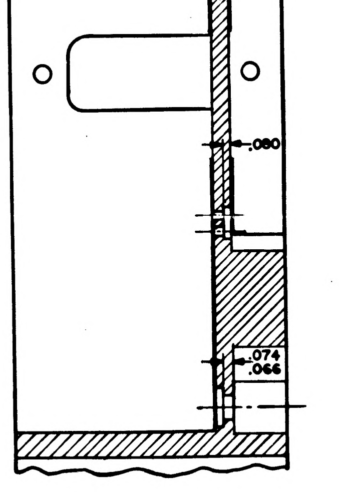
1008426

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

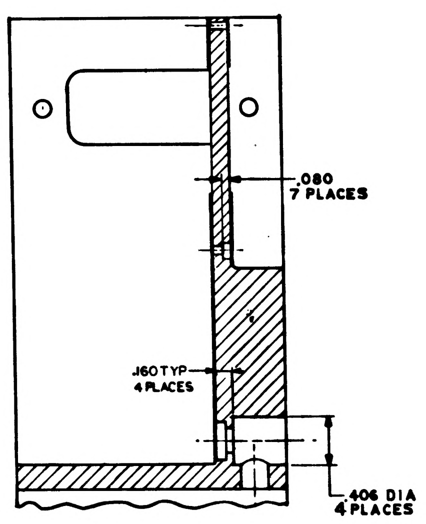
SYM	REVISIONS DESCRIPTION	DATE	APPROVAL


24 EQUAL SPACES AT .127/.123 = 3.002/2.998
TOLERANCE NON-CUMULATIVE
16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
151 PLACES
.061/.063 DIA THRU
16 PLACES
.183/.187 DIA THRU
COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECT H-H (FAR SIDE)
25 PLACES
15.144
11.144
7.644
4.144
3.802/3.798
3.377/3.373
2.002/1.998
1.252/1.248
.368/.382
.243/.257
.127/.123
.152/.148
.252/.248
3.302/3.298
3.118/3.132
J
H
.062
5 PLACES
.062 TYP
.062 R
12 PLACES
.259/.255
.074/.070 7 PLACES
3.656
3.156
1.828
1.643
1.241
R
16 PLACES
3.435
3.110
.916
1.685
1.241
2.118/2.132
.743/.757
1.743/1.757
1.627/1.623
.125
.493/.507
.340/.336
4.127/4.123
.062
1.078
2.156
2.302/2.298
2.546
2.377/2.373
4.406
4.552/4.548
4.794
7.294
9.869
13.294
.787
C
C
3 EQUAL SPACES AT .127/.123 = .377/.373
TOLERANCE NON-CUMULATIVE
5 EQUAL SPACES AT .127/.123 = .627/.623
TOLERANCE NON-CUMULATIVE
13 EQUAL SPACES AT .127/.123 = 1.627/1.623
TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .127/.123 = .502/.498
TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127/.123 = .752/.748
TOLERANCE NON-CUMULATIVE

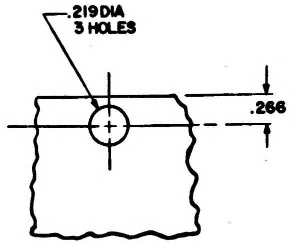
VIEW B B
SCALE ~ 2:1


.080
5 PLACES
.080
.074/.066

SECTION H-H


.080
7 PLACES
.160 TYP
4 PLACES
.406 DIA
4 PLACES

SECTION J-J


.219 DIA
3 HOLES
.266

VIEW C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN D. L... DATE
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL 10-29-64
NASA APPROVAL W. J. R... 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

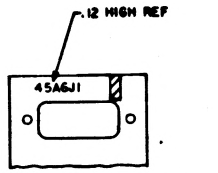
FRAME,
TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008426
SCALE 2:1
WT
SHEET 2 OF 3

1008426

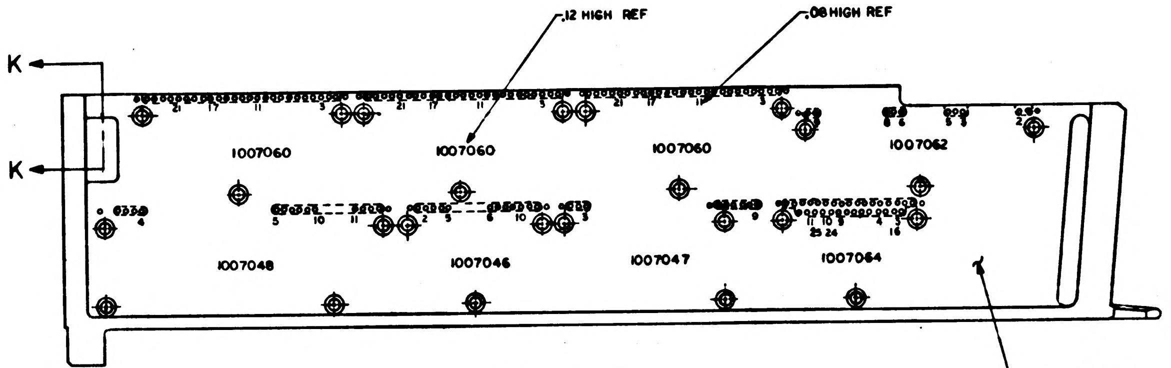
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL



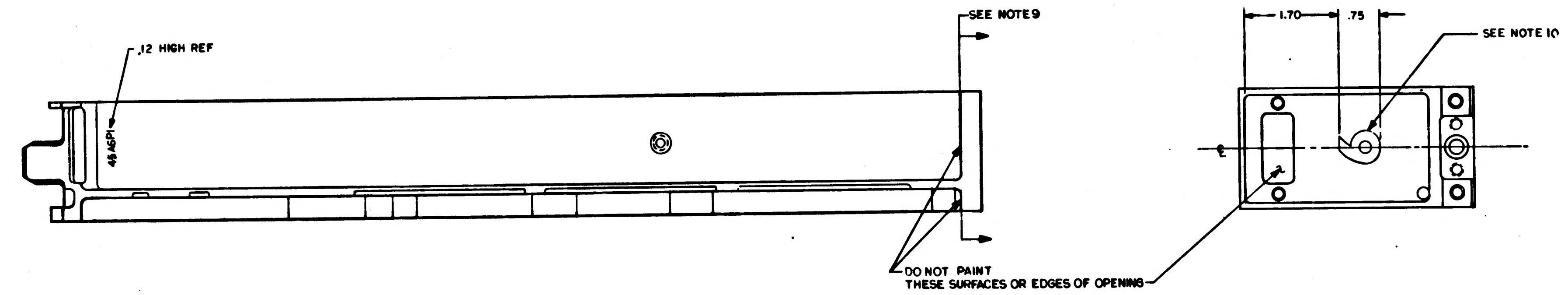
.12 HIGH REF
45A6J1

PARTIAL SECTION K-K

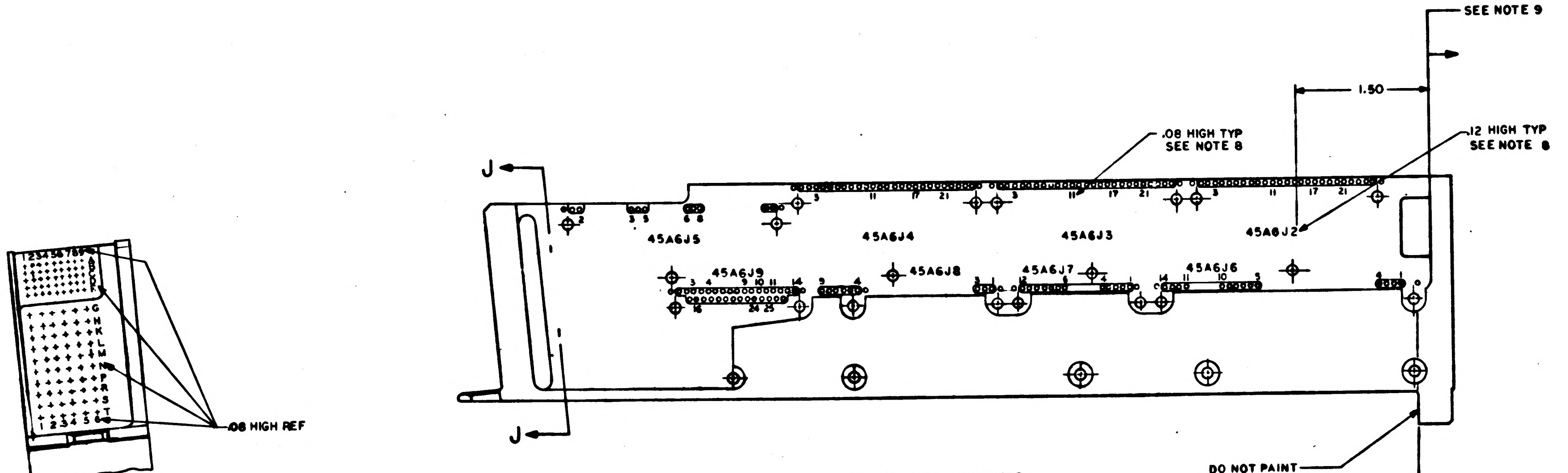


K
K
.12 HIGH REF
.08 HIGH REF
1007060
1007060
1007060
1007062
1007048
1007046
1007047
1007064
SURFACE-D-REF

VIEW ROTATED 180°

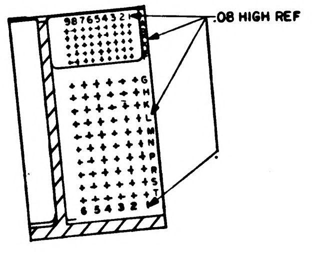


.12 HIGH REF
45A6P1
SEE NOTE 9
1.70
.75
SEE NOTE 10
℄
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENING



SEE NOTE 9
1.50
.08 HIGH TYP
SEE NOTE 8
.12 HIGH TYP
SEE NOTE 8
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
.08 HIGH REF
DO NOT PAINT
THIS SURFACE

MARKING VIEWS



SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN [illegible] DATE [illegible]
CHECKED [illegible] 6 OCT 64
APPROVAL [illegible] 9 OCT 64
E.T.S. APPROVAL [illegible] 10-30-64
NASA APPROVAL W. J. Rh[illegible] 12-1-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

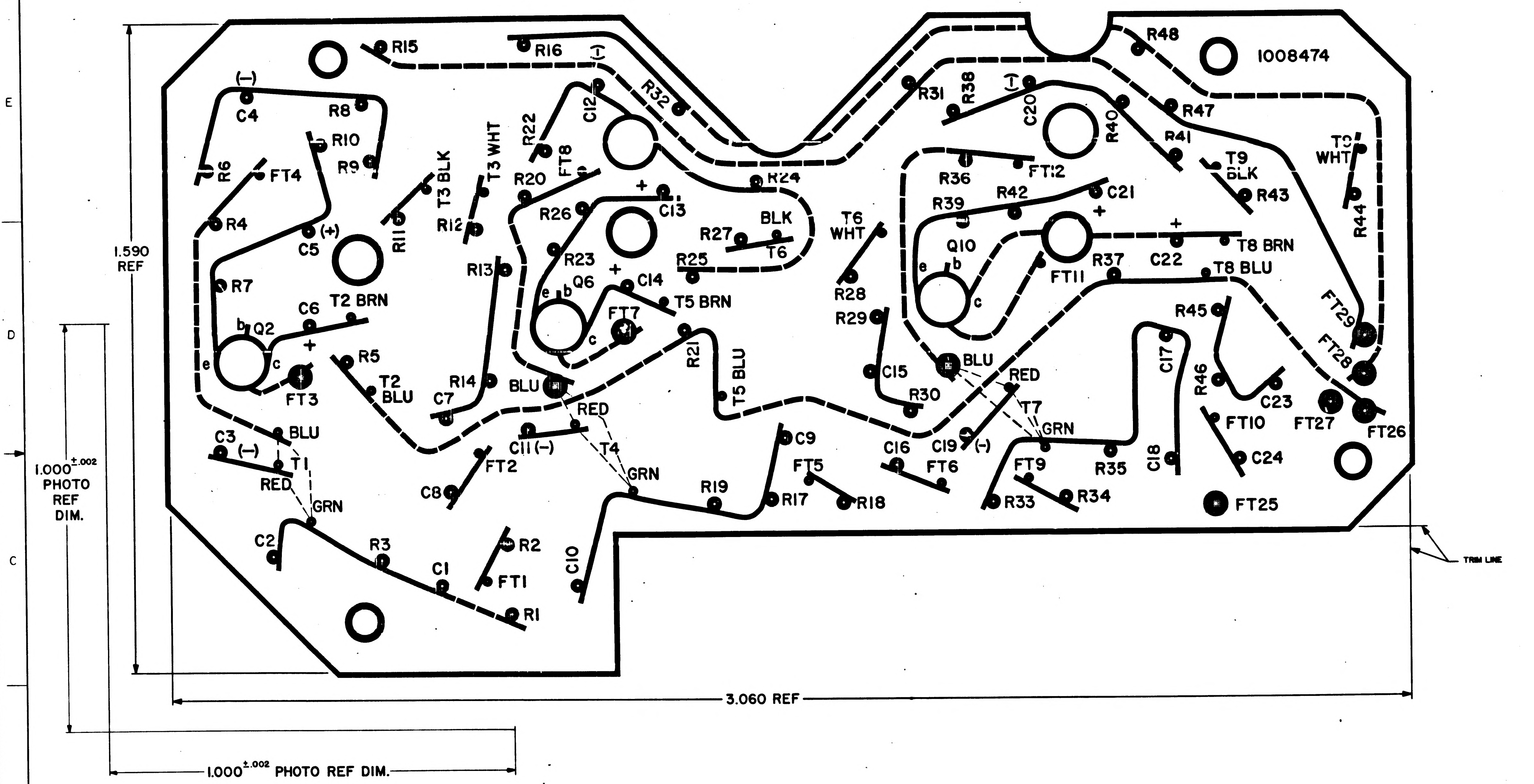
CODE IDENT NO. | SIZE E | NASA DRAWING NO 1008426
SCALE 1/1 | WT | SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008469

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS



R15
R16
(−)
R32
R31
R38
(−)
C20
R48
1008474
R47
R40
R41
(−)
C4
R8
R10
R9
R6
FT4
R4
(+)
C5
R11
T3 BLK
T3 WHT
R12
R22
C12
FT8
R20
R26
+
C13
R24
R27
BLK
T6
R25
T6
WHT
R36
FT12
R39
R42
C21
+
T9
BLK
R43
T9
WHT
R44
R7
C6
T2 BRN
R13
R23
Q6
+
C14
T5 BRN
Q10
b
e
c
FT11
R37
C22
+
T8 BRN
T8 BLU
b
Q2
e
c
+
FT3
R5
T2
BLU
C7
R14
BLU
e
b
c
FT7
R21
T5 BLU
R28
R29
C15
R30
BLU
RED
T7
GRN
C17
R45
R46
C23
FT29
FT28
FT27
FT26
C3
(−)
BLU
T1
RED
GRN
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C11 (−)
T4
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FT2
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C9
FT5
R17
R18
R19
C16
FT6
C19 (−)
FT9
R35
C18
FT10
C24
R33
R34
FT25
C2
R3
C1
FT1
R2
R1
C10
1.590
REF
1.000 ±.002
PHOTO
REF
DIM.
1.000 ±.002 PHOTO REF DIM.
3.060 REF
TRIM LINE

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN J. Wolski DATE 10 Nov 65
CHECKED J. Gibson 17 NOV 65
APPROVAL R. Gilbert 3 DEC 65
APPROVAL 1/24/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL McMurley 1-25-66

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

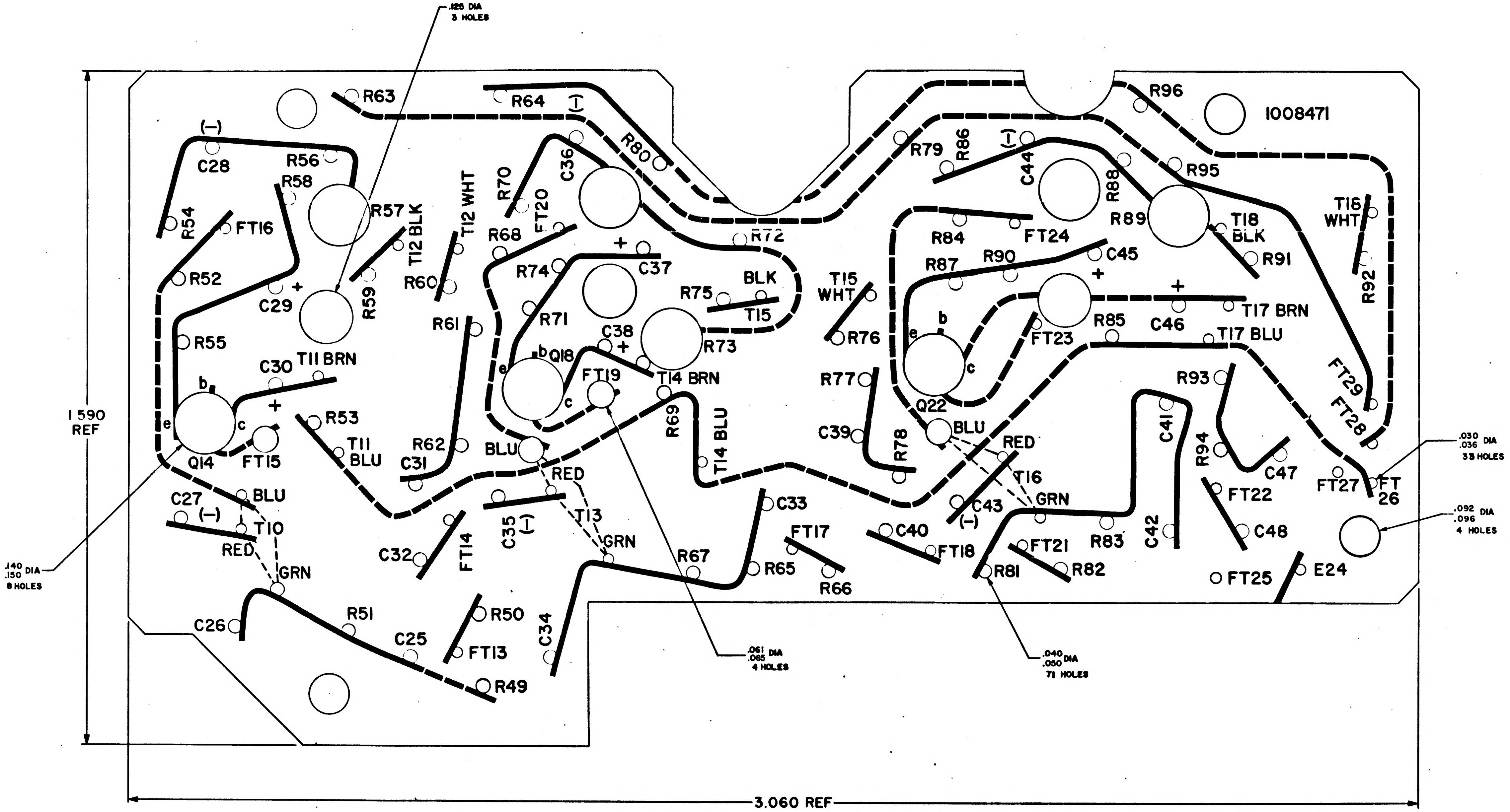
PHOTOGRAPHIC MASTER
WIRING BOARD B SIGNAL CONDITIONER
GIMBAL RESOLVER

CODE IDENT NO	SIZE	NASA DRAWING NO
80230	E	1008469
SCALE 10/1	WT —	SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008471

REVISIONS 35500			
SYM	DESCRIPTION	DATE	APPROVAL


.125 DIA
3 HOLES
R63
R64
(–)
R96
1008471
(–)
C28
R56
R58
R57
C36
R80
R79
R86
(–)
C44
R88
R95
R54
FT16
T12 BLK
T12 WHT
R70
FT20
R68
R72
R84
FT24
R89
T18
BLK
T16
WHT
R52
R59
R60
R74
+
C37
R87
R90
+
C45
R91
R92
+
C29
R61
R71
R75
BLK
T15
T15
WHT
+
T17 BRN
C46
R85
FT23
R55
C38
+
R73
R76
e
b
T17 BLU
C30
T11 BRN
b
Q18
e
FT19
T14 BRN
R77
c
Q22
R93
FT29
1.590
REF
b
+
c
R69
T14 BLU
BLU
C41
FT28
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c
R53
R62
C31
BLU
RED
C39
R78
R94
C47
Q14
FT15
T11
BLU
RED
T16
FT27
FT
26
.030 DIA
.036
33 HOLES
C27
BLU
(–)
T10
C35
(–)
T13
C33
C43
(–)
GRN
FT22
FT14
C32
RED
GRN
FT17
C40
FT18
R83
C42
C48
.092 DIA
.096
4 HOLES
.140 DIA
.150
8 HOLES
GRN
R67
R65
R66
R81
FT21
R82
FT25
E24
C26
R51
R50
C25
FT13
C34
.061 DIA
.065
4 HOLES
.040 DIA
.050
71 HOLES
R49
3.060 REF

REF:
DRAWING NO. 1008473 FOR PHOTOGRAPHIC MASTER

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019
5. BROKEN LINE DENOTES SLEEVING

1008471

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007664	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE NOV 65
CHECKED Wilson 16 Nov 65
APPROVAL R. Oaberg 3 DEC 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

WIRING BOARD D
SIGNAL CONDITIONER
GIMBAL RESOLVER

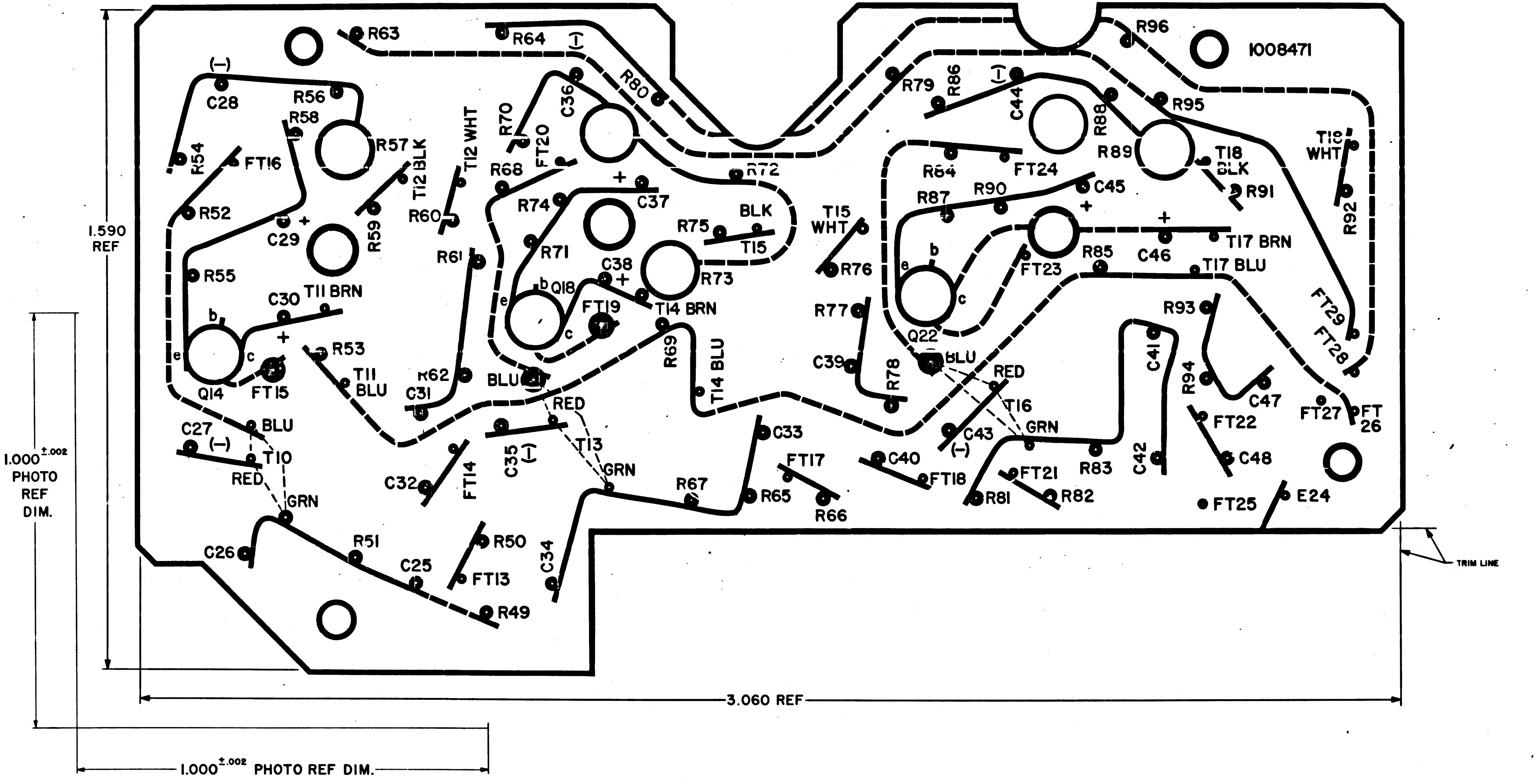
CODE IDENT NO	SIZE	NASA DRAWING NO
80230	E	1008471

SCALE 10/1 WT — SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008473

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			



R63
R64
(–)
R96
1008471
(–)
C28
R56
R58
R57
R54
FT16
R52
C29
+
R59
R55
C30
T11 BRN
b
e
c
Q14
FT15
+
R53
T11
BLU
R80
C36
R70
FT20
T12 WHT
T12 BLK
R68
R60
R72
+
C37
R74
R61
R71
C38
+
Q18
b
e
c
FT19
T14 BRN
R75
BLK
T15
R73
R62
C31
BLU
R69
T14 BLU
R79
R86
(–)
C44
R88
R95
R89
T18
BLK
T18
WHT
R91
R64
FT24
C45
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R92
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C46
T17 BLU
FT23
b
e
c
Q22
R77
C39
R78
BLU
RED
T16
GRN
C43
(–)
R93
C41
R94
C47
FT29
FT28
FT27
FT
26
FT22
C48
C27
(–)
BLU
T10
RED
GRN
C32
FT14
C35
(–)
RED
T13
GRN
C33
FT17
R67
R65
R66
C40
FT18
FT21
R83
C42
R81
R82
FT25
E24
C26
R51
C25
R50
FT13
C34
R49
1.590
REF
1.000 ±.002
PHOTO
REF
DIM.
3.060 REF
1.000 ±.002 PHOTO REF DIM.
TRIM LINE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN M J Gunnerson DATE 11 Nov 65
CHECKED WILSON 15 NOV 65
APPROVAL R Cruikberg 3 DEC 65
APPROVAL E Hues 1/3/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL W G Hurley 1-25-66

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD D SIGNAL CONDITIONER
GIMBAL RESOLVER

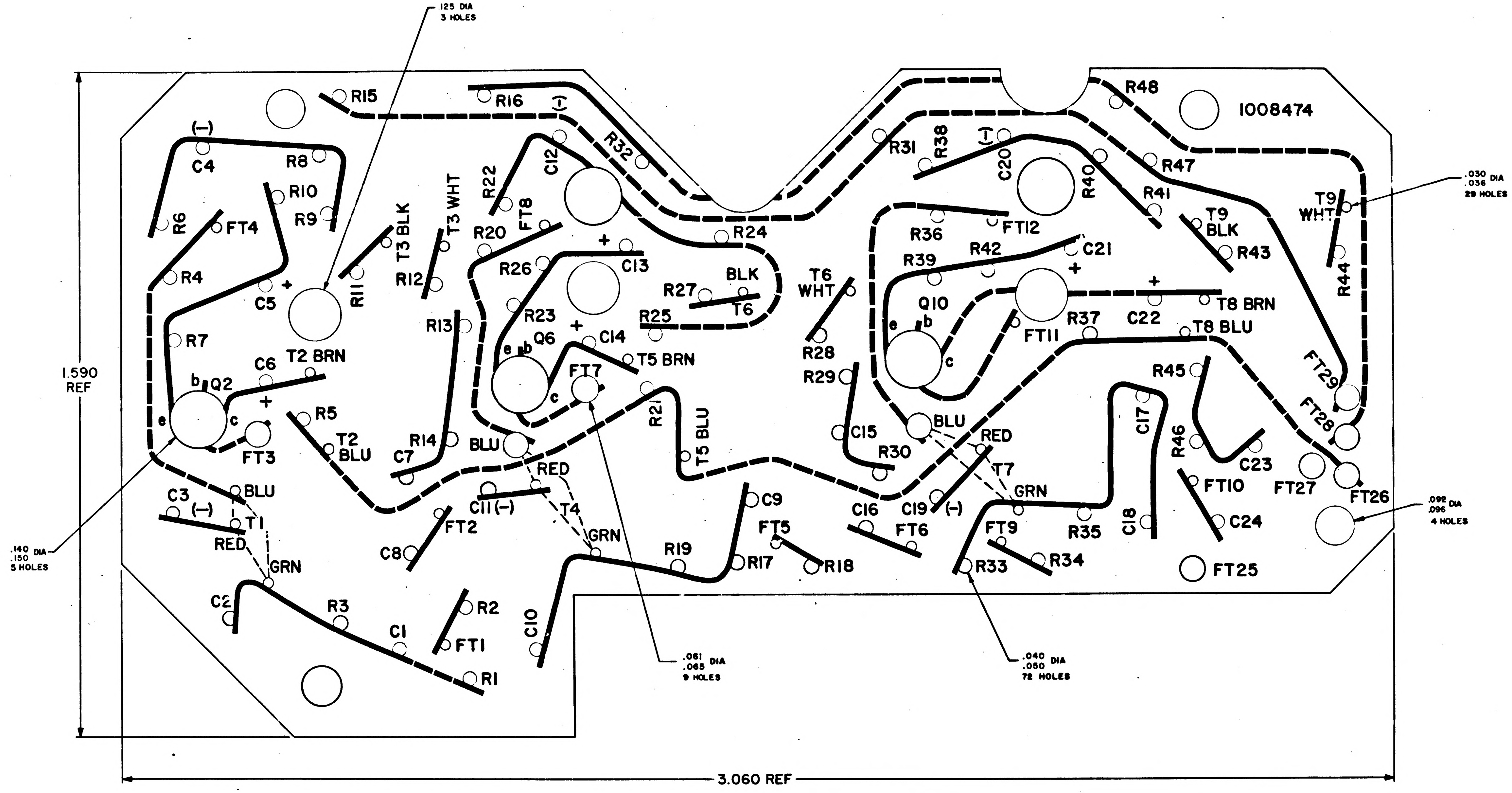
CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008473
SCALE 10/1
WT —
SHEET 1 OF 1

1008473

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008474

REVISIONS 2550			
SYM	DESCRIPTION	DATE	APPROVAL


.125 DIA
3 HOLES
R15
R16
(−)
R48
1008474
(−)
C4
R8
R10
R9
R6
FT4
R4
C5
+
R11
T3 BLK
T3 WHT
R12
R22
FT8
R20
C12
R32
R31
R38
(−)
C20
R40
R47
R41
T9 BLK
R43
T9 WHT
R44
.030
.036 DIA
29 HOLES
R24
R26
+
C13
R27
BLK
T6
R25
T6 WHT
R28
R29
R36
FT12
R39
R42
C21
Q10
e
b
c
+
+
FT11
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T8 BLU
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Q6
e
b
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+
C14
T5 BRN
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Q2
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+
FT3
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R21
T5 BLU
C15
R30
BLU
RED
T7
GRN
R45
C17
R46
C23
FT10
FT27
FT28
FT29
FT26
C24
.092
.096 DIA
4 HOLES
C3
(−)
BLU
T1
RED
GRN
C11 (−)
RED
T4
GRN
FT2
C8
C9
FT5
R17
R18
R19
C16
C19
(−)
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FT9
R35
C18
R33
R34
FT25
C2
R3
C1
R2
FT1
R1
C10
.140
.150 DIA
5 HOLES
.061
.065 DIA
9 HOLES
.040
.050 DIA
72 HOLES
1.590
REF
3.060 REF

REF:
DRAWING NO. 1008469 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE.
3. PREPARE BOARD FOR PHOTOGRAPH PER ND 1002133.
4. MARK BLACK CHARACTERS PER ND 1002019.
5. BROKEN LINE DENOTES SLEEVING.

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007664	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± .010 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN [illegible] DATE 11 NOV 65
CHECKED J. GRIEB 17 NOV 65
APPROVAL R. Osborn 3 DEC 65
APPROVAL [illegible] 1/24/66
NASA APPROVAL A. C. METZGER
MIT APPROVAL [illegible] 1-25-66

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

WIRING BOARD B
SIGNAL CONDITIONER
GIMBAL RESOLVER

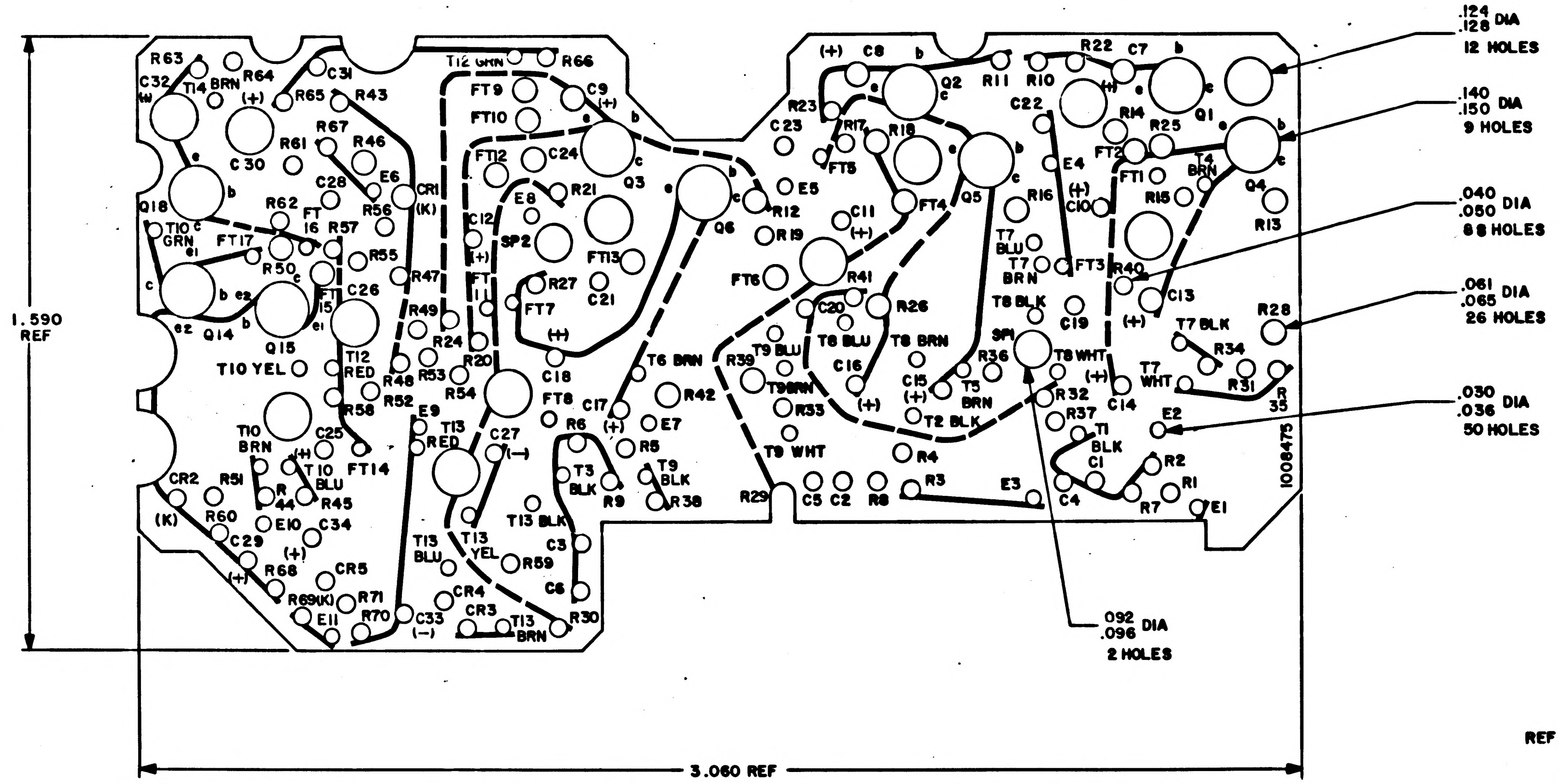
CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008474
SCALE 10/1
WT —
SHEET 1 OF 1

1008474

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 25045

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



REF:
DRAWING NO. 1008478 FOR
PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: .031 THICK PLASTIC SHEET MIL-P-18177 TYPE GEE.
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133.
4. MARK BLACK CHARACTERS PER ND 1002019.
5. BROKEN LINE DENOTES SLEEVING.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007661	1008207

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN A. Addario Jr. 2 Dec 65
CHECKED 3 JAN 66
APPROVED 3 Jan 66
APPROVED
APPROVED MIT 4 Jan 66
APPROVED MSC A. C. METZGER
DATE

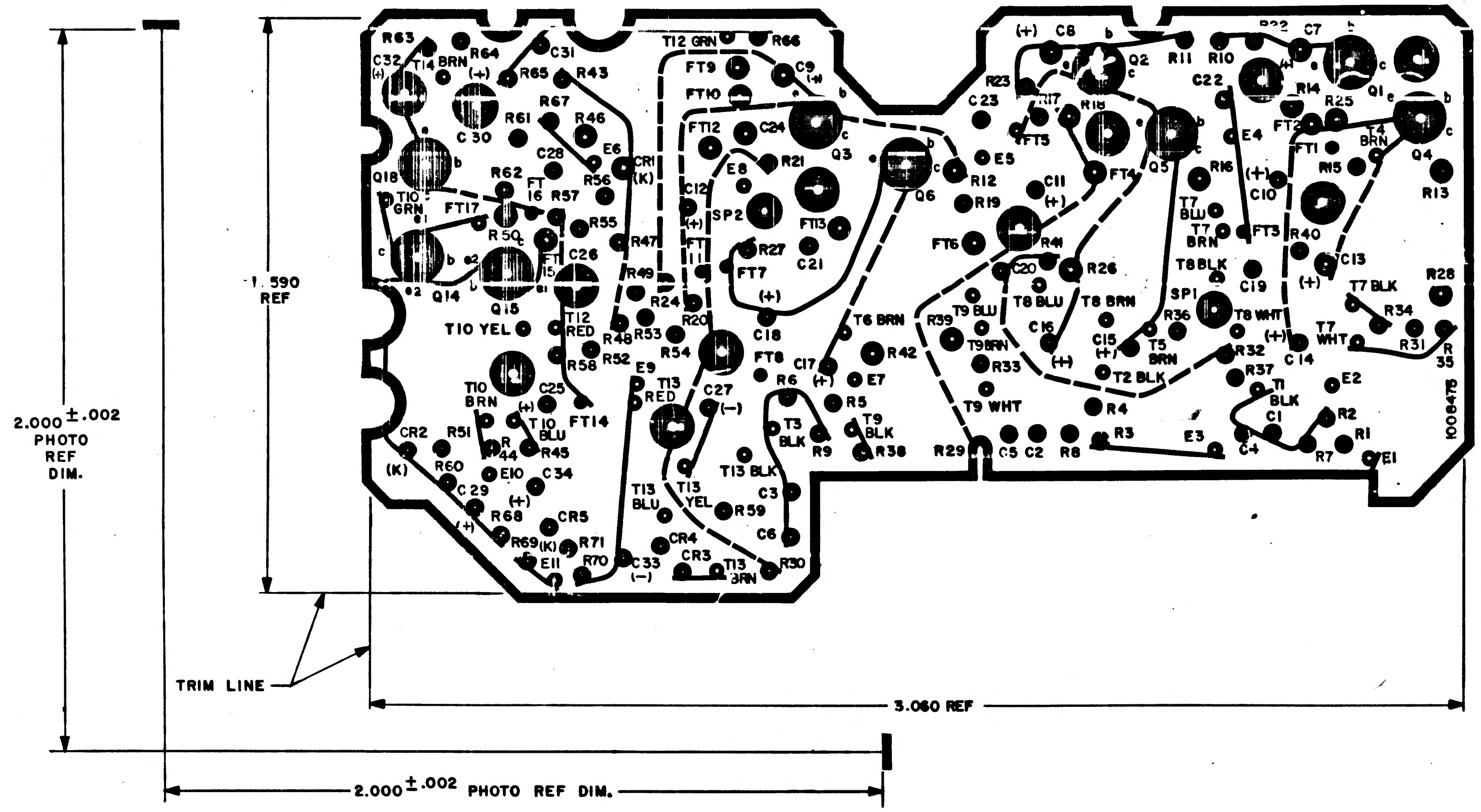
WIRING BOARD B
PIPA SIGNAL CONDITIONER

CODE IDENT NO. 80230
SIZE D
DRAWING NO. 1008475
SCALE 5/1
SHEET 1 OF 1

NOTICE WHEN GOVERNMENT DRAWINGS SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 25045

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


1.590 REF
2.000 ±.002 PHOTO REF DIM.
TRIM LINE
3.060 REF
2.000 ±.002 PHOTO REF DIM.
1008478
R63
C32 (+)
T14 BRN
R64
C31
(+)
R65
R43
T12 GRN
R66
FT9
C9
FT10
C30
R61
R67
R46
Q18
T10 GRN
FT17
R62
FT 16
R57
C28
E6
CR1 (K)
R56
FT12
C24
E8
R21
Q3
Q6
SP2
FT13
C12
(+)
FT11
R27
C21
FT7
(+)
R55
R50
C26
FT15
R47
R49
R24
Q14
Q15
T10 YEL
T12 RED
R48
R53
R20
R58
R52
R54
C18
FT8
E9
T13 RED
C27 (−)
T10 BRN
C25
(+)
T10 BLU
R44
R45
FT14
CR2
(K)
R51
R60
C29
E10
C34
R68
(+)
CR5
R69
(K)
R71
E11
R70
C33 (−)
CR4
CR3
T13 BRN
R30
T13 BLU
T13 YEL
R59
T13 BLK
C3
C6
T3 BLK
R9
R6
C17
(+)
R5
E7
T6 BRN
R42
T9 BLK
R38
R29
C5
C2
R8
(+)
C8
R23
C23
R17
FT5
E5
R12
R19
FT6
R18
Q2
R11
R10
C22
C11
(+)
FT4
Q5
R41
C20
R26
T8 BLU
T8 BRN
T9 BLU
R39
T9 BRN
R33
C16
(+)
C15
(+)
T5 BRN
T2 BLK
T9 WHT
R4
R3
E3
R22
C7
Q1
R14
R25
E4
FT2
FT1
T4 BRN
Q4
R16
(+)
C10
R15
R13
T7 BLU
T7 BRN
FT3
R40
T8 BLK
C13
SP1
C19
(+)
T7 BLK
R28
T8 WHT
R36
(+)
T7 WHT
R34
R31
R35
R32
R37
C14
T1 BLK
E2
C1
R2
C+
R7
R1
E1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY.
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS.
4. CUT TO WITHIN .010 OF TRIM LINE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ±— DECIMALS ±— ANGLES ±—
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN A. Addario J. 17Dec65
CHECKED Russo 3 JAN 66
APPROVED 3Jan 66
APPROVED
APPROVED MIT W Kupfer 4Jan66
APPROVED MSC A. C. METZGER
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER WIRING BOARD B

PIPA SIGNAL CONDITIONER

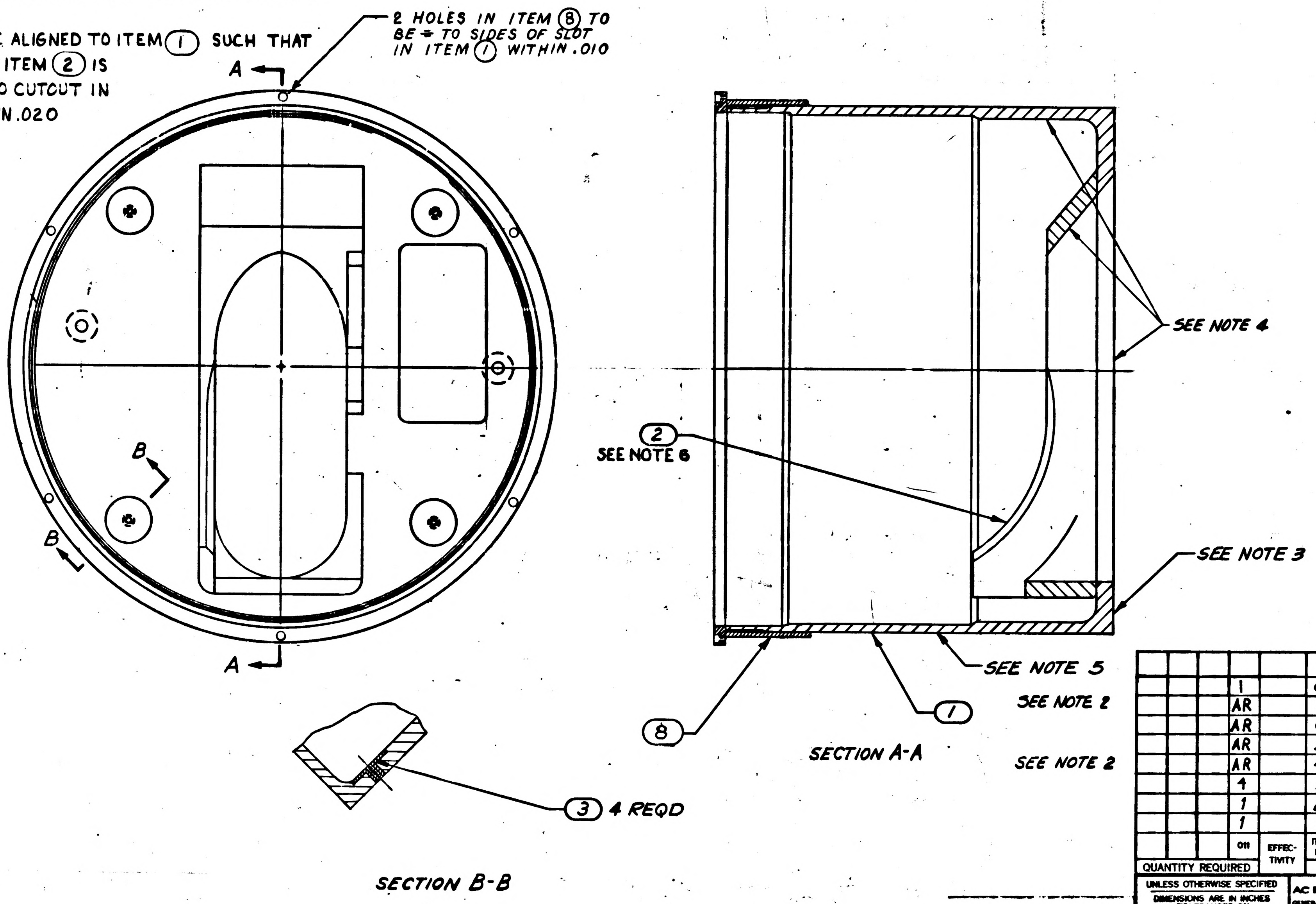
CODE IDENT NO. 80230
SIZE D
DRAWING NO. 1008478
SCALE 5/1
SHEET 1 OF 1

B 1008480

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
D5	A	REVISED PER D.O. 62423		13 OCT 66	CG
C-6	B	REVISED PER ECM 216224		12 NOV 66	JRR
	C	INITIAL RELEASE CLASS A PER TDRR 32202		14/1/66	DB

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. BOND ITEM ② TO ITEM ① USING ITEM ④ IN ACCORDANCE WITH ND1002329-002.
   BOND ITEM ③ & ⑧ TO ITEM ① USING ITEM ⑦ IN ACCORDANCE WITH ND1002329-001.
3. IDENTIFY USING DRAWING NUMBER PER ND1002019, SERIALIZE PER ND1002023.
4. UNLESS OTHERWISE SPECIFIED:
   APPLY BLACK COATING PER ND1002277 USING ITEM ⑤ ON SURFACES INDICATED.
5. APPLY WHITE COATING PER ND1002277 USING ITEM ⑥.
6. ITEM ② TO BE ALIGNED TO ITEM ① SUCH THAT THE CUTOUT IN ITEM ② IS SYMETRICAL TO CUTOUT IN ITEM ① WITHIN .020



SECTION A-A

SECTION B-B

			1		8	1008482	FLANGE, SEXTANT COVER
			AR		7	1008903	ADHESIVE
			AR		6	1012543-002	COATING KIT, LIGHT-DIFFUSING
			AR		5	1012543-001	COATING KIT, LIGHT-DIFFUSING
			AR		4	1008904	ADHESIVE
			4		3	1008483-002	NUT, BONDED
			1		2	1008481	BAFFLE
			1		1	1008479	COVER
			011	EFFECTIVITY	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
QUANTITY REQUIRED					LIST OF PARTS AND MATERIALS		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL 11 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.
DRAWN J. Guff DATE 6 OCT '66
CHECKED C. Pizida 6 OCT 66
APPROVALS 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
AC MSF APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEXTANT COVER AND BAFFLE
(INSEPARABLE ASSEMBLY)

SIZE D
CODE IDENT NO. 99974
1008480
SCALE 1:1
SHEET 1 OF 1

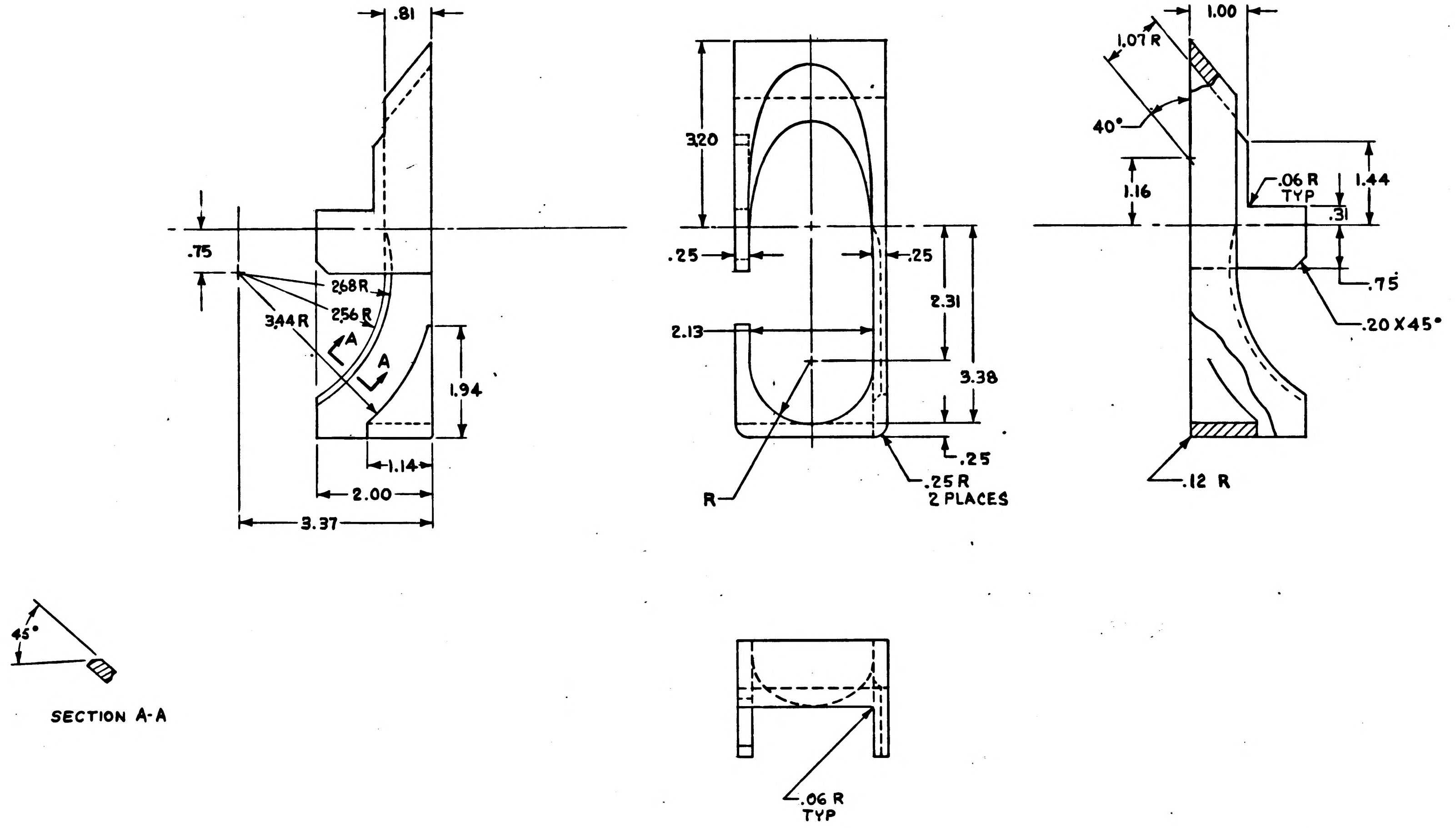
NEXT ASSY | USED ON
APPLICATION

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 32202		3/66	

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: PER 1008917.
3. MUST BE FREE FROM BURRS AND SHARP EDGES.
4. PARTS TO BE FABRICATED IN ACCORDANCE WITH ND 1002315.

5. FINISHED PARTS SHALL BE FREE OF ALL TOOLING AIDS, CREASES, FRAYED EDGES, DELAMINATION AND SHALL HAVE A MINIMUM OF WRINKLES.
6. IDENTIFY USING DRAWING NUMBER PER ND 1002019.


.81
.75
2.68R
2.56R
3.44R
A
A
1.94
1.14
2.00
3.37
3.20
.25
.25
2.31
3.38
2.13
R
.25
.25 R
2 PLACES
1.00
1.07 R
40°
1.16
.06 R
TYP
1.44
.31
.75
.20 X 45°
.12 R
45°
SECTION A-A
.06 R
TYP

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ±.02
3 PLACE DECIMALS ± -
ANGLES ±2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.
DRAWN J.W. DATE 6 OCT 66
CHECKED 6 OCT 66
APPROVED 6 OCT 66
CONTRACT NAS 9-497

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

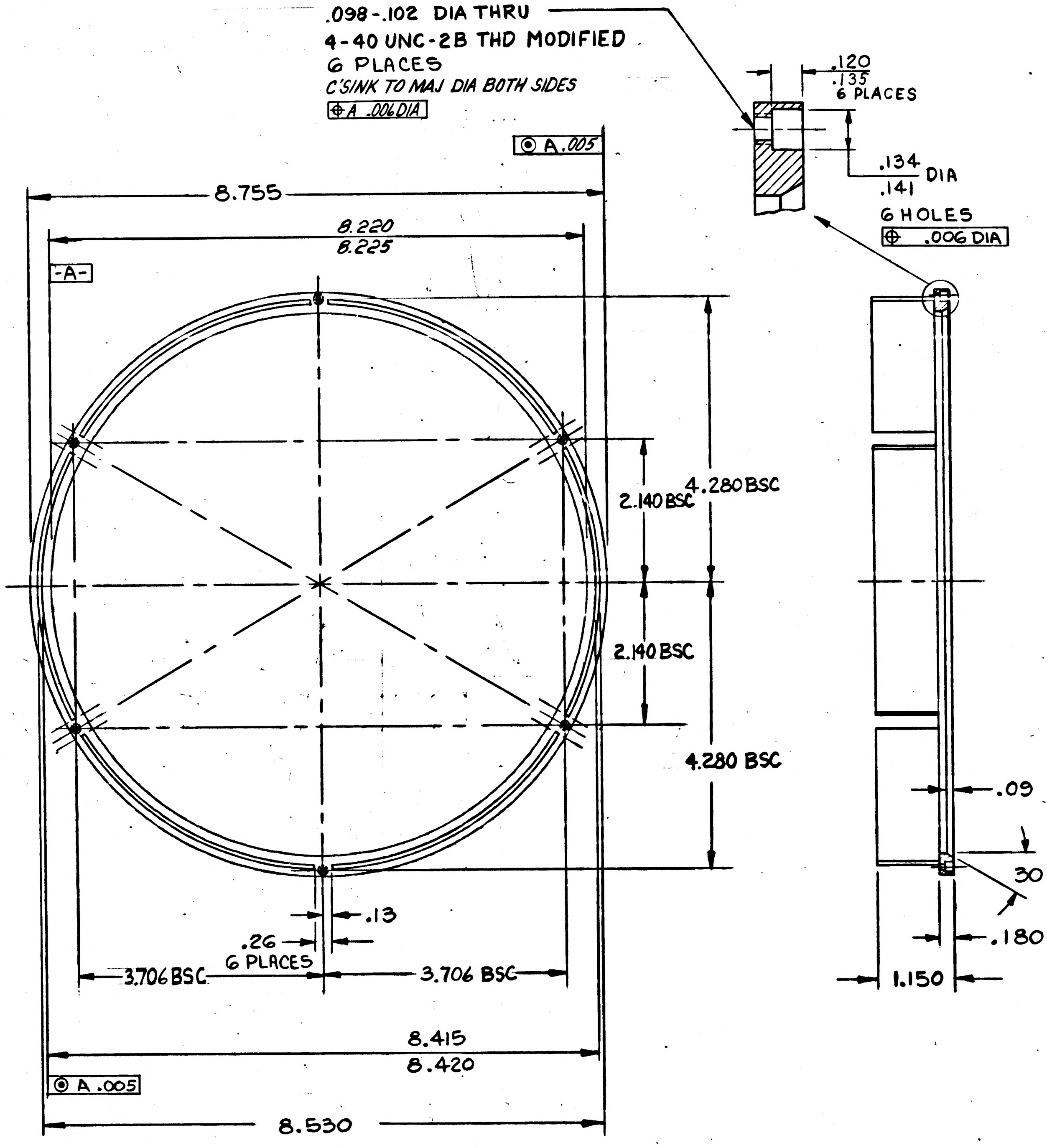
BAFFLE, SEXTANT
100 SERIES

SIZE E
CODE IDENT NO. 99974
1008481
SCALE
SHEET

NEXT ASSY | USED ON
APPLICATION

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: ALUMINUM ALLOY, TYPE 6061-T6 PER QQ-A-250/11
3. FINISH: CHEMICAL FILM PER MIL-C-5541 CLASS I.
4. MUST BE FREE FROM BURRS.
5. UNLESS OTHERWISE SPECIFIED:
   - A. SURFACE ROUGHNESS MUST NOT EXCEED 125/√.
   - B. ALL CORNERS TO BE .005 TO .015 R OR CHAMFER.
6. IDENTIFY USING DWG. NO. PER ND1002019.



.098-.102 DIA THRU
4-40 UNC-2B THD MODIFIED
6 PLACES
C'SINK TO MAJ DIA BOTH SIDES
⊕ A .006 DIA
◎ A .005
8.755
8.220
8.225
-A-
.120
.135
6 PLACES
.134
.141
DIA
6 HOLES
⊕ .006 DIA
2.140 BSC
4.280 BSC
2.140 BSC
4.280 BSC
.09
30°
.180
1.150
.13
.26
6 PLACES
3.706 BSC
3.706 BSC
8.415
8.420
◎ A .005
8.530

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER ECM 216225		12 NOV 66	JRK EG
	B	INITIAL RELEASE CLASS A PER TDRR 32202		12/1/66	JRK EG

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± .02
3 PLACE DECIMALS ± .005
ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL —
APPROVAL
11 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.
DRAWN Dezel DATE 6 OCT 66
CHECKED G. Sayler 7 OCT 66
APPROVAL L. Smith 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

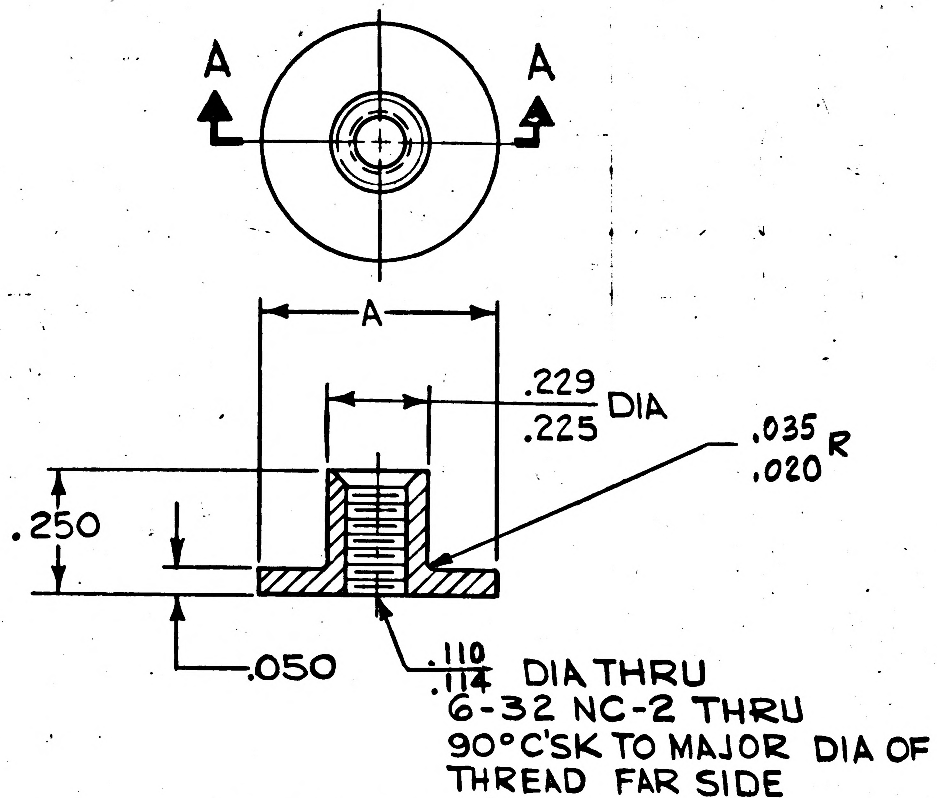
FLANGE, SEXTANT COVER

SIZE D
CODE IDENT NO. 99974
1008482
SCALE FULL
SHEET 1 OF 1

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER ECM 216183		12 NOV 66	JRK EG
	B	INITIAL RELEASE CLASS A PER TDRR 32202		12/1/66	JRK EG
	C	REVISED PER TDRR 32211		10 DEC 66	JPW CP

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: AMS 7848
3. UNLESS OTHERWISE SPECIFIED:
   A. SURFACE ROUGHNESS MUST NOT EXCEED 63√.
   B. ALL CORNERS MUST BE .005 TO .015 R OR CHAMFER.
4. MUST BE FREE FROM BURRS.
5. IDENTIFY USING DRAWING NUMBER PER ND1002013.



SECTION A-A

DASH NO.	DIA A
-001	.370-.375
-002	.745-.750

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± .005
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
APPROVAL Cha Cutn 10 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.
DRAWN PILLAR DATE 5 OCT 66
CHECKED C. Piojda 6 OCT 66
APPROVAL L C Smith 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
AC APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

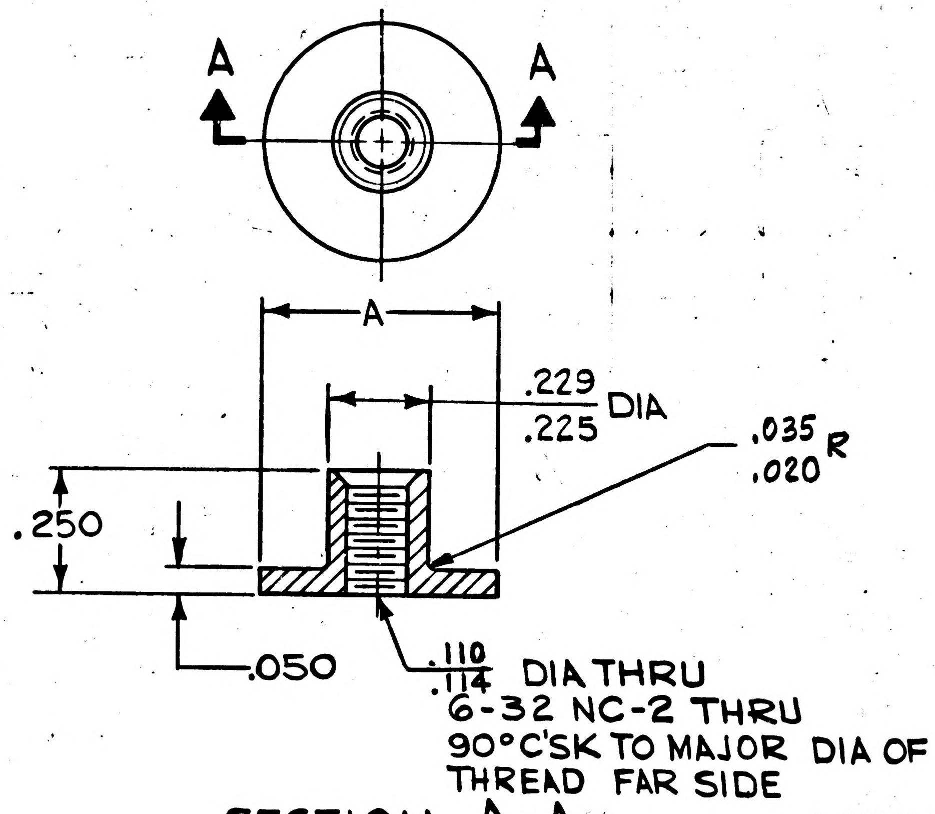
NUT, BONDED

SIZE C
CODE IDENT NO. 99974
1008483
SCALE 4:1
SHEET 1 OF 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: AMS 7848
3. UNLESS OTHERWISE SPECIFIED:
   A. SURFACE ROUGHNESS MUST NOT EXCEED 63/.
   B. ALL CORNERS MUST BE .005 TO .015 R OR CHAMFER.
4. MUST BE FREE FROM BURRS.
5. IDENTIFY USING DRAWING NUMBER PER ND1002019.

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER ECM 216183		2 NOV 66	JRK EG
	B	INITIAL RELEASE CLASS A PER TDRR 32202		12/1/66	JRK EG
	C	REVISED PER TDRR 32211		10 DEC 66	JPW CP



SECTION A-A

DASH NO.	DIA A
-001	.370-.375
-002	.745-.750

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
APPROVAL 10 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.
DRAWN PILLAR DATE 5 OCT 66
CHECKED C. Piojda 6 OCT 66
APPROVAL L.C. Smith 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
AC APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

NUT, BONDED

SIZE C
CODE IDENT NO. 99974
1008483
SCALE 4:1
SHEET 1 OF 1

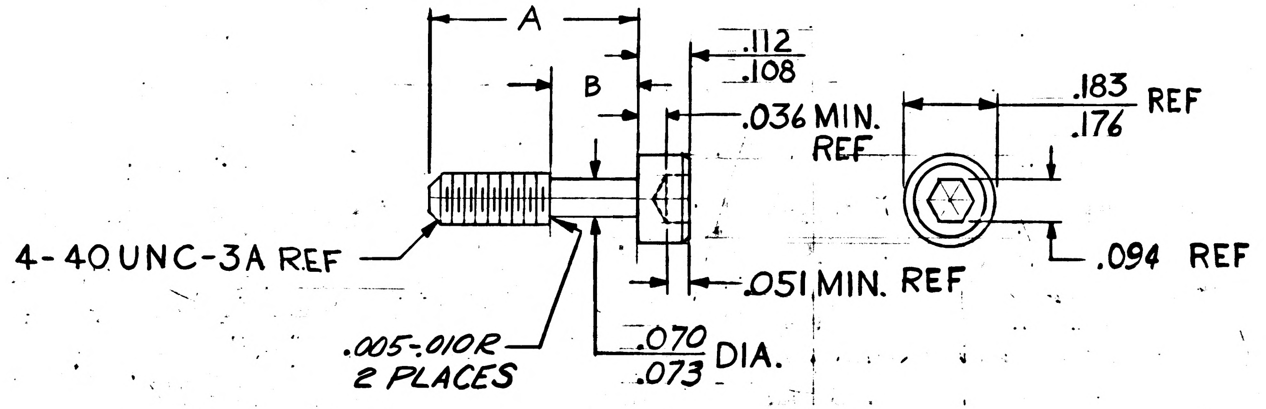
MIL-1052C F

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPD
	A	REVISED PER ECM 216222		12 NOV 66	JRK EJ
	B	INITIAL RELEASE CLASS A PER TDRR 32202		12/1/66	JRK EJ

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: MAKE FROM PART NUMBER 1001488 PER TABLE.
3. FINISH: PASSIVATE PER MIL-F-14072 (SIG C) FIN E 300



PART NO.	A	B	MAKE FROM
1008484-000	.405 ±.005	.120	1001488-5
1008484-001	.687 ±.015	.320	1001488-9

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
APPROVAL Charleston 10 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.
DRAWN J. REBER DATE 6 OCT 66
CHECKED 7 OCT 66
APPROVAL 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAPTIVE
HEX SOCKET HEAD

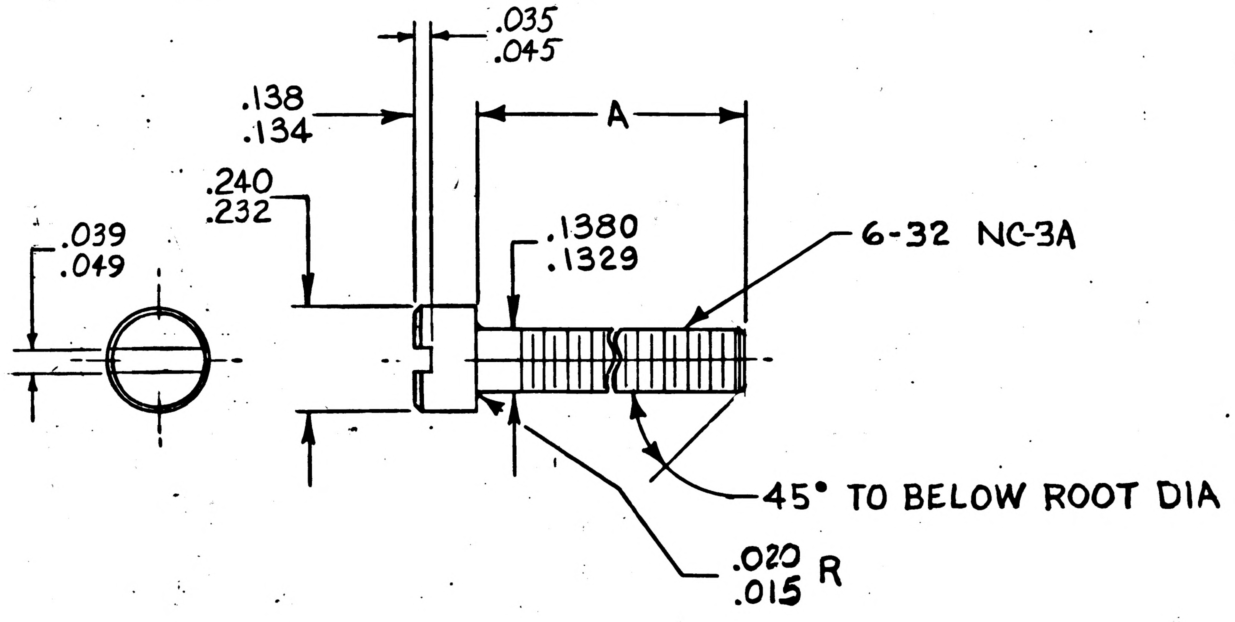
SIZE C
CODE IDENT NO. 99974
1008484
SCALE 4:1
SHEET 1 OF 1

REV LTR B 1008487

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER ECM 216185		11-12-66	JPW EG
	B	INITIAL RELEASE CLASS A PER TDRR 32202		12/1/66	JRK EG

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: AMS 7848
3. UNLESS OTHERWISE SPECIFIED:
   A. SURFACE ROUGHNESS MUST NOT EXCEED $\overset{63}{\surd}$.
   B. ALL CORNERS MUST BE .005 TO .015 R OR CHAMFER.
4. MUST BE FREE FROM BURRS.
5. IDENTIFY USING DRAWING NUMBER PER ND1002019
6. CONCENTRICITY: SCREW HEAD SHALL BE CONCENTRIC TO THE AXIS OF THE SHANK OF THE SCREW WITHIN .008 BEARING SURFACE OF HEAD TO BE SQUARE WITH BODY WITHIN ± 2°.
7. LENGTH TOLERANCES: ±.01
8. SCREWS SHALL MEET THE REQUIREMENTS OF FF-S-86 TYPE VI.
9. MARKING: PACKAGING OF PARTS SHALL BE MARKED IN ACCORDANCE WITH MIL-STD-129, WITH THE NASA DRAWING NUMBER AND DASH NUMBER.



DASH NO.	DIM. A
-001	1.52
-002	1.40
-003	.63

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

1008487

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

2 PLACE DECIMALS	3 PLACE DECIMALS	ANGLES
± .02	± .005	± 2°

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2

APPROVAL Charleston 10 Oct 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.

DRAWN PILLAR DATE 5 OCT 66
CHECKED C. Pioida 6 OCT 66
APPROVAL L. Goodell 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
AC APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP,
SLOTTED HEAD

SIZE C CODE IDENT NO. 99974 1008487

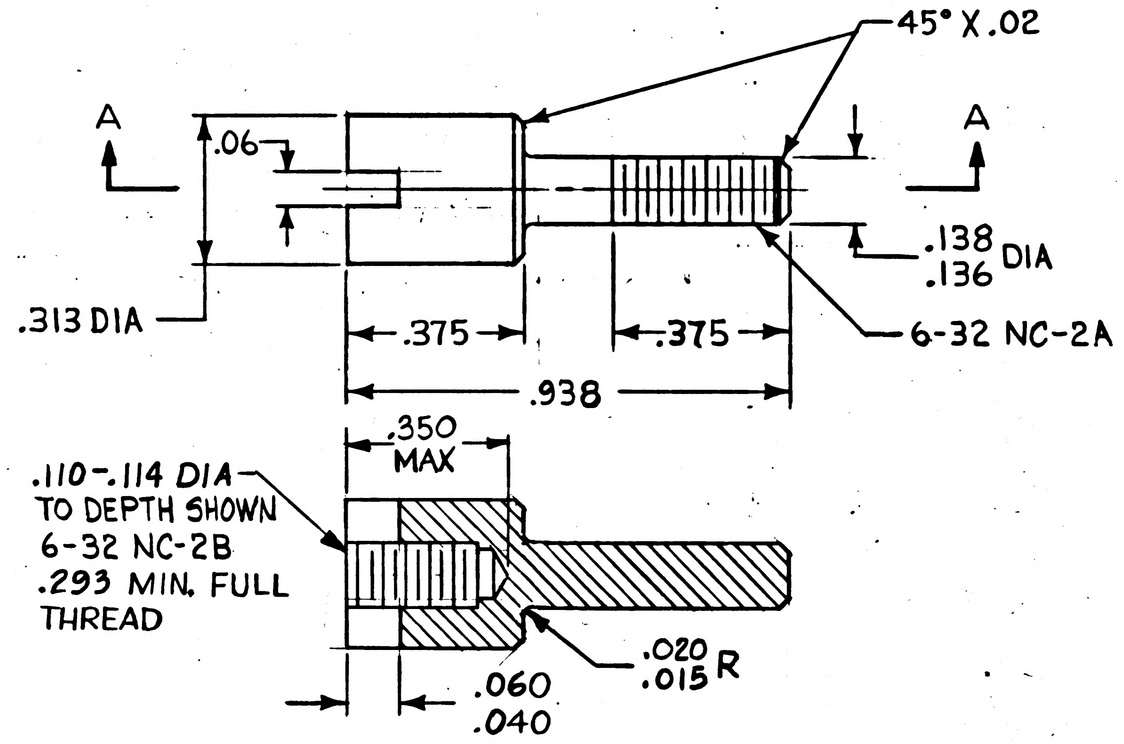
SCALE 4:1 SHEET 1 OF 1

MIL-1058C P

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG. NO.	DATE	APPD
A		REVISED PER ECM 216186		11-12-66	JPW EG
B		INITIAL RELEASE CLASS A PER TDRR 32202		12/1/66	JRK EG

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: AMS-7848
3. UNLESS OTHERWISE SPECIFIED:
   A. SURFACE ROUGHNESS MUST NOT EXCEED 63/.
   B. ALL CORNERS MUST BE .005 TO .015R OR CHAMFER.
4. IDENTIFY USING DRAWING NUMBER PER ND1002019.
5. MUST BE FREE FROM BURRS.


45° X .02
A
A
.06
.313 DIA
.138
.136 DIA
6-32 NC-2A
.375
.375
.938
.350
MAX
.110-.114 DIA
TO DEPTH SHOWN
6-32 NC-2B
.293 MIN. FULL
THREAD
.020
.015 R
.060
.040

SECTION A-A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ±.02 3 PLACE DECIMALS ±.005 ANGLES ±2°	AC ELECTRONICS DIVISION GENERAL [illegible] CORP. MILWAUKEE WIS.
DO NOT SCALE THIS DRAWING	DRAWN DATE 6 OCT 66 CHECKED 6 OCT 66 APPROVAL 10 OCT 66 CONTRACT NAS 9-497
MATERIAL SEE NOTE 2	NASA APPROVAL
APPROVAL 10 OCT 66	AC APPROVAL

NEXT ASSY	USED ON
APPLICATION	

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, SLOTTED, SPECIAL
SEXTANT COVER

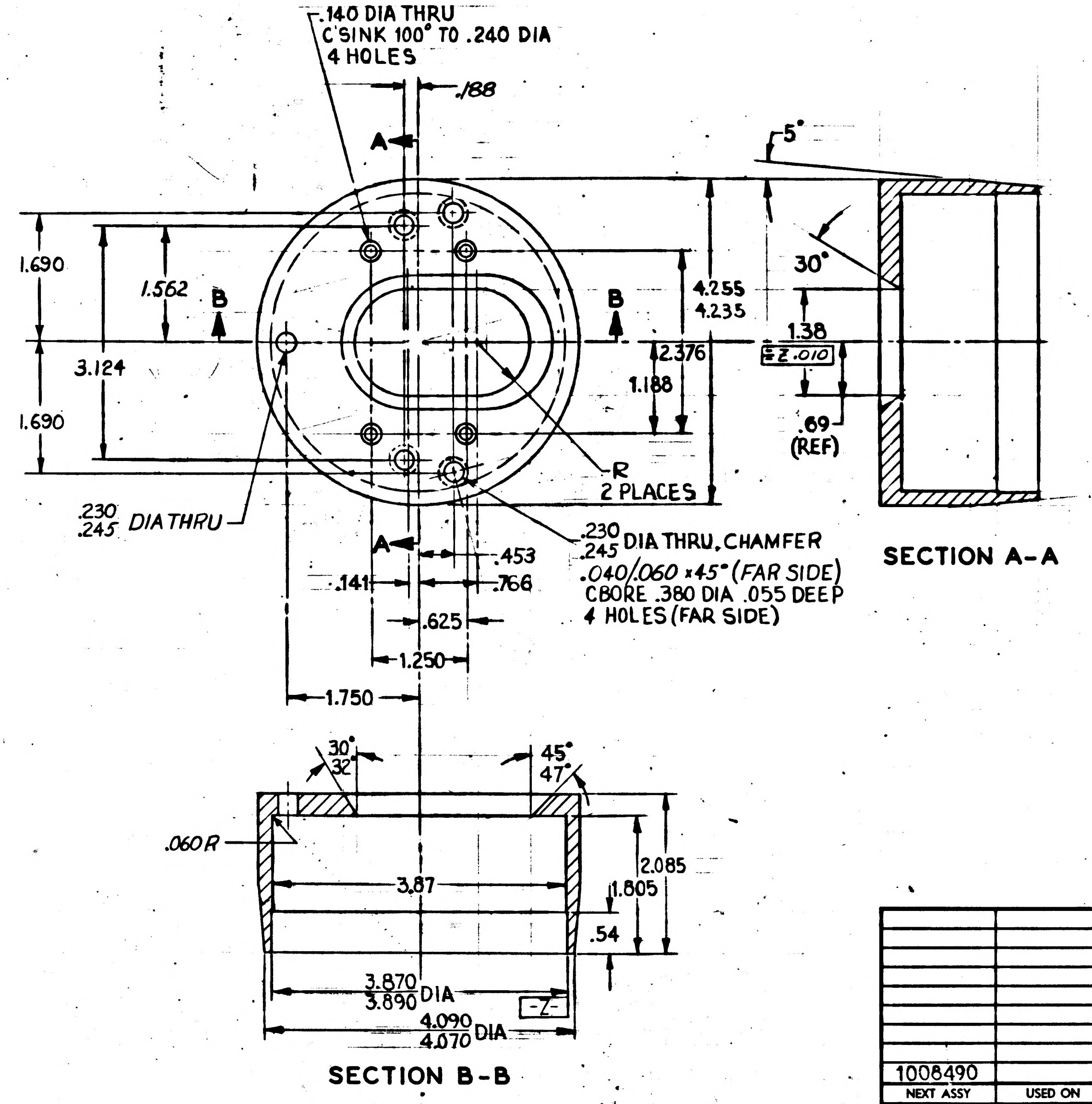
SIZE	CODE IDENT NO.	
C	99974	1008488
SCALE 4:1		SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		REVISED PER ECM 216226		11-12-66	JPW EG
B		INITIAL RELEASE CLASS A PER TDRR 32202		9/1/66	JRK EG

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: PER 1008917.
3. PARTS TO BE FABRICATED IN ACCORDANCE WITH ND1002315.
4. FINISHED PARTS SHALL BE FREE OF ALL TOOLING AIDS, CREASES, FRAYED EDGES, DELAMINATION AND SHALL HAVE A MINIMUM OF WRINKLES.
5. MUST BE FREE OF BURRS AND SHARP EDGES.
6. IDENTIFY USING DRAWING NUMBER PER ND1002019
7. DIAMETER SIZES APPLY WITH -Z- RESTRAINED TO DRAWING DIMENSIONS


.140 DIA THRU
C'SINK 100° TO .240 DIA
4 HOLES
.188
A
A
B
B
1.690
1.562
3.124
1.690
4.255
4.235
2.376
1.188
R
2 PLACES
.230
.245 DIA THRU
.230
.245 DIA THRU, CHAMFER
.040/.060 ×45° (FAR SIDE)
CBORE .380 DIA .055 DEEP
4 HOLES (FAR SIDE)
.141
.453
.766
.625
1.250
1.750
5°
30°
1.38
±.010
.69
(REF)
SECTION A-A
30°
32°
45°
47°
.060R
3.87
2.085
1.805
.54
3.870
3.890 DIA
4.090
4.070 DIA
-Z-
SECTION B-B

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ±.02 3 PLACE DECIMALS ±.005 ANGLES ±1°	AC ELECTRONICS DIVISION GENERAL MOTORS CORP. MILWAUKEE WIS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
			DRAWN J. Parker DATE 28SEP66 CHECKED 6 OCT 66 APPROVAL 10 OCT 66 CONTRACT NAS 9-497	COVER, TELESCOPE HEAD		
		DO NOT SCALE THIS DRAWING				
1008490		MATERIAL SEE NOTE 2	NASA APPROVAL	SIZE D	CODE IDENT NO. 99974	1008489
NEXT ASSY	USED ON		AC APPROVAL	SCALE FULL		SHEET 1 OF 1
APPLICATION		APPROVAL Charlton 11 OCT 66				

0648001 | 2

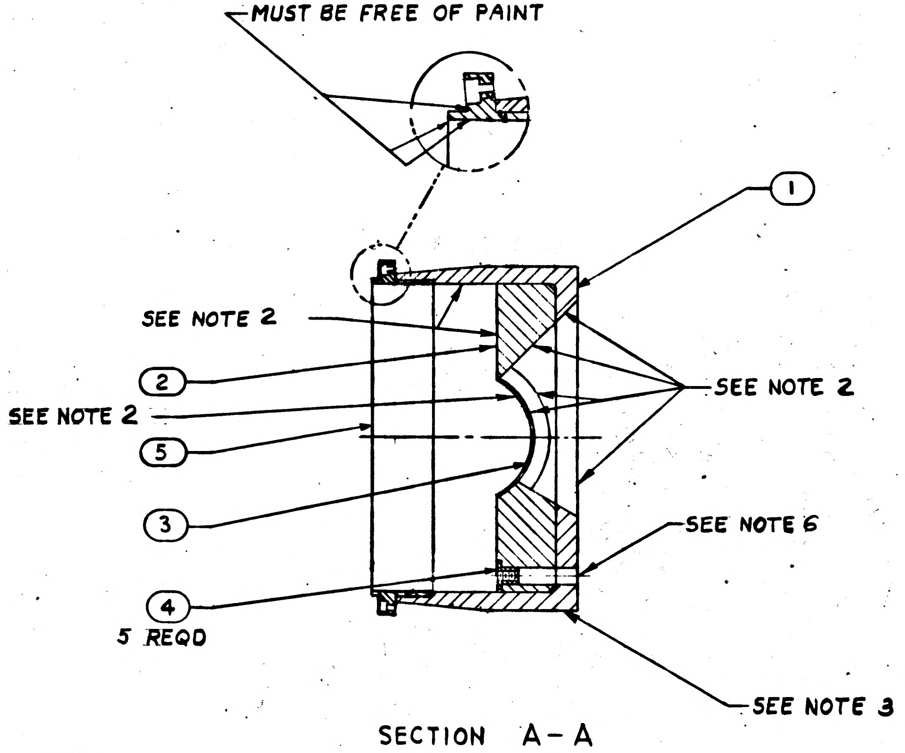
REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
C6	A	REVISED PER D.C. 62423		13 OCT	DG
	B	REVISED PER ECM 216227		11-12-66	JPW EG
	C	INITIAL RELEASE CLASS A PER TDRR 32202		11/14	DE

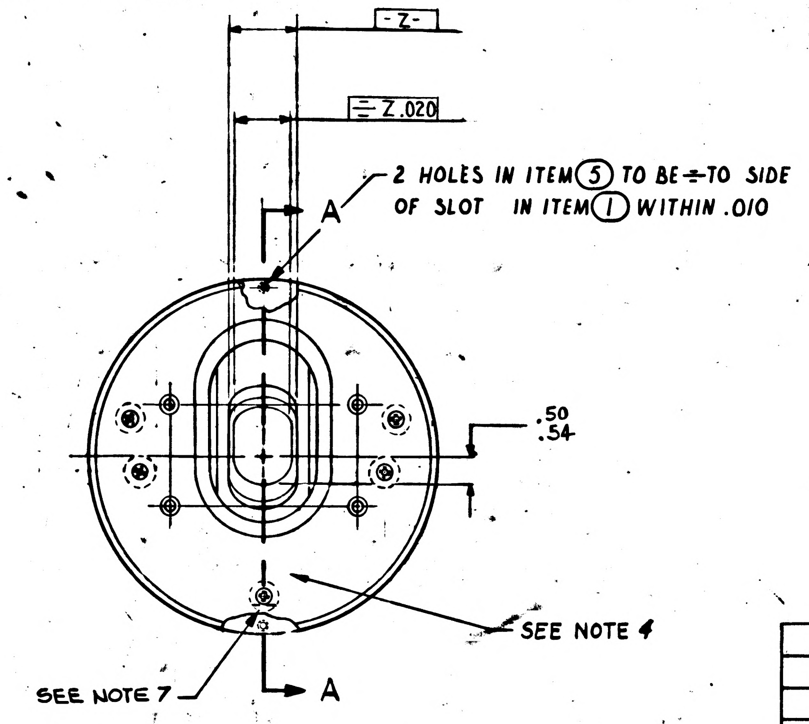
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

NOTES:

1. *INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.*
2. APPLY BLACK COATING PER ND 1002277 USING ITEM ⑦ ON SURFACES INDICATED.
3. APPLY WHITE COATING PER ND 1002277 USING ITEM ⑧
4. IDENTIFY USING DRAWING NUMBER PER ND 1002019; SERIALIZE PER ND 1002023
5. BOND ITEM ② TO ITEM ① USING ITEM ⑥ IN ACCORDANCE WITH ND1002329-002. BOND ITEMS ⑤ TO ITEM ① AND ITEMS ③ AND ④ TO ITEM ② USING ITEM ⑨ IN ACCORDANCE WITH ND1002329-001
6. INDICATED HOLE IN ITEM ② CONCENTRIC TO HOLE IN ITEM ① WITHIN .010, SLOTS IN ITEMS ① AND ② MUST BE PARALLEL WITHIN .010.
7. MACHINE THE PROTRUSION OF ITEM ④ TO WITHIN THE CONFINES OF THE OUTER DIAMETER OF ITEM ②



SECTION A-A


-Z-
⟂ Z .020
2 HOLES IN ITEM ⑤ TO BE ⟂ TO SIDE OF SLOT IN ITEM ① WITHIN .010
A
.50
.54
SEE NOTE 4
SEE NOTE 7
A

SEE NOTE 5

			AR	9	1008903	ADHESIVE
			AR	8	1012543-002	COATING KIT, LIGHT-DIFFUSING
			AR	7	1012543-001	COATING KIT, LIGHT-DIFFUSING
			AR	6	1008904	ADHESIVE
			1	5	1008492	FLANGE, TELESCOPE COVER
			5	4	1008483-001	NUT, BONDED
			1	3	1021333	SHIELD, LIGHT
			1	2	1008491	BAFFLE, TELESCOPE COVER
			1	1	1008489	COVER
			011	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
QUANTITY REQUIRED				LIST OF PARTS AND MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
APPROVAL 11 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE, WIS.
DRAWN W. Knoll DATE 6 OCT 66
CHECKED C. Pizzola 6 OCT 66
APPROVAL 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

COVER AND BAFFLE (TELESCOPE)
(INSEPARABLE ASSEMBLY)

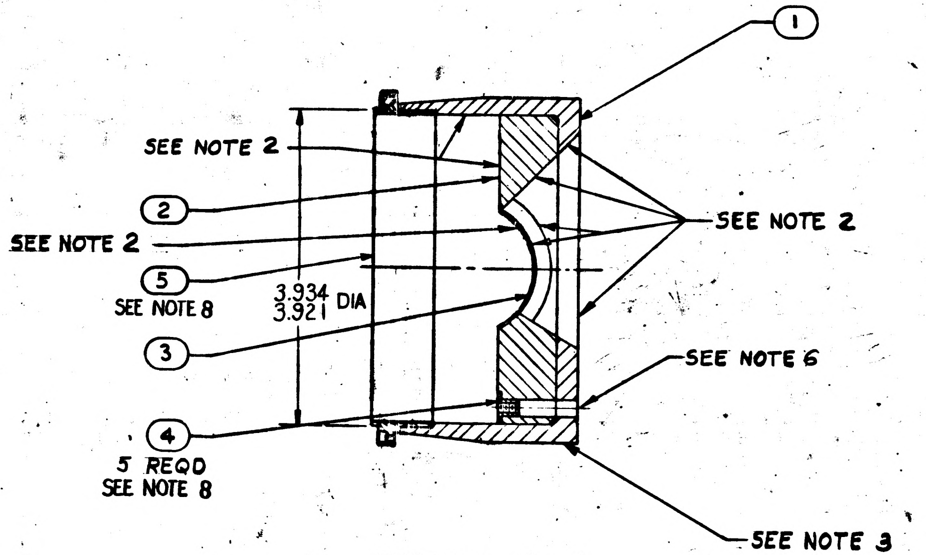
SIZE D
CODE IDENT NO. 99974
1008490
SCALE 1:1
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

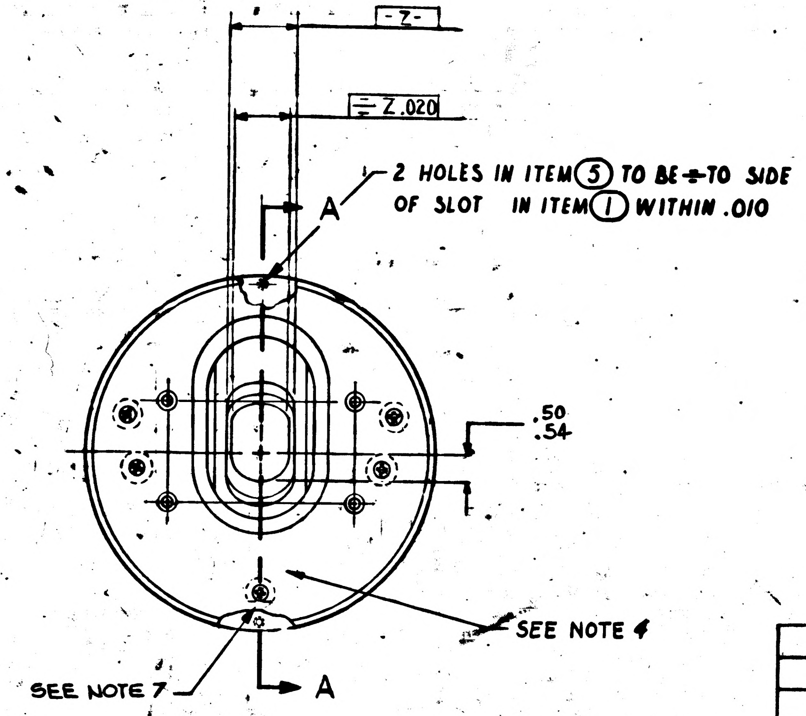
REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
C6	A	REVISED PER D.O. 62423		13 OCT 66	DG
	B	REVISED PER ECM 216227		11-12-66	
	C	INITIAL RELEASE CLASS A PER TDRR 32202			DG
	D	REVISED PER TDRR 32212		13 DEC 66	HA

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. APPLY BLACK COATING PER ND 1002277 USING ITEM ⑦ ON SURFACES INDICATED, EXCEPT CURE AT 150° ± 10°F.
3. APPLY WHITE COATING PER ND 1002277 USING ITEM ⑧, EXCEPT CURE AT 150° ± 10°F.
4. IDENTIFY USING DRAWING NUMBER PER ND 1002019. SERIALIZE PER ND 1002023
5. BOND ITEM ② TO ITEM ① USING ITEM ⑥ IN ACCORDANCE WITH ND1002329-002. BOND ITEMS ⑤ TO ITEM ① AND ITEMS ③ AND ④ TO ITEM ② USING ITEM ⑨ IN ACCORDANCE WITH ND1002329-001
6. INDICATED HOLE IN ITEM ② CONCENTRIC TO HOLE IN ITEM ① WITHIN .010, SLOTS IN ITEMS ① AND ② MUST BE PARALLEL WITHIN .010.
7. MACHINE THE PROTRUSION OF ITEM ④ TO WITHIN THE CONFINES OF THE OUTER DIAMETER OF ITEM ②
8. ITEM ⑤ AND THREADS OF ITEM ④ TO BE FREE OF PAINT.



SECTION A - A


-Z-
⌯ Z .020
2 HOLES IN ITEM ⑤ TO BE ⊥ TO SIDE OF SLOT IN ITEM ① WITHIN .010
A
.50
.54
SEE NOTE 4
SEE NOTE 7
A

SEE NOTE 5

			AR	9	1008903	ADHESIVE
			AR	8	1012543-002	COATING KIT, LIGHT-DIFFUSING
			AR	7	1012543-001	COATING KIT, LIGHT-DIFFUSING
			AR	6	1008904	ADHESIVE
			1	5	1008492	FLANGE, TELESCOPE COVER
			5	4	1008483-001	NUT, BONDED
			1	3	1021333	SHIELD, LIGHT
			1	2	1008491	BAFFLE, TELESCOPE COVER
			1	1	1008489	COVER
			011	ITEM NO.	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
QUANTITY REQUIRED				LIST OF PARTS AND MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL
11 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE, WIS.
DRAWN W. Knoll DATE 6 OCT 66
CHECKED C. Pioda 6 OCT 66
APPROVAL 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

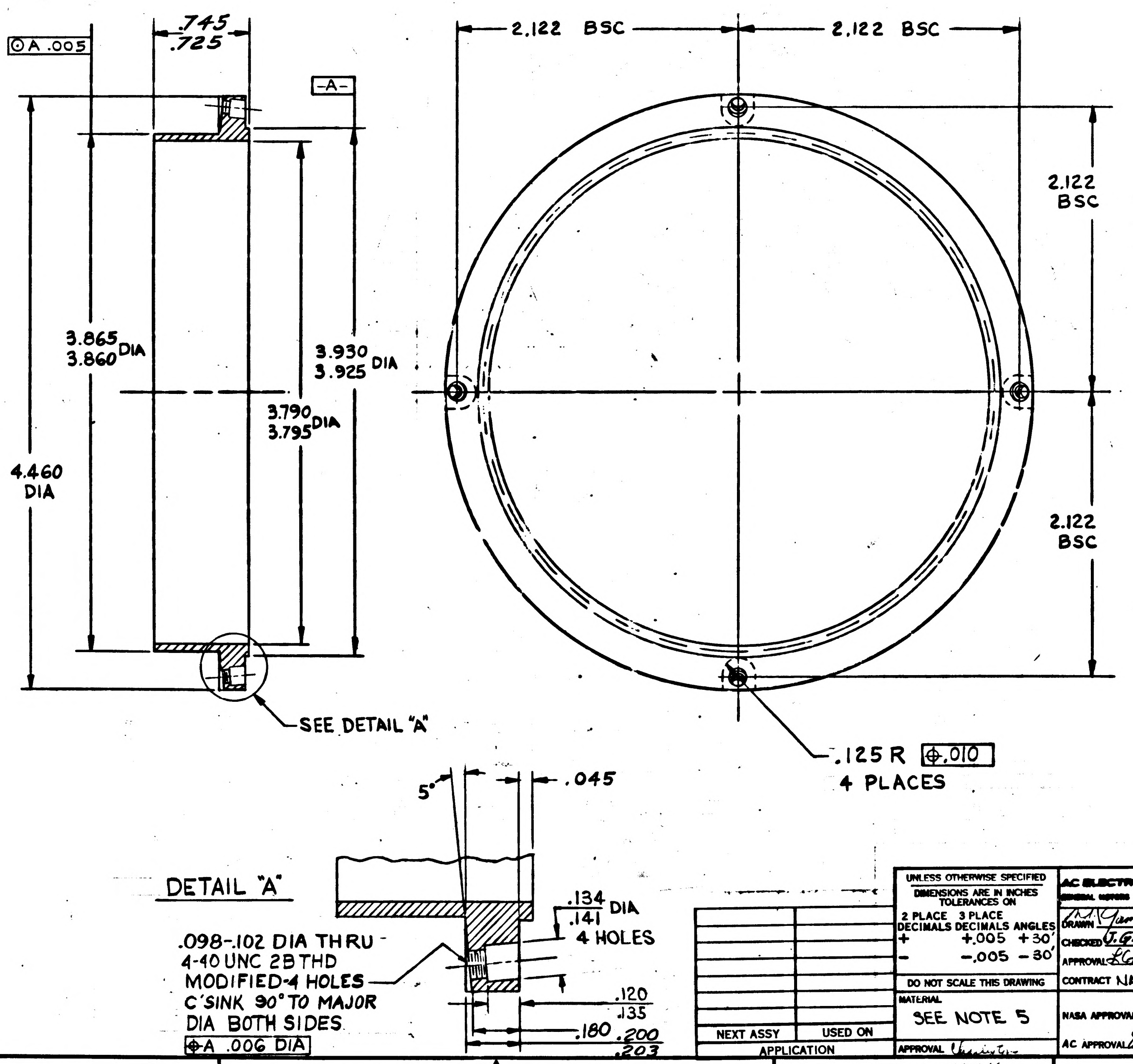
COVER AND BAFFLE (TELESCOPE)
(INSEPARABLE ASSEMBLY)

SIZE D
CODE IDENT NO. 99974
1008490
SCALE 1:1
SHEET 1 OF 1

REVISIONS					
ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER ECM 216229		11-12-66	JPW EJ
	B	INITIAL RELEASE CLASS A PER TDRR 32202		11/66	JRK EJ

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MUST BE FREE FROM BURRS.
3. UNLESS OTHERWISE SPECIFIED:
   A. SURFACE ROUGHNESS MUST NOT EXCEED 125√
   B. ALL CORNERS TO BE .005 TO .015 R OR CHAMFER
4. IDENTIFY USING DRAWING NUMBER PER ND 1002019.
5. MATERIAL: ALUMINUM ALLOY, TYPE 6061-T6 PER QQ-A-250/11
6. FINISH: CHEMICAL FILM TREATMENT, CLASS I PER MIL-C-5541



.745
.725
◎A .005
-A-
3.865
3.860 DIA
3.930
3.925 DIA
3.790
3.795 DIA
4.460
DIA
SEE DETAIL "A"
2.122 BSC
2.122 BSC
2.122
BSC
2.122
BSC
.125 R ⌖.010
4 PLACES
DETAIL "A"
5°
.045
.134
.141 DIA
4 HOLES
.098-.102 DIA THRU
4-40 UNC 2B THD
MODIFIED-4 HOLES
C'SINK 90° TO MAJOR
DIA BOTH SIDES
⌖A .006 DIA
.120
.135
.180
.200
.203

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS: + / -
3 PLACE DECIMALS: +.005 / -.005
ANGLES: +30' / -30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
APPROVAL 11-Oct-66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.
DRAWN M. Yamasaki DATE 6 OCT 66
CHECKED J. GRIEB 6 OCT 66
APPROVAL L Schmidt 10 OCT 66
CONTRACT NAS 9-497
NASA APPROVAL
AC APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

FLANGE,
TELESCOPE COVER

SIZE D
CODE IDENT NO. 99974
1008492
SCALE 2/1
SHEET 1 OF 1

1008492

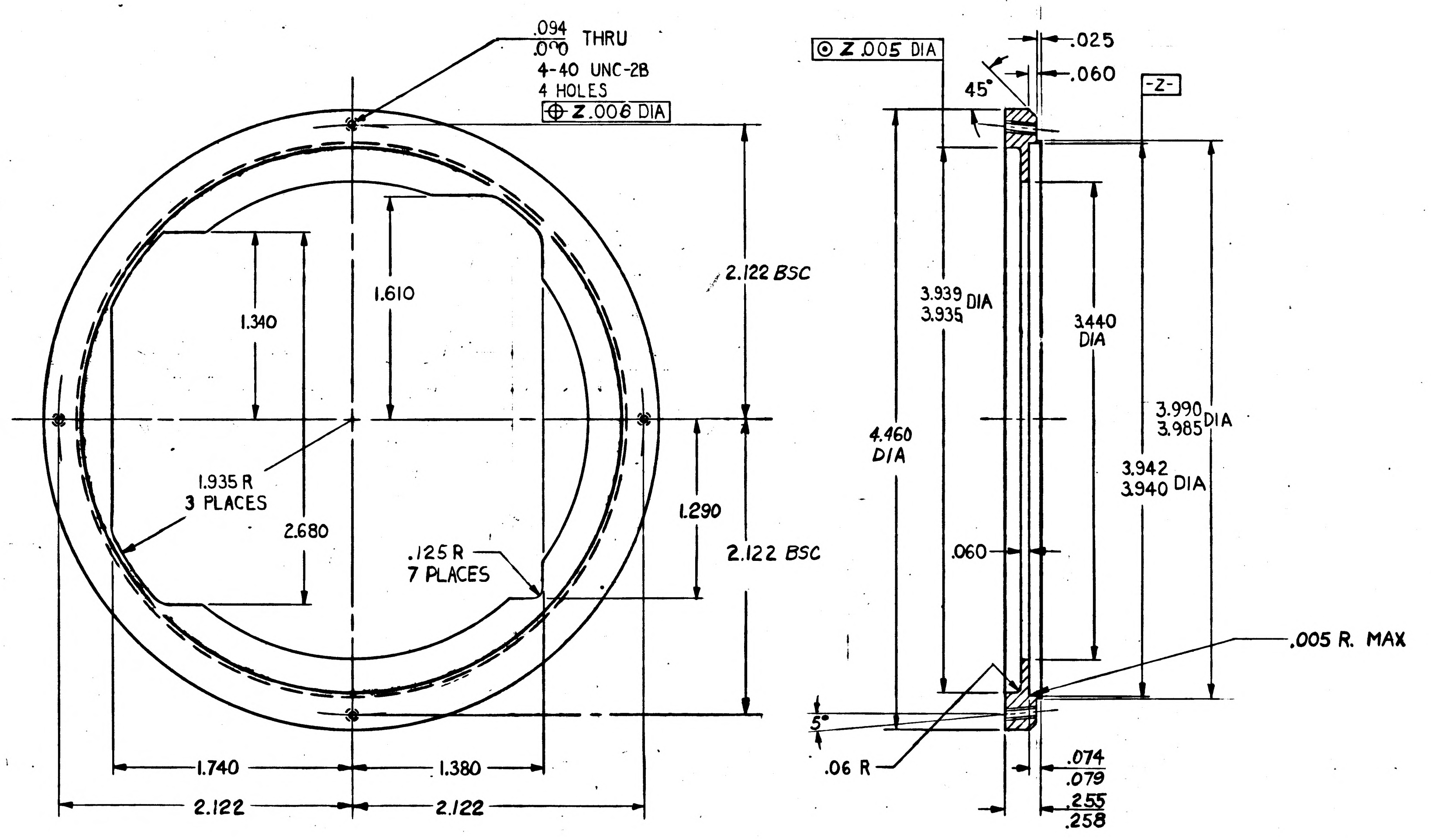
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

ZONE	LTR	DESCRIPTION	CHG. NO.	DATE	APPROVED
	A	REVISED PER CM 216230		12 NOV 66	JIMP EG
	B	INITIAL RELEASE CLASS A PER TDRR 32202		12/1/66	JRK EG

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MUST BE FREE FROM BURRS.
3. UNLESS OTHERWISE SPECIFIED:
   A. SURFACE ROUGHNESS MUST NOT EXCEED 125√
   B. ALL CORNERS TO BE .005 TO .015 R OR CHAMFER.
4. IDENTIFY USING DRAWING NUMBER PER ND 1002019.
5. MATERIAL: ALUMINUM ALLOY, TYPE 6061-T6 PER QQ-A-250/11
6. FINISH: CHEMICAL FILM TREATMENT, CLASS I PER MIL-C-5541.



.094
.090 THRU
4-40 UNC-2B
4 HOLES
⊕ Z .006 DIA
2.122 BSC
1.340
1.610
1.935 R
3 PLACES
2.680
.125 R
7 PLACES
1.290
2.122 BSC
1.740
1.380
2.122
2.122
⊙ Z .005 DIA
.025
.060
45°
-Z-
3.939
3.935 DIA
3.440
DIA
4.460
DIA
3.990
3.985 DIA
3.942
3.940 DIA
.060
.005 R. MAX
5°
.06 R
.074
.079
.255
.258

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON		
2 PLACE DECIMALS	3 PLACE DECIMALS	ANGLES
± .01	± .005	± .5°

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 5

APPROVAL 11 OCT 66

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.

DRAWN D.J. Schutz DATE 6/20/66
CHECKED Ed Foster 7 OCT 66
APPROVAL 10 OCT 66
CONTRACT NAS9-497
NASA APPROVAL
CCB APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SEAT,
TELESCOPE COVER

SIZE	CODE IDENT NO.	
D	99974	1008495

SCALE 2.1 SHEET 1 OF 1

NEXT ASSY	USED ON
APPLICATION	

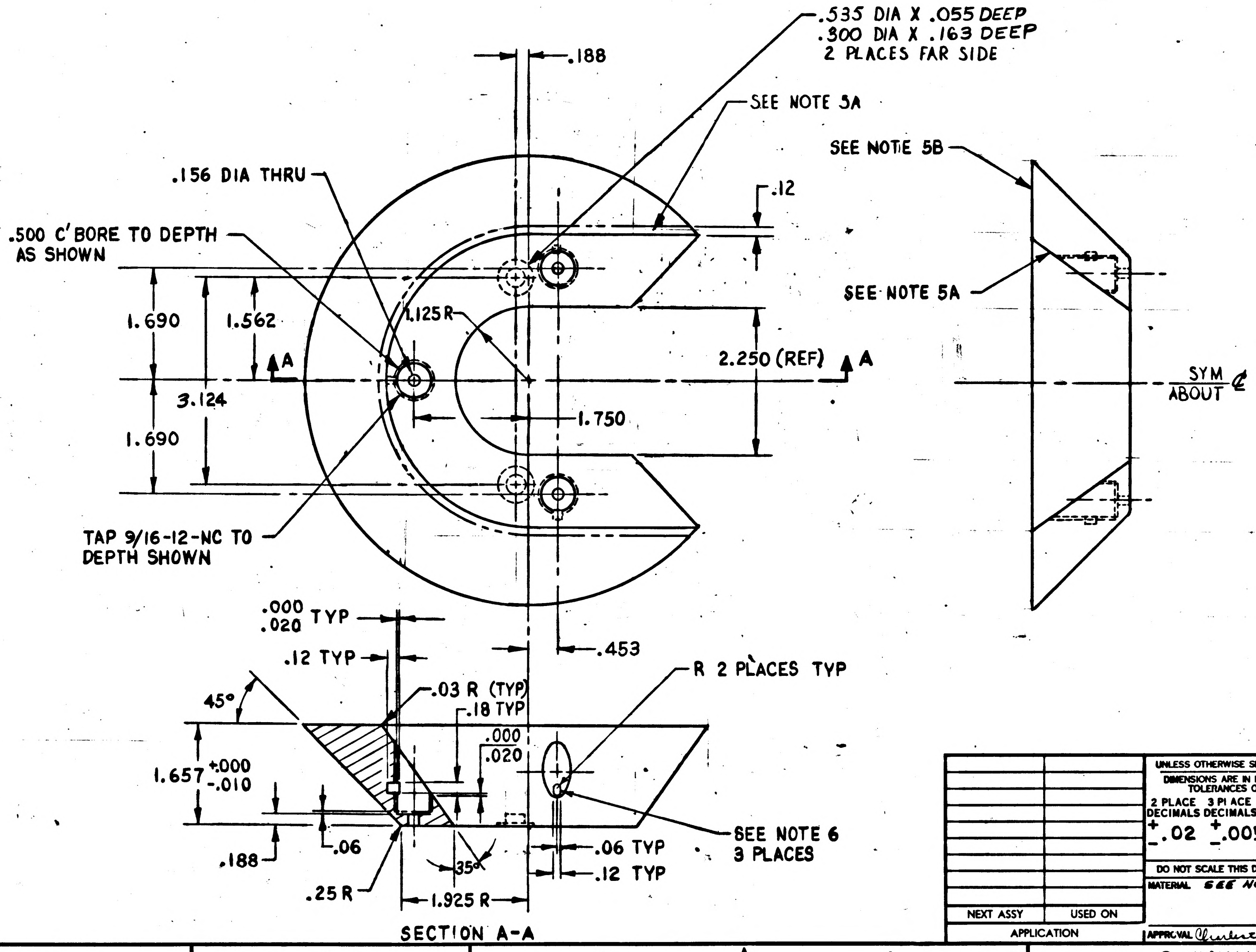
D1008495

A 1008496

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		INITIAL RELEASE CLASS A PER TDRR 32202		11/1/66	10/24/66

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. IDENTIFY USING DRAWING NUMBER PER ND 1002019.
3. MUST BE FREE FROM BURRS AND SHARP EDGES.
4. MATERIAL: PER 1008905-003
5. FINISH: SEALING AND PAINT REQUIREMENTS, APPLY SEALER ALL OVER PER ND1002328-001
   - A. APPLY BLACK COATING PER ND1002277 TO SPECIFIED SURFACES USING 1012543-001
   - B. APPLY GRAY COATING TO SPECIFIED SURFACES PER ND1002328-002, USING 1008910.
6. APPLY SILICONE RUBBER 1008906 IN AREA INDICATED IN ACCORDANCE WITH ND1002329-003 AFTER SEALING.



.188
.535 DIA X .055 DEEP
.300 DIA X .163 DEEP
2 PLACES FAR SIDE
SEE NOTE 5A
SEE NOTE 5B
.156 DIA THRU
.12
.500 C'BORE TO DEPTH AS SHOWN
SEE NOTE 5A
1.690
1.562
1.125 R
A
2.250 (REF)
A
SYM ABOUT ℄
3.124
1.690
1.750
TAP 9/16-12-NC TO DEPTH SHOWN
.000 .020 TYP
.453
.12 TYP
.03 R (TYP)
.18 TYP
R 2 PLACES TYP
45°
.000 .020
1.657 +.000 -.010
.06
.188
35°
.06 TYP
.12 TYP
SEE NOTE 6 3 PLACES
.25 R
1.925 R
SECTION A-A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ±.02 3 PLACE DECIMALS ±.005 ANGLES ±15'	AC ELECTRONICS DIVISION GENERAL MOTORS CORP. MILWAUKEE WIS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN J. Patterson DATE 6 OCT 66 CHECKED C. Piojo 7 OCT 66 APPROVAL L. Smith 11 OCT 66 CONTRACT NAS9-497	FILLET, PROTECTOR, TELESCOPE COVER
MATERIAL SEE NOTE 4	NASA APPROVAL	SIZE D CODE IDENT NO. 99974 1008496
APPROVAL Charleston 11 OCT 66	AC APPROVAL	SCALE 1:1 SHEET 1 OF 1

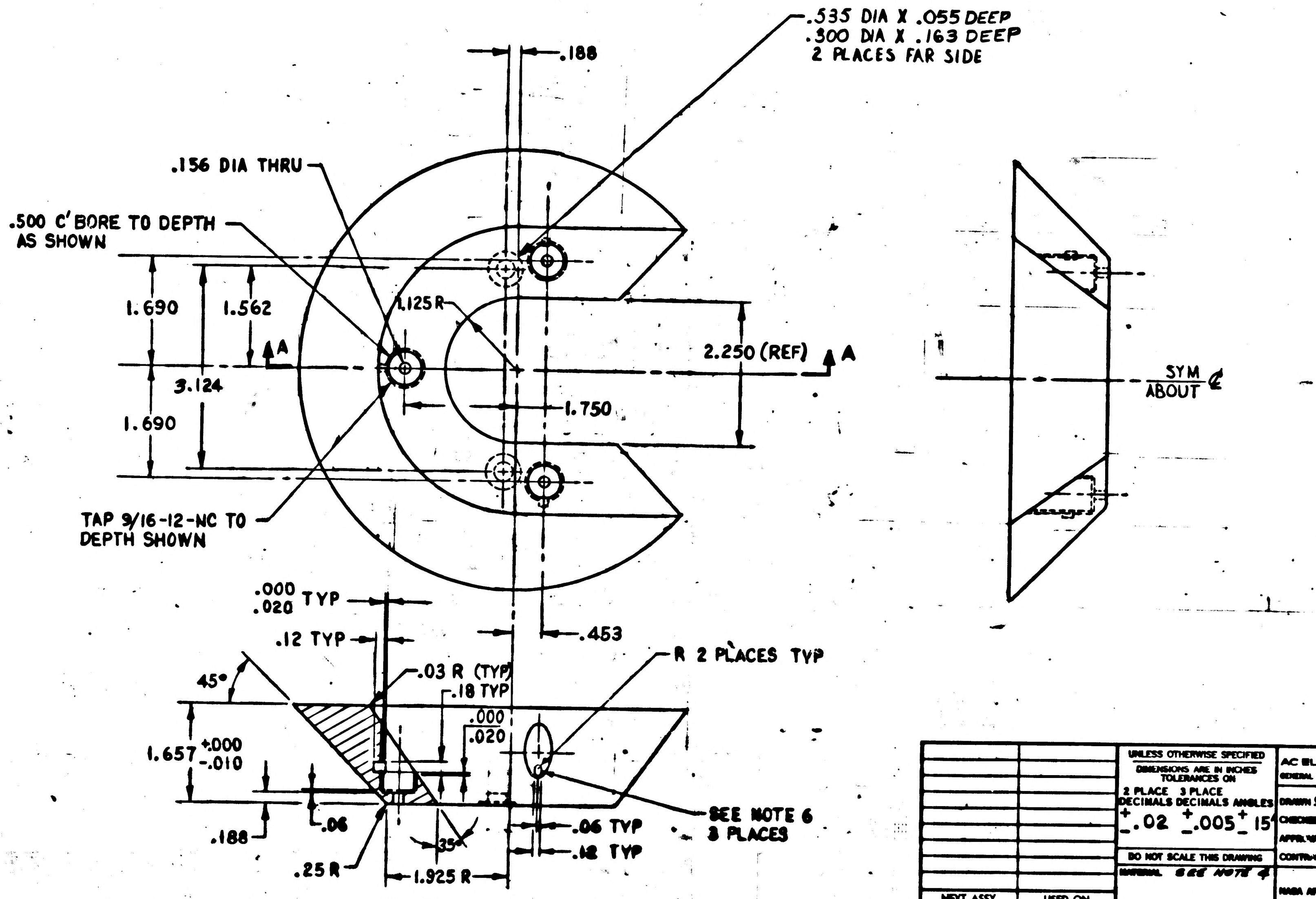
NEXT ASSY	USED ON
APPLICATION	

B 1008496

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		INITIAL RELEASE CLASS A PER TDRR 32202		11/1/66	
B		REVISED PER TDRR 33180		13 MAR 67	JC

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. IDENTIFY USING DRAWING NUMBER PER ND 1002019.
3. MUST BE FREE FROM BURRS AND SHARP EDGES.
4. MATERIAL: PER 1008905-003
5. FINISH: APPLY SEALER ALL OVER PER ND 1002328-001.
6. APPLY SILICONE RUBBER 1008906 IN AREA INDICATED IN ACCORDANCE WITH ND 1002329-003 AFTER SEALING.



.535 DIA X .055 DEEP
.300 DIA X .163 DEEP
2 PLACES FAR SIDE
.188
.156 DIA THRU
.500 C'BORE TO DEPTH AS SHOWN
1.690
1.562
1.125 R
A
3.124
1.690
2.250 (REF)
A
1.750
TAP 9/16-12-NC TO DEPTH SHOWN
SYM ℄ ABOUT
.000
.020 TYP
.12 TYP
.453
.03 R (TYP)
.18 TYP
.000
.020
R 2 PLACES TYP
45°
1.657 +.000 -.010
SEE NOTE 6 3 PLACES
.188
.06
.06 TYP
.12 TYP
35°
.25 R
1.925 R

SECTION A-A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON

2 PLACE DECIMALS	3 PLACE DECIMALS	ANGLES
±.02	±.005	±15'

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 4

APPROVAL

NEXT ASSY | USED ON

APPLICATION

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP. MILWAUKEE WIS.

DRAWN J. Patterson DATE 6 OCT 66
CHECKED C. Pirola 7 OCT 66
APPROVED 11 OCT 66
CONTRACT NAS9-497
NASA APPROVAL
AC APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FILLET, PROTECTOR, TELESCOPE COVER

SIZE D
CODE IDENT NO. 99974
1008496
SCALE :
SHEET OF

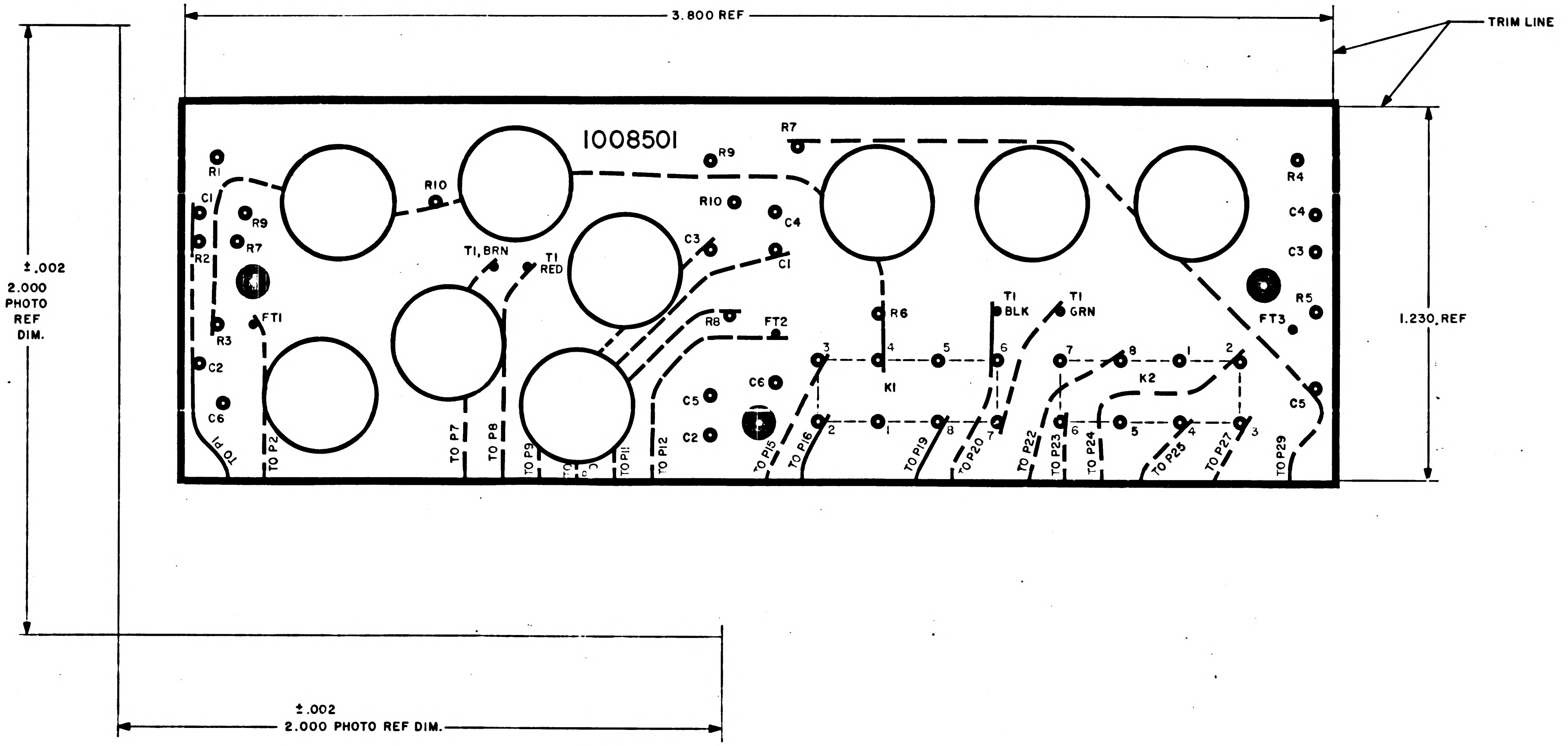
11 OCT 66

1008496

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 13094

S.M	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16626	26 FEB 65	A.N.


3.800 REF
TRIM LINE
1008501
±.002
2.000
PHOTO
REF
DIM.
1.230 REF
±.002
2.000 PHOTO REF DIM.
R1
C1
R9
R7
R2
FT1
R3
C2
C6
R10
T1, BRN
T1
RED
C3
R9
R10
C4
C1
R8
FT2
C5
C6
C2
R7
R6
K1
T1
BLK
T1
GRN
K2
R4
C4
C3
R5
FT3
C5
TO P1
TO P2
TO P7
TO P8
TO P9
TO P11
TO P12
TO P15
TO P16
TO P19
TO P20
TO P22
TO P23
TO P24
TO P26
TO P27
TO P29
1
2
3
4
5
6
7
8

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIMLINE.
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO
CONTRACT
DRAWN W. Horgan DATE 8-18-64
CHECKED [illegible]
APPROVAL [illegible] 22 Sep 64
APPROVAL [illegible] 29 Sep 64
NASA APPROVAL [illegible] 9-29-64
MIT APPROVAL [illegible] 29 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER WIRING BOARD TOP

CDU RESOLVER LOADS

CODE IDENT NO —
SIZE D
NASA DRAWING NO. 1008500
SCALE 5:1
WT —
SHEET 1 OF 1

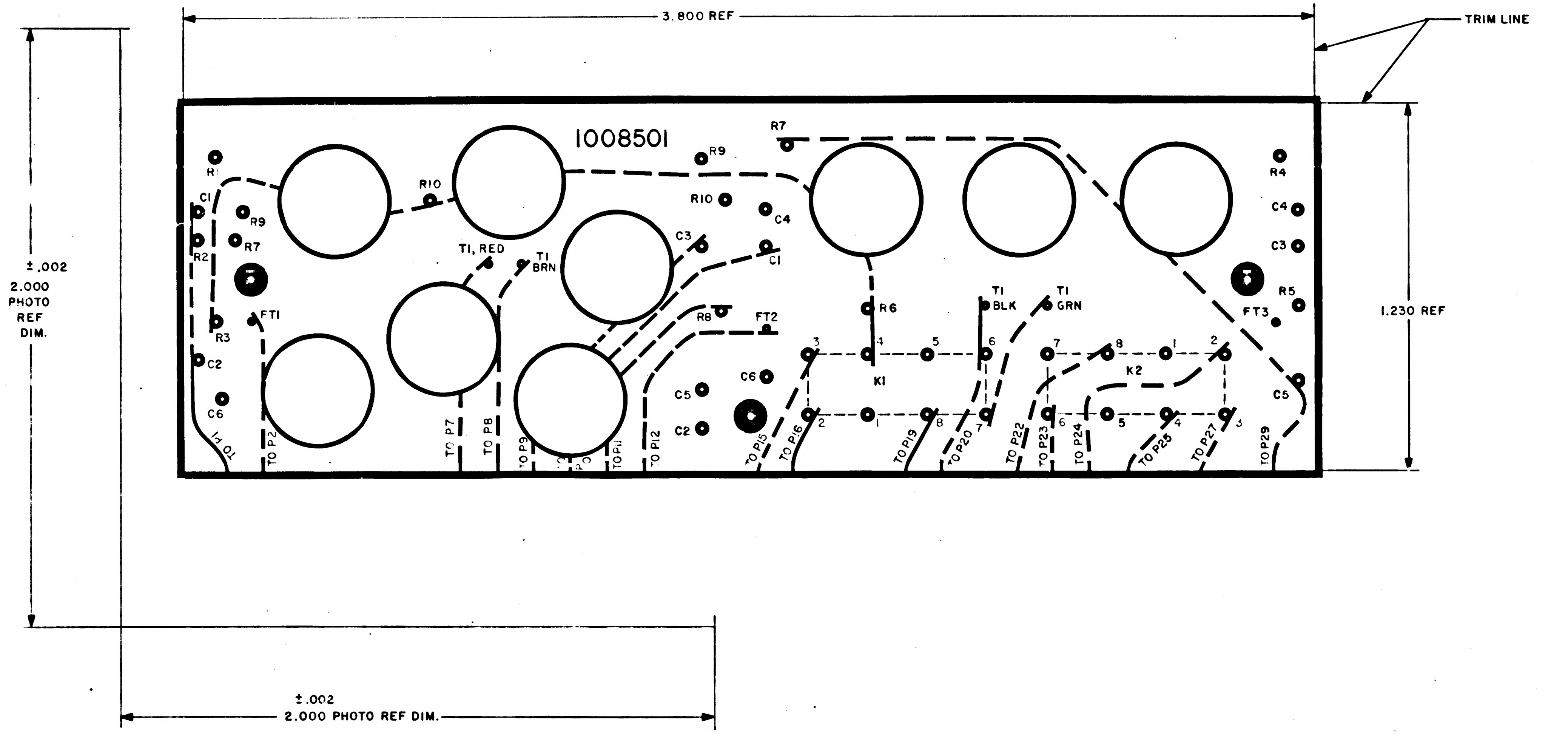
1008500 A

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 15097

3-17-65 HG

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16626	26 FEB 65	A.N.
B	REVISED PER TDRR 18542	27 APR 65	A.N.


3.800 REF
TRIM LINE
1008501
R1
C1
R9
R2
R7
FT1
R3
C2
C6
TO P1
TO P2
R10
T1, RED
T1 BRN
TO P7
TO P8
TO P9
TO P10
TO P11
C3
R9
R10
C4
C1
R8
FT2
TO P12
C5
C2
C6
TO P15
TO P16
R7
R6
T1 BLK
T1 GRN
K1
3
4
5
6
2
1
8
7
TO P19
TO P20
K2
7
8
1
2
6
5
4
3
TO P22
TO P23
TO P24
TO P25
TO P27
TO P29
R4
C4
C3
R5
FT3
C5
1.230 REF
±.002
2.000
PHOTO
REF
DIM.
±.002
2.000 PHOTO REF DIM.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIMLINE.
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS — ANGLES —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN W. Horgan DATE 8-18-64
CHECKED [illegible]
APPROVAL [illegible] 22 [illegible]
APPROVAL [illegible] 21 Aug 64
NASA APPROVAL [illegible]
MIT APPROVAL W Kyffe 25 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER WIRING BOARD TOP

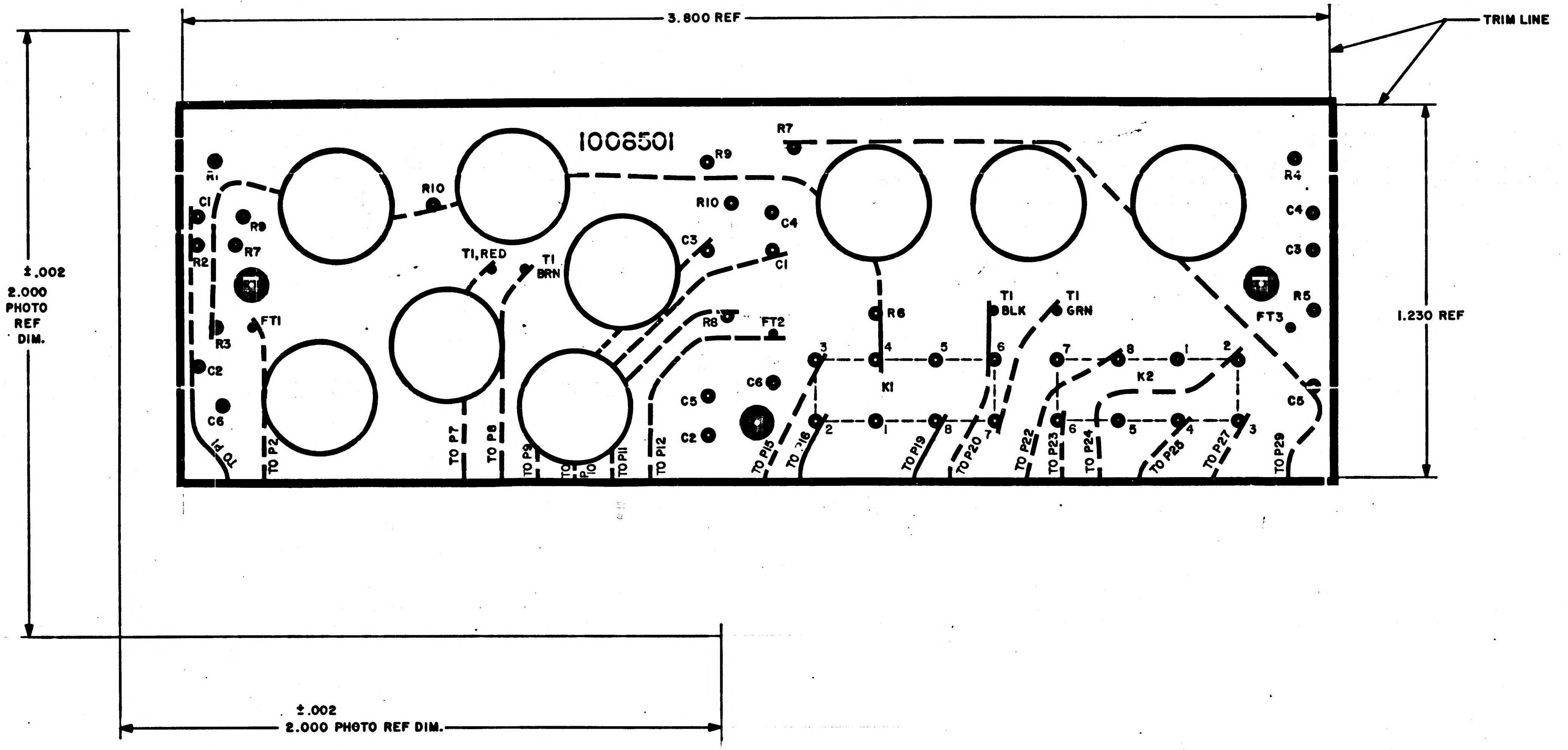
CDU RESOLVER LOADS

CODE IDENT NO —
SIZE D
NASA DRAWING NO. 1008500
SCALE 5:1
WT —
SHEET 1 OF 1

1008500 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13094			
SYM	DESCRIPTION	DATE	APPROVAL


3.800 REF
TRIM LINE
±.002
2.000
PHOTO
REF
DIM.
1.230 REF
±.002
2.000 PHOTO REF DIM.
1008501
R1
C1
R9
R7
R2
FT1
R3
C2
C6
R10
T1, RED
T1
BRN
C3
R9
R10
C4
C1
R8
FT2
C5
C6
C2
R7
R6
T1
BLK
T1
GRN
K1
K2
R4
C4
C3
R5
FT3
C5
1
2
3
4
5
6
7
8
TO P1
TO P2
TO P7
TO P8
TO P9
TO P10
TO P11
TO P12
TO P15
TO P16
TO P19
TO P20
TO P22
TO P23
TO P24
TO P25
TO P27
TO P29

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIMLINE.
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN W. Horgan DATE 8-18-64
CHECKED [illegible]
APPROVAL E. F. [illegible] Sept 64
APPROVAL D. G. [illegible] 29 Sept 64
NASA APPROVAL W. J. [illegible] 9-29-64
MIT APPROVAL W. [illegible] 29 Sept 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER WIRING BOARD TOP
CDU RESOLVER LOADS

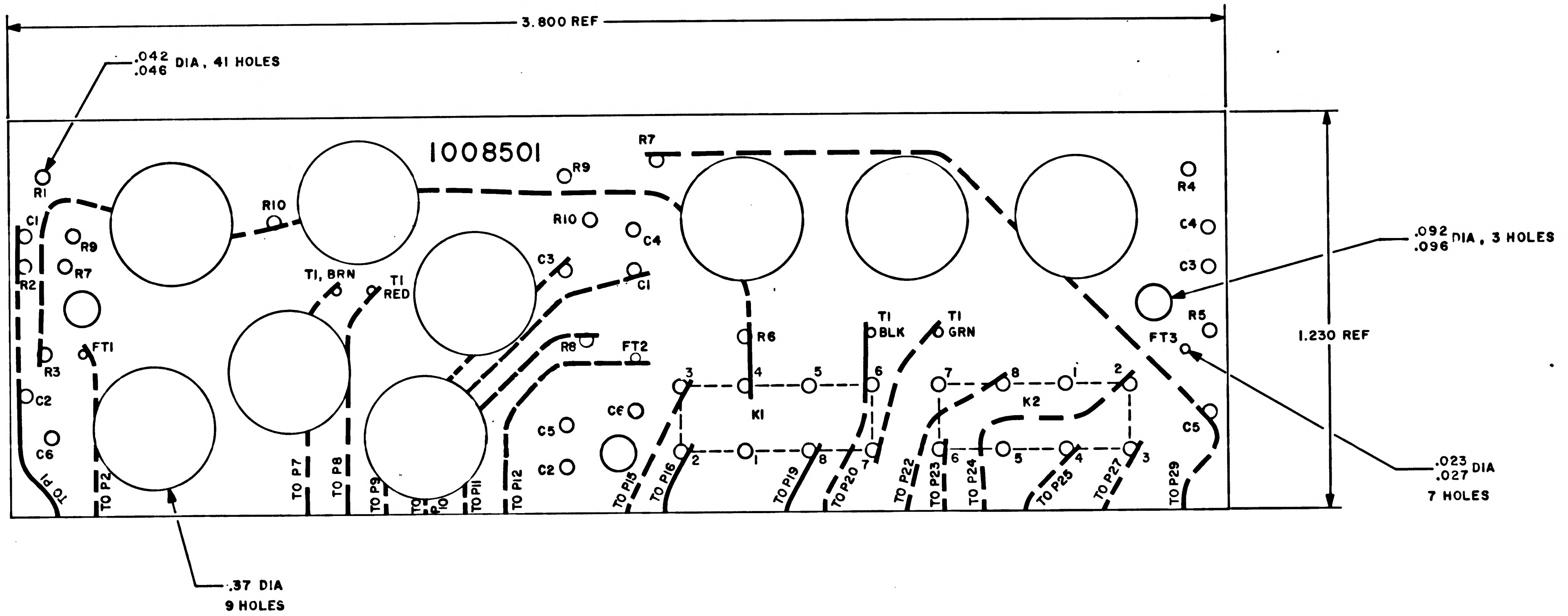
CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008500
SCALE 5:1
WT —
SHEET 1 OF 1

INCHES

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 13094

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16626	26 FEB 65	AA



3.800 REF
.042
.046 DIA, 41 HOLES
1008501
R1
C1
R2
R9
R7
R3
FT1
C2
C6
TO P1
TO P2
R10
T1, BRN
T1 RED
TO P7
TO P8
TO P9
TO P10
TO P11
TO P12
R9
R10
R7
C4
C3
C1
R8
FT2
C5
C6
C2
TO P15
TO P16
R6
K1
T1 BLK
T1 GRN
K2
1
2
3
4
5
6
7
8
TO P19
TO P20
TO P22
TO P23
TO P24
TO P25
TO P27
TO P29
R4
C4
C3
R5
FT3
C5
.092
.096 DIA, 3 HOLES
1.230 REF
.023
.027 DIA
7 HOLES
.37 DIA
9 HOLES

1008501 A

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 10020:9

REF DRAWING
DWG NO. 1008500 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
10075.0	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN W. Horgan DATE 8-11-64
CHECKED [illegible] 24-64
APPROVAL [illegible] 22 Sept 64
APPROVAL [illegible] 9/22/64
NASA APPROVAL [illegible] 9-25-64
MIT APPROVAL [illegible] 25 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD TOP
CDU RESOLVER LOADS

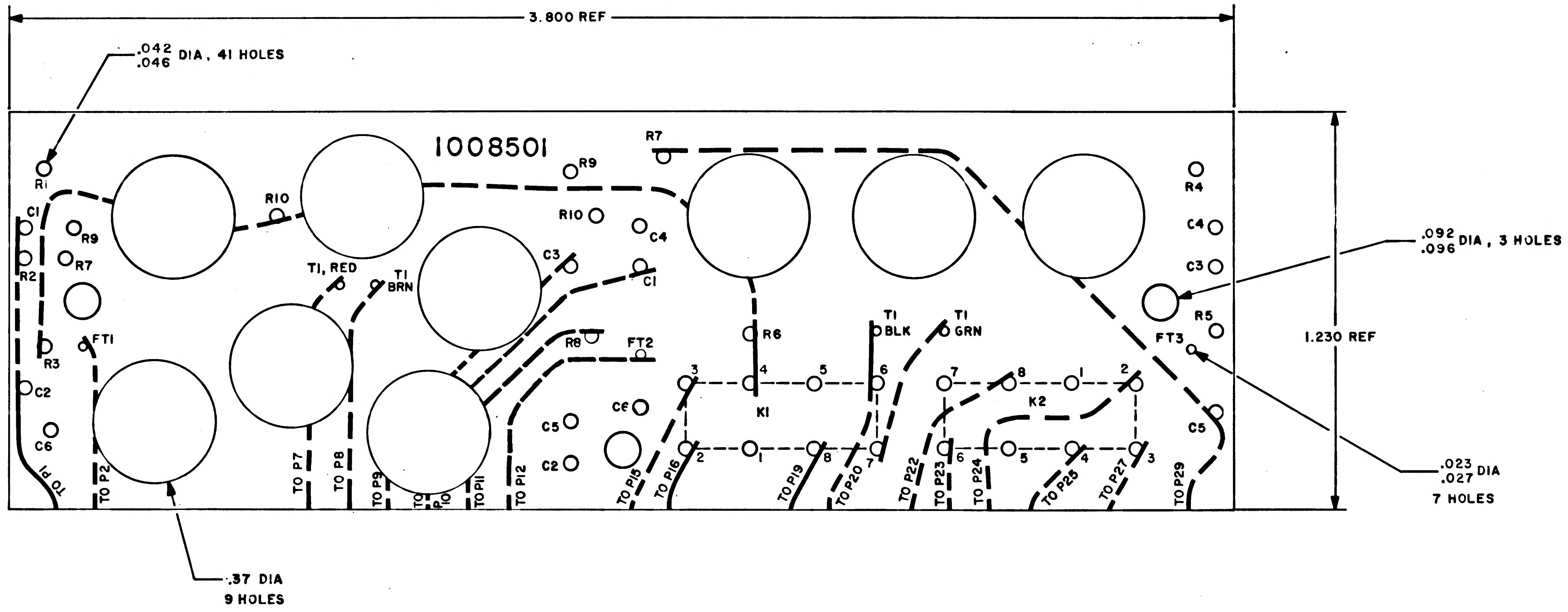
CODE IDENT NO	SIZE	NASA DRAWING NO.
—	D	1008501

SCALE 5:1 WT SHEET 1 OF 1

NOTICE - WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 13094

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16626	24 FEB 65	AN
B	REVISED PER TDRR 18542	27 APR 65	A.N.


3.800 REF
.042 .046 DIA, 41 HOLES
1008501
R1
R10
R9
R7
C1
R9
R7
R2
FT1
R3
C2
C6
TO P1
TO P2
R10
C4
C3
C1
T1, RED
T1 BRN
R8
FT2
C5
C2
C6
TO P7
TO P8
TO P9
TO P10
TO P11
TO P12
R6
T1 BLK
T1 GRN
K1
K2
TO P15
TO P16
TO P19
TO P20
TO P22
TO P23
TO P24
TO P25
TO P27
TO P29
R4
C4
C3
R5
FT3
C5
.092 .096 DIA, 3 HOLES
1.230 REF
.023 .027 DIA 7 HOLES
.37 DIA 9 HOLES

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND 1002019

REF DRAWING
DWG NO. 1008500 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007510	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN W. Horgan DATE 8-11-64
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

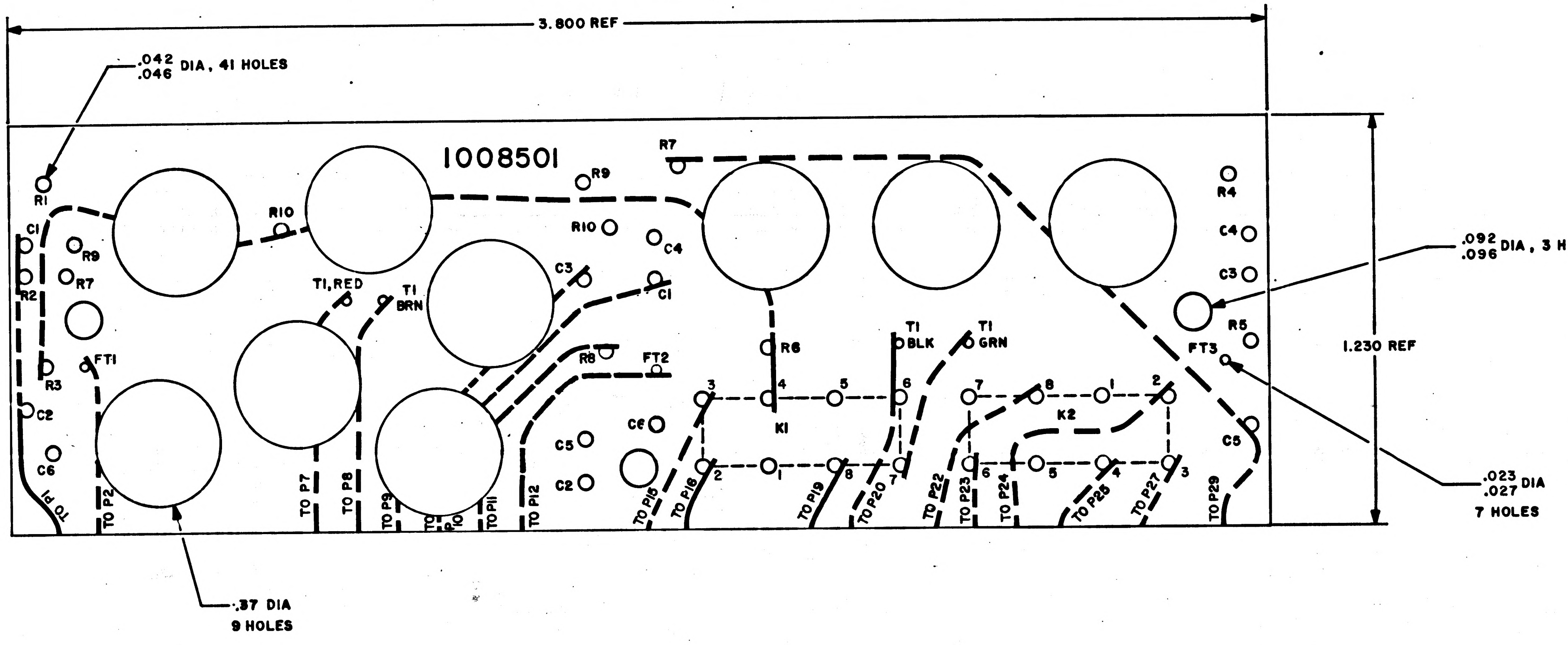
WIRING BOARD TOP
CDU RESOLVER LOADS

CODE IDENT NO 80230
SIZE D
NASA DRAWING NO. 1008501
SCALE 5:1
WT
SHEET 1 OF 1

1008501 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13094			
SYM	DESCRIPTION	DATE	APPROVAL


3.800 REF
.042
.046 DIA, 41 HOLES
1008501
R1
C1
R9
R7
R2
R3
FT1
C2
C6
TO P1
TO P2
R10
T1, RED
T1
BRN
TO P7
TO P8
TO P9
TO P10
TO P11
TO P12
C3
C1
R9
R10
C4
R7
R8
FT2
C5
C6
C2
R6
T1
BLK
T1
GRN
K1
K2
3
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TO P22
TO P23
TO P24
TO P25
TO P27
TO P29
R4
C4
C3
R5
FT3
C5
.092
.096 DIA, 3 HOLES
1.230 REF
.023
.027 DIA
7 HOLES
.37 DIA
9 HOLES

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

REF DRAWING
DWG NO. 1008500 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

1007510	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN W. Horgan DATE 8-11-64
CHECKED [illegible] 18 Aug 64
APPROVAL [illegible] 22 Sept 64
APPROVAL [illegible] 9/22/64
NASA APPROVAL W. J. [illegible] 9-29-64
MIT APPROVAL [illegible] 25 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD TOP
CDU RESOLVER LOADS

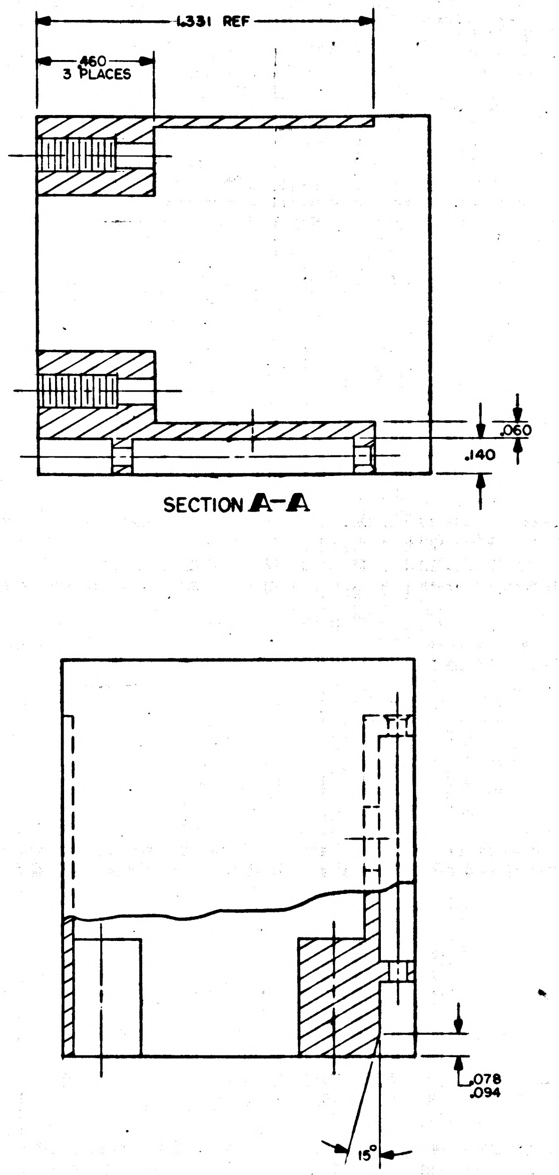
CODE IDENT NO.	SIZE	NASA DRAWING NO.
—	D	1008501
SCALE 5:1	WT	SHEET 1 OF 1

INCHES
0 1 2

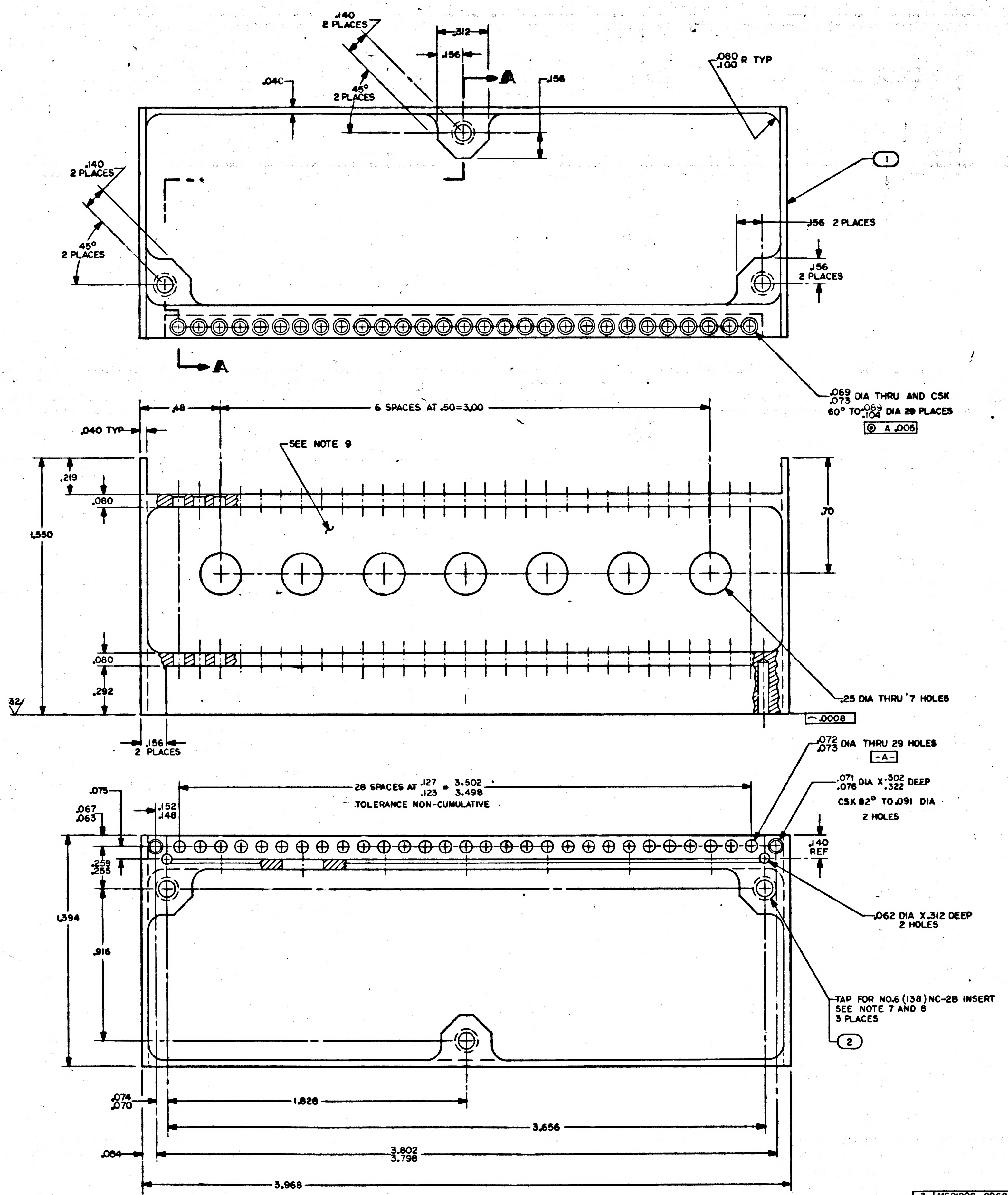
NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS 13094



1.331 REF
.460
3 PLACES
.060
.140
SECTION A-A
.078
.094
15°



.140
2 PLACES
.312
.156
45°
2 PLACES
.040
A
.156
.080
.100 R TYP
1
.140
2 PLACES
45°
2 PLACES
.156 2 PLACES
.156
2 PLACES
A
.069
.073 DIA THRU AND CSK
60° TO .063
.104 DIA 29 PLACES
◎ A .005
.48
6 SPACES AT .50=3.00
.040 TYP
SEE NOTE 9
.219
.080
1.550
.70
.080
.292
32
.25 DIA THRU 7 HOLES
⌒ .0008
.156
2 PLACES
.072
.073 DIA THRU 29 HOLES
-A-
.071
.076 DIA X .302
.322 DEEP
CSK 82° TO .091 DIA
2 HOLES
.075
.067
.063
.152
.148
28 SPACES AT .127
.123 = 3.502
3.498
TOLERANCE NON-CUMULATIVE
.140
REF
.259
.255
1.394
.916
.062 DIA X .312 DEEP
2 HOLES
TAP FOR NO.6 (138) NC-2B INSERT
SEE NOTE 7 AND 8
3 PLACES
2
.074
.070
1.828
3.656
3.802
3.798
.084
3.968

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5/QQ-M-31
3. FINISH: PLUG INSERT HOLES AND ANODIZE PER MIL-M-3171A TYPE IV
4. ALL SURFACES 125 UNLESS OTHERWISE SPECIFIED
5. REMOVE ALL BURRS AND BREAK SHARP EDGES .005/.015
6. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX
7. COAT THREADS AND FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. INSTALL FIND NO.2 PER MS33646. BREAK OFF DRIVING TANG
9. PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. MARK PER ND 1002019, LOCATE CENTRALLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
3	MS21209-C0620	INSERT, SCREW LOCKING	2
1	1008504-1	FRAME	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007510	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX .005
ANGLES ±1/2°
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2

HEAT TREATMENT —

FINAL FINISH SEE NOTE 3

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Mahoney DATE Aug 64
CHECKED E.P. June 23 '64
APPROVAL E.F. 28 Sept 64
APPROVAL D.A.

NASA APPROVAL W.J. 9-28-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

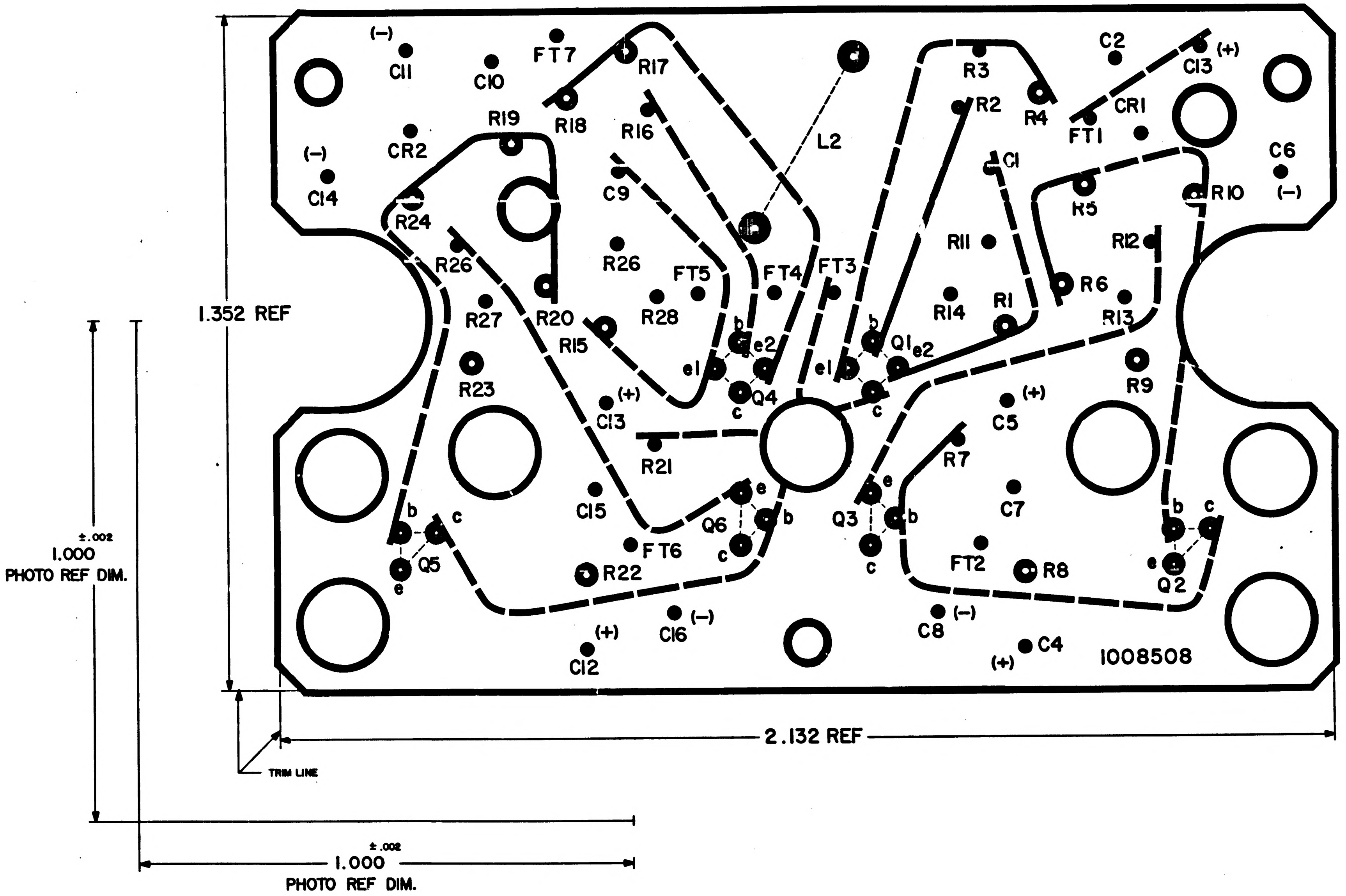
FRAME
CDU RESOLVER LOADS

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008504
SCALE 4/1
WT —
SHEET 1 OF 1

MASTER

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	ZONE	REVISIONS DESCRIPTION	DR	CHK	DATE	APPROVED


(−)
C11
C10
FT7
R17
R18
R19
R16
L2
R3
R2
R4
C2
C13
(+)
CR1
FT1
C6
(−)
(−)
C14
CR2
C9
C1
R5
R10
R24
R26
R26
FT5
FT4
FT3
R11
R12
R27
R20
R28
R14
R1
R6
R13
R15
b
e2
e1
Q4
c
b
Q1
e2
e1
c
R23
(+)
C13
R21
(+)
C5
R9
R7
b
c
e
b
C15
Q6
c
e
Q3
b
c
C7
b
c
Q5
e
FT6
R22
FT2
R8
e
Q2
(+)
C16
(−)
C8
(−)
C12
(+)
C4
1008508
1.352 REF
±.002
1.000
PHOTO REF DIM.
2.132 REF
TRIM LINE
±.002
1.000
PHOTO REF DIM.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± ——— DECIMALS ± ——— ANGLES ± ———
DO NOT SCALE THIS DRAWING
MATERIAL

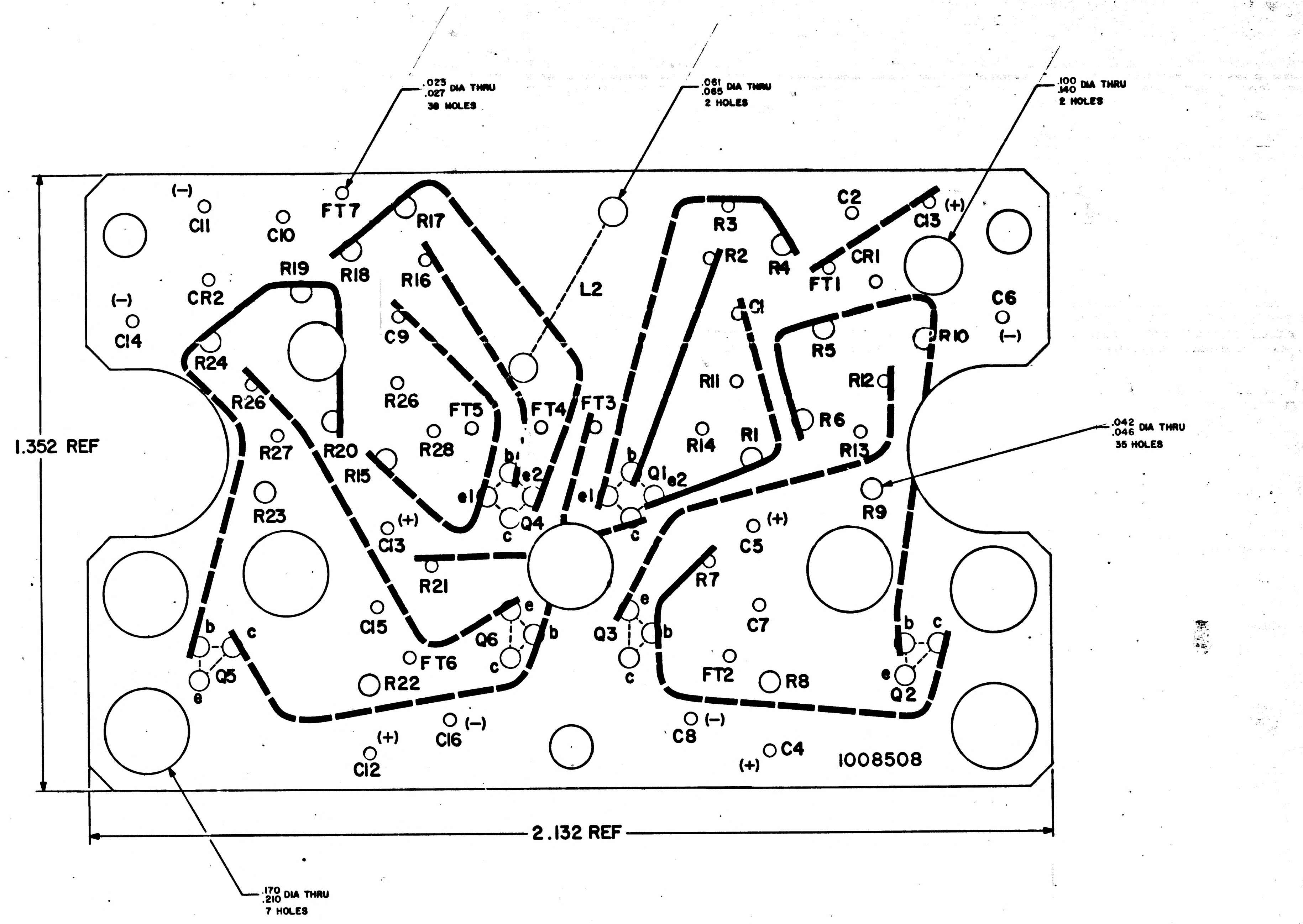
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J. Coombs 23 SEPT 64
CHECKED R.P. Kuga
APPROVED E.L. Sheridan 5 NOV 64
APPROVED D. Rotert 11-9-64
APPROVED MIT
APPROVED MSC 11-12-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD, BOTTOM
MODULATOR AND LOOP COMPENSATION

CODE IDENT NO. ———
SIZE E
DRAWING NO. 1008507
SCALE 10/1
SHEET 1 OF 1


.023 .027 DIA THRU
36 HOLES
.061 .065 DIA THRU
2 HOLES
.100 .140 DIA THRU
2 HOLES
.042 .046 DIA THRU
35 HOLES
.170 .210 DIA THRU
7 HOLES
1.352 REF
2.132 REF
(−)
C11
C10
FT7
R17
R18
R19
R16
L2
R3
R2
R4
C2
C13
(+)
CR1
FT1
C6
(−)
R10
(−)
C14
CR2
C9
C1
R5
R24
R26
R26
FT5
FT4
FT3
R11
R12
R6
R27
R20
R28
R14
R1
R13
R15
b
e2
b
Q1
e2
e1
e1
Q4
c
c
R9
R23
(+)
C13
(+)
C5
R21
R7
e
e
C15
Q6
b
Q3
b
C7
b
c
b
c
c
c
Q5
FT6
FT2
R8
e
Q2
e
R22
(+)
C16
(−)
C8
(−)
C4
C12
(+)
1008508

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

REF DRAWING
DWG NO. 1008507 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007511	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J. Crowley
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC

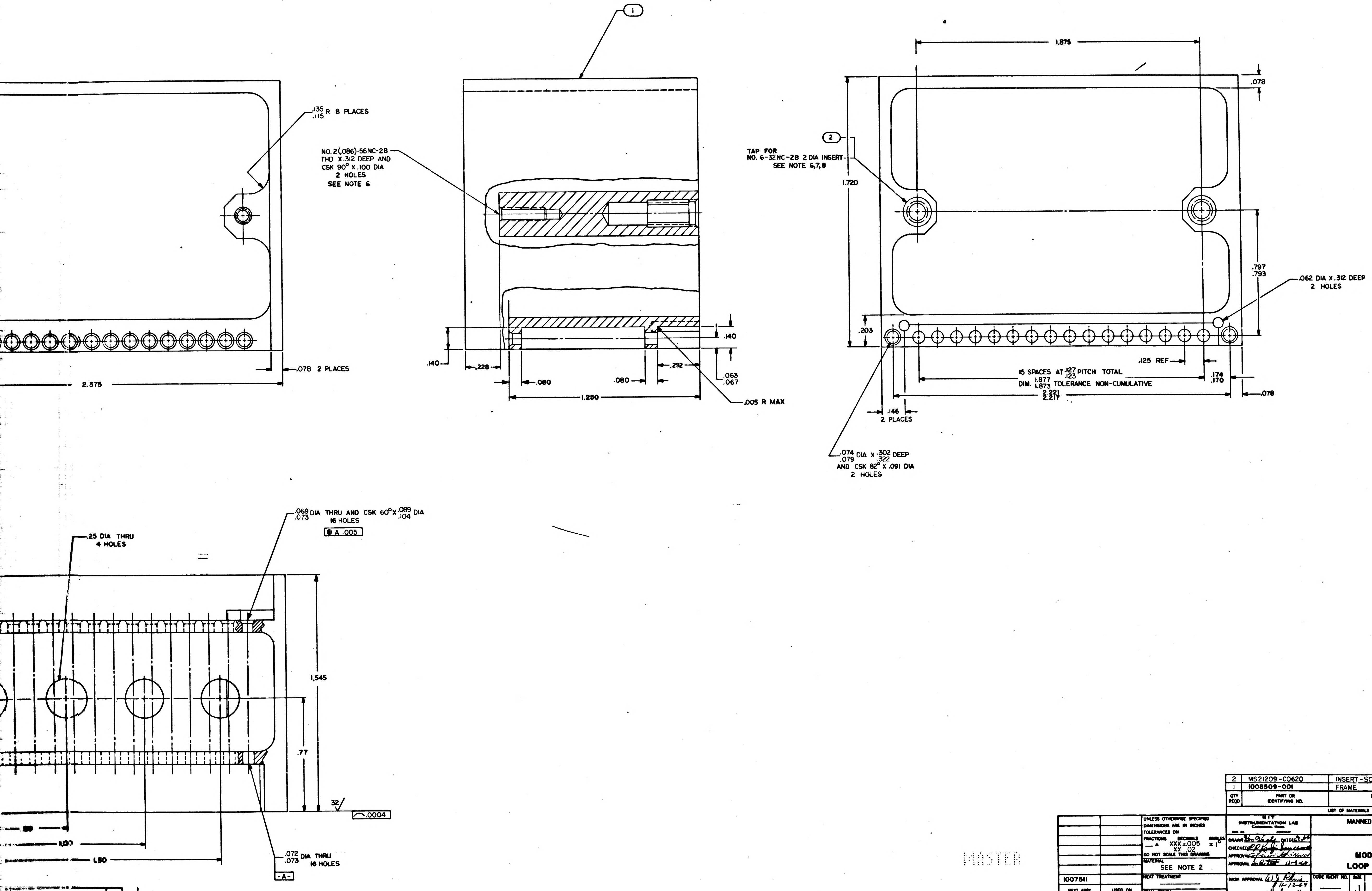
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD BOTTOM
MODULATOR AND LOOP COMPENSATION

SIZE E
DRAWING NO. 1008508

1008509

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL



①
.135
.115 R 8 PLACES
NO. 2(.086)-56NC-2B THD X .312 DEEP AND CSK 90° X .100 DIA 2 HOLES SEE NOTE 6
.078 2 PLACES
2.375
.140
.228
.080
.080
.292
1.250
.140
.063
.067
.005 R MAX
1.875
.078
②
TAP FOR NO. 6-32NC-2B 2 DIA INSERT- SEE NOTE 6,7,8
1.720
.797
.793
.062 DIA X .312 DEEP 2 HOLES
.203
.125 REF
15 SPACES AT .127 .123 PITCH TOTAL DIM. 1.877 1.873 TOLERANCE NON-CUMULATIVE
.174
.170
2.221
2.217
.078
.146 2 PLACES
.074 .079 DIA X .302 .322 DEEP AND CSK 82° X .091 DIA 2 HOLES
.069 .073 DIA THRU AND CSK 60° X .089 .104 DIA 16 HOLES
◉ A .005
.25 DIA THRU 4 HOLES
1.545
.77
32
⌒ .0004
1.00
1.50
.072 .073 DIA THRU 16 HOLES
-A-

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	MS21209-C0620	INSERT-SCREWTHD, LOCKING, CRES	2
1	1008509-001	FRAME	1

LIST OF MATERIALS

1007511	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — ± DECIMALS XXX ±.005 XX .02 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ———
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE
CHECKED
APPROVAL 5 Nov 64
APPROVAL 11-9-64
NASA APPROVAL 11-12-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
MODULATOR AND
LOOP COMPENSATION

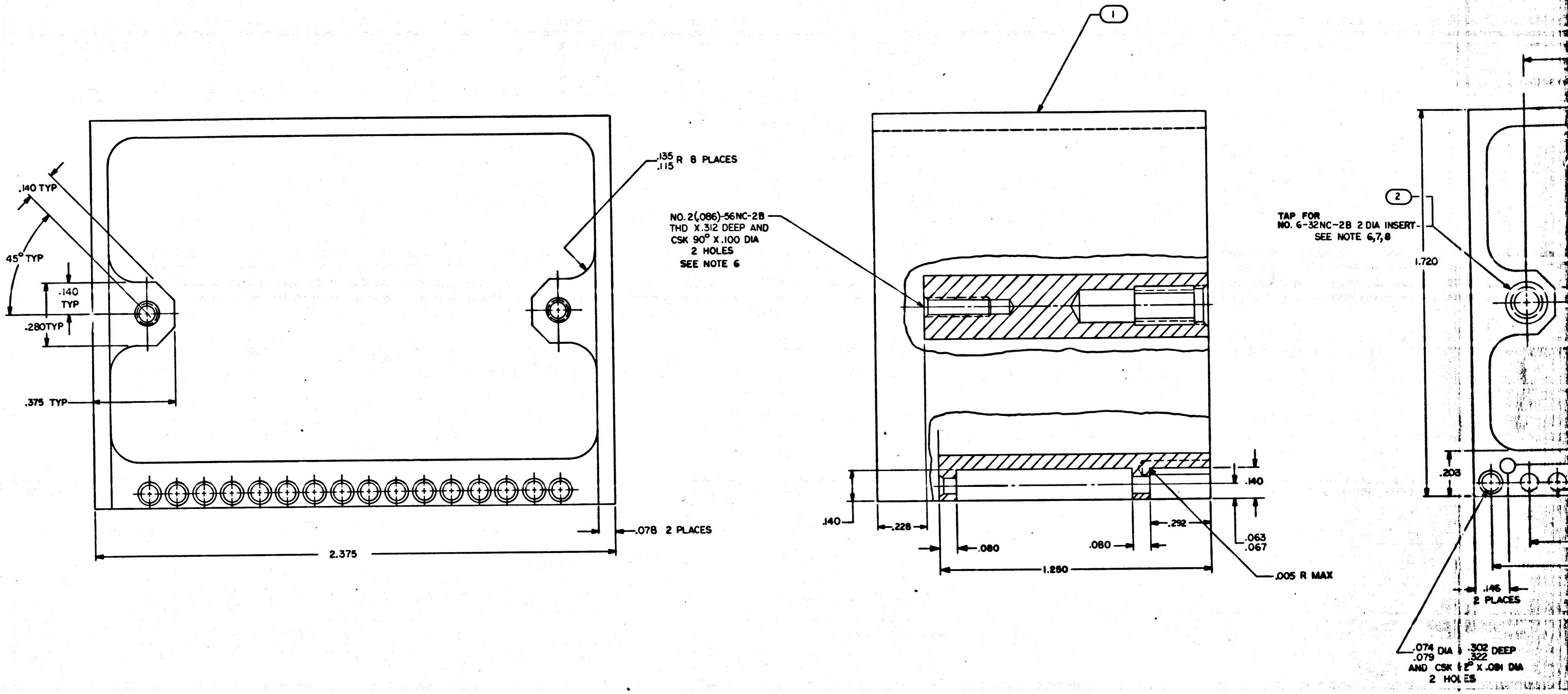
CODE IDENT NO. ——— SIZE J NASA DRAWING NO. 1008509
SCALE 5/1 WT ——— SHEET 1 OF 1

1008509

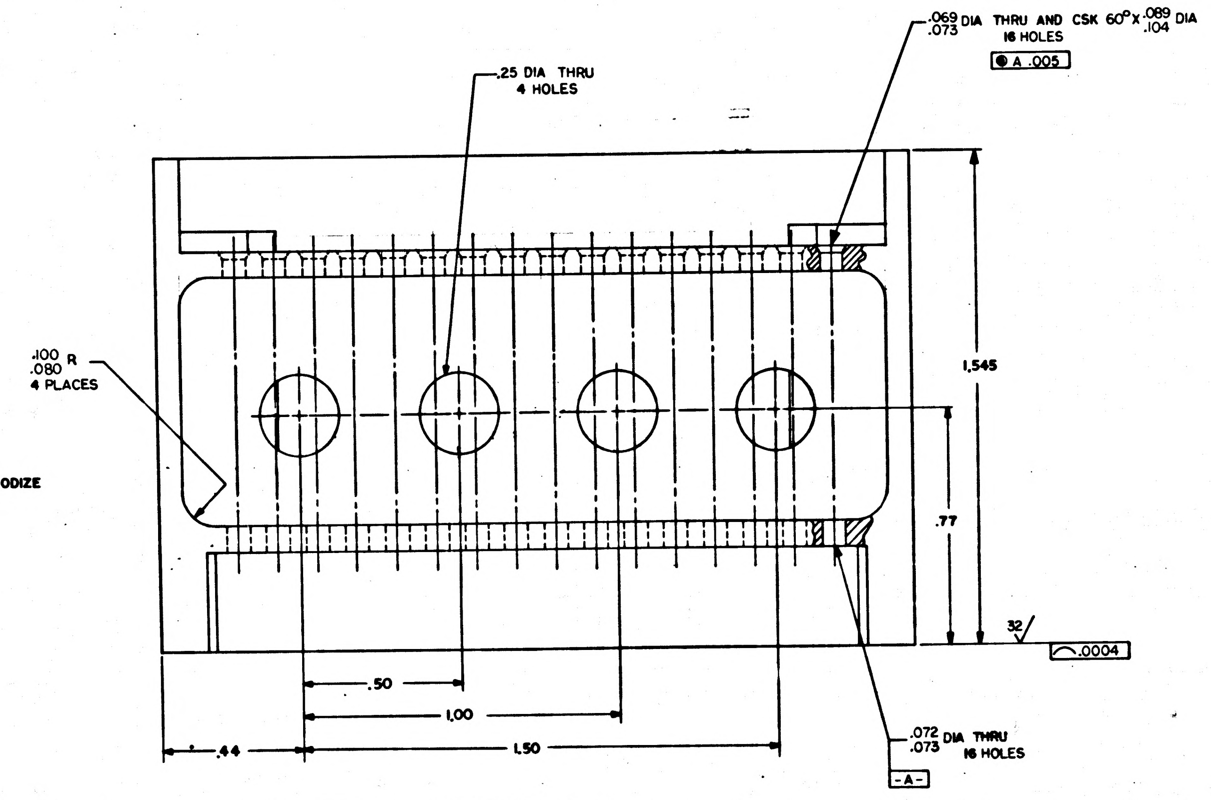
MASTER

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008509



.140 TYP
45° TYP
.140 TYP
.280TYP
.375 TYP
.135 .115 R 8 PLACES
.078 2 PLACES
2.375
①
NO. 2(.086)-56NC-2B THD X.312 DEEP AND CSK 90° X.100 DIA 2 HOLES SEE NOTE 6
.140
.228
.080
.080
.292
1.250
.140
.063 .067
.005 R MAX
②
TAP FOR NO. 6-32NC-2B 2 DIA INSERT- SEE NOTE 6,7,8
1.720
.203
.146 2 PLACES
.074 .079 DIA X .302 .322 DEEP AND CSK 82° X.081 DIA 2 HOLES



.25 DIA THRU 4 HOLES
.069 .073 DIA THRU AND CSK 60° X .089 .104 DIA 16 HOLES
● A .005
.100 .080 R 4 PLACES
1.545
.77
32
.0004
.50
1.00
.44
1.50
.072 .073 DIA THRU 16 HOLES
-A-

NOTES:

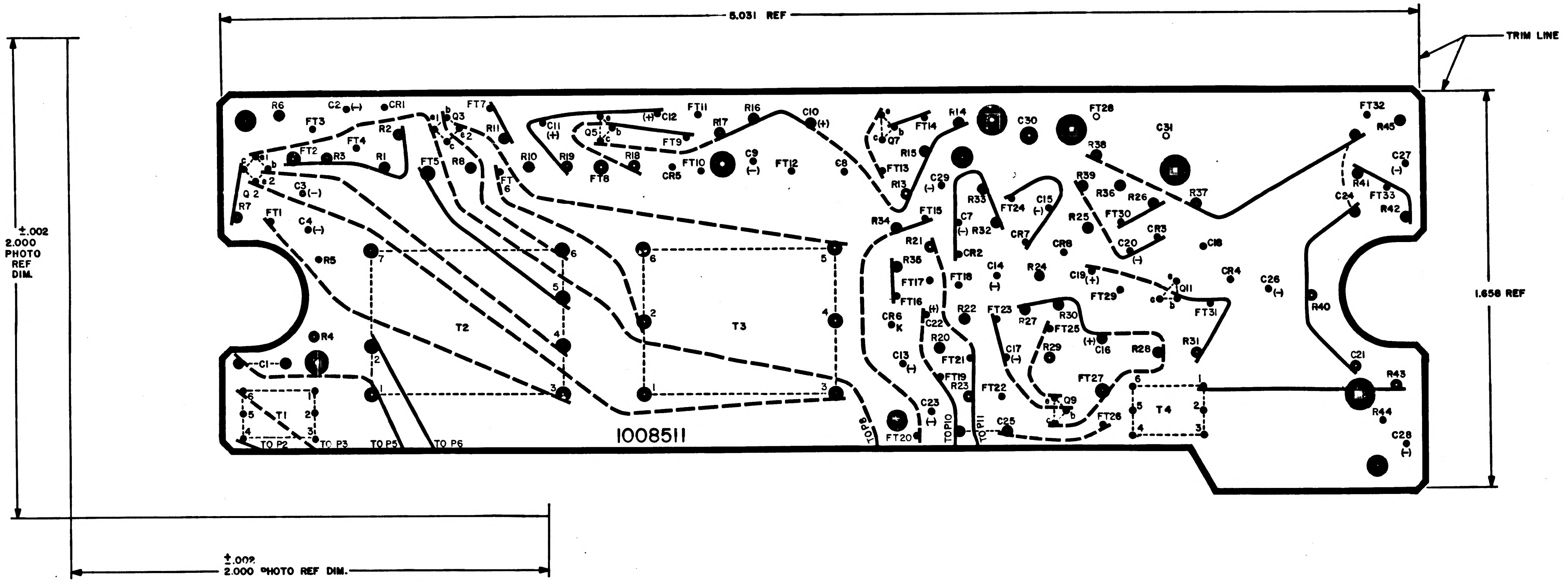
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5 PER QQ-M-31
3. REMOVE ALL BURRS AND BREAK SHARP EDGES .005/.015
4. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX
5. UNLESS OTHERWISE SPECIFIED 125√ ALL OVER
6. FINISH: ANODIZE PER MIL-M-3171A, TYPE IV. ALL THREADED HOLES TO BE FREE OF ANODIZE
7. INSTALL FIND NO. 2 PER MS33646, EXCEPT DIM. F TO BE .594, BREAK OFF DRIVING TANG
8. COAT THREADS AND FIND NO. 2 WITH MIL-P-8585, WET ZINC CHROMATE PRIMER
9. IDENTIFY PER ND 1002019

1008509

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1456

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15227			8 JAN 65	


5.031 REF
TRIM LINE
±.002
2.000
PHOTO
REF
DIM.
1.658 REF
±.002
2.000 PHOTO REF DIM.
1008511
T1
T2
T3
T4
TO P2
TO P3
TO P5
TO P6
TO P8
TO P10
TO P11
R1
R2
R3
R4
R5
R6
R7
R8
R10
R11
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R40
R41
R42
R43
R44
R45
C1
C2 (−)
C3 (−)
C4 (−)
C7 (−)
C8
C9 (−)
C10 (+)
C11 (+)
C12 (+)
C13 (−)
C14 (−)
C15 (−)
C16 (+)
C17 (−)
C18
C19 (+)
C20 (−)
C21
C22 (+)
C23 (−)
C24
C25
C26 (−)
C27 (−)
C28 (−)
C29 (−)
C30
C31
CR1
CR2
CR3
CR4
CR5
CR6 K
CR7
CR8
Q2
Q3
Q5
Q7
Q9
Q11
FT1
FT2
FT3
FT4
FT5
FT6
FT7
FT8
FT9
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FT11
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FT19
FT20
FT21
FT22
FT23
FT24
FT25
FT26
FT27
FT28
FT29
FT30
FT31
FT32
FT33

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.010 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN	J.K. Walsh	6 Oct 64
CHECKED	R. Lu Sonni	23 OCT 64
APPROVED	Russo	3 NOV 64
APPROVED	A.R. Foot	11-9-64
APPROVED MIT	W Kupfer	1 Dec 64
APPROVED MSC	W.J. Rhine	12-1-64
		DATE

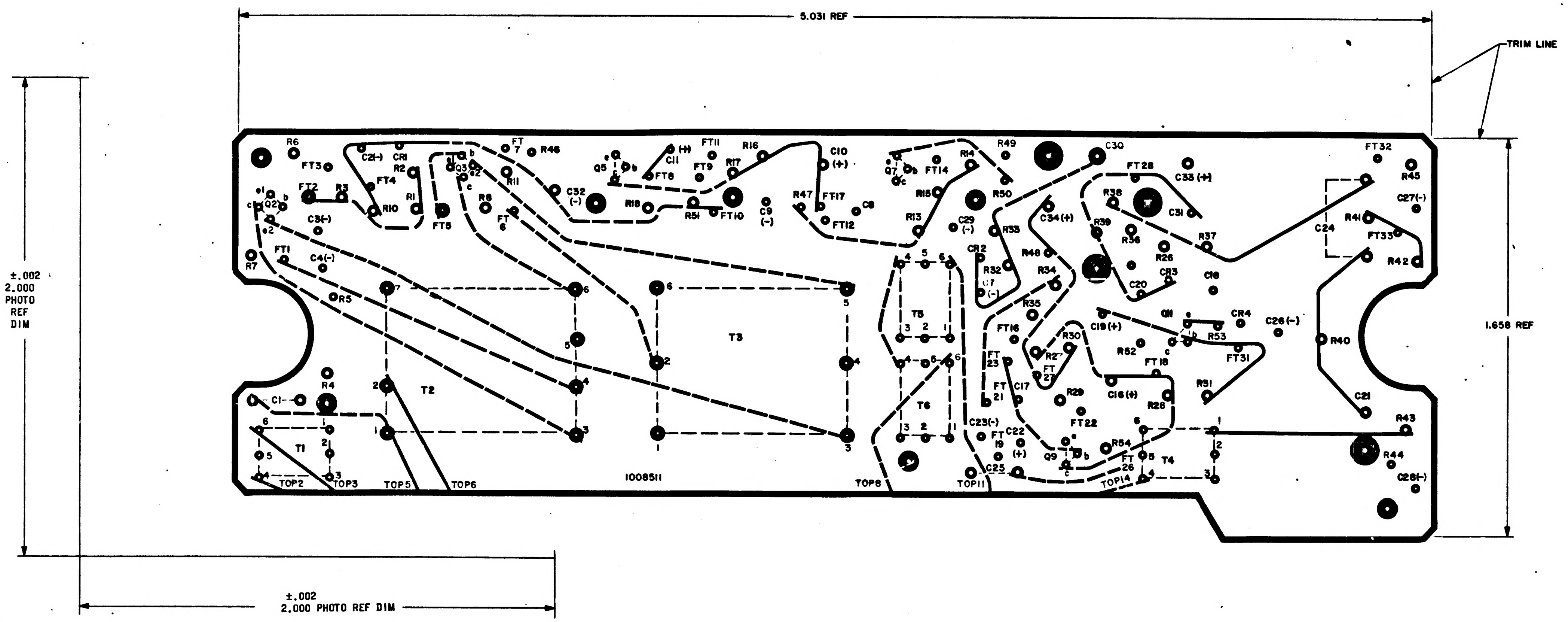
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD (TOP)
TRACKER Y CHANNEL

CODE IDENT NO.	SIZE	DRAWING NO.
—	E	1008510
SCALE 5/1		SHEET 1 OF 1

1008510 A

REVISIONS ~~20120~~					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20130	—	4 MAY 65	DKO W.C



5.031 REF
TRIM LINE
±.002
2.000
PHOTO
REF
DIM
1.658 REF
±.002
2.000 PHOTO REF DIM
R6
FT3
C2(-)
CR1
R2
FT4
R1
R10
FT2
R3
e1
c
Q2
b
e2
C3(-)
FT5
FT1
C4(-)
R7
R5
Q3
b
e2
c
R11
R8
FT 6
FT 7
R46
C32 (-)
Q5
e
b
c
C11
(+)
FT8
FT11
FT9
R17
R16
R18
R51
FT10
C9 (-)
C10 (+)
R47
FT17
C8
FT12
Q7
e
b
c
FT14
R14
R15
R13
R49
R50
C29 (-)
R33
C30
FT28
C33 (+)
R38
C31
C34(+)
R39
R36
R26
R37
CR2
R32
C7 (-)
R48
R34
C20
CR3
C18
R35
FT16
C19(+)
R30
R27
FT 27
Q11
e
b
c
R53
CR4
C26(-)
R52
FT18
FT31
FT 23
FT 21
C17
R29
C16(+)
R28
R31
FT22
C23(-)
FT 19
C22 (+)
Q9
e
b
c
R54
FT 26
T4
C25
TOP14
TOP11
TOP8
T5
T6
T3
T2
T1
R4
C1
TOP2
TOP3
TOP5
TOP6
1008511
FT32
R45
C27(-)
C24
R41
FT33
R42
R40
C21
R43
R44
C28(-)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

Ⓒ REPLACES REV(B)WITH CHANGE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + −
DECIMALS + .010 − .010
ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN [illegible] DATE 15 APR 65
CHECKED [illegible] 19 APR 65
APPROVAL [illegible] 20 APR 65
APPROVAL [illegible] 4/14/65
NASA APPROVAL [illegible] 6-15-65
MIT APPROVAL [illegible] 15 [illegible] 65

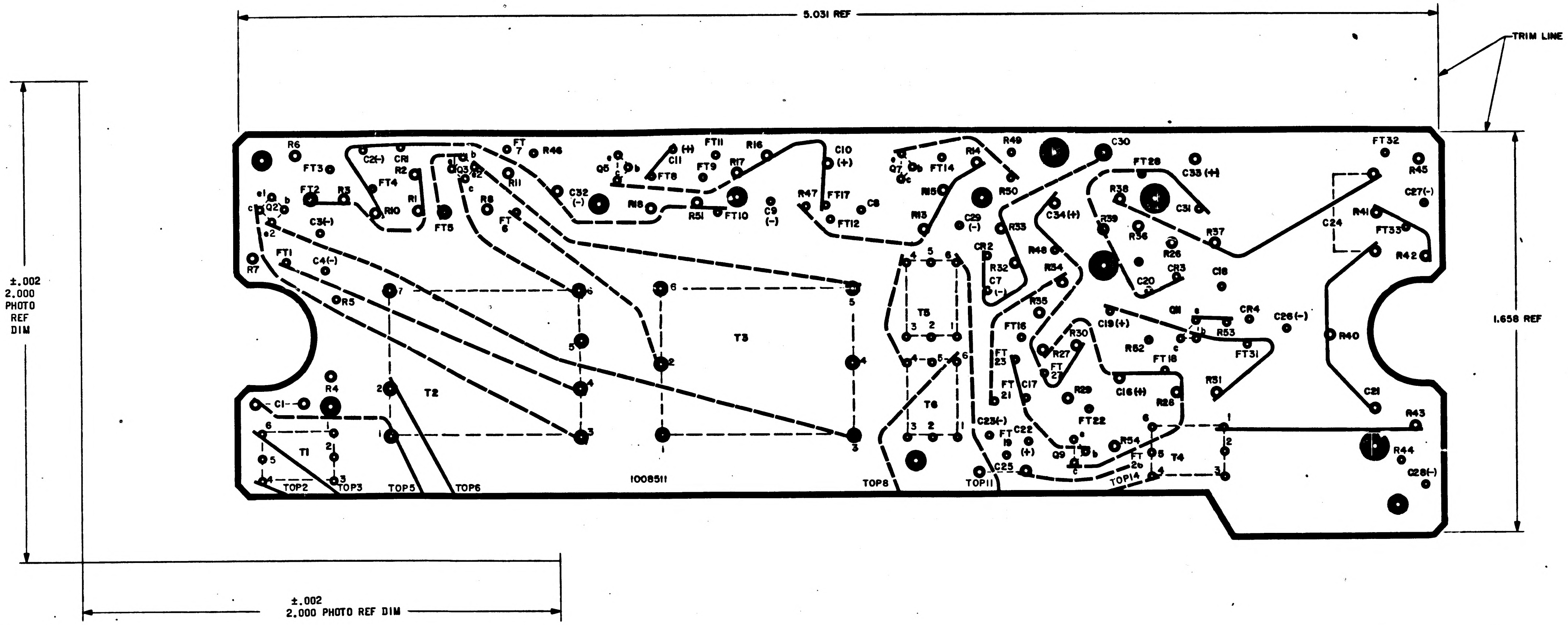
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD (TOP)
TRACKER "Y" CHANNEL

CODE IDENT NO. 80230
SIZE E
1008510
SCALE 5/1
SHEET 1 OF 1

1008510 C

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
C		REPLACES REVISION B WITH CHANGE PER TDRR 20,20	—	4 MAY 65	DHC WIC


5.031 REF
TRIM LINE
1.658 REF
±.002
2.000
PHOTO
REF
DIM
±.002
2.000 PHOTO REF DIM
T1
T2
T3
T4
T5
T6
1008511
TOP2
TOP3
TOP5
TOP6
TOP8
TOP11
TOP14
R6
FT3
C2(-)
CR1
R2
FT4
R10
R1
FT5
R9
R11
FT7
R46
C32(-)
Q5
C11
FT8
FT11
FT9
R16
R17
R18
R51
FT10
C9(-)
R47
FT17
FT12
C10(+)
C8
Q7
FT14
R14
R15
R13
R49
R50
C30
FT28
C33(+)
C31
R38
R39
R36
R26
R37
CR3
C18
C20
C34(+)
C29(-)
R33
CR2
R32
C7(-)
R48
R34
R35
FT16
R30
R27
FT27
C19(+)
Q11
CR4
C26(-)
R53
R52
FT18
FT31
C16(+)
R28
R29
FT22
R54
Q9
C17
FT21
FT23
C23(-)
C22(+)
FT19
C25
FT26
R51
FT32
R45
C27(-)
R41
FT33
C24
R42
R40
C21
R43
R44
C28(-)
R7
FT1
C4(-)
R5
Q2
FT2
R3
C3(-)
C1
R4
Q1
Q3

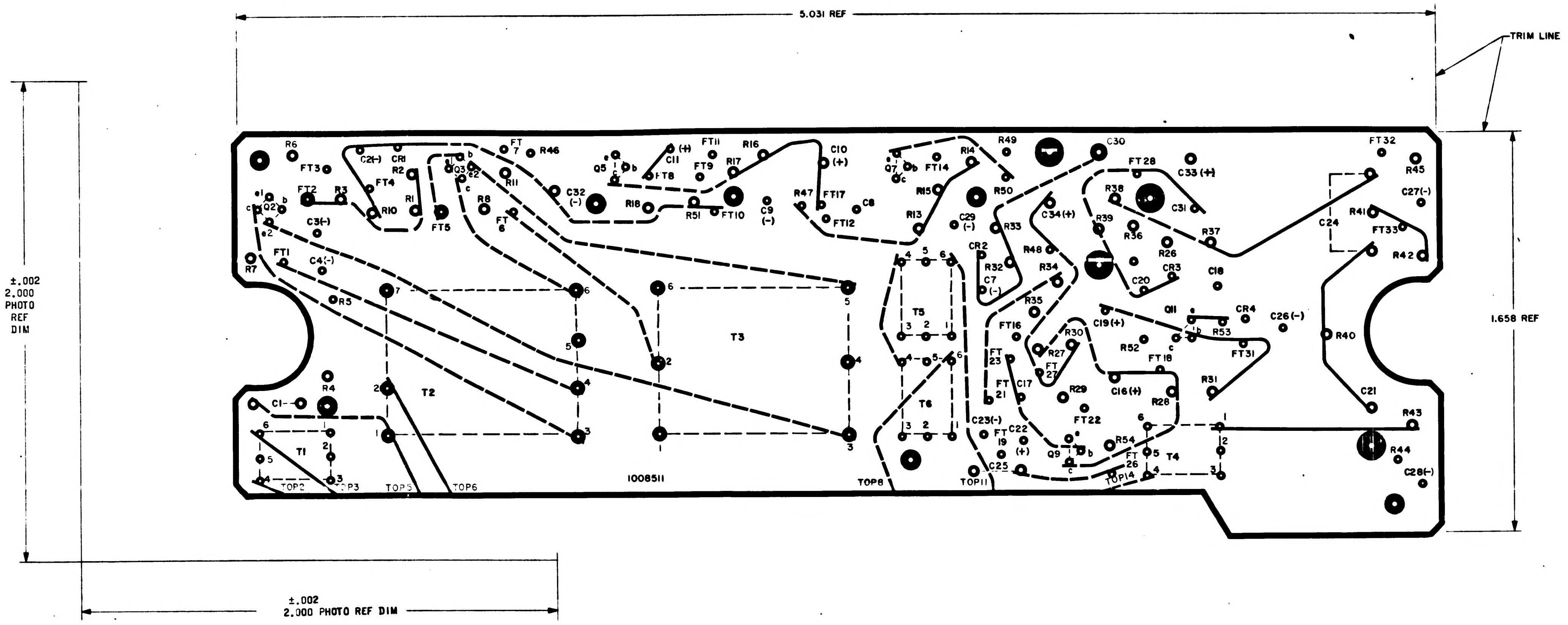
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

Ⓒ REPLACES REV(B)WITH CHANGE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS +.010 −.010 ANGLES + −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	ACSP PN	
DO NOT SCALE THIS DRAWING	DRAWN DATE 15APR CHECKED 19APR 65 APPROVAL 2 APR 65 APPROVAL 4/14/65	PHOTOGRAPHIC MASTER WIRING BOARD (TOP) TRACKER "Y" CHANNEL
MATERIAL	NASA APPROVAL 6-15-65 MIT APPROVAL 15 Jun 65	CODE IDENT NO. 80230 SIZE E 1008510
CONTRACT		SCALE 5/1 SHEET 1 OF 1

1008510 C

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	—	4 MAY 65	CKD
D		REVISED PER TDRR 21488	—	Aug 68	CKD



5.031 REF
TRIM LINE
1.658 REF
±.002 2.000 PHOTO REF DIM
±.002 2.000 PHOTO REF DIM
T1
T2
T3
T4
T5
T6
1008511
TOP2
TOP3
TOP5
TOP6
TOP8
TOP11
TOP14

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

Ⓒ REPLACES REV(B)WITH CHANGE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+.010	+
−	−.010	−

DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN [illegible] DATE 15 APR 65
CHECKED Udovich 19 APR 65
APPROVAL [illegible] 20 APR 65
APPROVAL [illegible] 4/14/65
NASA APPROVAL [illegible] 6-1-65
MIT APPROVAL [illegible]

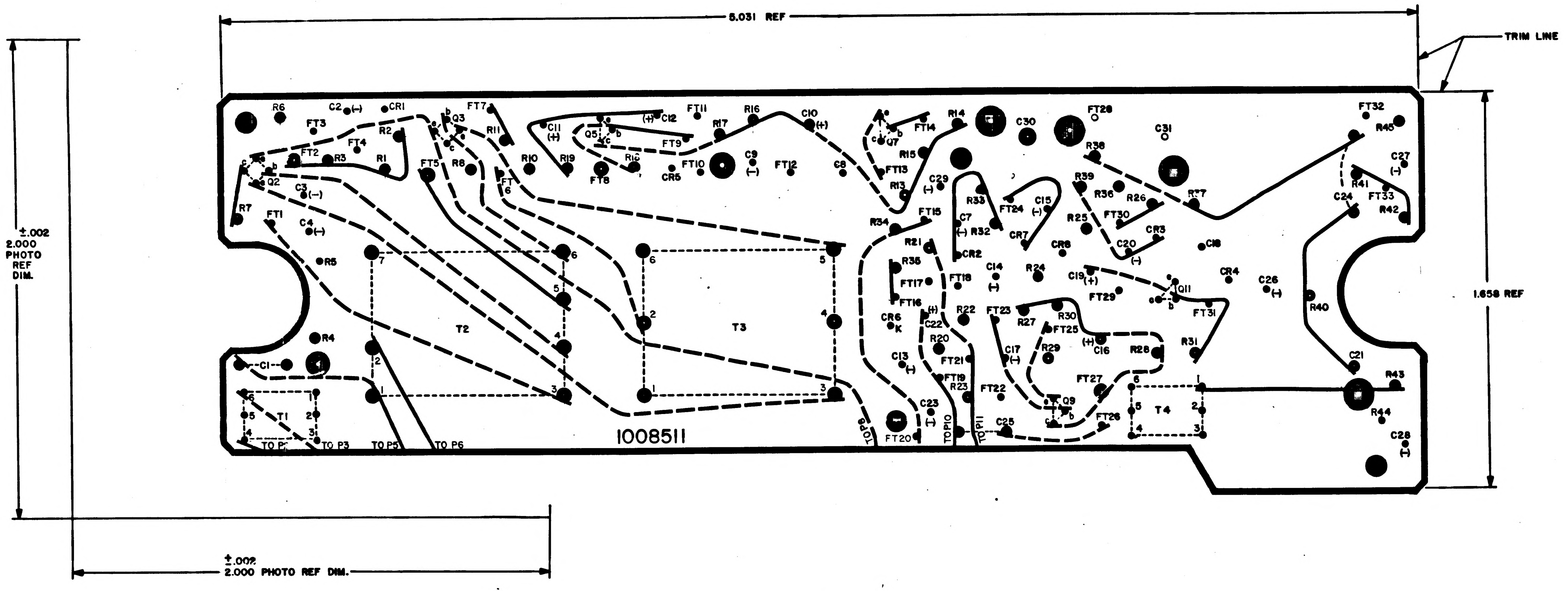
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD (TOP)
TRACKER "Y" CHANNEL

CODE IDENT NO 80230
SIZE E
1008510
SCALE 5/1
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



5.031 REF
TRIM LINE
±.002
2.000
PHOTO
REF
DIM.
1.658 REF
±.002
2.000 PHOTO REF DIM.
1008511
R6
C2 (–)
CR1
FT7
FT3
FT4
R2
R1
R3
FT2
Q2
b
c
e
Q3
R7
C3 (–)
FT1
C4 (–)
R5
R4
C1
T1
1 2 3 4 5 6
TO P2
TO P3
TO P5
TO P6
T2
1 2 3 4 5 6 7
T3
1 2 3 4 5 6
FT5
R8
R11
FT6
R10
R19
C11 (+)
Q5
(+) C12
FT9
FT8
R18
CR5
FT10
FT11
R17
R16
C9 (–)
FT12
C10 (+)
C8
Q7
FT13
R15
R13
FT14
R14
R34
FT15
C29 (–)
C7 (–)
R32
R33
CR2
R21
R35
FT17
FT16
CR6 K
C22 (+)
C13 (–)
R20
FT21
FT19
R23
C23 (–)
FT20
TO P8
TO P10
TO P11
FT18
C14 (–)
R22
FT23
FT22
C25
C30
FT24
C15 (–)
CR7
R24
R27
R30
FT25
R29
C17 (–)
FT28
R38
R39
R36
R25
CR8
R26
FT30
CR3
C20 (–)
C19 (+)
FT29
C16 (+)
R28
FT27
Q9
FT26
T4
1 2 3 4 5 6
C31
R37
C18
CR4
Q11
FT31
R31
C26 (–)
FT32
R45
C27 (–)
R41
C24
FT33
R42
R40
C21
R43
R44
C28 (–)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.010 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN 6 Oct 64
CHECKED 23 OCT 64
APPROVED 3 NOV 64
APPROVED 11-9-64
APPROVED MIT 1 Dec 64
APPROVED MSC 12-1-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

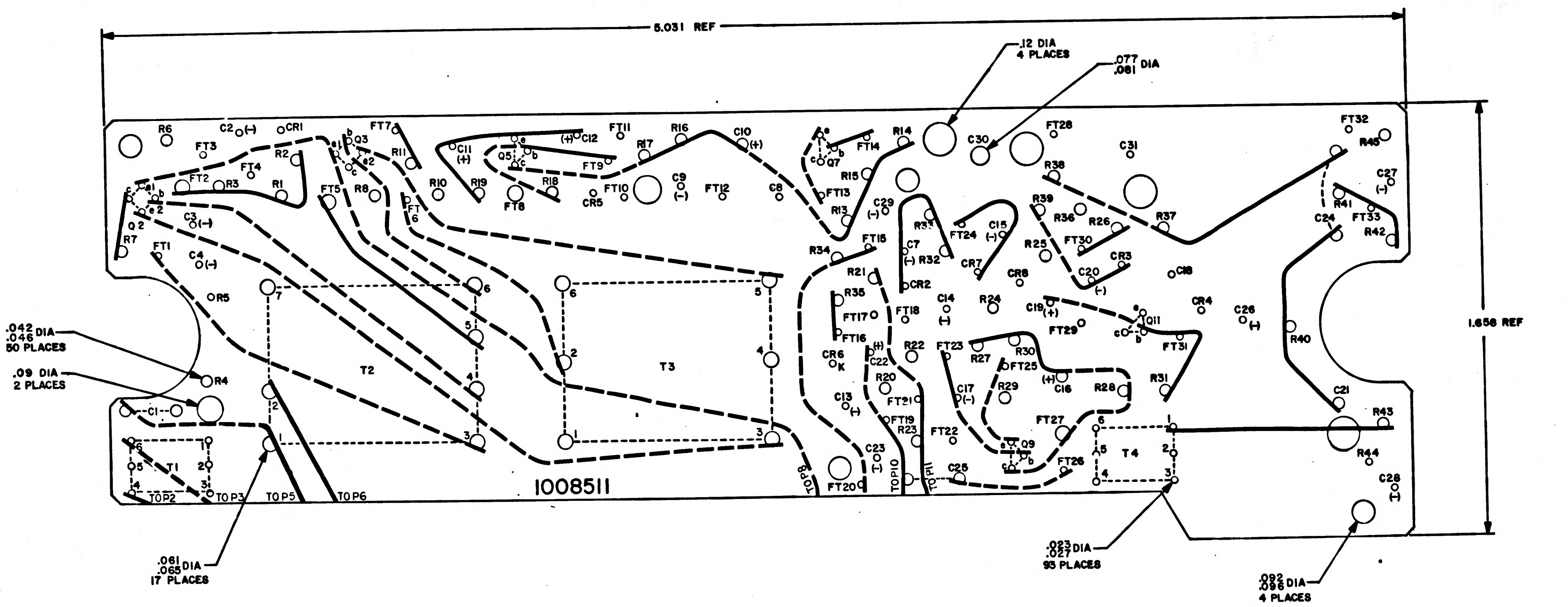
PHOTOGRAPHIC MASTER
WIRING BOARD (TOP)
TRACKER Y CHANNEL

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008510
SCALE 5/1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRF 15227			8JAN65	


5.031 REF
1.658 REF
.12 DIA 4 PLACES
.077 .081 DIA
.042 .046 DIA 50 PLACES
.09 DIA 2 PLACES
.061 .065 DIA 17 PLACES
.023 .027 DIA 93 PLACES
.092 .096 DIA 4 PLACES
R6
C2 (−)
CR1
FT3
FT4
R2
R1
R3
FT2
Q2
R7
FT1
C3 (−)
C4 (−)
R5
R4
C1
T1
TO P2
TO P3
TO P5
TO P6
T2
T3
1008511
FT7
Q3
R11
FT5
R8
FT6
C11 (+)
Q5
(+) C12
FT9
R10
R19
R18
FT8
CR5
FT10
FT11
R17
R16
C9 (−)
FT12
C10 (+)
C8
Q7
FT14
FT13
R15
R13
R14
C29 (−)
C30
FT28
C31
R38
R39
R36
R26
R37
R33
FT24
C15 (−)
C7 (−)
R32
R34
FT15
R21
CR2
CR7
CR8
R25
FT30
CR3
C20 (−)
C18
R35
FT17
FT16
FT18
C14 (−)
R24
C19 (+)
FT29
Q11
CR4
C26 (−)
CR6 K
C22 (+)
R22
FT23
R27
R30
FT25
R20
C13 (−)
FT21
FT19
R23
C17 (−)
R29
(+) C16
R28
R31
FT31
FT22
FT27
Q9
FT26
C25
C23 (−)
FT20
TO P8
TO P10
TO P11
T4
FT32
R45
C27 (−)
R41
FT33
C24
R42
R40
C21
R43
R44
C28 (−)

REF DWG:
NO. 1008510 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007512	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.010 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN		6 Oct 64
CHECKED		23 OCT 64
APPROVED		3 NOV 64
APPROVED		11-9-64
APPROVED MIT	W Kupfer	16 Dec 64
APPROVED MSC		12-...
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

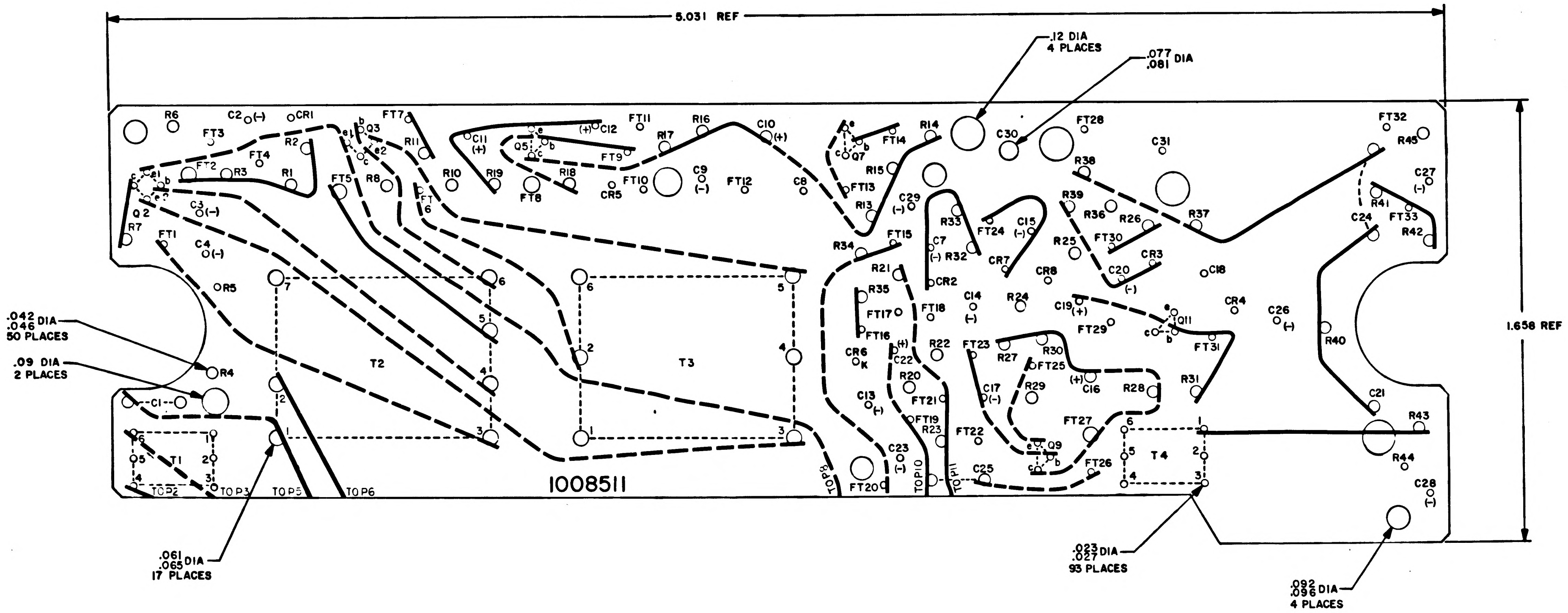
WIRING BOARD
(TOP)
TRACKER Y CHANNEL

CODE IDENT NO.	SIZE	DRAWING NO.
	E	1008511
SCALE 5/1		SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15227				
B		REPLACED WITH CHANGE BY REV C PER TDRR 20120				


5.031 REF
1.658 REF
.12 DIA
4 PLACES
.077
.081 DIA
.042
.046 DIA
50 PLACES
.09 DIA
2 PLACES
.061
.065 DIA
17 PLACES
.023
.027 DIA
93 PLACES
.092
.096 DIA
4 PLACES
1008511
T1
T2
T3
T4
TOP2
TOP3
TOP5
TOP6
TOP9
TOP10
TOP11
R6
C2 (-)
CR1
FT7
FT11
R16
C10 (+)
R14
C30
FT28
FT32
R45
FT3
FT4
R2
R1
R3
FT2
Q3
R11
C11 (+)
Q5
C12 (+)
R17
FT9
R18
FT10
CR5
C9 (-)
FT12
C8
Q7
FT14
R15
FT13
R13
C29 (-)
R33
C15 (-)
R38
R39
R36
R26
R37
C31
C27 (-)
R41
C24
FT33
R42
Q2
R7
C3 (-)
C4 (-)
FT1
R5
FT5
R8
FT6
R10
R19
FT8
R34
FT15
C7 (-)
R32
FT24
CR7
R25
FT30
CR3
C20 (-)
C18
R21
R35
CR2
C14 (-)
R24
CR8
C19 (+)
Q11
CR4
C26 (-)
FT31
R40
FT17
FT18
FT16
C22 (+)
CR6 K
R22
FT23
R27
R30
FT25
FT29
R20
C13 (-)
C17 (-)
R29
C16 (+)
R28
R31
FT21
FT19
R23
C23 (-)
FT20
FT22
C25
Q9
FT27
FT26
C21
R43
R44
C28 (-)
R4
C1

Ⓑ REPLACED WITH CHANGE BY REV C

REF DWG:
NO. 1008510 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007512	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.010 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN	J.F. Welch	6 Oct 64
CHECKED	[illegible]	[illegible]
APPROVED	[illegible]	3 Nov 64
APPROVED	[illegible]	11-9-64
APPROVED MIT	[illegible]	[illegible]
APPROVED MSC	[illegible]	[illegible]
		DATE

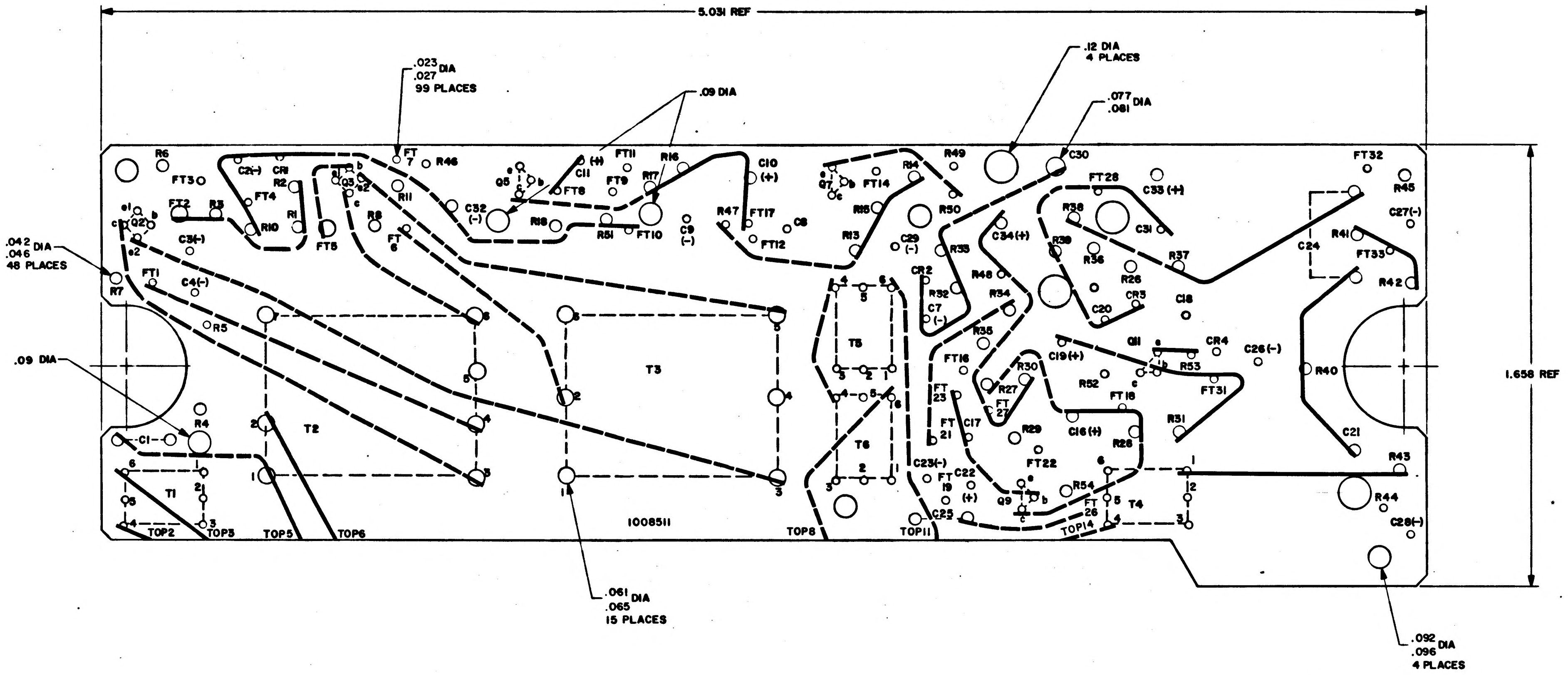
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD
(TOP)
TRACKER Y CHANNEL

CODE IDENT NO	SIZE	DRAWING NO
80230	E	1008511

SCALE 5/1 SHEET 1 OF 1

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	–	14 MAY 65	DKD / WK



5.031 REF
.023 .027 DIA 99 PLACES
.09 DIA
.12 DIA 4 PLACES
.077 .081 DIA
.042 .046 DIA 48 PLACES
.09 DIA
1.658 REF
.061 .065 DIA 15 PLACES
.092 .096 DIA 4 PLACES
1008511
R6
FT3
C2(–)
CR1
R2
FT4
R1
R10
FT2
R3
Q2
C3(–)
FT1
C4(–)
R7
R5
R4
C1
T1
T2
T3
T4
T5
T6
TOP2
TOP3
TOP5
TOP6
TOP8
TOP11
TOP14
Q3
FT5
R8
R11
FT 6
FT 7
R46
C32 (–)
Q5
C11 (+)
FT8
FT9
FT11
R16
R17
R18
R51
FT10
C9 (–)
C10 (+)
R47
FT17
FT12
C8
Q7
FT14
R15
R13
R14
R49
R50
C29 (–)
R33
C30
C34(+)
CR2
R32
C7 (–)
R48
R34
R35
FT16
FT 23
FT 21
C17
C23(–)
FT 19
C22 (+)
C25
R30
R27
FT 27
R29
FT22
Q9
R54
FT 26
FT28
C33 (+)
R38
R39
R36
C31
R26
R37
CR3
C20
C18
Q11
CR4
C19(+)
R52
R53
FT18
FT31
C16(+)
R28
R31
C26(–)
C24
FT32
R45
C27(–)
R41
FT33
R42
R40
C21
R43
R44
C28(–)

REF DWG:
NO. 1008510 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

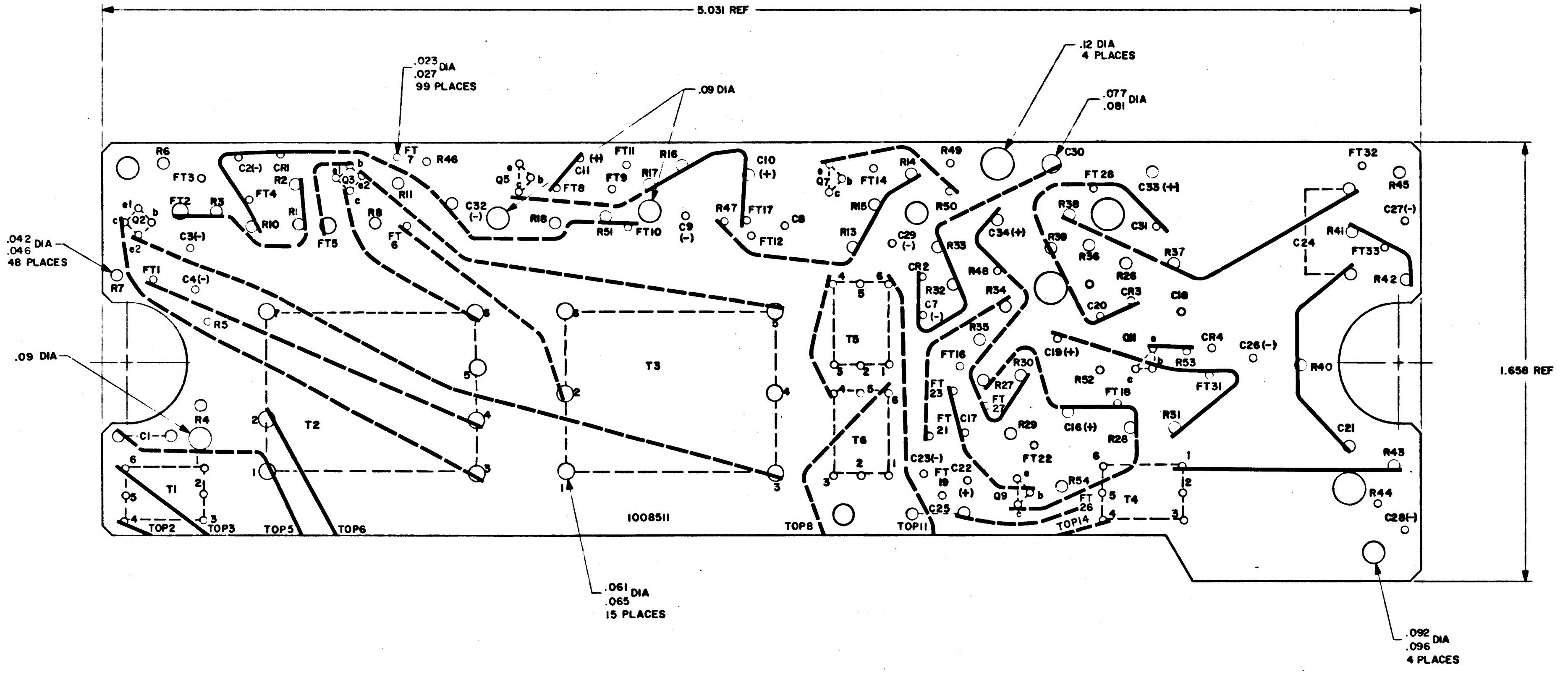
Ⓒ REPLACES REV(B) WITH CHANGE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ±; DECIMALS ±.010; ANGLES ±	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	ACSP PN	
	DRAWN E. Wasser DATE 17 APR 65 CHECKED W. Udonch 20 APR 65 APPROVAL Mark H. Johnson APPROVAL D. A. Trout 4/20/65	WIRING BOARD (TOP) TRACKER "Y" CHANNEL
MATERIAL SEE NOTE 2	NASA APPROVAL W. J. Klime 6-15-65	CODE IDENT NO. — SIZE E — 1008511
CONTRACT	MIT APPROVAL W. Kupfer 6-65	SCALE 5/1 — SHEET 1 OF 1

1008511

1008511 C

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	—	14 MAY 65	DKD / WK
D		REVISED PER TDRR 26036		15 FEB 66	


5.031 REF
.023 DIA
.027
99 PLACES
.09 DIA
.12 DIA
4 PLACES
.077 DIA
.081
.042 DIA
.046
48 PLACES
.09 DIA
1.658 REF
.061 DIA
.065
15 PLACES
.092 DIA
.096
4 PLACES
R6
FT3
FT2
R3
e1
b
c
Q2
e2
C3(-)
R7
FT1
C4(-)
R5
R4
C1
T1
TOP2
TOP3
C2(-)
CR1
R2
FT4
R1
R10
FT5
Q3
e2
R8
FT 6
FT 7
R46
R11
C32 (-)
Q5
C11
(+)
FT8
FT11
FT9
R17
R16
R18
R51
FT10
C9 (-)
C10 (+)
R47
FT17
FT12
C8
T2
T3
TOP5
TOP6
1008511
TOP8
Q7
FT14
R14
R15
R13
R49
R50
C29 (-)
R33
CR2
R32
C7 (-)
C30
FT28
C33 (+)
C34(+)
R38
C31
R39
R36
R26
R48
R34
R37
CR3
C18
C20
R35
FT16
C19(+)
Q11
CR4
C26(-)
R30
R27
FT 27
R52
R53
FT18
FT31
FT 23
FT 21
C17
R29
C16(+)
R28
R31
T5
T6
C23(-)
FT 19
C22 (+)
C25
Q9
FT22
R54
FT 26
T4
TOP11
TOP14
FT32
R45
C27(-)
C24
R41
FT33
R42
R40
C21
R43
R44
C28(-)

REF DWG:
NO. 1008510 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

Ⓒ REPLACES REV(B) WITH CHANGE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+.010	+
−	−.010	−

DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE WISCONSIN
ACSP PN
DRAWN DATE 17APR 65
CHECKED 20 APR 65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

WIRING BOARD
(TOP)
TRACKER "Y" CHANNEL

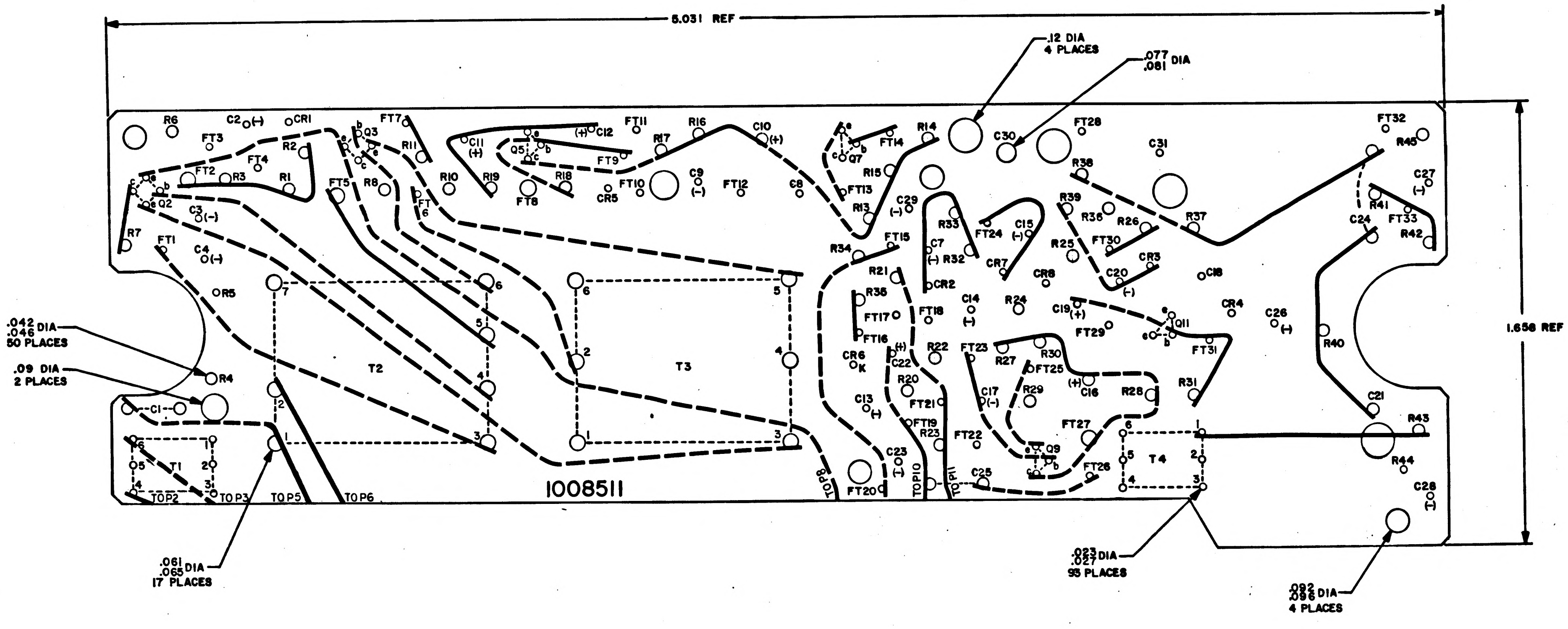
CODE IDENT NO
SIZE E
1008511
SCALE 5/1
SHEET 1 OF 1

1008511 D

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1586

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


5.031 REF
.12 DIA
4 PLACES
.077
.081 DIA
1.656 REF
.042
.046 DIA
50 PLACES
.09 DIA
2 PLACES
.061
.065 DIA
17 PLACES
.023
.027 DIA
93 PLACES
.092
.096 DIA
4 PLACES
1008511
R6
C2 (-)
CR1
FT3
FT4
R2
R1
FT2
R3
Q2
C3 (-)
R7
FT1
C4 (-)
R5
R4
C1
T1
TO P2
TO P3
TO P5
TO P6
T2
FT7
Q3
R11
FT5
R8
FT6
R10
R19
C11 (+)
Q5
C12 (+)
FT9
R18
FT8
CR5
FT10
FT11
R17
R16
C9 (-)
FT12
C10 (+)
C8
T3
Q7
FT14
R14
R15
FT13
R13
C29 (-)
C30
FT28
C31
R38
R33
R34
FT15
C7 (-)
R32
CR2
R21
R35
FT17
FT16
FT18
CR6 K
C22 (+)
R22
R20
C13 (-)
FT21
FT19
R23
C23 (-)
FT20
TO P8
TO P10
TO P11
FT24
C15 (-)
CR7
CR8
R39
R36
R26
R25
FT30
CR3
C20 (-)
R37
C18
C14 (-)
R24
C19 (+)
FT29
Q11
FT31
CR4
C26 (-)
FT23
R27
R30
FT25
C17 (-)
R29
C16 (+)
R28
R31
FT22
FT27
Q9
C25
FT26
T4
FT32
R45
C27 (-)
R41
FT33
C24
R42
R40
C21
R43
R44
C28 (-)

REF DWG:
NO. 1008510 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007512	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.010 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J.F. Walsh 6 Oct 64
CHECKED R. Lindeman 30 Oct 64
APPROVED Bowen 3 Nov 64
APPROVED A. R. 11-9-64
APPROVED MIT W Kupfer 1 Dec 64
APPROVED MSC W. J. Rhine 12-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD (TOP)
TRACKER Y CHANNEL

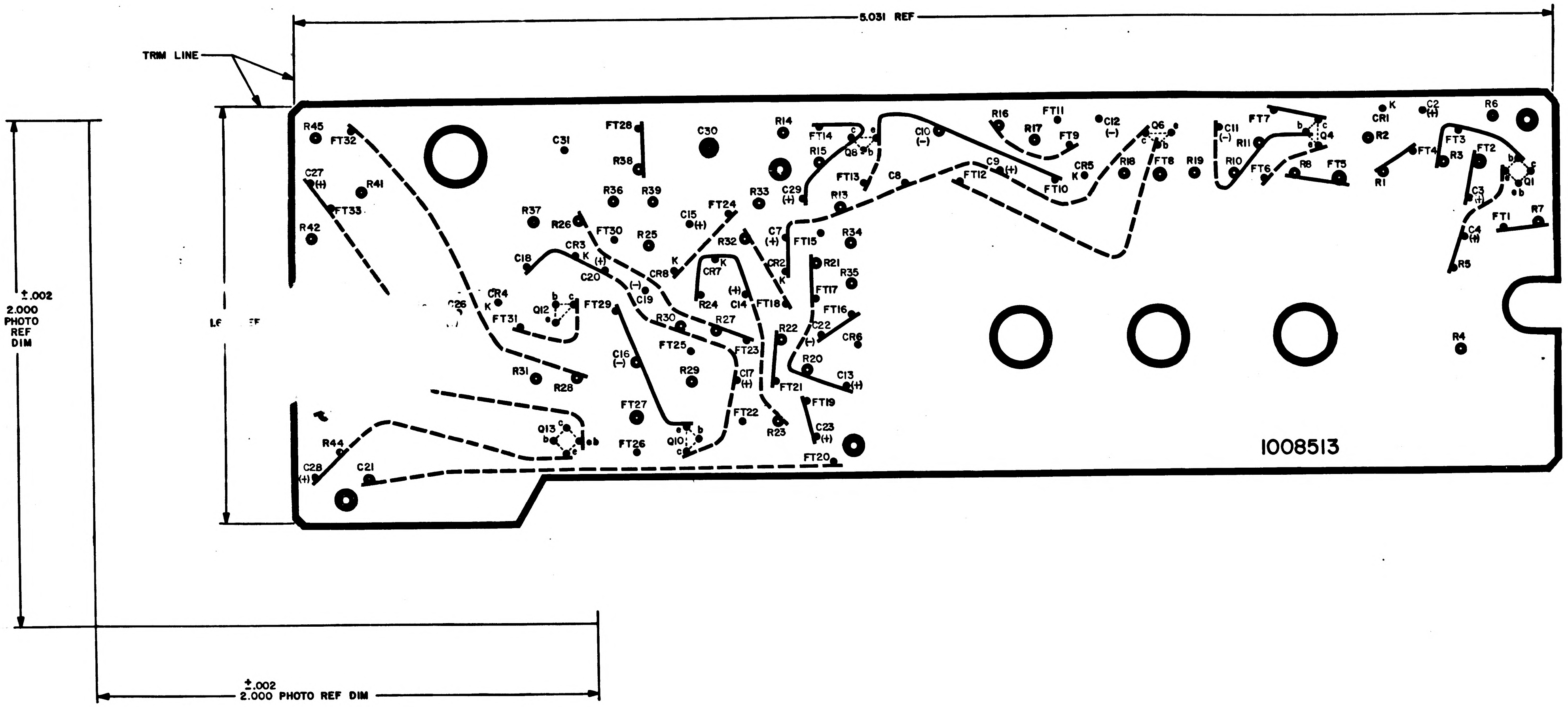
CODE IDENT NO.
SIZE E
DRAWING NO. 1008511
SCALE 5/1
SHEET 1 OF 1

1008511

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14556

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15227			8 JAN 64	


5.031 REF
TRIM LINE
±.002
2.000
PHOTO
REF
DIM
±.002
2.000 PHOTO REF DIM
1008513
R45
FT32
C27 (+)
R41
FT33
R42
C31
FT28
R38
C30
R14
FT14
Q8
C10 (−)
R16
FT11
R17
FT9
C12 (−)
Q6
C11 (−)
R11
FT7
Q4
K
CR1
C2 (+)
R6
R2
FT4
FT3
R3
FT2
Q1
R1
C3 (+)
FT1
R7
C4 (+)
R5
R4
R37
R36
R39
R33
C29 (+)
FT13
C8
FT12
C9 (+)
FT10
CR5
R18
FT8
R19
R10
FT6
R8
FT5
C15 (+)
FT24
R13
R26
FT30
R25
R32
C7 (+)
FT15
R34
CR3
C20
K
CR8
CR7
CR2
R21
C18
CR4
C26
Q12
FT29
C19
R24
C14 (+)
FT18
FT17
R35
FT31
R30
R27
R22
C22
FT16
CR6
FT25
C16 (−)
R29
C17 (+)
FT23
R20
C13 (+)
R31
R28
FT21
FT19
FT27
FT22
Q13
FT26
Q10
R23
C23 (+)
R44
FT20
C28 (+)
C21

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	G.F. Walsh	5 Oct 64
CHECKED	R. Eachmus	23 Oct 64
APPROVED		3 Nov 64
APPROVED		11-9-64
APPROVED MIT		Dec 64
APPROVED MSC		12-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

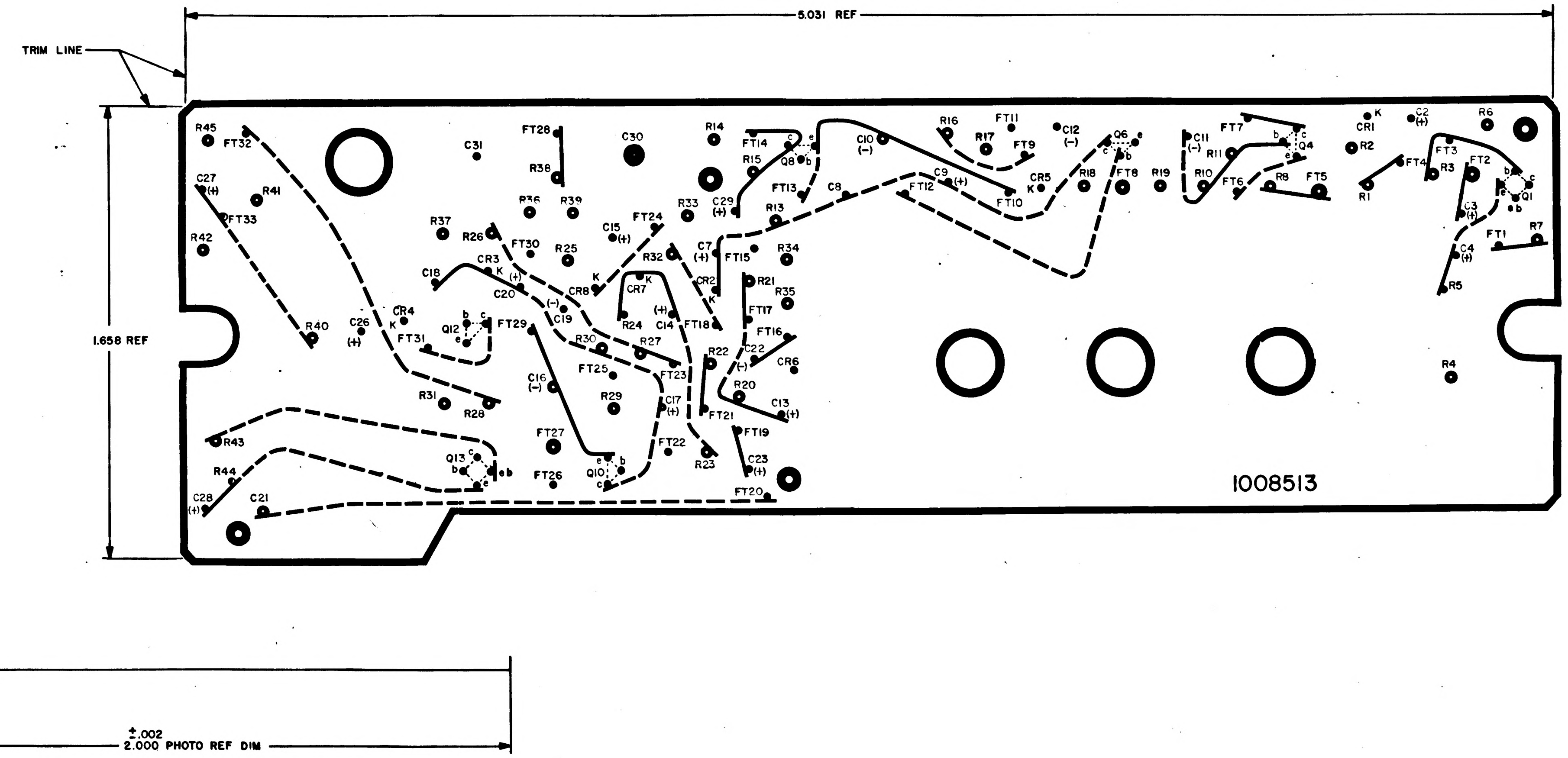
PHOTOGRAPHIC MASTER
WIRING BOARD (BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008512
SCALE 5/1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14586

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15227				
B		REPLACED WITH CHANGE BY REV. C PER TDRR 20120	A.N.		23 JUN 65	



TRIM LINE
5.031 REF
1.658 REF
±.002 2.000 PHOTO REF DIM
±.002 2.000 PHOTO REF DIM
1008513
R45
FT32
C27 (+)
R41
FT33
R42
R40
C26 (+)
CR4
K
FT31
Q12
b
c
e
C31
FT28
R38
R36
R39
R37
R26
FT30
CR3
K
(+)
C18
C20
(–)
C19
FT29
R31
R28
C30
R14
FT14
R15
Q8
c
e
b
FT13
C8
R13
R33
C29 (+)
FT24
C15 (+)
R25
R32
CR8
K
CR7
K
R24
(+)
C14
FT18
R30
R27
FT23
FT25
C16 (–)
R29
C17 (+)
FT27
FT26
Q10
e
b
c
FT22
R23
C7 (+)
FT15
R34
CR2
K
R21
R35
FT17
FT16
R22
C22 (–)
CR6
R20
C13 (+)
FT21
FT19
C23 (+)
FT20
R43
R44
C28 (+)
C21
Q13
c
b
e
eb
C10 (–)
R16
R17
FT11
FT9
C12 (–)
C9 (+)
FT12
FT10
CR5
K
Q6
c
e
b
R18
FT8
R19
C11 (–)
R11
FT7
R10
FT6
Q4
b
c
e
R8
FT5
CR1
K
C2 (+)
R2
R1
FT4
FT3
R3
R6
FT2
Q1
b
c
e
b
C3 (+)
FT1
R7
C4 (+)
R5
R4

Ⓑ REPLACED WITH CHANGE BY REV C

1008512 | B

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

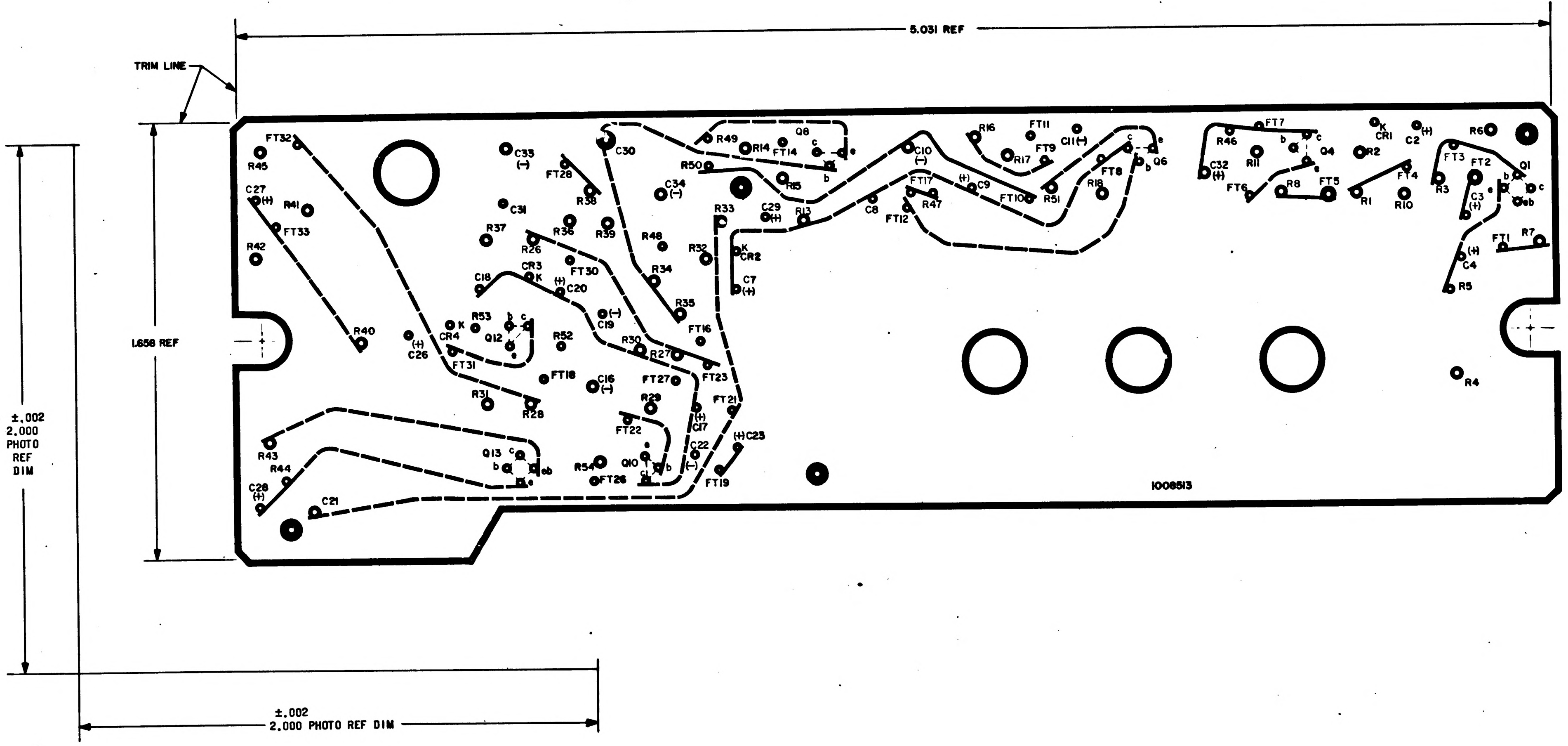
DRAWN	E.F. Walsh	5 Oct 64
CHECKED		23 Oct 64
APPROVED		
APPROVED		11-9-64
APPROVED MIT		
APPROVED MSC		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD (BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO	SIZE	DRAWING NO
80230	E	1008512
SCALE 5/1		SHEET 1 OF 1

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD.
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	—	14 MAY 65	DKD



TRIM LINE
5.031 REF
1.658 REF
±.002
2.000
PHOTO
REF
DIM
±.002
2.000 PHOTO REF DIM
FT32
R45
C27 (+)
R41
FT33
R42
R40
C26 (+)
CR4 K
R53
Q12 b c e
FT31
C33 (−)
C31
FT28
R38
R37
R36
R39
R26
CR3 K
C18
FT30
(+) C20
(−) C19
R52
R30
R27
FT18
C16 (−)
FT27
R31
R28
R29
FT22
C17 (+)
C22 (−)
(+) C23
FT21
FT19
Q10 b e c
R54
FT26
Q13 c b eb e
R43
R44
C28 (+)
C21
C30
R49
R14
FT14
Q8 c e b
R50
R15
C34 (−)
R48
R34
R35
FT16
FT23
R33
R32
CR2 K
C7 (+)
C29 (+)
R13
C8
FT12
FT17
R47
C10 (−)
(+) C9
FT10
R51
R16
R17
FT11
FT9
C11 (−)
FT8
R18
Q6 c e b
C32 (+)
R46
FT7
FT6
R11
Q4 b c e
R8
FT5
R2
R1
FT4
R10
CR1 K
C2 (+)
R6
FT3
R3
FT2
C3 (+)
Q1 b c e eb
FT1
R7
C4 (+)
R5
R4
1008513

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED :001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

Ⓒ REPLACES REV (B) WITH CHANGE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS +— −— DECIMALS +.010 −.010 ANGLES +— −—
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN L [illegible] DATE 15 APR 65
CHECKED [illegible] Udovich 19 APR 65
APPROVAL [illegible] 20 APR 65
APPROVAL [illegible] 4/14/65
NASA APPROVAL [illegible] 6-15-65
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

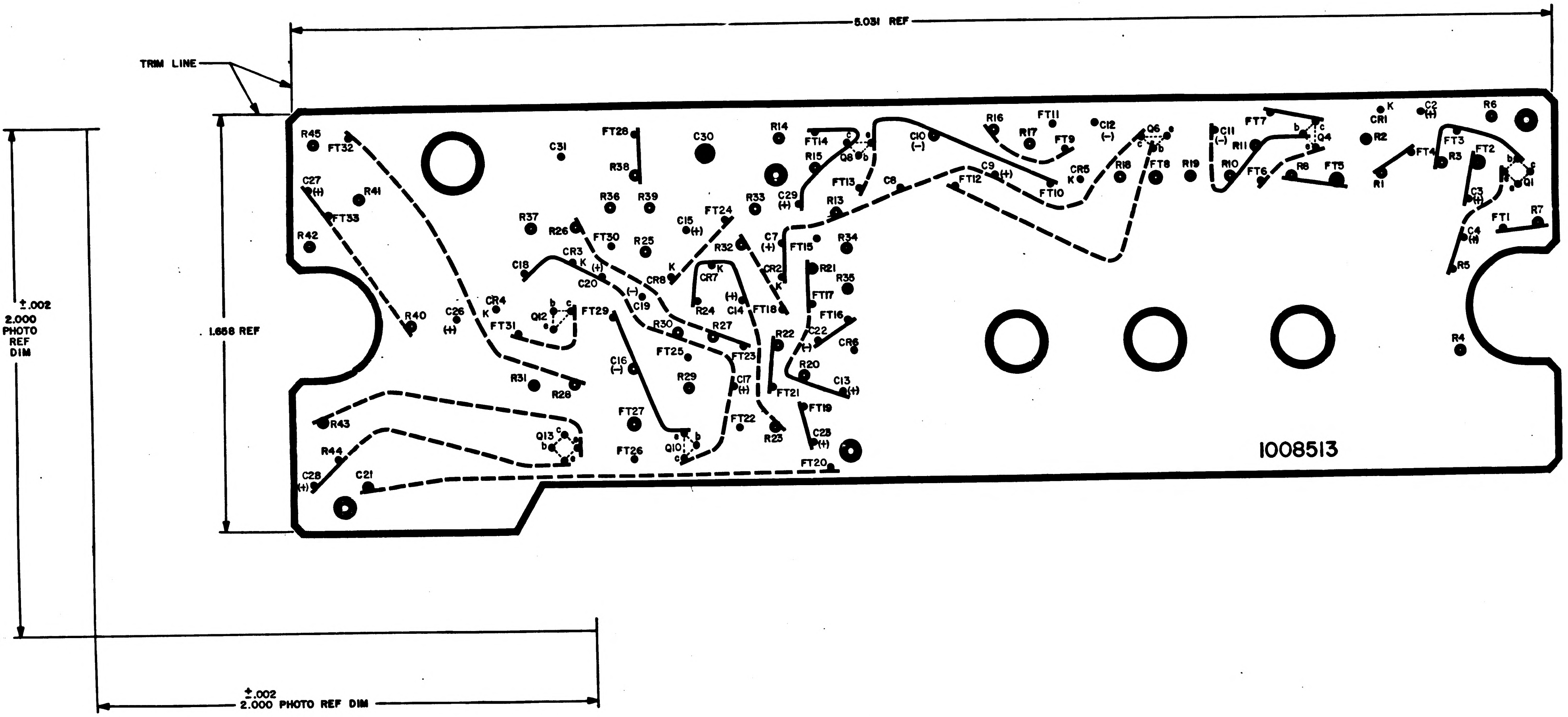
PHOTOGRAPHIC MASTER
WIRING BOARD (BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO. 80230
SIZE E
1008512
SCALE 5/1
SHEET

1008512 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 4526						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



TRIM LINE
5.031 REF
1.658 REF
±.002 2.000 PHOTO REF DIM
±.002 2.000 PHOTO REF DIM
R45
FT32
C27 (+)
R41
FT33
R42
R40
C26 (+)
K
CR4
FT31
Q12
b c e
R31
R28
R43
R44
C28 (+)
C21
Q13
c b e
C31
FT28
R38
R36
R39
R37
R26
FT30
R25
CR3
K
(+)
C20
C18
(−)
C19
CR8
K
C15 (+)
FT24
R32
CR7
K
R24
(+)
C14
R30
R27
FT29
FT25
FT23
C16 (−)
R29
C17 (+)
FT27
FT26
Q10
e b c
FT22
R23
C30
R14
FT14
Q8
c e b
R15
R33
C29 (+)
FT13
R13
C7 (+)
FT15
R34
CR2
K
FT18
R21
R35
FT17
FT16
R22
C22 (−)
CR6
R20
FT21
C13 (+)
FT19
C23 (+)
FT20
C10 (−)
C8
R16
R17
FT11
FT9
C12 (−)
C9 (+)
FT12
FT10
CR5
K
R18
Q6
c e b
FT8
R19
C11 (−)
R11
R10
FT7
FT6
Q4
b c e
R8
FT5
K
CR1
R2
R1
C2 (+)
FT4
R6
FT3
R3
FT2
Q1
b c e
C3 (+)
C4 (+)
FT1
R7
R5
R4
1008513

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J.F. Walsh 5 Oct 64
CHECKED R. Lindmi 23 Oct 64
APPROVED 3 Nov 64
APPROVED 11-9-64
APPROVED MIT W Kupfer Dec 64
APPROVED MSC W.J. Rhine 12-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

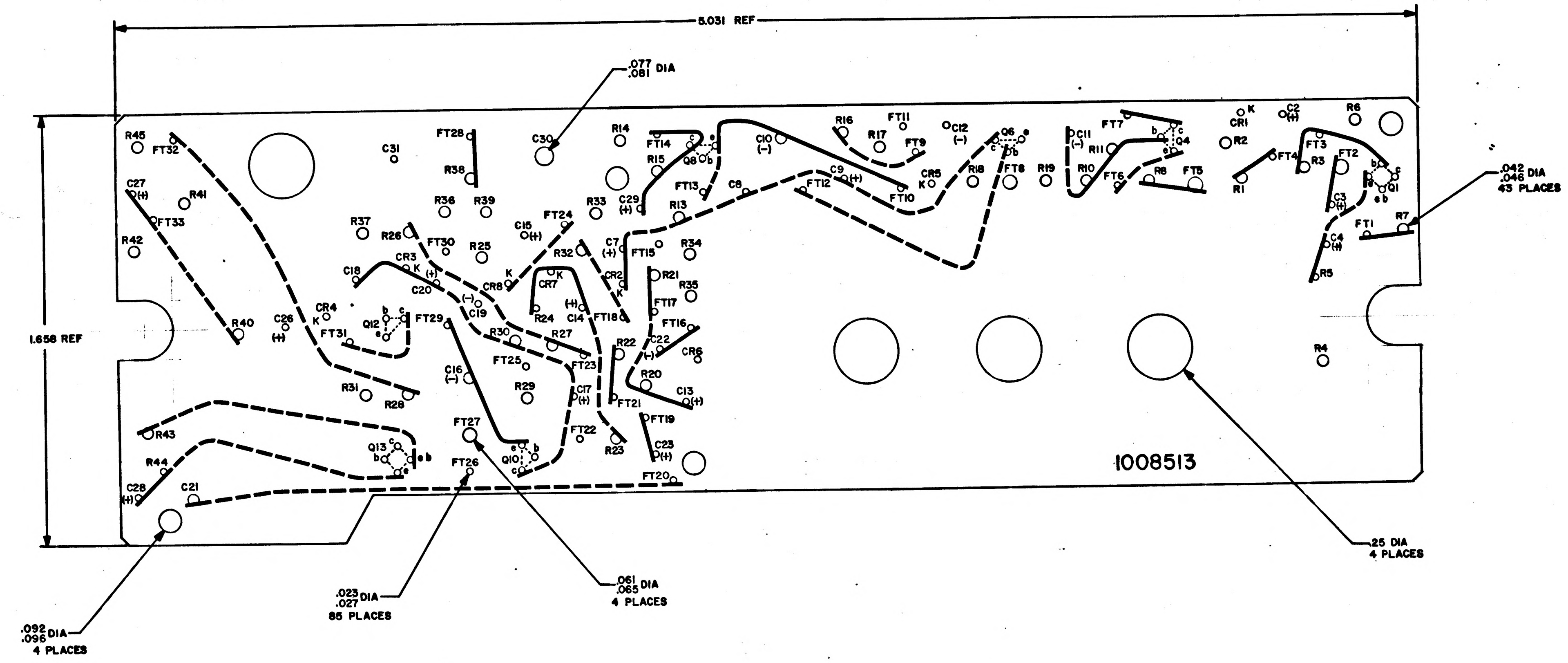
PHOTOGRAPHIC MASTER
WIRING BOARD (BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008512
SCALE 5/1
SHEET 1 OF 1

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14586

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15227	A.A.		8 Jan 65	


5.031 REF
1.656 REF
.077 .081 DIA
.042 .046 DIA 43 PLACES
.25 DIA 4 PLACES
.061 .065 DIA 4 PLACES
.023 .027 DIA 85 PLACES
.092 .096 DIA 4 PLACES
1008513
R45
FT32
C31
FT28
R38
C30
R14
FT14
Q8
R15
FT13
C29 (+)
R13
C8
C10 (-)
R16
R17
FT11
FT9
C12 (-)
Q6
FT12
C9 (+)
FT10
CR5 K
R18
FT8
R19
C11 (-)
R11
R10
FT7
Q4
FT6
R8
FT5
CR1 K
C2 (+)
R2
R1
FT4
R6
FT3
R3
FT2
Q1
C3 (+)
FT1
R7
C4 (+)
R5
R4
C27 (+)
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FT33
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C15 (+)
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C20 (+)
CR8 K
CR7 K
CR2 K
R21
R35
FT17
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CR4 K
Q12
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R24
(+) C14
FT18
FT16
R30
R27
C22 (-)
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CR6
FT25
FT23
R20
C16 (-)
R29
C17 (+)
FT21
C13 (+)
R31
R28
R43
FT27
FT22
R23
FT19
Q13
Q10
C23 (+)
R44
FT26
FT20
C28 (+)
C21
b c e K

REF DWG:
NO 1008512 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: 031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

NEXT ASSY	USED ON
1007512	

APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN D.F. Walsh 8 Oct 64
CHECKED 23 Oct 64
APPROVED 3 Nov 64
APPROVED 11-9-64
APPROVED MIT 1 Dec 64
APPROVED MSC 12-1-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

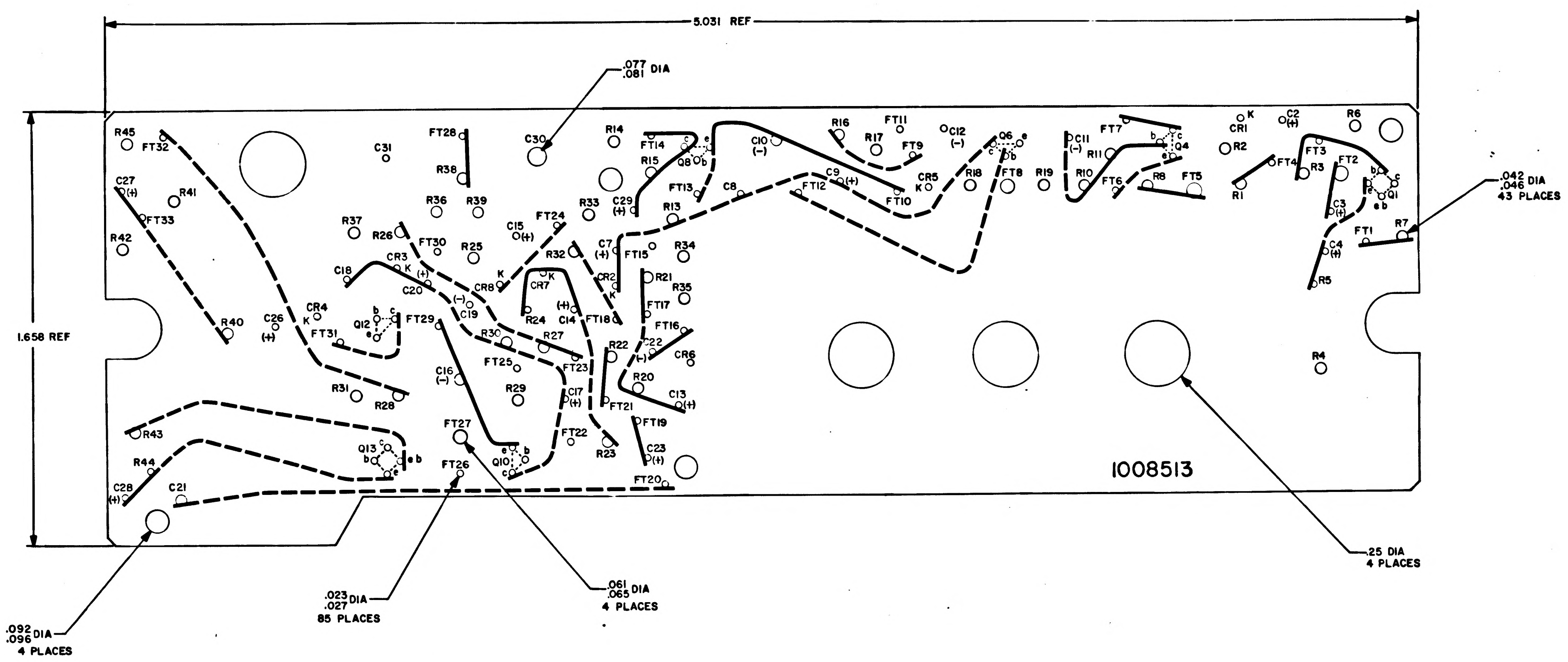
WIRING BOARD
(BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008513
SCALE 5/1
SHEET 1 OF 1

1008513 A

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15227				
B		REPLACED WITH CHANGE BY REV. C PER TDRR 20120	A.N.		28 JUN 65	



5.031 REF
1.658 REF
.077 / .081 DIA
.042 / .046 DIA 43 PLACES
.25 DIA 4 PLACES
.061 / .065 DIA 4 PLACES
.023 / .027 DIA 85 PLACES
.092 / .096 DIA 4 PLACES
1008513
R45
FT32
C27 (+)
R41
FT33
R42
R40
C31
FT28
R38
R36
R39
R37
R26
FT30
R25
C18
CR3
C20
CR4
C26 (+)
FT31
Q12
FT29
C19
CR8
C30
C15 (+)
FT24
R33
C29 (+)
R14
FT14
R15
Q8
FT13
R13
C8
C10 (-)
C7 (+)
FT15
R34
R32
CR7
CR2
R21
R35
FT17
FT16
C14
FT18
R24
R30
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R22
CR6
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C16 (-)
R29
C17 (+)
FT21
FT19
FT22
R23
C23 (+)
FT20
R31
R28
R43
R44
Q13
C28 (+)
C21
FT27
FT26
Q10
R16
R17
FT11
FT9
C12 (-)
C9 (+)
FT12
FT10
CR5
Q6
R18
FT8
R19
C11 (-)
R11
R10
FT7
FT6
Q4
R8
FT5
CR1
R2
C2 (+)
FT4
R1
FT3
R3
FT2
R6
Q1
C3 (+)
C4 (+)
FT1
R7
R5
R4

Ⓑ **REPLACED WITH CHANGE BY REV C**

REF DWG:
NO 1008512 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007512	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± .010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

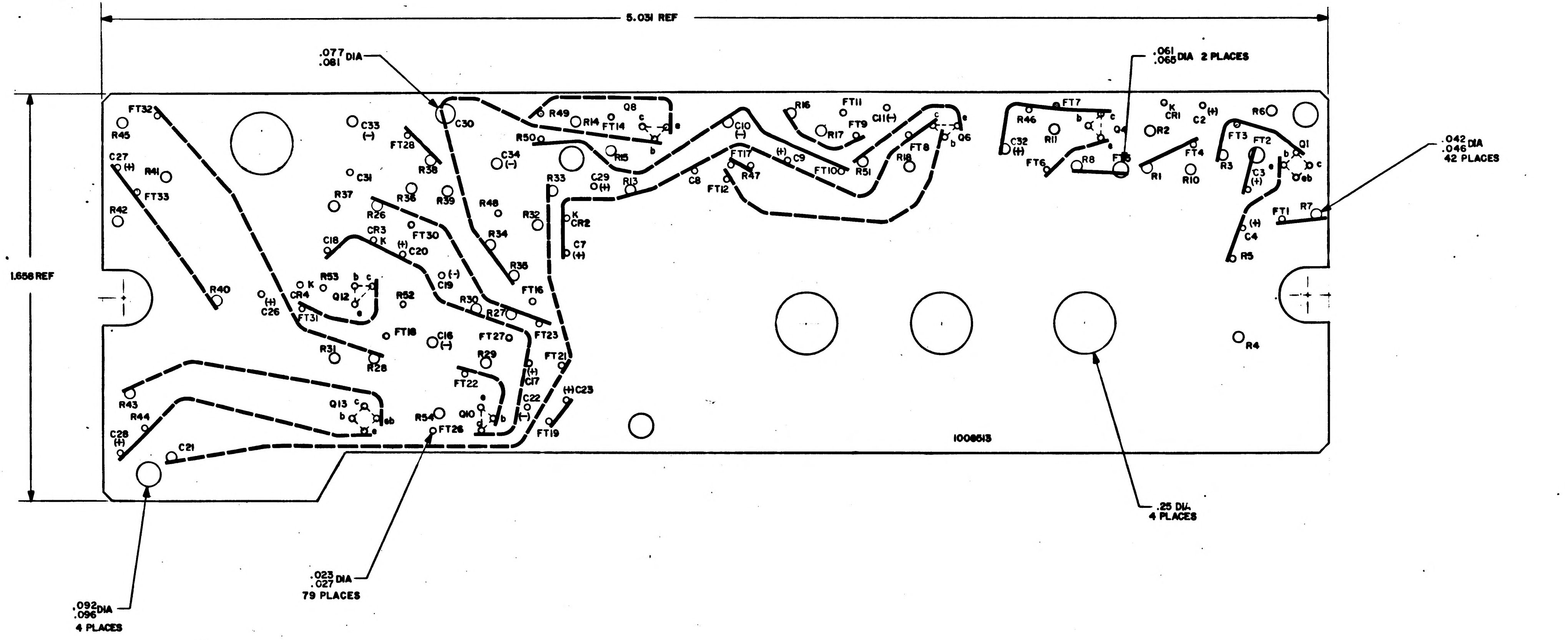
DRAWN J.F. Walsh 5 Oct 64
CHECKED 23 Oct 64
APPROVED
APPROVED 11-9-64
APPROVED MIT
APPROVED MSC 12-
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD (BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO 80230
SIZE E
DRAWING NO 1008513
SCALE 5/1
SHEET 1 OF 1

REVISIONS ~~20120~~					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	--	14 MAY 65	DKD uK



5.031 REF
1.656 REF
.077
.081 DIA
.061
.065 DIA 2 PLACES
.042
.046 DIA
42 PLACES
.25 DIA
4 PLACES
.023
.027 DIA
79 PLACES
.092
.096 DIA
4 PLACES
1008513
FT32
R45
C27 (+)
R41
FT33
R42
R40
C33 (-)
C30
FT28
C31
R38
R37
R36
R39
R26
CR3
C20
FT30
C18
R53
CR4
Q12
C26
FT31
R52
C19
R30
R27
FT16
FT18
C16
FT27
FT23
R31
R28
R29
FT22
C17
FT21
C23
C22
Q13
R43
R44
C28
C21
R54
FT26
Q10
FT19
R49
R14
FT14
Q8
R50
C34
R5
R48
R33
R32
CR2
C7 (+)
R34
R35
C29 (+)
R13
C8
FT12
R47
FT17
C10 (-)
R16
R17
FT11
FT9
C11 (-)
C9
FT10
R51
R18
FT8
Q6
R46
C32 (+)
R11
FT6
FT7
Q4
R8
FT5
CR1
R2
C2 (+)
R1
FT4
R10
FT3
FT2
R3
Q1
R6
C3 (+)
C4 (+)
R5
FT1
R7
R4

° REF DWG:
NO. 1008512 FOR PHOTOGRAPHIC MASTER

NOTES:

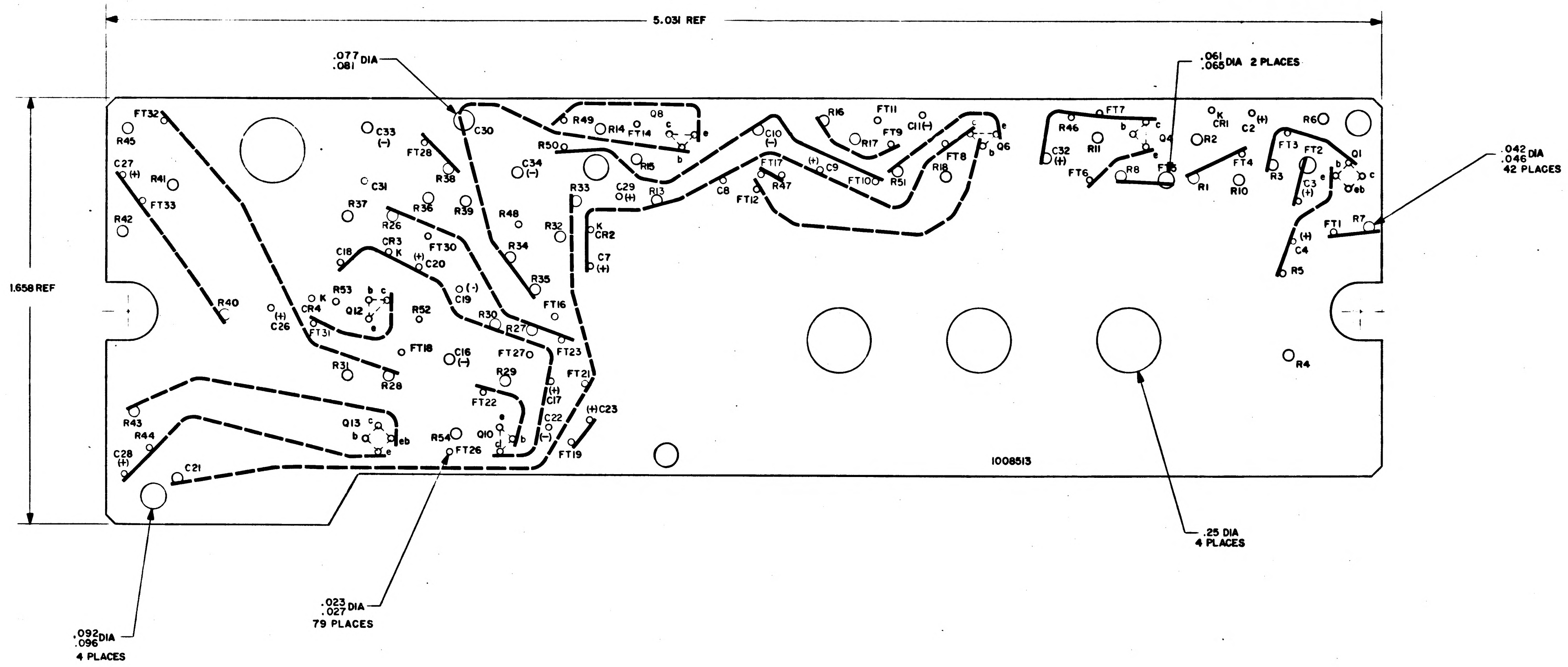
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

Ⓒ REPLACES REV(B)WITH CHANGE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS +.010 -.010 ANGLES ± —	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	ACSP PN DRAWN DATE 15 APR 65 CHECKED F. Udovich 19 APR 65 APPROVAL Mark K. Johnson 20 APR 65 APPROVAL C. B. Tait 6/10/65	WIRING BOARD (BOTTOM) TRACKER Y CHANNEL
MATERIAL SEE NOTE 2	NASA APPROVAL 6-15-65 MIT APPROVAL	CODE IDENT NO 80230 SIZE E 1008513
CONTRACT		SCALE 5/1 SHEET

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	—	14 MAY 65	DKD
D		REVISED PER TDRR 26036		5 FEB 66	MGM



5.031 REF
1.658 REF
.077 .081 DIA
.061 .065 DIA 2 PLACES
.042 .046 DIA 42 PLACES
.25 DIA 4 PLACES
.023 .027 DIA 79 PLACES
.092 .096 DIA 4 PLACES
1008513
FT32
R45
C27 (+)
R41
FT33
R42
R40
C26 (+)
CR4 K
FT31
R53
Q12 b c e
C18
CR3 K
R26
R37
C31
C33 (−)
FT28
R38
R36
R39
FT30
C20 (+)
C19 (−)
R52
R30
R27
FT18
C16 (−)
FT27
R31
R28
R29
FT22
C17 (+)
C22 (−)
Q10 b c
R54
FT26
R43
R44
C28 (+)
C21
Q13 c b e eb
C30
R48
R34
R35
FT16
FT23
FT21
C23 (+)
FT19
C34 (−)
R33
R32
CR2 K
C7 (+)
R49
R14
FT14
Q8 c e b
R50
R15
C29 (+)
R13
C8
FT12
C10 (−)
FT17
R47
C9 (+)
FT10
R16
FT11
R17
FT9
C11 (−)
R51
FT8
R18
Q6 c e b
R46
FT7
C32 (+)
R11
FT6
R8
Q4 b c e
FT5
CR1 K
C2 (+)
R2
R1
FT4
R10
R6
FT3
R3
FT2
C3 (+)
Q1 b c e eb
FT1
R7
C4 (+)
R5
R4

REF DWG:
NO. 1008512 FOR PHOTOGRAPHIC MASTER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

1008513 D

Ⓒ REPLACES REV( )WITH CHANGE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ —	+.010	+ —
− —	−.010	− —

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE WISCONSIN
ACSP PN
DRAWN [illegible] DATE 15 APR 65
CHECKED Udovich 19 APR 65
APPROVAL Mark L. Johnson 20 APR 65
APPROVAL [illegible] 6/14/65
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

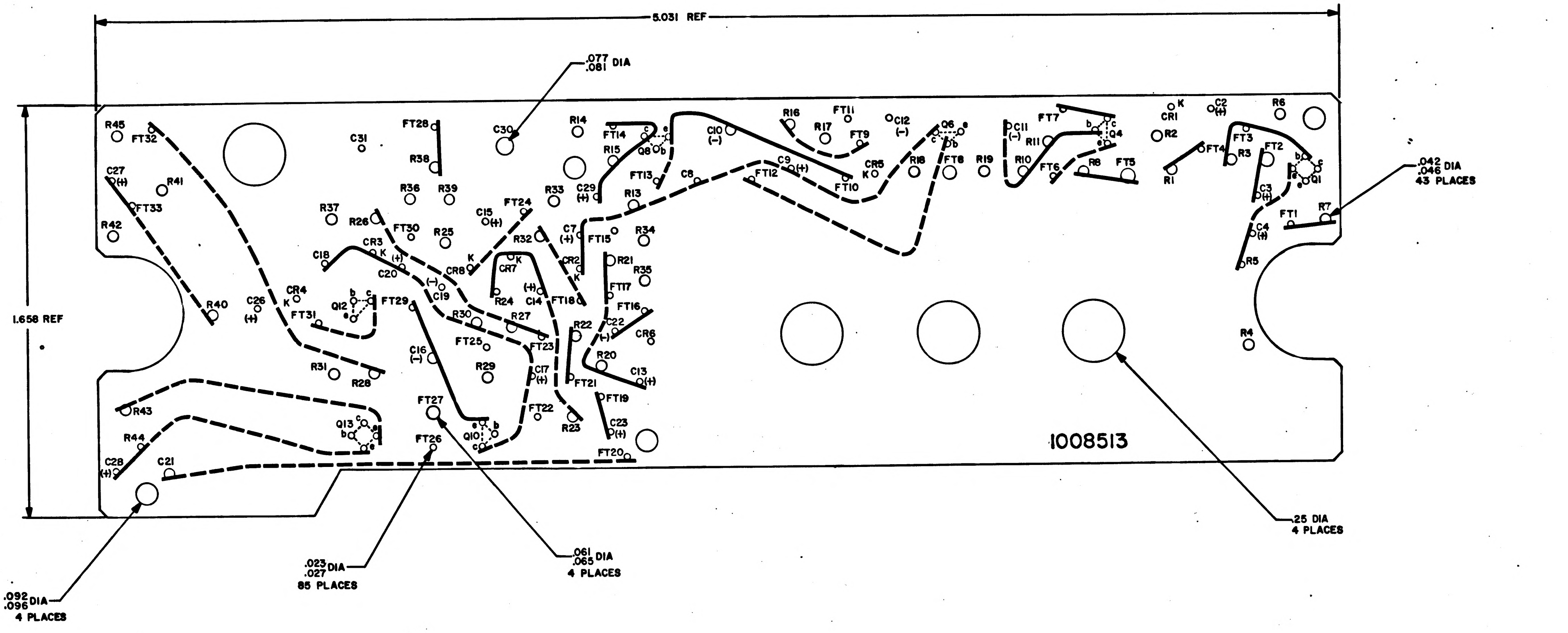
WIRING BOARD
(BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO 80230
SIZE E
1008513
SCALE 5/1
SHEET

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1456

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


5.031 REF
1.658 REF
.077 .081 DIA
.042 .046 DIA 43 PLACES
.25 DIA 4 PLACES
.061 .065 DIA 4 PLACES
.023 .027 DIA 85 PLACES
.092 .096 DIA 4 PLACES
1008513
R45 FT32 C27 (+) R41 FT33 R42 R40 C26 (+) CR4 K FT31 Q12 b c e C18 CR3 K C20 (+) R26 R37 FT30 R25 CR8 (–) C19 FT29 R30 FT25 C16 (–) R31 R28 R29 R43 R44 Q13 C28 (+) C21 FT27 FT26 Q10 C31 FT28 R38 R36 R39 C30 C15 (+) FT24 R33 C29 (+) R14 FT14 R15 Q8 FT13 R13 R32 CR7 K R24 R27 C14 (+) FT18 FT23 C17 (+) FT22 R23 FT21 R22 R20 CR2 K C7 (+) FT15 R34 R21 R35 FT17 FT16 C22 (+) CR6 C13 (+) FT19 C23 (+) FT20 C8 C10 (–) C9 (+) FT12 FT10 R16 R17 FT11 FT9 C12 (–) CR5 K R18 Q6 FT8 R19 C11 (–) R11 R10 FT7 Q4 FT6 R8 FT5 CR1 K R1 R2 C2 (+) FT4 FT3 R3 R6 FT2 Q1 C3 (+) C4 (+) FT1 R7 R5 R4

REF DWG:
NO 1008512 FOR PHOTOGRAPHIC MASTER

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007512	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

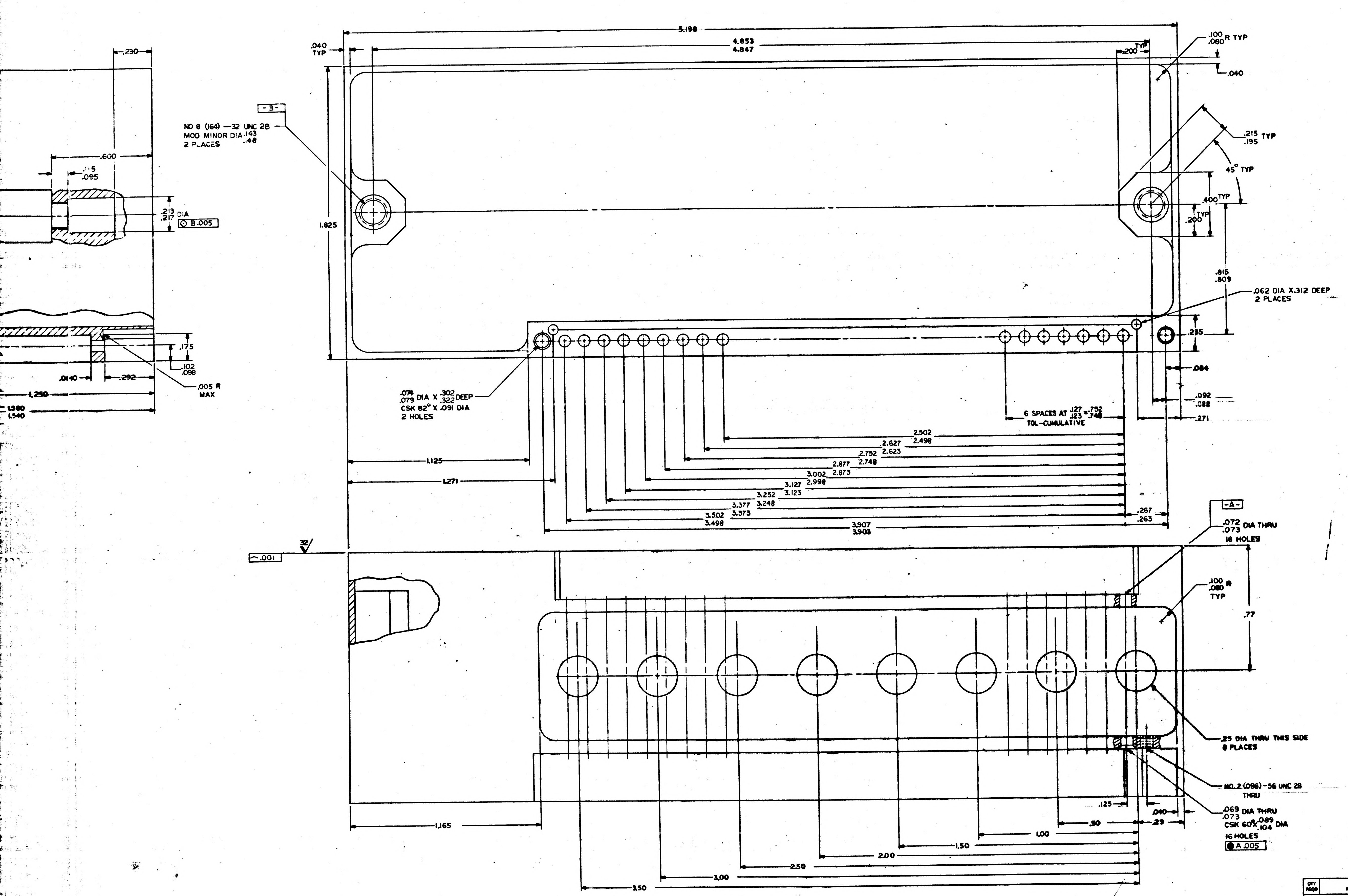
DRAWN J. F. Nylok 5 Oct 64
CHECKED R. Lardini 23 Oct 64
APPROVED 3 NOV 64
APPROVED 11-9-64
APPROVED MIT W. Kyfer 11 Dec 64
APPROVED MSC W. J. Rhine 12-1-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD (BOTTOM)
TRACKER Y CHANNEL

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008513
SCALE 5/1
SHEET 1 OF 1

1008514



.230
NO 8 (164) —32 UNC 2B
MOD MINOR DIA .143 .148
2 PLACES
-3-
.600
.115 .095
.213 .217 DIA
⊙ B.005
.175
.102 .098
.0140
.292
.005 R MAX
1.250
1.560 1.540
.040 TYP
5.198
4.853 4.847
.200 TYP
.100 .080 R TYP
.040
.215 .195 TYP
45° TYP
.400 TYP
.200 TYP
1.825
.815 .809
.062 DIA X.312 DEEP
2 PLACES
.235
.084
.092 .088
.271
.074 .079 DIA X .302 .322 DEEP
CSK 82° X .091 DIA
2 HOLES
6 SPACES AT .127 .123 = .752 .748
TOL-CUMULATIVE
2.502 2.498
2.627 2.623
2.752 2.748
2.877 2.873
3.002 2.998
3.127 3.123
3.252 3.248
3.377 3.373
3.502 3.498
3.907 3.903
1.125
1.271
.267 .263
32
.001
-A-
.072 .073 DIA THRU
16 HOLES
.100 .080 R TYP
.77
.25 DIA THRU THIS SIDE
8 PLACES
NO. 2 (086) -56 UNC 2B THRU
.069 .073 DIA THRU
CSK 60° X .089 .104 DIA
16 HOLES
● A .005
.125
.040
.50
.29
1.00
1.50
2.00
2.50
3.00
3.50
1.165

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

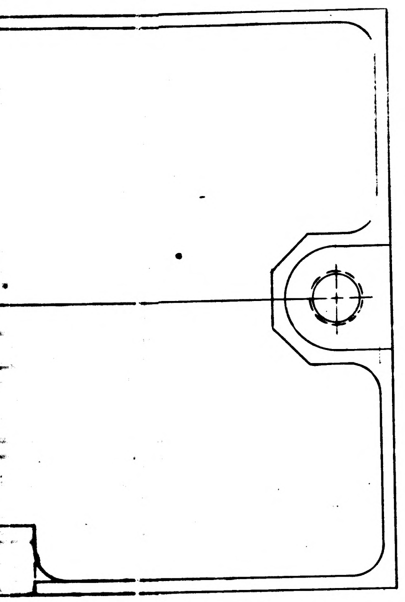
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ±1/64 DECIMALS XXX ± .005 XX .02 ANGLES ± 1/2° DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL SEE NOTE 2	DRAWN A Conley DATE 21 July 64 CHECKED R Lindsay 9 OCT 64 APPROVAL 9 Nov 64 APPROVAL 11-4-64	FRAME TRACKER Y CHANNEL
HEAT TREATMENT —	NASA APPROVAL W D Rhine Nov-64	CODE IDENT NO. — SIZE J NASA DRAWING NO. 1008514
FINAL FINISH SEE NOTE 3	MIT APPROVAL	SCALE 5/1 WT — SHEET 1 OF 1

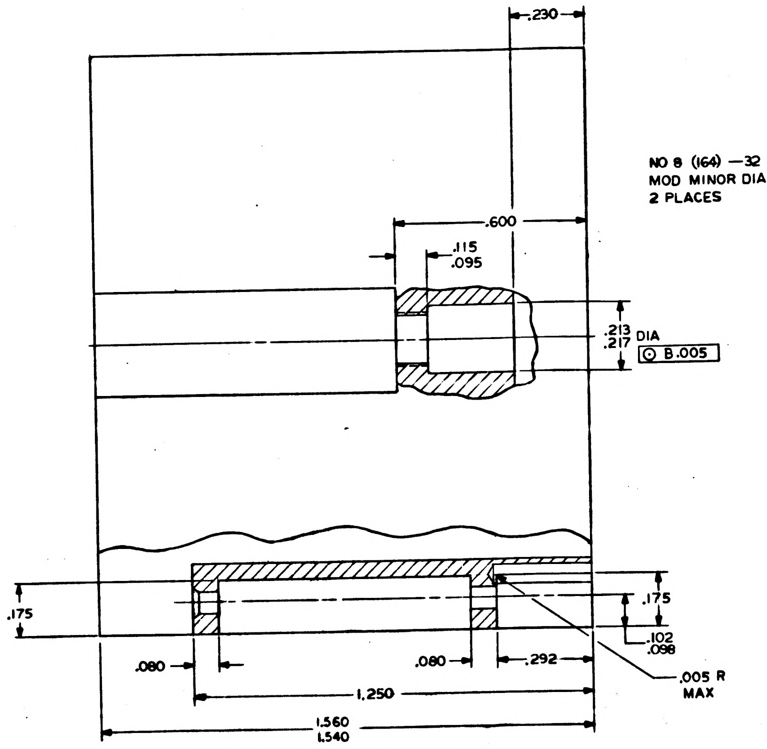
NEXT ASSY	USED ON
1007512	

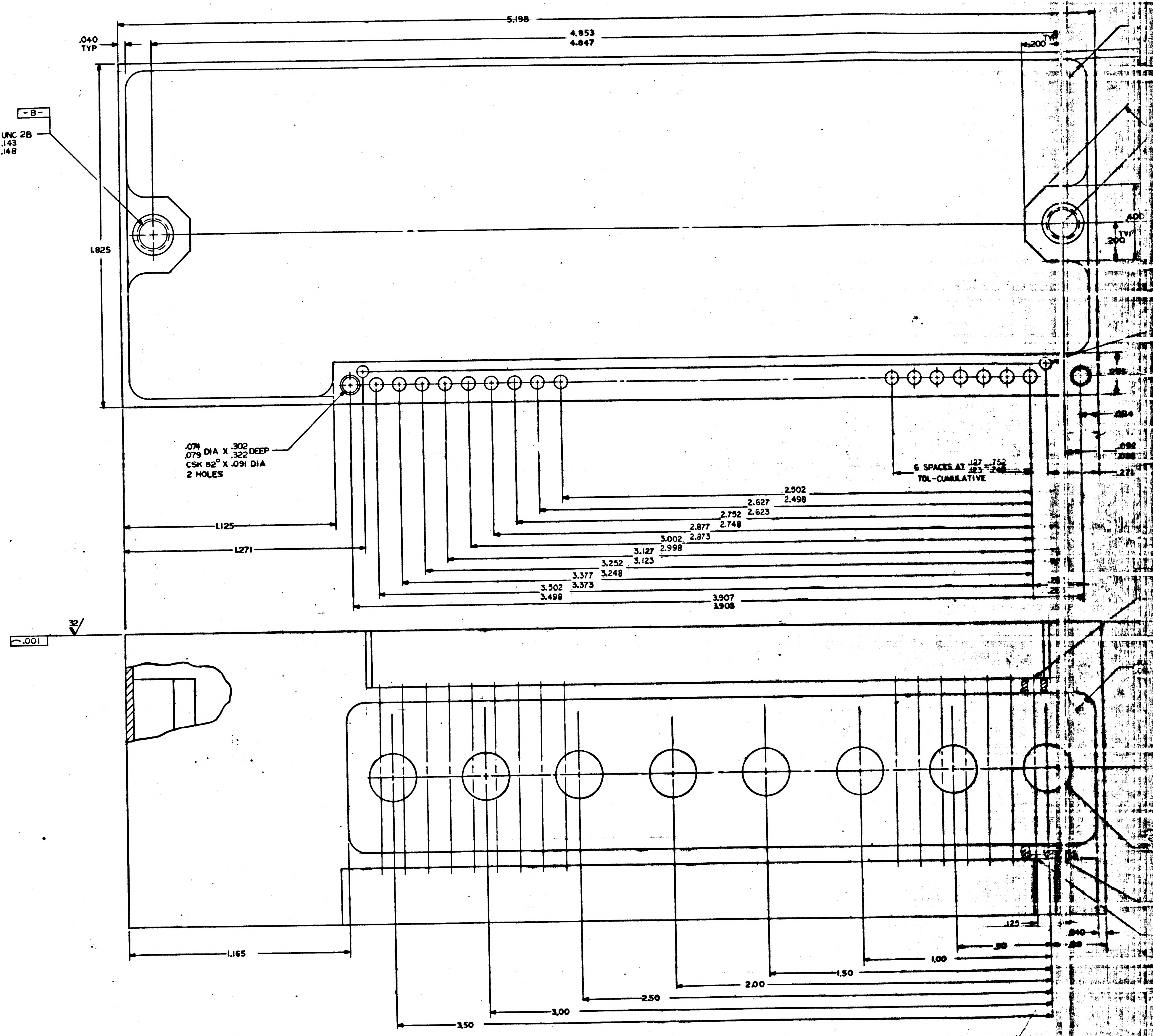
APPLICATION

MASTER

1008514




.230
.600
.115
.095
.213
.217 DIA
◎ B .005
.175
.175
.102
.098
.080
.080
.292
1.250
.005 R
MAX
1.560
1.540

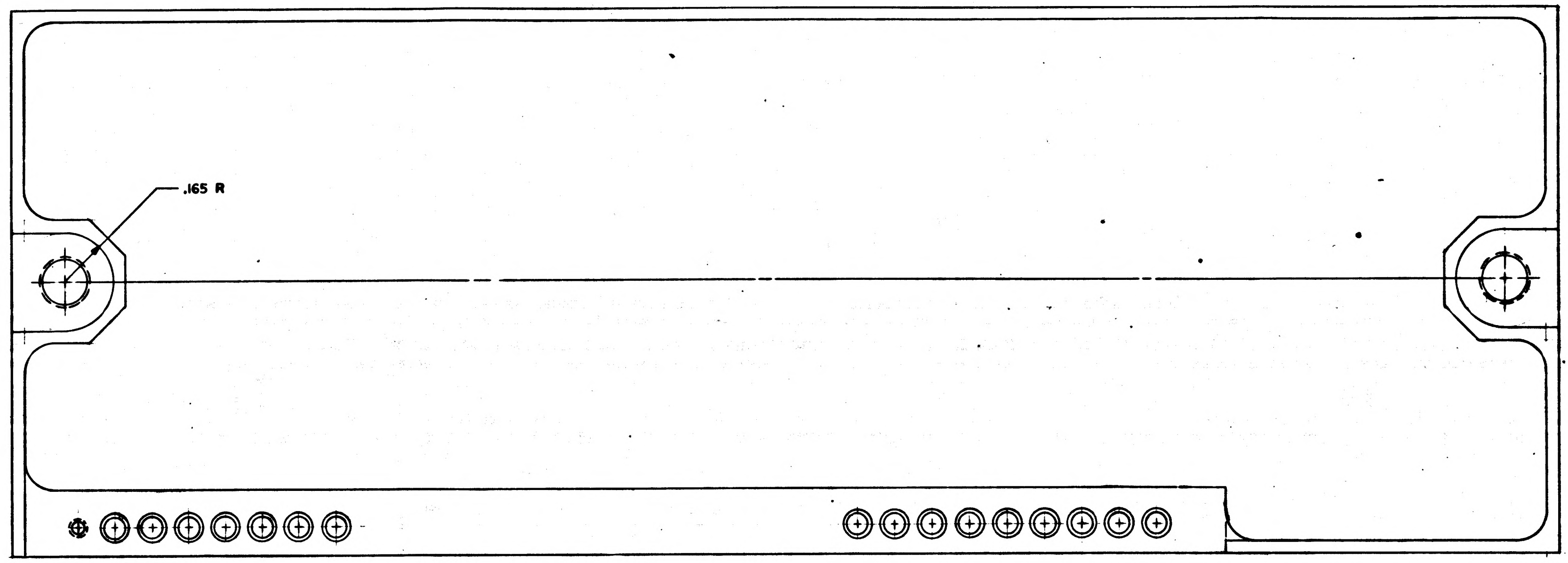

5.198
4.853
4.847
.040
TYP
.200
TYP
-B-
NO 8 (164) —32 UNC 2B
MOD MINOR DIA .143
.148
2 PLACES
1.825
.400
.200
TYP
.074
.079 DIA X .302
.322 DEEP
CSK 82° X .091 DIA
2 HOLES
6 SPACES AT .127
.123 = .752
.748
TOL-CUMULATIVE
.084
.092
.088
.271
2.502
2.498
2.627
2.623
2.752
2.748
2.877
2.873
3.002
2.998
3.127
3.123
3.252
3.248
3.377
3.373
3.502
3.498
3.907
3.903
1.125
1.271
32
⌒ .001
1.165
.125
.840
.50
.50
1.00
1.50
2.00
2.50
3.00
3.50

MASTER

1008512

NEXT ASSY USED ON

APPLICATION

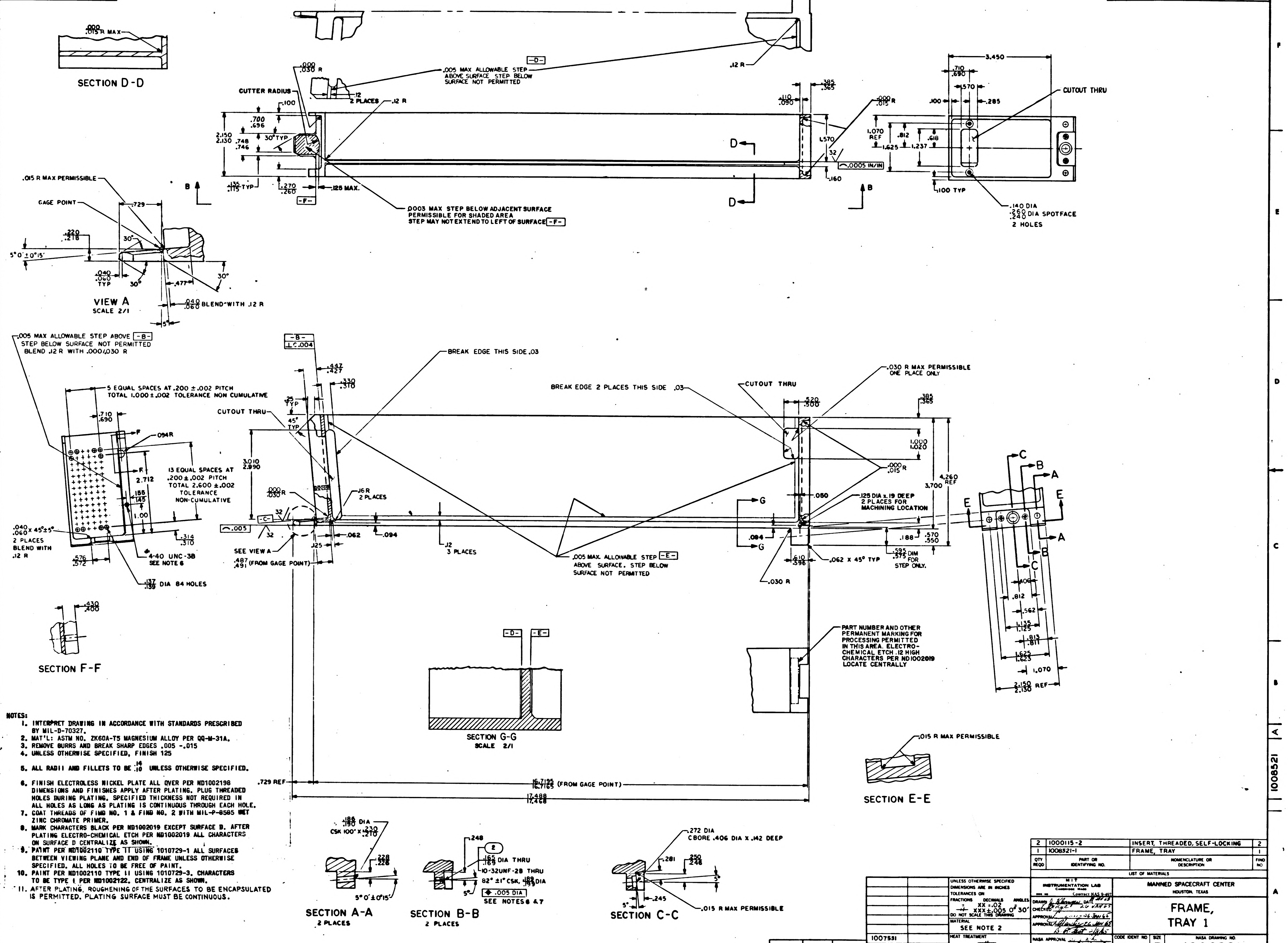


NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5 PER QQ-M-31
3. FINISH: ANODIZE PER MIL-M-45202 TYPE I, CLASS C
4. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX
5. REMOVE ALL BURRS AND BREAK SHARP EDGES .005/.015
6. UNLESS OTHERWISE SPECIFIED 125/ ALL OVER
7. IDENTIFY PER ND 1002019

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	AN MEM


SECTION D-D
.000 / .015 R MAX
-D-
.005 MAX ALLOWABLE STEP ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
.000 / .030 R
CUTTER RADIUS
.12 / 2 PLACES
.12 R
.100
.700 / .696
30° TYP
2.150 / 2.130
.748 / .746
.135 / .115 TYP
.270 / .260
-F-
.125 MAX.
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
D
B
.110 / .090
.385 / .365
.000 / .015 R
1.570
32
.0005 IN/IN
.160
1.070 REF
1.625
.812
1.237
.618
3.450
.710 / .690
.570
.100
.285
CUTOUT THRU
.100 TYP
.140 DIA
.260 / .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 / .218
30°
5° 0' ± 0° 15'
.040 / .060 TYP
.477
VIEW A
SCALE 2/1
.040 / .060 BLEND WITH .12 R
5°
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12 R WITH .000/.030 R
-B-
⊥ .004
.447 / .427
.330 / .310
BREAK EDGE THIS SIDE .03
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710 / .690
.094R
F
2.712
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
.155 / .145
1.00
.040 / .060 x 45° ± 5° 2 PLACES BLEND WITH .12 R
.576 / .572
.314 / .310
4-40 UNC-3B SEE NOTE 6
.137 / .139 DIA 84 HOLES
.25 TYP
45° TYP
CUTOUT THRU
3.010 / 2.990
.000 / .030 R
.16 R 2 PLACES
-C-
.005
32
SEE VIEW A
.487 / .491 (FROM GAGE POINT)
.125
.062
.094
.12 3 PLACES
BREAK EDGE 2 PLACES THIS SIDE .03
CUTOUT THRU
.520 / .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 / .365
1.000 / 1.020
.000 / .015 R
3.700
4.260 REF
.050
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
G
.084
.188
.570 / .550
.005 MAX. ALLOWABLE STEP -E- ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
.610 / .596
.062 x 45° TYP
.595 / .575 DIM FOR STEP ONLY.
.030 R
C
B
A
E
.406
.812
.562
1.135 / 1.125
1.813 / 1.811
1.625 / 1.623
1.070
2.150 / 2.130 REF
.430 / .400
SECTION F-F
-D-
-E-
SECTION G-G
SCALE 2/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 / 16.7165 (FROM GAGE POINT)
17.488 / 17.468
.186 / .190 DIA
CSK 100° x .230 / .210
.228 / .226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165 / .169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189 / .193 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 / .246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A.
3. REMOVE BURRS AND BREAK SHARP EDGES .005 -.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED.
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3. CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008521-1	FRAME, TRAY	1

LIST OF MATERIALS

SHEET 1	SHEET 2	SHEET 3
REVISION STATUS OF SHEETS		

NEXT ASSY	USED ON
1007531	
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN J. Klanger DATE 11 JAN 63
CHECKED L. Dodge 26 JAN 65
APPROVAL 26 JAN 65
APPROVAL 26 JAN 65
D. B. Test 2/18/65
NASA APPROVAL 2-6-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

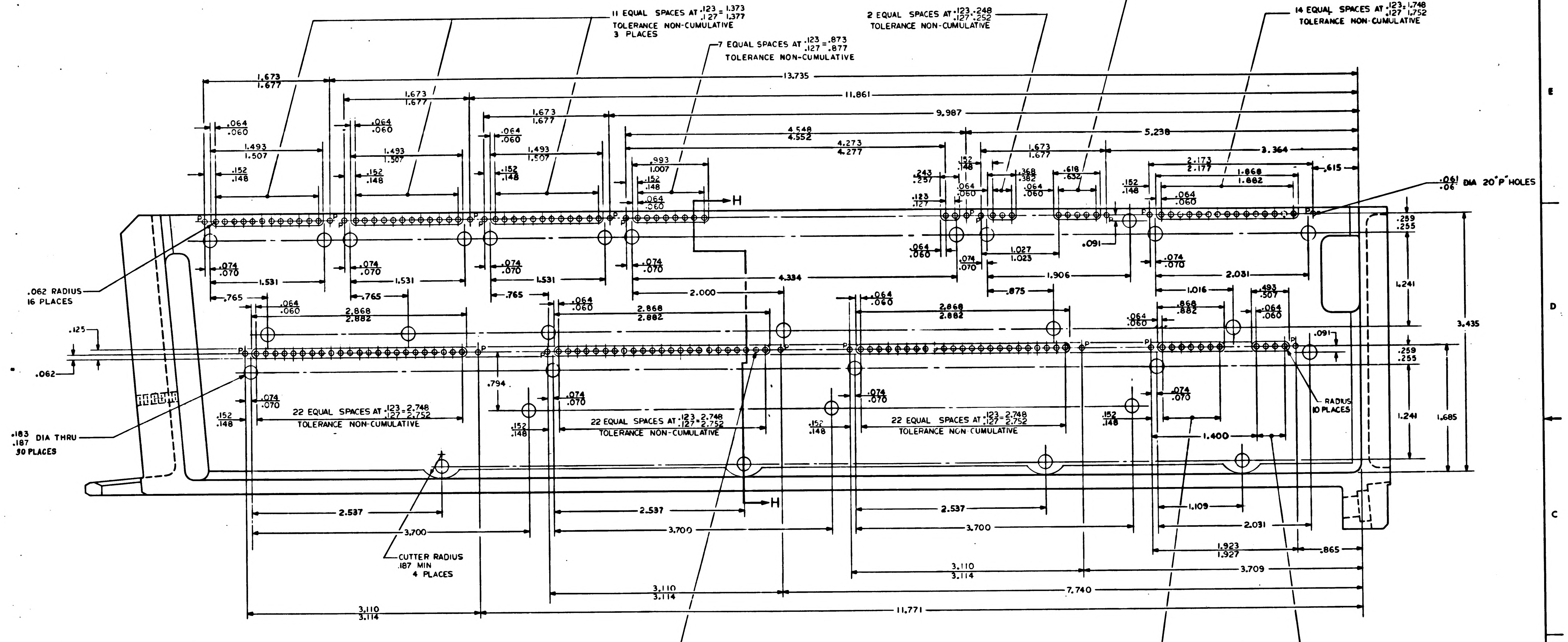
FRAME,
TRAY 1

CODE IDENT NO	SIZE	NASA DRAWING NO.
80230	E	1008521
SCALE 1/1	WT	SHEET 1 OF 3

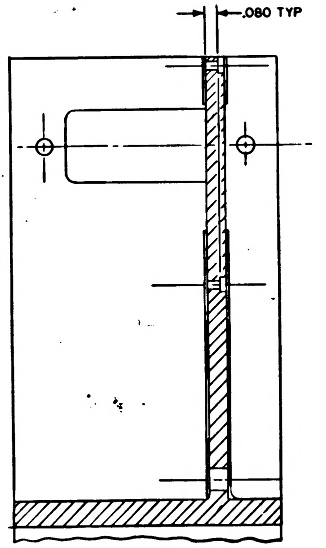
1008521 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	J.N. MEM


11 EQUAL SPACES AT .123 - 1.373 / .127 - 1.377
TOLERANCE NON-CUMULATIVE
3 PLACES
7 EQUAL SPACES AT .123 - .873 / .127 - .877
TOLERANCE NON-CUMULATIVE
2 EQUAL SPACES AT .123 - .248 / .127 - .252
TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .123 - .498 / .127 - .502
TOLERANCE NON-CUMULATIVE
14 EQUAL SPACES AT .123 - 1.748 / .127 - 1.752
TOLERANCE NON-CUMULATIVE
.061 / .065 DIA 20 "P" HOLES
13.735
11.861
9.987
5.238
3.364
.615
4.548 / 4.552
4.273 / 4.277
1.673 / 1.677
1.493 / 1.507
.064 / .060
.152 / .148
.993 / 1.007
.243 / .257
.123 / .127
.368 / .382
.618 / .632
2.173 / 2.177
1.868 / 1.882
H
.062 RADIUS
16 PLACES
.074 / .070
1.531
.765
4.334
2.000
1.027 / 1.023
.091
1.906
.875
2.031
1.016
.868 / .882
.493 / .507
.259 / .255
1.241
3.435
1.685
.125
.062
2.868 / 2.882
.794
.183 / .187 DIA THRU
30 PLACES
22 EQUAL SPACES AT .123 - 2.748 / .127 - 2.752
TOLERANCE NON-CUMULATIVE
RADIUS
10 PLACES
1.400
2.537
3.700
1.109
1.923 / 1.927
.865
CUTTER RADIUS
.187 MIN
4 PLACES
3.110 / 3.114
3.709
7.740
11.771
3 EQUAL SPACES AT .123 - .373 / .127 - .377
TOLERANCE NON-CUMULATIVE
.077 / .073 DIA 149 HOLES
6 EQUAL SPACES AT .123 - .752 / .127 - .748
TOLERANCE NON-CUMULATIVE

VIEW B-B
SCALE: 2:1



SECTION H-H
SCALE 2/1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN C. Kilmagan DATE 11 JAN 65
CHECKED K. Mikye 26 JAN 65
APPROVAL 26 JAN 65
APPROVAL D. Hamilton 26 JAN 65
2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 1

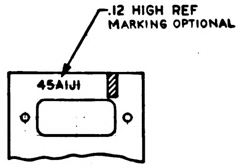
CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008521
SCALE 2:1
WT
SHEET 2 OF 3

1008521 A

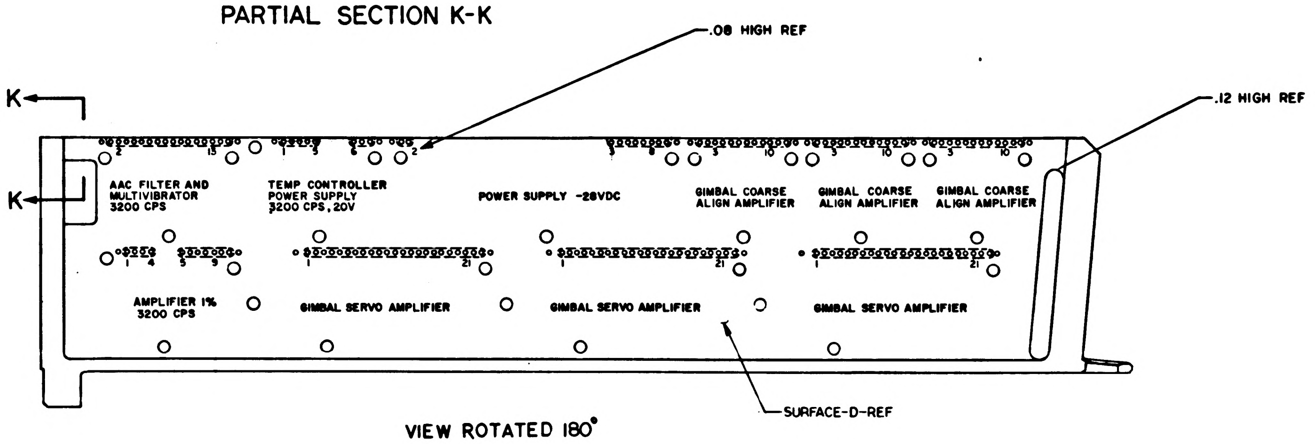
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008521

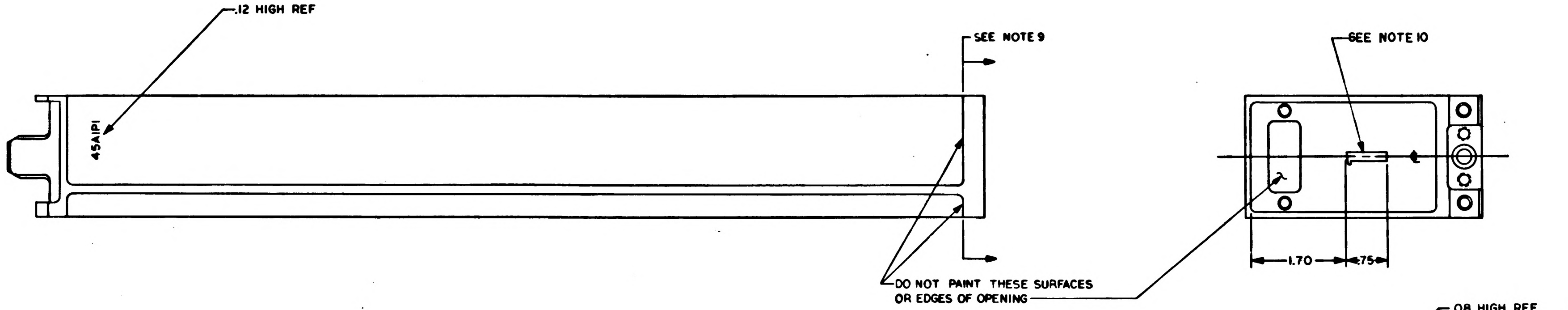
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 8692	5 MAY 65	AN

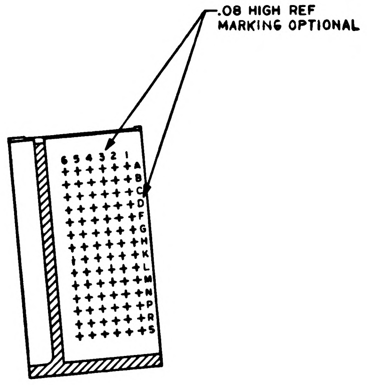

.12 HIGH REF
MARKING OPTIONAL
45A1J1

PARTIAL SECTION K-K

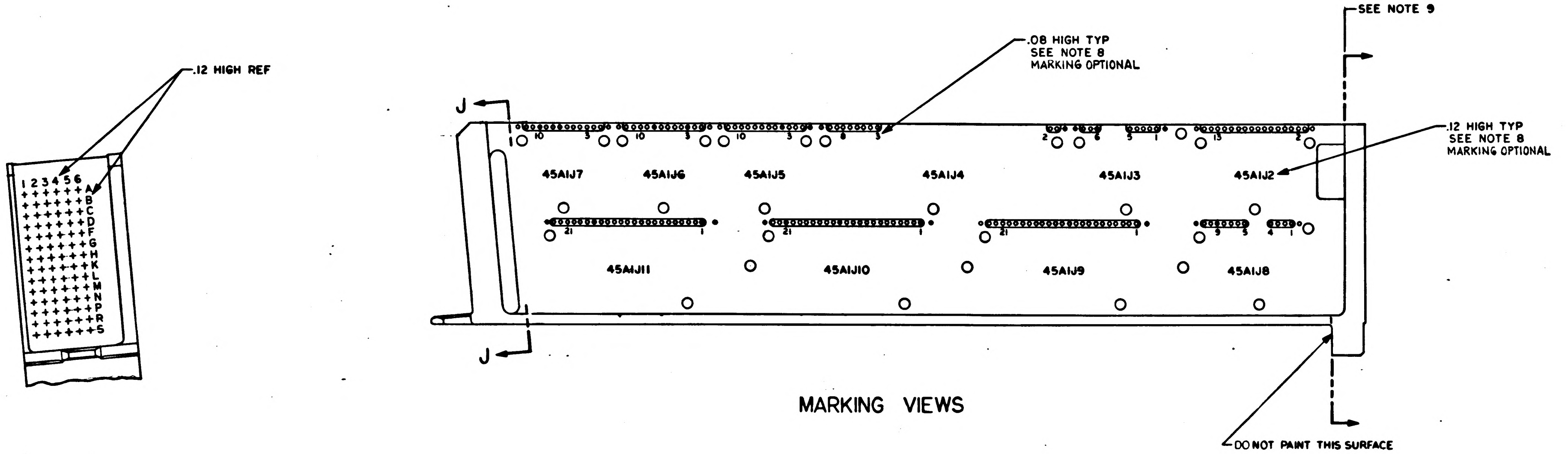

.08 HIGH REF
.12 HIGH REF
K
K
AAC FILTER AND MULTIVIBRATOR 3200 CPS
TEMP CONTROLLER POWER SUPPLY 3200 CPS, 20V
POWER SUPPLY -28VDC
GIMBAL COARSE ALIGN AMPLIFIER
GIMBAL COARSE ALIGN AMPLIFIER
GIMBAL COARSE ALIGN AMPLIFIER
AMPLIFIER 1% 3200 CPS
GIMBAL SERVO AMPLIFIER
GIMBAL SERVO AMPLIFIER
GIMBAL SERVO AMPLIFIER
SURFACE-D-REF

VIEW ROTATED 180°


.12 HIGH REF
45A1P1
SEE NOTE 9
SEE NOTE 10
DO NOT PAINT THESE SURFACES OR EDGES OF OPENING
1.70
.75


.08 HIGH REF
MARKING OPTIONAL
6 5 4 3 2 1
A B C D E F G H K L M N P R S

SECTION J-J


.12 HIGH REF
1 2 3 4 5 6
A B C D E F G H K L M N P R S
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
SEE NOTE 9
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
J
J
45A1J7
45A1J6
45A1J5
45A1J4
45A1J3
45A1J2
45A1J11
45A1J10
45A1J9
45A1J8
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

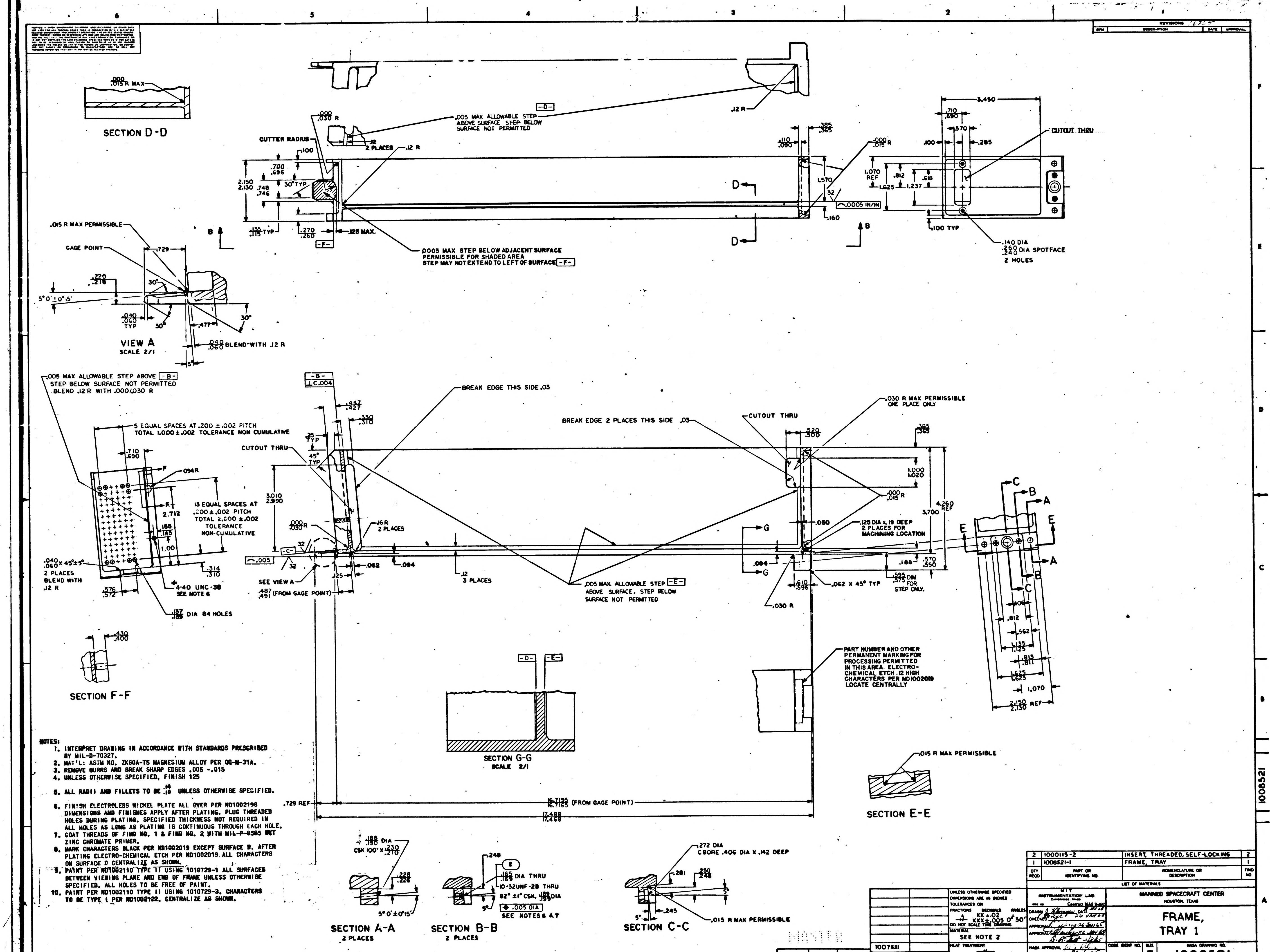
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN J. Klingner DATE 21 JAN 65
CHECKED [illegible] 26 JAN 65
APPROVAL [illegible] 26 JAN 65
APPROVAL [illegible] 26 JAN 65
[illegible] 2/8/65
NASA APPROVAL [illegible] 2-6-65
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 1

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008521
SCALE 1/1
WT
SHEET 3 OF 3


SECTION D-D
VIEW A
SCALE 2/1
SECTION F-F
SECTION G-G
SCALE 2/1
SECTION E-E
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
SECTION C-C
CUTTER RADIUS
CUTOUT THRU
GAGE POINT
.005 MAX ALLOWABLE STEP ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12 R WITH .000/.030 R
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 84 HOLES
4-40 UNC-3B SEE NOTE 6
BREAK EDGE THIS SIDE .03
BREAK EDGE 2 PLACES THIS SIDE .03
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
SEE VIEW A
.272 DIA CBORE .406 DIA X .142 DEEP
10-32UNF-2B THRU
SEE NOTES 6 & 7
1008521

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A.
3. REMOVE BURRS AND BREAK SHARP EDGES .005 -.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED.
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. ~~PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.~~
10. PAINT PER ND1002110 TYPE II USING 1010729-3. CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008521-1	FRAME, TRAY	1

LIST OF MATERIALS

SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

NEXT ASSY	USED ON
1007531	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN J. Klinger DATE 21 JAN 63
CHECKED 26 JAN 63
APPROVAL 26 JAN 65
APPROVAL 26 JAN 65
2/8/65
NASA APPROVAL 2-6-63
MIT APPROVAL 9 Feb 65

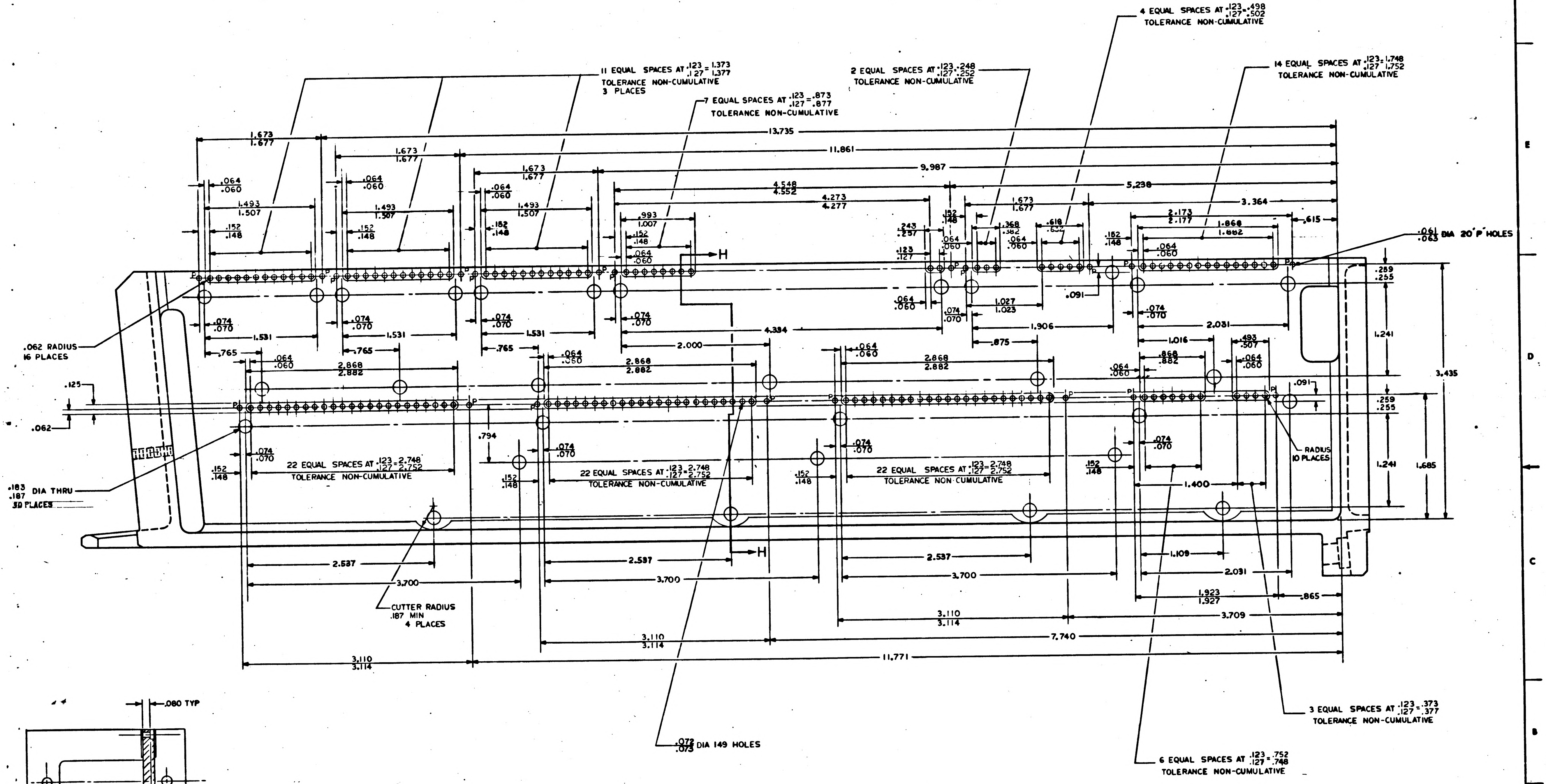
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 1

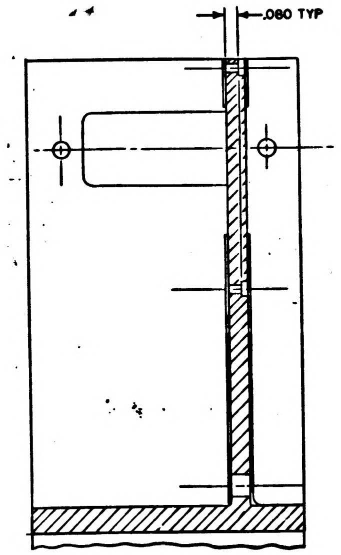
CODE IDENT NO. SIZE E NASA DRAWING NO. 1008521
SCALE 1/1 WT SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 6255			
SYM	DESCRIPTION	DATE	APPROVAL


11 EQUAL SPACES AT .123/.127 = 1.373/1.377
TOLERANCE NON-CUMULATIVE
3 PLACES
7 EQUAL SPACES AT .123/.127 = .873/.877
TOLERANCE NON-CUMULATIVE
2 EQUAL SPACES AT .123/.127 = .248/.252
TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .123/.127 = .498/.502
TOLERANCE NON-CUMULATIVE
14 EQUAL SPACES AT .123/.127 = 1.748/1.752
TOLERANCE NON-CUMULATIVE
13.735
11.861
9.987
5.238
3.364
4.548/4.552
4.273/4.277
1.673/1.677
1.493/1.507
.064/.060
.152/.148
.993/1.007
.243/.257
.123/.127
.368/.382
.618/.632
2.173/2.177
1.868/1.882
.615
.061/.063 DIA 20 "P" HOLES
H
.289/.255
.091
1.027/1.023
.074/.070
1.531
.765
1.906
2.031
4.334
2.000
.875
1.016
.868/.882
.493/.507
1.241
3.435
.259/.255
1.685
.062 RADIUS
16 PLACES
.125
.062
2.868/2.882
.794
22 EQUAL SPACES AT .123/.127 = 2.748/2.752
TOLERANCE NON-CUMULATIVE
.183/.187 DIA THRU
30 PLACES
RADIUS
10 PLACES
1.400
2.537
3.700
CUTTER RADIUS
.187 MIN
4 PLACES
1.109
1.923/1.927
.865
3.110/3.114
3.709
7.740
11.771
3 EQUAL SPACES AT .123/.127 = .373/.377
TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .123/.127 = .752/.748
TOLERANCE NON-CUMULATIVE
.072/.075 DIA 149 HOLES

VIEW B-B
SCALE: 2:1



SECTION H-H
SCALE 2/1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX±.02 XXX±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO Contract NAS 9-497
DRAWN C. Kilroy DATE 21 JAN 65
CHECKED 26 JAN 65
APPROVAL 26 JAN 65
APPROVAL 26 JAN 65
D. Bt 2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 2/8/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

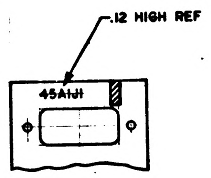
FRAME,
TRAY 1

CODE IDENT NO. | SIZE E | NASA DRAWING NO 1008521
SCALE 2:1 | WT | SHEET 2 OF 3

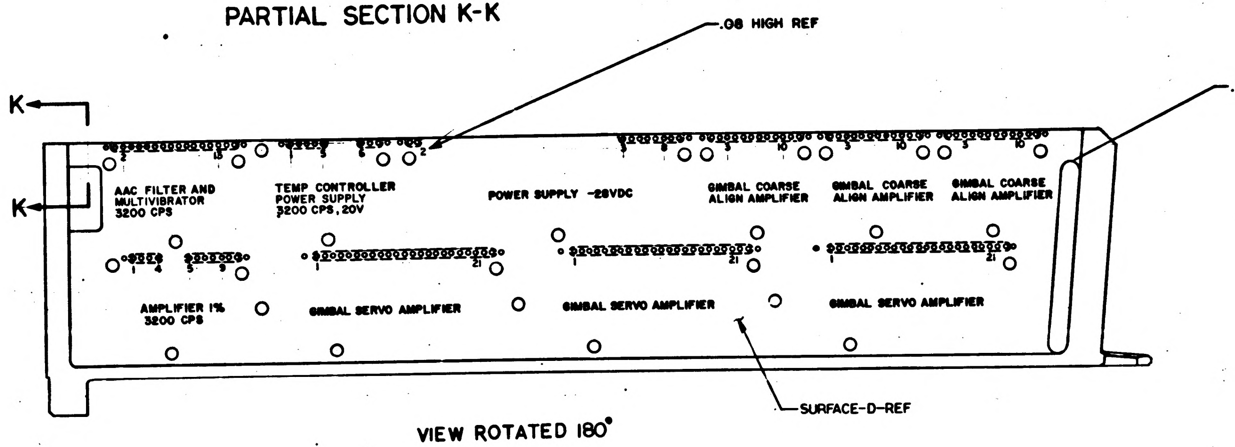
1008521

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

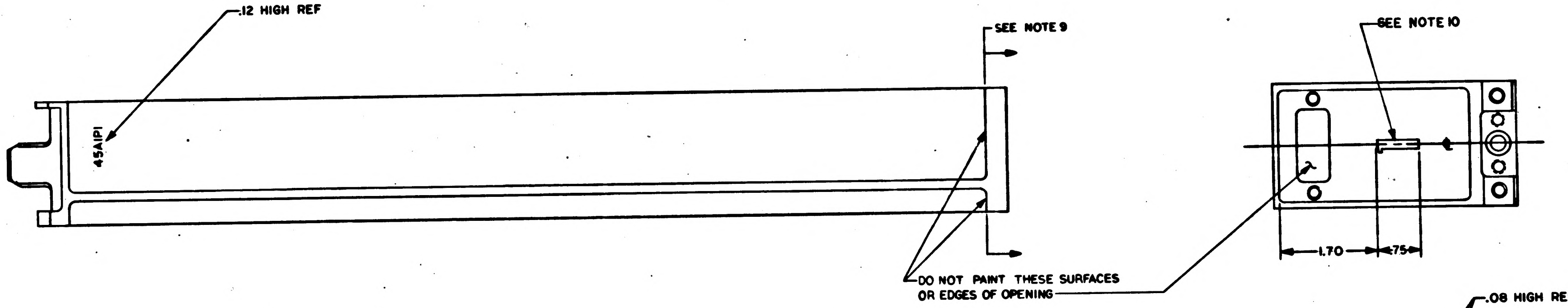
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

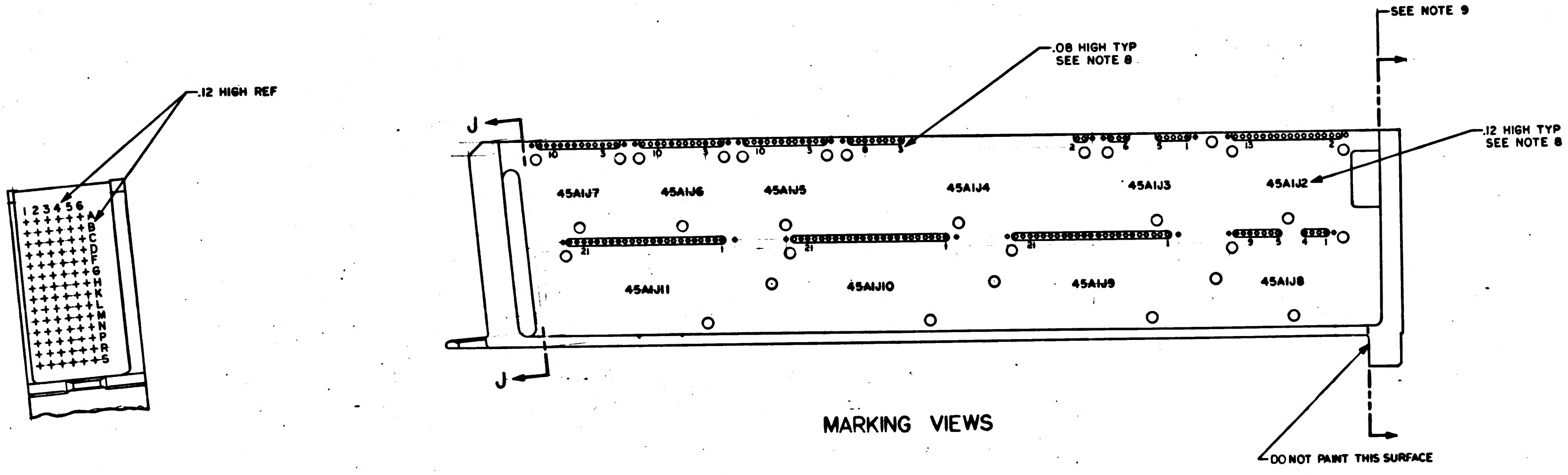

.12 HIGH REF
45A1J1

PARTIAL SECTION K-K

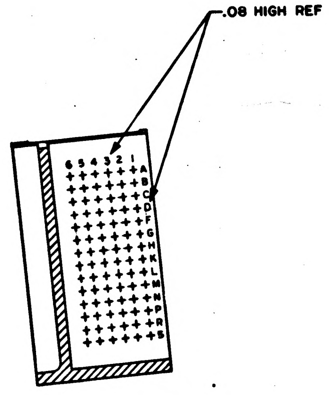

.08 HIGH REF
.12 HIGH REF
K
K
AAC FILTER AND MULTIVIBRATOR 3200 CPS
TEMP CONTROLLER POWER SUPPLY 3200 CPS, 20V
POWER SUPPLY -28VDC
GIMBAL COARSE ALIGN AMPLIFIER
GIMBAL COARSE ALIGN AMPLIFIER
GIMBAL COARSE ALIGN AMPLIFIER
AMPLIFIER 1% 3200 CPS
GIMBAL SERVO AMPLIFIER
GIMBAL SERVO AMPLIFIER
GIMBAL SERVO AMPLIFIER
SURFACE-D-REF

VIEW ROTATED 180°


.12 HIGH REF
45A1P1
SEE NOTE 9
SEE NOTE 10
1.70
.75
DO NOT PAINT THESE SURFACES OR EDGES OF OPENING


.12 HIGH REF
1 2 3 4 5 6
A B C D E F G H J K L M N P R S
.08 HIGH TYP SEE NOTE 8
SEE NOTE 9
.12 HIGH TYP SEE NOTE 8
J
J
45A1J7
45A1J6
45A1J5
45A1J4
45A1J3
45A1J2
45A1J11
45A1J10
45A1J9
45A1J8
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
6 5 4 3 2 1
A B C D E F G H J K L M N P R S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN J. Klinger DATE 21 JAN 65
CHECKED T. Whitye 26 JAN 65
APPROVAL R Oglberg 26 JAN 65
APPROVAL 26 JAN 65
2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 Feb 65

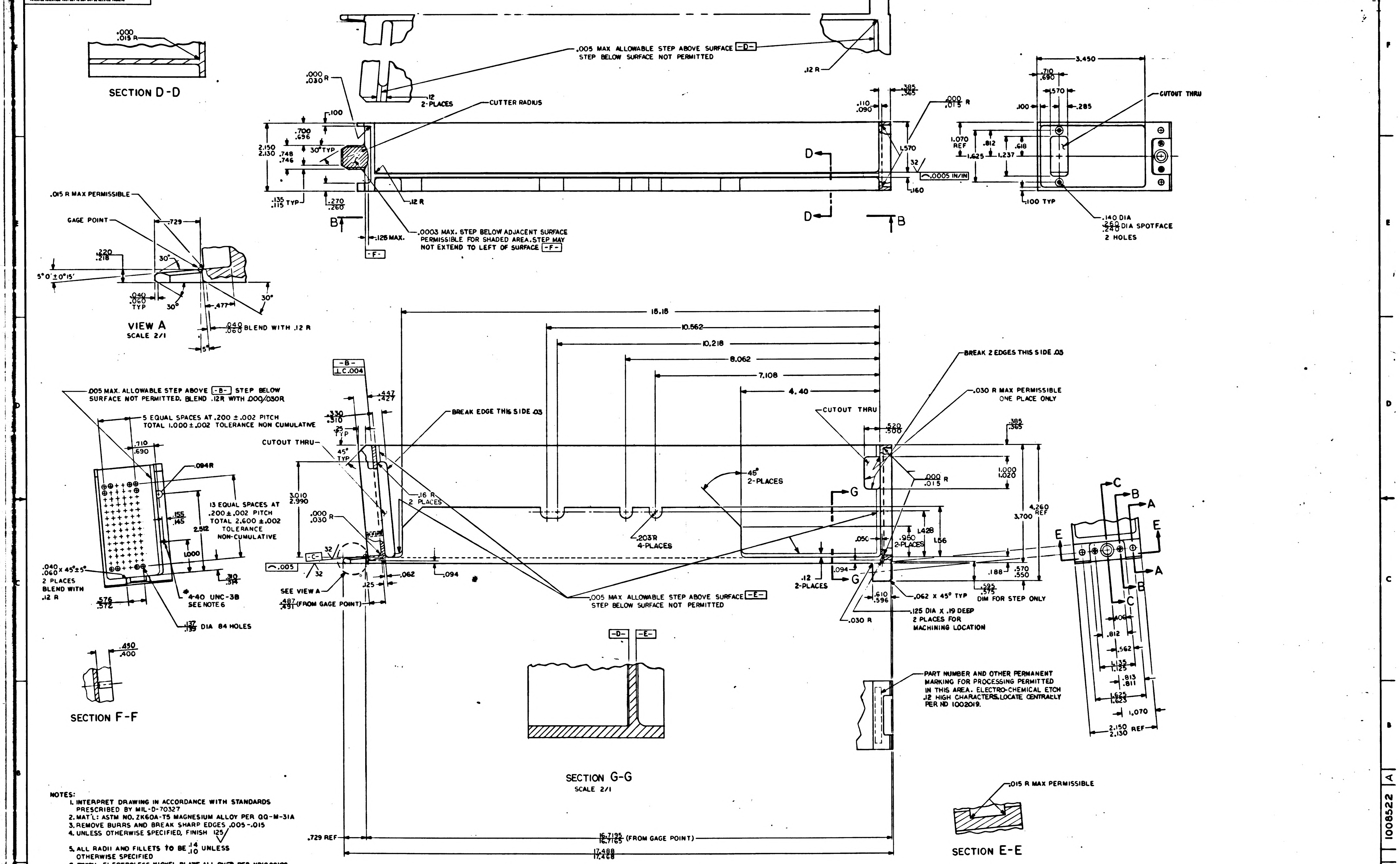
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 1

CODE IDENT NO. SIZE E NASA DRAWING NO. 1008521
SCALE 1/1 WT SHEET 3 OF 3

1008521

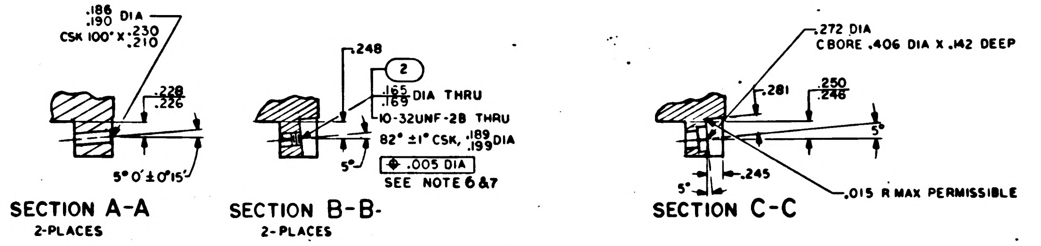
REVISIONS 1/6/2-65			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	



SECTION D-D
.000
.015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.000
.030 R
.12
2-PLACES
CUTTER RADIUS
.100
.700
.696
2.150
2.130
.748
.746
30° TYP
.135
.115 TYP
.270
.260
.12 R
B
.126 MAX.
-F-
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.110
.090
.385
.365
.000
.015 R
1.570
D
32
.0005 IN/IN
.160
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.250
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5° 0' ± 0° 15'
.040
.060
TYP
.477
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
15.18
10.562
10.218
8.062
7.108
4.40
-B-
⊥C.004
.447
.427
.330
.310
.25 TYP
CUTOUT THRU
45° TYP
BREAK EDGE THIS SIDE .03
.005 MAX. ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED. BLEND .12R WITH .000/.030R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710
.690
.094R
13 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 2.600 ± .002
TOLERANCE NON-CUMULATIVE
.155
.145
2.512
1.000
.040
.060 X 45° ± 5°
2 PLACES
BLEND WITH .12 R
.576
.572
4-40 UNC-3B
SEE NOTE 6
.310
.314
.137
.139 DIA 84 HOLES
3.010
2.990
.000
.030 R
.16 R
2 PLACES
32
-C-
.005
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125
.062
.094
.203R
4-PLACES
45°
2-PLACES
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
BREAK 2 EDGES THIS SIDE .03
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
CUTOUT THRU
.520
.500
.385
.365
.000
.015 R
1.000
1.020
3.700
4.260 REF
G
.050
.950
2-PLACES
1.428
1.56
.12
2-PLACES
.094
.610
.596
.062 X 45° TYP
.188
.570
.550
.595
.575
DIM FOR STEP ONLY
.030 R
.125 DIA X .19 DEEP
2 PLACES FOR
MACHINING LOCATION
C
B
A
E
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
.450
.400
SECTION F-F
-D-
-E-
SECTION G-G
SCALE 2/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS. LOCATE CENTRALLY PER ND 1002019.
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.14}{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURACE D. AFTER PLATING ELECTRO CHEMICAL ETCH ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTER TO BE TYPE I PER ND 1002122, CENTRALIZE AS SHOWN
11. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.



.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5° 0' ± 0° 15'
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189
.199 DIA
⌖ .005 DIA
SEE NOTE 6 & 7
5°
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
.245
.015 R MAX PERMISSIBLE

SECTION A-A
2-PLACES

SECTION B-B-
2-PLACES

SECTION C-C

2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008522-001	FRAME, TRAY	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007532	
NEXT ASSY	USED ON
APPLICATION	

SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN DATE 26 JAN 65
CHECKED 26 JAN 65
APPROVAL 26 JAN 65
APPROVAL 26 JAN 65
2/8/65
NASA APPROVAL 2-5-65
MIT APPROVAL 9 FEB 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 2

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008522
SCALE 1/1
WT
SHEET 1 OF 3

1008522 A

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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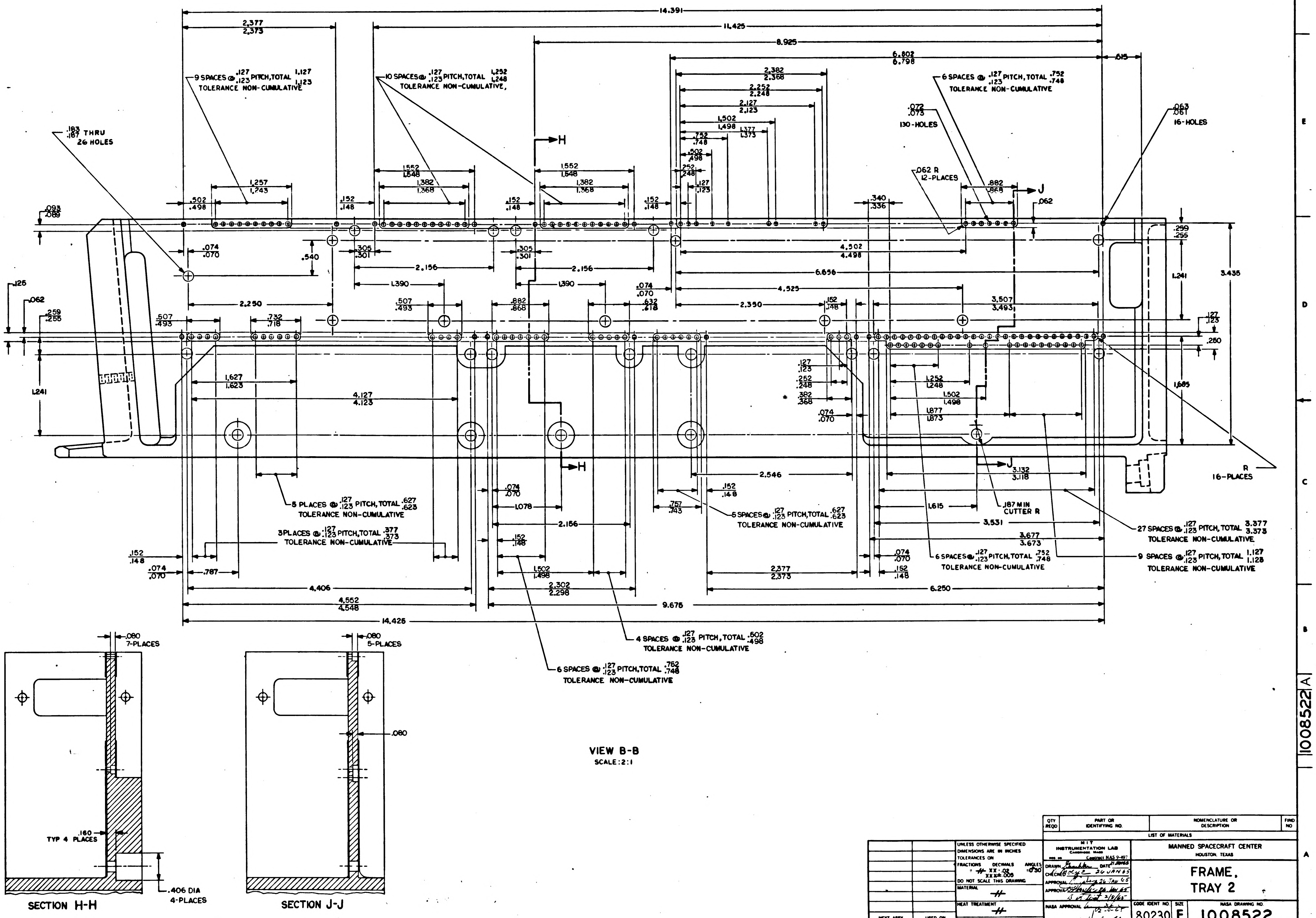

14.391
11.425
8.925
6.802
6.798
.615
2.377
2.373
9 SPACES @ .127 .123 PITCH, TOTAL 1.127 1.123
TOLERANCE NON-CUMULATIVE
10 SPACES @ .127 .123 PITCH, TOTAL 1.252 1.248
TOLERANCE NON-CUMULATIVE,
6 SPACES @ .127 .123 PITCH, TOTAL .752 .748
TOLERANCE NON-CUMULATIVE
.183 .187 THRU
26 HOLES
.072 .073
130-HOLES
.063 .061
16-HOLES
.062 R
12-PLACES
2.382 2.368
2.252 2.248
2.127 2.123
1.502 1.498
1.377 1.373
.752 .748
.502 .498
.252 .248
.127 .123
1.552 1.548
1.382 1.368
1.257 1.243
.502 .498
.152 .148
.093 .089
.340 .336
.882 .868
.062
.259 .255
1.241
3.435
.074 .070
.540
.305 .301
2.156
1.390
2.250
4.502 4.498
6.656
4.525
2.350
3.507 3.493
.632 .618
.507 .493
.732 .718
.125
.062
.127 .123
.250
1.685
1.627 1.623
4.127 4.123
.382 .368
1.252 1.248
1.877 1.873
H
J
R
16-PLACES
3.132 3.118
.187 MIN
CUTTER R
2.546
1.615
3.531
3.677 3.673
5 PLACES @ .127 .123 PITCH, TOTAL .627 .623
TOLERANCE NON-CUMULATIVE
3 PLACES @ .127 .123 PITCH, TOTAL .377 .373
TOLERANCE NON-CUMULATIVE
5 SPACES @ .127 .123 PITCH, TOTAL .627 .623
TOLERANCE NON-CUMULATIVE
.757 .743
1.078
27 SPACES @ .127 .123 PITCH, TOTAL 3.377 3.373
TOLERANCE NON-CUMULATIVE
6 SPACES @ .127 .123 PITCH, TOTAL .752 .748
TOLERANCE NON-CUMULATIVE
9 SPACES @ .127 .123 PITCH, TOTAL 1.127 1.128
TOLERANCE NON-CUMULATIVE
.787
4.406
4.552 4.548
14.425
2.302 2.298
9.675
2.377 2.373
6.250
4 SPACES @ .127 .123 PITCH, TOTAL .502 .498
TOLERANCE NON-CUMULATIVE
6 SPACES @ .127 .123 PITCH, TOTAL .752 .748
TOLERANCE NON-CUMULATIVE
.080
7-PLACES
.080
5-PLACES
.080
.160
TYP 4 PLACES
.406 DIA
4-PLACES
SECTION H-H
SECTION J-J

VIEW B-B
SCALE: 2:1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 XXX ± .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN Gaskin DATE 21 JAN 65
CHECKED Holze 26 JAN 65
APPROVAL 26 JAN 65
APPROVAL 26 JAN 65
2/8/65
NASA APPROVAL 2-5-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 2

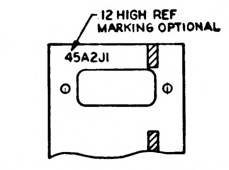
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008522
SCALE 2:1
WT
SHEET 2 OF 3

1008522 A

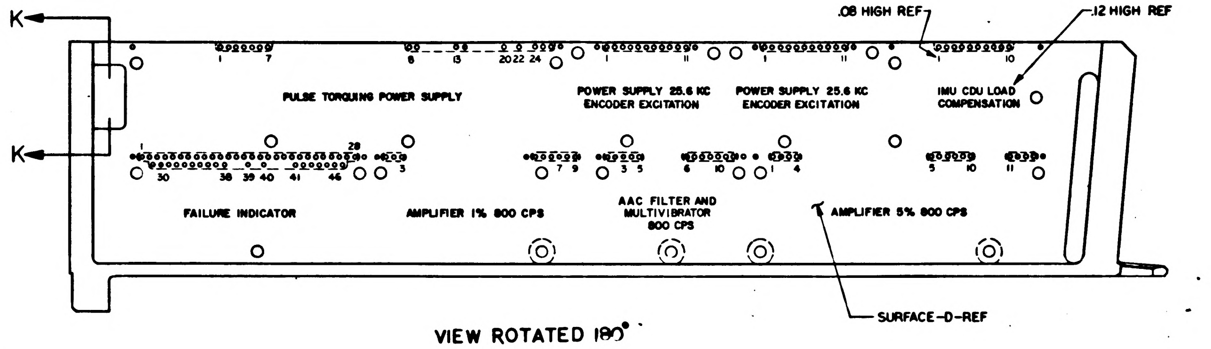
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

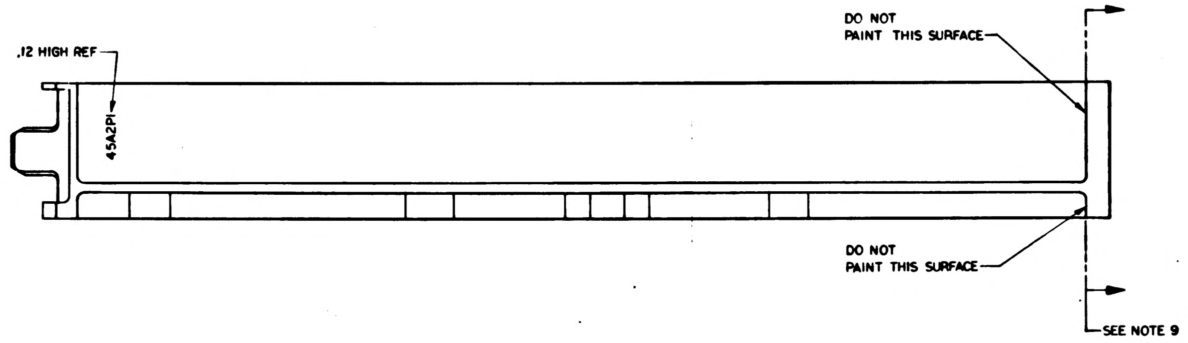
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	

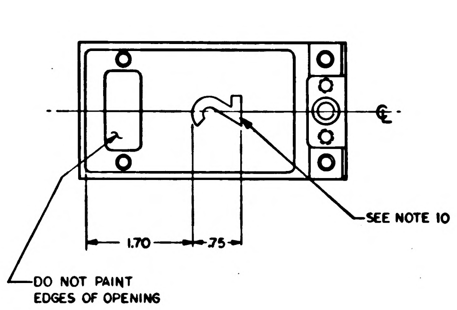

.12 HIGH REF
MARKING OPTIONAL
45A2J1

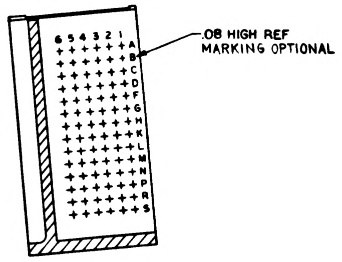
PARTIAL SECTION K-K


K
K
.08 HIGH REF
.12 HIGH REF
1
7
8
13
20 22 24
1
11
1
11
1
10
PULSE TORQUING POWER SUPPLY
POWER SUPPLY 25.6 KC
ENCODER EXCITATION
POWER SUPPLY 25.6 KC
ENCODER EXCITATION
IMU CDU LOAD
COMPENSATION
1
28
30
38 39 40
41
46
3
7 9
3 5
6
10
1 4
5
10
11
FAILURE INDICATOR
AMPLIFIER 1% 800 CPS
AAC FILTER AND
MULTIVIBRATOR
800 CPS
AMPLIFIER 5% 800 CPS
SURFACE-D-REF

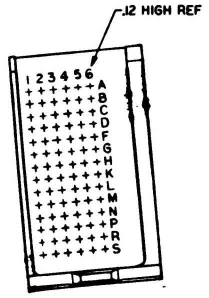
VIEW ROTATED 180°

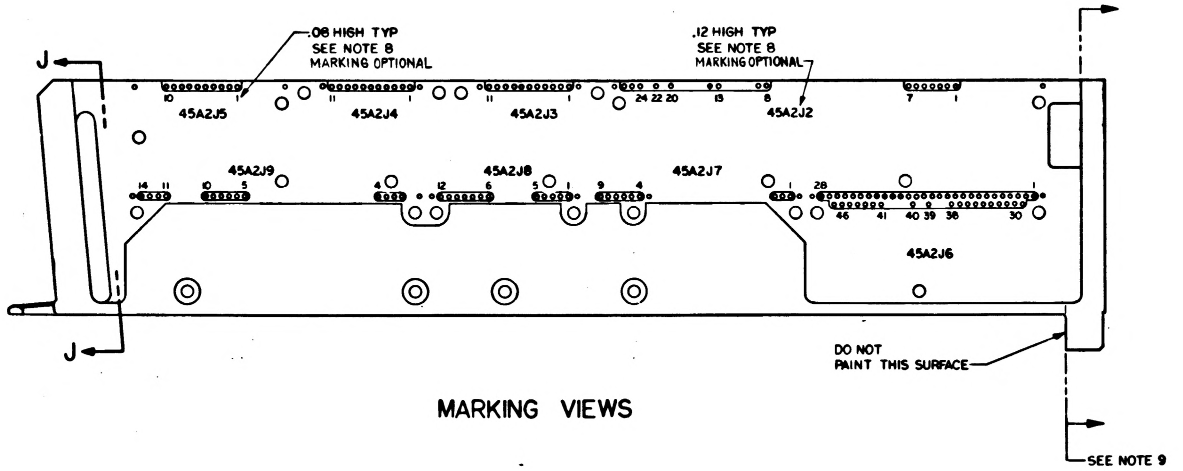

.12 HIGH REF
45A2P1
DO NOT
PAINT THIS SURFACE
DO NOT
PAINT THIS SURFACE
SEE NOTE 9


℄
1.70
.75
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING


.08 HIGH REF
MARKING OPTIONAL
6 5 4 3 2 1
A
B
C
D
E
F
G
H
J
K
L
M
N
P

SECTION J-J


.12 HIGH REF
1 2 3 4 5 6
A
B
C
D
E
F
G
H
J
K
L
M
N
P
R
S


.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
J
J
10
1
45A2J5
11
1
45A2J4
11
1
45A2J3
24 22 20
13
8
45A2J2
7
1
45A2J9
14
11
10
5
45A2J8
4
12
6
5
1
9
4
45A2J7
1
28
1
46
41
40 39
38
30
45A2J6
DO NOT
PAINT THIS SURFACE
SEE NOTE 9

MARKING VIEWS

1008522 A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX± .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

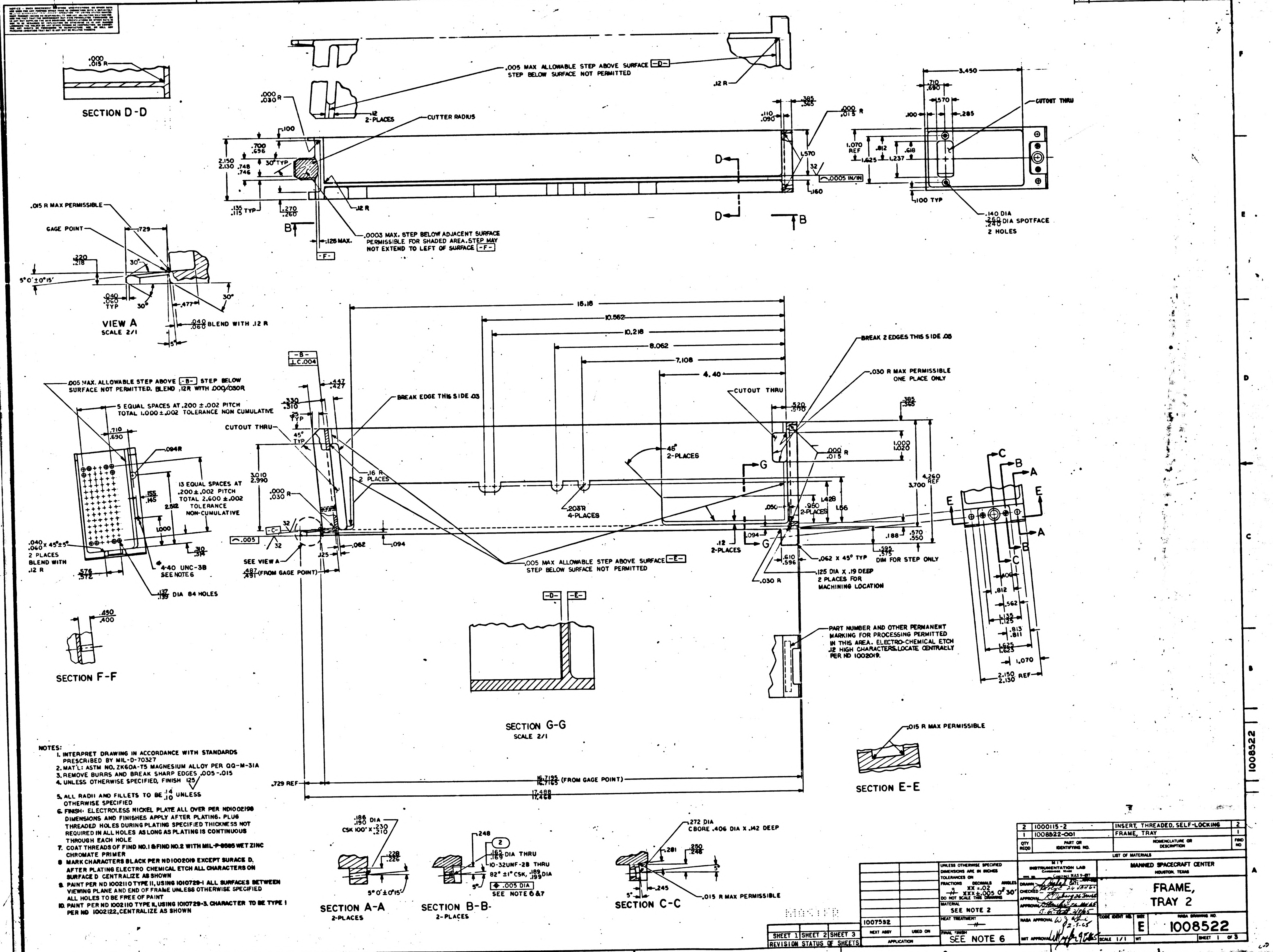
M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497

DRAWN DATE 26-Jan-65
CHECKED 26 JAN 65
APPROVAL 26 JAN 65
APPROVAL 26 JAN 65
2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 FEB 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 2

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008522
SCALE 1/1
WT
SHEET 3 OF 3


REVISIONS 16265
SECTION D-D
VIEW A
SCALE 2/1
SECTION F-F
SECTION G-G
SCALE 2/1
SECTION E-E
SECTION A-A
2-PLACES
SECTION B-B
2-PLACES
SECTION C-C
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
CUTTER RADIUS
CUTOUT THRU
.140 DIA .250 .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.040 .060 BLEND WITH .12 R
.005 MAX. ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED. BLEND .12R WITH .000/.030R
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3B SEE NOTE 6
.137 .139 DIA 84 HOLES
BREAK EDGE THIS SIDE .03
BREAK 2 EDGES THIS SIDE .05
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
DIM FOR STEP ONLY
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS. LOCATE CENTRALLY PER ND 1002019.
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
.186 .190 DIA CSK 100° X .230 .210
.165 .169 DIA THRU
10-32UNF-2B THRU 82° ±1° CSK, .189 .199 DIA
.005 DIA SEE NOTE 6 & 7
.272 DIA CBORE .406 DIA X .142 DEEP
1008522

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURACE D, AFTER PLATING ELECTRO CHEMICAL ETCH ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTER TO BE TYPE I PER ND 1002122, CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008522-001	FRAME, TRAY	1

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

NEXT ASSY 1007532
USED ON
APPLICATION

SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN [illegible] DATE
CHECKED [illegible] 24 JAN 65
APPROVAL K Osberg 26 Jan 65
APPROVAL [illegible] 26 Jan 65
G. G. [illegible] 2/8/65
NASA APPROVAL W J [illegible] 2-5-65
MIT APPROVAL [illegible]

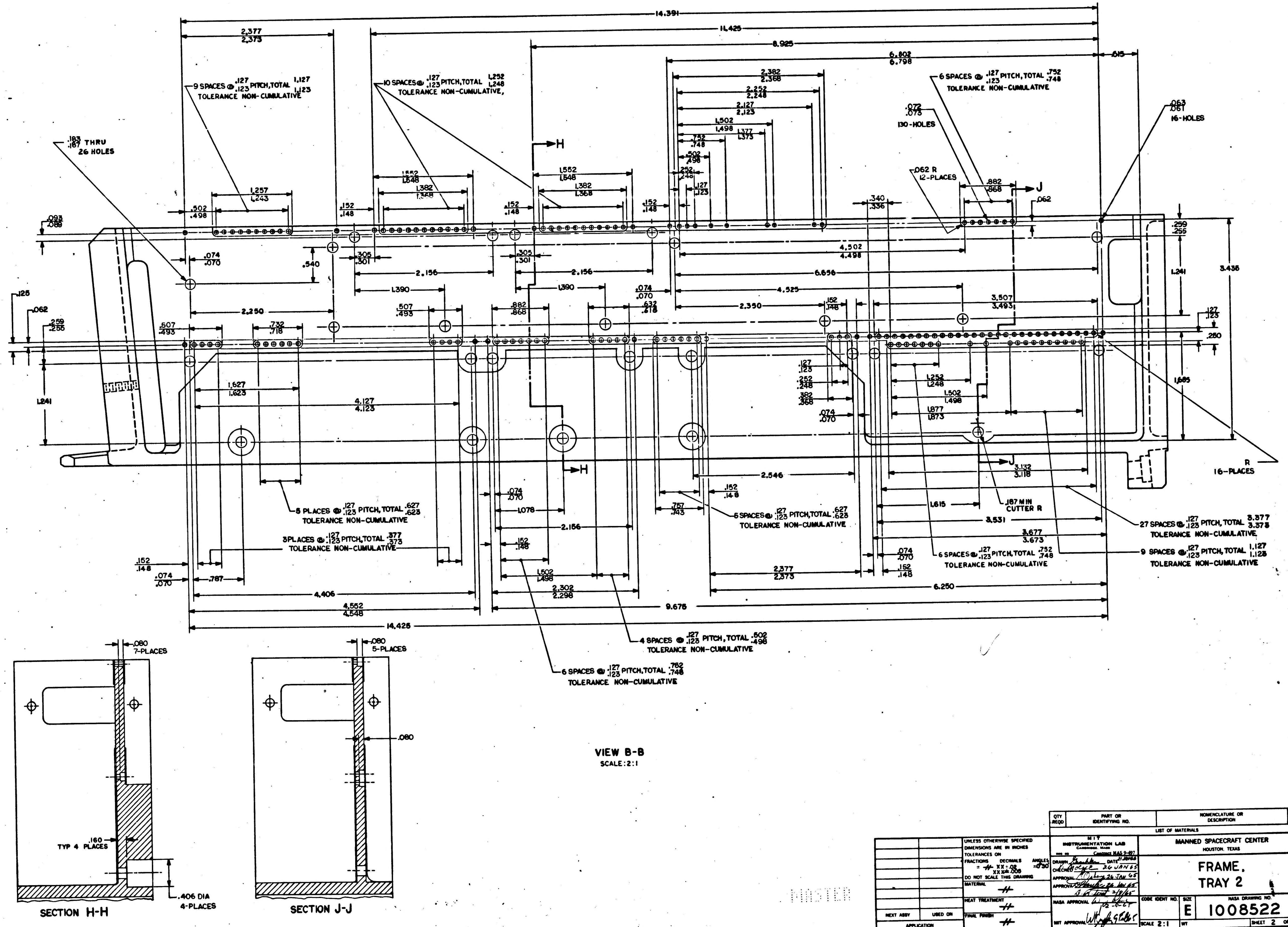
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 2

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008522
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


14.391
11.425
8.925
6.802 / 6.798
.615
2.377 / 2.373
9 SPACES @ .127/.123 PITCH, TOTAL 1.127/1.123 TOLERANCE NON-CUMULATIVE
10 SPACES @ .127/.123 PITCH, TOTAL 1.252/1.248 TOLERANCE NON-CUMULATIVE,
2.382 / 2.368
2.252 / 2.248
2.127 / 2.123
1.502 / 1.498
1.377 / 1.373
.752 / .748
.502 / .498
.252 / .248
.127 / .123
6 SPACES @ .127/.123 PITCH, TOTAL .752/.748 TOLERANCE NON-CUMULATIVE
.072 / .073 130-HOLES
.063 / .061 16-HOLES
.183 / .187 THRU 26 HOLES
H
1.552 / 1.548
1.382 / 1.368
1.257 / 1.243
.502 / .498
.152 / .148
.093 / .089
.062 R 12-PLACES
.882 / .868
J
.062
.340 / .336
.259 / .255
.074 / .070
.540
.305 / .301
2.156
1.390
4.502 / 4.498
6.656
1.241
3.436
4.525
2.350
3.507 / 3.493
.125
.062
.259 / .255
.507 / .493
.732 / .718
2.250
.882 / .868
.632 / .618
.127 / .123
.250
1.627 / 1.623
4.127 / 4.123
1.241
.127 / .123
.252 / .248
.382 / .368
.074 / .070
1.252 / 1.248
1.502 / 1.498
1.877 / 1.873
1.685
R 16-PLACES
3.132 / 3.118
.187 MIN CUTTER R
2.546
.152 / .148
.757 / .743
5 SPACES @ .127/.123 PITCH, TOTAL .627/.623 TOLERANCE NON-CUMULATIVE
5 PLACES @ .127/.123 PITCH, TOTAL .627/.623 TOLERANCE NON-CUMULATIVE
3 PLACES @ .127/.123 PITCH, TOTAL .377/.373 TOLERANCE NON-CUMULATIVE
.074 / .070
1.078
2.156
.152 / .148
1.502 / 1.498
2.302 / 2.298
1.615
3.531
3.677 / 3.673
27 SPACES @ .127/.123 PITCH, TOTAL 3.377/3.373 TOLERANCE NON-CUMULATIVE
9 SPACES @ .127/.123 PITCH, TOTAL 1.127/1.123 TOLERANCE NON-CUMULATIVE
6 SPACES @ .127/.123 PITCH, TOTAL .752/.748 TOLERANCE NON-CUMULATIVE
.787
2.377 / 2.373
6.250
4.406
4.552 / 4.548
9.676
14.428
4 SPACES @ .127/.123 PITCH, TOTAL .502/.498 TOLERANCE NON-CUMULATIVE
6 SPACES @ .127/.123 PITCH, TOTAL .762/.748 TOLERANCE NON-CUMULATIVE
.080 7-PLACES
.080 5-PLACES
.080
.160 TYP 4 PLACES
.406 DIA 4-PLACES
VIEW B-B
SCALE: 2:1
SECTION H-H
SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ± .02 XXX ± .005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN Franklin DATE 21 JAN 65
CHECKED 26 JAN 65
APPROVAL 26 JAN 65
APPROVAL 26 JAN 65
2/8/65
NASA APPROVAL 02-5-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 2

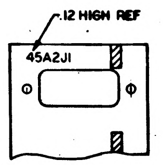
CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008522
SCALE 2:1 | WT | SHEET 2 OF 3

1008522

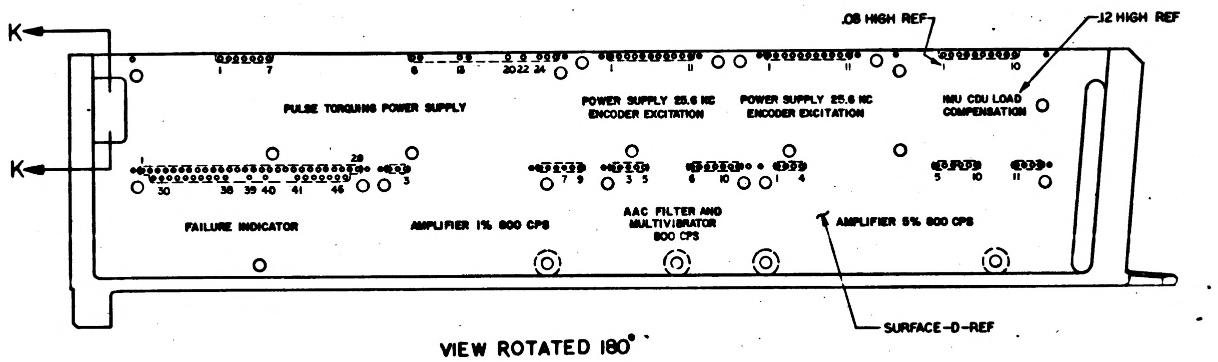
MASTER

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

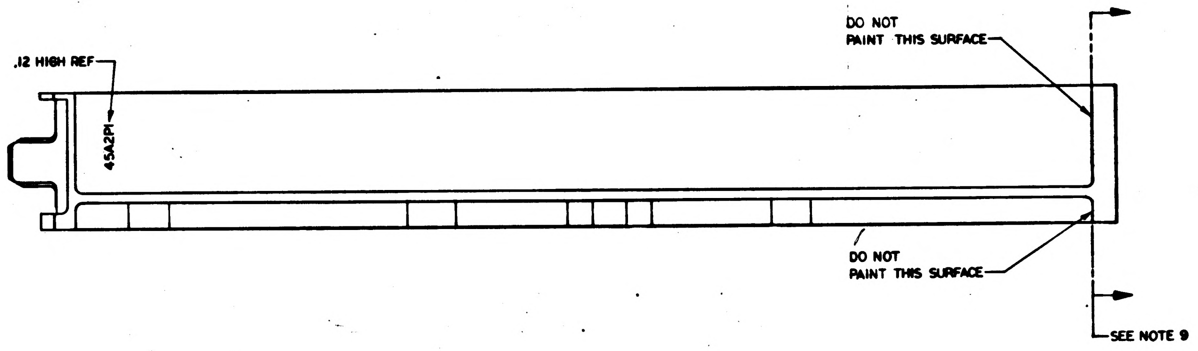
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

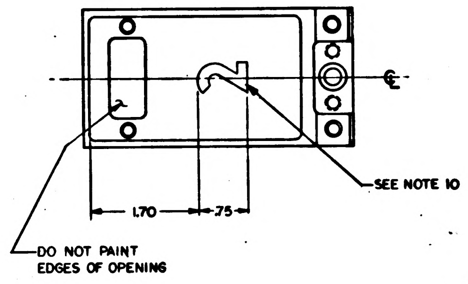

.12 HIGH REF
45A2J1

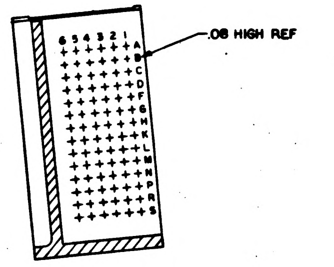
PARTIAL SECTION K-K


K
K
.08 HIGH REF
.12 HIGH REF
1
7
8
18
20 22 24
1
11
1
11
1
10
PULSE TORQUING POWER SUPPLY
POWER SUPPLY 25.6 KC ENCODER EXCITATION
POWER SUPPLY 25.6 KC ENCODER EXCITATION
IMU CDU LOAD COMPENSATION
1
28
30
38 39 40
41
46
3
7 9
3 5
6
10
1 4
5
10
11
FAILURE INDICATOR
AMPLIFIER 1% 800 CPS
AAC FILTER AND MULTIVIBRATOR 800 CPS
AMPLIFIER 5% 800 CPS
SURFACE-D-REF

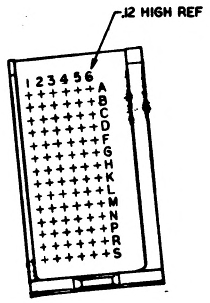
VIEW ROTATED 180°

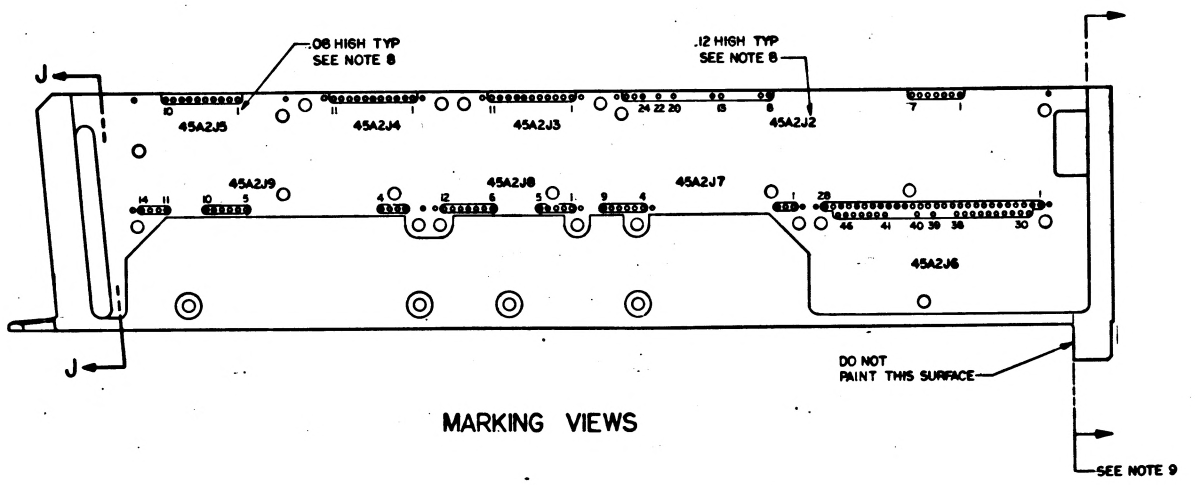

.12 HIGH REF
45A2P1
DO NOT PAINT THIS SURFACE
DO NOT PAINT THIS SURFACE
SEE NOTE 9


℄
SEE NOTE 10
1.70
.75
DO NOT PAINT EDGES OF OPENING


6 5 4 3 2 1
A B C D E F G H K L M N P R
.08 HIGH REF

SECTION J-J


.12 HIGH REF
1 2 3 4 5 6
A B C D E F G H K L M N P R S


.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
J
J
10
1
45A2J5
11
1
45A2J4
11
1
45A2J3
24 22 20
13
8
45A2J2
7
1
45A2J9
14 11
10 5
4
12 6
45A2J8
5 1
9 4
45A2J7
1
28
1
46 41 40 39 38 30
45A2J6
DO NOT PAINT THIS SURFACE
SEE NOTE 9

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±
DECIMALS XX±.02
ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
Contract NAS 9-497
DRAWN DATE
CHECKED Wolye 26 JAN 65
APPROVAL R Osberg 26 JAN 65
APPROVAL 26 JAN 65
2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 FEB 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

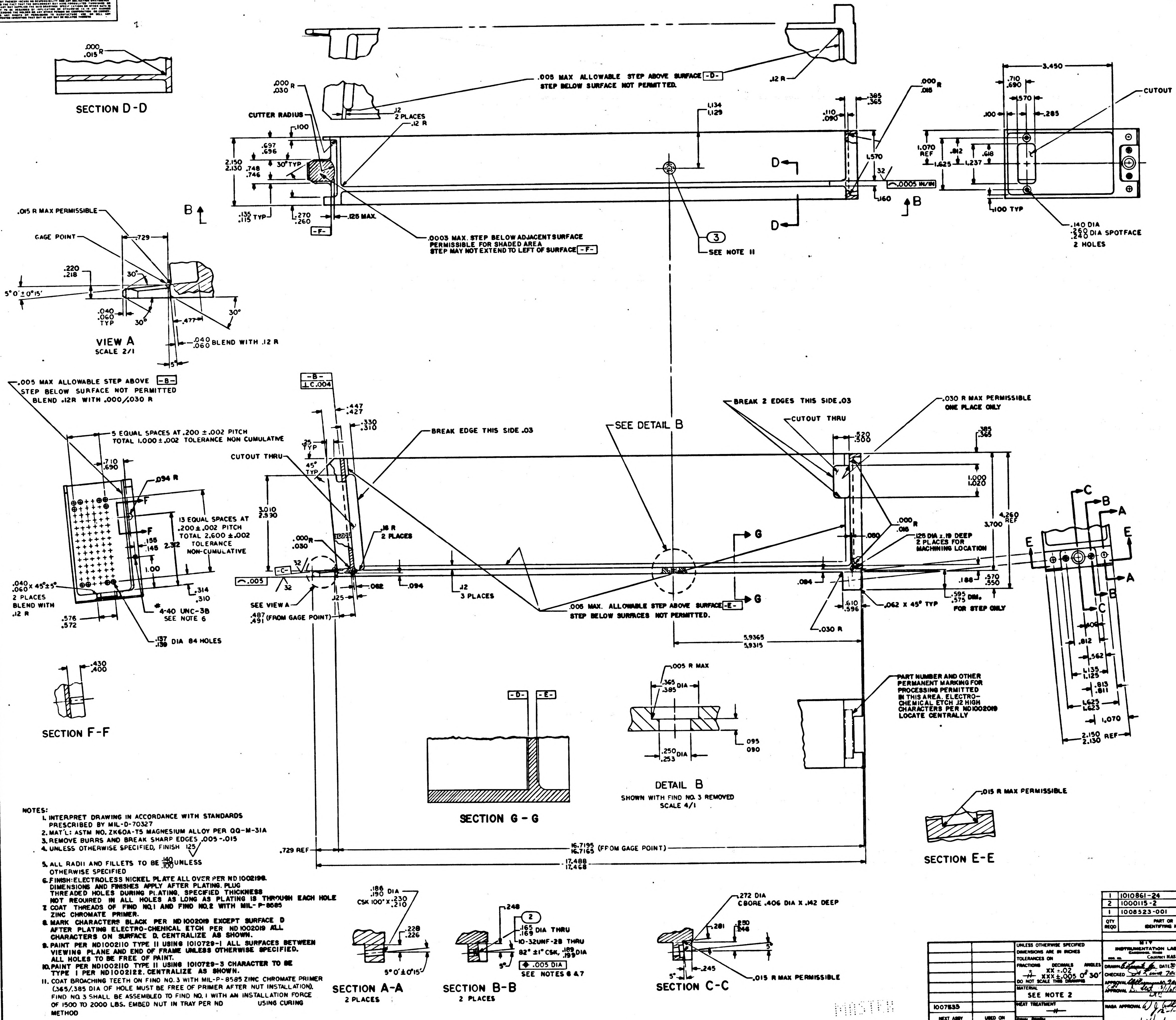
FRAME,
TRAY 2

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1008522
SCALE 1/1
WT
SHEET 3 OF 3

1008522

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 4027			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	65	



.000
.015 R
SECTION D-D
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12 R
.000
.030 R
CUTTER RADIUS
.12
2 PLACES
.12 R
.100
.697
.696
2.150
2.130
.748
.746
30° TYP
.135
.115 TYP
.270
.260
-F-
.125 MAX.
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
1.134
1.129
D
B
3
SEE NOTE 11
.110
.090
.385
.365
.000
.015 R
1.570
32
.0005 IN/IN
.160
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070
REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5° 0' ± 0° 15'
.040
.060
TYP
30°
.477
30°
.040
.060 BLEND WITH .12 R
5°
VIEW A
SCALE 2/1
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .000/.030 R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710
.690
.094 R
F
13 EQUAL SPACES AT
.200 ± .002 PITCH
TOTAL 2.600 ± .002
TOLERANCE
NON-CUMULATIVE
.155
.145
2.312
1.00
.040
.060 X 45° ± 5°
2 PLACES
BLEND WITH
.12 R
.314
.310
.576
.572
* 4-40 UNC-3B
SEE NOTE 6
.137
.139 DIA 84 HOLES
.430
.400
SECTION F-F
-B-
⊥ C .004
.447
.427
.330
.310
.25
TYP
45°
TYP
CUTOUT THRU
3.010
2.990
.000
.030 R
32
-C-
.005
32
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125
.062
.094
.16 R
2 PLACES
.12
3 PLACES
BREAK EDGE THIS SIDE .03
SEE DETAIL B
G
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520
.500
.385
.365
1.000
1.020
3.700
4.260
REF
.000
.015 R
.080
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.084
.188
.570
.550
.610
.596
.062 X 45° TYP
.595
.575 DIM.
FOR STEP ONLY
.030 R
5.9365
5.9315
C
B
A
E
.400
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
-D-
-E-
SECTION G - G
.005 R MAX
.365
.385 DIA
.095
.090
.250
.253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189
.199 DIA
5°
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 AND FIND NO.2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008523-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02, XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 2
HEAT TREATMENT: —
FINAL FINISH: SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN DATE 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 9 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

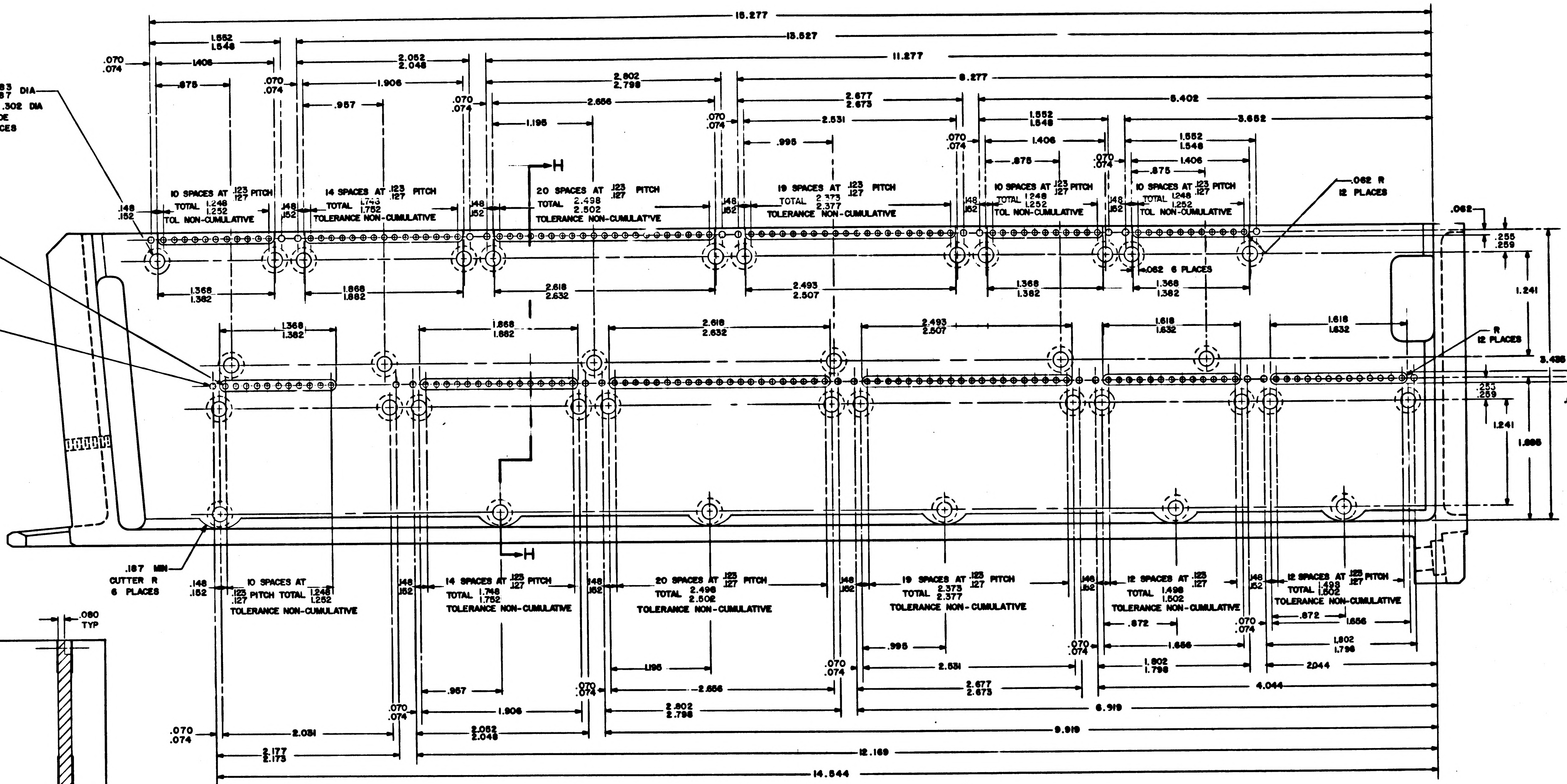
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008523
SCALE 1/1
WT
SHEET 1 OF 3

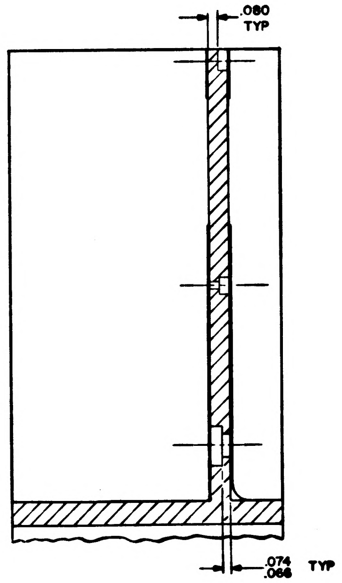
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	



.183 / .187 DIA
C BORE .302 DIA
FAR SIDE
36 PLACES
.072 / .073 DIA
182 HOLES
.061 / .063 DIA
24 HOLES
.187 MIN
CUTTER R
6 PLACES
.062 R
12 PLACES
R
12 PLACES
.062 6 PLACES
H
H
15.277
13.527
11.277
8.277
5.402
3.652
1.552 / 1.548
2.052 / 2.048
2.802 / 2.798
2.677 / 2.673
1.406
1.906
2.656
2.531
.875
.957
1.195
.995
.070 / .074
.148 / .152
10 SPACES AT .123 / .127 PITCH
TOTAL 1.248 / 1.252
TOL NON-CUMULATIVE
14 SPACES AT .123 / .127 PITCH
TOTAL 1.743 / 1.752
TOLERANCE NON-CUMULATIVE
20 SPACES AT .123 / .127 PITCH
TOTAL 2.498 / 2.502
TOLERANCE NON-CUMULATIVE
19 SPACES AT .123 / .127 PITCH
TOTAL 2.373 / 2.377
TOLERANCE NON-CUMULATIVE
12 SPACES AT .123 / .127 PITCH
TOTAL 1.498 / 1.502
TOLERANCE NON-CUMULATIVE
1.368 / 1.382
1.868 / 1.882
2.618 / 2.632
2.493 / 2.507
1.618 / 1.632
.062
.255 / .259
1.241
3.436
.186
1.895
2.031
2.177 / 2.173
.872
1.656
1.802 / 1.798
2.044
4.044
6.919
9.919
12.169
14.544

VIEW B-B
SCALE: 2:1



.080
TYP
.074 / .066 TYP

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN E. [illegible] 30 SEP 64
CHECKED [illegible] 7 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible] 2/1/64
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible] 4 Dec 64

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HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008523
SCALE 2/1 | WT | SHEET 2 OF 3

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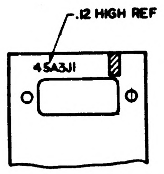
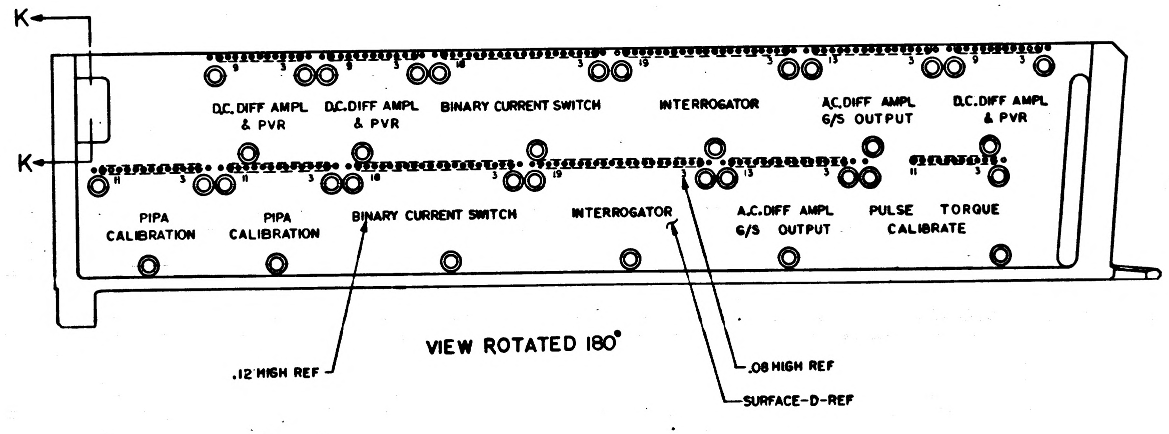
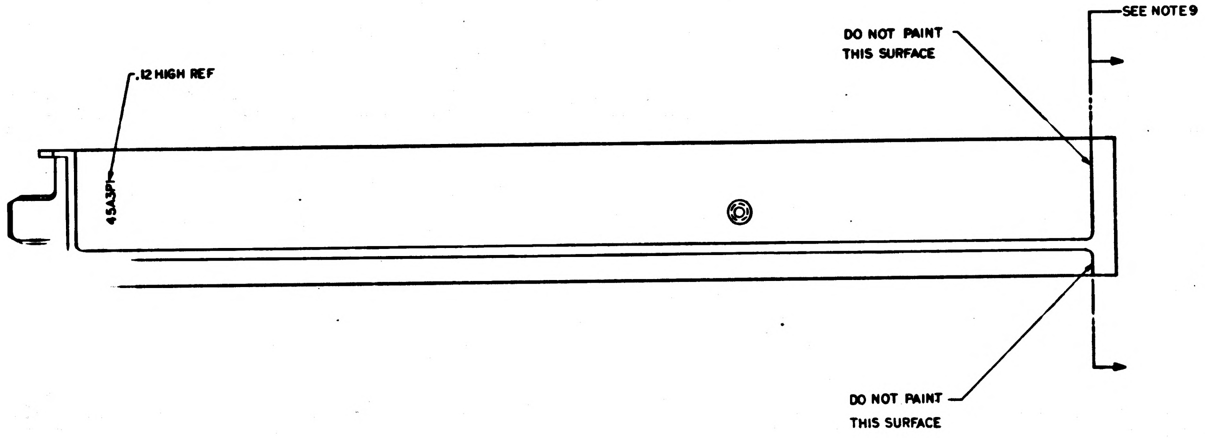
REVISIONS Tu28			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	[illegible]

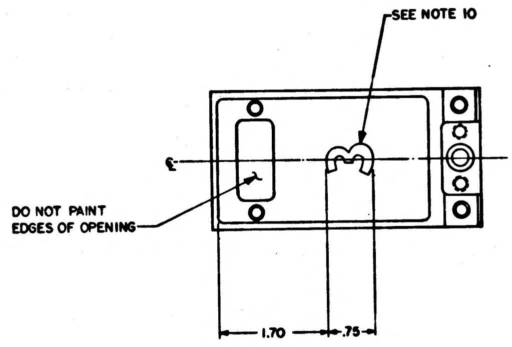

.12 HIGH REF
45A3J1

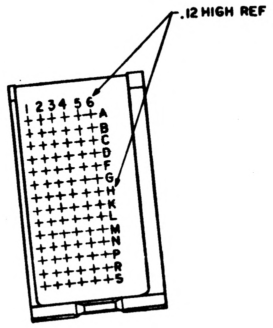
PARTIAL SECTION K-K

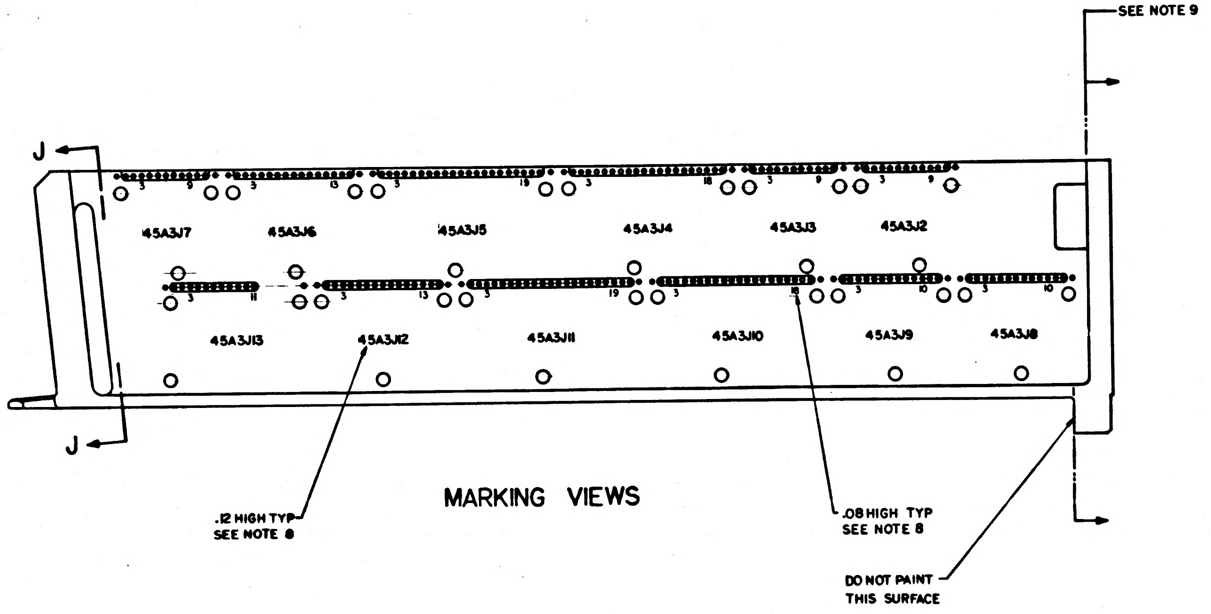

K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL 6/S OUTPUT
D.C. DIFF AMPL & PVR
PIPA CALIBRATION
PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL 6/S OUTPUT
PULSE CALIBRATE
TORQUE
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF

VIEW ROTATED 180°

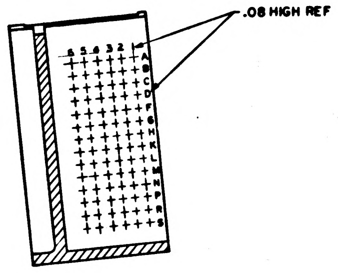

SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE


SEE NOTE 10
DO NOT PAINT EDGES OF OPENING
℄
1.70
.75


.12 HIGH REF
1 2 3 4 5 6
A
B
C
D
E
F
G
H
K
L
M
N
P
R
S


SEE NOTE 9
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
.12 HIGH TYP SEE NOTE 8
.08 HIGH TYP SEE NOTE 8
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
6 5 4 3 2 1
A
B
C
D
E
F
G
H
K
L
M
N
P
R
S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN [illegible] DATE 30 SEP 64
CHECKED [illegible] 7 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible] 12/1/64
NASA APPROVAL W J R[illegible] 12-1-64
MIT APPROVAL [illegible] 1 Dec 64

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HOUSTON, TEXAS

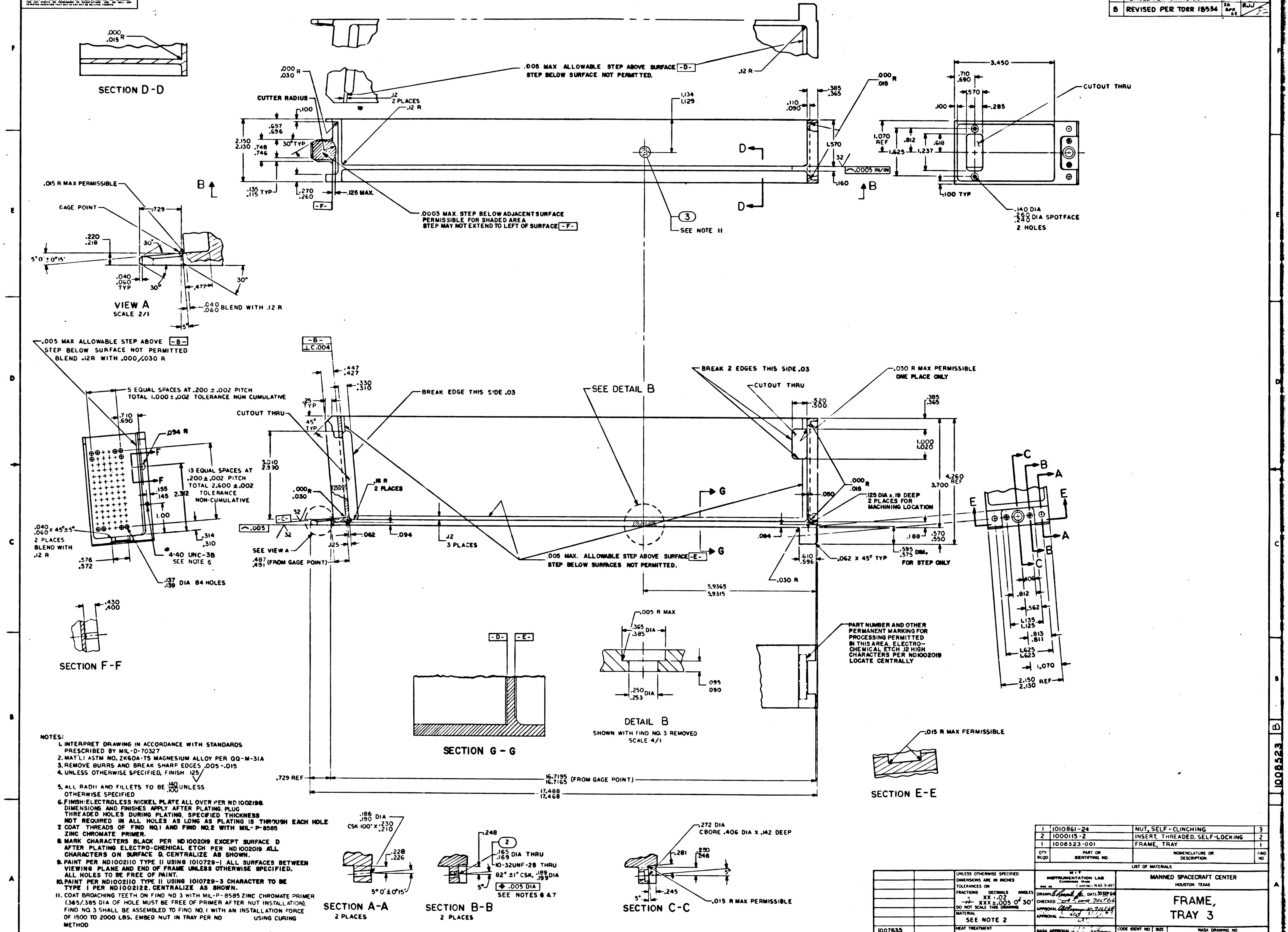
FRAME,
TRAY 3

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008523
SCALE 1/1 | WT | SHEET 3 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	
B	REVISED PER TDRR 18534	26 APR 65	RJJ


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED.
.12 R
CUTTER RADIUS
.12 2 PLACES
.12 R
.000 .030 R
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.125 MAX.
-F-
30° TYP
.0005 IN/IN
3
SEE NOTE 11
D
B
3.450
CUTOUT THRU
.100 TYP
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
5° 0' ± 0° 15'
.040 .060 TYP
VIEW A
SCALE 2/1
.040 .060 BLEND WITH .12 R
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12R WITH .000/.030 R
-B-
⊥ C .004
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.094 R
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
.040 .060 X 45° ± 5° 2 PLACES BLEND WITH .12 R
4-40 UNC-3B SEE NOTE 6
.137 .139 DIA 84 HOLES
CUTOUT THRU
BREAK EDGE THIS SIDE .03
.16 R 2 PLACES
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.12 3 PLACES
SEE DETAIL B
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACES NOT PERMITTED.
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
.030 R
5.9365 5.9315
G
SECTION F-F
-D- -E-
SECTION G-G
.005 R MAX
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.015 R MAX PERMISSIBLE
SECTION E-E
2.150 2.130 REF
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
2
10-32UNF-2B THRU
82° ± 1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
.272 DIA CBORE .406 DIA X .142 DEEP
SECTION C-C
.015 R MAX PERMISSIBLE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005 -.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND 1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008523-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ± .02 XXX ± .005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
Cambridge, Mass.
Contract NAS 9-497

DRAWN E. Leonard Jr. DATE 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 9 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 3

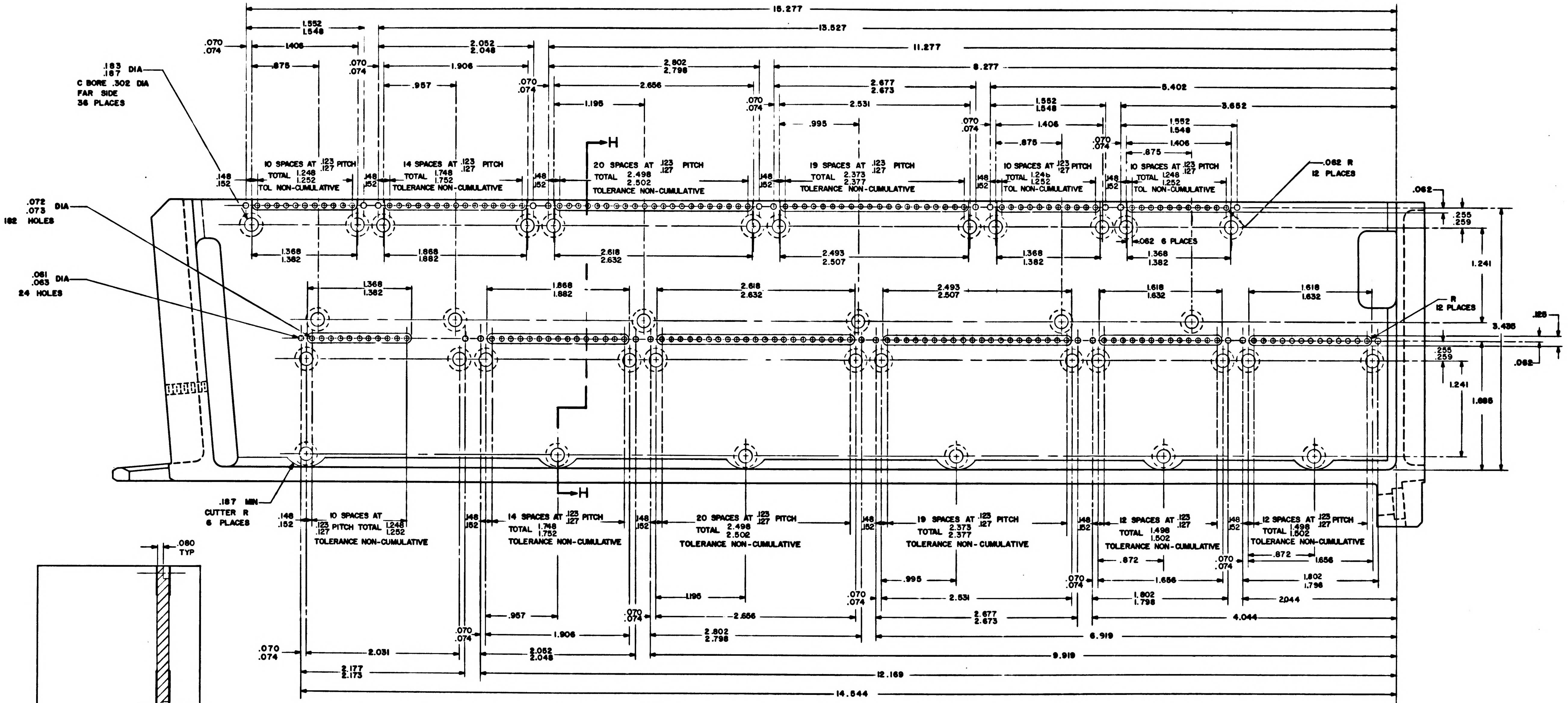
CODE IDENT NO
SIZE E
NASA DRAWING NO 1008523
SCALE 1/1
WT
SHEET 1 OF 3

1008523 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

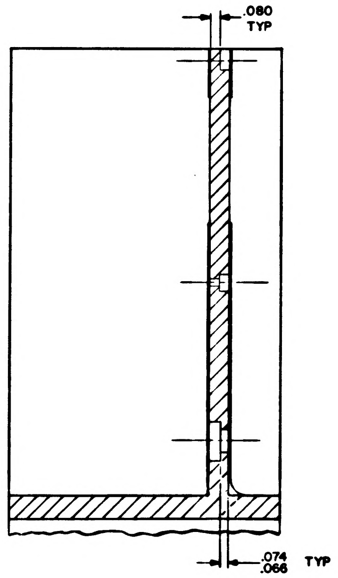
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	
B	REVISED PER TDRR 18534	26 apr 65	RJJ



15.277
13.527
11.277
8.277
6.402
3.652
1.552 / 1.548
2.052 / 2.048
2.802 / 2.798
2.677 / 2.673
.070 / .074
1.406
.875
1.906
.957
2.656
1.195
2.531
.995
.183 / .187 DIA
C BORE .302 DIA
FAR SIDE
38 PLACES
10 SPACES AT .123 / .127 PITCH TOTAL 1.248 / 1.252 TOL NON-CUMULATIVE
14 SPACES AT .123 / .127 PITCH TOTAL 1.748 / 1.752 TOLERANCE NON-CUMULATIVE
20 SPACES AT .123 / .127 PITCH TOTAL 2.498 / 2.502 TOLERANCE NON-CUMULATIVE
19 SPACES AT .123 / .127 PITCH TOTAL 2.373 / 2.377 TOLERANCE NON-CUMULATIVE
12 SPACES AT .123 / .127 TOTAL 1.498 / 1.502 TOLERANCE NON-CUMULATIVE
.148 / .152
H
.062 R
12 PLACES
.062
.255 / .259
1.241
3.436
.126
1.885
.072 / .073 DIA
182 HOLES
.061 / .063 DIA
24 HOLES
1.368 / 1.382
1.868 / 1.882
2.618 / 2.632
2.493 / 2.507
1.618 / 1.632
.062 6 PLACES
R
12 PLACES
.187 MIN
CUTTER R
6 PLACES
.872
1.656
1.802 / 1.798
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177 / 2.173

VIEW B-B
SCALE: 2:1



.080 TYP
.074 / .066 TYP

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN E Leonik Jr 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL 4 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

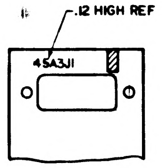
CODE IDENT NO | SIZE E | NASA DRAWING NO 1008523
SCALE 2/1 | WT | SHEET 2 OF 3

1008523 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

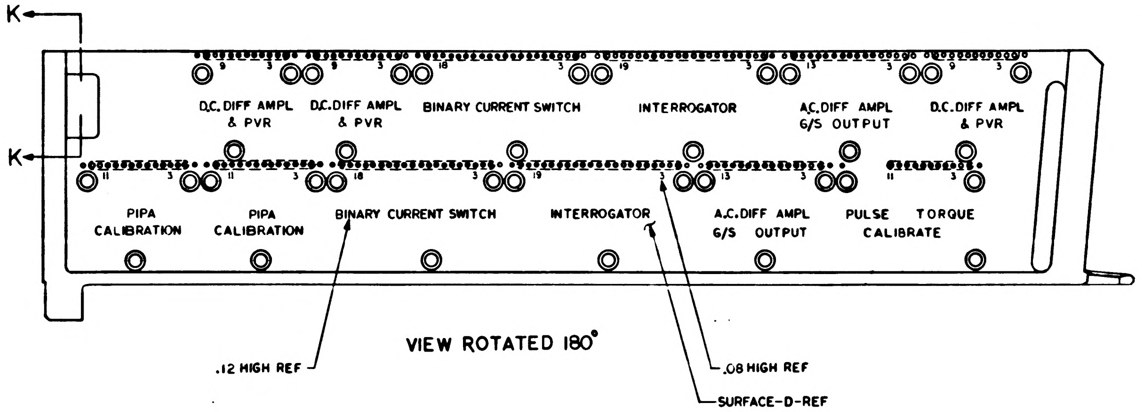
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	[illegible]
B	REVISED PER TDRR 18534	26 APR 65	RJJ



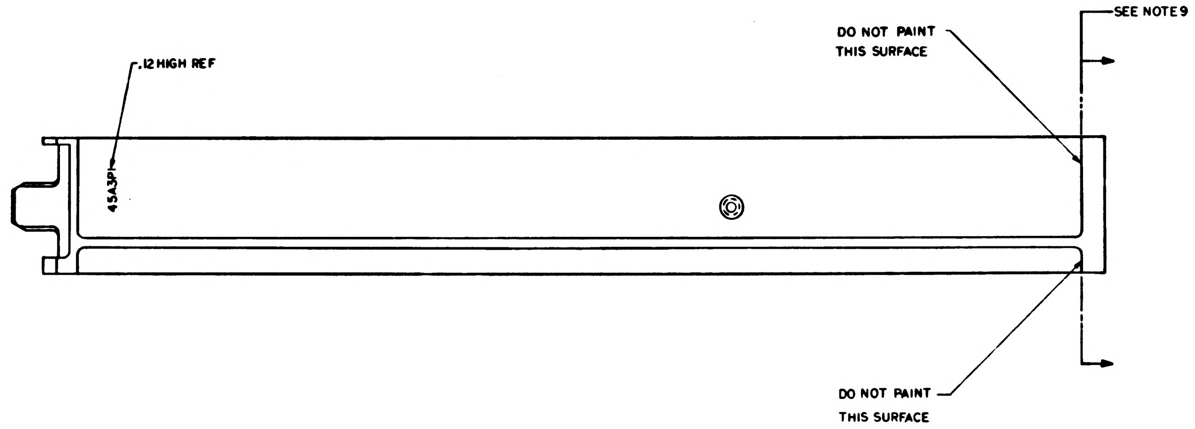
.12 HIGH REF
45A3J1

PARTIAL SECTION K-K

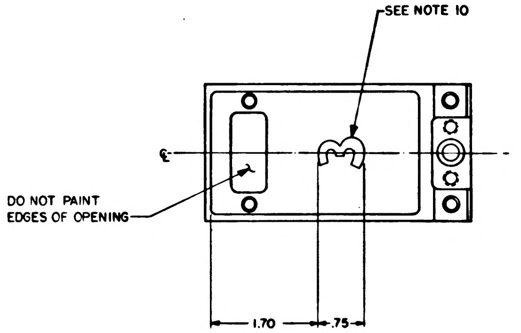


K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
PIPA CALIBRATION
PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE TORQUE CALIBRATE
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF

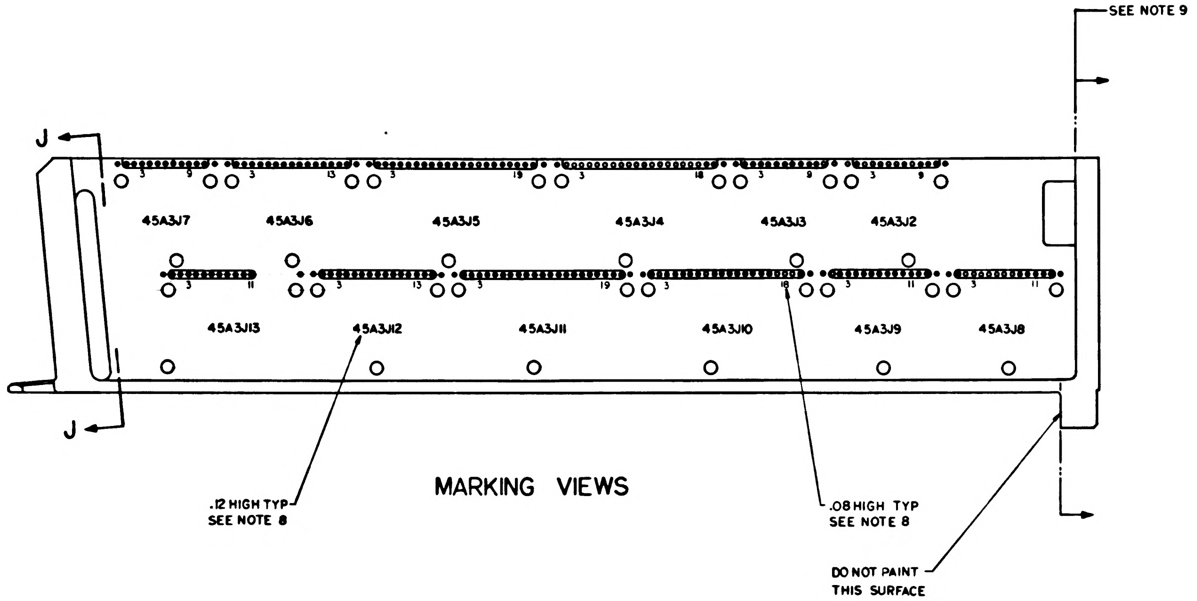
VIEW ROTATED 180°



.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE
SEE NOTE 9
DO NOT PAINT THIS SURFACE

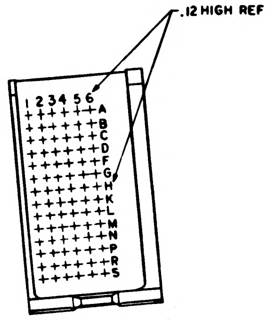


SEE NOTE 10
℄
DO NOT PAINT EDGES OF OPENING
1.70
.75

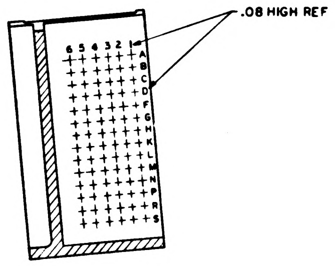


SEE NOTE 9
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
.12 HIGH TYP SEE NOTE 8
.08 HIGH TYP SEE NOTE 8
DO NOT PAINT THIS SURFACE

MARKING VIEWS



.12 HIGH REF
1 2 3 4 5 6
A B C D E F G H J K L M N P R S



.08 HIGH REF
6 5 4 3 2 1
A B C D E F G H J K L M N P R S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO Contract NAS 9-497

DRAWN [illegible] DATE 30 SEP 64
CHECKED [illegible] 7 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible] Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

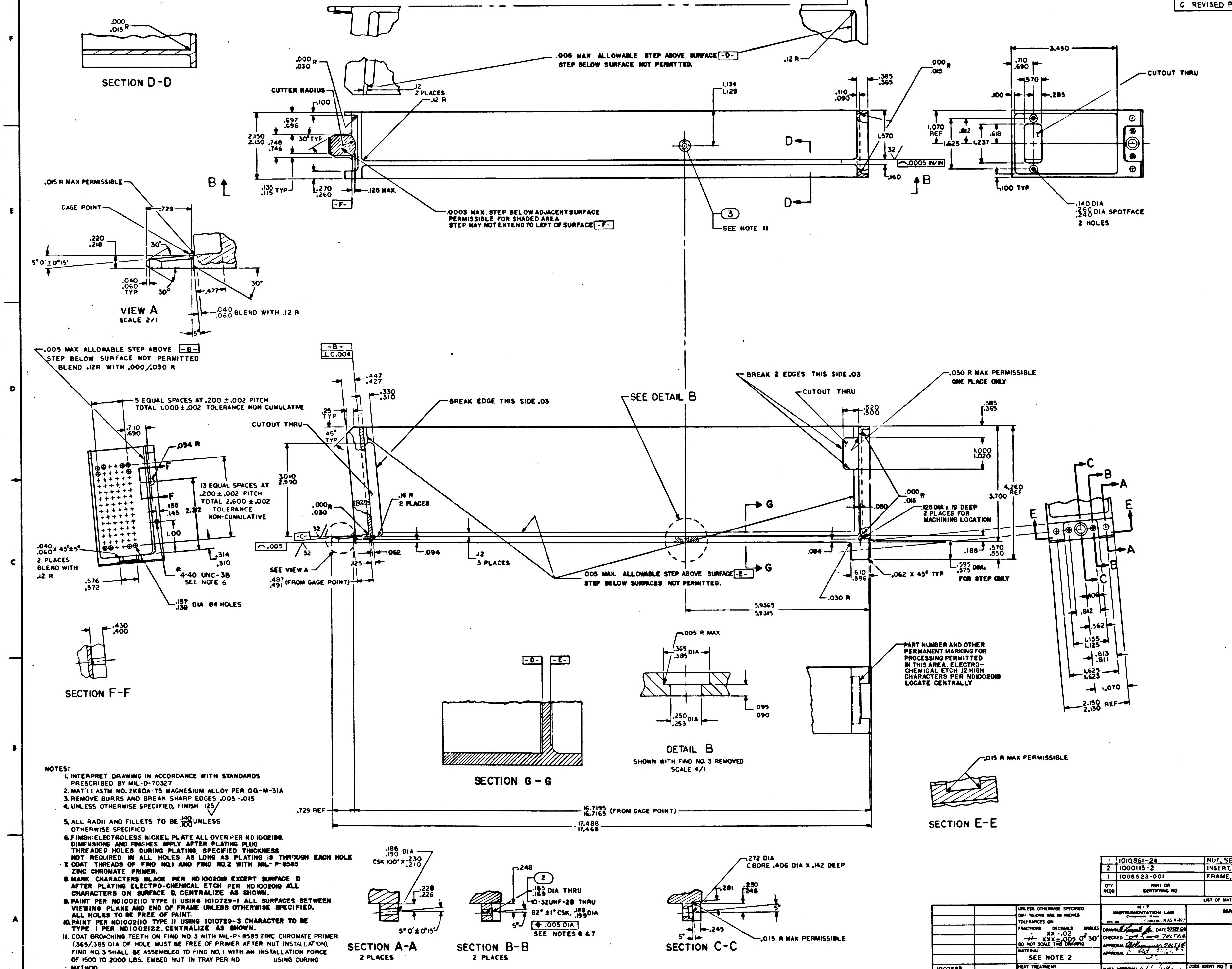
FRAME,
TRAY 3

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1008523
SCALE 1/1
WT
SHEET 3 OF 3

1008523 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 [illegible] 65	[illegible]
B	REVISED PER TDRR 18534	26 APR 65	RJJ
C	REVISED PER TDRR 18692	[illegible]	T.N.


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED.
.12 R
CUTTER RADIUS
.12 2 PLACES
.12 R
.000 .030 R
.100
.697 .696
30° TYP
.748 .746
2.150 2.130
.135 .115 TYP
.270 .260
-F-
.125 MAX.
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
1.134 1.129
3
SEE NOTE 11
D
B
.110 .090
.385 .365
.000 .015 R
1.570
32
.0005 IN/IN
.160
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5°0' ±0°15'
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
VIEW A
SCALE 2/1
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12R WITH .000/.030 R
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.710 .690
.094 R
13 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 2.600 ±.002 TOLERANCE NON-CUMULATIVE
.155 .145
2.312
1.00
.040 .060 X 45° ±5° 2 PLACES BLEND WITH .12 R
.576 .572
4-40 UNC-3B SEE NOTE 6
.314 .310
.137 .139 DIA 84 HOLES
-B- ⊥ C .004
.447 .427
.330 .310
.25 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
3.010 2.990
.16 R 2 PLACES
.000 .030 R
32
-C-
.005
SEE VIEW A
.125
.062
.094
.487 .491 (FROM GAGE POINT)
.12 3 PLACES
SEE DETAIL B
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACES NOT PERMITTED.
G
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
1.000 1.020
3.700
4.260 REF
.080
.000 .015 R
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
.084
.188
.570 .550
.610 .596
.062 x 45° TYP
.595 .575 DIM. FOR STEP ONLY
.030 R
5.9365 5.9315
C B A E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
.430 .400
SECTION F-F
-D- -E-
SECTION G-G
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° x .230 .210
.228 .226
5°0' ±0°15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK. .189 .199 DIA
5°
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
C'BORE .406 DIA x .142 DEEP
.281
.250 .248
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 AND FIND NO.2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008523-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN E. [illegible] DATE 30 SEP 64
CHECKED [illegible] 7 OCT 64
APPROVAL [illegible] 9 OCT 64
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

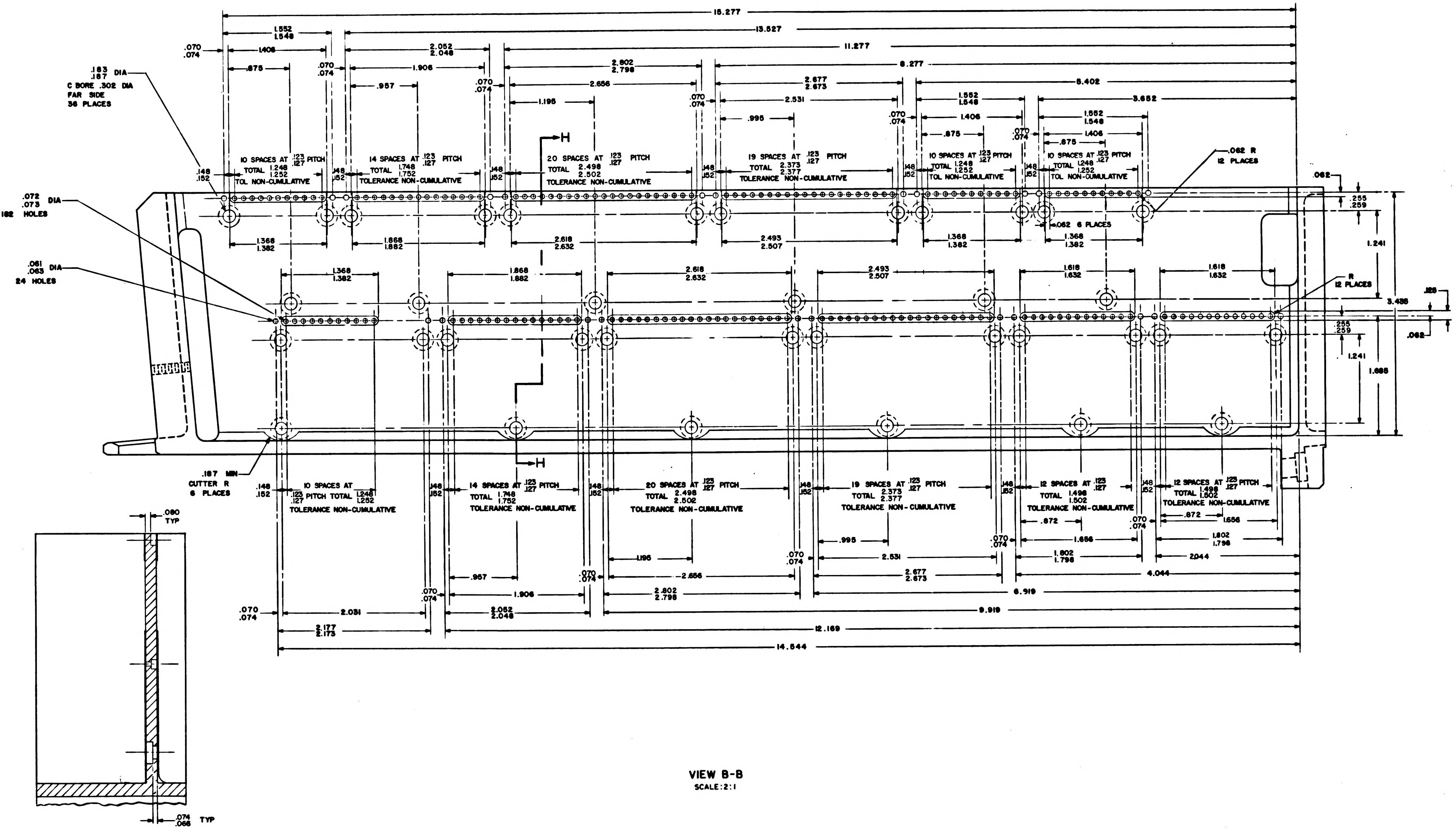
FRAME,
TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008523
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 4628

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	
(M) B	REVISED PER TDRR 18534	26 apr 65	RJJ
C	REVISED PER TDRR 18692	6 MAY 65	


15.277
13.527
11.277
8.277
5.402
3.652
1.552
1.548
.070
.074
1.406
.875
2.052
2.048
1.906
.957
2.802
2.798
2.656
1.195
2.677
2.673
2.531
.995
.183
.187 DIA
C BORE .302 DIA
FAR SIDE
36 PLACES
.148
.152
10 SPACES AT .123 .127 PITCH
TOTAL 1.248 1.252
TOL NON-CUMULATIVE
14 SPACES AT .123 .127 PITCH
TOTAL 1.748 1.752
TOLERANCE NON-CUMULATIVE
H
20 SPACES AT .123 .127 PITCH
TOTAL 2.498 2.502
TOLERANCE NON-CUMULATIVE
19 SPACES AT .123 .127 PITCH
TOTAL 2.373 2.377
TOLERANCE NON-CUMULATIVE
.062 R
12 PLACES
.062
.255
.259
.072
.073 DIA
182 HOLES
1.368
1.382
1.868
1.882
2.618
2.632
2.493
2.507
.062 6 PLACES
1.241
.061
.063 DIA
24 HOLES
1.618
1.632
R
12 PLACES
3.486
.125
1.685
.187 MIN
CUTTER R
6 PLACES
10 SPACES AT .123 .127 PITCH TOTAL 1.248 1.252
12 SPACES AT .123 .127
TOTAL 1.498 1.502
12 SPACES AT .123 .127 PITCH
.872
1.656
1.802
1.798
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177
2.173
.080 TYP
.074
.068 TYP

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN E. Leamick Jr 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL 1 Oct 64
NASA APPROVAL 12-1-64
MIT APPROVAL 4 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

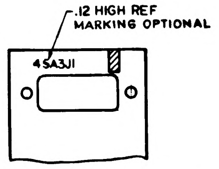
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008523
SCALE 2/1
WT
SHEET 2 OF 3

1008523 C

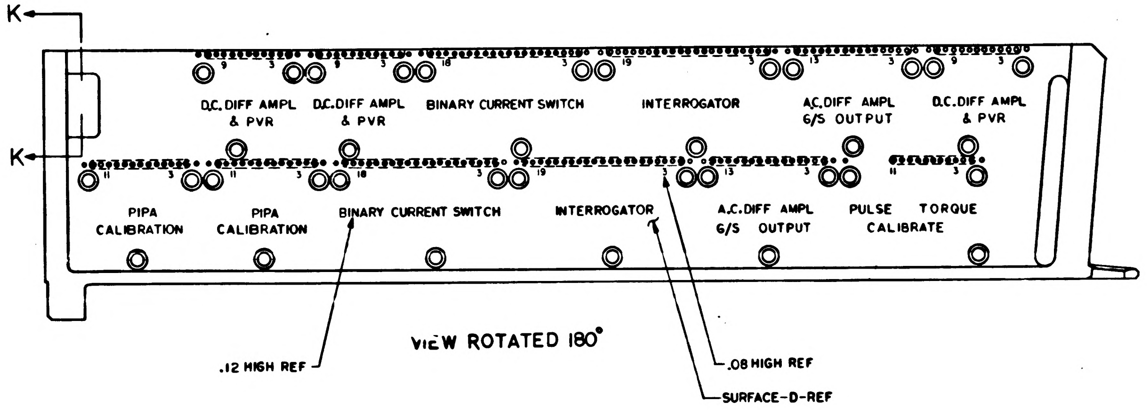
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 4628

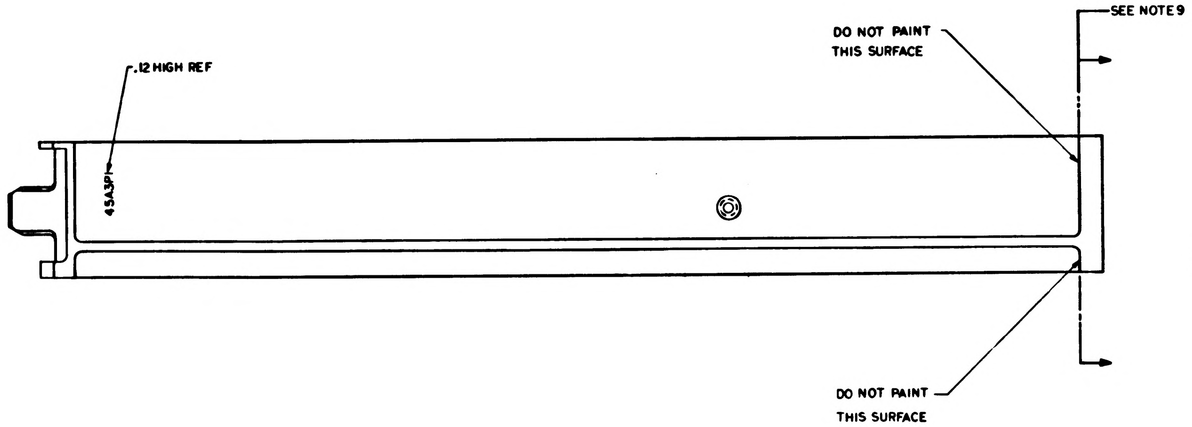
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	2-65	
Ⓜ B	REVISED PER TDRR 18534	26 APR 65	RJJ
C	REVISED PER TDRR 18692	6 MAY 65	

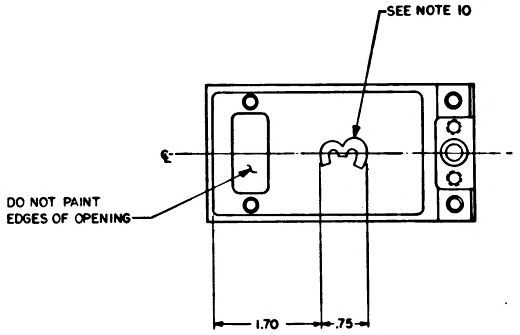

.12 HIGH REF
MARKING OPTIONAL
45A3J1

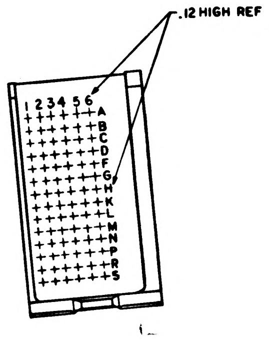
PARTIAL SECTION K-K

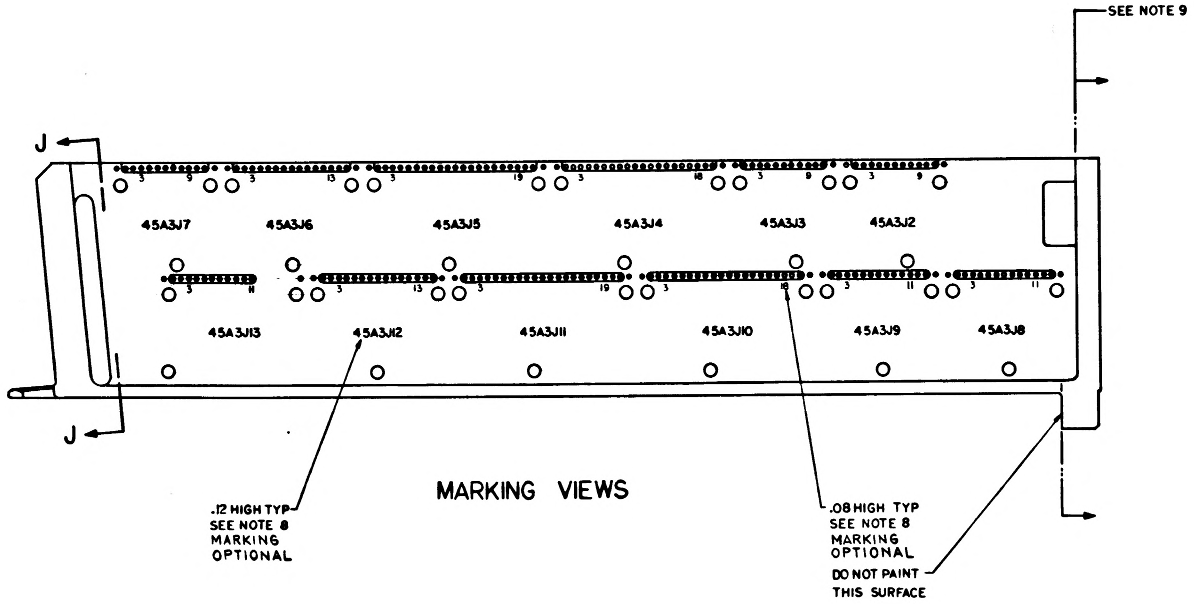

K
K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
PIPA CALIBRATION
PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE CALIBRATE
TORQUE
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF

VIEW ROTATED 180°

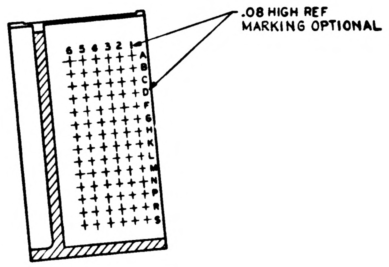

SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE


SEE NOTE 10
DO NOT PAINT EDGES OF OPENING
1.70
.75


.12 HIGH REF
1 2 3 4 5 6
A B C D E F G H K L M N P R S


SEE NOTE 9
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
MARKING OPTIONAL
6 5 4 3 2 1
A B C D E F G H K L M N P R S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN E. Koonsk Jr DATE 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL Dec 64

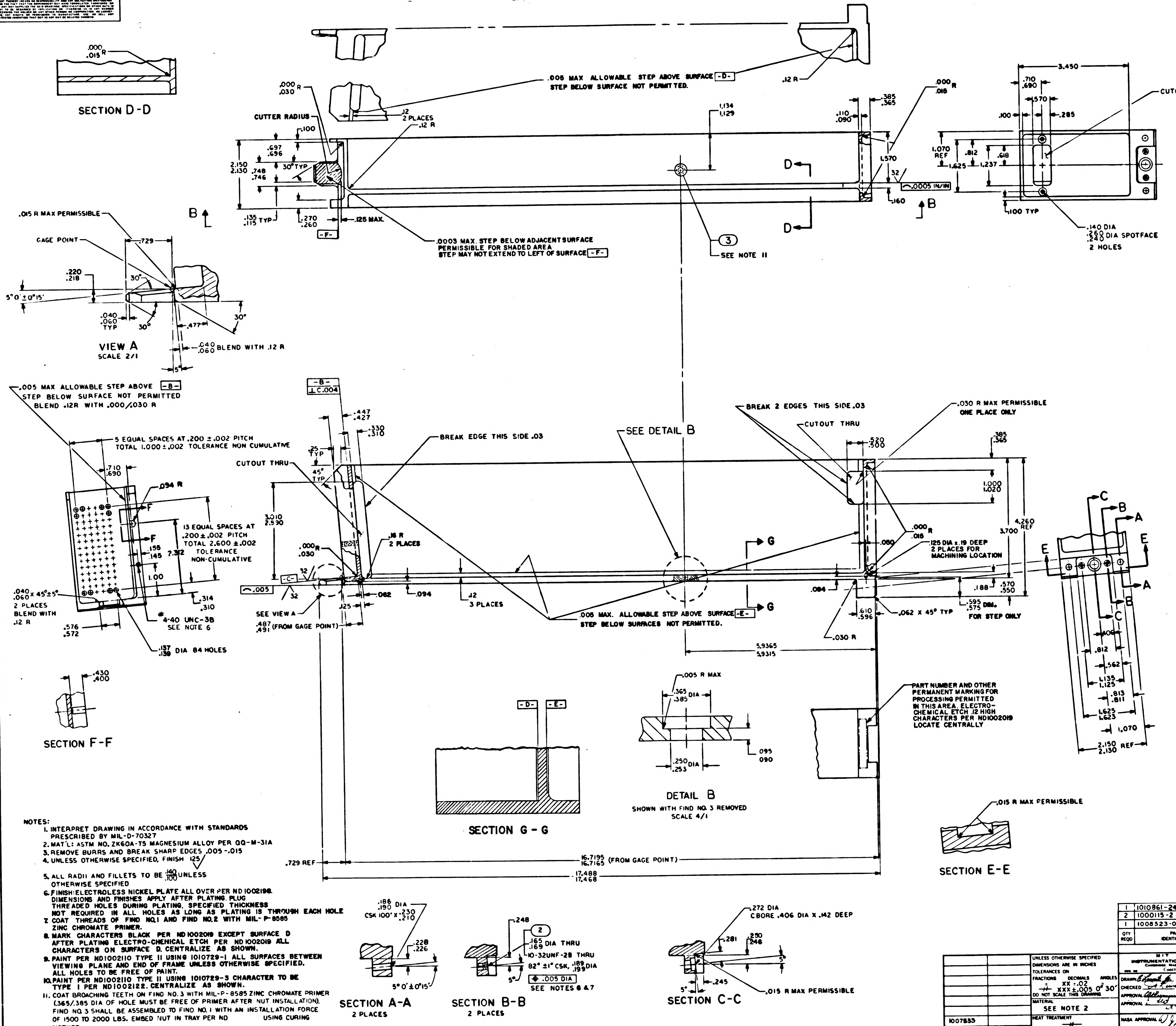
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008523
SCALE 1/1
WT
SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 4629			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	
B	REVISED PER TDRR 18534	26 APR 65	RJJ
C	REVISED PER TDRR 18692	6 MAY 65	A.N.
D	REVISION STATUS CHANGED	7-65	GM


SECTION D-D
.000
.015 R
.000 R
.030
CUTTER RADIUS
.12
2 PLACES
.12 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12 R
1.134
1.129
.385
.365
.110
.090
.000 R
.015
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
.100
.697
.696
30° TYP
2.150
2.130
.748
.746
1.570
32
.0005 IN/IN
D
D
B
B
.160
1.070 REF
.812
.618
1.625
1.237
.135
.115 TYP
.270
.260
-F-
.125 MAX.
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
3
SEE NOTE 11
.100 TYP
.140 DIA
.250
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5°0' ± 0°15'
.040
.060
TYP
30°
.477
30°
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .000/.030 R
-B-
⊥ C .004
.447
.427
.330
.310
BREAK EDGE THIS SIDE .03
SEE DETAIL B
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710
.690
.094 R
F
F
13 EQUAL SPACES AT
.200 ± .002 PITCH
TOTAL 2.600 ± .002
TOLERANCE
NON-CUMULATIVE
.155
.145
2.312
1.00
.040
.060 x 45° ± 5°
2 PLACES
BLEND WITH
.12 R
.576
.572
4-40 UNC-3B
SEE NOTE 6
.314
.310
.137
.139 DIA 84 HOLES
.25
TYP
CUTOUT THRU
45°
TYP
3.010
2.990
.000 R
.030
.16 R
2 PLACES
-C-
.005
32
32
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125
.062
.094
.12
3 PLACES
G
G
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
.520
.500
.385
.365
1.000
1.020
4.260
3.700 REF
.080
.000 R
.015
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.084
.188
.570
.550
.610
.596
.062 X 45° TYP
.595
.575 DIM.
FOR STEP ONLY
.030 R
5.9365
5.9315
C
B
A
E
E
A
B
C
.400
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
.430
.400
SECTION F-F
-D-
-E-
SECTION G-G
.005 R MAX
.365
.385 DIA
.250
.253 DIA
.095
.090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
.186
.190 DIA
CSK 100° x .230
.210
.228
.226
5°0' ± 0°15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189
.199 DIA
5°
◆ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.248
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 AND FIND NO.2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008523-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN E. Leavitt Jr. DATE 30 SEP 64
CHECKED A. Kiewa 7 OCT 64
APPROVAL 9 OCT 64
APPROVAL
NASA APPROVAL W. J. 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008523
SCALE 1/1
WT
SHEET 1 OF 3

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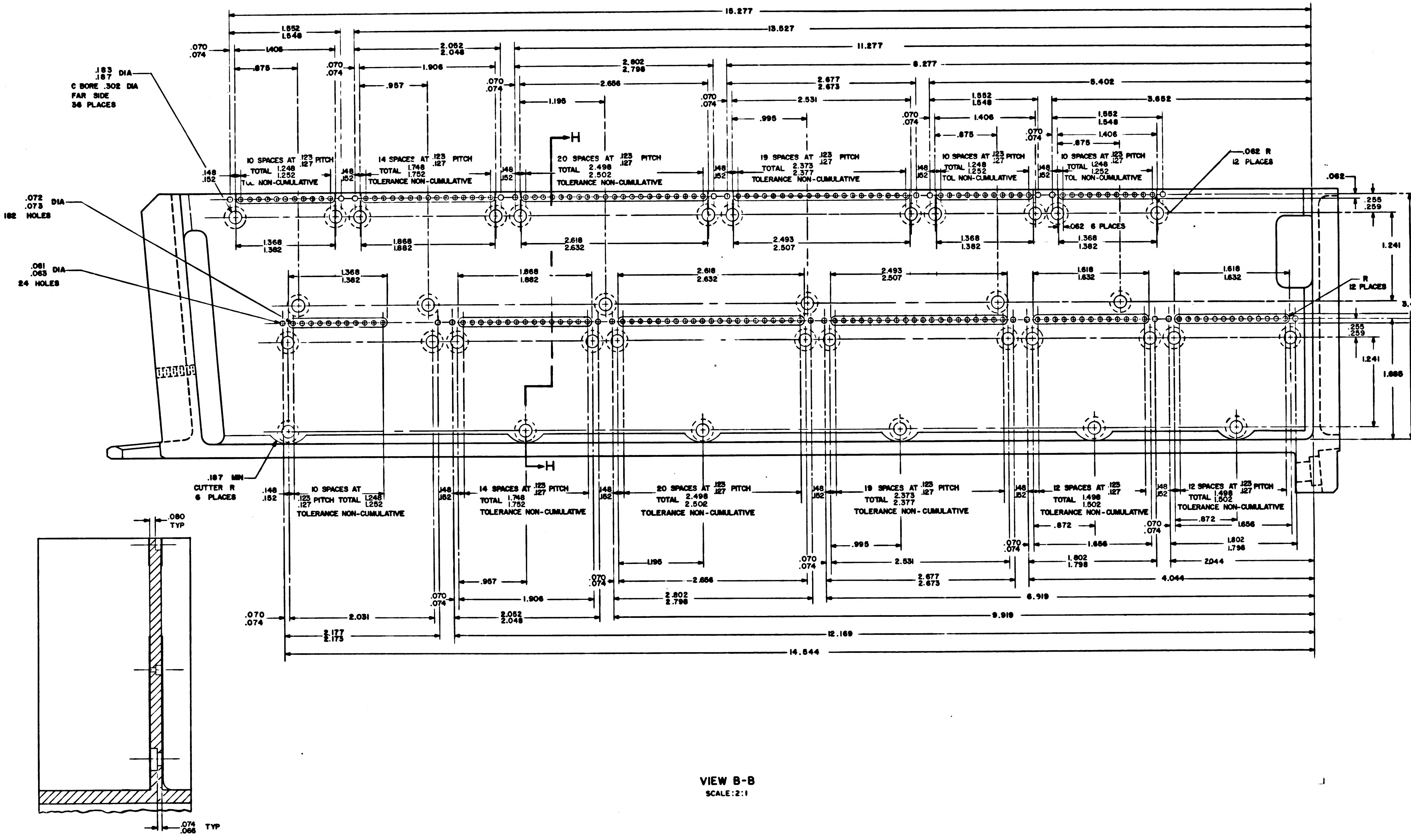
REVISIONS 4625

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	
Ⓜ B	REVISED PER TDRR 18534	26 apr 65	RJU
C	REVISED PER TDRR 18692	6 Jul 65	A.H. mem
D	REVISION STATUS CHANGED	7 Jun 65	F


15.277
13.527
11.277
8.277
5.402
3.652
1.552 1.548
2.052 2.048
2.802 2.798
2.677 2.673
.070 .074
1.406
.875
1.906
.957
2.656
1.195
2.531
.995
.183 .187 DIA
C BORE .302 DIA
FAR SIDE
36 PLACES
10 SPACES AT .123 .127 PITCH TOTAL 1.248 1.252 TOL NON-CUMULATIVE
14 SPACES AT .123 .127 PITCH TOTAL 1.748 1.752 TOLERANCE NON-CUMULATIVE
20 SPACES AT .123 .127 PITCH TOTAL 2.498 2.502 TOLERANCE NON-CUMULATIVE
19 SPACES AT .123 .127 PITCH TOTAL 2.373 2.377 TOLERANCE NON-CUMULATIVE
12 SPACES AT .123 .127 PITCH TOTAL 1.498 1.502 TOLERANCE NON-CUMULATIVE
.148 .152
H
.062 R
12 PLACES
.072 .073 DIA
182 HOLES
.061 .063 DIA
24 HOLES
1.368 1.362
1.868 1.882
2.618 2.632
2.493 2.507
1.618 1.632
.062 6 PLACES
.062
.255 .259
1.241
3.435
.125
R
12 PLACES
1.665
.187 MIN
CUTTER R
6 PLACES
1.802 1.798
1.656
.872
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177 2.173
.080 TYP
.074 .066 TYP

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ⧣ DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL ⧣
HEAT TREATMENT ⧣
FINAL FINISH ⧣

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN E. Lemke 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL 4 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008523
SCALE 2/1
WT
SHEET 2 OF 3

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
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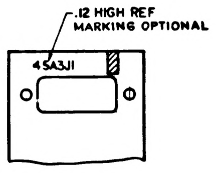
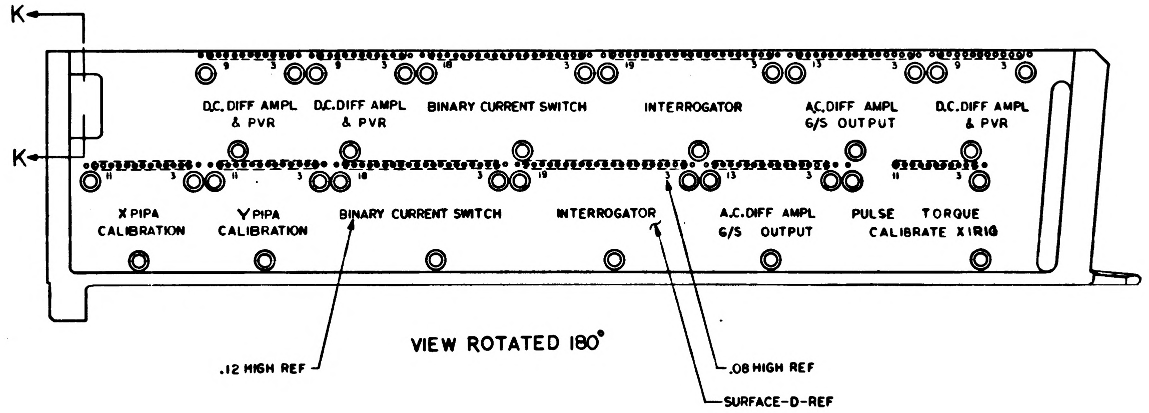
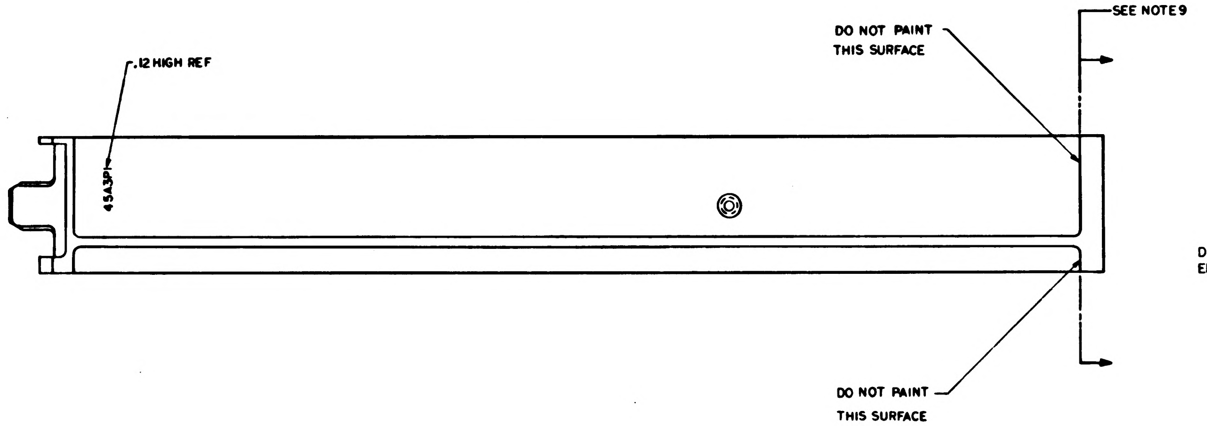
(M) B	REVISED PER TDRR 18534	26 APR 65	RJJ
C	REVISED PER TDRR 18692	6 MAY 65	
D	REVISED PER TDRR 19797	7 JUN 65	

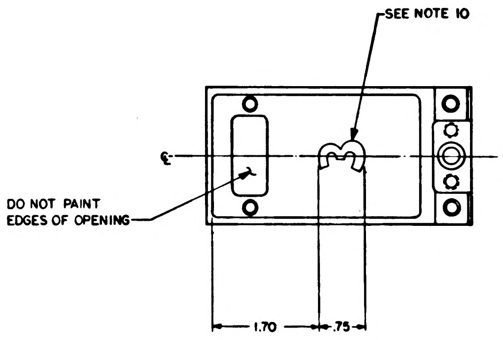

.12 HIGH REF
MARKING OPTIONAL
45A3J1

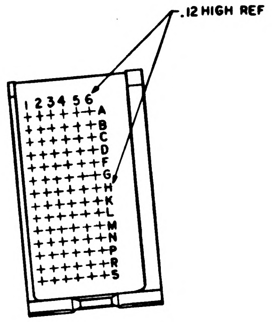
PARTIAL SECTION K-K


K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
X PIPA CALIBRATION
Y PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE TORQUE
CALIBRATE X IRIG
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF

VIEW ROTATED 180°


SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE


SEE NOTE 10
℄
DO NOT PAINT EDGES OF OPENING
1.70
.75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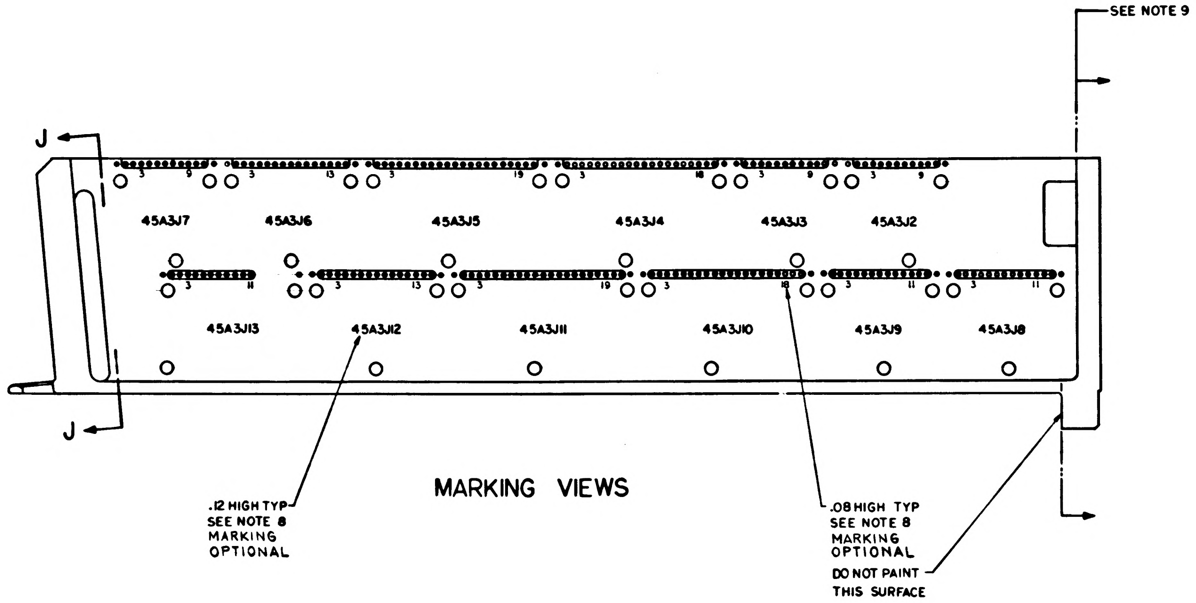
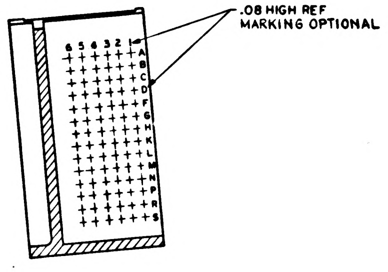
1 2 3 4 5 6
A B C D E F G H K L M N P R S


SEE NOTE 9
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
MARKING OPTIONAL
6 5 4 3 2 1
A B C D E F G H K L M N P R S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS XX ±.02 ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DWG NO Contract NAS 9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL #	DRAWN DATE 30 SEP 64 CHECKED 7 OCT 64 APPROVAL 8 OCT 64 APPROVAL 12/1/64	FRAME, TRAY 3
HEAT TREATMENT #	NASA APPROVAL 12-1-64	CODE IDENT NO. 80230 / SIZE E / NASA DRAWING NO 1008523
FINAL FINISH #	MIT APPROVAL	SCALE 1/1 / WT / SHEET 3 OF 3

1008523

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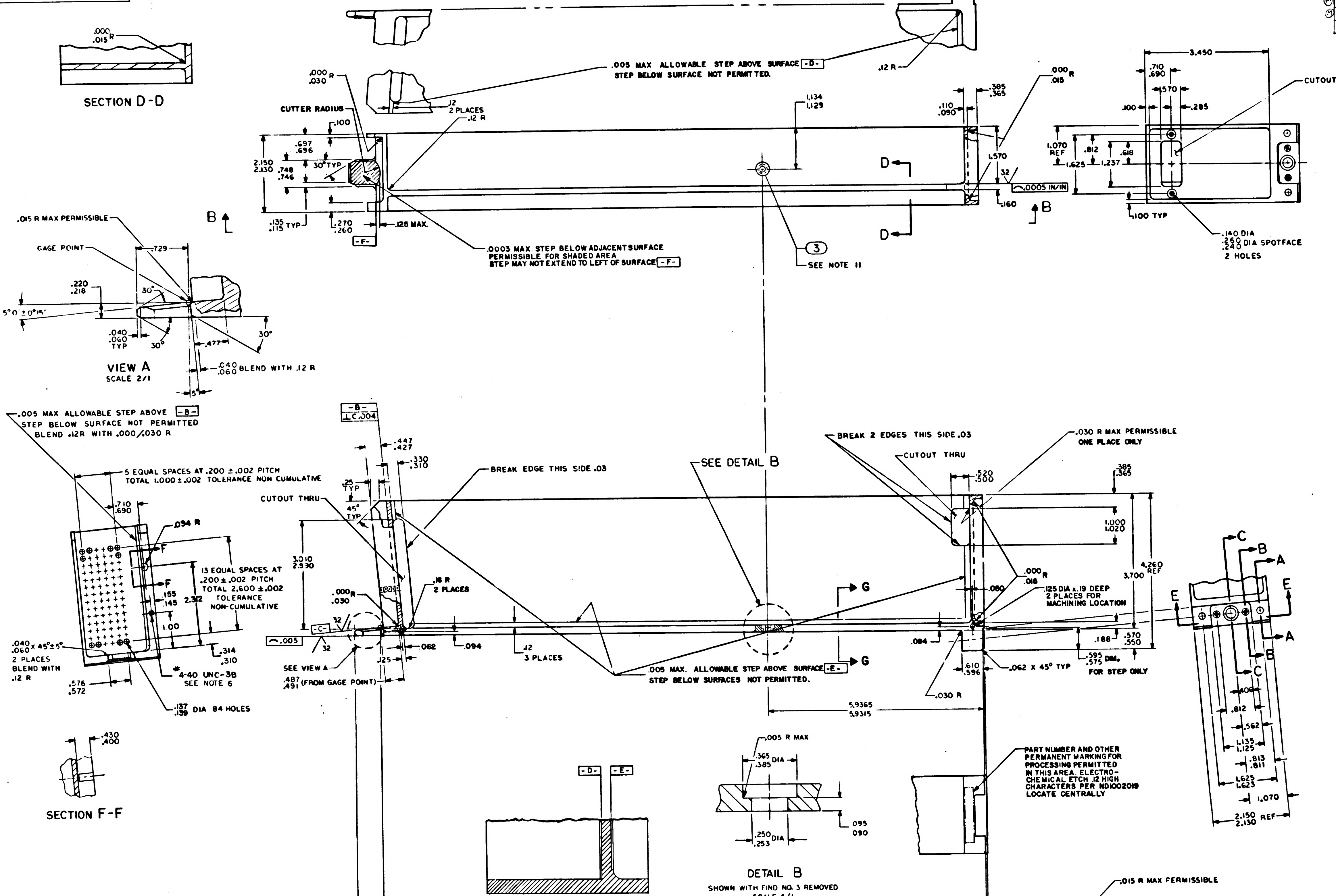
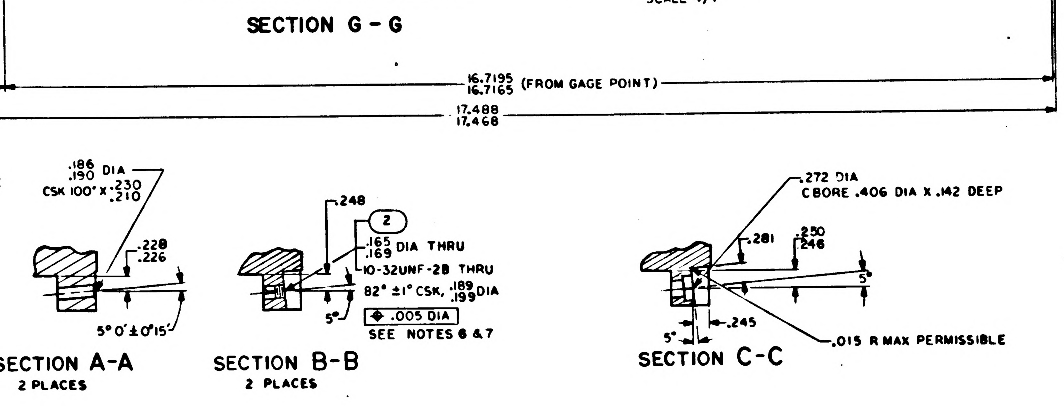
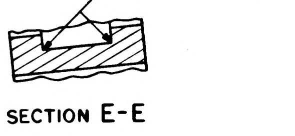
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	[illegible]	[illegible]
Ⓜ B	REVISED PER TDRR 18534	26 APR 65	RJJ
Ⓜ C	REVISED PER TDRR 18692	[illegible] 65	[illegible]
Ⓜ D	REVISION STATUS CHANGED	7- 65	SM
E	REVISED PER TDRR 21520	[illegible]	[illegible]



.000
.015 R
SECTION D-D
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12 R
.000
.030 R
CUTTER RADIUS
.12
2 PLACES
.12 R
.100
1.134
1.129
.385
.365
.000 R
.015
.110
.090
2.150
2.130
.697
.696
.748
.746
30° TYP
1.570
D
.32
.0005 IN/IN
.160
B
.135
.115 TYP
.270
.260
.125 MAX.
-F-
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
3
SEE NOTE 11
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5° 0' ± 0° 15'
.040
.060
TYP
30°
.477
30°
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .000/.030 R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
-B-
⊥ C .004
.447
.427
.330
.310
.25 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
SEE DETAIL B
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520
.500
.385
.365
.710
.690
.094 R
F
13 EQUAL SPACES AT
.200 ± .002 PITCH
TOTAL 2.600 ± .002
TOLERANCE
NON-CUMULATIVE
.155
.145
2.312
1.00
3.010
2.990
.000 R
.030
.16 R
2 PLACES
1.000
1.020
4.260 REF
3.700
G
.000
.018
.080
.125 DIA ± .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.040
.060 X 45° ± 5°
2 PLACES
BLEND WITH
.12 R
.314
.310
4-40 UNC-3B
SEE NOTE 6
.576
.572
.137
.139 DIA 84 HOLES
-C-
.32
.005
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.062
.094
.125
.12
3 PLACES
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
.084
.610
.596
.062 X 45° TYP
.030 R
.188
.570
.550
.595
.575 DIM.
FOR STEP ONLY
5.9365
5.9315
C
B
A
E
E
A
B
C
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
.430
.400
SECTION F-F
-D-
-E-
.005 R MAX
.365
.385 DIA
.250
.253 DIA
.095
.090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE



SECTION G-G
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK. .189
.199 DIA
5°
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
C BORE .406 DIA X .142 DEEP
.281
.250
.246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002126 USING CURING METHOD III
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008523-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ± .02 XXX ± .005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN E. Leavitt Jr. DATE 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 7 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

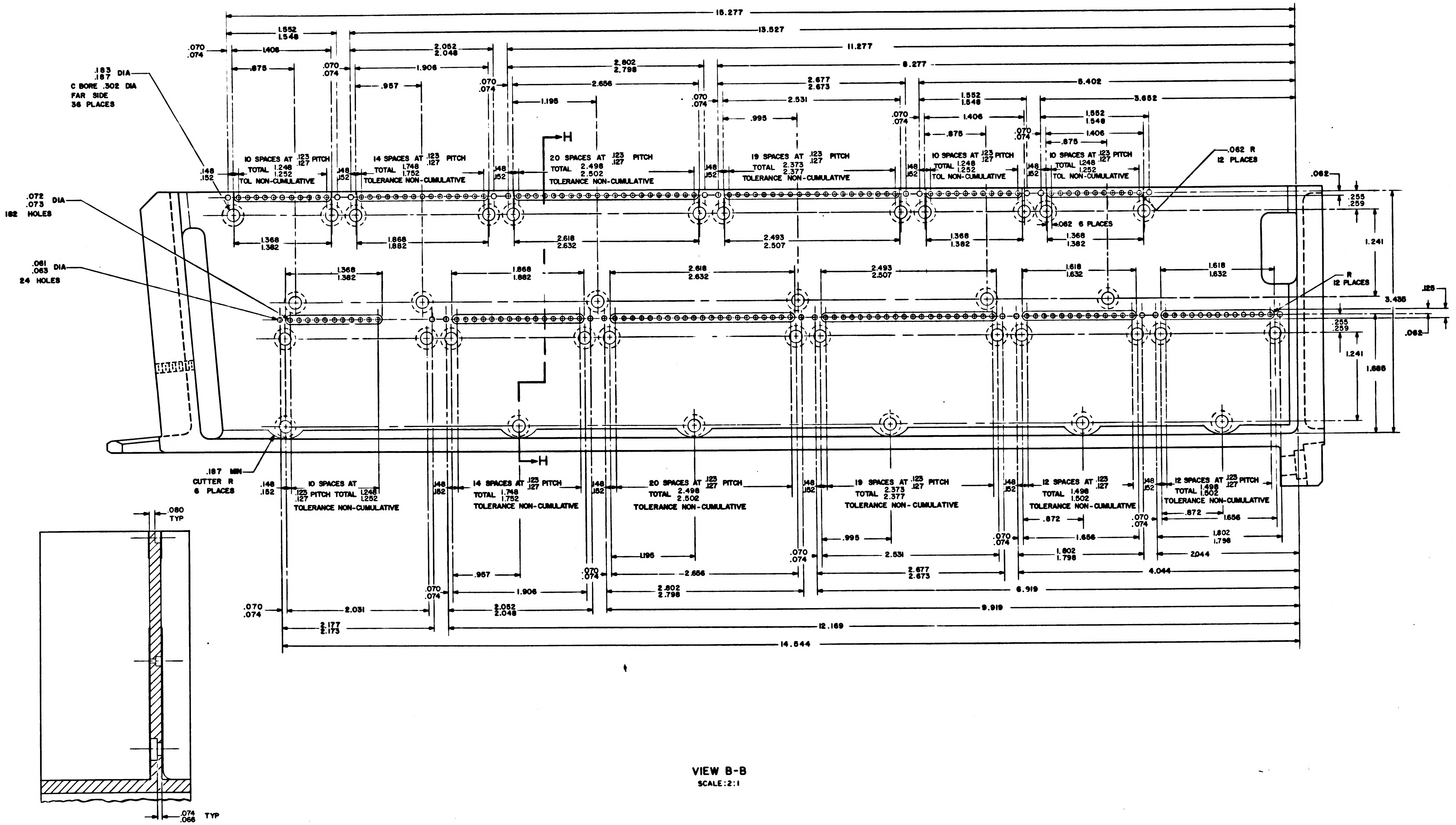
CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	E	1008523

SCALE 1/1 WT SHEET 1 OF 3

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	4 Jan 65	
B	REVISED PER TDRR 18534	26 apr 65	RJW
C	REVISED PER TDRR 18692	6 MAY 65	
D	REVISION STATUS CHANGED	7 JUN 65	GM
E	REVISION STATUS CHANGED	16 Aug 65	



15.277
13.527
11.277
8.277
6.402
3.652
1.552 1.548
2.052 2.048
2.802 2.798
2.677 2.673
.070 .074
1.406
.875
1.906
.957
2.656
1.196
2.531
.995
.183 .187 DIA
C BORE .302 DIA
FAR SIDE
36 PLACES
10 SPACES AT .123 .127 PITCH
TOTAL 1.248 1.252
TOL NON-CUMULATIVE
14 SPACES AT .123 .127 PITCH
TOTAL 1.748 1.752
TOLERANCE NON-CUMULATIVE
20 SPACES AT .123 .127 PITCH
TOTAL 2.498 2.502
19 SPACES AT .123 .127 PITCH
TOTAL 2.373 2.377
.148 .152
.062 R
12 PLACES
.062
.255 .259
.072 .073 DIA
182 HOLES
.061 .063 DIA
24 HOLES
1.368 1.382
1.868 1.882
2.618 2.632
2.493 2.507
1.618 1.632
.062 6 PLACES
1.241
3.436
1.686
.125
R
12 PLACES
H
.187 MIN
CUTTER R
6 PLACES
12 SPACES AT .123 .127
TOTAL 1.498 1.502
12 SPACES AT .123 .127 PITCH
.872
1.656
1.802 1.798
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177 2.173
.080 TYP
.074 .066 TYP

VIEW B-B
SCALE:2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL #

HEAT TREATMENT #

FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN E. Lemak Jr 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL

NASA APPROVAL 12-1-64

MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

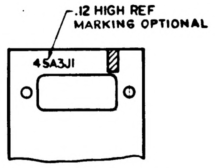
FRAME,
TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008523
SCALE 2/1
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

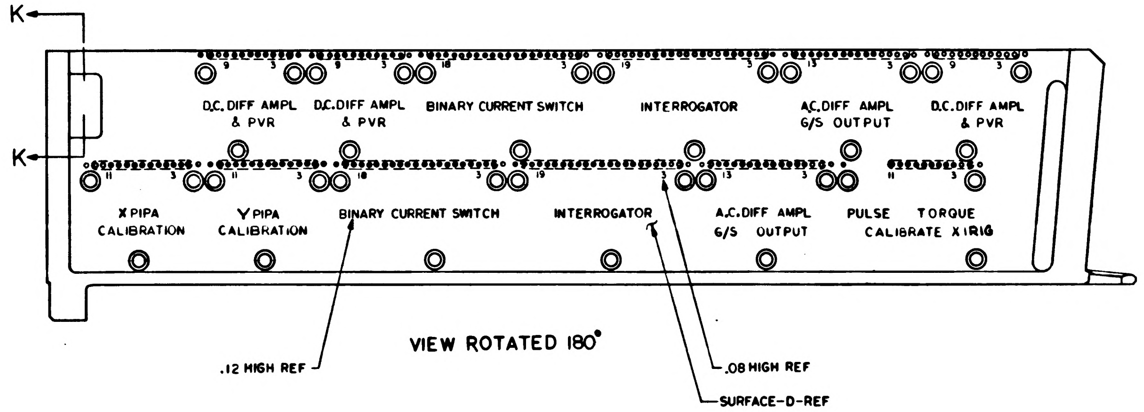
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15168	9 Jan 65	
B	REVISED PER TDRR 18534	26 APR 65	RJJ
C	REVISED PER TDRR 18292	6 MAY 65	
D	REVISED PER TDRR 19797	JUN 65	
E	REVISION STATUS CHANGED	AUG 65	



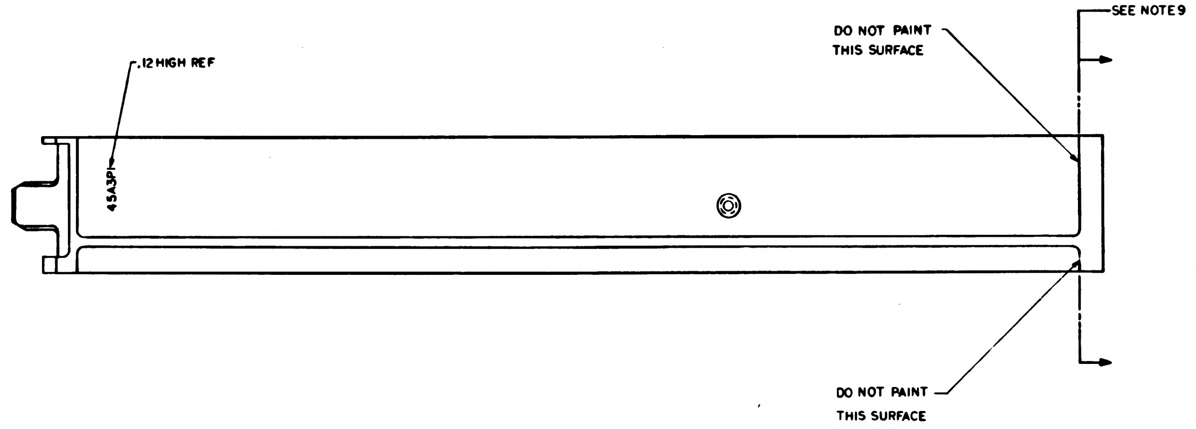
.12 HIGH REF
MARKING OPTIONAL
45A3J1

PARTIAL SECTION K-K

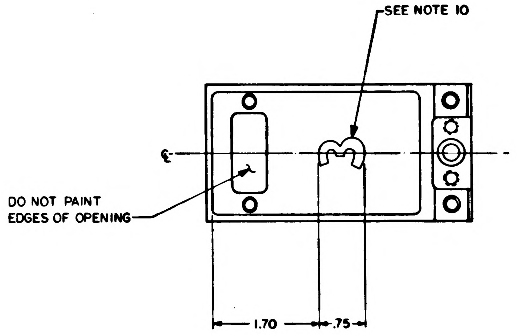


K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
X PIPA CALIBRATION
Y PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE TORQUE CALIBRATE X IRIG
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF

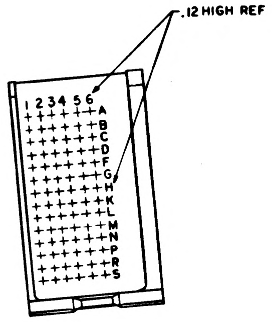
VIEW ROTATED 180°



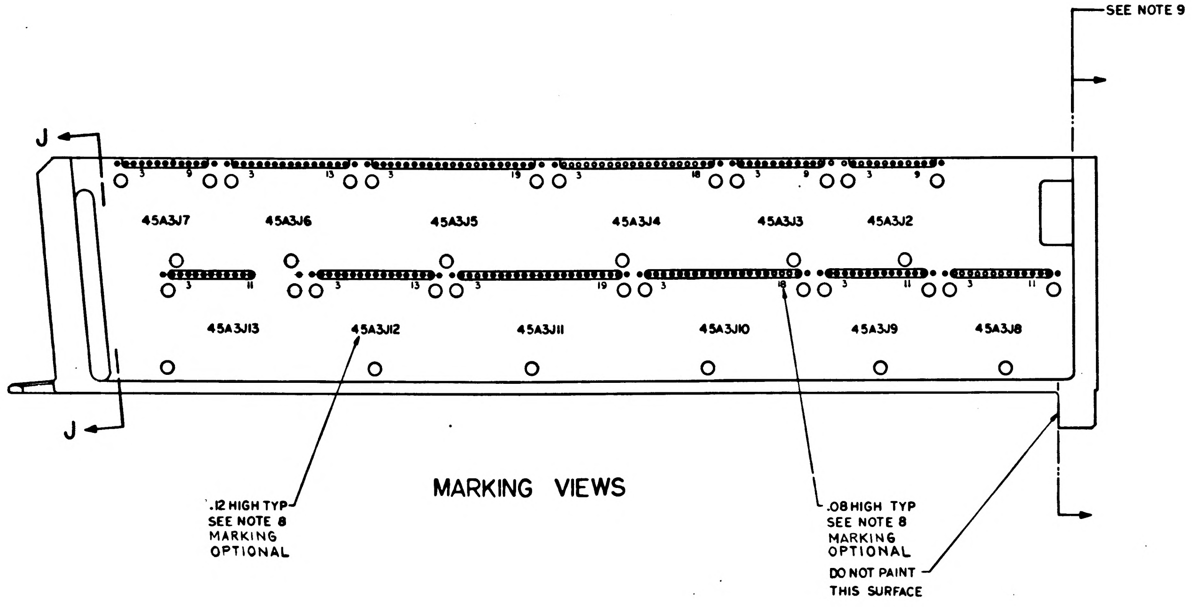
SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE



SEE NOTE 10
DO NOT PAINT EDGES OF OPENING
1.70
.75

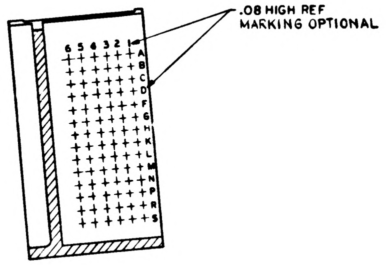


.12 HIGH REF
1 2 3 4 5 6
A B C D E F G H J K L M N P R S



SEE NOTE 9
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS



.08 HIGH REF
MARKING OPTIONAL
6 5 4 3 2 1
A B C D E F H J K L M N P R S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

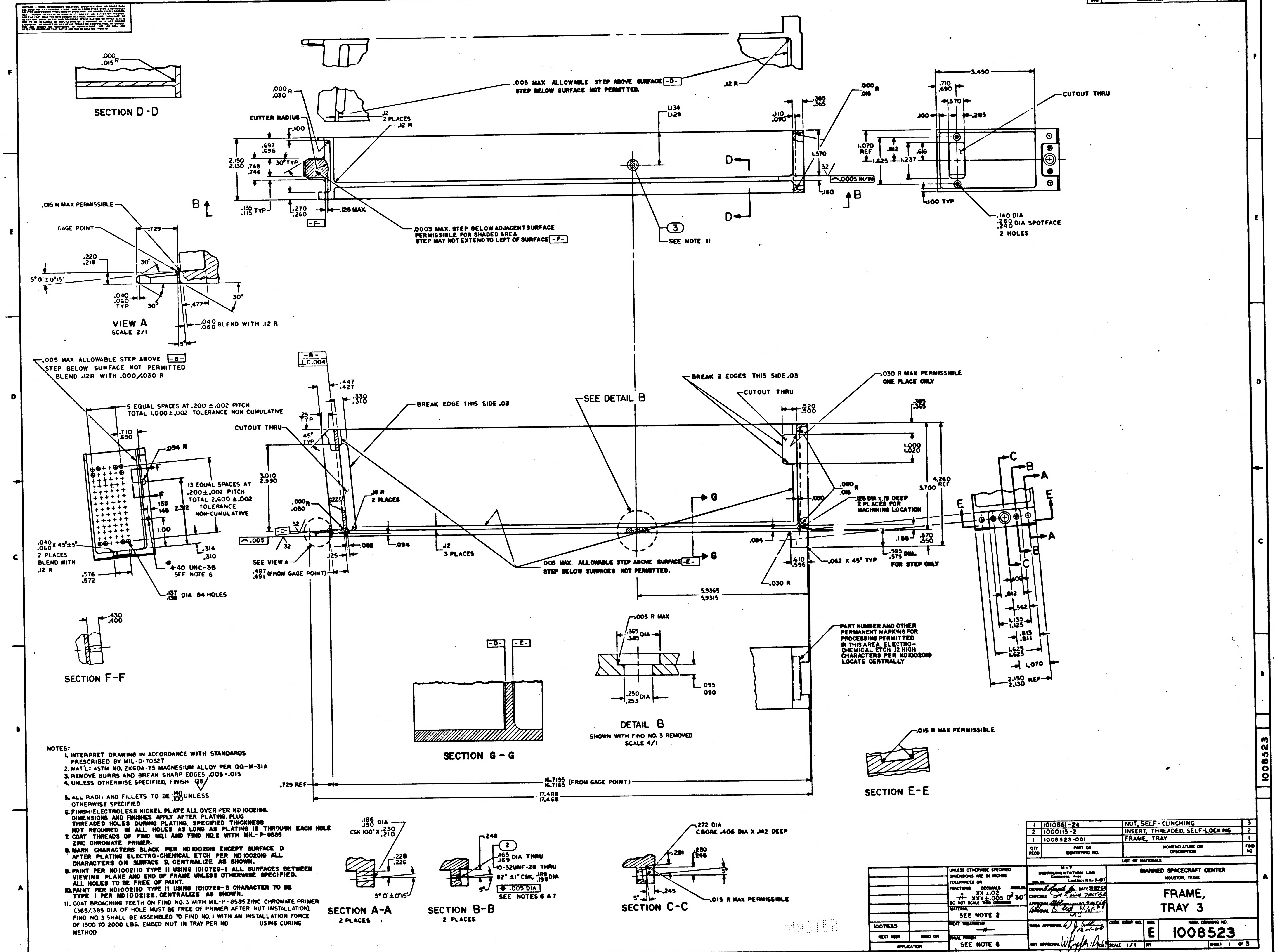
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
Contract NAS 9-497

DRAWN E. Leonik Jr. DATE 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008523
SCALE 1/1
WT
SHEET 3 OF 3


REVISIONS
4227
SECTION D-D
.000 R
.015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12 R
CUTTER RADIUS
.12 2 PLACES
.12 R
.100
.697 .696
30° TYP
2.150 2.130
.748 .746
.135 .115 TYP
.270 .260
.125 MAX.
-F-
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
1.134 1.129
3
SEE NOTE 11
.110 .090
.385 .365
.000 R .015
1.570
32
.0005 IN/IN
.160
B
D
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5°0' ±0°15'
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
VIEW A
SCALE 2/1
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .000/.030 R
5 EQUAL SPACES AT .200 ±.002 PITCH
TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.094 R
13 EQUAL SPACES AT .200 ±.002 PITCH
TOTAL 2.600 ±.002 TOLERANCE NON-CUMULATIVE
.155 .145
2.312
1.00
.040 X 45° ±5°
.060
2 PLACES
BLEND WITH .12 R
.576 .572
4-40 UNC-3B
SEE NOTE 6
.314 .310
.137 .136 DIA 84 HOLES
-B-
⊥ C .004
.447 .427
.330 .310
.25 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
3.010 2.990
.18 R
2 PLACES
.000 R .030
-C-
.005
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.062
.094
.12 3 PLACES
SEE DETAIL B
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
G
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520 .500
.385 .365
1.000 1.020
3.700
4.260 REF
.000 R .015
.080
.125 DIA x .19 DEEP
2 PLACES FOR MACHINING LOCATION
.084
.610 .596
.062 X 45° TYP
.188
.570 .550
.595 .575 DIM. FOR STEP ONLY
.030 R
5.9365 5.9315
C
B
A
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
.430 .400
SECTION F-F
-D- -E-
SECTION G-G
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0' ±0°15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .248
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C
MASTER
1008523

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND 1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008523-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS XX ±.02 XXX ±.005 ANGLES 0° ± 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN DATE 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 9 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

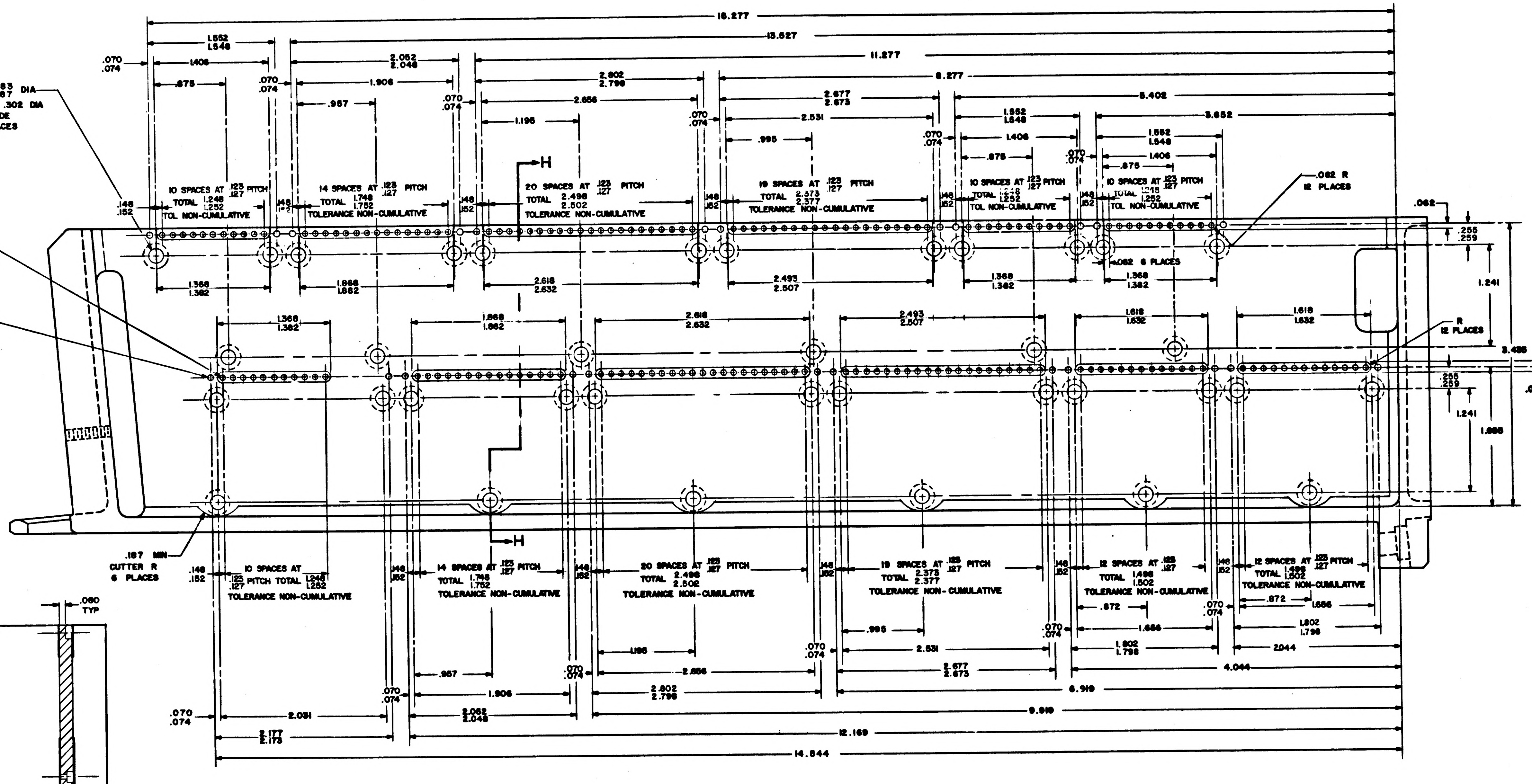
FRAME,
TRAY 3

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008523
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

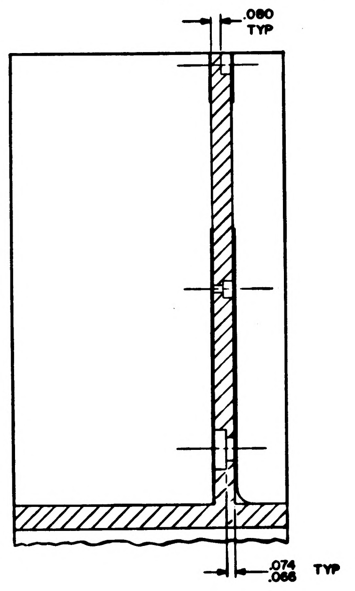
1008523

REVISIONS 4628			
SYM	DESCRIPTION	DATE	APPROVAL



18.277
13.527
11.277
8.277
5.402
3.652
1.552 1.548
1.406
.875
.070 .074
2.052 2.048
1.906
.957
2.802 2.796
2.656
1.195
2.677 2.673
2.531
.995
.183 .187 DIA
C BORE .302 DIA
FAR SIDE
36 PLACES
10 SPACES AT .123 .127 PITCH
TOTAL 1.248 1.252
TOL NON-CUMULATIVE
14 SPACES AT .123 .127 PITCH
TOTAL 1.748 1.752
TOLERANCE NON-CUMULATIVE
20 SPACES AT .123 .127 PITCH
TOTAL 2.498 2.502
19 SPACES AT .123 .127 PITCH
TOTAL 2.373 2.377
.148 .152
H
.062 R
12 PLACES
.062
.255 .259
1.241
3.486
.125
.072 .073 DIA
182 HOLES
.061 .063 DIA
24 HOLES
1.368 1.382
1.868 1.882
2.618 2.632
2.493 2.507
.062 6 PLACES
1.618 1.632
R
12 PLACES
1.686
.187 MIN
CUTTER R
6 PLACES
10 SPACES AT .123 .127 PITCH TOTAL 1.248 1.252
12 SPACES AT .123 .127
TOTAL 1.498 1.502
12 SPACES AT .123 .127 PITCH
.872
1.656
1.802 1.798
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177 2.173

VIEW B-B
SCALE: 2:1



.060 TYP
.074 .066 TYP

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ⧣ DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL ⧣
HEAT TREATMENT ⧣
FINAL FINISH ⧣

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN 30 SEP 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL E. Test 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL 4 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

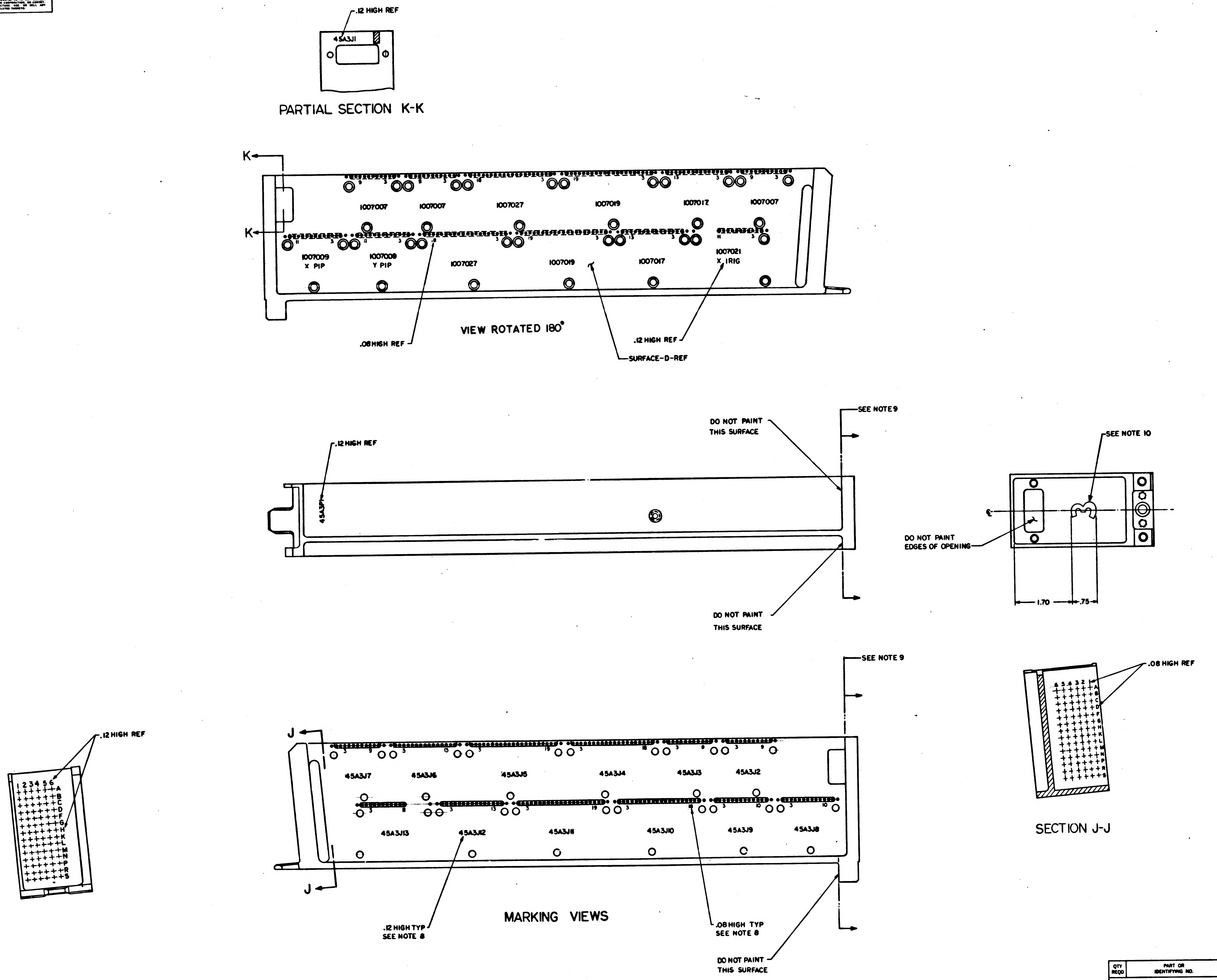
FRAME,
TRAY 3

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008523
SCALE 2/1
WT
SHEET 2 OF 3

1008523

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	DESCRIPTION	DATE	APPROVAL


.12 HIGH REF
45A3J1
PARTIAL SECTION K-K
K
K
1007007
1007007
1007027
1007019
1007017
1007007
1007009
X PIP
1007009
Y PIP
1007027
1007019
1007017
1007021
X IRIG
VIEW ROTATED 180°
.08 HIGH REF
.12 HIGH REF
SURFACE-D-REF
SEE NOTE 9
DO NOT PAINT
THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT
THIS SURFACE
SEE NOTE 10
℄
DO NOT PAINT
EDGES OF OPENING
1.70
.75
SEE NOTE 9
.08 HIGH REF
6 5 4 3 2 1
A
B
C
D
E
F
G
H
K
L
M
N
P
R
S
SECTION J-J
.12 HIGH REF
1 2 3 4 5 6
A
B
C
D
E
F
G
H
K
L
M
N
P
R
S
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
MARKING VIEWS
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
DO NOT PAINT
THIS SURFACE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497
DRAWN DATE 30SEP64
CHECKED 7OCT64
APPROVAL 8OCT64
APPROVAL
NASA APPROVAL W J Rhine 12-1-64
MIT APPROVAL

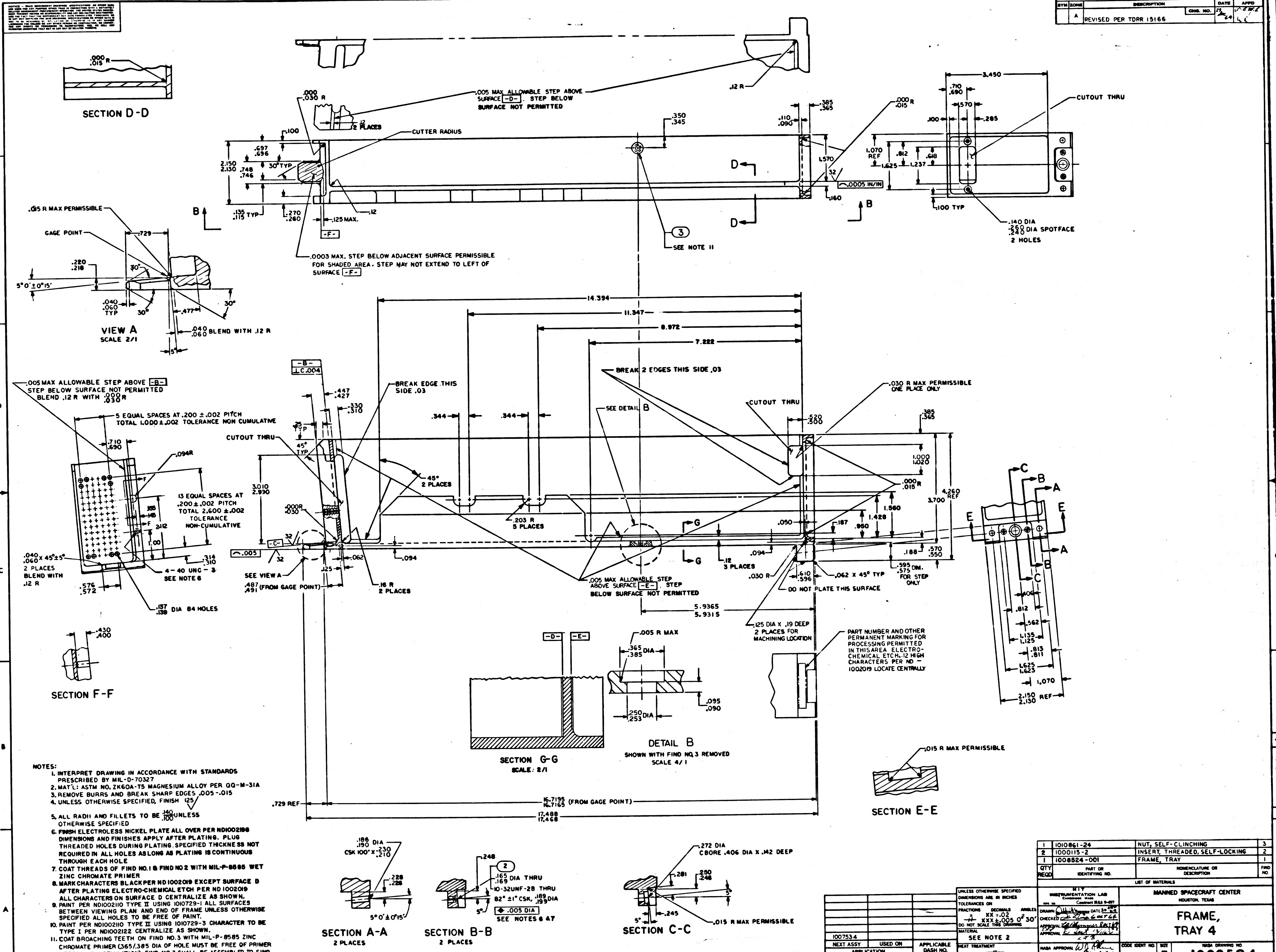
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008523
SCALE 1/1
WT
SHEET 3 OF 3

1008523

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
	A	REVISED PER TDRR 15166	29 Dec 64	


SECTION D-D
.000 .015 R
.12 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-. STEP BELOW SURFACE NOT PERMITTED
CUTTER RADIUS
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SEE NOTE 11
CUTOUT THRU
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
VIEW A
SCALE 2/1
.040 .060 BLEND WITH .12 R
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12 R WITH .000 .030 R
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
.040 .060 X 45° ± 5° 2 PLACES BLEND WITH .12 R
4-40 UNC-3 SEE NOTE 6
.137 .139 DIA 84 HOLES
SECTION F-F
BREAK EDGE THIS SIDE .03
BREAK 2 EDGES THIS SIDE .03
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
45° 2 PLACES
.203 R 5 PLACES
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-. STEP BELOW SURFACE NOT PERMITTED
.12 3 PLACES
.062 X 45° TYP
DO NOT PLATE THIS SURFACE
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH. .12 HIGH CHARACTERS PER ND-1002019 LOCATE CENTRALLY
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.16 R 2 PLACES
14.394
11.347
8.972
7.222
5.9365 5.9315
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
SECTION G-G
SCALE: 2/1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
SECTION E-E
.015 R MAX PERMISSIBLE
SECTION A-A
2 PLACES
.186 .190 DIA CSK 100° X .230 .210
5° 0' ± 0°15'
SECTION B-B
2 PLACES
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION C-C
.272 DIA
CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLAN AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION), FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008524-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007534		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN DATE 30 Sep 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

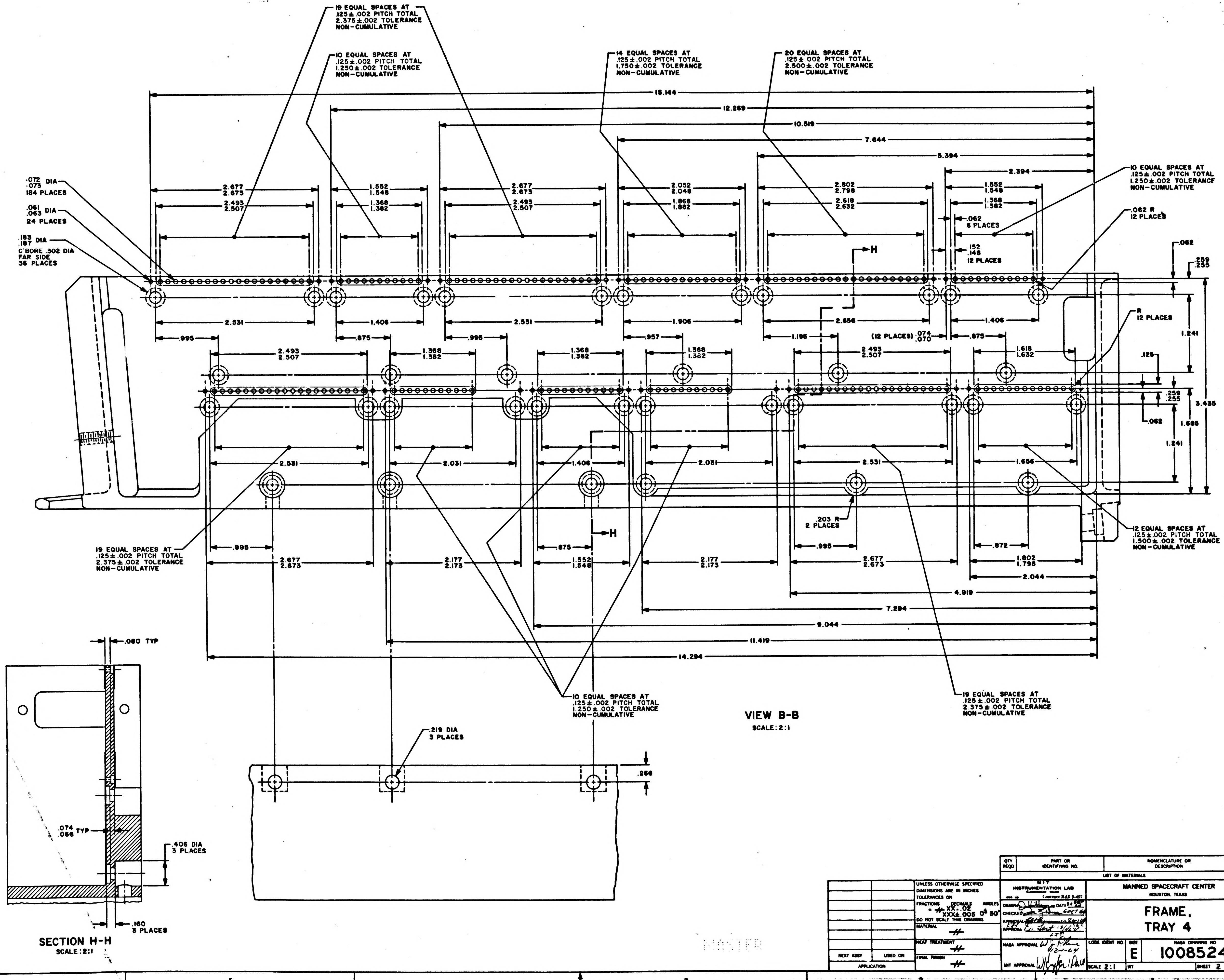
FRAME,
TRAY 4

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008524
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15166	29 Dec '64	[illegible]



19 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.375±.002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE
14 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.750±.002 TOLERANCE NON-CUMULATIVE
20 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.500±.002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE
12 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.500±.002 TOLERANCE NON-CUMULATIVE
15.144
12.269
10.519
7.644
5.394
2.394
.072 .073 DIA 184 PLACES
.061 .063 DIA 24 PLACES
.183 .187 DIA C'BORE .302 DIA FAR SIDE 36 PLACES
2.677 2.673
2.493 2.507
1.552 1.548
1.368 1.382
2.052 2.048
1.868 1.882
2.802 2.798
2.618 2.632
.062 6 PLACES
.152 .148 12 PLACES
.062 R 12 PLACES
R 12 PLACES
.062
.259 .255
H
2.531
1.406
1.906
2.656
.995
.875
.957
1.196
(12 PLACES) .074 .070
1.618 1.632
1.241
3.435
1.685
.125
2.031
1.656
.203 R 2 PLACES
.872
2.177 2.173
1.802 1.798
2.044
4.919
7.294
9.044
11.419
14.294
VIEW B-B
SCALE: 2:1
.219 DIA 3 PLACES
.266
.080 TYP
.074 .066 TYP
.406 DIA 3 PLACES
.160 3 PLACES
SECTION H-H
SCALE: 2:1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN [illegible] DATE 30 Sep 64
CHECKED [illegible] 6 OCT 64
APPROVAL [illegible] 8 OCT 64
EPL APPROVAL [illegible] 12/4/64
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1008524
SCALE 2:1
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	DESCRIPTION	DATE	APPROVAL
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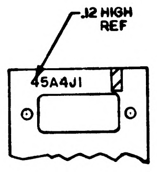
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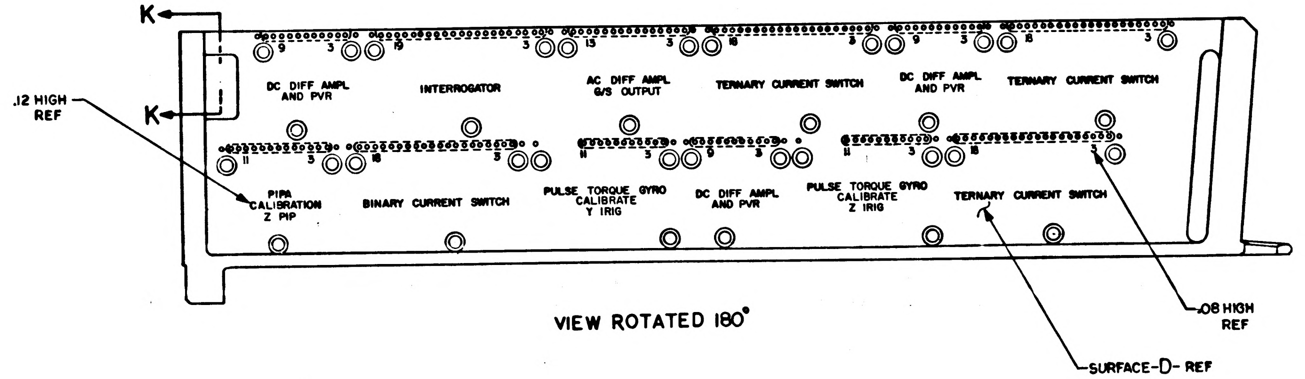
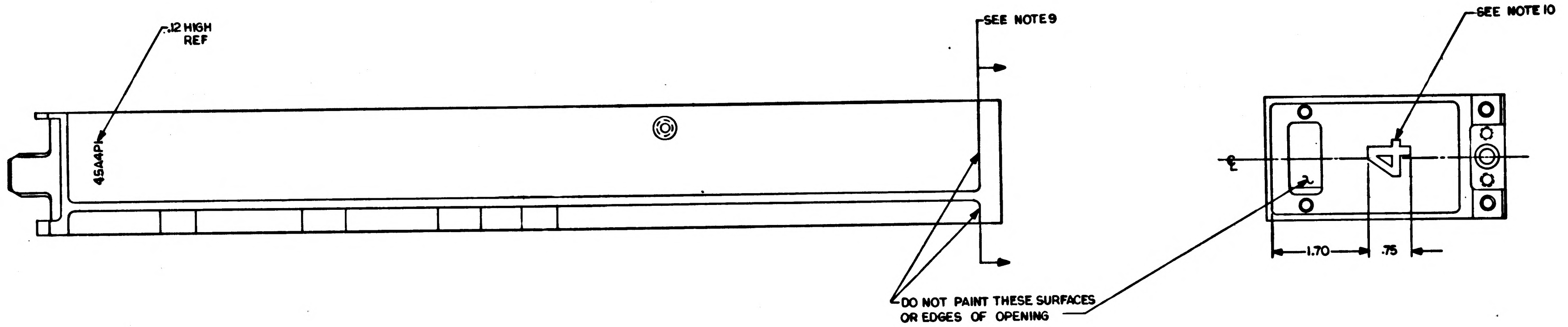
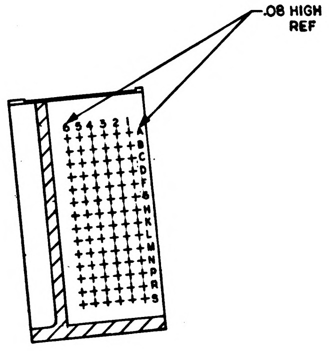
REF
45A4J1

PARTIAL SECTION K-K

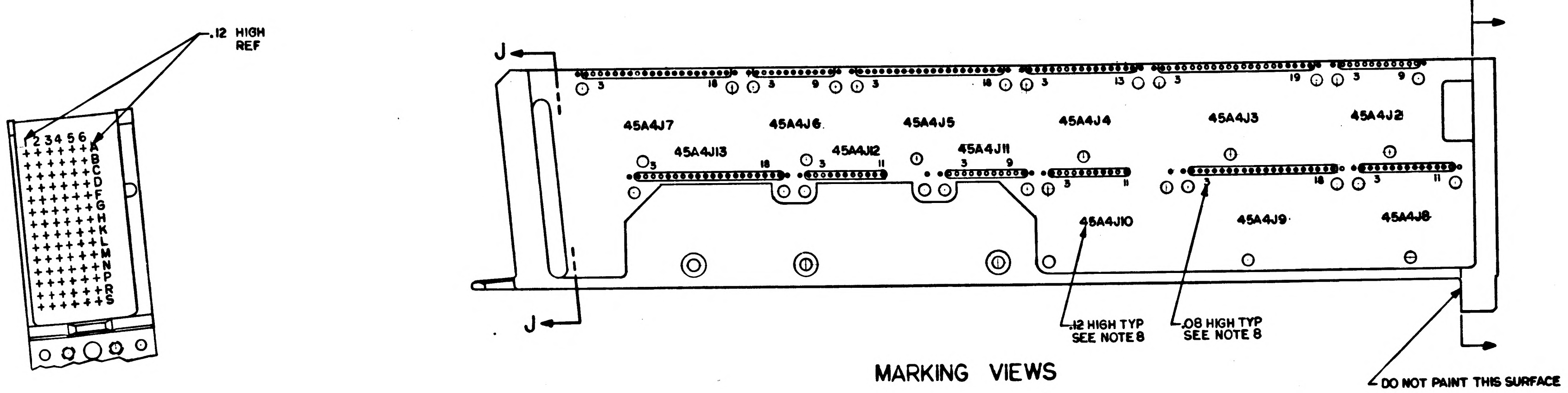

K
K
.12 HIGH
REF
DC DIFF AMPL AND PVR
INTERROGATOR
AC DIFF AMPL G/S OUTPUT
TERNARY CURRENT SWITCH
DC DIFF AMPL AND PVR
TERNARY CURRENT SWITCH
PIPA CALIBRATION Z PIP
BINARY CURRENT SWITCH
PULSE TORQUE GYRO CALIBRATE Y IRIG
DC DIFF AMPL AND PVR
PULSE TORQUE GYRO CALIBRATE Z IRIG
TERNARY CURRENT SWITCH
.08 HIGH
REF
SURFACE-D- REF

VIEW ROTATED 180°


.12 HIGH
REF
45A4P1
SEE NOTE 9
SEE NOTE 10
4
1.70
.75
DO NOT PAINT THESE SURFACES
OR EDGES OF OPENING


.08 HIGH
REF
6 5 4 3 2 1
A B C D E F G H K L M N P R S

SECTION J-J


.12 HIGH
REF
1 2 3 4 5 6
A B C D E F G H K L M N P R S
SEE NOTE 9
J
J
45A4J7
45A4J6
45A4J5
45A4J4
45A4J3
45A4J2
45A4J13
45A4J12
45A4J11
45A4J10
45A4J9
45A4J8
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

NEXT ASSY | USED ON
APPLICATION

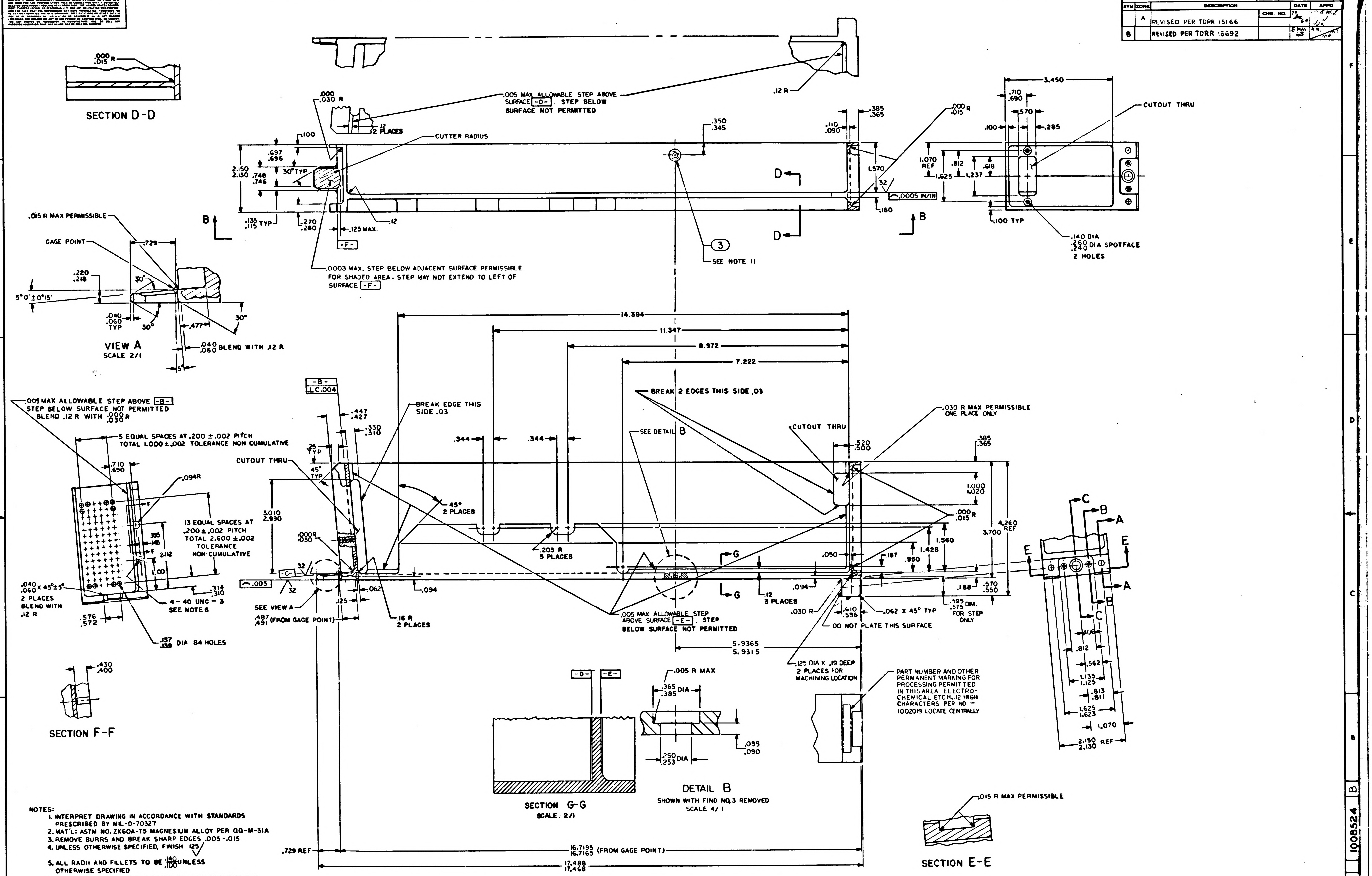
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497
DRAWN [illegible] DATE 30 64
CHECKED [illegible] 6 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

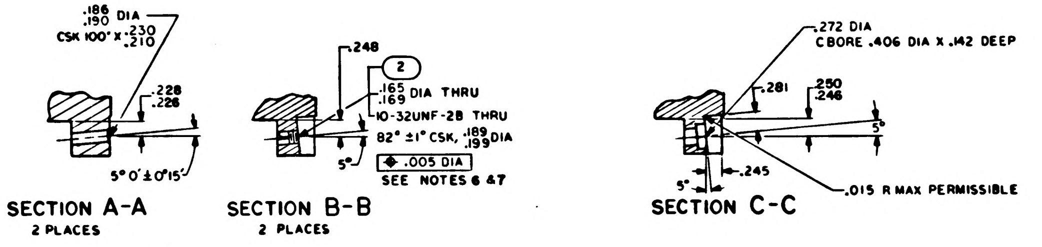
CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008524
SCALE 1/1 | WT | SHEET 3 OF 3

SYM	ZONE	DESCRIPTION	CHG. NO.	DATE	APPD
	A	REVISED PER TDRR 15166		29 Dec 64	
B		REVISED PER TDRR 18692		5 MAY 65	A.N.



SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-. STEP BELOW SURFACE NOT PERMITTED
.000 .030 R
.12 2 PLACES
CUTTER RADIUS
.100
.697 .696
30° TYP
.748 .746
2.150 2.130
.135 .115 TYP
.270 .260
.125 MAX.
.12
-F-
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.12 R
.350 .345
.110 .090
.385 .365
.000 R .015
1.570
32
.0005 IN/IN
.160
D
B
3
SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.250 .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5° 0' ± 0° 15'
.040 .060 TYP
30°
.477
.040 .060 BLEND WITH .12 R
VIEW A
SCALE 2/1
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12 R WITH .000 .030 R
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710 .690
.094R
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
.155 .145
2.112
1.00
.314 .310
.040 .060 x 45° ± 5° 2 PLACES BLEND WITH .12 R
.576 .572
4 - 40 UNC - 3 SEE NOTE 6
.137 .139 DIA 84 HOLES
-B-
⊥ C .004
.447 .427
.330 .310
.25 TYP
CUTOUT THRU
45° TYP
BREAK EDGE THIS SIDE .03
45° 2 PLACES
3.010 2.990
.000R .030
-C-
32
.005
SEE VIEW A
.125
.062
.16 R 2 PLACES
.094
.487 .491 (FROM GAGE POINT)
14.394
11.347
8.972
7.222
.344
.344
BREAK 2 EDGES THIS SIDE .03
SEE DETAIL B
CUTOUT THRU
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
1.000 1.020
.000 .015 R
4.260 REF
3.700
1.560
1.428
.187
.950
.050
.203 R 5 PLACES
G
.12 3 PLACES
.094
.030 R
.610 .596
.062 x 45° TYP
.188
.570 .550
.595 .575 DIM. FOR STEP ONLY
DO NOT PLATE THIS SURFACE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-. STEP BELOW SURFACE NOT PERMITTED
5.9365 5.9315
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH. .12 HIGH CHARACTERS PER ND 1002019 LOCATE CENTRALLY
A
B
C
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
.430 .400
SECTION F-F
-D-
-E-
SECTION G-G
SCALE: 2/1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLAN AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE TO BE CONTINUOUS.



.186 .190 DIA
CSK 100° x .230 .210
.228 .226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189 .199 DIA
5°
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA x .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008524-001	FRAME, TRAY	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007534		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ± .02 XXX ± .005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

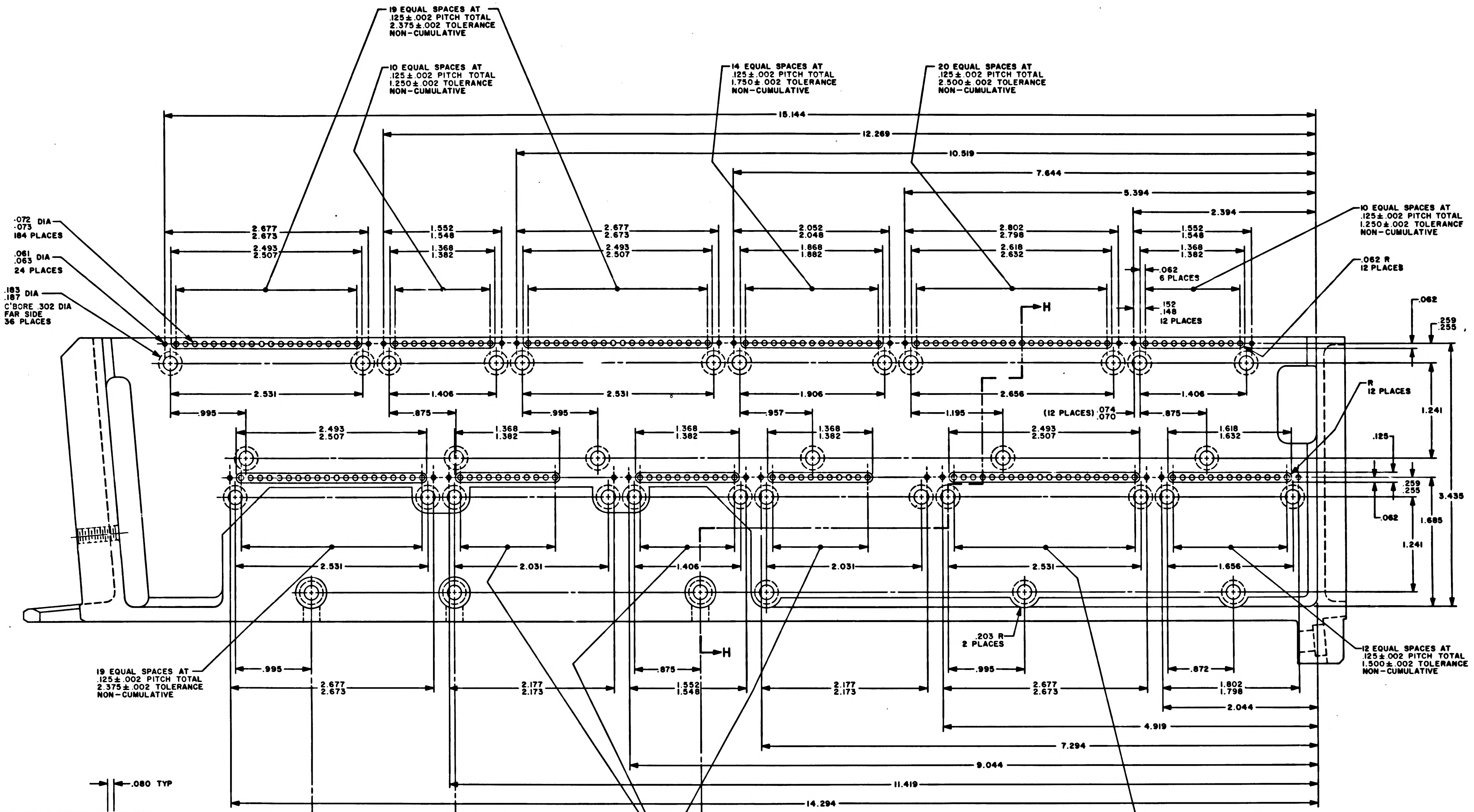
FRAME, TRAY 4

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008524
SCALE 1/1
WT
SHEET 1 OF 3

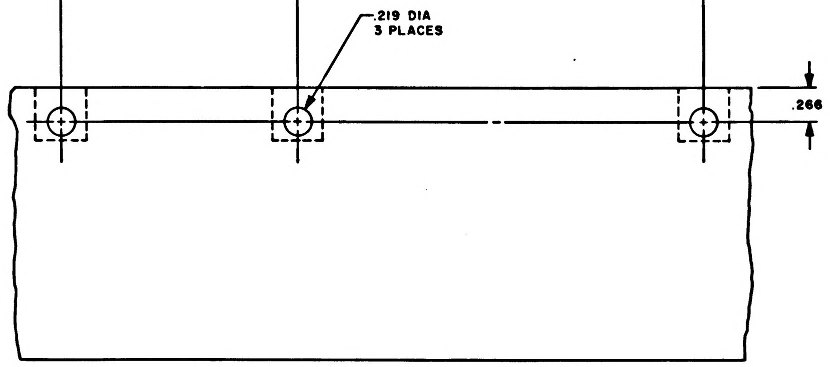
1008524 B

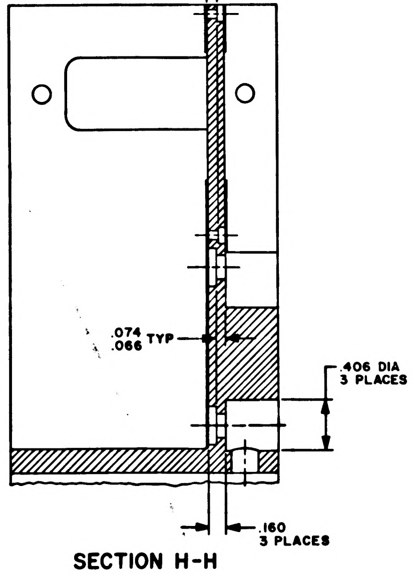
NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDPP 15166	29 Dec '64	
B	REVISED PER TDRR 18692	5 MAY 65	


19 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
2.375 ± .002 TOLERANCE
NON-CUMULATIVE
10 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
1.250 ± .002 TOLERANCE
NON-CUMULATIVE
14 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
1.750 ± .002 TOLERANCE
NON-CUMULATIVE
20 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
2.500 ± .002 TOLERANCE
NON-CUMULATIVE
15.144
12.269
10.519
7.644
5.394
2.394
10 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
1.250 ± .002 TOLERANCE
NON-CUMULATIVE
.072 .073 DIA
184 PLACES
.061 .063 DIA
24 PLACES
.183 .187 DIA
C'BORE .302 DIA
FAR SIDE
36 PLACES
2.677 2.673
1.552 1.548
2.677 2.673
2.052 2.048
2.802 2.798
1.552 1.548
2.493 2.507
1.368 1.382
2.493 2.507
1.868 1.882
2.618 2.632
1.368 1.382
.062
6 PLACES
.152 .148
12 PLACES
.062 R
12 PLACES
H
.062
.259 .255
2.531
1.406
2.531
1.906
2.656
1.406
.995
.875
.995
.957
1.195
(12 PLACES) .074 .070
.875
R
12 PLACES
1.241
2.493 2.507
1.368 1.382
1.368 1.382
1.368 1.382
2.493 2.507
1.618 1.632
.125
.259 .255
3.435
.062
1.685
1.241
2.531
2.031
1.406
2.031
2.531
1.656
.203 R
2 PLACES
H
12 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
1.500 ± .002 TOLERANCE
NON-CUMULATIVE
19 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
2.375 ± .002 TOLERANCE
NON-CUMULATIVE
.995
.875
.995
.872
2.677 2.673
2.177 2.173
1.552 1.548
2.177 2.173
2.677 2.673
1.802 1.798
2.044
4.919
7.294
9.044
11.419
14.294
10 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
1.250 ± .002 TOLERANCE
NON-CUMULATIVE
19 EQUAL SPACES AT
.125 ± .002 PITCH TOTAL
2.375 ± .002 TOLERANCE
NON-CUMULATIVE
.219 DIA
3 PLACES
.266

VIEW B-B
SCALE: 2:1




.080 TYP
.074 .066 TYP
.406 DIA
3 PLACES
.160
3 PLACES

SECTION H-H
SCALE: 2:1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

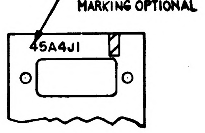
FRAME, TRAY 4

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008524
SCALE 2:1
WT
SHEET 2 OF 3

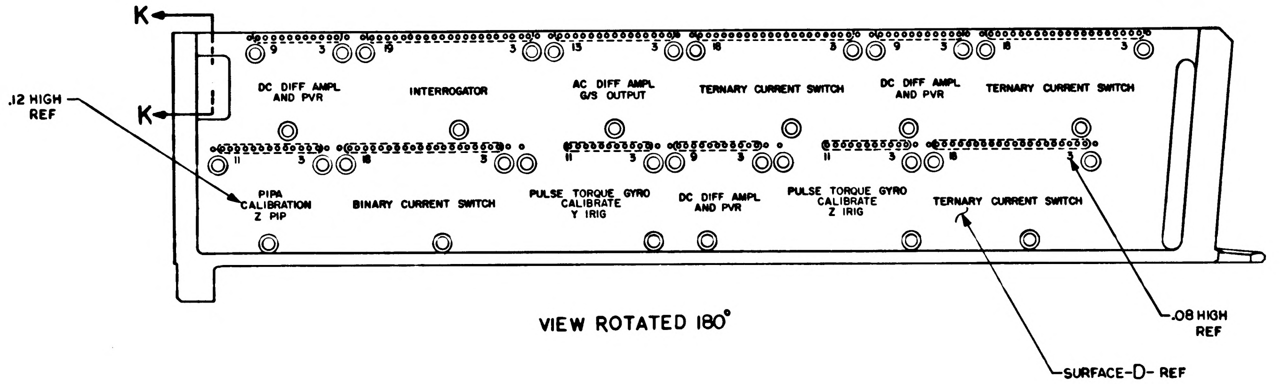
1008524 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

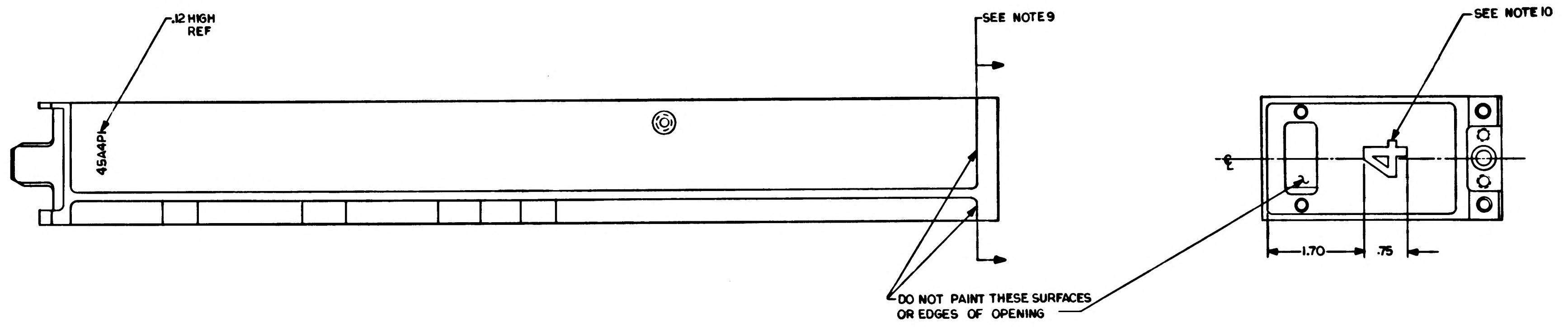
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 5166	29 Dec '64	
B	REVISED PER TDRR 18692	5 MAY 65	A.N.

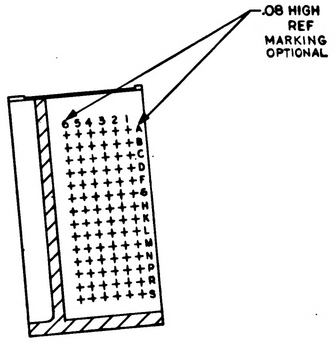

.12 HIGH
REF
MARKING OPTIONAL
45A4J1

PARTIAL SECTION K-K

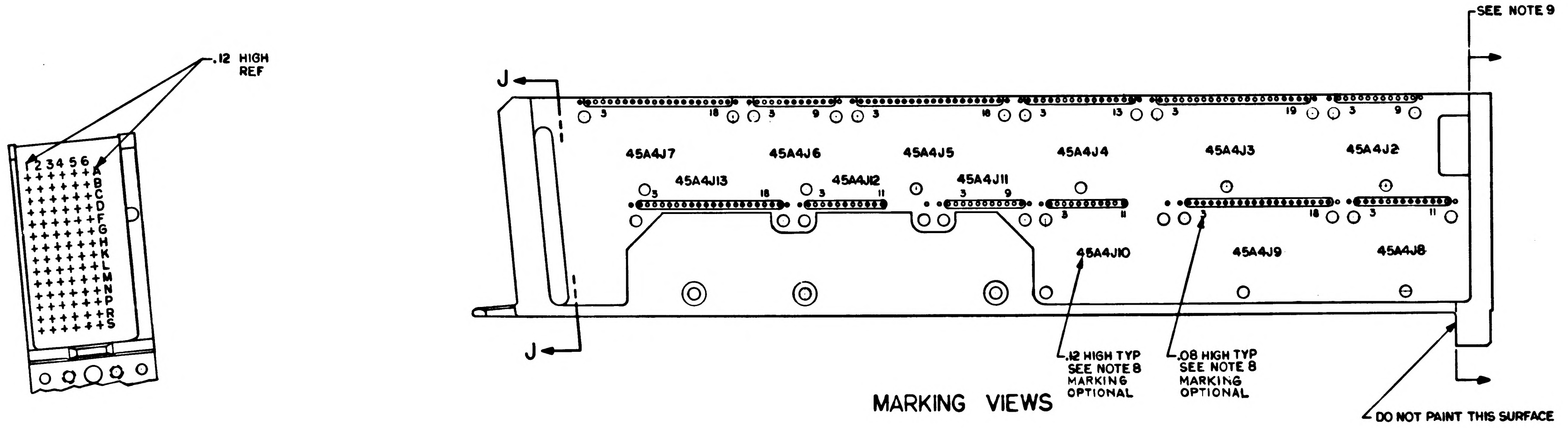

K
K
.12 HIGH
REF
DC DIFF AMPL
AND PVR
INTERROGATOR
AC DIFF AMPL
G/S OUTPUT
TERNARY CURRENT SWITCH
DC DIFF AMPL
AND PVR
TERNARY CURRENT SWITCH
PIPA
CALIBRATION
Z PIP
BINARY CURRENT SWITCH
PULSE TORQUE GYRO
CALIBRATE
Y IRIG
DC DIFF AMPL
AND PVR
PULSE TORQUE GYRO
CALIBRATE
Z IRIG
TERNARY CURRENT SWITCH
.08 HIGH
REF
SURFACE-D- REF

VIEW ROTATED 180°


.12 HIGH
REF
45A4P1
SEE NOTE 9
SEE NOTE 10
1.70
.75
DO NOT PAINT THESE SURFACES
OR EDGES OF OPENING


.08 HIGH
REF
MARKING
OPTIONAL
6 5 4 3 2 1
A B C D E F G H K L M N P R S

SECTION J-J


.12 HIGH
REF
2 3 4 5 6
A B C D E F G H K L M N P R S
SEE NOTE 9
J
J
45A4J7
45A4J6
45A4J5
45A4J4
45A4J3
45A4J2
45A4J13
45A4J12
45A4J11
45A4J10
45A4J9
45A4J8
.12 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN [illegible] DATE 30 [illegible] 64
CHECKED [illegible] 6 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible]
NASA APPROVAL W. J. Rhine 12-1-64
MIT APPROVAL [illegible]

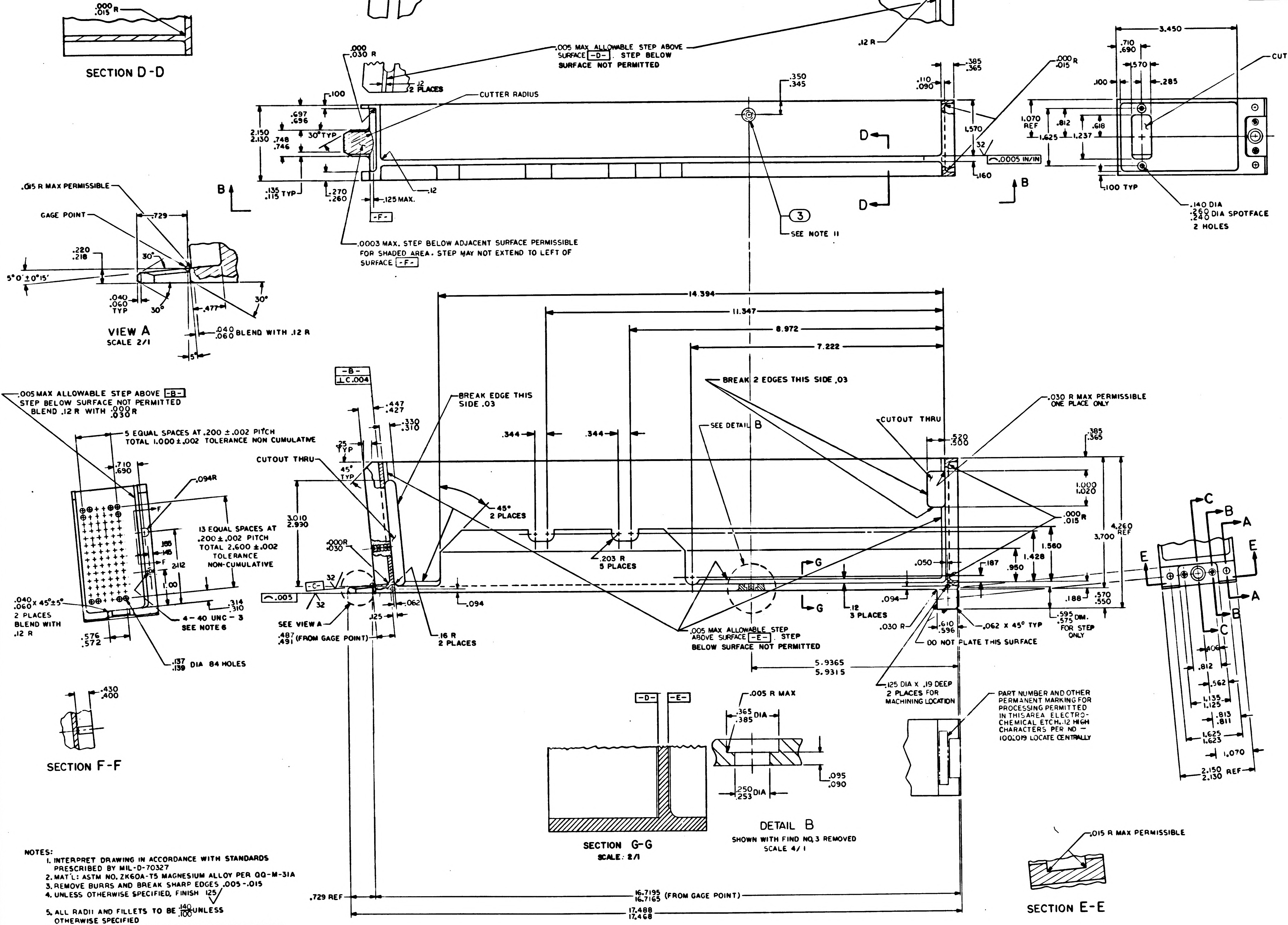
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008524
SCALE 1/1
WT
SHEET 3 OF 3

1008524 B

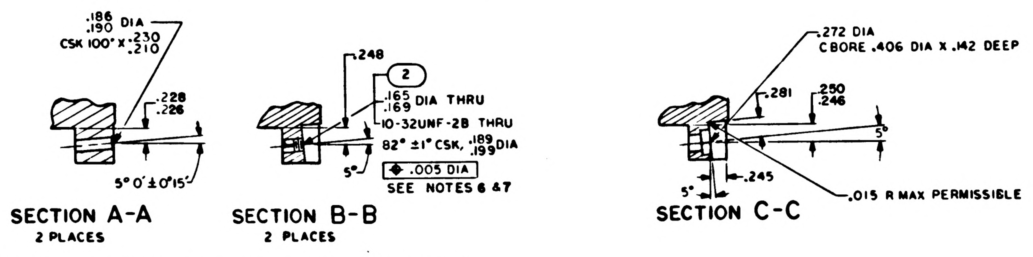
REVISIONS					
SYM	ZONE	DESCRIPTION	CHG. NO.	DATE	APPD
	A	REVISED PEP TDRR 15166		29 Dec 64	
B		REVISED PER TDRR 18692		5 MAY 65	A.N.
C		REVISED PER TDRR 21520		16 Aug 66	



.000 .015 R
SECTION D-D
.000 .030 R
.12 2 PLACES
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-. STEP BELOW SURFACE NOT PERMITTED
CUTTER RADIUS
.12 R
.100
.697 .696
30° TYP
2.150 2.130
.748 .746
.135 .115 TYP
.270 .260
.125 MAX.
.12
-F-
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
B
.350 .345
D
3
SEE NOTE 11
.110 .090
.385 .365
1.570
32
.0005 IN/IN
.160
.000 .015 R
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5°0' ± 0°15'
.040 .060 TYP
30°
.477
VIEW A
SCALE 2/1
.040 .060 BLEND WITH .12 R
5°
14.394
11.347
8.972
7.222
-B-
⊥C.004
.447 .427
.330 .310
BREAK EDGE THIS SIDE .03
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12 R WITH .000 .030 R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710 .690
.094R
F
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
.165 .145
2.112
1.00
.040 .060 X 45° ± 5°
2 PLACES
BLEND WITH .12 R
.314 .310
4-40 UNC-3
SEE NOTE 6
.576 .572
.137 .139 DIA 84 HOLES
.25 TYP
45° TYP
CUTOUT THRU
3.010 2.930
.000R .030
-C-
32
.005
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.062
.16 R
2 PLACES
.094
45°
2 PLACES
.344
.344
.203 R
5 PLACES
BREAK 2 EDGES THIS SIDE .03
SEE DETAIL B
CUTOUT THRU
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
1.000 1.020
.000 .015 R
4.260 REF
3.700
1.560
1.428
.950
.187
.050
G
.12
3 PLACES
.094
.188
.570 .550
.595 .575 DIM. FOR STEP ONLY
.030 R
.610 .596
.062 X 45° TYP
DO NOT PLATE THIS SURFACE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-. STEP BELOW SURFACE NOT PERMITTED
5.9365 5.9315
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND-1002019 LOCATE CENTRALLY
C
B
A
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
.430 .400
SECTION F-F
-D-
-E-
SECTION G-G
SCALE: 2/1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLAN AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO.3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002126 USING CURING METHOD III



.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0' ± 0°15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189 .199 DIA
5°
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE TO BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008524-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007534		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//— DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—//—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN DATE 30 Sep 64
CHECKED 6 OCT 64
APPROVAL
APPROVAL

NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

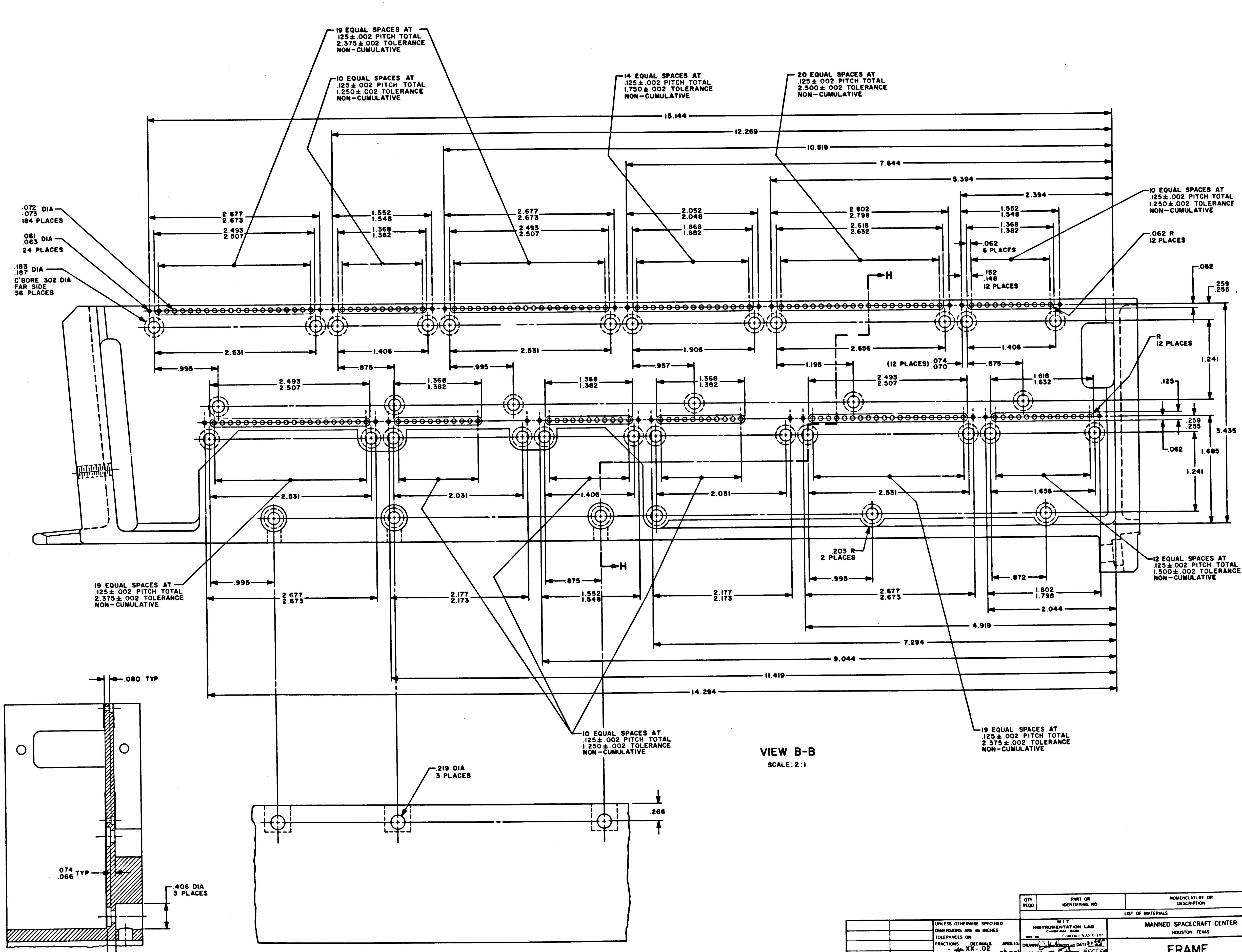
FRAME,
TRAY 4

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008524
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15166	29 Dec '64	G.W.E.
B	REVISED PER TDRR 15692	5 MAY 65	A.N.
C	REVISION STATUS CHANGED	16 AUG 65	



19 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.375±.002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE
14 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.750±.002 TOLERANCE NON-CUMULATIVE
20 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.500±.002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE
.062 R 12 PLACES
15.144
12.269
10.519
7.644
5.394
2.394
2.677 2.673
1.552 1.548
2.052 2.048
2.802 2.798
2.493 2.507
1.368 1.382
1.868 1.882
2.618 2.632
.072 DIA .073 184 PLACES
.061 DIA .063 24 PLACES
.183 DIA .187 C'BORE .302 DIA FAR SIDE 36 PLACES
.062 6 PLACES
.152 .148 12 PLACES
H
.062
.259 .255
2.531
1.406
1.906
2.656
.995
.875
.957
1.195
(12 PLACES) .074 .070
R 12 PLACES
1.241
.125
1.618 1.632
.259 .255
.062
3.435
1.685
1.241
2.031
1.656
.203 R 2 PLACES
12 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.500±.002 TOLERANCE NON-CUMULATIVE
19 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.375±.002 TOLERANCE NON-CUMULATIVE
.872
1.802 1.798
2.177 2.173
2.044
4.919
7.294
9.044
11.419
14.294
10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE
19 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.375±.002 TOLERANCE NON-CUMULATIVE
.080 TYP
.074 .066 TYP
.406 DIA 3 PLACES
.160 3 PLACES
.219 DIA 3 PLACES
.266

VIEW B-B
SCALE: 2:1

SECTION H-H
SCALE: 2:1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ±.02 XXX±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN D. Hi... DATE 30 SEP 64
CHECKED ... 6 OCT 64
APPROVAL ... 8 OCT 64
APPROVAL ...
NASA APPROVAL W. ... 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

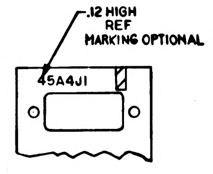
FRAME,
TRAY 4

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008524
SCALE 2:1
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 5166	29 Dec '64	
B	REVISED PER TDRR 18692	5 MAY 65	A.N.
C	REVISION STATUS CHANGED	16 Aug 65	R.W.T.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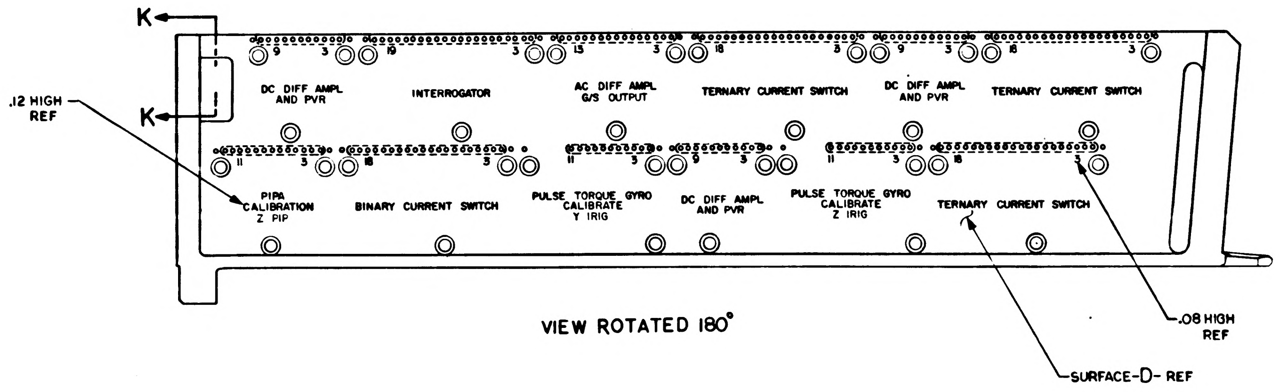
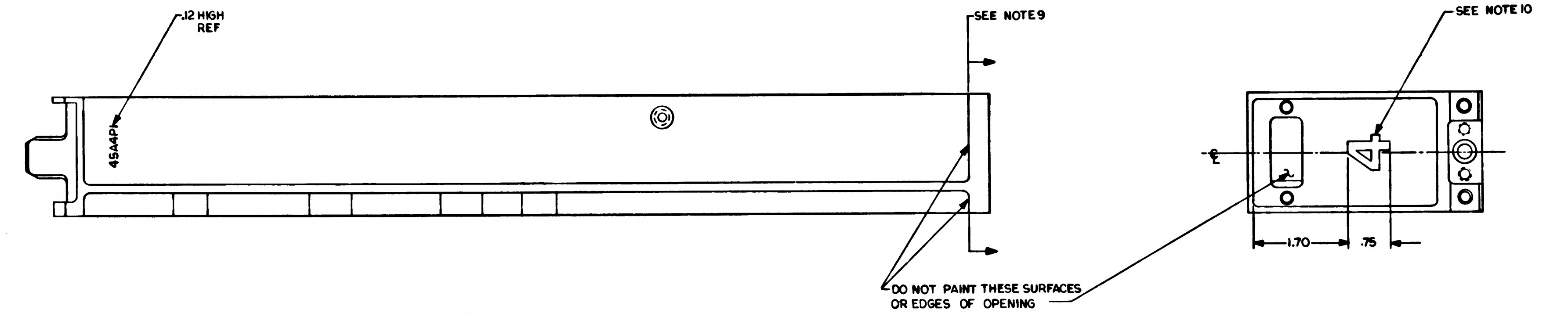
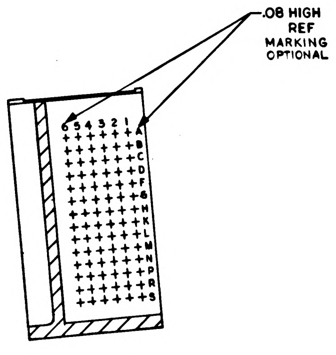
REF
MARKING OPTIONAL
45A4J1

PARTIAL SECTION K-K

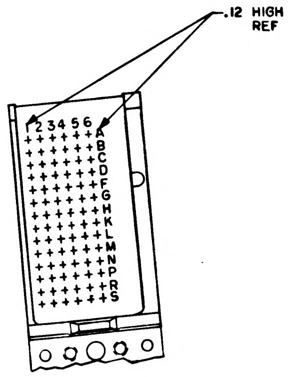

K
K
.12 HIGH
REF
DC DIFF AMPL AND PVR
INTERROGATOR
AC DIFF AMPL G/S OUTPUT
TERNARY CURRENT SWITCH
DC DIFF AMPL AND PVR
TERNARY CURRENT SWITCH
PIPA CALIBRATION Z PIP
BINARY CURRENT SWITCH
PULSE TORQUE GYRO CALIBRATE Y IRIG
DC DIFF AMPL AND PVR
PULSE TORQUE GYRO CALIBRATE Z IRIG
TERNARY CURRENT SWITCH
.08 HIGH
REF
SURFACE-D- REF

VIEW ROTATED 180°


.12 HIGH
REF
45A4P1
SEE NOTE 9
SEE NOTE 10
℄
1.70
.75
DO NOT PAINT THESE SURFACES OR EDGES OF OPENING


.08 HIGH
REF
MARKING
OPTIONAL
6 5 4 3 2 1
A B C D E F H J K L M N P R S

SECTION J-J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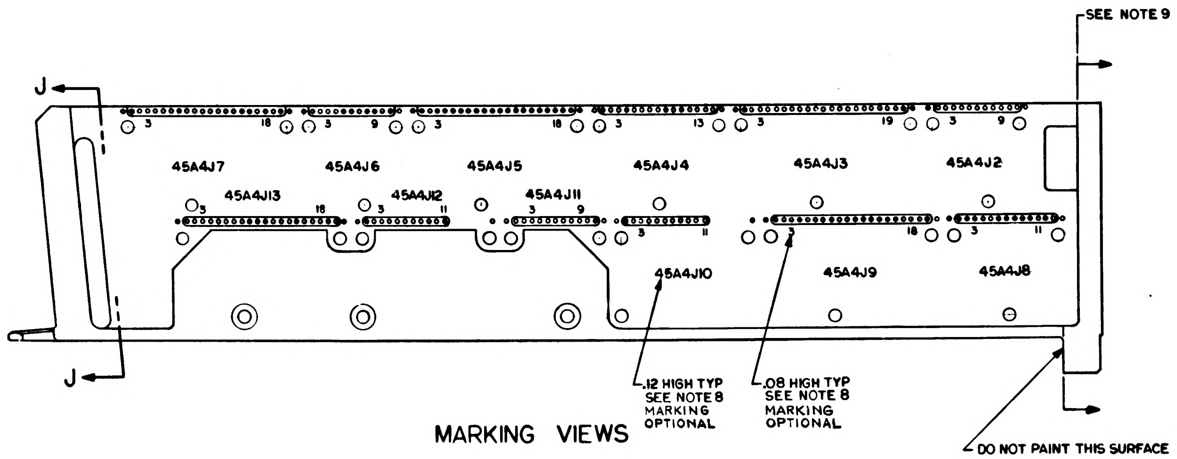
REF
1 2 3 4 5 6
A B C D E F G H J K L M N P R S


SEE NOTE 9
J
J
45A4J7
45A4J6
45A4J5
45A4J4
45A4J3
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45A4J12
45A4J11
45A4J10
45A4J9
45A4J8
.12 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

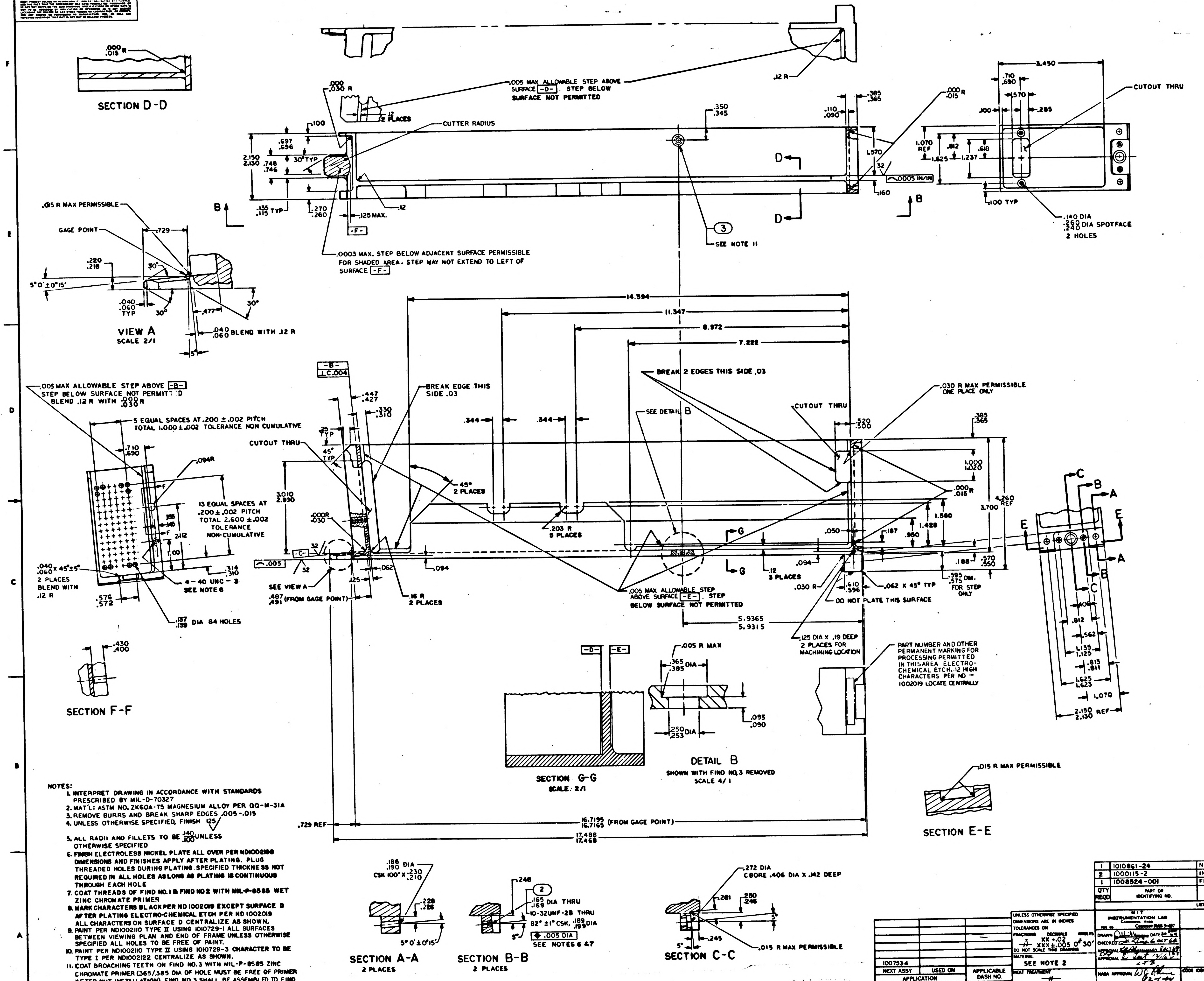
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO Contract NAS 9-497
DRAWN DATE 30
CHECKED 6 OCT 64
APPROVAL 5 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008524
SCALE 1/1
WT
SHEET 3 OF 3


SECTION D-D
SECTION F-F
VIEW A
SCALE 2/1
CUTTER RADIUS
CUTOUT THRU
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- . STEP BELOW SURFACE NOT PERMITTED
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SEE NOTE 11
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
GAGE POINT
.015 R MAX PERMISSIBLE
.040 .060 BLEND WITH .12 R
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12 R WITH .000 .030 R
5 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3 SEE NOTE 6
.137 .139 DIA 84 HOLES
BREAK EDGE THIS SIDE .03
BREAK 2 EDGES THIS SIDE .03
SEE DETAIL B
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- . STEP BELOW SURFACE NOT PERMITTED
DO NOT PLATE THIS SURFACE
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH. .12 HIGH CHARACTERS PER ND-1002019 LOCATE CENTRALLY
SEE VIEW A
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
14.394
11.347
8.972
7.222
5.9365 5.9315
SECTION G-G
SCALE: 2/1
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
SECTION E-E
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
SEE NOTES 6 & 7
10-32UNF-2B THRU
SECTION C-C
.272 DIA CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE
REVISIONS
SYM
ZONE
DESCRIPTION
DATE
APPD
CHG. NO.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLAN AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO.3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO.3 SHALL BE ASSEMBLED TO FIND NO.1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008524-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007534		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN DATE 3-6-64
CHECKED 6 OCT 64
APPROVAL
APPROVAL 12/16/64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

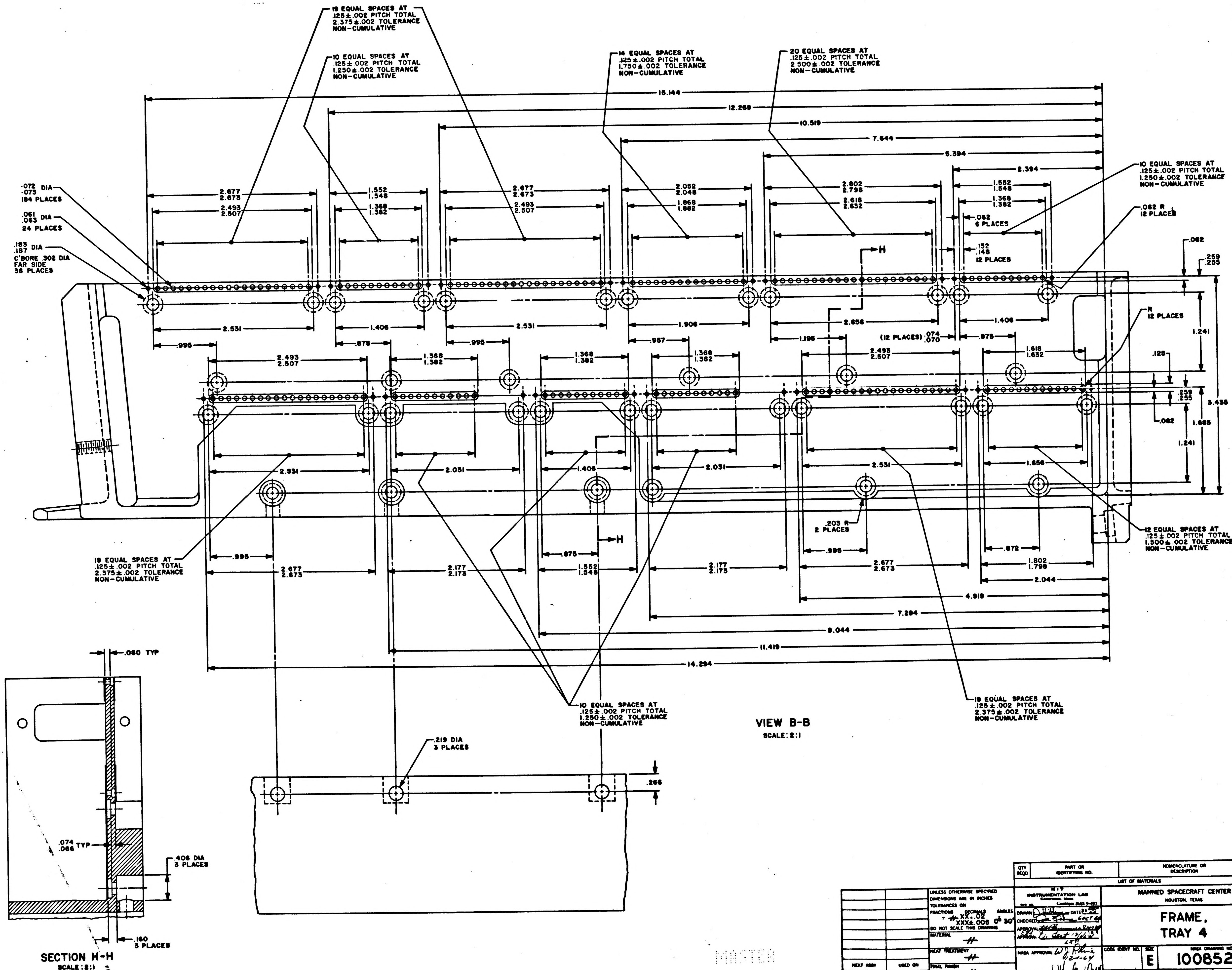
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008524
SCALE 1/1
WT
SHEET 1 OF 3

1008524

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL


19 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.375 ± .002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.250 ± .002 TOLERANCE NON-CUMULATIVE
14 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.750 ± .002 TOLERANCE NON-CUMULATIVE
20 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.500 ± .002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.250 ± .002 TOLERANCE NON-CUMULATIVE
12 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.500 ± .002 TOLERANCE NON-CUMULATIVE
19 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.375 ± .002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.250 ± .002 TOLERANCE NON-CUMULATIVE
19 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.375 ± .002 TOLERANCE NON-CUMULATIVE
.072 .073 DIA 184 PLACES
.061 .063 DIA 24 PLACES
.183 .187 DIA C'BORE .302 DIA FAR SIDE 36 PLACES
.062 6 PLACES
.152 .148 12 PLACES
.062 R 12 PLACES
R 12 PLACES
.203 R 2 PLACES
(12 PLACES) .074 .070
15.144
12.269
10.519
7.644
5.394
2.394
2.677 2.673
1.552 1.548
2.493 2.507
1.368 1.382
2.052 2.048
1.868 1.862
2.802 2.798
2.618 2.632
2.531
1.406
1.906
2.656
.995
.875
.957
1.196
.062
.259 .255
1.241
.125
3.435
1.685
1.618 1.632
2.031
1.656
2.177 2.173
1.802 1.798
.872
2.044
4.919
7.294
9.044
11.419
14.294
H
VIEW B-B
SCALE: 2:1
.219 DIA 3 PLACES
.266
.080 TYP
.074 .066 TYP
.406 DIA 3 PLACES
.160 3 PLACES
SECTION H-H
SCALE: 2:1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ± .02 XXX ± .005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL 12/4/64
NASA APPROVAL W. J. Rhine 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

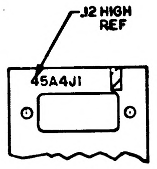
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008524
SCALE 2:1
WT
SHEET 2 OF 3

MASTER

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS 14627

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.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REF
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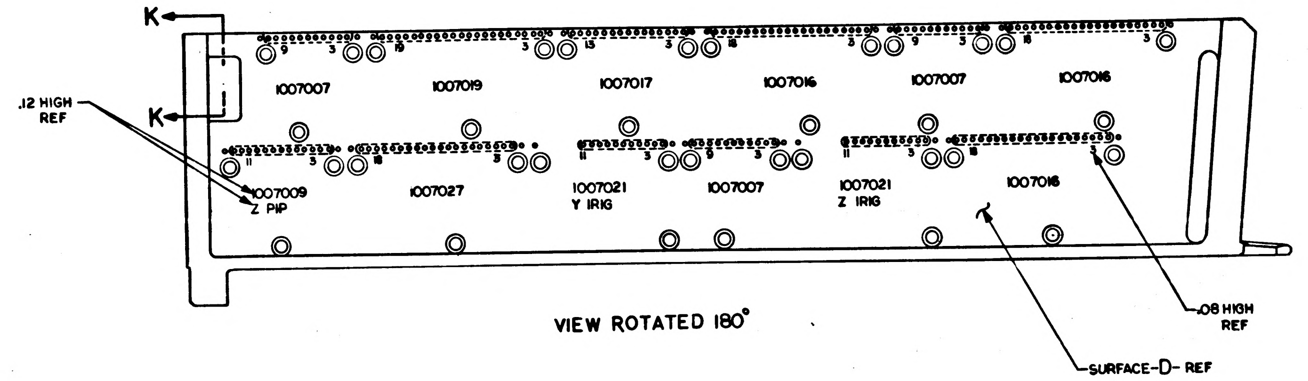
PARTIAL SECTION K-K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K
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1007007
1007019
1007017
1007016
1007007
1007016
1007009
Z PIP
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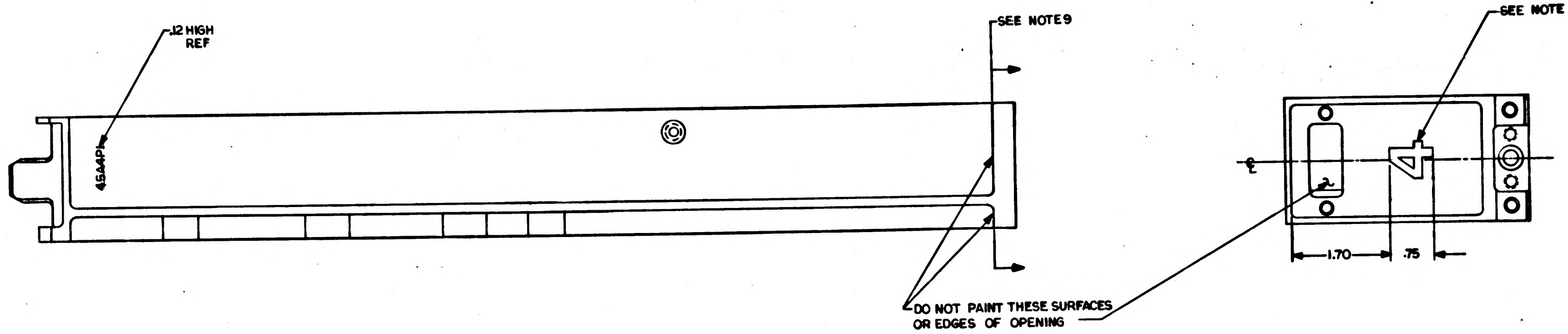
Y IRIG
1007007
1007021
Z IRIG
1007016
.08 HIGH
REF
SURFACE-D- REF

VIEW ROTATED 180°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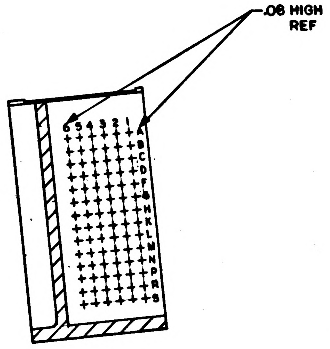
REF
45A4P1
SEE NOTE 9
SEE NOTE 10
4
1.70
.75
DO NOT PAINT THESE SURFACES
OR EDGES OF OPENING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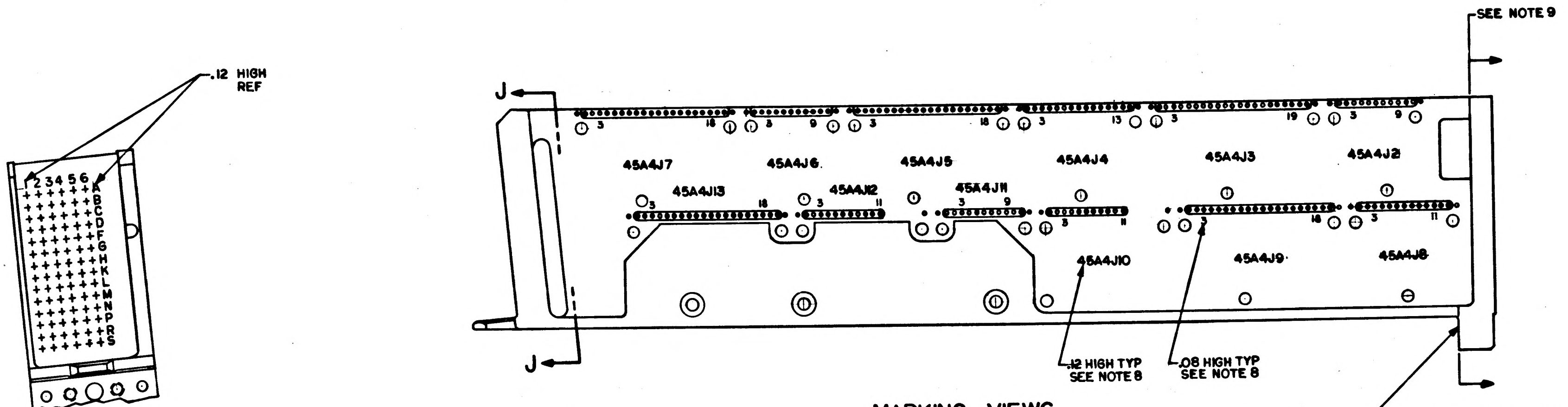
A B C D E F G H K L M N P R S

SECTION J-J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REF
1 2 3 4 5 6
A B C D E F G H K L M N P R S
SEE NOTE 9
J
J
45A4J7
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45A4J5
45A4J4
45A4J3
45A4J2
45A4J13
45A4J12
45A4J11
45A4J10
45A4J9
45A4J8
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN DATE
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

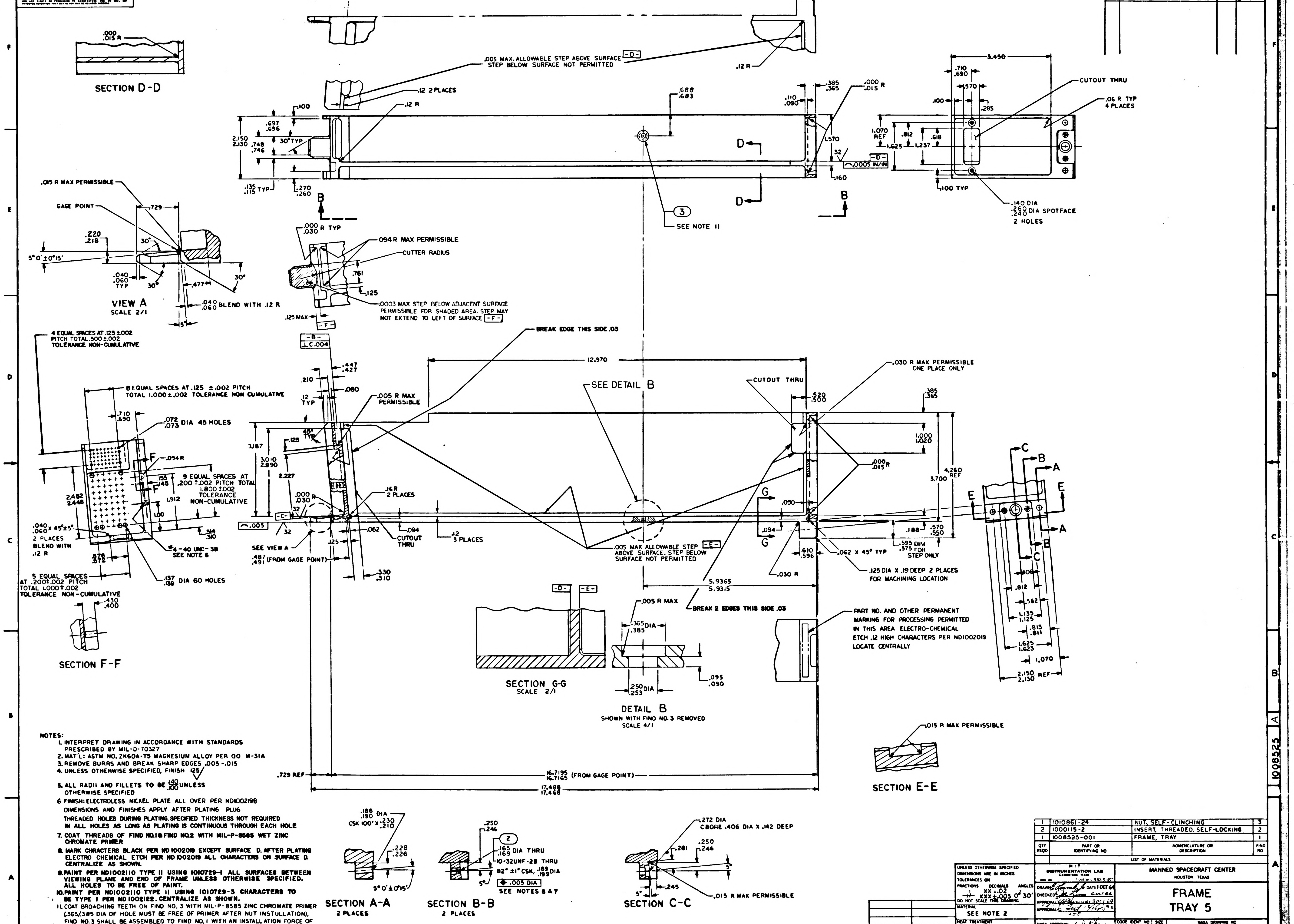
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

CODE IDENT NO. SIZE E NASA DRAWING NO. 1008524
SCALE 1/1 WT SHEET 3 OF 3

1008524

REV	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	[illegible]


SECTION D-D
.000 .015 R
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
3.450
CUTOUT THRU
.06 R TYP 4 PLACES
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.100 TYP
.0005 IN/IN
SEE NOTE 11
VIEW A
SCALE 2/1
GAGE POINT
.015 R MAX PERMISSIBLE
.040 .060 BLEND WITH .12 R
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
BREAK EDGE THIS SIDE .03
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.072 .073 DIA 45 HOLES
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
.040 .060 x 45° ±5° 2 PLACES BLEND WITH .12 R
4-40 UNC-3B SEE NOTE 6
.137 .139 DIA 60 HOLES
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
SECTION F-F
12.970
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.005 R MAX PERMISSIBLE
.16 R 2 PLACES
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.005 MAX ALLOWABLE STEP ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
.062 x 45° TYP
.595 DIM .575 FOR STEP ONLY
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
BREAK 2 EDGES THIS SIDE .03
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION G-G
SCALE 2/1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.005 R MAX
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
SECTION E-E
.015 R MAX PERMISSIBLE
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
10-32UNF-2B THRU
SEE NOTES 6 & 7
SECTION C-C
.272 DIA CBORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005 -.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125/
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHRACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTULLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS, EMBED NUT IN TRAY PER ND USING CURING METHOD.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008525-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007535	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN E. Loomis Jr DATE 1 OCT 64
CHECKED [illegible] 6 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible]

NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 5

CODE IDENT NO	SIZE	NASA DRAWING NO
80230	E	1008525

SCALE 1/1 WT SHEET 1 OF 3

1008525 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD
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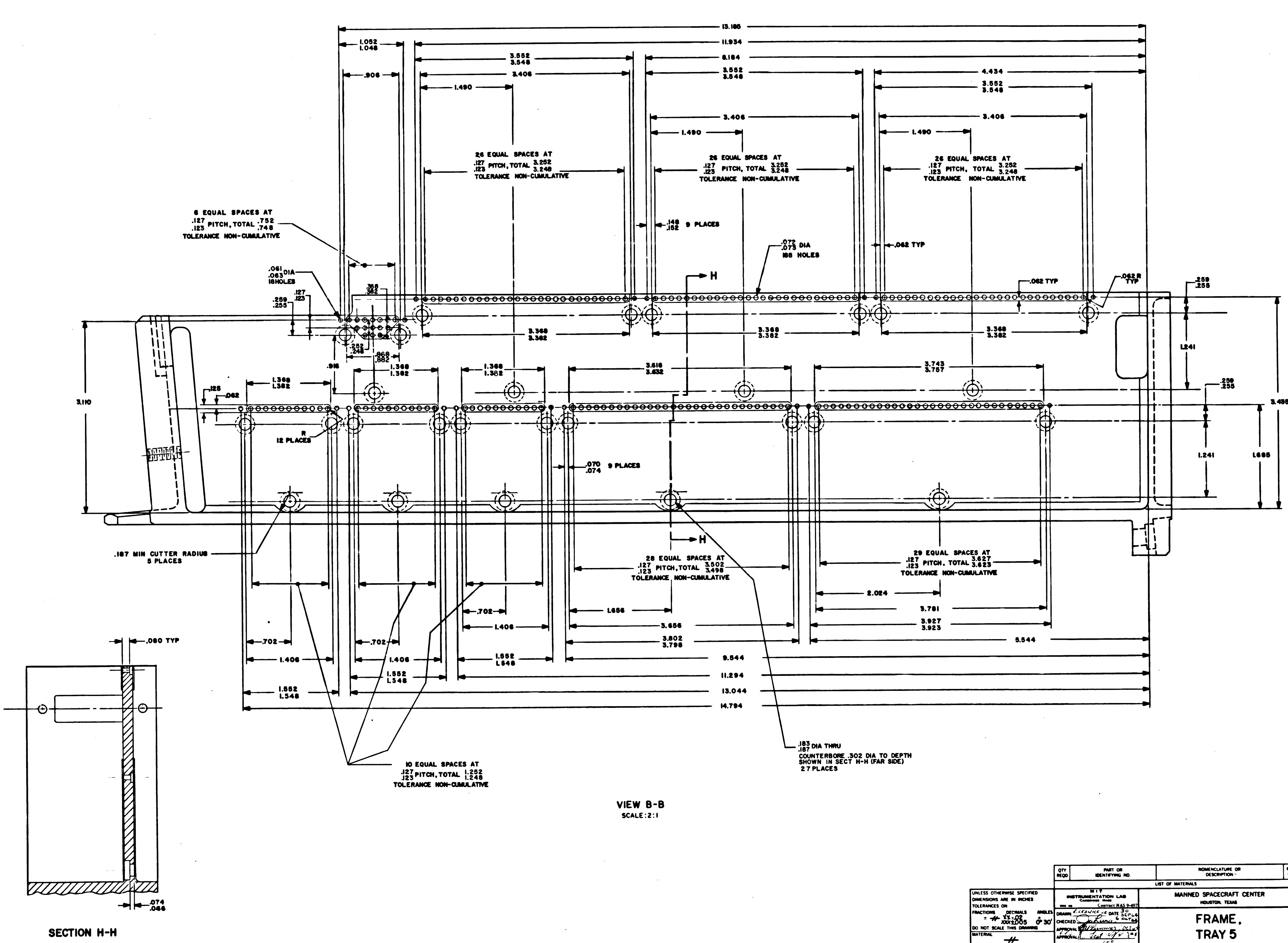

13.186
11.934
1.052
1.048
.906
3.552
3.548
3.406
1.490
8.184
3.552
3.548
4.434
3.552
3.548
3.406
1.490
3.406
1.490
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
.148 .152 9 PLACES
.072 .073 DIA 188 HOLES
.062 TYP
.061 .063 DIA 18HOLES
H
.062 TYP
.062 R TYP
.259 .255
.127 .123
.368 .382
.259 .255
3.368 3.382
3.368 3.382
3.368 3.382
1.241
.252 .248
.868 .882
.916
1.368 1.382
1.368 1.382
1.368 1.382
3.618 3.632
3.743 3.757
.259 .255
3.455
3.110
.125
.062
R 12 PLACES
.070 .074 9 PLACES
1.241
1.685
H
.187 MIN CUTTER RADIUS 5 PLACES
28 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.502 3.498 TOLERANCE NON-CUMULATIVE
29 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.627 3.623 TOLERANCE NON-CUMULATIVE
2.024
.702
1.656
3.781
1.406
3.656
3.927 3.923
.702
.702
3.802 3.798
5.544
1.406
1.406
1.552 1.548
9.544
1.552 1.548
11.294
1.552 1.548
13.044
14.794
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECT H-H (FAR SIDE) 27 PLACES
10 EQUAL SPACES AT .127 .123 PITCH, TOTAL 1.252 1.248 TOLERANCE NON-CUMULATIVE
.080 TYP
.074 .066

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± -//- DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL -//-
HEAT TREATMENT -//-
FINAL FINISH -//-

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN E. LESNICK JR DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008525
SCALE 2:1
WT
SHEET 2 OF 3

1008525 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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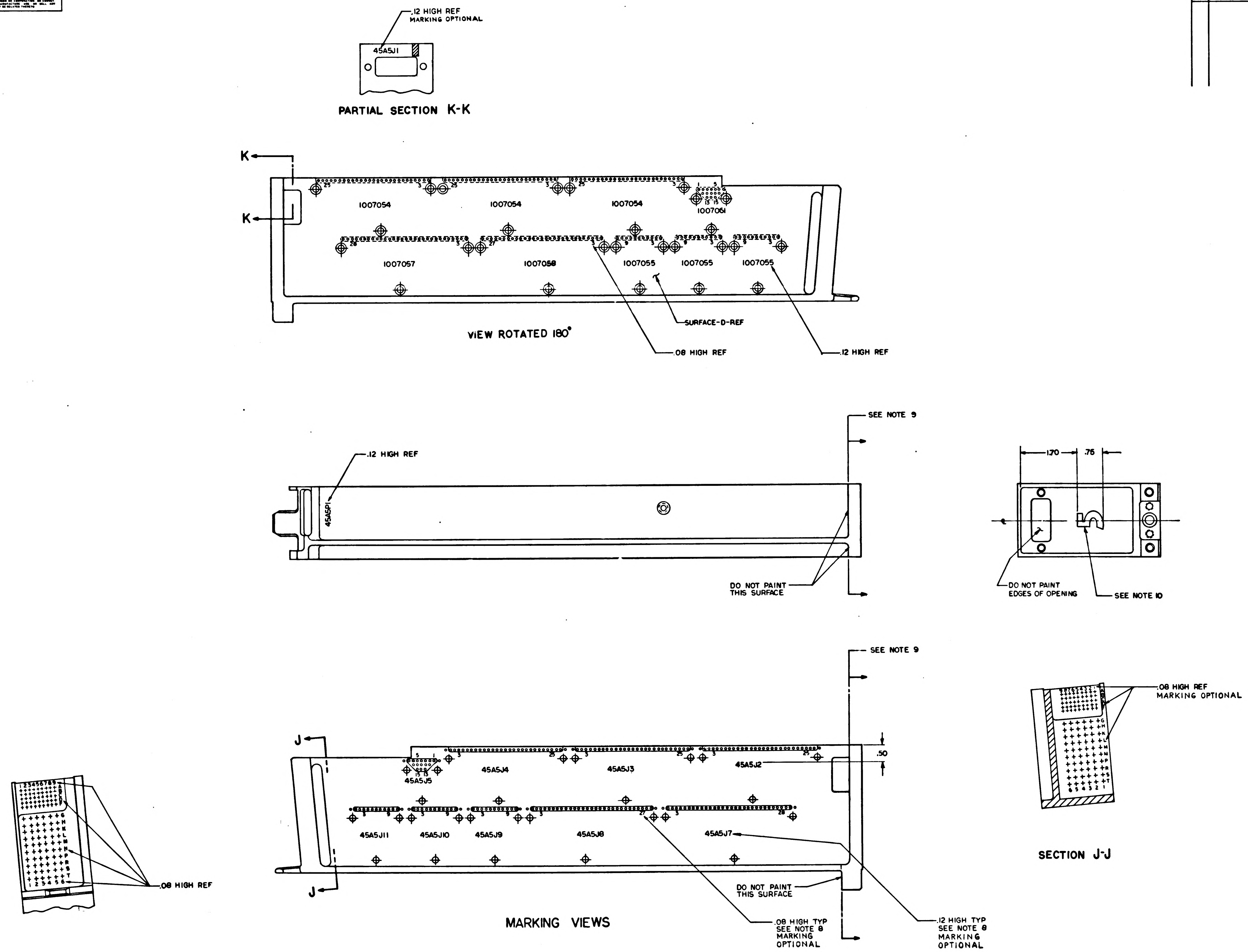

.12 HIGH REF
MARKING OPTIONAL
45A5J1
K
K
1007054
1007054
1007054
1007061
1007057
1007058
1007055
1007055
1007055
SURFACE-D-REF
.08 HIGH REF
.12 HIGH REF
SEE NOTE 9
.12 HIGH REF
45A5P1
DO NOT PAINT
THIS SURFACE
1.70
.75
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10
SEE NOTE 9
.08 HIGH REF
MARKING OPTIONAL
J
J
.50
45A5J5
45A5J4
45A5J3
45A5J2
45A5J11
45A5J10
45A5J9
45A5J8
45A5J7
.08 HIGH REF
DO NOT PAINT
THIS SURFACE
.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL

PARTIAL SECTION K-K

VIEW ROTATED 180°

SECTION J-J

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN E. Lesonsky DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL 12 Dec 64

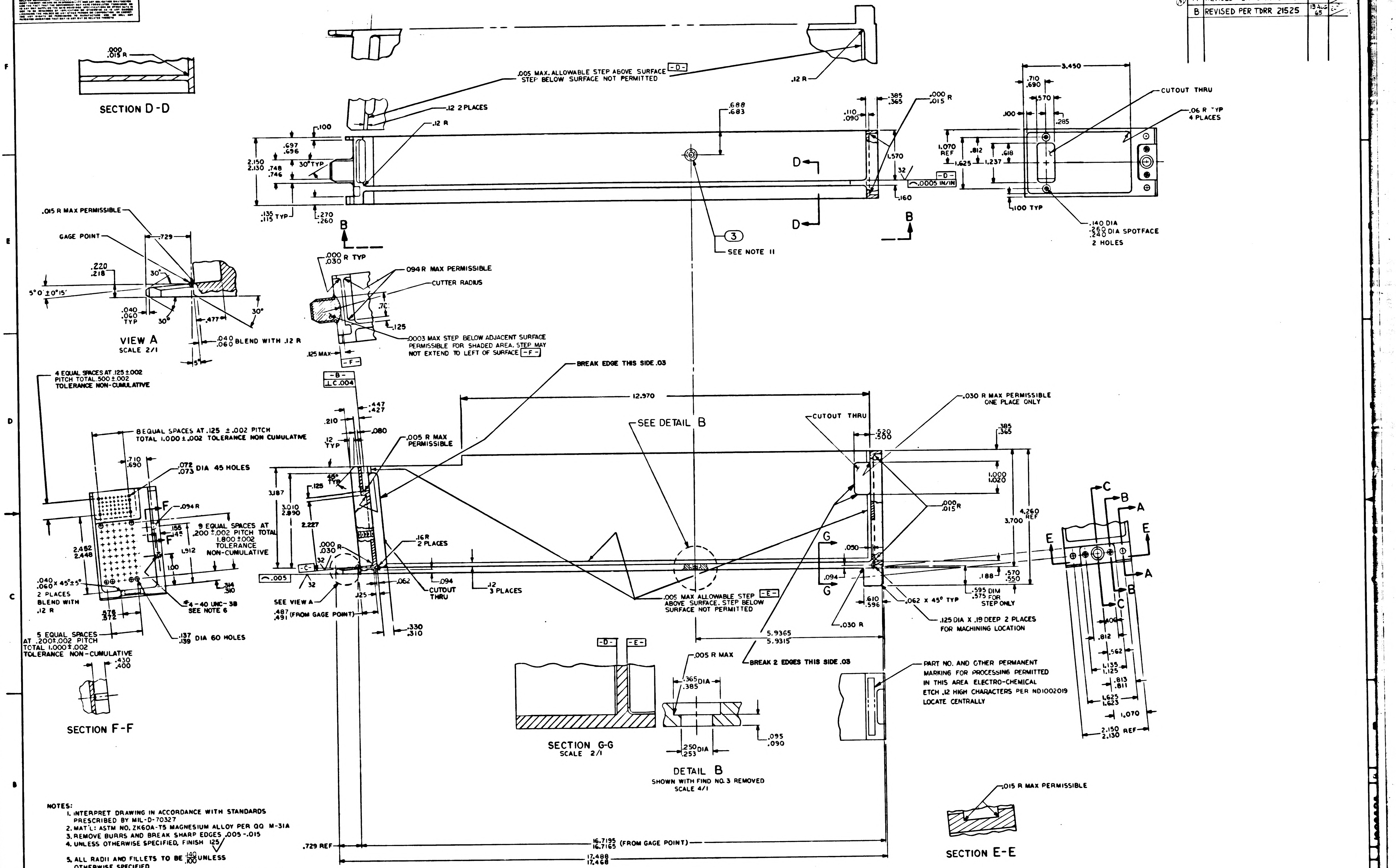
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

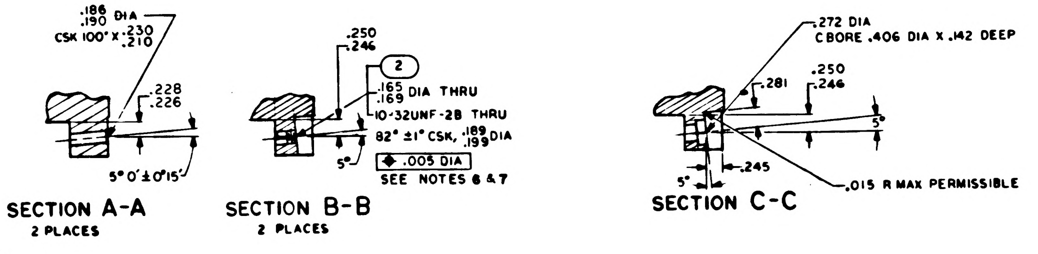
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008525
SCALE 1/1
WT
SHEET 3 OF 3

1008525 A

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAY 65	
B	REVISED PER TDRR 21525	13 AUG 65	



SECTION D-D
.000 .015 R
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.12 R
.100
2.150 2.130
.697 .696
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.688 .683
.110 .090
.385 .365
.000 R .015
.570
.160
D
B
3
SEE NOTE 11
.0005 IN/IN
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
.06 R TYP 4 PLACES
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
5°0' ±0°15'
30°
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
VIEW A SCALE 2/1
.000 .030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.70
.125
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.125 MAX
-F-
-B- ⊥ C.004
BREAK EDGE THIS SIDE .03
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.710 .690
.072 .073 DIA 45 HOLES
.094 R
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
2.462 2.448
.155 .145
1.912
1.00
.314 .310
.040 .060 x 45° ±5° 2 PLACES BLEND WITH .12 R
.476 .472
4-40 UNC-3B SEE NOTE 6
.137 .139 DIA 60 HOLES
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.430 .400
SECTION F-F
.447 .427
.210
.080
12 TYP
.005 R MAX PERMISSIBLE
45° TYP
.125
3.187
3.010 2.990
2.227
.000 .030 R
32
-C-
.005
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.062
.16 R 2 PLACES
.094
CUTOUT THRU
.12 3 PLACES
.330 .310
12.970
SEE DETAIL B
.005 MAX ALLOWABLE STEP -E- ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
5.9365 5.9315
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385 .365
1.000 1.020
.000 .015 R
4.260 REF
3.700
.050
.094
.188
.570 .550
.595 DIM .575 FOR STEP ONLY
.610 .596
.062 x 45° TYP
.030 R
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
G
A
B
C
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D- -E-
SECTION G-G SCALE 2/1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B SHOWN WITH FIND NO.3 REMOVED SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468



.186 .190 DIA
CSK 100° x .230 .210
.228 .226
5°0' ±0°15'
SECTION A-A 2 PLACES
.250 .246
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK. .189 .199 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B 2 PLACES
.272 DIA
CBORE .406 DIA x .142 DEEP
.281
.250 .246
.245
5°
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHRACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTULLATION). FIND NO.3 SHALL BE ASSEMBLED TO FIND NO. I WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS, EMBED NUT IN TRAY PER ND 1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008525-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007535	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS XX ±.02 XXX ±.005 — ANGLES 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTE 2
HEAT TREATMENT: —
FINAL FINISH: SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN E. Loosnik Jr DATE 1 OCT 64
CHECKED 6 OCT 64
APPROVAL 30 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

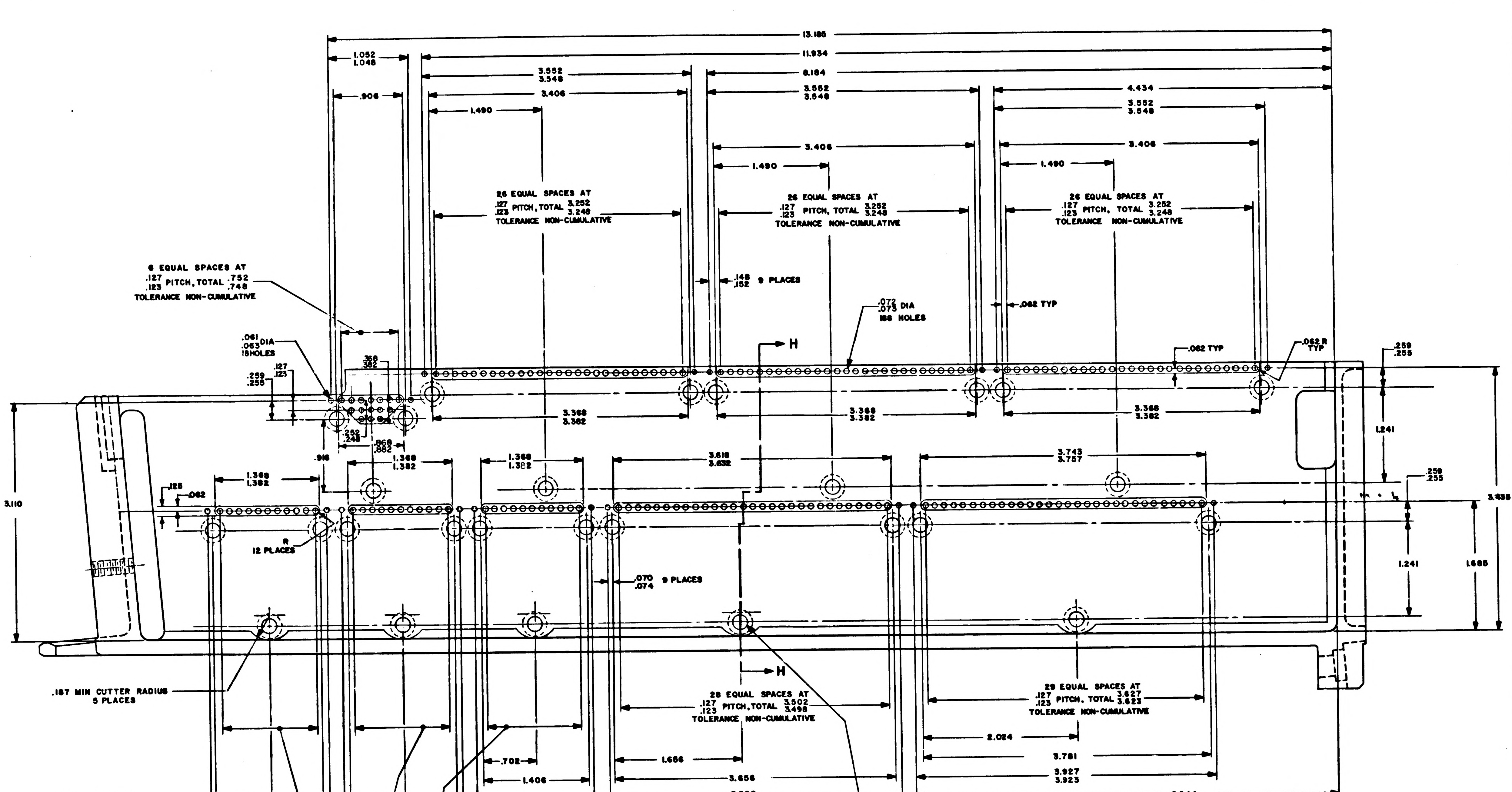
FRAME
TRAY 5

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008525
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD
A		REVISED PER TDRR 8692	6 MAY 65	
B		REVISION STATUS CHANGED	13 AUG 65	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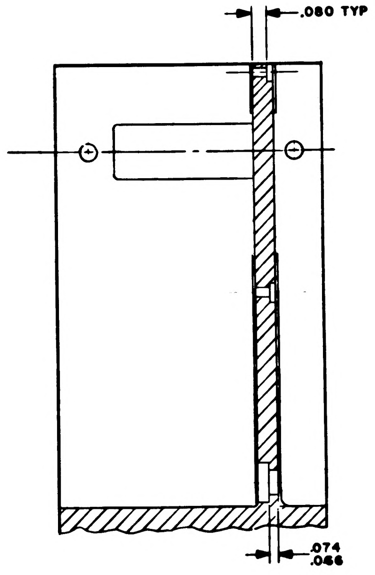
1.052
1.048
3.552
3.548
8.184
.906
3.406
3.552
3.548
4.434
1.490
3.406
1.490
1.490
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
.148 .152 9 PLACES
.072 .075 DIA 186 HOLES
.062 TYP
.062 TYP
.062 R TYP
.061 .063 DIA 18 HOLES
.127 .123
.259 .255
.368 .382
H
3.368 3.382
3.368 3.382
3.368 3.382
.252 .248
.868 .882
.916
1.368 1.382
1.368 1.382
1.368 1.382
3.618 3.632
3.743 3.757
.259 .255
1.241
.259 .255
.125
.062
3.110
R 12 PLACES
.070 .074 9 PLACES
1.241
1.685
3.435
H
.187 MIN CUTTER RADIUS 5 PLACES
28 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.502 3.498 TOLERANCE NON-CUMULATIVE
29 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.627 3.623 TOLERANCE NON-CUMULATIVE
2.024
.702
1.656
3.781
1.406
3.656
3.927 3.923
.702
.702
3.802 3.798
5.544
1.406
1.406
1.552 1.548
9.544
1.552 1.548
11.294
1.552 1.548
13.044
14.794
10 EQUAL SPACES AT .127 .123 PITCH, TOTAL 1.252 1.248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECT H-H (FAR SIDE) 27 PLACES

VIEW B-B
SCALE: 2:1


.080 TYP
.074 .066

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN E. LESNICK DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

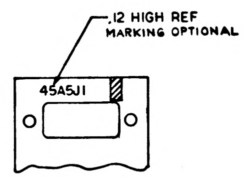
FRAME,
TRAY 5

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008525
SCALE 2:1
WT
SHEET 2 OF 3

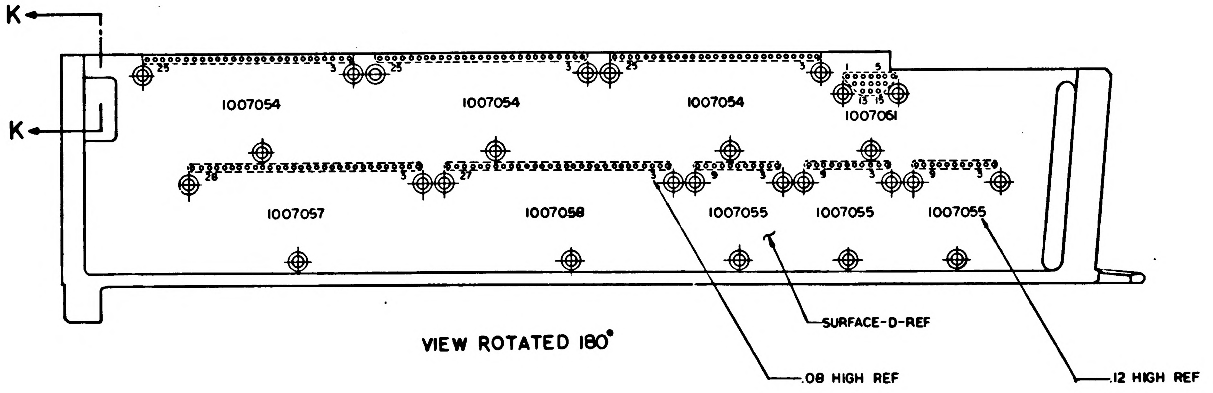
NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 8692	65	A N
B	REVISION STATUS CHANGED	13 Aug 65	RP


.12 HIGH REF
MARKING OPTIONAL
45A5J1

PARTIAL SECTION K-K


K
K
25
3
25
3
25
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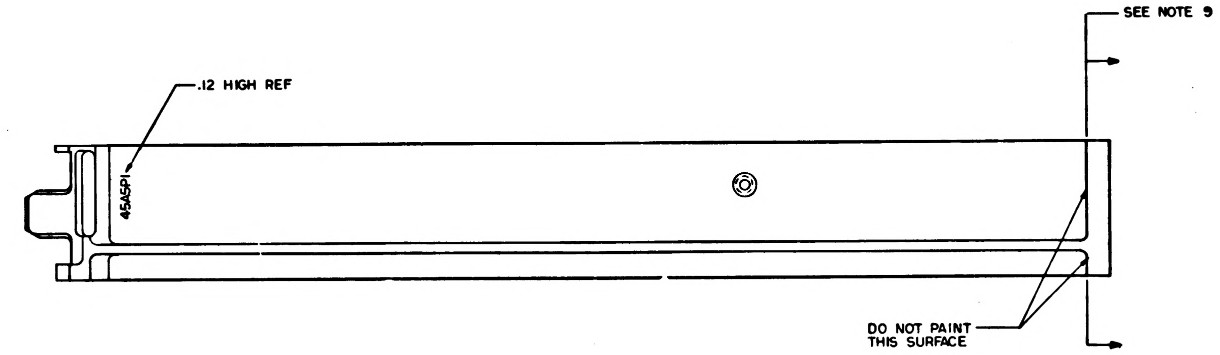
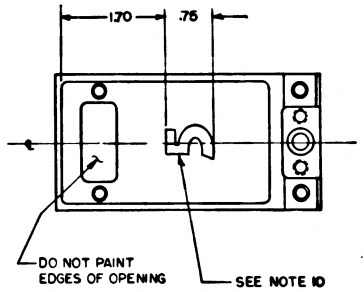
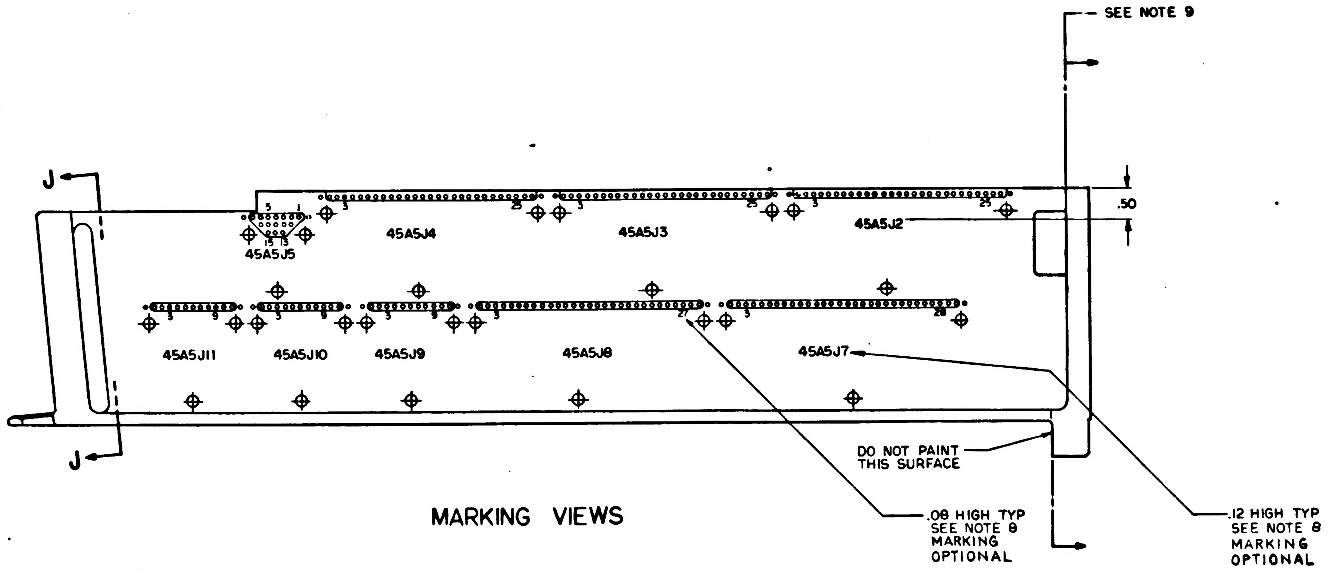
1
5
13
15
1007054
1007054
1007054
1007061
28
3
27
3
9
3
9
3
9
3
1007057
1007058
1007055
1007055
1007055
SURFACE-D-REF
.08 HIGH REF
.12 HIGH REF

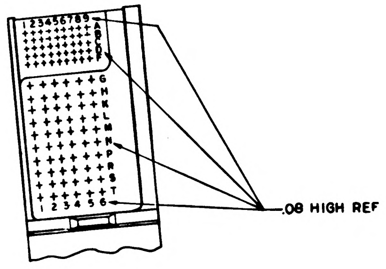
VIEW ROTATED 180°

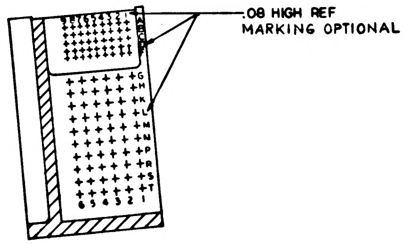

SEE NOTE 9
.12 HIGH REF
45A5P1
DO NOT PAINT
THIS SURFACE


1.70
.75
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10


SEE NOTE 9
J
J
.50
5
1
15
13
3
25
3
25
3
25
45A5J5
45A5J4
45A5J3
45A5J2
3
9
3
9
3
9
3
27
3
28
45A5J11
45A5J10
45A5J9
45A5J8
45A5J7
DO NOT PAINT
THIS SURFACE
.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL

MARKING VIEWS


123456789
.08 HIGH REF


.08 HIGH REF
MARKING OPTIONAL

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.		NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

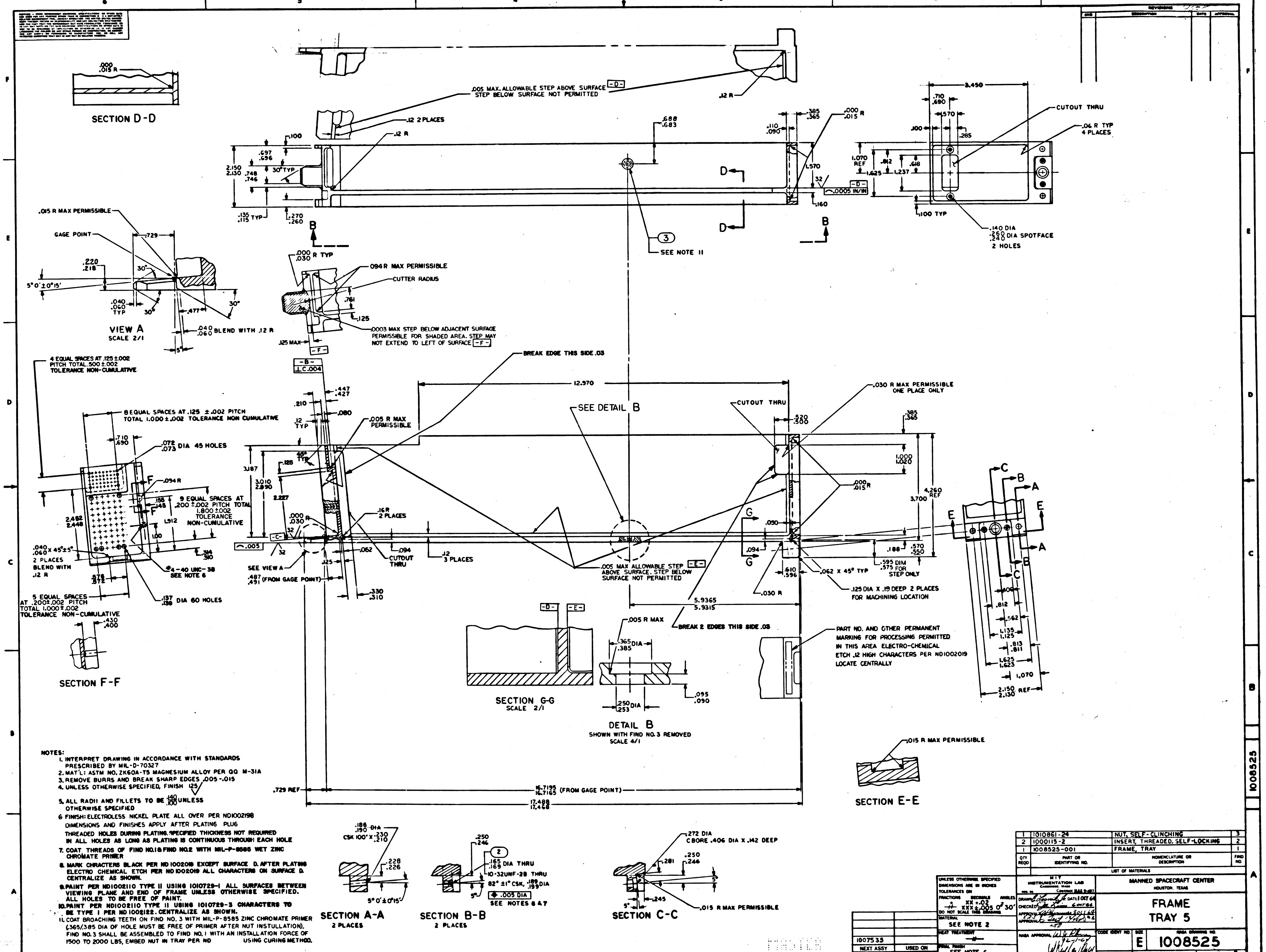
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN E. Leonard DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008525
SCALE 1/1
WT
SHEET 3 OF 3


SECTION D-D
VIEW A
SCALE 2/1
SECTION F-F
SECTION G-G
SCALE 2/1
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
SECTION E-E
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
SECTION C-C
SEE DETAIL B
SEE VIEW A
SEE NOTE 11
SEE NOTES 6 & 7
CUTOUT THRU
BREAK EDGE THIS SIDE .03
BREAK 2 EDGES THIS SIDE .03
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.005 MAX ALLOWABLE STEP -E- ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.072 .073 DIA 45 HOLES
.137 .139 DIA 60 HOLES
4-40 UNC-3B SEE NOTE 6
10-32UNF-2B THRU
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
12.970
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6 FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHRACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTULLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS, EMBED NUT IN TRAY PER ND USING CURING METHOD.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008525-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007535	

APPLICATION

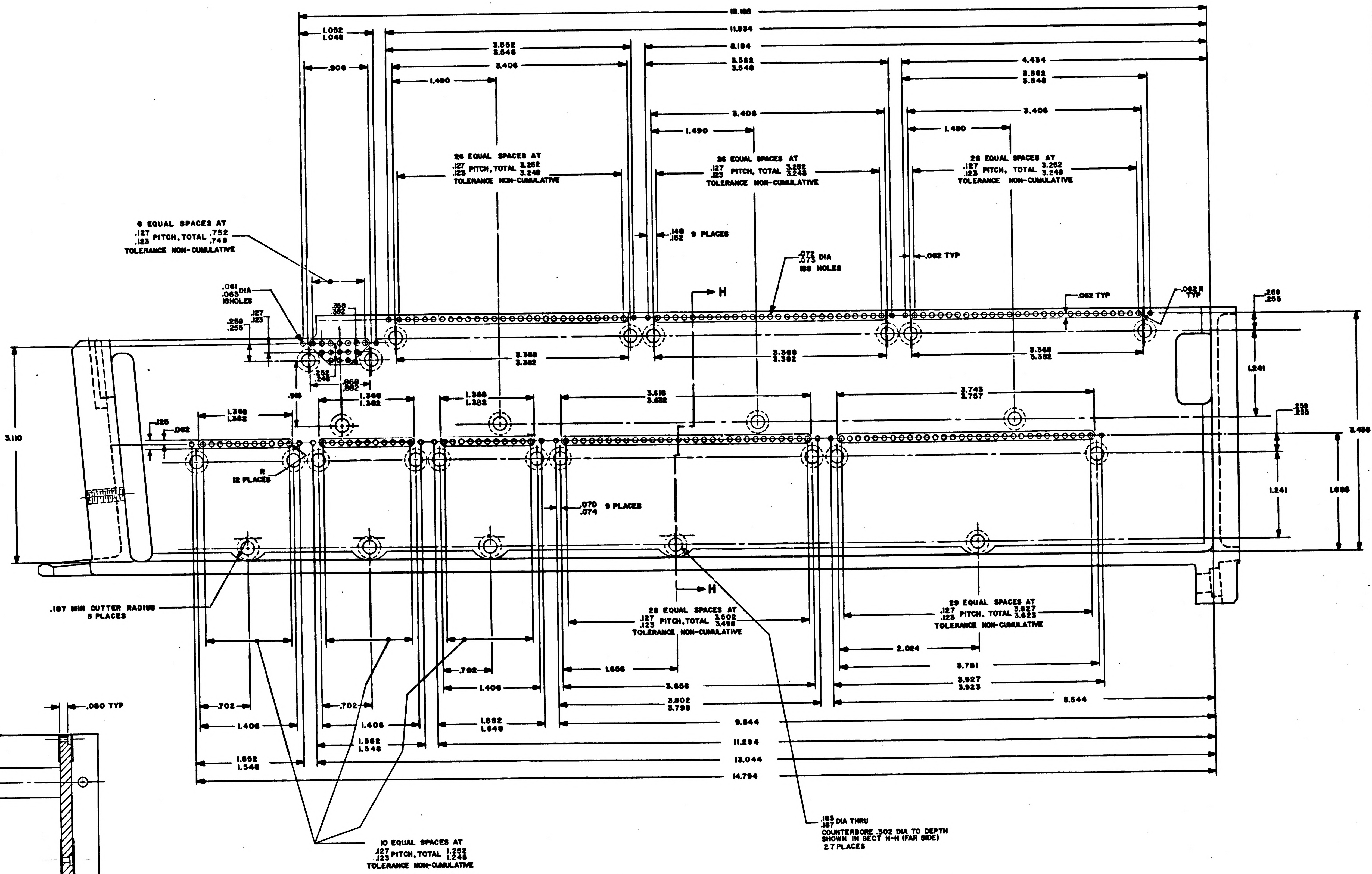
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN E. Loomis Jr. DATE 1 OCT 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

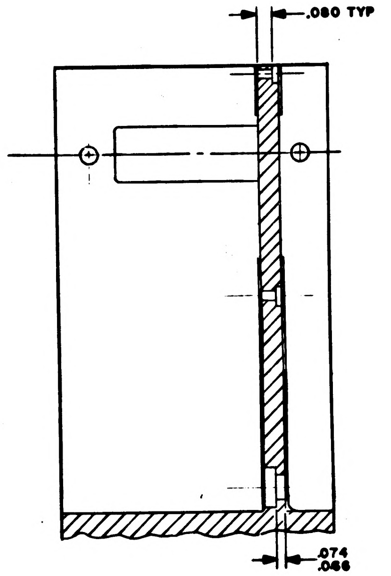
FRAME
TRAY 5

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008525
SCALE 1/1 | WT | SHEET 1 OF 3



13.185
11.934
1.052
1.048
.906
3.552
3.548
3.406
1.490
8.184
4.434
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
.148 .152 9 PLACES
.072 .073 DIA 188 HOLES
.062 TYP
.061 .063 DIA 18 HOLES
.062 R TYP
.259 .255
.127 .123
.368 .382
3.368 3.382
.252 .248
.868 .882
.916
1.368 1.382
3.618 3.632
3.743 3.757
1.241
3.110
3.496
1.686
.125
.062
R 12 PLACES
.070 .074 9 PLACES
H
.187 MIN CUTTER RADIUS 5 PLACES
28 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.502 3.498 TOLERANCE NON-CUMULATIVE
29 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.627 3.623 TOLERANCE NON-CUMULATIVE
2.024
3.781
3.927 3.923
1.656
3.656
3.802 3.798
5.544
.702
1.406
1.552 1.548
9.544
11.294
13.044
14.794
10 EQUAL SPACES AT .127 .123 PITCH, TOTAL 1.252 1.248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECT H-H (FAR SIDE) 27 PLACES

VIEW B-B
SCALE: 2:1



.080 TYP
.074 .066

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —   DECIMALS XX ±.02 XXX ±.005   ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN E. LESNICK JR DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL W J Rhine 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008525
SCALE 2:1
WT
SHEET 2 OF 2

1008525

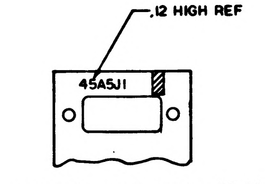
MASTER

MASTER

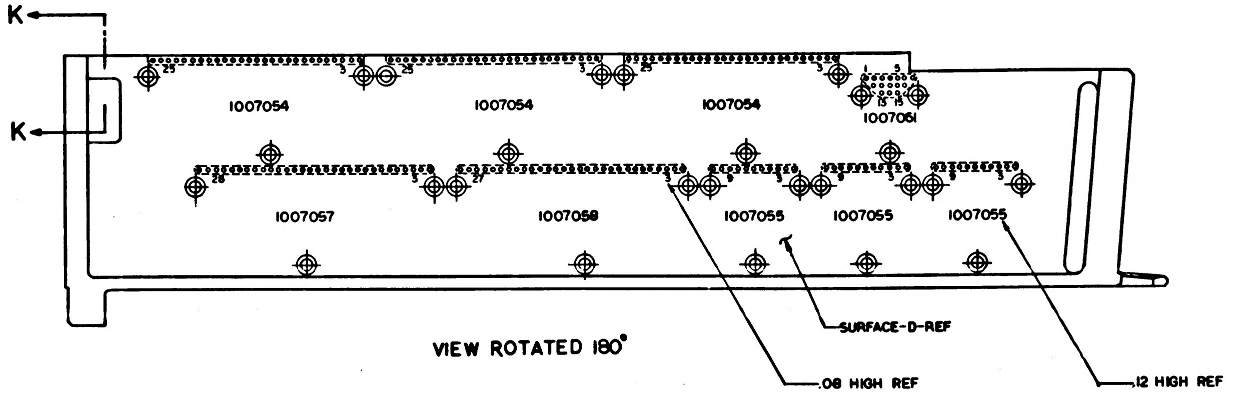
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1462F

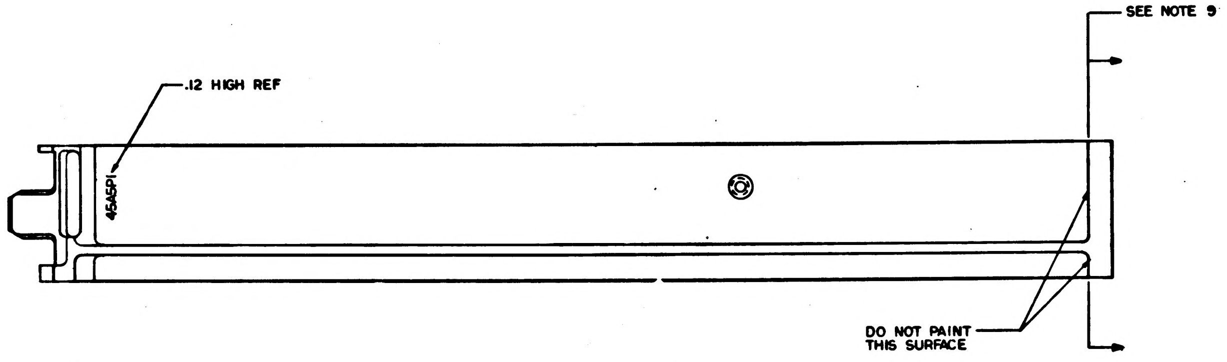
SYM	DESCRIPTION	DATE	APPROVAL

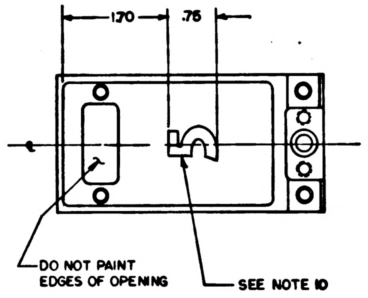

.12 HIGH REF
45A5J1

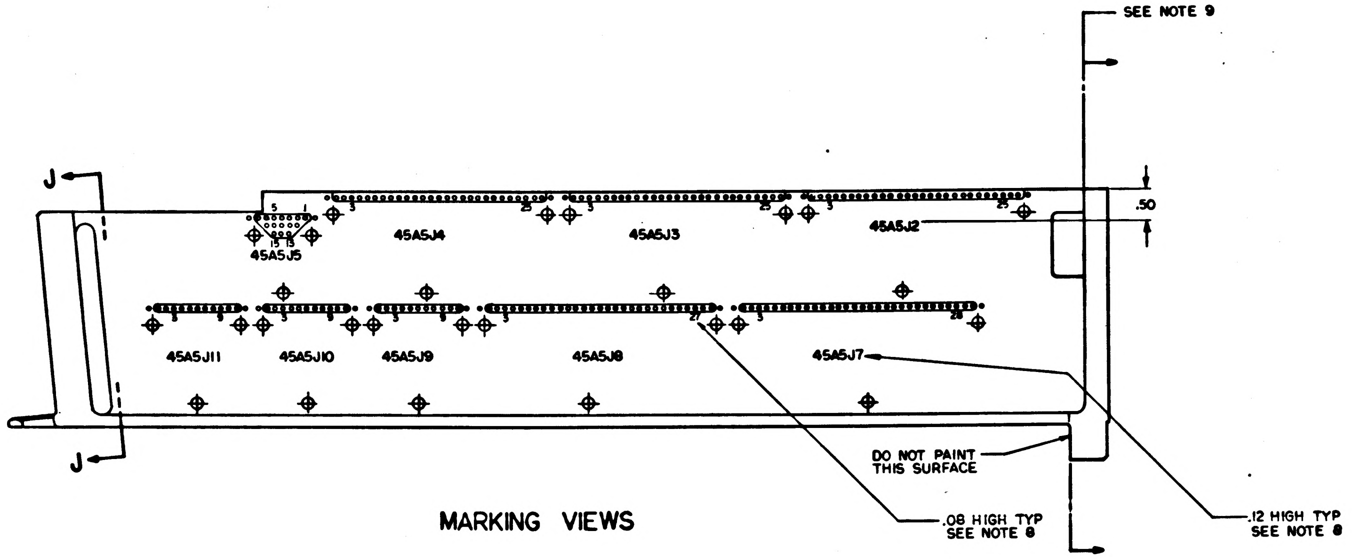
PARTIAL SECTION K-K


K
K
25
3
25
3
25
3
1
5
15
1007054
1007054
1007054
1007051
26
3
27
3
27
3
9
3
1007057
1007058
1007055
1007055
1007055
SURFACE-D-REF
.08 HIGH REF
.12 HIGH REF

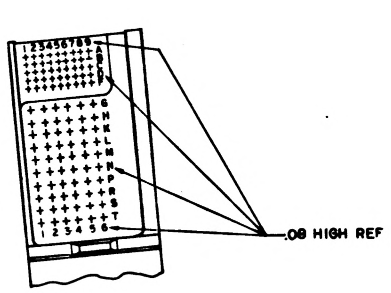
VIEW ROTATED 180°

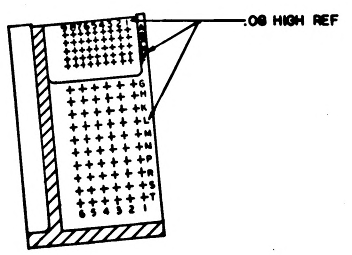

SEE NOTE 9
.12 HIGH REF
45A5P1
DO NOT PAINT THIS SURFACE


1.70
.75
DO NOT PAINT EDGES OF OPENING
SEE NOTE 10


SEE NOTE 9
J
J
5
1
15
45A5J5
45A5J4
25
3
45A5J3
25
3
45A5J2
.50
45A5J11
45A5J10
45A5J9
45A5J8
27
3
26
45A5J7
DO NOT PAINT THIS SURFACE
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8

MARKING VIEWS


123456789
.08 HIGH REF



SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN E. Lesnik DATE 30 SEP 64
CHECKED 6 OCT 64
APPROVAL 8 OCT 64
APPROVAL 12/1/64
LTB
NASA APPROVAL 12-1-64
MIT APPROVAL 12/Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008525
SCALE 1/1
WT
SHEET 3 OF 3

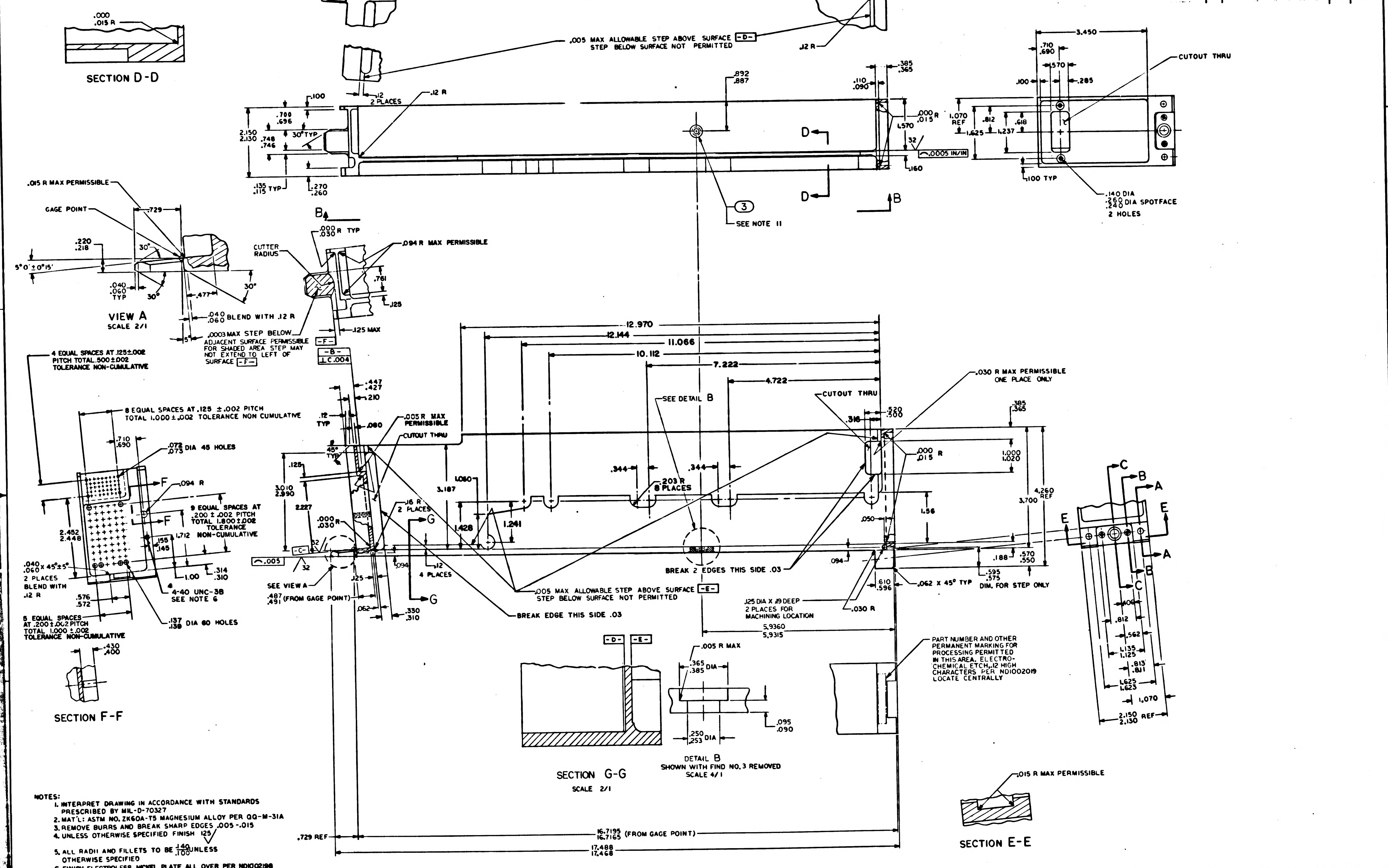
1008525

1008525
SH 3 OF 3

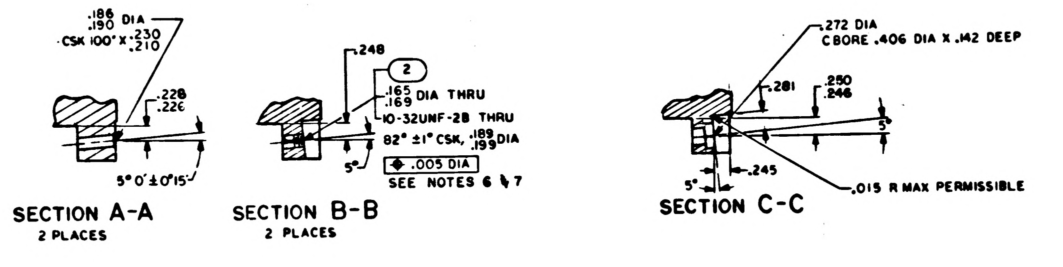
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR15950	11 FEB 65	M.G.



SECTION D-D
.000
.015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.12
2 PLACES
.100
.700
.696
2.150
2.130
.748
.746
30° TYP
.135
.115 TYP
.270
.260
.892
.887
.110
.090
.385
.365
.000 R
.015
1.570
32
.0005 IN/IN
.160
D
B
3
SEE NOTE 11
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
5°0' ±0°15'
30°
.040
.060
TYP
.477
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
.000
.030 R TYP
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
.125 MAX
-B-
⊥ C .004
4 EQUAL SPACES AT .125±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.710
.690
.072
.073 DIA 45 HOLES
F
.094 R
9 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
2.452
2.448
.155
.145
1.712
.040
.060 X 45°±5°
2 PLACES
BLEND WITH .12 R
1.00
.314
.310
4-40 UNC-3B
SEE NOTE 6
.576
.572
5 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.137
.139 DIA 60 HOLES
.430
.400
SECTION F-F
12.970
12.144
11.066
10.112
7.222
4.722
.447
.427
.210
.12
TYP
.080
.005 R MAX PERMISSIBLE
CUTOUT THRU
45° TYP
.125
3.010
2.990
2.227
.000
.030 R
-C-
.005
32
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.062
.125
.094
.330
.310
.16 R
2 PLACES
G
.12
4 PLACES
1.060
3.187
1.428
1.241
SEE DETAIL B
.344
.203 R
8 PLACES
.344
CUTOUT THRU
.316
.520
.500
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.385
.365
.000
.015 R
1.000
1.020
4.260
REF
3.700
1.56
.050
BREAK 2 EDGES THIS SIDE .03
.094
.188
.570
.550
.595
.575
DIM. FOR STEP ONLY
.610
.596
.062 X 45° TYP
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
.125 DIA X .19 DEEP
2 PLACES FOR MACHINING LOCATION
.030 R
5.9360
5.9315
C
B
A
E
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
-D-
-E-
.005 R MAX
.365
.385 DIA
.250
.253 DIA
.095
.090
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH, .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION G-G
SCALE 2/1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468



.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5°0' ±0°15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189
.199 DIA
5°
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TPYE II, USING 1010729-3. CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

			1		1010861-24	NUT, SELF-CLINCHING	3
			2		1000115-2	INSERT, THREADED, SELF-LOCKING	2
			1		1008526-001	FRAME, TRAY	1
QUANTITY REQUIRED				EFFECTIVITY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
					LIST OF MATERIALS		

1007536		
NEXT ASSY	USED ON	APPLICABLE DASH NO.
APPLICATION		

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//— DECIMALS XX ±.02 XXX ±.005 ANGLES 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —//—
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN R. J. Fox DATE 5 OCT 64
CHECKED [illegible] 19 Oct 64
APPROVAL
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

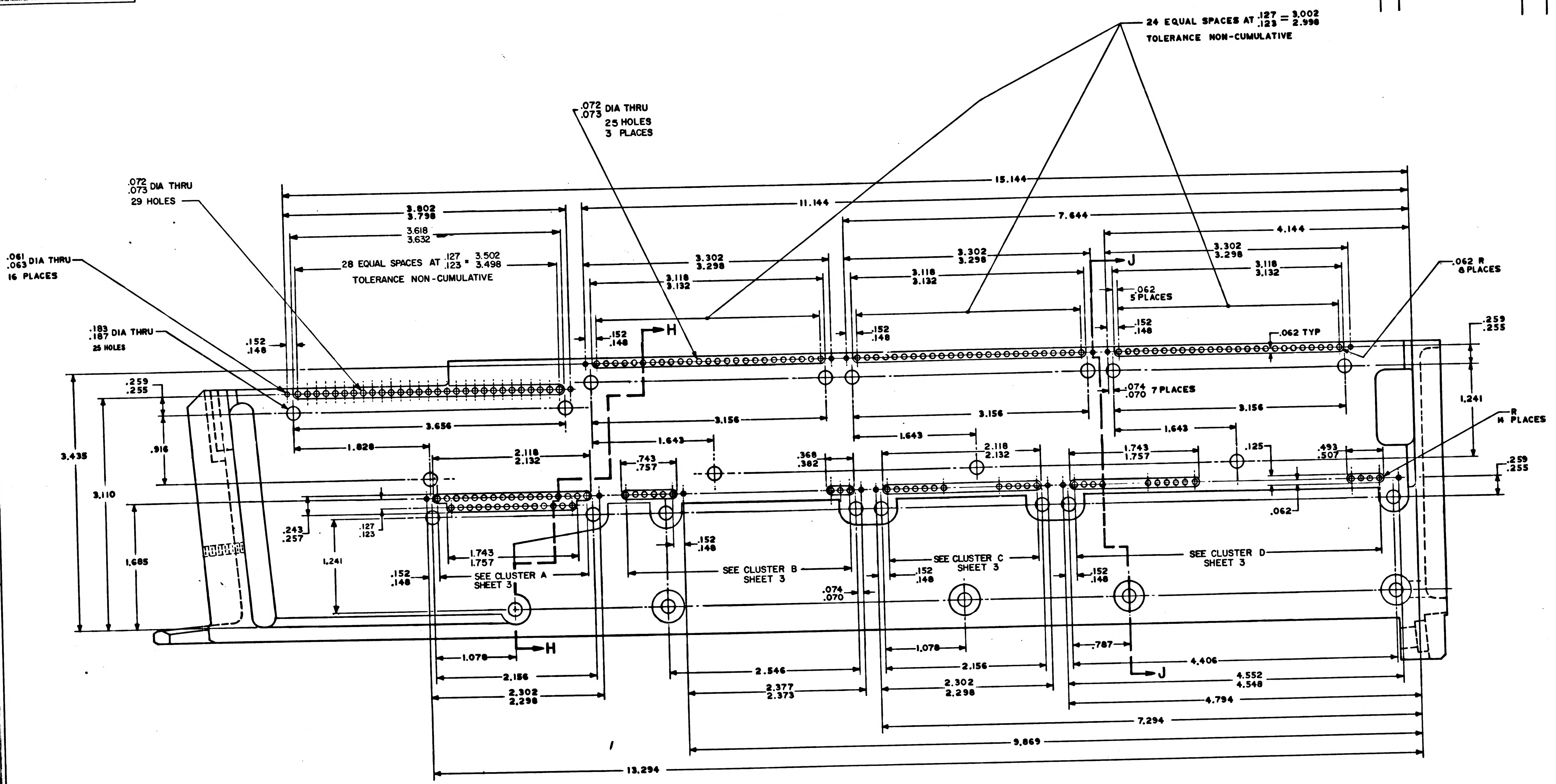
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008526
SCALE 1/1
WT
SHEET 1 OF 4

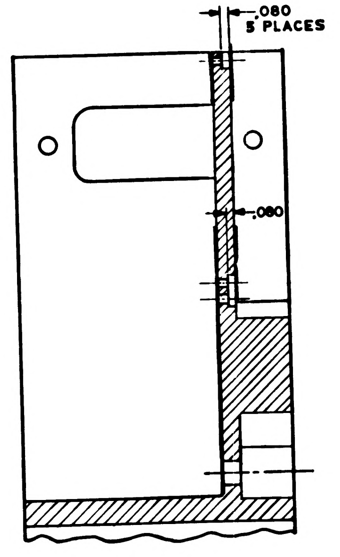
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 14627			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15950	11-FEB 65	M.G



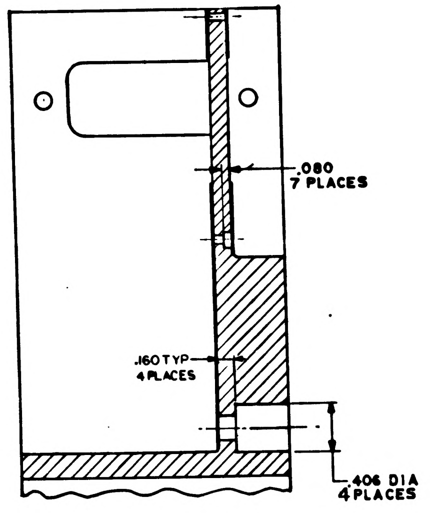
24 EQUAL SPACES AT .127/.123 = 3.002/2.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
25 HOLES
3 PLACES
.072/.073 DIA THRU
29 HOLES
.061/.063 DIA THRU
16 PLACES
.183/.187 DIA THRU
25 HOLES
15.144
11.144
7.644
4.144
3.802/3.798
3.618/3.632
28 EQUAL SPACES AT .127/.123 = 3.502/3.498
TOLERANCE NON-CUMULATIVE
3.302/3.298
3.118/3.132
.152/.148
H
J
.062
5 PLACES
.062 TYP
.062 R
8 PLACES
.259/.255
.074/.070 7 PLACES
3.656
3.156
1.643
1.828
2.118/2.132
.743/.757
.368/.382
1.743/1.757
.125
.493/.507
R
14 PLACES
1.241
3.435
3.110
.916
1.685
.243/.257
.127/.123
.062
SEE CLUSTER A
SHEET 3
SEE CLUSTER B
SHEET 3
SEE CLUSTER C
SHEET 3
SEE CLUSTER D
SHEET 3
.074/.070
1.078
2.156
2.302/2.298
2.546
2.377/2.373
.787
4.406
4.552/4.548
4.794
7.294
9.869
13.294

VIEW B B
SCALE~2:1



.080
5 PLACES
.080

SECTION H-H



.080
7 PLACES
.160 TYP
4 PLACES
.406 DIA
4 PLACES

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 XXX ± .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

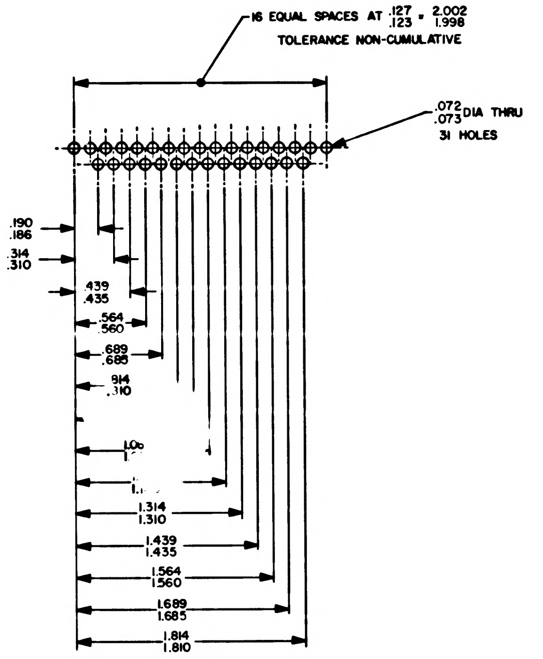
DRAWN RJ Fox DATE 2 OCT 64
CHECKED Di Lima 8 OCT 64
APPROVAL 14 Oct 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

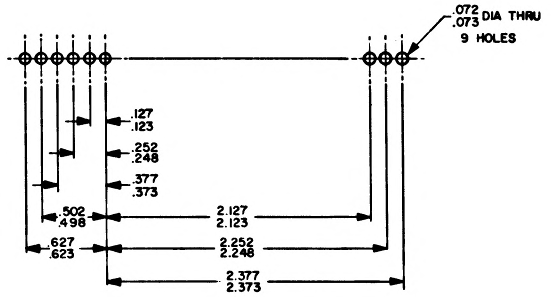
CODE IDENT NO. — SIZE E — NASA DRAWING NO 1008526
SCALE 2:1 — WT — SHEET 2 OF 4

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A		REVISED PER TDRR 1595C		11-FEB-65	



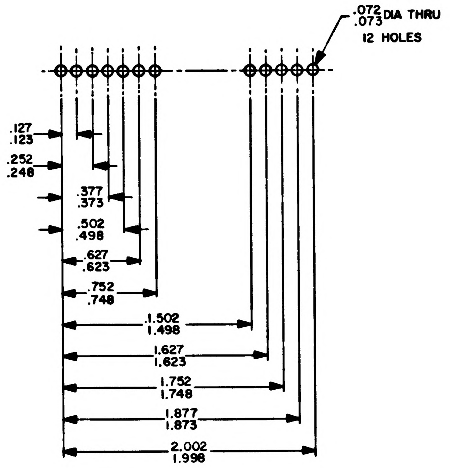
16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
31 HOLES
.190/.186
.314/.310
.439/.435
.564/.560
.689/.685
.814/.810
1.06
1.314/1.310
1.439/1.435
1.564/1.560
1.689/1.685
1.814/1.810

CLUSTER A



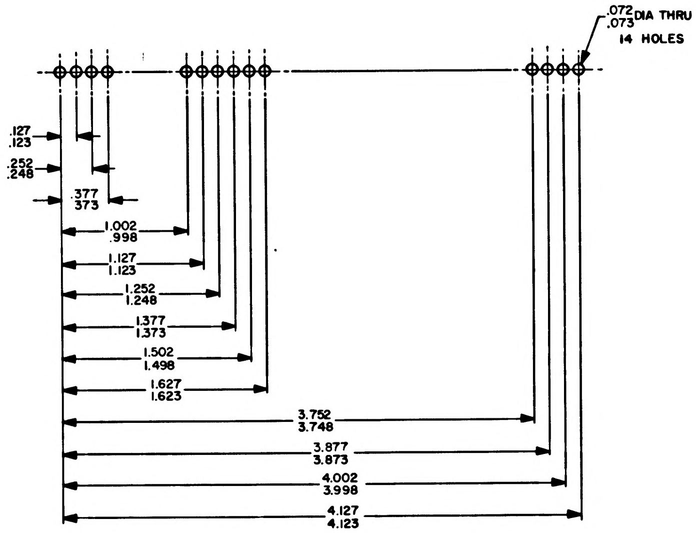
.072/.073 DIA THRU
9 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
.627/.623
2.127/2.123
2.252/2.248
2.377/2.373

CLUSTER B



.072/.073 DIA THRU
12 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
.627/.623
.752/.748
1.502/1.498
1.627/1.623
1.752/1.748
1.877/1.873
2.002/1.998

CLUSTER C



.072/.073 DIA THRU
14 HOLES
.127/.123
.252/.248
.377/.373
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123

CLUSTER D

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Jaquin DATE 5 OCT 64
CHECKED 8 OCT 64
APPROVAL 14 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 6

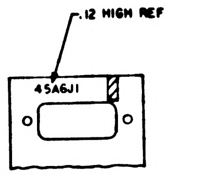
CODE IDENT NO
SIZE E
1008526
SCALE 2:1
SHEET 3 of 4

1008526 A

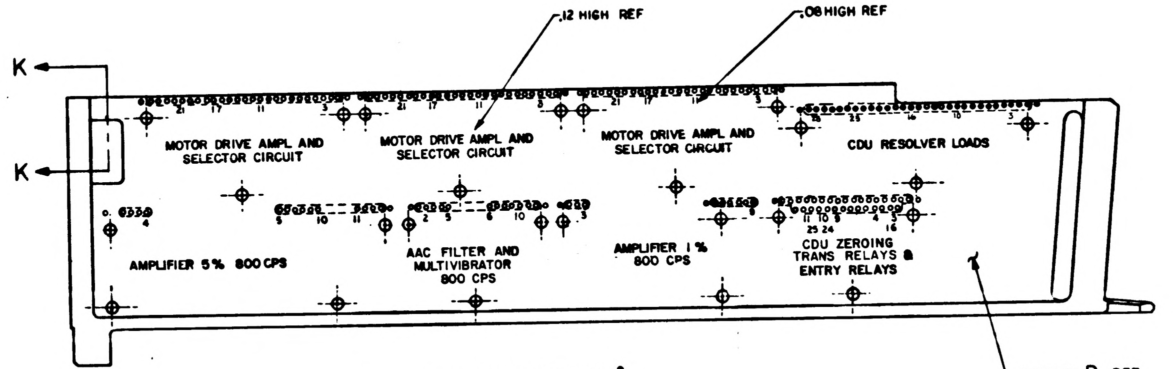
NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1062?

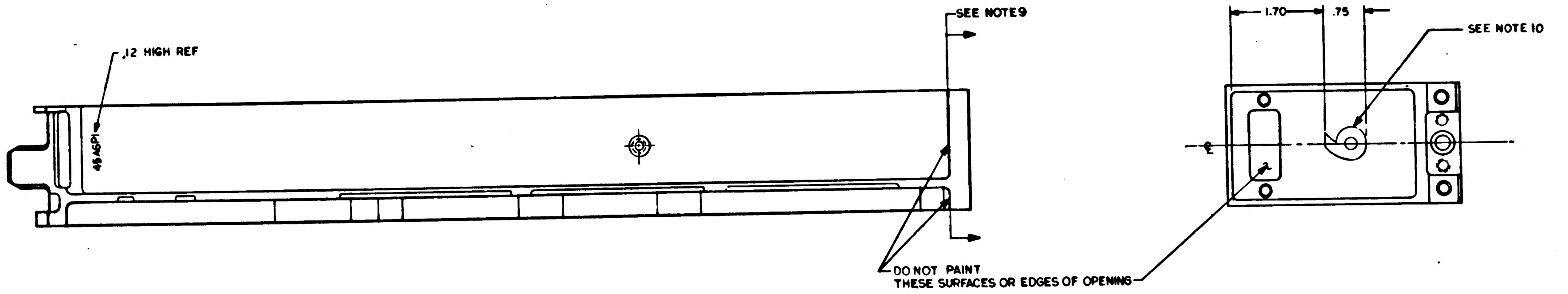
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR15950	11-FEB 65	

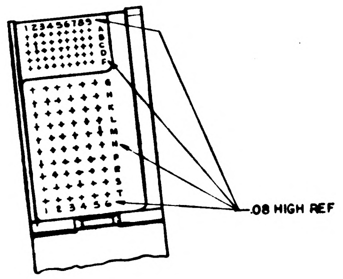

.12 HIGH REF
45A6J1

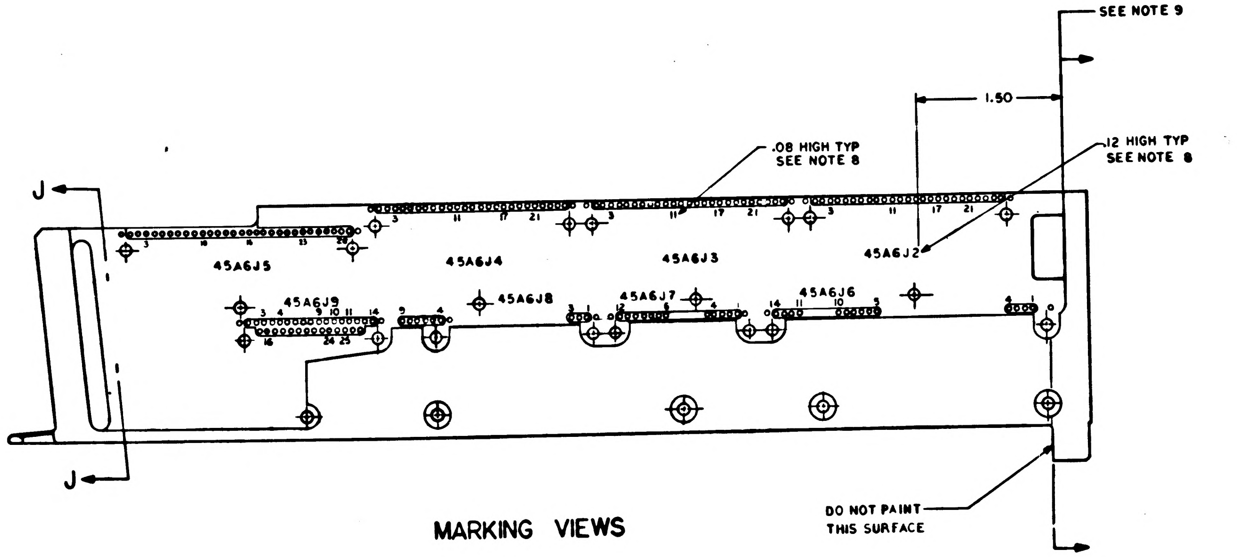
PARTIAL SECTION K-K


K
K
.12 HIGH REF
.08 HIGH REF
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
CDU RESOLVER LOADS
AMPLIFIER 5% 800 CPS
AAC FILTER AND MULTIVIBRATOR 800 CPS
AMPLIFIER 1% 800 CPS
CDU ZEROING TRANS RELAYS & ENTRY RELAYS
SURFACE-D-REF

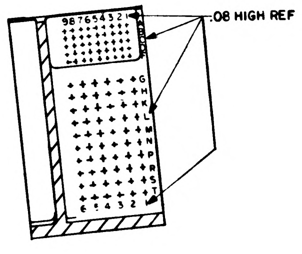
VIEW ROTATED 180°


.12 HIGH REF
45A6P1
SEE NOTE 9
1.70
.75
SEE NOTE 10
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS




SEE NOTE 9
1.50
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
DO NOT PAINT THIS SURFACE

MARKING VIEWS



SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN R J Fox DATE 2 OCT 64
CHECKED 2 OCT 64
APPROVAL 19 Oct 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL 1 Dec 64

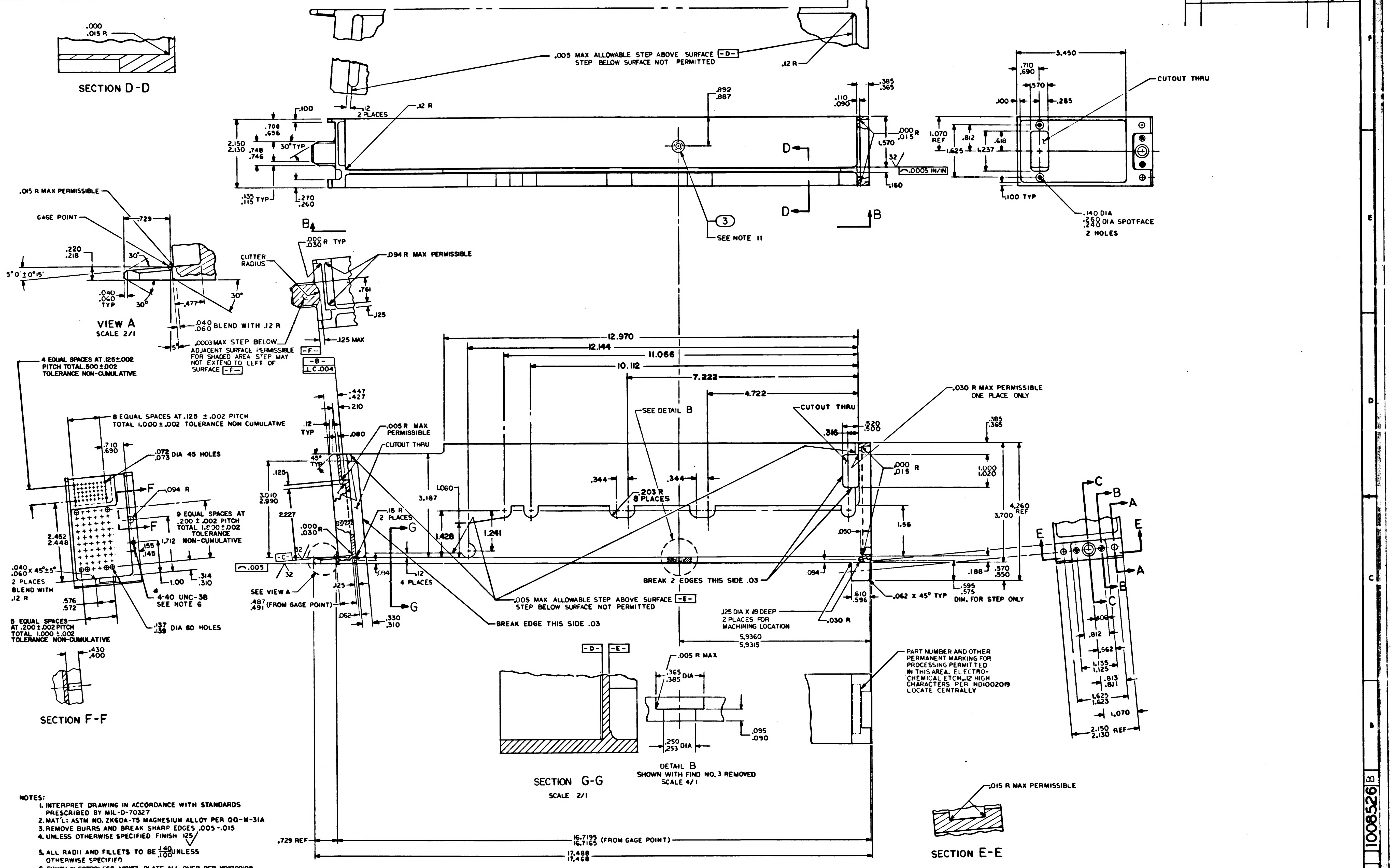
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1008526
SCALE 1/1
WT
SHEET 4 OF 4

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

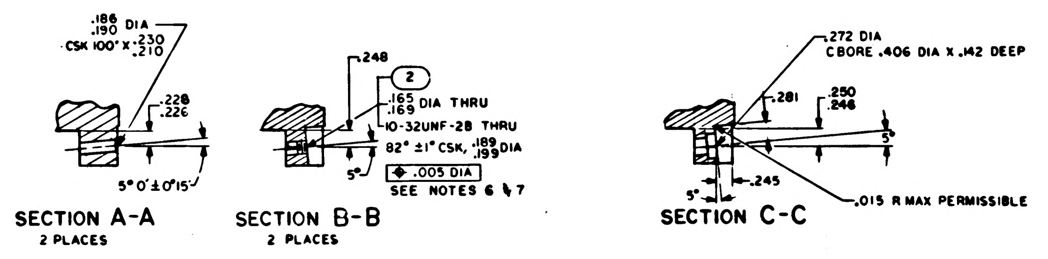
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR15950	FEB 65	
B	REVISED PER TDRR 18692	5 MAY 65	



SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.100
.700 .696
30° TYP
2.150 2.130
.748 .746
.135 .115 TYP
.270 .260
.892 .887
.110 .090
.385 .365
.000 .015 R
1.570
32
.0005 IN/IN
.160
D
B
3
SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
5°0' ±0°15'
30°
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
VIEW A
SCALE 2/1
.000 .030 R TYP
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥ C .004
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.710 .690
.072 .073 DIA 45 HOLES
.094 R
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
2.452 2.448
.155 .145
1.712
.040 .060 X 45° ±5° 2 PLACES BLEND WITH .12 R
1.00
.314 .310
.576 .572
4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
12.970
12.144
11.066
10.112
7.222
4.722
.447 .427
.210
.12 TYP
.080
.005 R MAX PERMISSIBLE
CUTOUT THRU
45° TYP
.125
3.010 2.990
3.187
2.227
1.060
.000 .030 R
.16 R 2 PLACES
G
1.428
1.241
.12 4 PLACES
-C-
.005
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.594
.062
.330 .310
SEE DETAIL B
.344
.203 R 8 PLACES
CUTOUT THRU
.316
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.000 .015 R
1.000 1.020
4.260 REF
3.700
1.56
.050
BREAK 2 EDGES THIS SIDE .03
.094
.188
.570 .550
.610 .596
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.030 R
5.9360 5.9315
C B A E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D- -E-
SECTION G-G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH, .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TPYE II, USING 1010729-3. CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD



.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0'±0°15'
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
.005 DIA
5°
SEE NOTES 6 & 7
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
.245
.015 R MAX PERMISSIBLE

SECTION A-A
2 PLACES

SECTION B-B
2 PLACES

SECTION C-C

12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

			1		1010861-24	NUT, SELF-CLINCHING	3
			2		1000115-2	INSERT, THREADED, SELF-LOCKING	2
			1		1008526-001	FRAME, TRAY	1
QUANTITY REQUIRED				EFFECTIVITY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
					LIST OF MATERIALS		

1007536		
NEXT ASSY	USED ON	APPLICABLE DASH NO.
APPLICATION		

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN R. J. Fox DATE 5 OCT 64
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

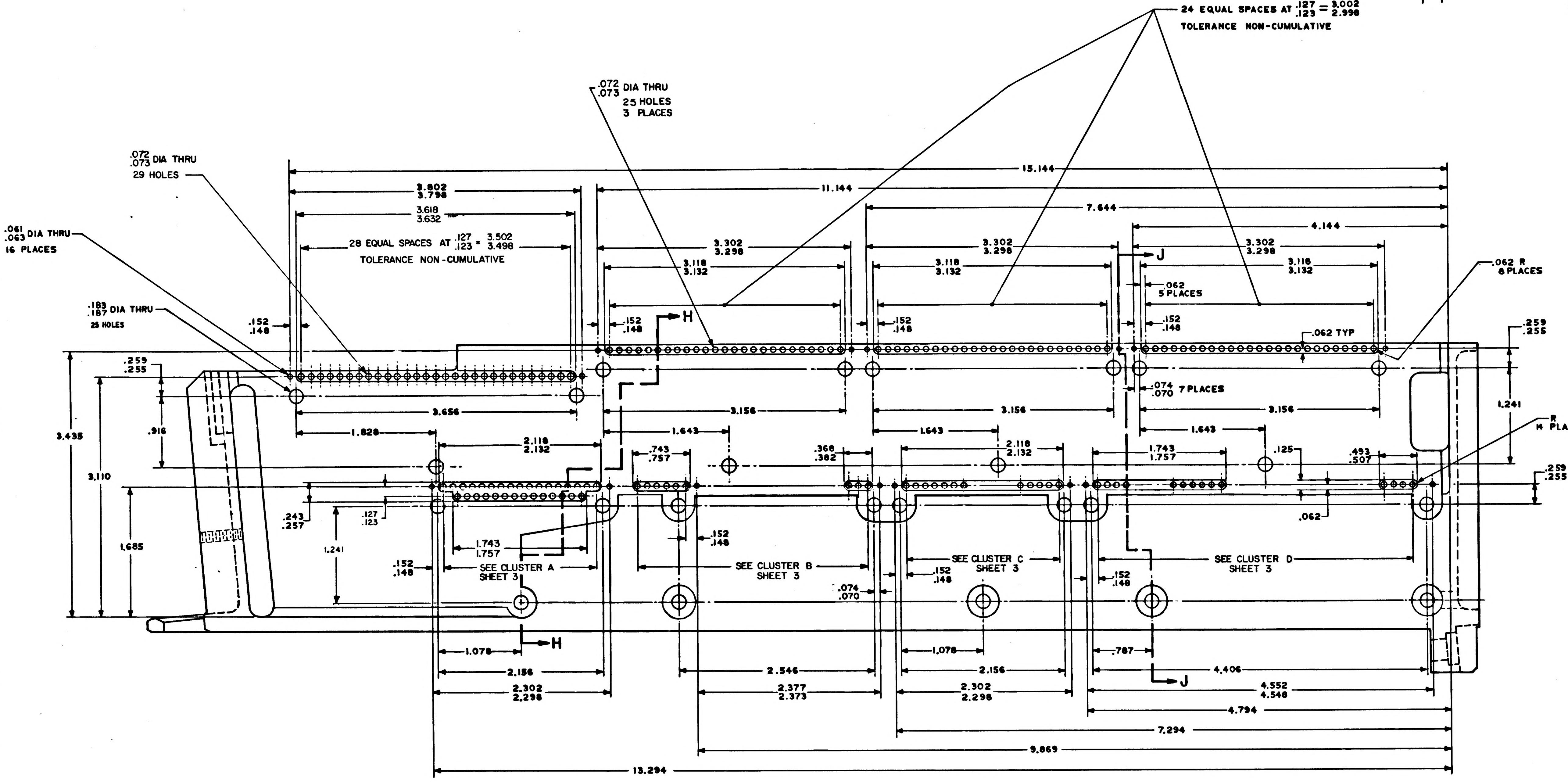
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008526
SCALE 1/1
WT
SHEET 1 OF 4

1008526 B

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

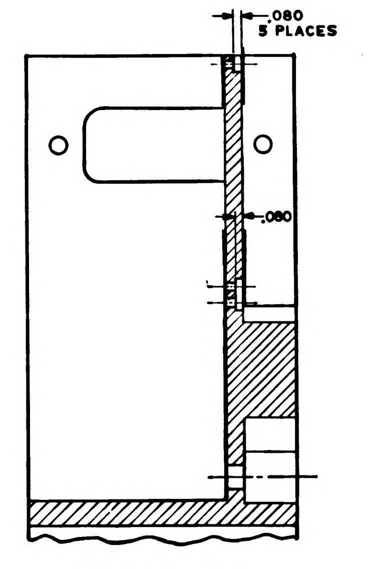
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15950	11-FEB 65	M.G. J.E.B.
B	REVISED PER TDRR 18692	5 MAY 65	A.N. mem



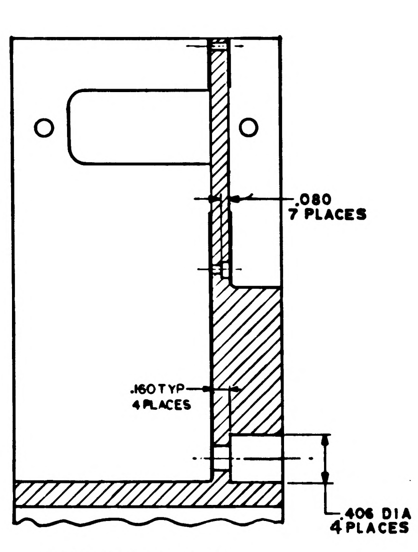
24 EQUAL SPACES AT .127/.123 = 3.002/2.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU 25 HOLES 3 PLACES
.072/.073 DIA THRU 29 HOLES
.061/.063 DIA THRU 16 PLACES
.183/.187 DIA THRU 25 HOLES
28 EQUAL SPACES AT .127/.123 = 3.502/3.498
TOLERANCE NON-CUMULATIVE
15.144
3.802/3.798
11.144
3.618/3.632
7.644
4.144
3.302/3.298
3.118/3.132
3.302/3.298
3.118/3.132
3.302/3.298
3.118/3.132
J
.062 5 PLACES
.062 R 8 PLACES
.152/.148
H
.062 TYP
.259/.255
.074/.070 7 PLACES
3.656
3.156
3.156
3.156
1.241
1.828
1.643
1.643
1.643
2.118/2.132
2.118/2.132
R 14 PLACES
.916
3.435
3.110
.743/.757
.368/.382
1.743/1.757
.125
.493/.507
.259/.255
.243/.257
.127/.123
1.685
1.241
.062
1.743/1.757
SEE CLUSTER A SHEET 3
SEE CLUSTER B SHEET 3
SEE CLUSTER C SHEET 3
SEE CLUSTER D SHEET 3
.074/.070
1.078
2.156
2.546
1.078
2.156
.787
4.406
2.302/2.298
2.377/2.373
2.302/2.298
4.552/4.548
4.794
7.294
9.869
13.294

VIEW B B
SCALE~2:1



.080 5 PLACES
.080

SECTION H-H



.080 7 PLACES
.160 TYP 4 PLACES
.406 DIA 4 PLACES

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ±0-30
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN R.J. Fox DATE 2 OCT. 64
CHECKED 8 OCT 64
APPROVAL 19 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008526
SCALE 2:1
WT
SHEET 2 OF 4

1008526 B

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
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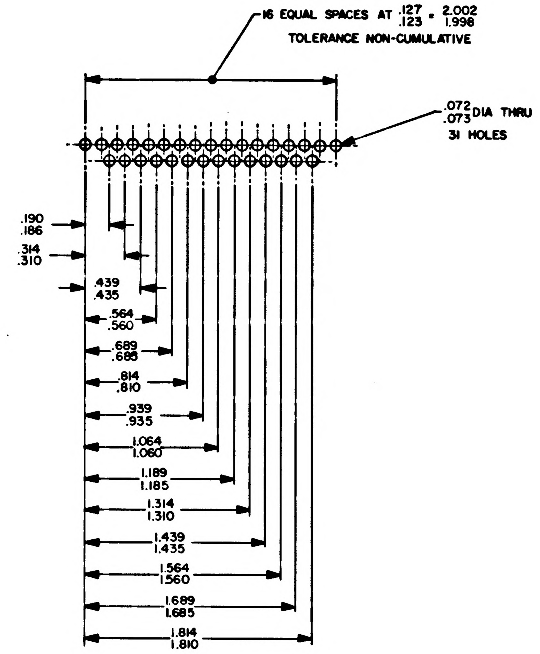
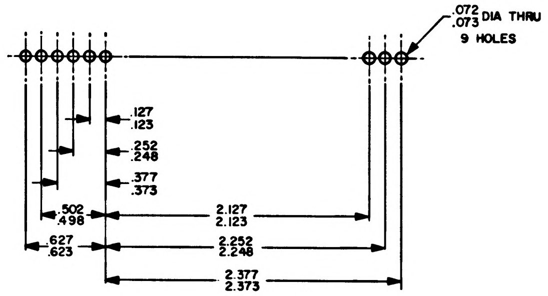
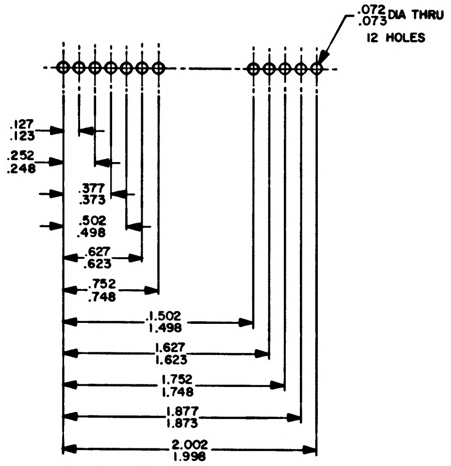
B		REVISED PER TDRR 18692		5 MAY 65	4 N.


16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
31 HOLES
.190/.186
.314/.310
.439/.435
.564/.560
.689/.685
.814/.810
.939/.935
1.064/1.060
1.189/1.185
1.314/1.310
1.439/1.435
1.564/1.560
1.689/1.685
1.814/1.810

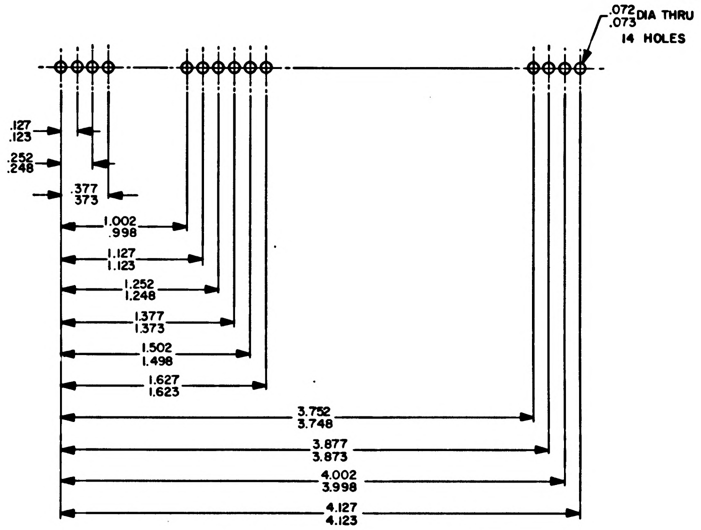
CLUSTER A


.072/.073 DIA THRU
9 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
.627/.623
2.127/2.123
2.252/2.248
2.377/2.373

CLUSTER B


.072/.073 DIA THRU
12 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
.627/.623
.752/.748
1.502/1.498
1.627/1.623
1.752/1.748
1.877/1.873
2.002/1.998

CLUSTER C


.072/.073 DIA THRU
14 HOLES
.127/.123
.252/.248
.377/.373
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123

CLUSTER D

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Jaquin DATE 5 OCT 64
CHECKED 8 OCT 64
APPROVAL 14 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

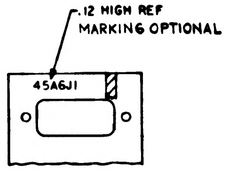
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 6

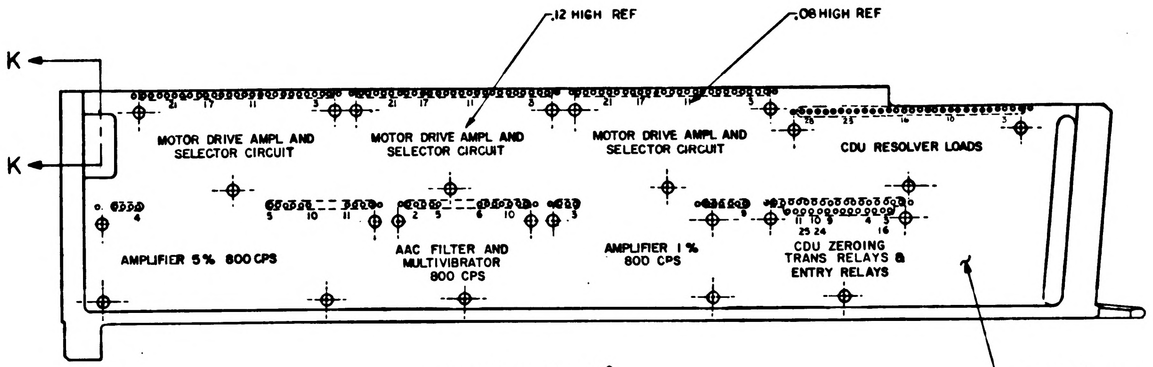
CODE IDENT NO 80230
SIZE E
1008526
SCALE 2:1
SHEET 3 of 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

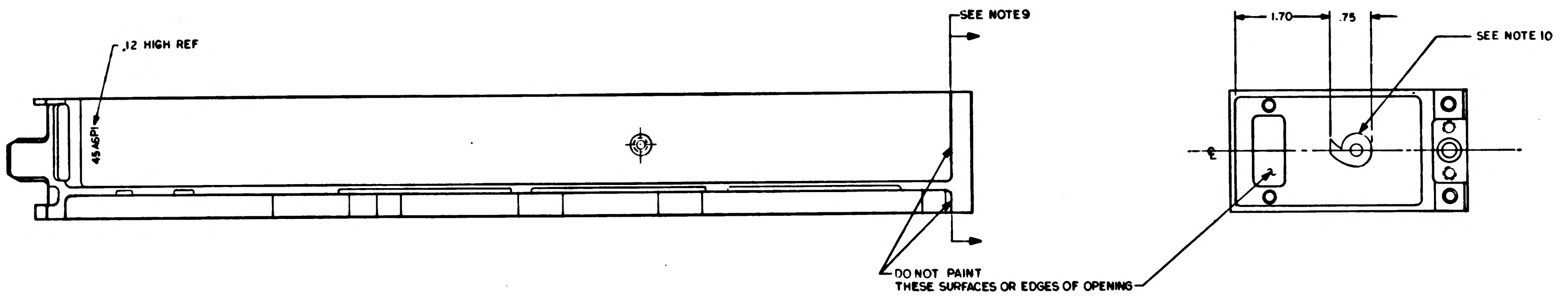
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR15950	05	J.E.S.
B	REVISED PER TDRR 18692	5 MAY 65	A.N.

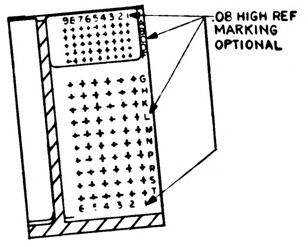

.12 HIGH REF
MARKING OPTIONAL
45A6J1

PARTIAL SECTION K-K

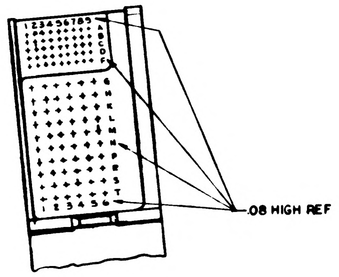

.12 HIGH REF
.08 HIGH REF
K
K
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
CDU RESOLVER LOADS
AMPLIFIER 5% 800 CPS
AAC FILTER AND MULTIVIBRATOR 800 CPS
AMPLIFIER 1% 800 CPS
CDU ZEROING TRANS RELAYS & ENTRY RELAYS
SURFACE-D-REF

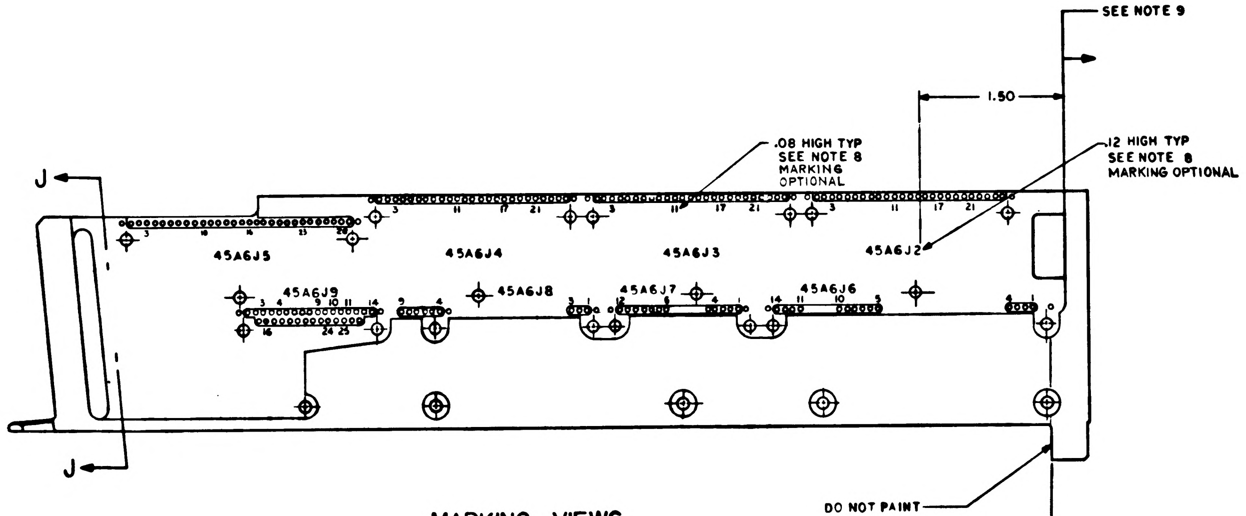
VIEW ROTATED 180°


.12 HIGH REF
45A6P1
SEE NOTE 9
1.70
.75
SEE NOTE 10
DO NOT PAINT
THESE SURFACES OR EDGES OF OPENING


.08 HIGH REF
MARKING OPTIONAL

SECTION J-J




SEE NOTE 9
1.50
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
DO NOT PAINT
THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL #

HEAT TREATMENT #

FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN R.J. Fox DATE 2 OCT 64
CHECKED D.G. Kuns Oct 64
APPROVAL L.A. Klumpp 14 Oct 64
APPROVAL E.H. 140 [illegible]

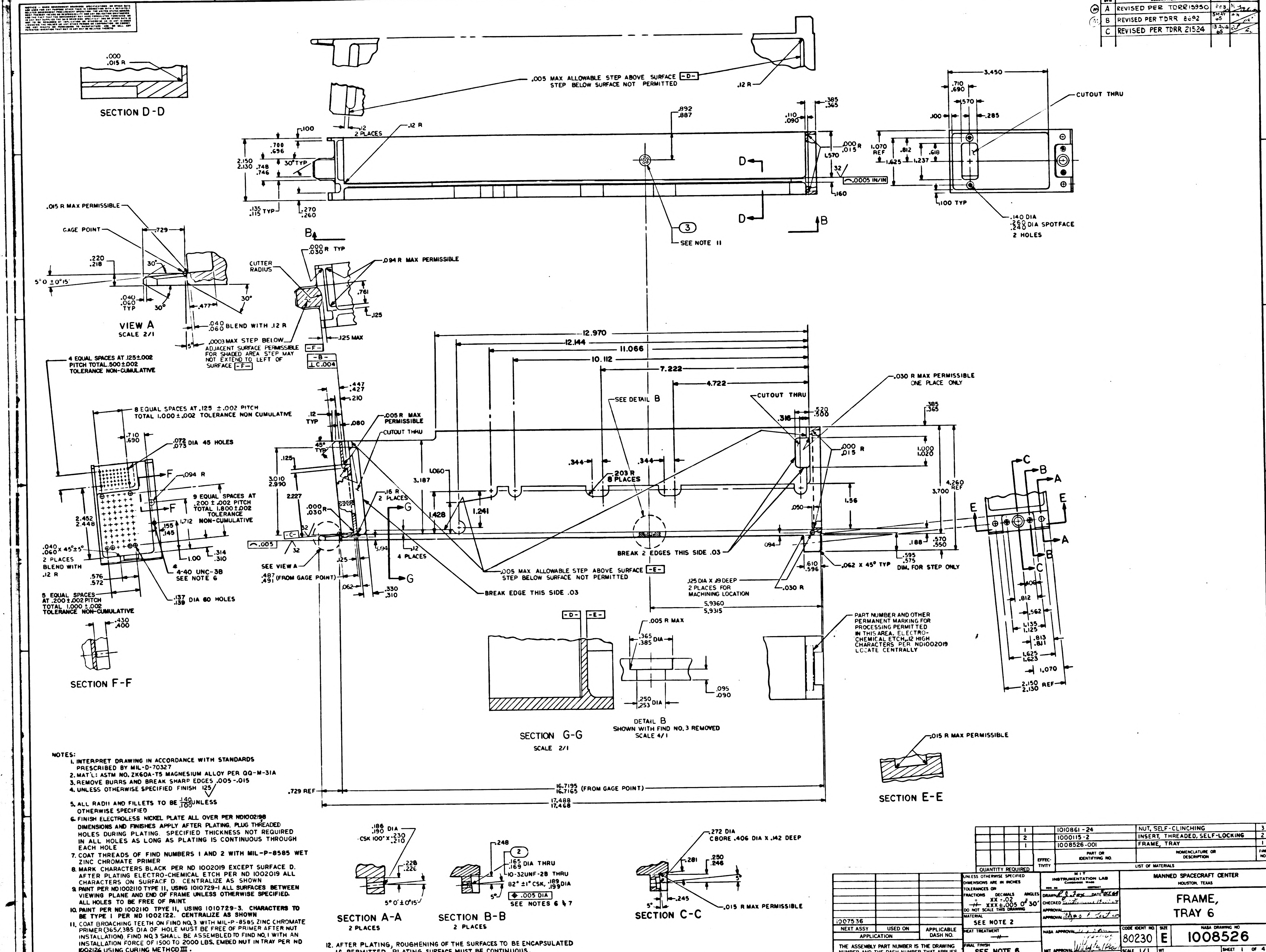
NASA APPROVAL 12-1-64
MIT APPROVAL [illegible] 1 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 6

CODE IDENT NO. 80230 | SIZE E | NASA DRAWING NO 1008526
SCALE 1/1 | WT | SHEET 4 OF 4

1008526 B


SECTION D-D
.000
.015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
2 PLACES
.100
.700
.696
2.150
2.130
.748
.746
30° TYP
.135
.115 TYP
.270
.260
.892
.887
.110
.090
.385
.365
.000
.015 R
1.570
32
.0005 IN/IN
.160
D
B
3
SEE NOTE 11
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
5°0 ±0°15'
30°
.040
.060 TYP
.477
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
CUTTER RADIUS
.000
.030 R TYP
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX
-F-
-B-
⊥ C .004
4 EQUAL SPACES AT .125±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.710
.690
.072
.075 DIA 45 HOLES
.094 R
9 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
2.452
2.448
1.712
.155
.145
1.00
.314
.310
.040
.060 X 45°±5°
2 PLACES
BLEND WITH .12 R
.576
.572
4-40 UNC-3B
SEE NOTE 6
.137
.139 DIA 60 HOLES
5 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.430
.400
SECTION F-F
.447
.427
.210
.12 TYP
.080
.005 R MAX PERMISSIBLE
CUTOUT THRU
45° TYP
3.010
2.990
2.227
.000
.030 R
-C-
.005
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125
.062
.330
.310
.094
.12
4 PLACES
.16 R
2 PLACES
G
12.970
12.144
11.066
10.112
7.222
4.722
SEE DETAIL B
CUTOUT THRU
.316
.520
.500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385
.365
.000
.015 R
1.000
1.020
3.187
1.060
1.428
1.241
.344
.203 R
8 PLACES
1.56
4.260 REF
3.700
.050
.570
.550
.188
.595
.575 DIM. FOR STEP ONLY
.062 x 45° TYP
.610
.596
.030 R
BREAK 2 EDGES THIS SIDE .03
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
.125 DIA X .19 DEEP
2 PLACES FOR MACHINING LOCATION
5.9360
5.9315
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
C
B
A
E
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
-D-
-E-
.005 R MAX
.365
.385 DIA
.095
.090
.250
.253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
SECTION G-G
SCALE 2/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5°0'±0°15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189
.199 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
.245
.015 R MAX PERMISSIBLE
SECTION C-C
1008526

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15950	FEB 65	
B	REVISED PER TDRR 8692	5 MAY 65	
C	REVISED PER TDRR 21524	13 AUG 65	

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TPYE II, USING 1010729-3. CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND 1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QUANTITY REQUIRED				EFFECTIVITY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
			1		1010861-24	NUT, SELF-CLINCHING	3
			2		1000115-2	INSERT, THREADED, SELF-LOCKING	2
			1		1008526-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007536		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN R. J. Fox DATE 5 OCT 64
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

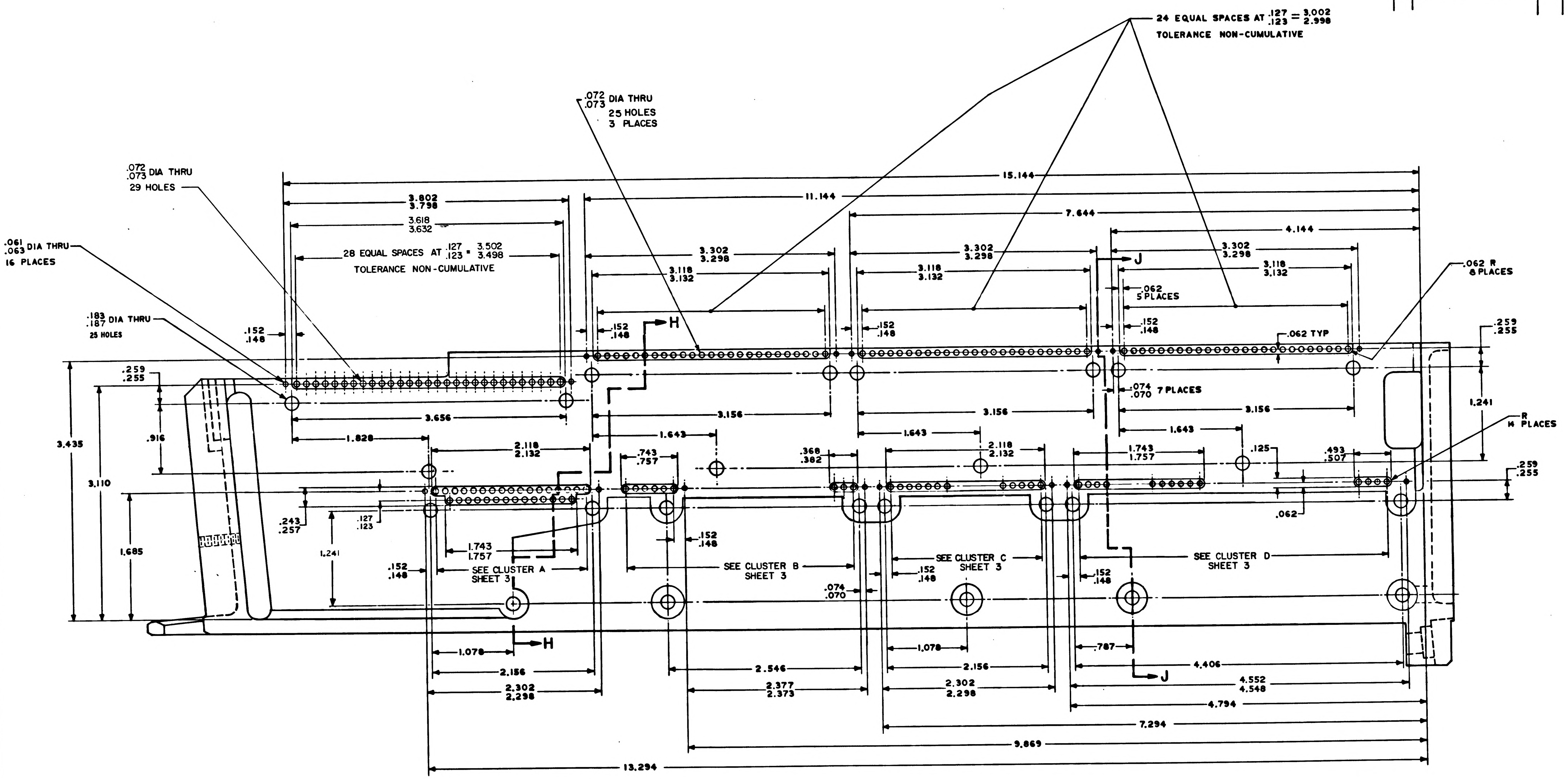
CODE IDENT NO.	SIZE	NASA DRAWING NO
80230	E	1008526

SCALE 1/1 WT SHEET 1 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

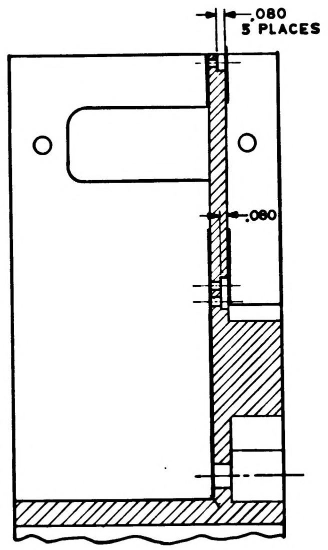
REVISIONS

	SYM	DESCRIPTION	DATE	APPROVAL
Ⓜ	A	REVISED PER TDRR 15950	FEB 65	[illegible]
Ⓜ	B	REVISED PER TDRR 18692	5 MAY 65	[illegible]
	C	REVISION STATUS CHANGED	13 AUG 65	[illegible]



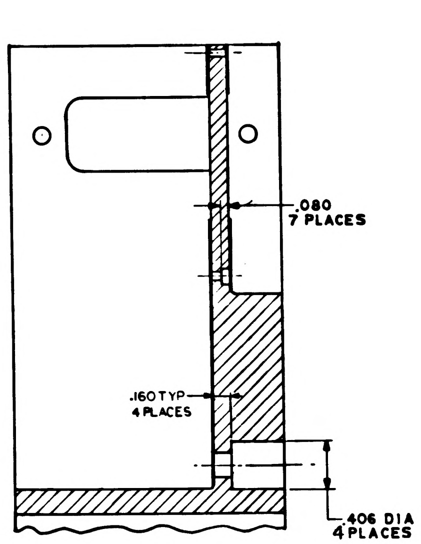
24 EQUAL SPACES AT .127/.123 = 3.002/2.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
25 HOLES
3 PLACES
.072/.073 DIA THRU
29 HOLES
.061/.063 DIA THRU
16 PLACES
.183/.187 DIA THRU
25 HOLES
28 EQUAL SPACES AT .127/.123 = 3.502/3.498
TOLERANCE NON-CUMULATIVE
15.144
11.144
7.644
4.144
3.802/3.798
3.618/3.632
3.302/3.298
3.118/3.132
.152/.148
J
H
.062
5 PLACES
.062 TYP
.062 R
6 PLACES
.259/.255
.074/.070 7 PLACES
3.656
3.156
1.828
1.643
1.241
R
14 PLACES
3.435
3.110
.916
1.685
2.118/2.132
.743/.757
.368/.382
1.743/1.757
.125
.493/.507
.243/.257
.127/.123
.062
SEE CLUSTER A
SHEET 3
SEE CLUSTER B
SHEET 3
SEE CLUSTER C
SHEET 3
SEE CLUSTER D
SHEET 3
.074/.070
1.078
.787
2.156
2.546
4.406
2.302/2.298
2.377/2.373
4.552/4.548
4.794
7.294
9.869
13.294

VIEW B B
SCALE~2:1



.080
5 PLACES
.080

SECTION H-H



.080
7 PLACES
.160 TYP
4 PLACES
.406 DIA
4 PLACES

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ± .02, XXX ± .005
ANGLES ± 0°-30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

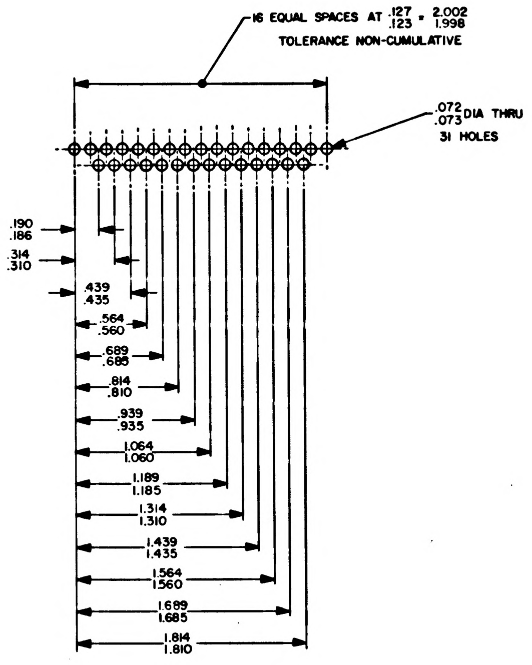
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
DRAWN R.J. Fox DATE 2 OCT. 64
CHECKED [illegible] 8 OCT 64
APPROVAL [illegible] 19 OCT 64
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL W Kupfer [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008526
SCALE 2:1
WT
SHEET 2 OF 4

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A		REVISED PER TDRR 15950		FEB 65	
B		REVISED PER TDRR 18692		5 MAY 65	4 N
C		REVISION STATUS CHANGED		13 AUG 65	



16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
31 HOLES
.190/.186
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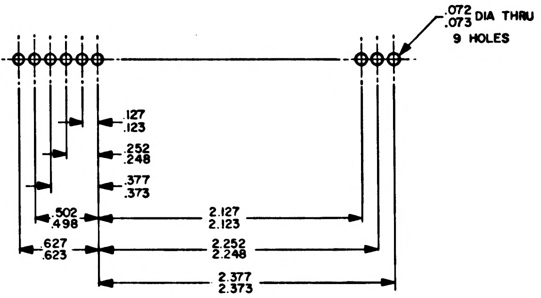
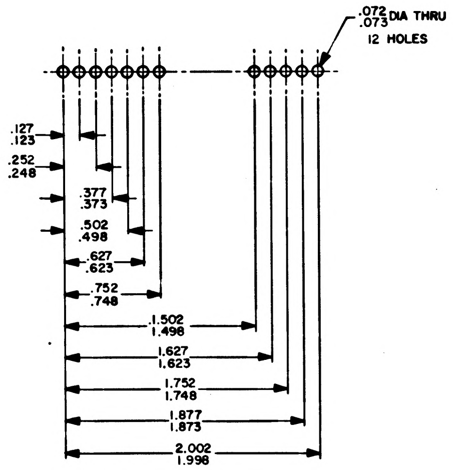
1.189/1.185
1.314/1.310
1.439/1.435
1.564/1.560
1.689/1.685
1.814/1.810

CLUSTER A



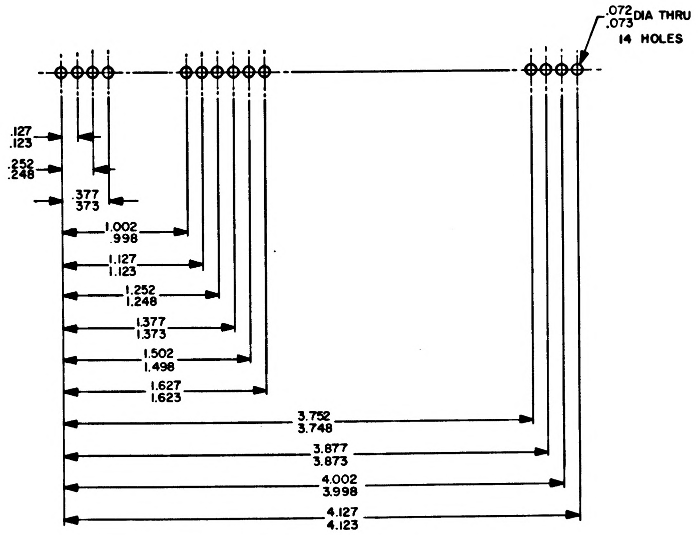
.072/.073 DIA THRU
9 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
.627/.623
2.127/2.123
2.252/2.248
2.377/2.373

CLUSTER B



.072/.073 DIA THRU
12 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
.627/.623
.752/.748
1.502/1.498
1.627/1.623
1.752/1.748
1.877/1.873
2.002/1.998

CLUSTER C



.072/.073 DIA THRU
14 HOLES
.127/.123
.252/.248
.377/.373
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123

CLUSTER D

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION. GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Jaquin DATE 5 OCT 64
CHECKED 8 OCT 64
APPROVAL 14 OCT 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

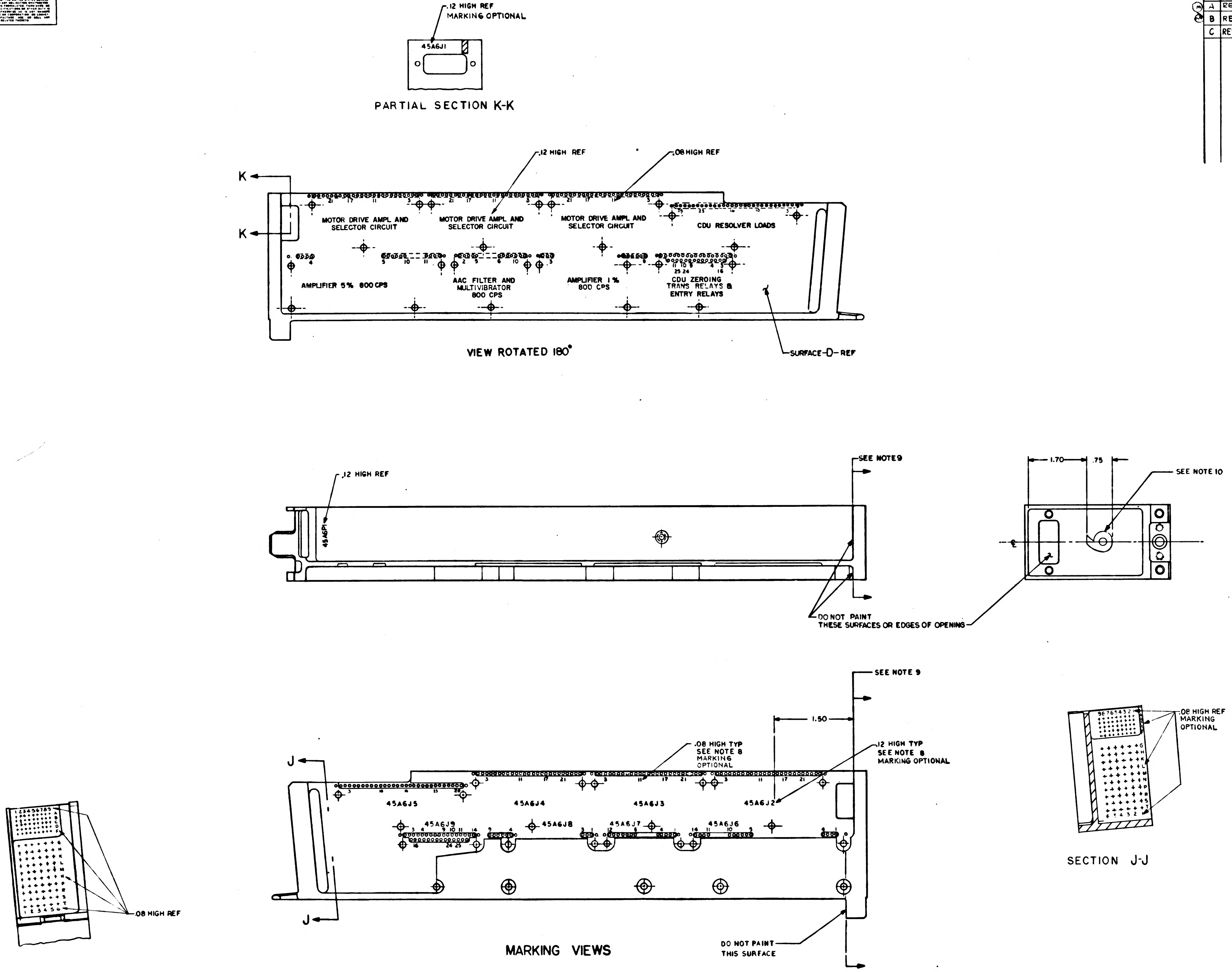
FRAME
TRAY 6

CODE IDENT NO. 80230
SIZE E
1008526
SCALE 2:1
SHEET 3 of 4

1008526

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15950	11 FEB 65	
B	REVISED PER TDRR 18692	5 MAY 65	A N.
C	REVISION STATUS CHANGED	13 AUG 65	


.12 HIGH REF
MARKING OPTIONAL
45A6J1
PARTIAL SECTION K-K
.12 HIGH REF
.08 HIGH REF
K
K
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
CDU RESOLVER LOADS
AMPLIFIER 5% 800 CPS
AAC FILTER AND MULTIVIBRATOR 800 CPS
AMPLIFIER 1% 800 CPS
CDU ZEROING TRANS RELAYS & ENTRY RELAYS
VIEW ROTATED 180°
SURFACE-D-REF
.12 HIGH REF
45A6P1
SEE NOTE 9
DO NOT PAINT THESE SURFACES OR EDGES OF OPENING
1.70
.75
SEE NOTE 10
℄
SEE NOTE 9
1.50
.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
.08 HIGH REF
MARKING OPTIONAL
SECTION J-J
.08 HIGH REF
MARKING VIEWS
DO NOT PAINT THIS SURFACE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

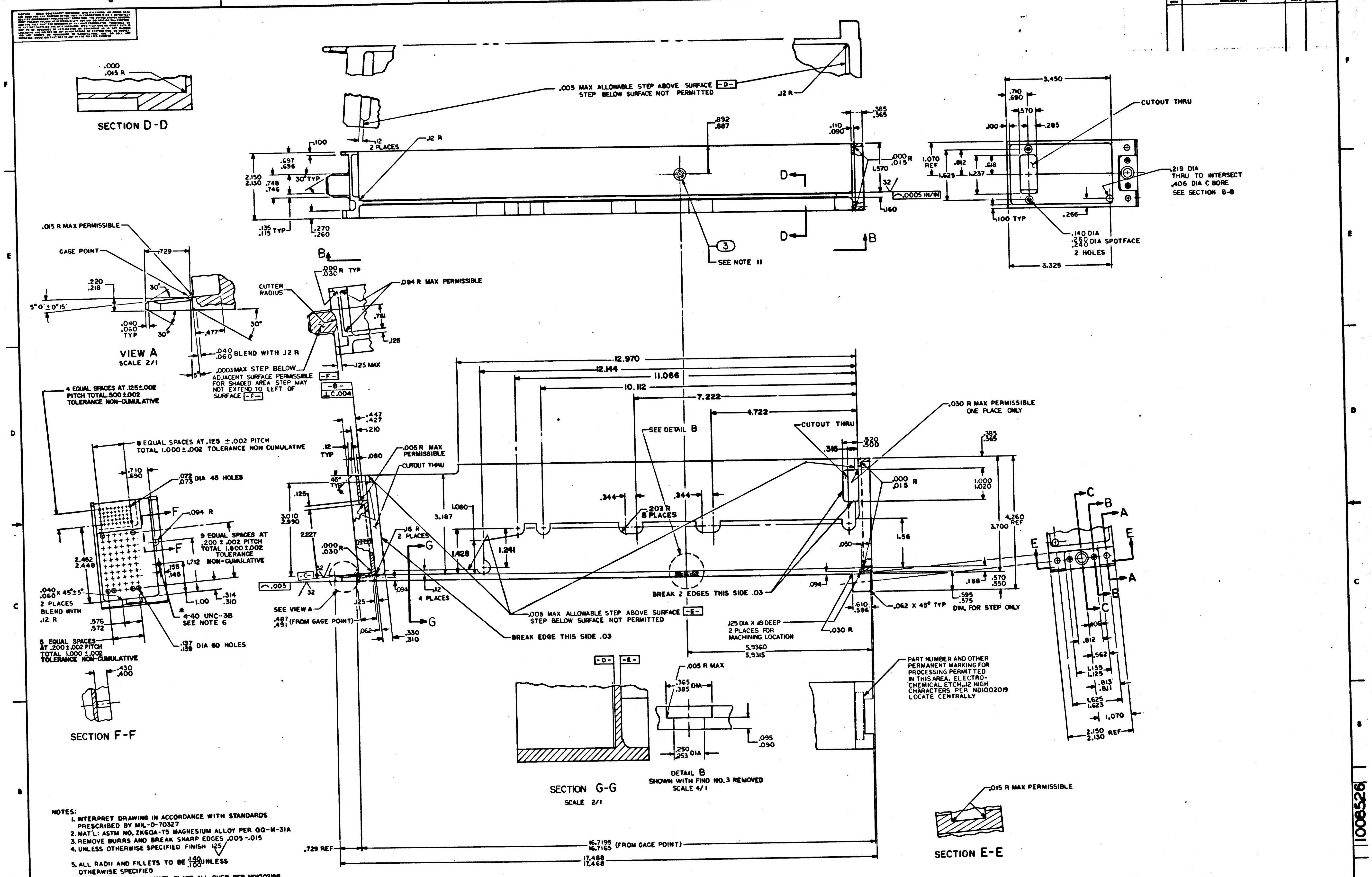
DRAWN R.J. Fox DATE 2 OCT 64
CHECKED 2 OCT 64
APPROVAL 19 Oct 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME, TRAY 6

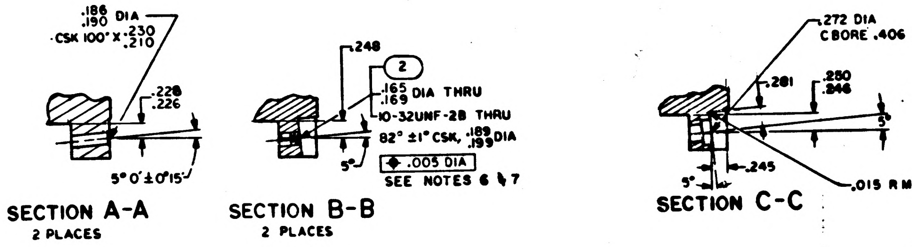
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008526
SCALE 1/1
WT
SHEET 4 OF 4

1008526 C


SECTION D-D
.000
.015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.892
.887
3.450
CUTOUT THRU
.219 DIA THRU TO INTERSECT .406 DIA C BORE SEE SECTION B-B
.140 DIA
.260
.240 DIA SPOTFACE 2 HOLES
3.325
SEE NOTE 11
.015 R MAX PERMISSIBLE
GAGE POINT
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
CUTTER RADIUS
.094 R MAX PERMISSIBLE
4 EQUAL SPACES AT .125±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.072
.075 DIA 45 HOLES
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.137
.139 DIA 60 HOLES
SECTION F-F
12.970
12.144
11.066
10.112
7.222
4.722
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.203 R 8 PLACES
BREAK 2 EDGES THIS SIDE .03
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
BREAK EDGE THIS SIDE .03
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.062 X 45° TYP
.595
.575 DIM. FOR STEP ONLY
5.9360
5.9315
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.005 R MAX
SECTION G-G
SCALE 2/1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
2.150
2.130 REF
1008526

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NUMBERS 1 AND 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND 1002140 TPYE II, USING 1010729-3. CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD


.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5° 0' ±0°15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK. .189
.193 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
C BORE .406 DIA X .142 DEEP
.281
.250
.246
.245
.015 R MAX PERMISSIBLE
SECTION C-C

QUANTITY REQUIRED				EFFECTIVITY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
			1		1010861-24	NUT, SELF-CLINCHING	3
			2		1000115-2	INSERT, THREADED, SELF-LOCKING	2
			1		1008526-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007536		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.
DRAWN R J Fox DATE 9 OCT 64
CHECKED 14 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 6

CODE IDENT NO. SIZE E NASA DRAWING NO. 1008526
SCALE 1/1 WT SHEET 1 OF 4

REVISIONS 14627

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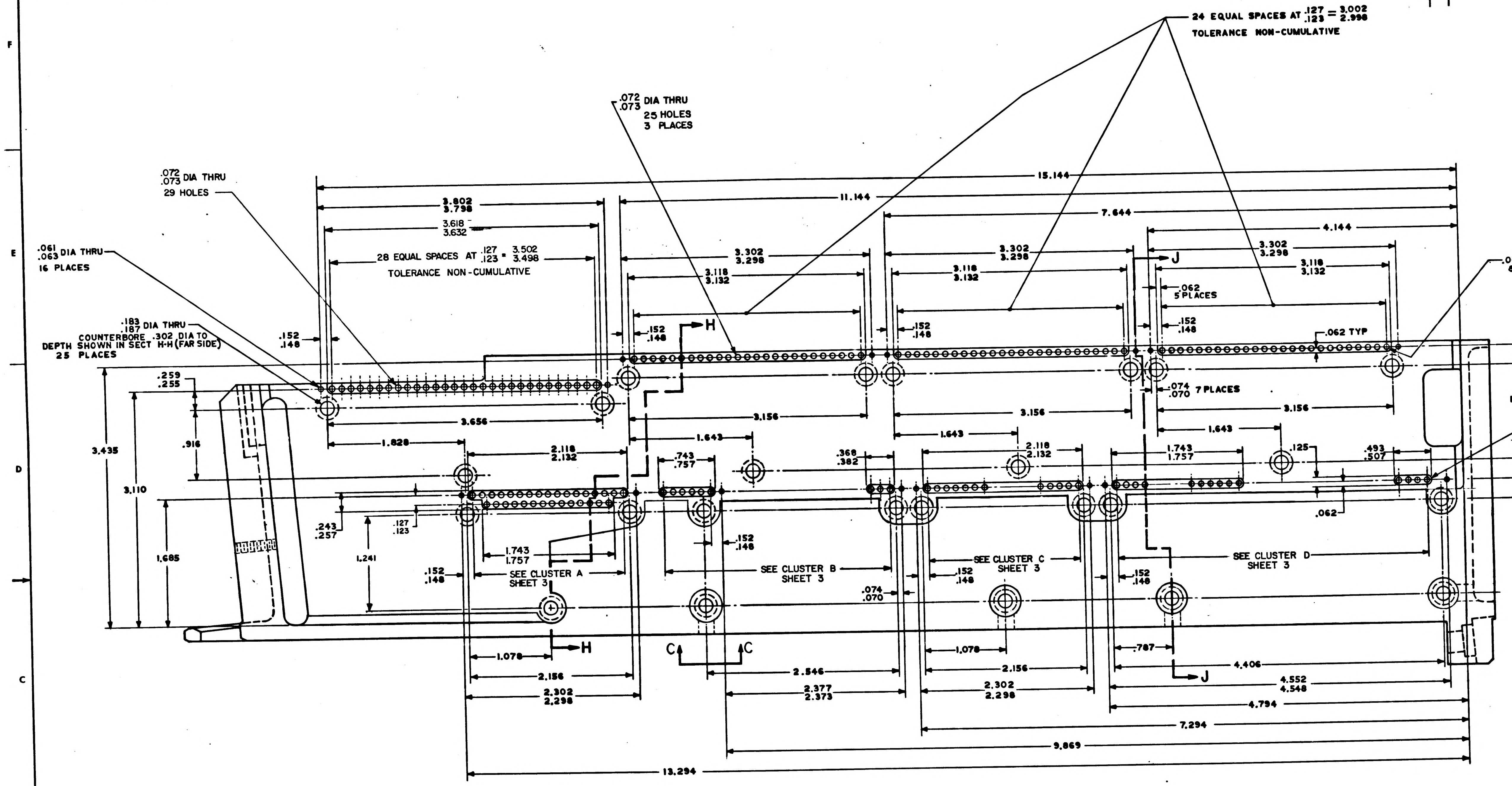
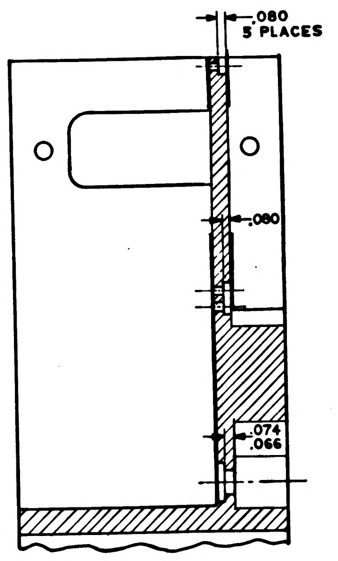
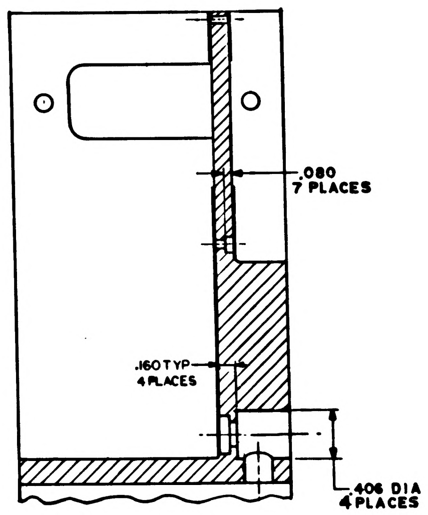
REVISIONS 14627			
SYM	DESCRIPTION	DATE	APPROVAL


24 EQUAL SPACES AT .127/.123 = 3.002/2.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
25 HOLES
3 PLACES
.072/.073 DIA THRU
29 HOLES
.061/.063 DIA THRU
16 PLACES
.183/.187 DIA THRU
COUNTERBORE .302 DIA TO
DEPTH SHOWN IN SECT H-H (FAR SIDE)
25 PLACES
28 EQUAL SPACES AT .127/.123 = 3.502/3.498
TOLERANCE NON-CUMULATIVE
15.144
11.144
7.644
4.144
3.802/3.798
3.618/3.632
3.302/3.298
3.118/3.132
.152/.148
.062
5 PLACES
.062 TYP
.062 R
8 PLACES
.259/.255
.074/.070 7 PLACES
3.656
3.156
1.241
R
14 PLACES
1.828
1.643
2.118/2.132
.743/.757
.368/.382
1.743/1.757
.125
.493/.507
3.435
3.110
.916
1.685
.243/.257
.127/.123
1.241
.062
SEE CLUSTER A
SHEET 3
SEE CLUSTER B
SHEET 3
SEE CLUSTER C
SHEET 3
SEE CLUSTER D
SHEET 3
H
J
C
1.078
2.156
2.302/2.298
2.546
2.377/2.373
.787
4.406
4.552/4.548
4.794
7.294
9.869
13.294

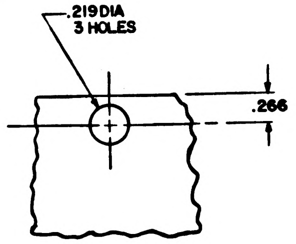
VIEW B B
SCALE~2:1


.080
5 PLACES
.080
.074/.066

SECTION H-H


.080
7 PLACES
.160 TYP
4 PLACES
.406 DIA
4 PLACES

SECTION J-J


.219 DIA
3 HOLES
.266

VIEW C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 XXX ± .005 ANGLES ±0-30
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN R. Fox DATE 2 OCT. 64
CHECKED D. Levine 8 OCT 64
APPROVAL 14 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL W. Kupfer Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

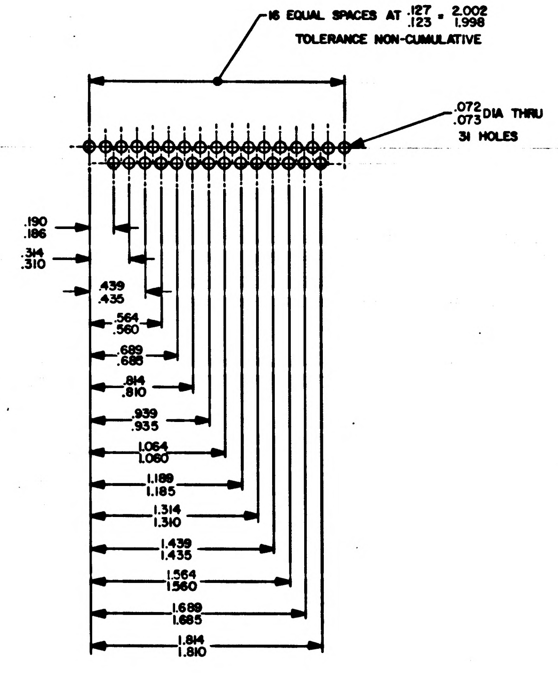
FRAME, TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008526
SCALE 2:1
WT
SHEET 2 OF 4

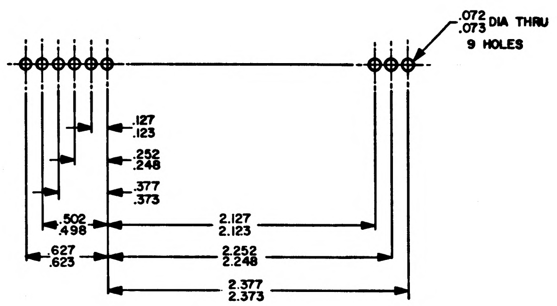
1008526

1008258

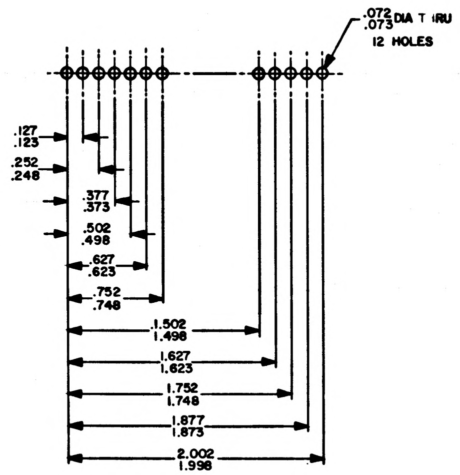
REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


16 EQUAL SPACES AT .127/.123 = 2.002/1.998
TOLERANCE NON-CUMULATIVE
.072/.073 DIA THRU
31 HOLES
.190/.186
.314/.310
.439/.435
.564/.560
.689/.685
.814/.810
.939/.935
1.064/1.060
1.189/1.185
1.314/1.310
1.439/1.435
1.564/1.560
1.689/1.685
1.814/1.810

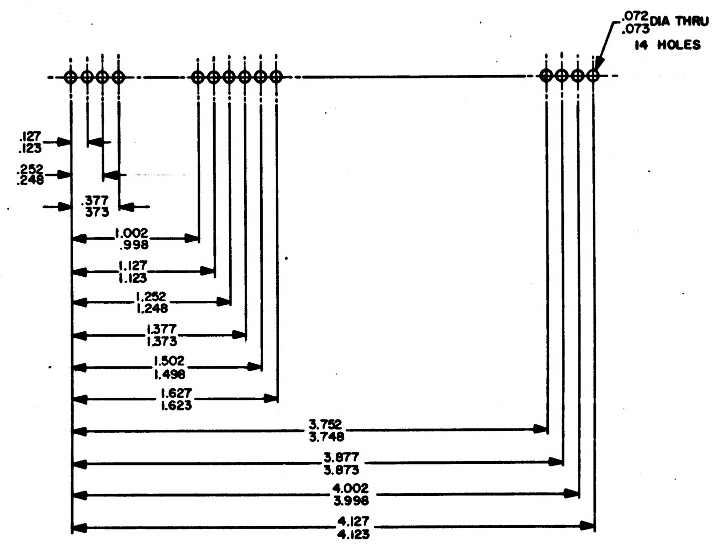
CLUSTER A


.072/.073 DIA THRU
9 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
2.127/2.123
.627/.623
2.252/2.248
2.377/2.373

CLUSTER B


.072/.073 DIA T IRU
12 HOLES
.127/.123
.252/.248
.377/.373
.502/.498
.627/.623
.752/.748
1.502/1.498
1.627/1.623
1.752/1.748
1.877/1.873
2.002/1.998

CLUSTER C


.072/.073 DIA THRU
14 HOLES
.127/.123
.252/.248
.377/.373
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123

CLUSTER D

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN DATE 5 OCT 64
CHECKED 8 OCT 64
APPROVAL 14 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

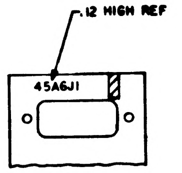
FRAME
TRAY 6

CODE IDENT NO.
SIZE E
1008526
SCALE 2 : 1
SHEET 3 of 4

1008526
SH 3 of 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS 14627		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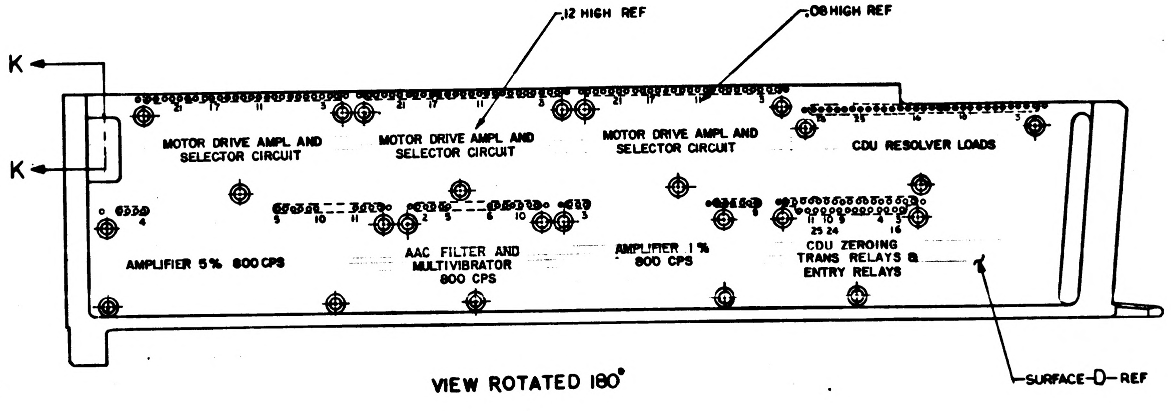
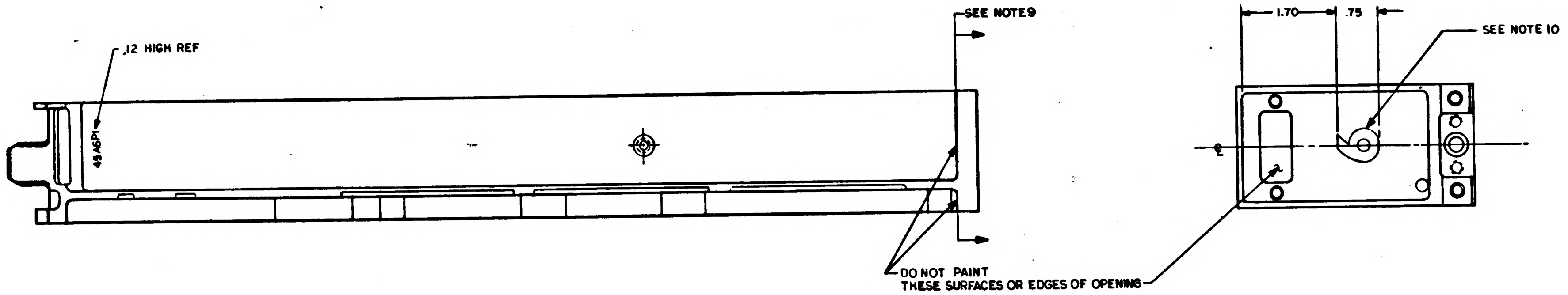
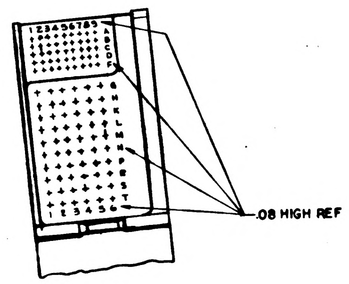
45A6J1

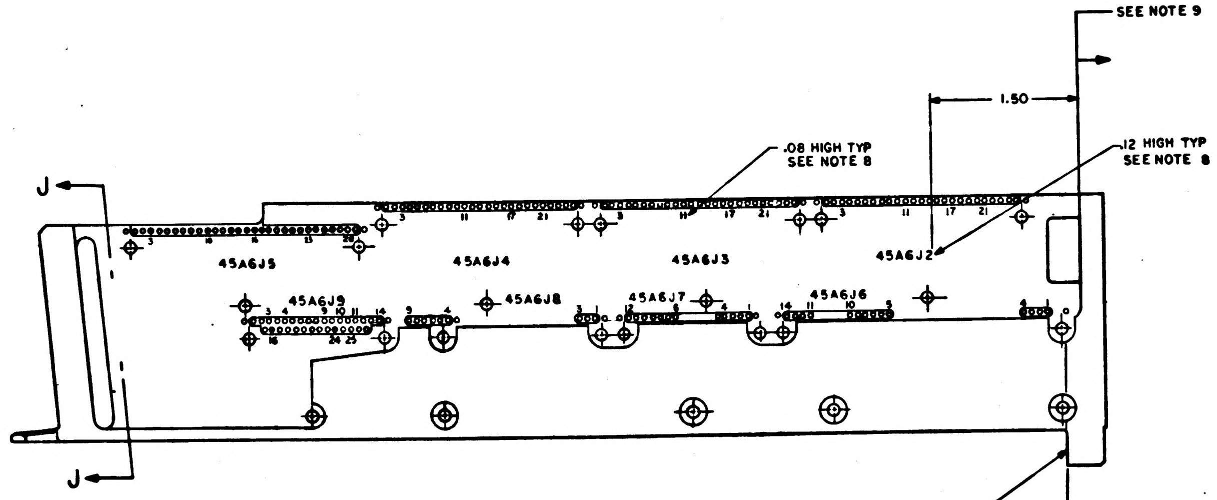
PARTIAL SECTION K-K


.12 HIGH REF
.08 HIGH REF
K
K
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
MOTOR DRIVE AMPL AND SELECTOR CIRCUIT
CDU RESOLVER LOADS
AMPLIFIER 5% 800 CPS
AAC FILTER AND MULTIVIBRATOR 800 CPS
AMPLIFIER 1% 800 CPS
CDU ZEROING TRANS RELAYS & ENTRY RELAYS
SURFACE -D- REF

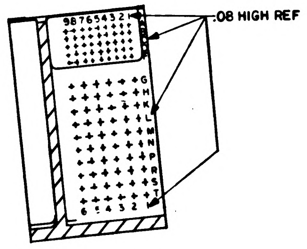
VIEW ROTATED 180°


.12 HIGH REF
45A6P1
SEE NOTE 9
1.70
.75
SEE NOTE 10
DO NOT PAINT THESE SURFACES OR EDGES OF OPENING




SEE NOTE 9
1.50
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
J
J
45A6J5
45A6J4
45A6J3
45A6J2
45A6J9
45A6J8
45A6J7
45A6J6
DO NOT PAINT THIS SURFACE

MARKING VIEWS



SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

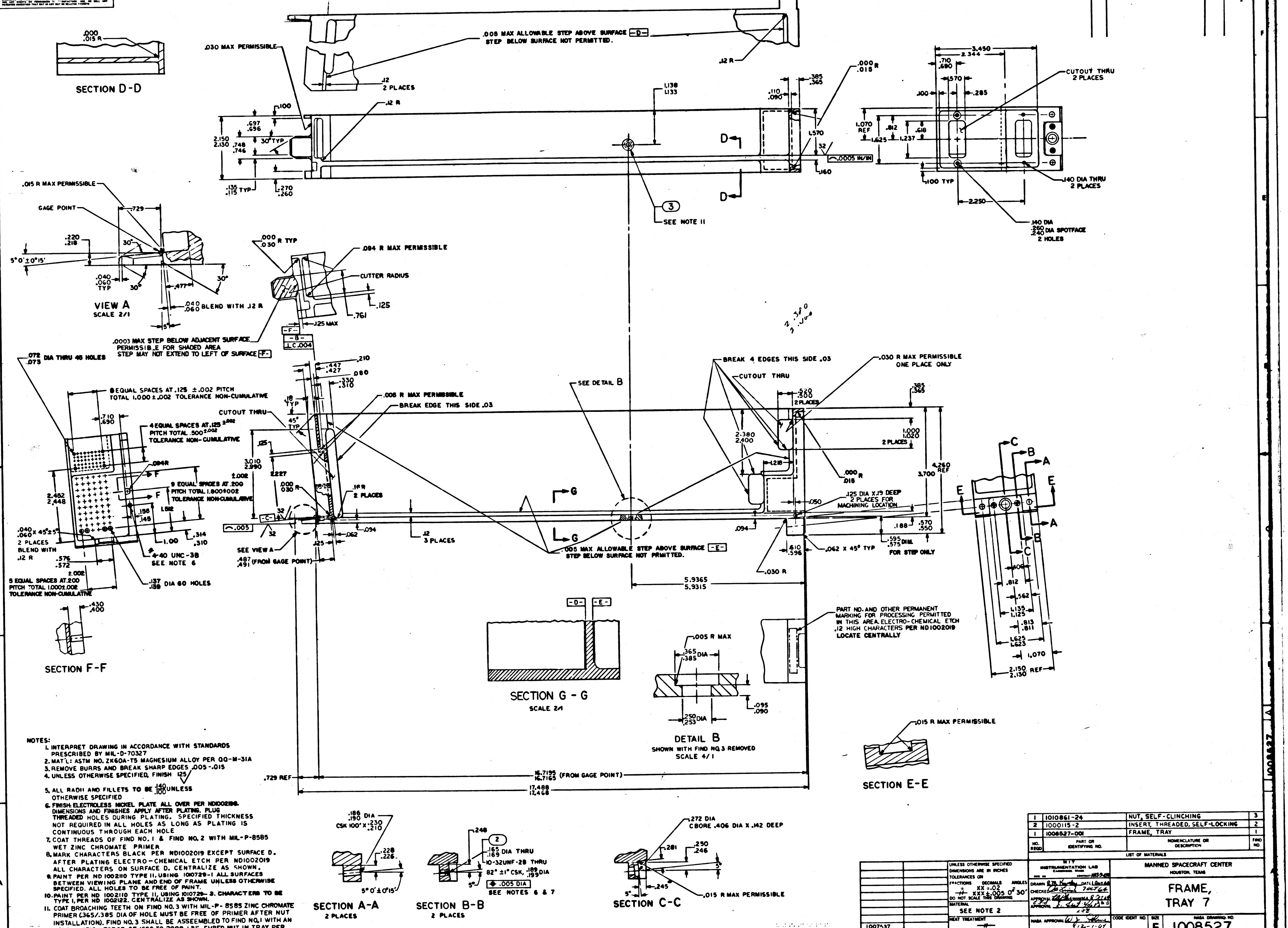
DRAWN R.J. Fox DATE 2 OCT 64
CHECKED D. G. Lions Oct 7 64
APPROVAL LaPlume 13 Oct 64
APPROVAL [illegible] G. Test
NASA APPROVAL W.D. Rhine 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 6.

CODE IDENT NO. | SIZE E | DRAWING NO 1008526
SCALE 1/1 | WT | SHEET 4 OF 4

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15167	29 Dec 64	


SECTION D-D
.000 .015 R
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED.
.12 2 PLACES
.12 R
1.138 1.133
.110 .090
.385 .365
.000 .015 R
1.570
.0005 IN/IN
.160
D
3
SEE NOTE 11
3.450
2.344
.710 .690
.570
.100
.285
CUTOUT THRU 2 PLACES
1.070 REF
.812
.618
1.625
1.237
.100 TYP
2.250
.140 DIA THRU 2 PLACES
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.100
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5° 0' ± 0° 15'
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
.5°
VIEW A SCALE 2/1
.000 .030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125
.761
.125 MAX
-F-
-B-
⊥ C .004
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.072 .075 DIA THRU 48 HOLES
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.710 .690
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
.094R
9 EQUAL SPACES AT .200 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
2.462 2.448
.156 .145
1.812
.040 .060 X 45° ±5° 2 PLACES BLEND WITH .12 R
.576 .572 ±.002
#4-40 UNC-3B SEE NOTE 6
1.00
.314 .310
5 EQUAL SPACES AT .200 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
.447 .427
.210
.080
.330 .310
.18 TYP
45° TYP
CUTOUT THRU
.006 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
3.010 2.990
.125
±.002
2.227
.000 .030 R
.16 R 2 PLACES
.005
-C-
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.062
.094
.12 3 PLACES
G
SEE DETAIL B
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PRMITTED.
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.520 .500 2 PLACES
.385 .365
2.380 2.400
1.000 1.020 2 PLACES
1.218
.000 .018 R
3.700
4.260 REF
.125 DIA X.19 DEEP 2 PLACES FOR MACHINING LOCATION
.050
.188
.570 .550
.094
.610 .596
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
.030 R
5.9365 5.9315
C B A E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
-D- -E-
SECTION G-G SCALE 2/1
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B SHOWN WITH FIND NO.3 REMOVED SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .150 DIA CSK 100° X .230 .210
.228 .226
5° 0' ± 0° 15'
SECTION A-A 2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B 2 PLACES
.272 DIA CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002196. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

LIST OF MATERIALS

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008527-001	FRAME, TRAY	1

NEXT ASSY	USED ON
1007537	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS
CONTRACT NAS 9-4065
DRAWN R.M. Kuchy DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

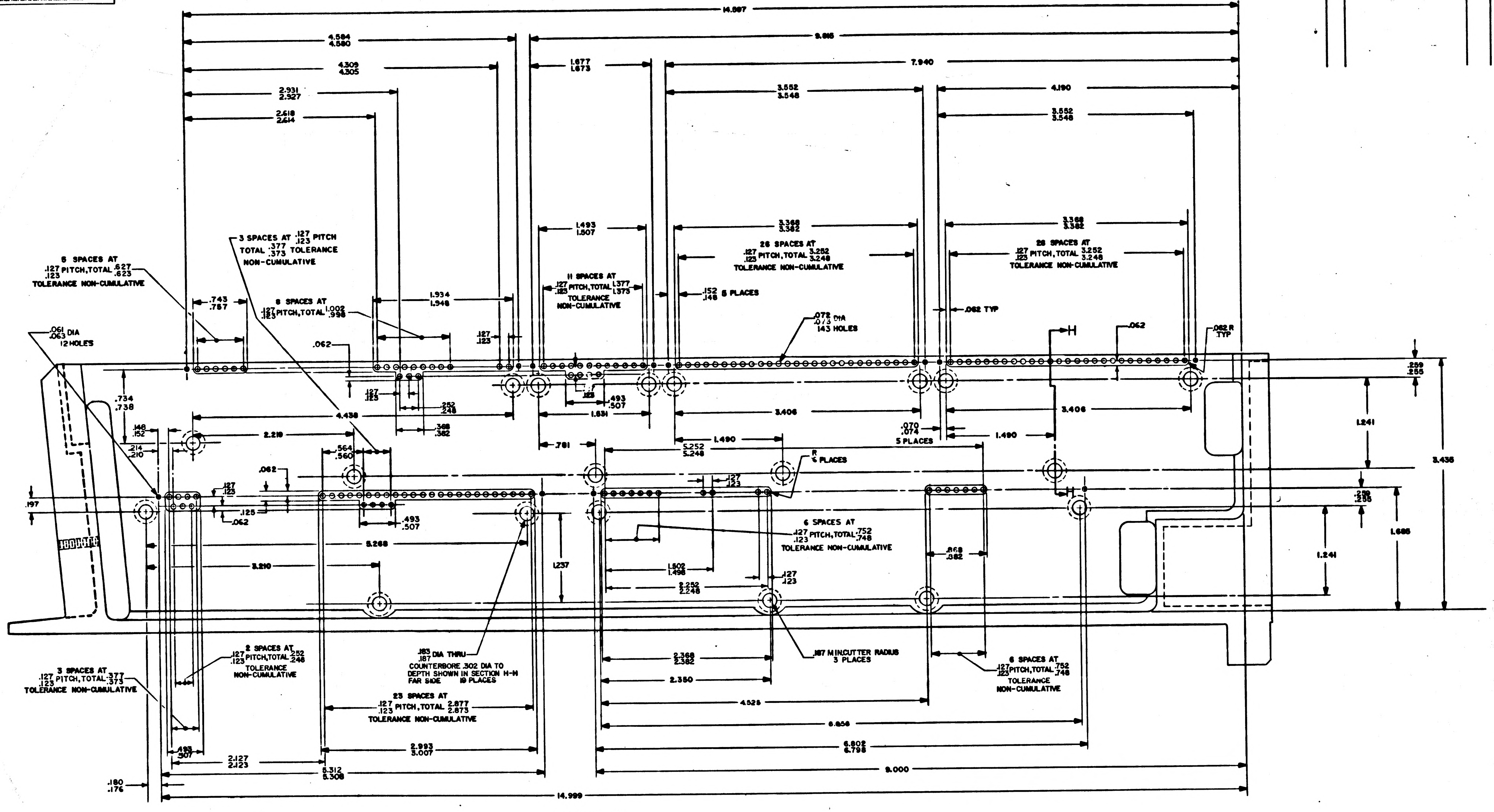
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 7

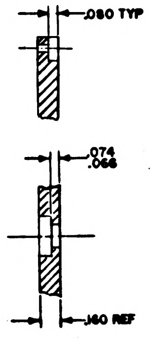
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008527
SCALE 1/1
WT
SHEET 1 OF 3

MASTER

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15167	29 Dec 64	


14.997
4.584 4.580
9.916
4.309 4.305
1.677 1.673
7.940
2.931 2.927
3.552 3.548
4.190
2.618 2.614
3.552 3.548
3 SPACES AT .127 .123 PITCH TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
1.493 1.507
3.368 3.382
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
3.368 3.382
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
5 SPACES AT .127 .123 PITCH, TOTAL .627 .623 TOLERANCE NON-CUMULATIVE
11 SPACES AT .127 .123 PITCH, TOTAL 1.377 1.373 TOLERANCE NON-CUMULATIVE
.152 .148 5 PLACES
.743 .757
8 SPACES AT .127 .123 PITCH, TOTAL 1.002 .998
1.934 1.948
.062 TYP
.072 .073 DIA 143 HOLES
.061 .063 DIA 12 HOLES
.127 .123
.062
.062 R TYP
.062
.259 .255
.127 .123
.252 .248
.493 .507
.734 .738
4.438
1.631
3.406
3.406
1.241
.368 .382
.070 .074 5 PLACES
.148 .152
2.219
.214 .210
.564 .560
.781
1.490
1.490
5.252 5.248
R 6 PLACES
3.436
.062
.127 .123
.127 .123
.197
.125
.062
.493 .507
.259 .255
1.686
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
5.268
1.237
1.241
3.210
.868 .882
1.502 1.498
.127 .123
2.252 2.248
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECTION H-H FAR SIDE 19 PLACES
.187 MIN CUTTER RADIUS 3 PLACES
2.368 2.382
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
2.350
23 SPACES AT .127 .123 PITCH, TOTAL 2.877 2.873 TOLERANCE NON-CUMULATIVE
4.525
6.856
2.993 3.007
6.802 6.798
.493 .507
2.127 2.123
5.312 5.308
9.000
.180 .176
14.999

VIEW B-B


.080 TYP
.074 .066
.160 REF

PARTIAL SECTION
H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG. NO. Contract NAS 9-497
DRAWN [illegible] DATE [illegible]
CHECKED [illegible] 7 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO. SIZE E NASA DRAWING NO. 1008527
SCALE 2/1 WT SHEET 2 OF 3

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14626

SYM	DESCRIPTION	DATE	APPROVAL
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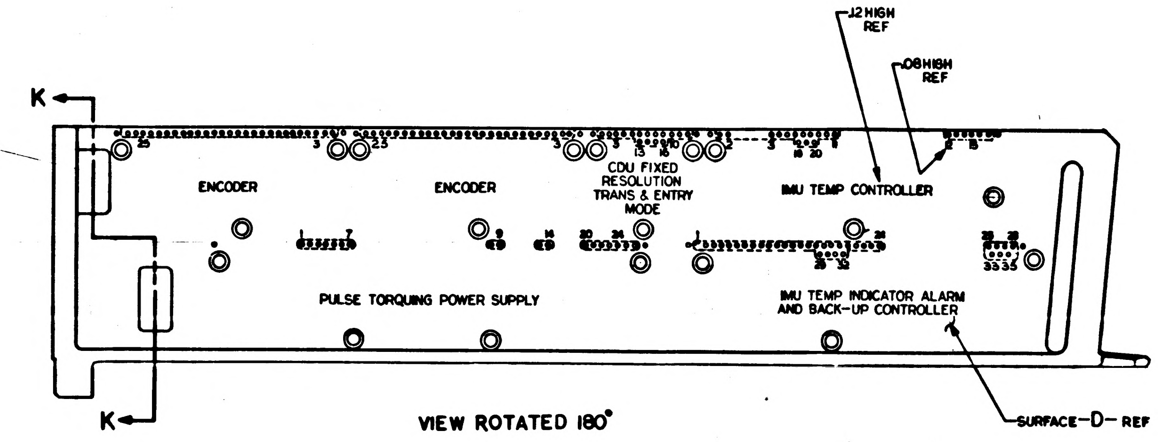
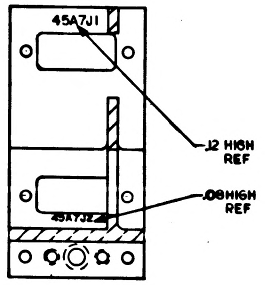
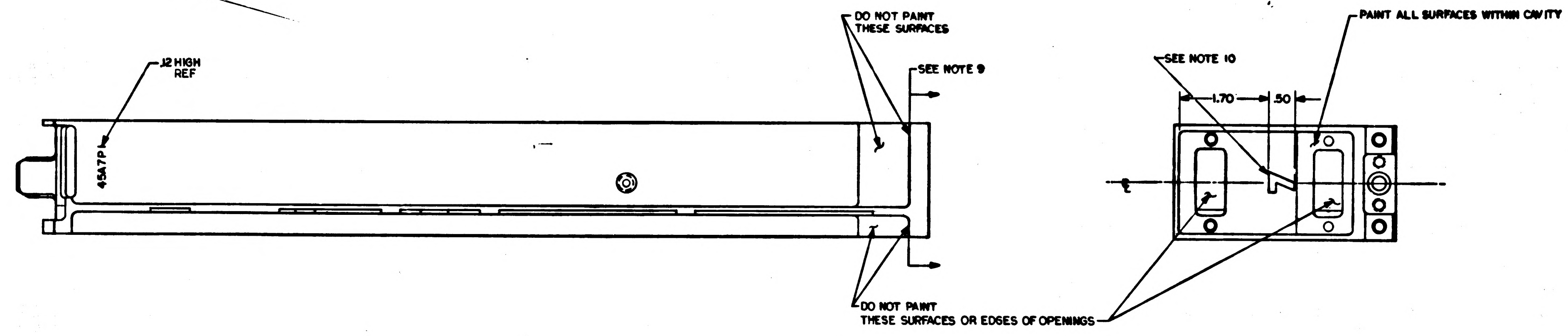
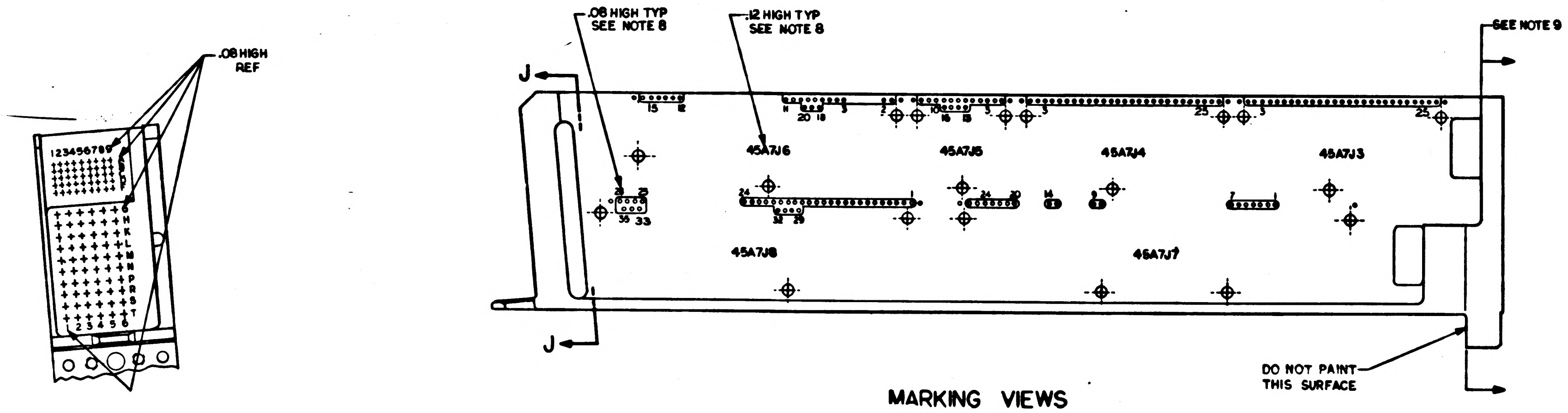

.12 HIGH REF
.08 HIGH REF
K
K
25
3
23
3
15
16
3
19
20
3
12
15
ENCODER
ENCODER
CDU FIXED RESOLUTION TRANS & ENTRY MODE
IMU TEMP CONTROLLER
1
7
9
14
20
24
1
25
26
33
32
33
35
35
PULSE TORQUING POWER SUPPLY
IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
SURFACE -D- REF

VIEW ROTATED 180°

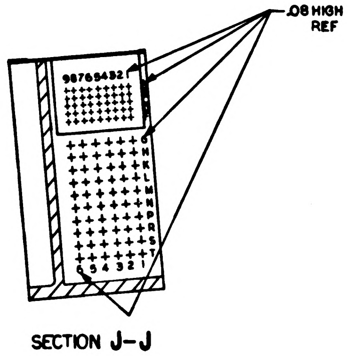

45A7J1
.12 HIGH REF
.08 HIGH REF
45A7J2

SECTION K-K


.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES
SEE NOTE 9
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS
SEE NOTE 10
PAINT ALL SURFACES WITHIN CAVITY
1.70
.50
℄


.08 HIGH REF
123456789
H
J
K
L
M
N
P
R
S
123456
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
SEE NOTE 9
J
J
15
12
11
20
19
7
16
15
25
3
25
45A7J6
45A7J5
45A7J4
45A7J3
1
25
35
33
24
34
29
24
30
14
9
7
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
987654321
H
J
K
L
M
N
P
R
S
654321

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX .005 — ANGLES ±0°30′
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

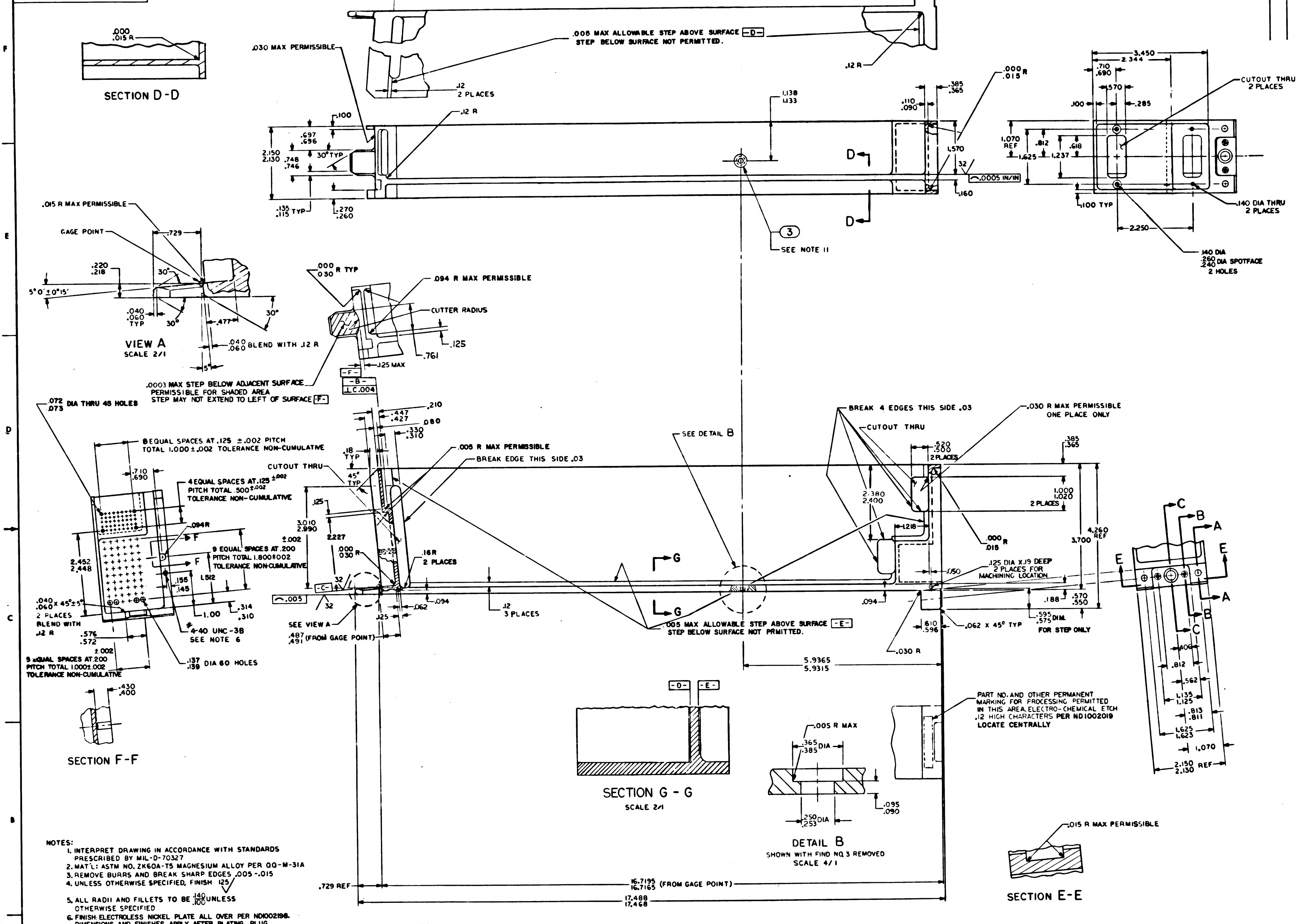
DRAWN R.M. Kenely DATE 1 Oct 64
CHECKED [illegible] 7 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible]
LTD
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible] Dec 64

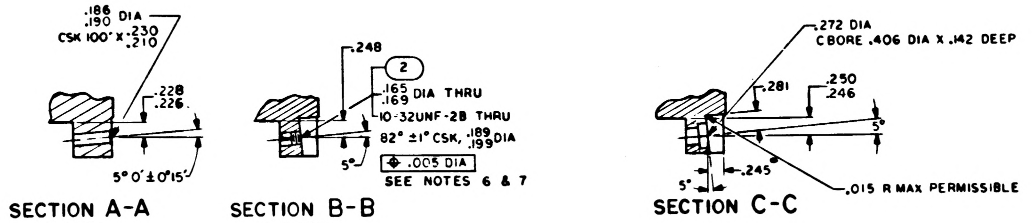
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008527
SCALE 1/1
WT
SHEET 3 OF 3

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15167		
B	REVISED PER TDRR 16836	4 M- 65	


.000
.015 R
SECTION D-D
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12
2 PLACES
.12 R
.100
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
1.138 1.133
.110 .090
.385 .365
.000 .015 R
1.570
32
.0005 IN/IN
.160
D
3
SEE NOTE 11
3.450
2.344
.710 .690
.570
.100
.285
CUTOUT THRU 2 PLACES
1.070 REF
.812
.618
1.625
1.237
.100 TYP
2.250
.140 DIA THRU 2 PLACES
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5° 0' ± 0° 15'
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
5°
VIEW A
SCALE 2/1
.000 .030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125
.761
.125 MAX
-F-
-B-
⊥ C .004
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.072 .073 DIA THRU 45 HOLES
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.710 .690
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
.094R
F
9 EQUAL SPACES AT .200 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
2.452 2.448
1.512
.155 .145
.040 .060 X 45° ± 5° 2 PLACES BLEND WITH .12 R
1.00
.314 .310
.576 .572
±.002
#4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
.210
.447 .427
.080
.330 .310
.18 TYP
CUTOUT THRU
45° TYP
.005 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
.125
3.010 2.990
±.002
2.227
.000 .030 R
.16R 2 PLACES
-C-
.005
32
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.125
.062
.094
.12 3 PLACES
SEE DETAIL B
G
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PRMITTED.
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.520 .500 2 PLACES
.385 .365
2.380 2.400
1.000 1.020 2 PLACES
1.218
.000 .015 R
3.700
4.260 REF
.050
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
.094
.188
.570 .550
.595 .575 DIM. FOR STEP ONLY
.610 .596
.062 X 45° TYP
.030 R
A
B
C
E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
5.9365 5.9315
-D-
-E-
SECTION G - G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468


.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5° 0' ± 0° 15'
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
5°
⌖ .005 DIA
SEE NOTES 6 & 7
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
.245
.015 R MAX PERMISSIBLE

SECTION A-A
2 PLACES

SECTION B-B
2 PLACES

SECTION C-C

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND . USING CURING METHOD

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008527-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007537	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
CONTRACT NAS 9-497

DRAWN R.M. Kuzsky DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

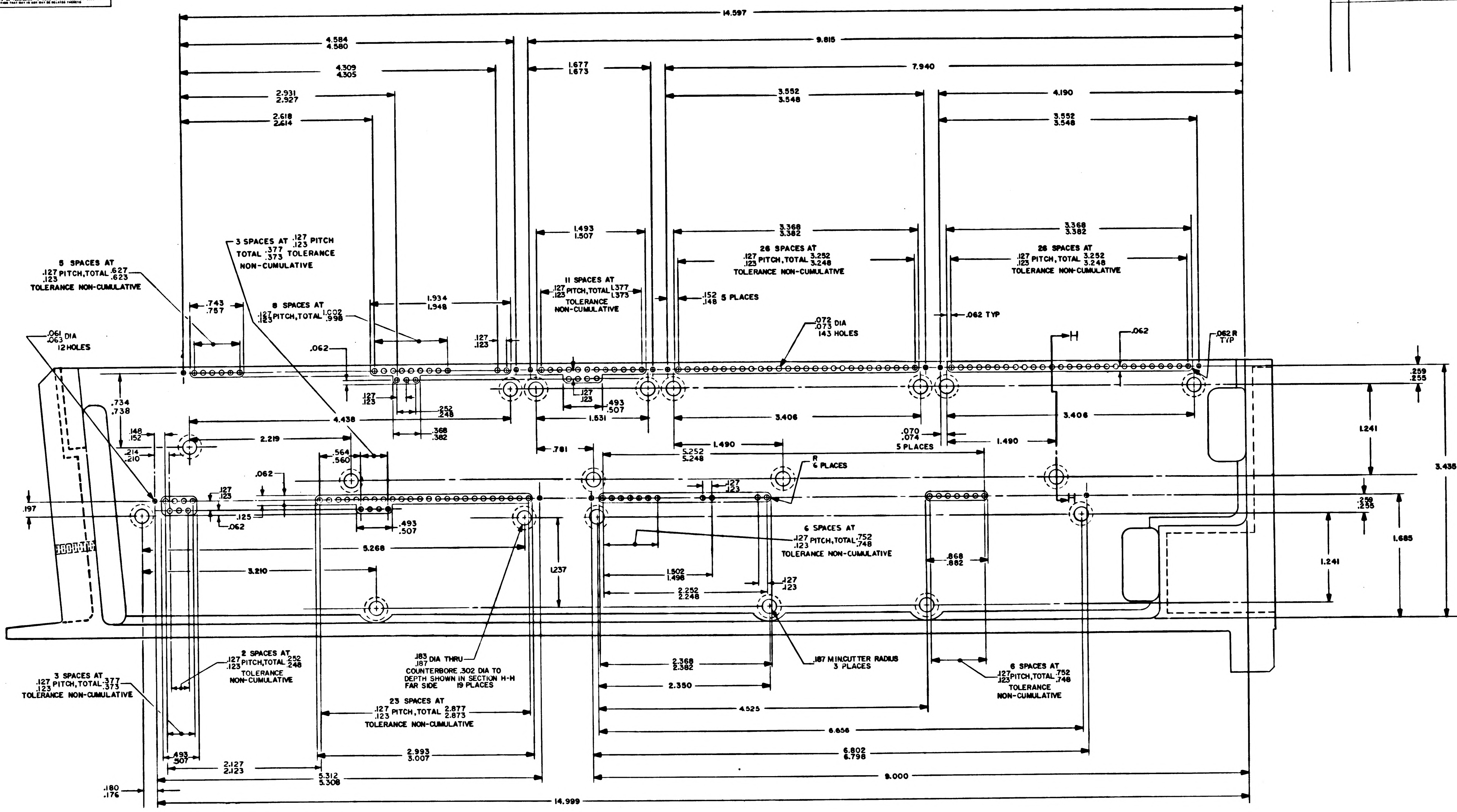
CODE IDENT NO
SIZE E
NASA DRAWING NO 1008527
SCALE 1/1
WT
SHEET 1 OF 3

1008527 B

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

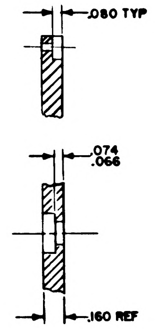
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15167	29 Dec 64	
B	REVISED PER TDRR 16836	4 MAR 65	



14.597
4.584 / 4.580
9.815
4.309 / 4.305
1.677 / 1.673
7.940
2.931 / 2.927
3.552 / 3.548
4.190
2.618 / 2.614
3.552 / 3.548
3 SPACES AT .127 / .123 PITCH TOTAL .377 / .373 TOLERANCE NON-CUMULATIVE
1.493 / 1.507
3.368 / 3.382
26 SPACES AT .127 / .123 PITCH, TOTAL 3.252 / 3.248 TOLERANCE NON-CUMULATIVE
3.368 / 3.382
26 SPACES AT .127 / .123 PITCH, TOTAL 3.252 / 3.248 TOLERANCE NON-CUMULATIVE
5 SPACES AT .127 / .123 PITCH, TOTAL .627 / .623 TOLERANCE NON-CUMULATIVE
.743 / .757
8 SPACES AT .127 / .123 PITCH, TOTAL 1.002 / .998
1.934 / 1.948
11 SPACES AT .127 / .123 PITCH, TOTAL 1.377 / 1.373 TOLERANCE NON-CUMULATIVE
.152 / .148 5 PLACES
.062 TYP
.072 / .073 DIA 143 HOLES
.061 / .063 DIA 12 HOLES
.062
.127 / .123
H
.062
.082 R TYP
.259 / .255
.734 / .738
.127 / .123
.252 / .248
.127 / .123
.493 / .507
4.438
.368 / .382
1.531
3.406
.070 / .074 5 PLACES
3.406
1.241
3.436
.148 / .152
2.219
.214 / .210
.564 / .560
.781
1.490
5.252 / 5.248
1.490
R 6 PLACES
.062
.127 / .123
.127 / .123
.197
.125
.062
.493 / .507
.259 / .255
1.685
6 SPACES AT .127 / .123 PITCH, TOTAL .752 / .748 TOLERANCE NON-CUMULATIVE
5.268
1.237
1.241
.868 / .882
3.210
1.502 / 1.498
2.252 / 2.248
.127 / .123
.183 / .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECTION H-H FAR SIDE 19 PLACES
.187 MIN CUTTER RADIUS 3 PLACES
2 SPACES AT .127 / .123 PITCH, TOTAL .252 / .248 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 / .123 PITCH, TOTAL .377 / .373 TOLERANCE NON-CUMULATIVE
2.368 / 2.382
2.350
6 SPACES AT .127 / .123 PITCH, TOTAL .752 / .748 TOLERANCE NON-CUMULATIVE
23 SPACES AT .127 / .123 PITCH, TOTAL 2.877 / 2.873 TOLERANCE NON-CUMULATIVE
4.525
6.656
.493 / .507
2.993 / 3.007
6.802 / 6.798
2.127 / 2.123
5.312 / 5.308
9.000
.180 / .176
14.999

VIEW B-B



.080 TYP
.074 / .066
.160 REF

PARTIAL SECTION
H-H

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —; DECIMALS XX ±.02, XXX ±.005; ANGLES ± 0°30′
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN R.M. Kurtz DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO
SIZE E
NASA DRAWING NO 1008527
SCALE 2/1
WT
SHEET 2 OF 3

1008527 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
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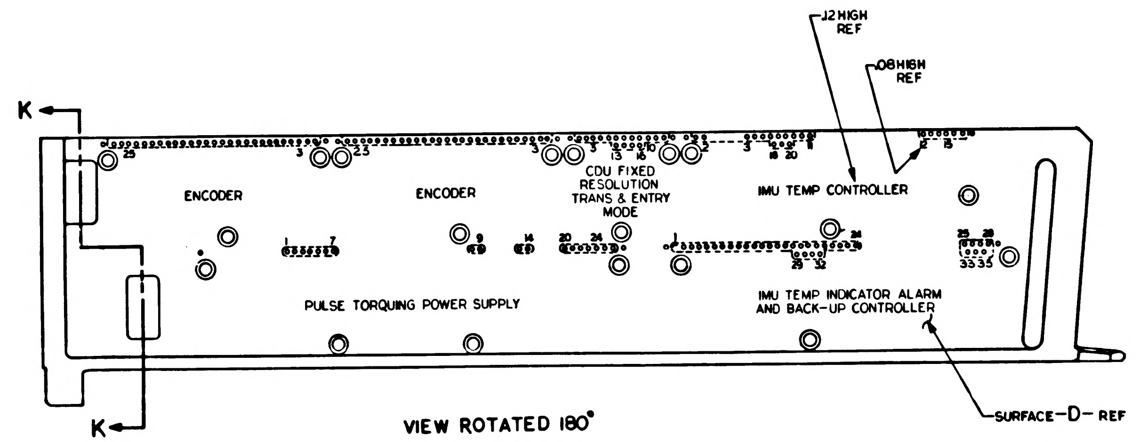
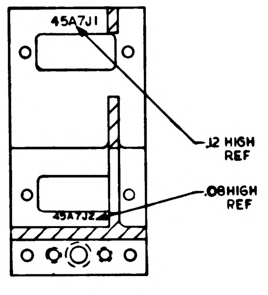
B	REVISED PER TDRR 16836	4 MAR 65	


K
K
.12 HIGH REF
.08 HIGH REF
25
3
23
3
3
13
16
10
2
3
18
20
11
12
15
ENCODER
ENCODER
CDU FIXED RESOLUTION TRANS & ENTRY MODE
IMU TEMP CONTROLLER
1
7
9
14
20
24
1
24
29
32
25
28
33
35
PULSE TORQUING POWER SUPPLY
IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
SURFACE -D- REF

VIEW ROTATED 180°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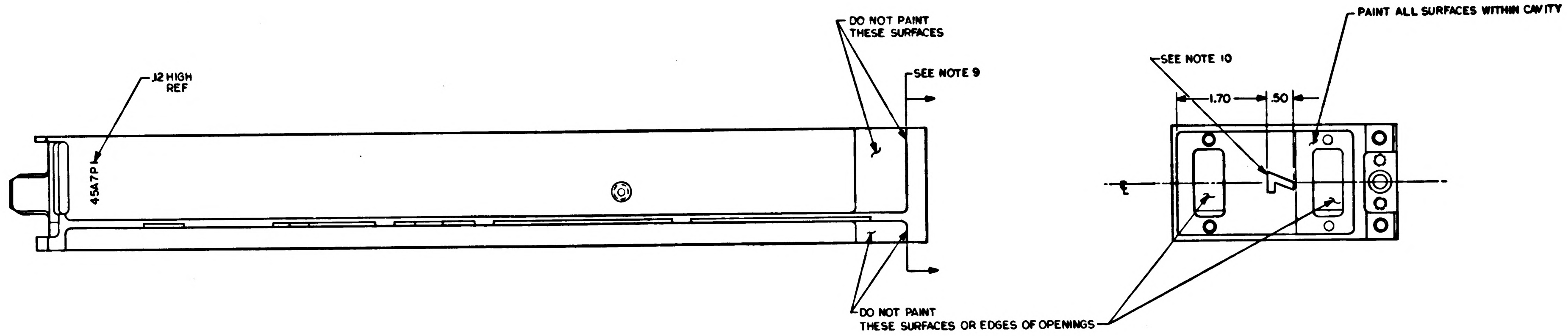
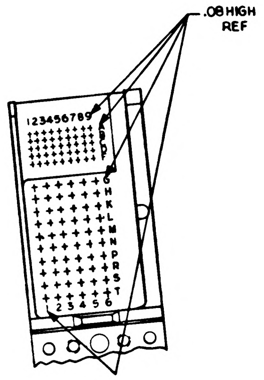
45A7J2
.12 HIGH REF
.08 HIGH REF

SECTION K-K


.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES
SEE NOTE 9
PAINT ALL SURFACES WITHIN CAVITY
SEE NOTE 10
1.70
.50
℄
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS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G
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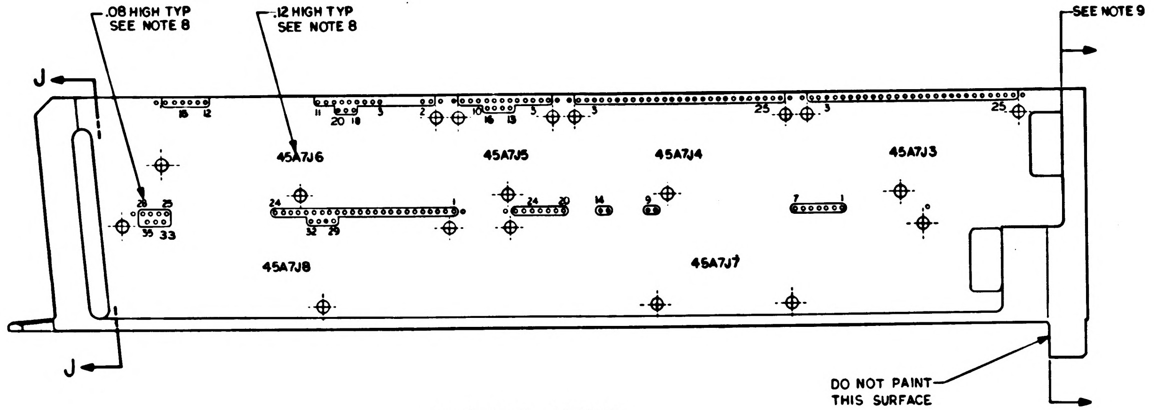
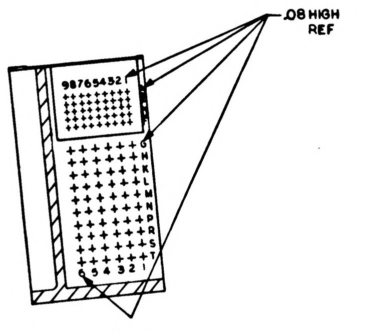
K
L
M
N
P
R
S
T
2 3 5 6


.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
SEE NOTE 9
J
J
18
12
11
20
18
3
2
10
16
13
5
3
25
3
25
45A7J6
45A7J5
45A7J4
45A7J3
28
25
35
33
24
1
32
29
24
20
14
9
7
1
45A7J8
45A7J7
1
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
987654321
H
K
L
M
N
P
R
S
T
6 5 4 3 2 1

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±# DECIMALS XX ±.02 XXX ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
Contract NAS 9-497
DRAWN R.M. Kennedy DATE 1 Oct 64
CHECKED [illegible] 7 Oct 64
APPROVAL [illegible] 8 Oct 64
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible] Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO
SIZE E
NASA DRAWING NO 1008527
SCALE 1/1
WT
SHEET 3 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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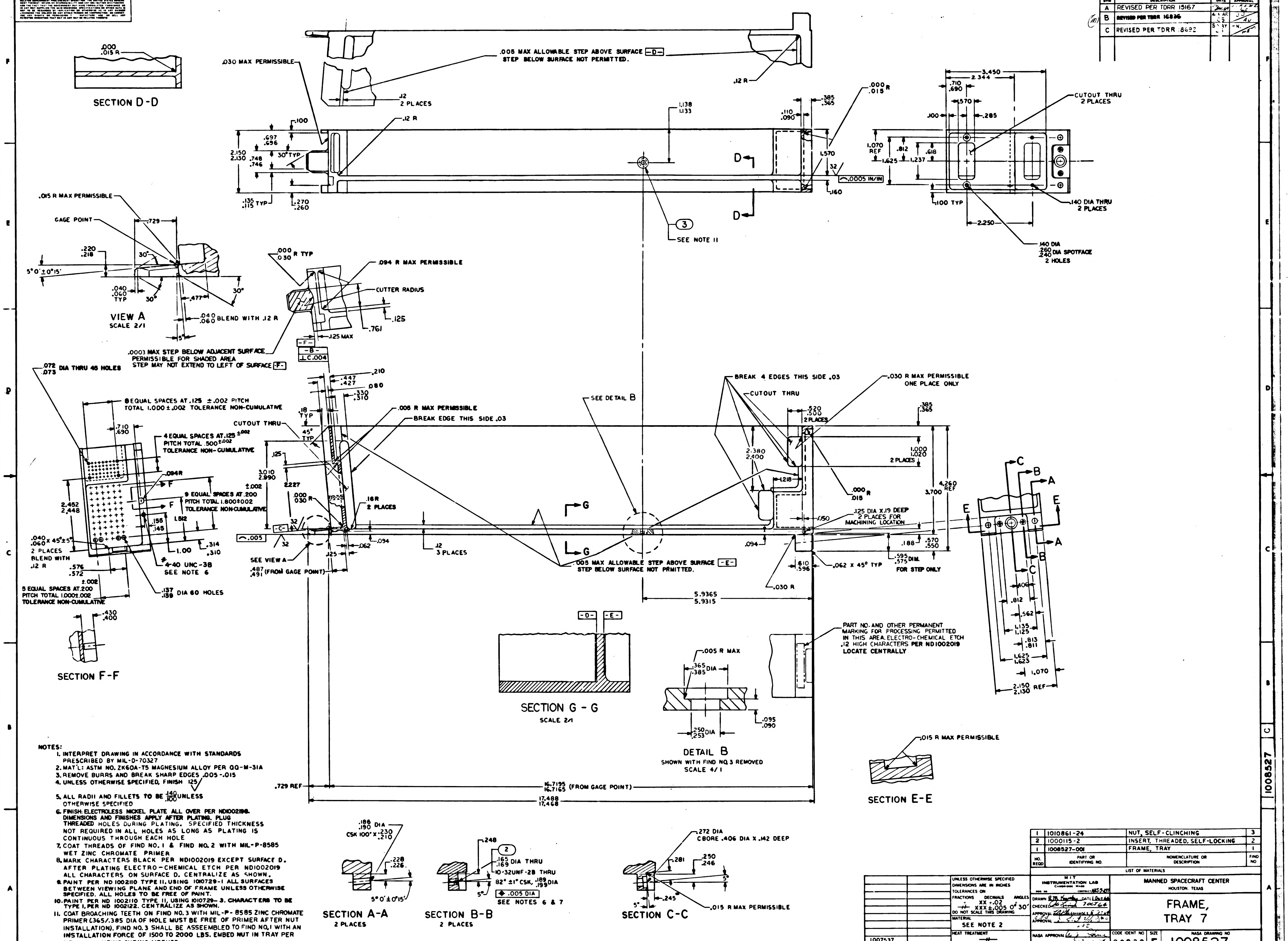
B	REVISED PER TDRR 16836	4 MAR 65	JJ AU
C	REVISED PER TDRR 18692	5 MAY	N. ME



SECTION D-D
.000 .015 R
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED.
.12 2 PLACES
.12 R
CUTOUT THRU 2 PLACES
.140 DIA THRU 2 PLACES
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.100 TYP
.0005 IN/IN
SEE NOTE 11
.015 R MAX PERMISSIBLE
GAGE POINT
VIEW A
SCALE 2/1
.040 .060 BLEND WITH .12 R
.000 .030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.072 .073 DIA THRU 45 HOLES
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
9 EQUAL SPACES AT .200 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
5 EQUAL SPACES AT .200 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
.040 .060 X 45°±5° 2 PLACES BLEND WITH .12 R
4-40 UNC-3B SEE NOTE 6
.137 .139 DIA 60 HOLES
SECTION F-F
CUTOUT THRU
.005 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
.16R 2 PLACES
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.12 3 PLACES
SEE DETAIL B
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PRMITTED.
BREAK 4 EDGES THIS SIDE .03
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.125 DIA X.19 DEEP 2 PLACES FOR MACHINING LOCATION
.062 X 45° TYP
.595 .575 DIM. FOR STEP ONLY
5.9365 5.9315
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION G-G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA CSK 100° X .230 .210
SECTION A-A
2 PLACES
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008527-001	FRAME, TRAY	1

LIST OF MATERIALS

1007537	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS 9-497
DRAWN R.M. Kinsley DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 7

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008527
SCALE 1/1
WT
SHEET 1 OF 3

1008527 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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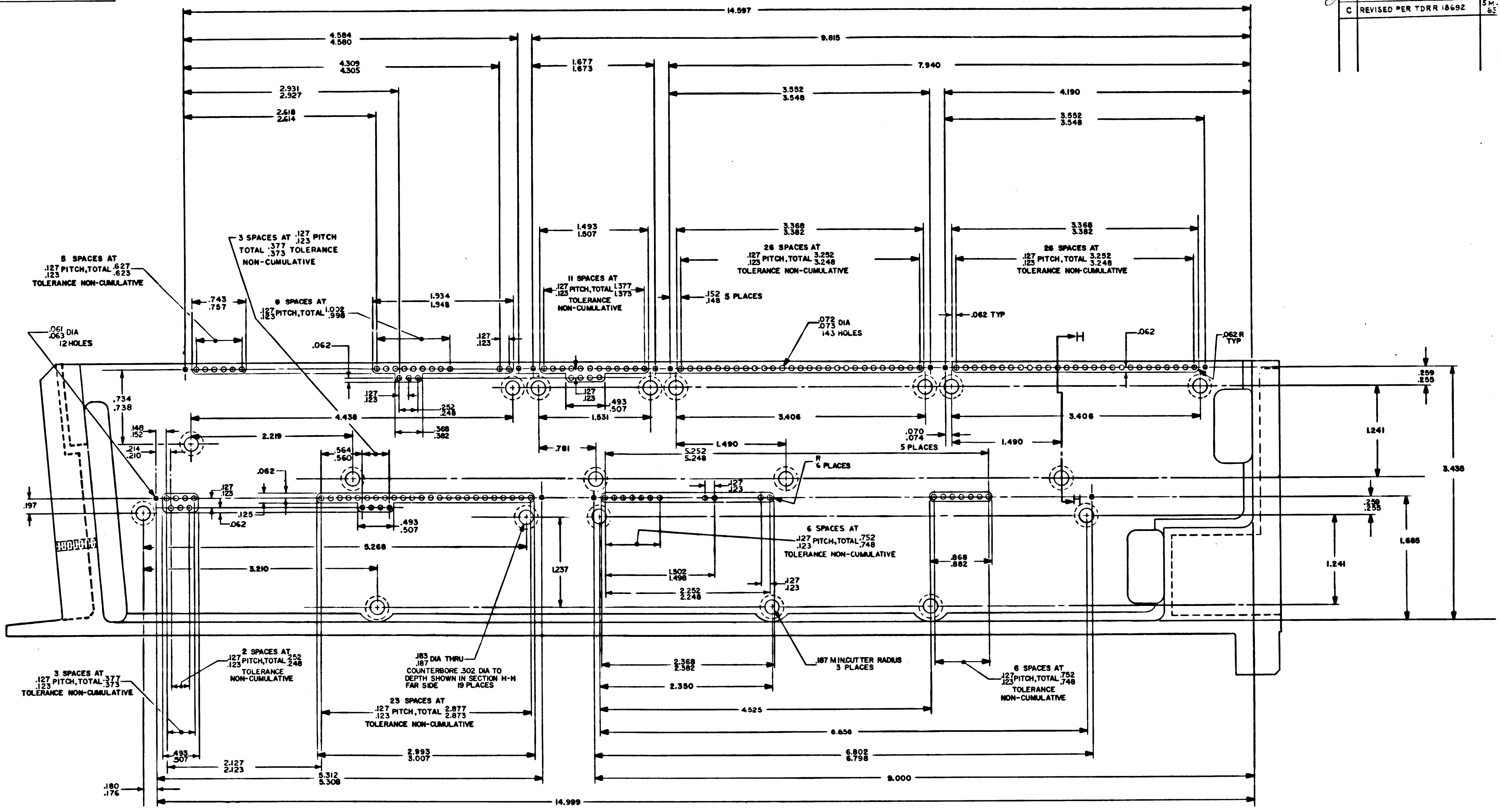
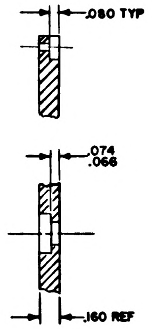
B	REVISED PER TDRR 16826	4 MAR 65	
C	REVISED PER TDRR 18692	5 MAY 65	



14.597
4.584 4.580
9.815
4.309 4.305
1.677 1.673
7.940
2.931 2.927
3.552 3.548
4.190
2.618 2.614
3.552 3.548
1.493 1.507
3.368 3.382
3.368 3.382
3 SPACES AT .127 .123 PITCH TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
5 SPACES AT .127 .123 PITCH, TOTAL .627 .623 TOLERANCE NON-CUMULATIVE
11 SPACES AT .127 .123 PITCH, TOTAL 1.377 1.373 TOLERANCE NON-CUMULATIVE
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
.743 .757
8 SPACES AT .127 .123 PITCH, TOTAL 1.002 .998
1.934 1.948
.152 .148 5 PLACES
.062 TYP
.061 .063 DIA 12 HOLES
.072 .073 DIA 143 HOLES
H
.062
.062 R TYP
.062
.127 .123
.127 .123
.127 .123
.493 .507
.252 .248
.368 .382
.734 .738
4.438
1.531
3.406
3.406
.259 .255
.148 .152
2.219
.070 .074 5 PLACES
1.241
3.436
.214 .210
.781
1.490
1.490
5.252 5.248
.564 .560
R 6 PLACES
.062
.127 .123
.197
.125
.062
.127 .123
.259 .255
.493 .507
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
5.268
1.685
1.241
3.210
1.237
1.502 1.498
.868 .882
.127 .123
2.252 2.248
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECTION H-H FAR SIDE 19 PLACES
2.368 2.382
.187 MIN CUTTER RADIUS 3 PLACES
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
2.350
23 SPACES AT .127 .123 PITCH, TOTAL 2.877 2.873 TOLERANCE NON-CUMULATIVE
4.525
6.856
6.802 6.798
.493 .507
2.993 3.007
2.127 2.123
5.312 5.308
8.000
.180 .176
14.999

VIEW B-B



.080 TYP
.074 .066
.160 REF

PARTIAL SECTION
H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX .005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN R.M. Kinsley DATE 1 Oct 64
CHECKED 7 Oct 64
APPROVAL 8 Oct 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008527
SCALE 2/1
WT
SHEET 2 OF 3

1008527 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 14C 2f

SYM	DESCRIPTION	DATE	APPROVAL
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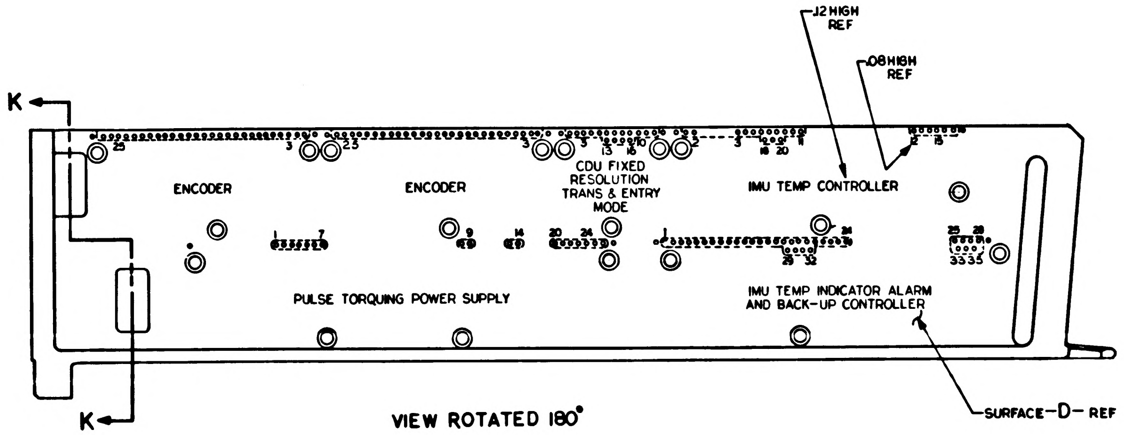
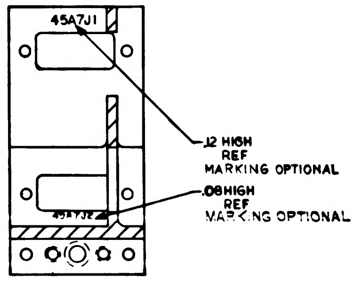
B	REVISED PER TDRR 16836	4 MAR 65	J J
C	REVISED PER TDRR 8692	5 MAY 65	AN


K
K
.12 HIGH REF
.08 HIGH REF
ENCODER
ENCODER
CDU FIXED RESOLUTION TRANS & ENTRY MODE
IMU TEMP CONTROLLER
PULSE TORQUING POWER SUPPLY
IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
SURFACE -D- REF

VIEW ROTATED 180°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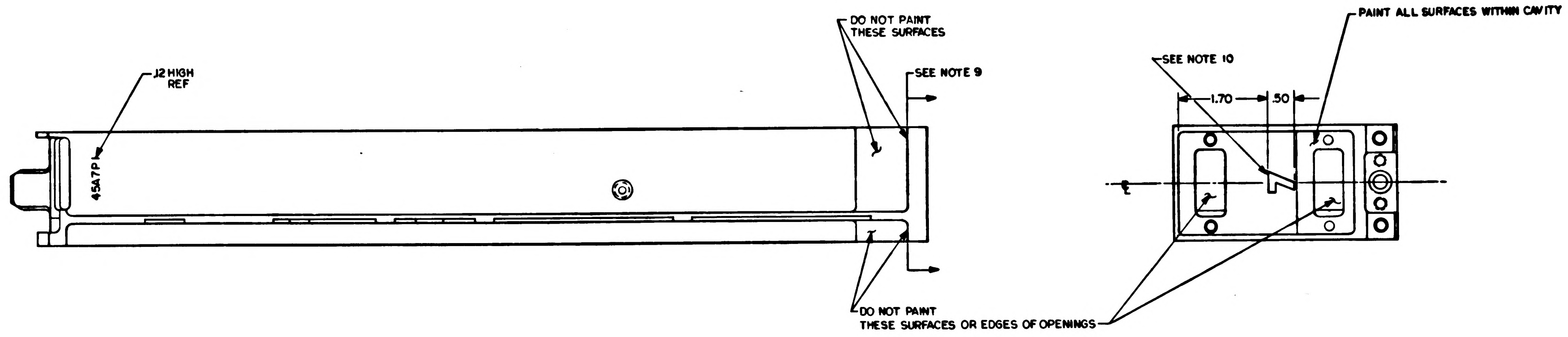
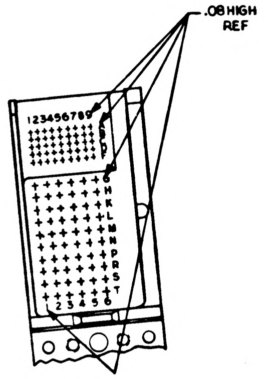
.12 HIGH REF MARKING OPTIONAL
.08 HIGH REF MARKING OPTIONAL
45A7J2

SECTION K-K


.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES
SEE NOTE 9
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS
SEE NOTE 10
1.70
.50
PAINT ALL SURFACES WITHIN CAVITY
℄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123456789
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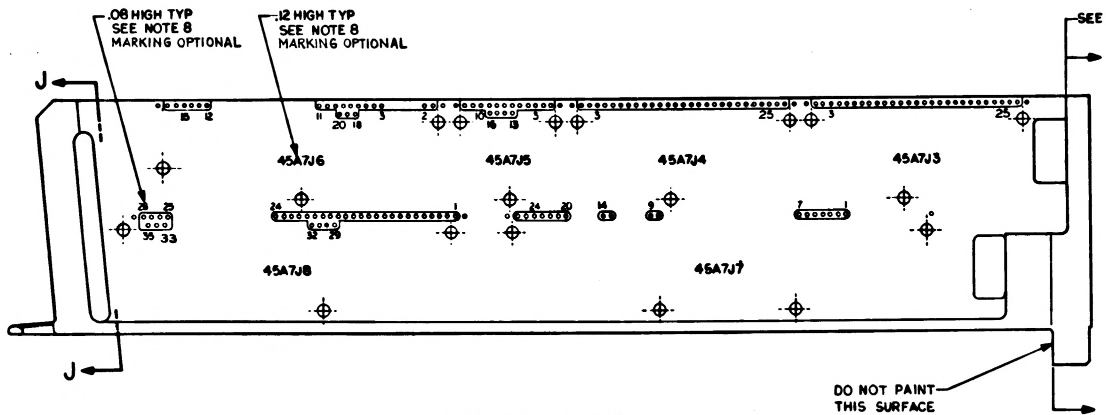
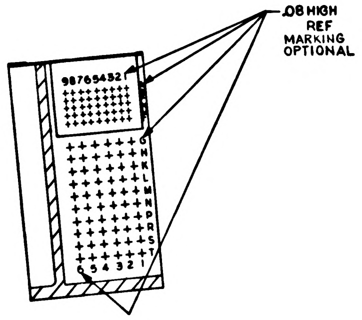

.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
SEE NOTE 9
J
J
45A7J6
45A7J5
45A7J4
45A7J3
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF MARKING OPTIONAL
987654321

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ±.02 XXX .005 ANGLES ±0°30′
DO NOT SCALE THIS DRAWING

MATERIAL #

HEAT TREATMENT #

FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN R.M. Kennedy DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL 9 Dec 64

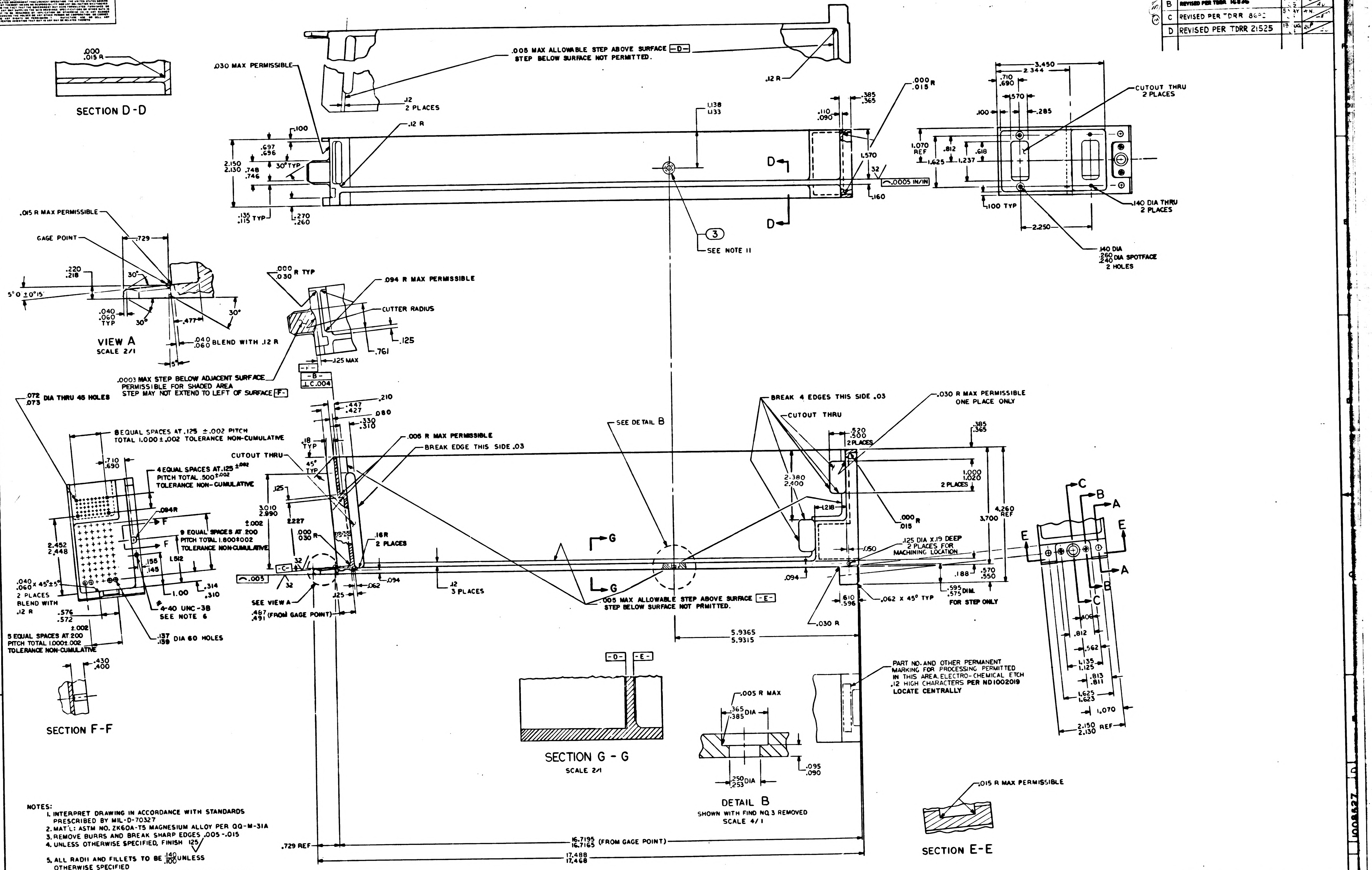
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 7

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008527
SCALE 1/1
WT
SHEET 3 OF 3

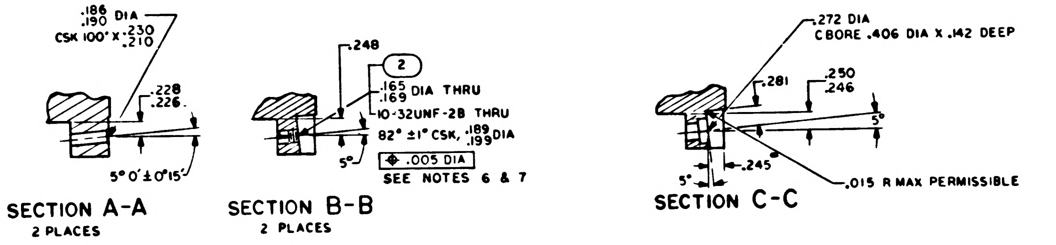
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15167	June 64	
B	REVISED PER TDRR 16836	4 MAR 65	JJ AU
C	REVISED PER TDRR 86[illegible]	5 MAY	A.N.
D	REVISED PER TDRR 21525	13 AUG	RLP


SECTION D-D
.000
.015 R
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12 R
.12
2 PLACES
1.138
1.133
.385
.365
.000
.015 R
.110
.090
1.570
32
.0005 IN/IN
.160
D
2.150
2.130
.097
.696
.748
.746
30° TYP
.100
.135
.115 TYP
.270
.260
3
SEE NOTE 11
3.450
2.344
.710
.690
.570
.285
.100
CUTOUT THRU
2 PLACES
1.070 REF
.812
.618
1.625
1.237
.100 TYP
2.250
.140 DIA THRU
2 PLACES
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
5°0' ±0°15'
30°
.040
.060
TYP
.477
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.000
.030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125
.761
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥ C .004
.072
.073 DIA THRU 45 HOLES
8 EQUAL SPACES AT .125 ±.002 PITCH
TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.710
.690
4 EQUAL SPACES AT .125 ±.002
PITCH TOTAL .500 ±.002
TOLERANCE NON-CUMULATIVE
.094R
F
9 EQUAL SPACES AT .200
PITCH TOTAL 1.800 ±.002
TOLERANCE NON-CUMULATIVE
2.452
2.448
.158
.145
1.512
1.00
.314
.310
.040
.060 X 45° ±5°
2 PLACES
BLEND WITH
.12 R
#4-40 UNC-3B
SEE NOTE 6
.576
.572
±.002
5 EQUAL SPACES AT .200
PITCH TOTAL 1.000 ±.002
TOLERANCE NON-CUMULATIVE
.137
.139 DIA 60 HOLES
.430
.400
SECTION F-F
.447
.427
.210
.080
.330
.310
.18 TYP
45° TYP
CUTOUT THRU
.005 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
3.010
2.990
±.002
2.227
.125
.000
.030 R
.16R
2 PLACES
-C-
.003
32
.062
.094
SEE VIEW A
.125
.497
.491 (FROM GAGE POINT)
.12
3 PLACES
G
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PRMITTED.
SEE DETAIL B
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520
.500
2 PLACES
.385
.365
2.380
2.400
1.000
1.020
2 PLACES
4.260 REF
3.700
1.218
.000
.015 R
.050
.125 DIA X .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.188
.570
.550
.595
.575 DIM.
FOR STEP ONLY
.094
.610
.596
.062 X 45° TYP
.030 R
5.9365
5.9315
C
B
A
E
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
-D-
-E-
SECTION G-G
SCALE 2/1
.005 R MAX
.365
.385 DIA
.095
.090
.250
.253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT
MARKING FOR PROCESSING PERMITTED
IN THIS AREA. ELECTRO-CHEMICAL ETCH
.12 HIGH CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND 1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.


.186
.190 DIA
CSK 100° X .230
.210
.228
.226
5°0' ±0°15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK. .189
.199 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008527-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007537	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±— DECIMALS XX ±.02 XXX ±.005 ANGLES 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
CONTRACT NAS-9-497

DRAWN R.M. Kursky DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

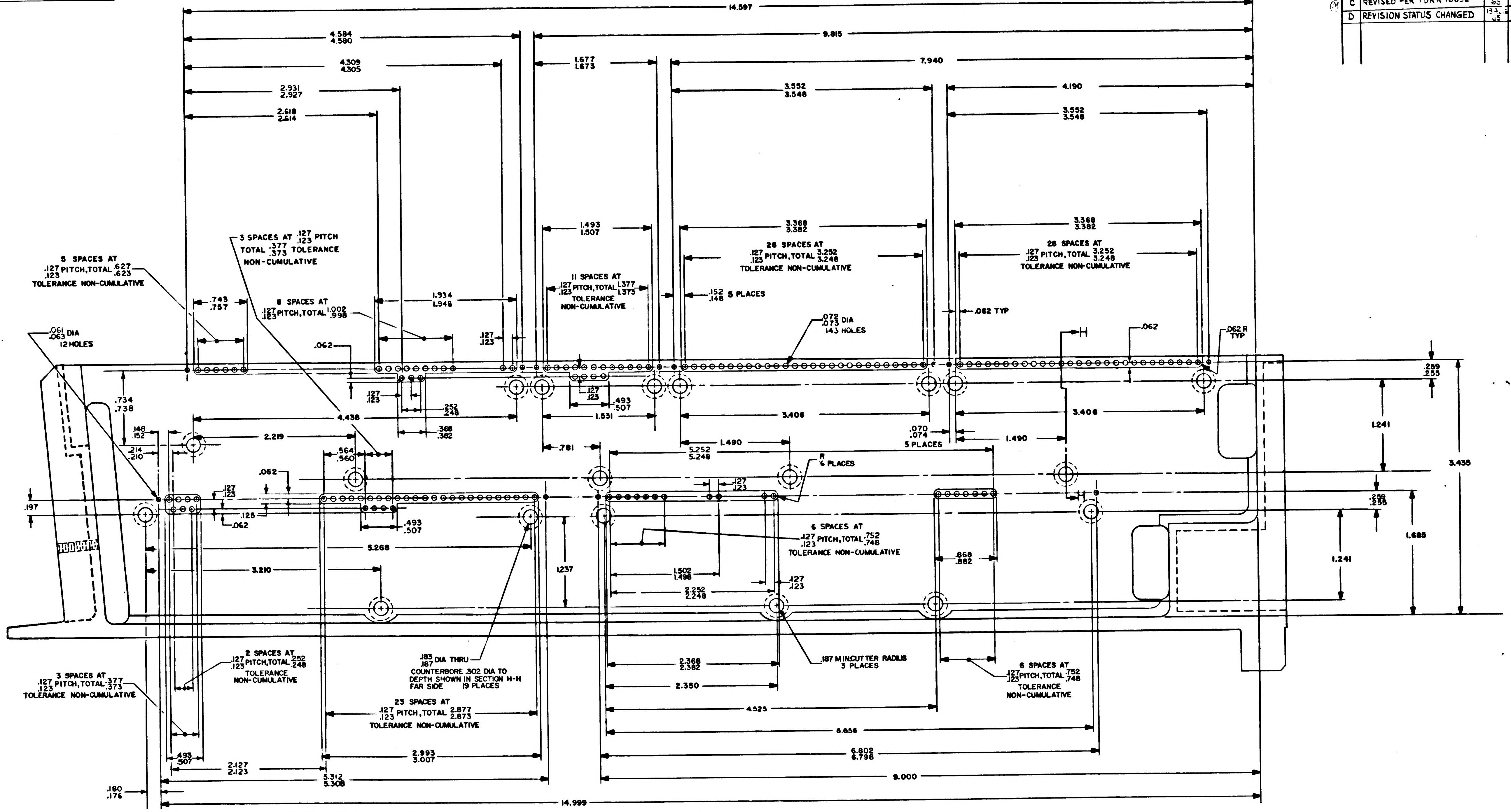
FRAME,
TRAY 7

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008527
SCALE 1/1
WT
SHEET 1 OF 3

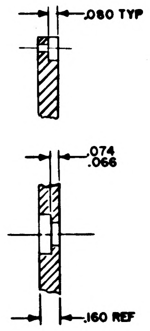
1008527 D

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15167	29 Dec 64	
B	REVISED PER TDRR 16826	4 MAR 65	
C	REVISED PER TDRR 18692	5 MAY 65	
D	REVISION STATUS CHANGED	13 [illegible] 65	


14.597
4.584 4.580
9.815
4.309 4.305
1.677 1.673
7.940
2.931 2.927
3.552 3.548
4.190
2.618 2.614
3.552 3.548
1.493 1.507
3.368 3.382
3.368 3.382
3 SPACES AT .127 .123 PITCH TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
5 SPACES AT .127 .123 PITCH, TOTAL .627 .623 TOLERANCE NON-CUMULATIVE
11 SPACES AT .127 .123 PITCH, TOTAL 1.377 1.373 TOLERANCE NON-CUMULATIVE
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
.743 .757
8 SPACES AT .127 .123 PITCH, TOTAL 1.002 .998
1.934 1.946
.152 .148 5 PLACES
.062 TYP
.072 .073 DIA 143 HOLES
.061 .063 DIA 12 HOLES
.062
.127 .123
H
.062
.062 R TYP
.259 .255
.734 .738
.127 .123
.252 .248
.127 .123
.493 .507
1.631
3.406
3.406
.368 .382
4.438
.148 .152
2.219
.070 .074 5 PLACES
1.490
1.490
1.241
3.435
.214 .210
.564 .560
.781
5.252 5.248
R 6 PLACES
.062
.127 .123
.127 .123
.197
.125
.062
.493 .507
.259 .255
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
1.685
5.268
1.241
.868 .882
3.210
1.237
1.502 1.498
2.252 2.248
.127 .123
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECTION H-H FAR SIDE 19 PLACES
.187 MIN CUTTER RADIUS 3 PLACES
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
2.368 2.382
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
2.350
23 SPACES AT .127 .123 PITCH, TOTAL 2.877 2.873 TOLERANCE NON-CUMULATIVE
4.525
6.656
6.802 6.798
.493 .507
2.127 2.123
2.993 3.007
.180 .176
5.312 5.308
9.000
14.999

VIEW B-B


.080 TYP
.074 .066
.160 REF

PARTIAL SECTION
H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS XX ± .02 XXX ± .005 ANGLES ± 0° 30′
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO Contract NAS 9-497
DRAWN R.M. Kowalsky DATE 1 Oct 64
CHECKED 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 7

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008527
SCALE 2/1
WT
SHEET 2 OF 3

1008527 D

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
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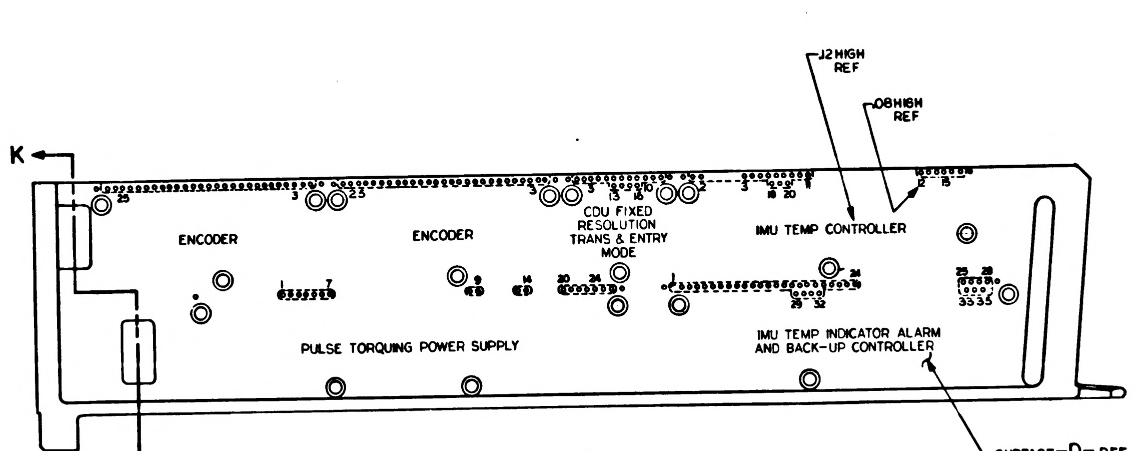
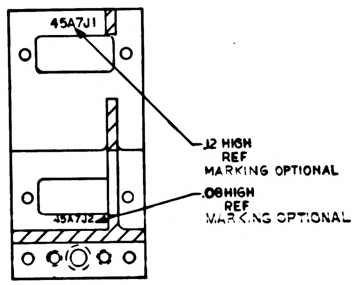
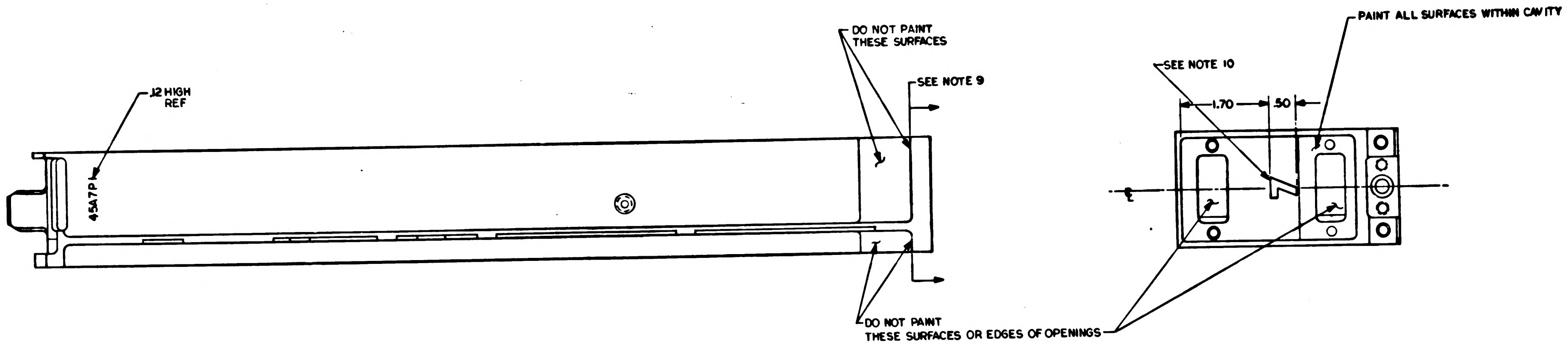
D	REVISION STATUS CHANGED	3 AUG 65	

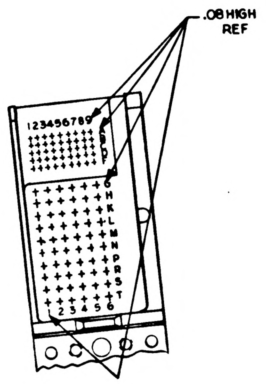

K
K
.12 HIGH REF
.08 HIGH REF
ENCODER
ENCODER
CDU FIXED RESOLUTION TRANS & ENTRY MODE
IMU TEMP CONTROLLER
PULSE TORQUING POWER SUPPLY
IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
SURFACE -D- REF

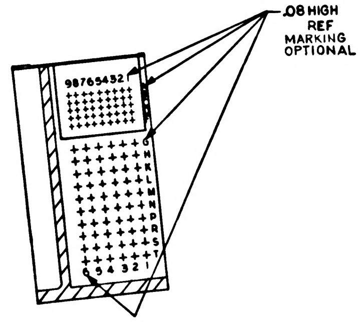
VIEW ROTATED 180°


45A7J1
45A7J2
.12 HIGH REF MARKING OPTIONAL
.08 HIGH REF MARKING OPTIONAL

SECTION K-K


.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES
SEE NOTE 9
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS
SEE NOTE 10
1.70
.50
PAINT ALL SURFACES WITHIN CAVITY
℄


.08 HIGH REF
123456789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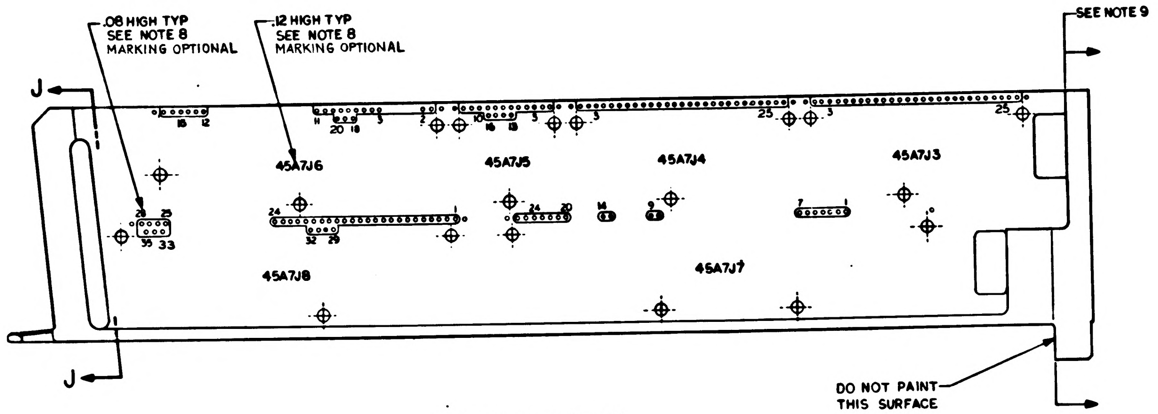
987654321

SECTION J-J


.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
SEE NOTE 9
J
J
45A7J6
45A7J5
45A7J4
45A7J3
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02, XXX ± .005 — ANGLES ± 0°30′
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN R.M. Kennedy DATE 1 Oct 64
CHECKED 7 Oct 64
APPROVAL 8 Oct 64
APPROVAL
NASA APPROVAL
MIT APPROVAL 9 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

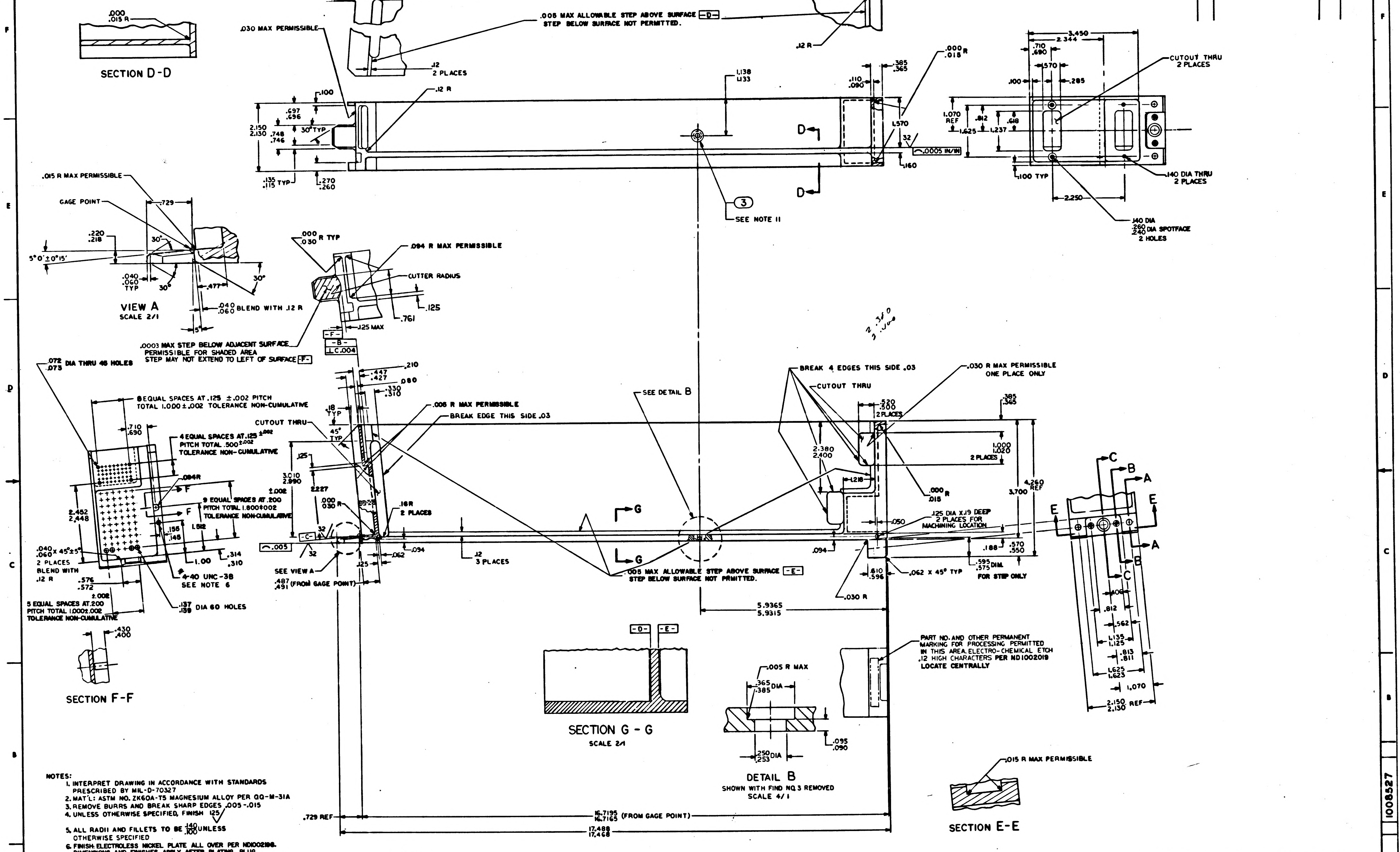
FRAME,
TRAY 7

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008527
SCALE 1/1
WT
SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

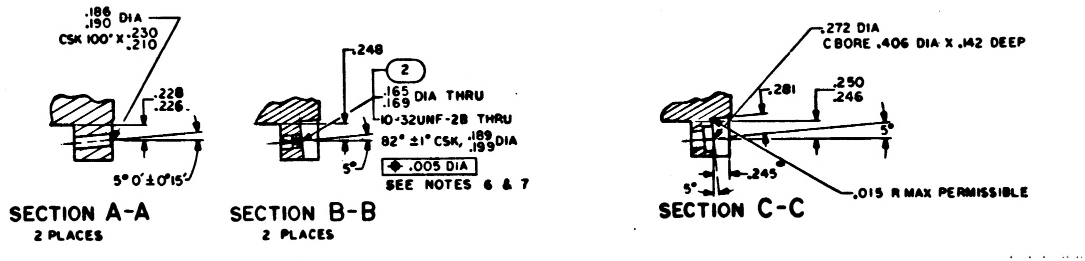
REVISIONS 14628

SYM	DESCRIPTION	DATE	APPROVAL



SECTION D-D
.000 .015 R
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12 2 PLACES
.12 R
1.138 1.133
.110 .090
.385 .365
.000 .015 R
1.570
.0005 IN/IN
.160
D
3
SEE NOTE 11
3.450
2.344
.710 .690
.570
.285
.100
CUTOUT THRU 2 PLACES
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA THRU 2 PLACES
2.250
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
5°0'±0°15'
30°
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
VIEW A
SCALE 2/1
.000 .030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125
.761
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F- -B- LC.004
.072 .073 DIA THRU 46 HOLES
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
9 EQUAL SPACES AT .200 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
.084R
F
2.452 2.448
.040 .060 X 45°±5° 2 PLACES
BLEND WITH .12 R
.576 .572
5 EQUAL SPACES AT .200 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3B SEE NOTE 6
.137 .139 DIA 60 HOLES
.430 .400
SECTION F-F
CUTOUT THRU
.447 .427
.210
.080
.330 .310
.006 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
45° TYP
3.010 2.990
2.227
.16R 2 PLACES
-C-
.005
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.094
.062
.12 3 PLACES
SEE DETAIL B
G
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED.
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.520 .500 2 PLACES
2.380 2.400
1.000 1.020 2 PLACES
1.218
.000 .015 R
.050
.125 DIA X.19 DEEP 2 PLACES FOR MACHINING LOCATION
3.700
4.260 REF
.188
.570 .550
.595 .575 DIM. FOR STEP ONLY
.610 .596
.062 X 45° TYP
.030 R
5.9365 5.9315
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
C B A E
.400
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D- -E-
SECTION G - G
SCALE 2/1
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD



.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0'±0°15'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
5°
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008527-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007537	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//—
DECIMALS XX ±.02 XXX ±.005
ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—//—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
CONTRACT NAS 9-497

DRAWN R.M. Kapsky DATE 1 Oct 64
CHECKED [illegible] 7 OCT 64
APPROVAL [illegible] 8 OCT 64
APPROVAL [illegible]
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 7

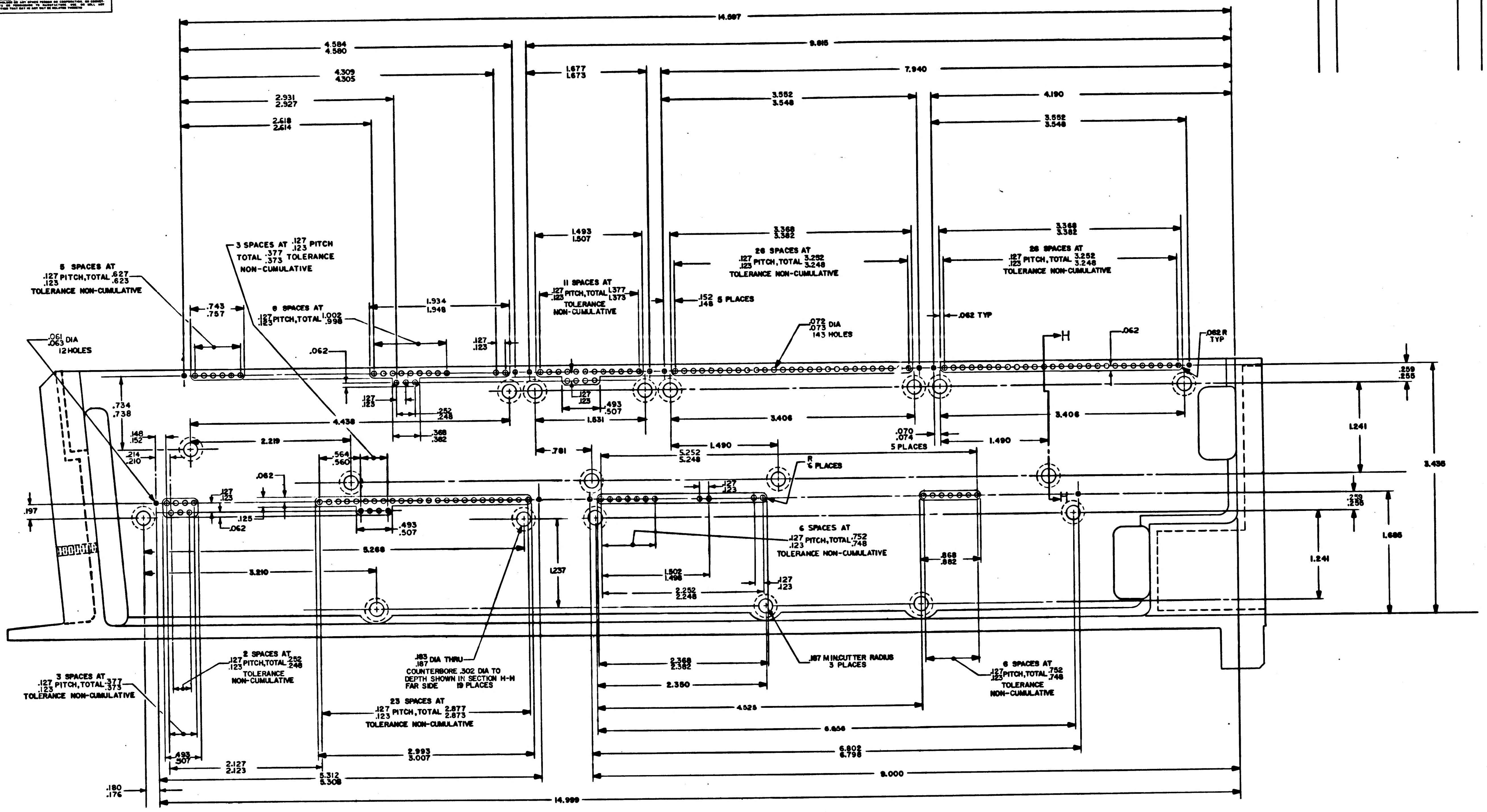
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008527
SCALE 1/1
WT
SHEET 1 OF 3

MASTER

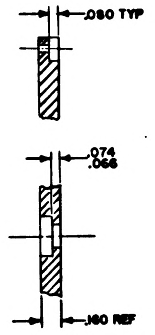
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 1462F

SYM	DESCRIPTION	DATE	APPROVAL


14.997
4.584 4.580
9.815
4.309 4.305
1.677 1.673
7.940
2.931 2.927
3.552 3.548
4.190
2.618 2.614
3.552 3.548
3 SPACES AT .127 .123 PITCH TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
5 SPACES AT .127 .123 PITCH, TOTAL .627 .623 TOLERANCE NON-CUMULATIVE
.743 .757
8 SPACES AT .127 .123 PITCH, TOTAL 1.002 .998
1.934 1.948
.127 .123
1.493 1.507
11 SPACES AT .127 .123 PITCH, TOTAL 1.377 1.373 TOLERANCE NON-CUMULATIVE
3.368 3.382
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
.152 .148 5 PLACES
.072 .073 DIA 143 HOLES
3.368 3.382
28 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
.062 TYP
H
.062
.062 R TYP
.061 .063 DIA 12 HOLES
.062
.734 .738
.127 .123
.252 .248
.368 .382
4.438
.127 .123
.493 .507
1.531
3.406
3.406
.259 .255
1.241
3.436
.148 .152
2.219
.214 .210
.564 .560
.781
1.490
5.252 5.248
.070 .074 5 PLACES
1.490
R 6 PLACES
.062
.127 .123
.197
.125
.062
.127 .123
.493 .507
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
.259 .255
1.686
5.268
1.241
3.210
1.237
1.502 1.498
.868 .882
.127 .123
2.252 2.248
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECTION H-H FAR SIDE 19 PLACES
23 SPACES AT .127 .123 PITCH, TOTAL 2.877 2.873 TOLERANCE NON-CUMULATIVE
.187 MIN CUTTER RADIUS 3 PLACES
2.368 2.382
2.350
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
4.525
6.856
.493 .507
2.993 3.007
6.802 6.798
2.127 2.123
5.312 5.308
9.000
.180 .176
14.999

VIEW B-B


.080 TYP
.074 .066
.160 REF

PARTIAL SECTION
H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN R.M. Kennedy DATE 1 Oct 64
CHECKED D. Lemon 7 OCT 64
APPROVAL 8 OCT 64
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

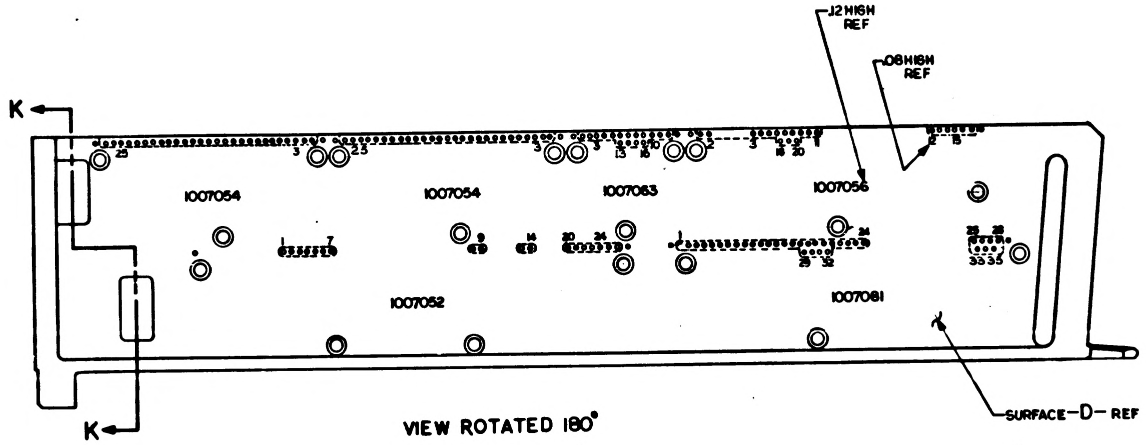
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008527
SCALE 2/1
WT
SHEET 2 OF 3

1008527

1008527

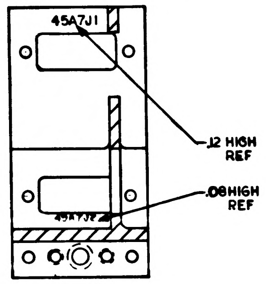
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1462			
SYM	DESCRIPTION	DATE	APPROVAL



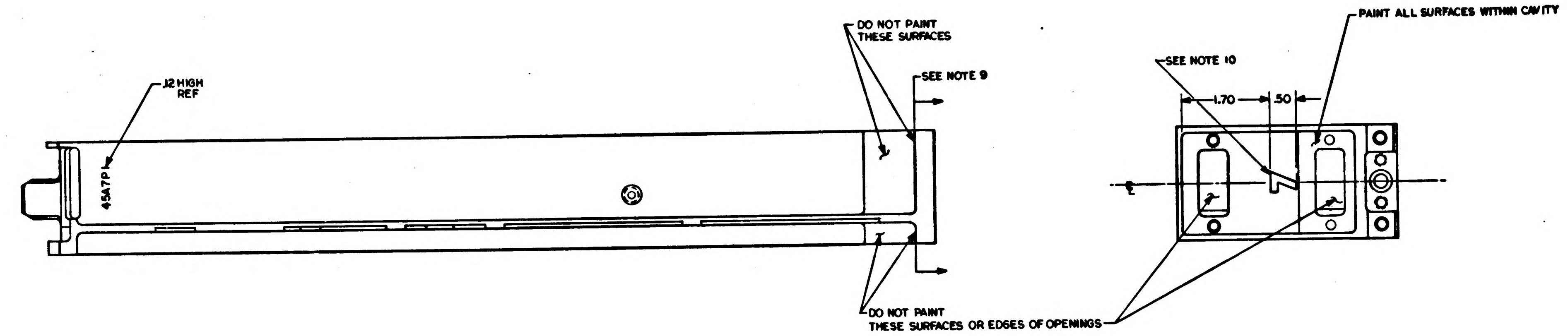
.12 HIGH REF
.08 HIGH REF
K
K
1007054
1007054
1007063
1007056
1007052
1007081
SURFACE -D- REF

VIEW ROTATED 180°

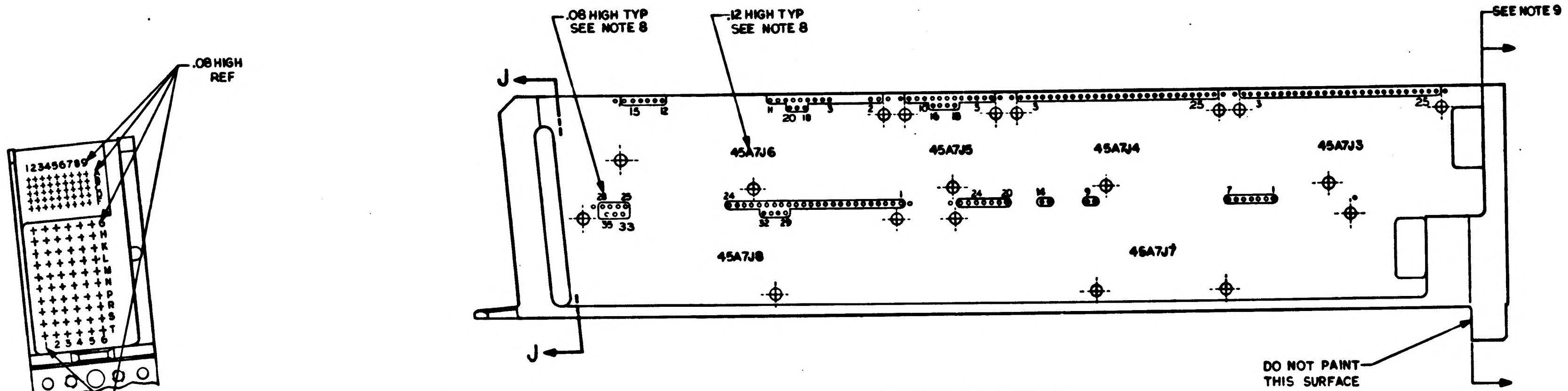


45A7J1
.12 HIGH REF
.08 HIGH REF
45A7J2

SECTION K-K

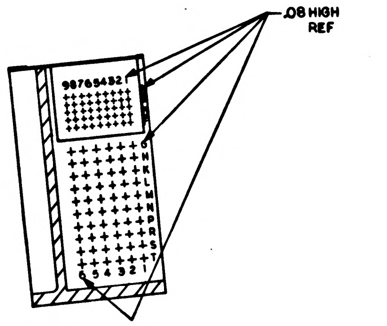


DO NOT PAINT THESE SURFACES
SEE NOTE 9
.12 HIGH REF
45A7P1
PAINT ALL SURFACES WITHIN CAVITY
SEE NOTE 10
1.70
.50
℄
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS



.08 HIGH REF
123456789
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
SEE NOTE 9
J
J
45A7J6
45A7J5
45A7J4
45A7J3
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE

MARKING VIEWS



.08 HIGH REF
987654321

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ±.02 XXX .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING

MATERIAL #

HEAT TREATMENT #

FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN R. M. Kennedy DATE 1 Oct 64
CHECKED [illegible] 7 Oct 64
APPROVAL [illegible] 8 Oct 64
APPROVAL [illegible]
LFB
NASA APPROVAL [illegible] 12-1-64
MIT APPROVAL [illegible] 1 Dec 64

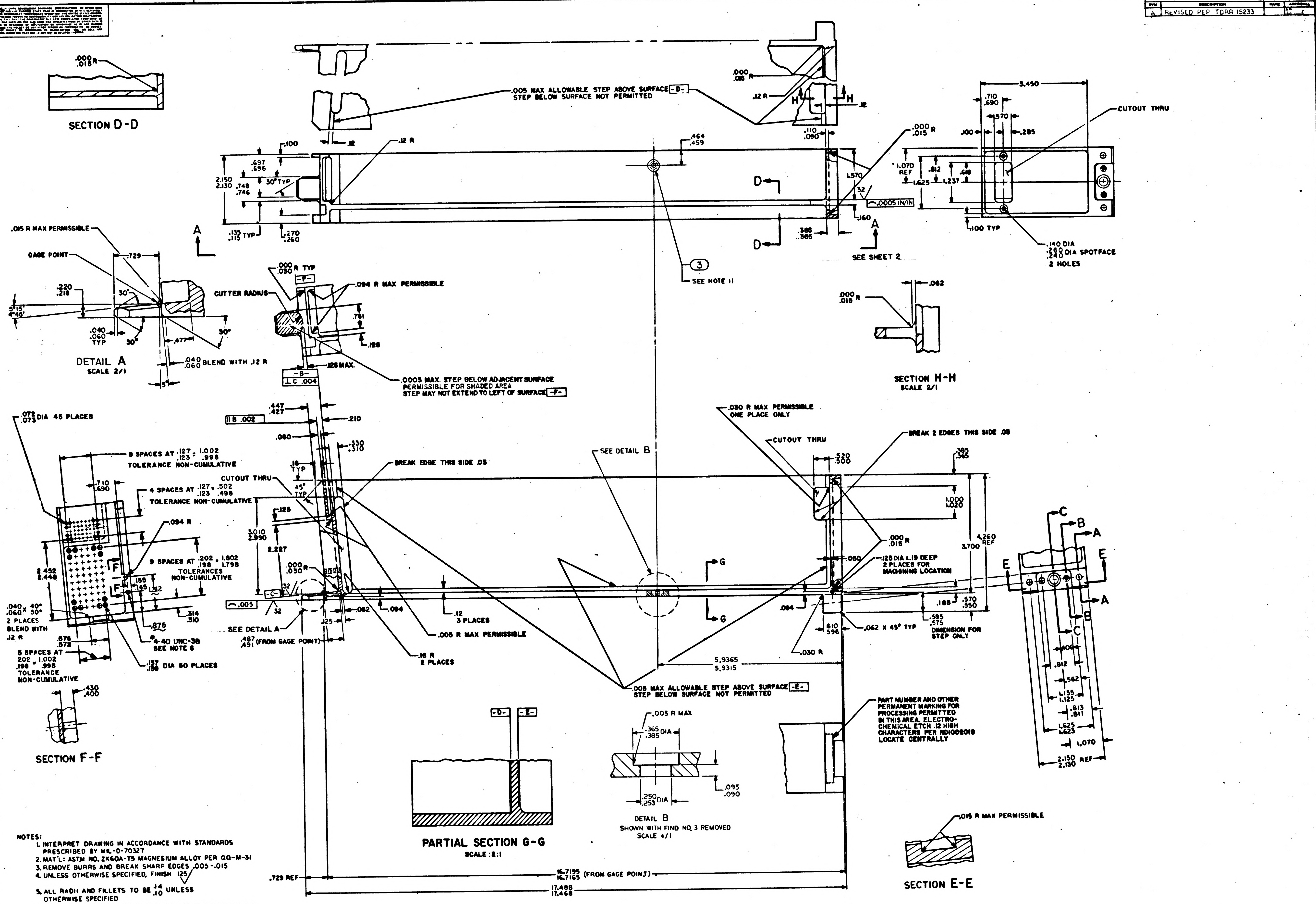
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

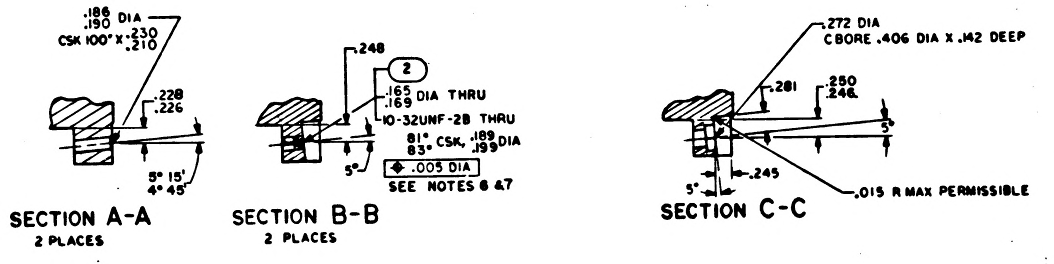
FRAME,
TRAY 7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008527
SCALE 1/1
WT
SHEET 3 OF 3

1008527

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PEP TDRR 15233		


SECTION D-D
.000 R
.015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
H
.110
.090
.100
.12
.697
.696
2.150
2.130
30° TYP
.748
.746
.135
.115 TYP
.270
.260
.464
.459
D
.000 R
.015
1.570
32
.0005 IN/IN
.385
.365
.160
A
SEE SHEET 2
3
SEE NOTE 11
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5°15'
4°45'
.040
.060
TYP
.477
DETAIL A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.000
.030 R TYP
-F-
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX.
-B-
⊥ C .004
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.062
SECTION H-H
SCALE 2/1
.072
.075 DIA 45 PLACES
8 SPACES AT .127 = 1.002
.123 .998
TOLERANCE NON-CUMULATIVE
.710
.690
4 SPACES AT .127 = .502
.123 .498
TOLERANCE NON-CUMULATIVE
.094 R
9 SPACES AT .202 = 1.802
.198 1.798
TOLERANCES
NON-CUMULATIVE
2.452
2.448
F
.155
.145
.12
.040 x 40°
.060 x 50°
2 PLACES
BLEND WITH
.12 R
.576
.572
.875
.314
.310
4-40 UNC-3B
SEE NOTE 6
5 SPACES AT
.202 = 1.002
.198 = .998
TOLERANCE
NON-CUMULATIVE
.137
.139 DIA 60 PLACES
.430
.400
SECTION F-F
.447
.427
B .002
.210
.080
.330
.310
.18
TYP
45°
TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
.125
3.010
2.990
2.227
.000
.030 R
-C-
32
.005
32
SEE DETAIL A
.487
.491 (FROM GAGE POINT)
.125
.062
.094
.12
3 PLACES
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
SEE DETAIL B
G
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
CUTOUT THRU
.520
.500
BREAK 2 EDGES THIS SIDE .03
.385
.365
1.000
1.020
4.260
REF
3.700
.000
.015 R
.060
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.188
.570
.550
.094
.610
.596
.062 x 45° TYP
.595
.575
DIMENSION FOR
STEP ONLY
.030 R
5.9365
5.9315
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
C
B
A
E
.409
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150
2.130 REF
-D-
-E-
PARTIAL SECTION G-G
SCALE :2:1
.005 R MAX
.365
.385 DIA
.095
.090
.250
.253 DIA
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468


.186
.150 DIA
CSK 100° x .230
.210
.228
.226
5° 15'
4° 45'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
81°
83° CSK, .189
.199 DIA
.005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
C BORE .406 DIA x .142 DEEP
.281
.250
.246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER(.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1.	1008528-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//— DECIMALS XX ±.02 XXX ±.005 ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—//—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

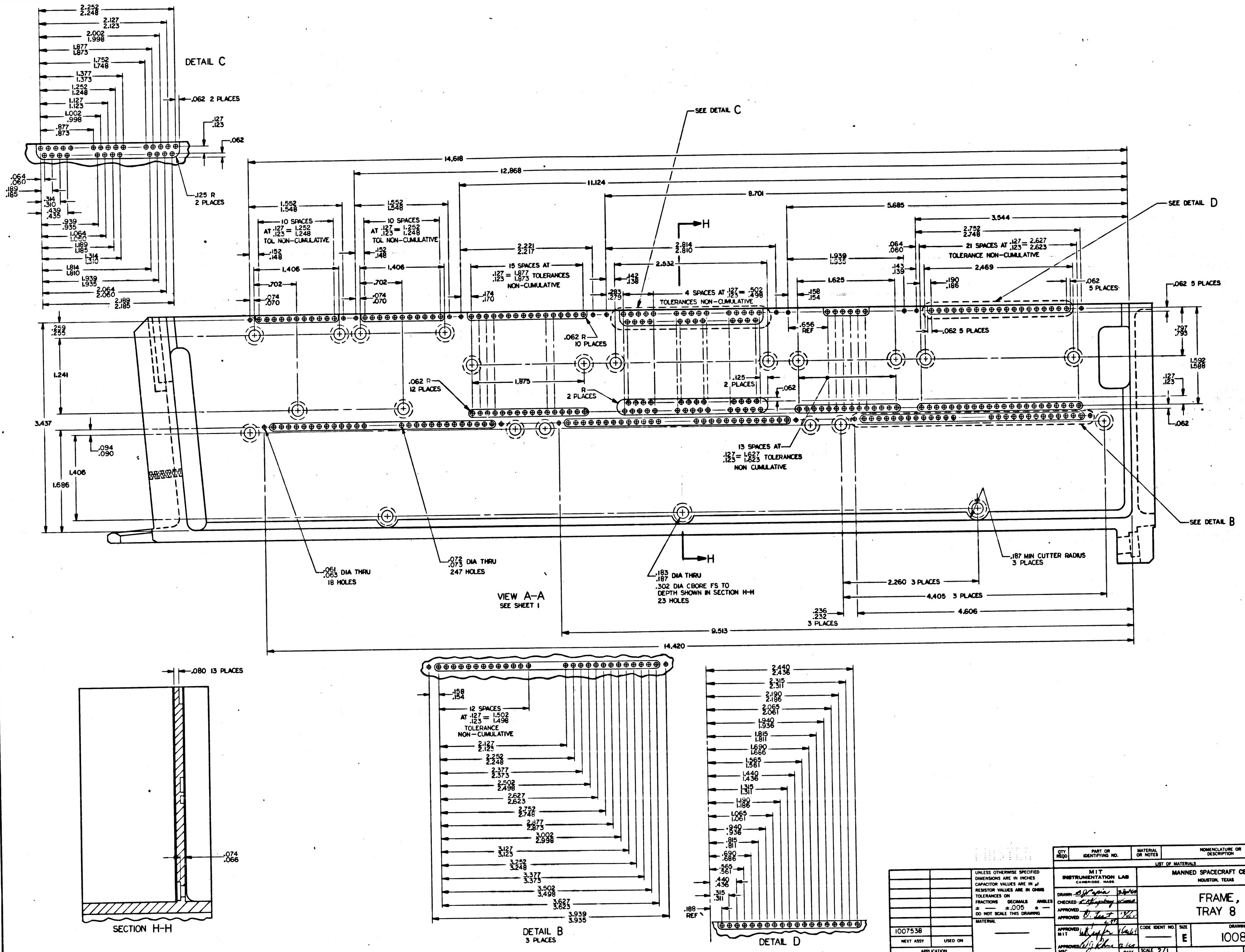
FRAME, TRAY 8

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008528
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDAR 15233	LK			


DETAIL C
SEE DETAIL C
SEE DETAIL D
SEE DETAIL B
.062 2 PLACES
.125 R 2 PLACES
14.618
12.868
11.124
8.701
5.685
3.544
10 SPACES AT .127/.123 = 1.252/1.248 TOL NON-CUMULATIVE
15 SPACES AT .127/.123 = 1.877/1.873 TOLERANCES NON-CUMULATIVE
4 SPACES AT .127/.123 = .502/.498 TOLERANCES NON-CUMULATIVE
21 SPACES AT .127/.123 = 2.627/2.623 TOLERANCE NON-CUMULATIVE
13 SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON CUMULATIVE
.062 5 PLACES
.062 R 10 PLACES
.062 R 12 PLACES
R 2 PLACES
.125 2 PLACES
.656 REF
H
.061/.063 DIA THRU 18 HOLES
.072/.073 DIA THRU 247 HOLES
.183/.187 DIA THRU .302 DIA CBORE FS TO DEPTH SHOWN IN SECTION H-H 23 HOLES
.187 MIN CUTTER RADIUS 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
4.606
.236/.232 3 PLACES
9.513
14.420
VIEW A-A
SEE SHEET 1
.080 13 PLACES
.074/.066
SECTION H-H
12 SPACES AT .127/.123 = 1.502/1.498 TOLERANCE NON-CUMULATIVE
DETAIL B
3 PLACES
.188 REF
DETAIL D

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN B J Napia
CHECKED
APPROVED
APPROVED O. Test
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 8

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008528
SCALE 2/1
SHEET 2 OF 3

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14527

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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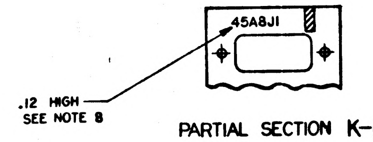
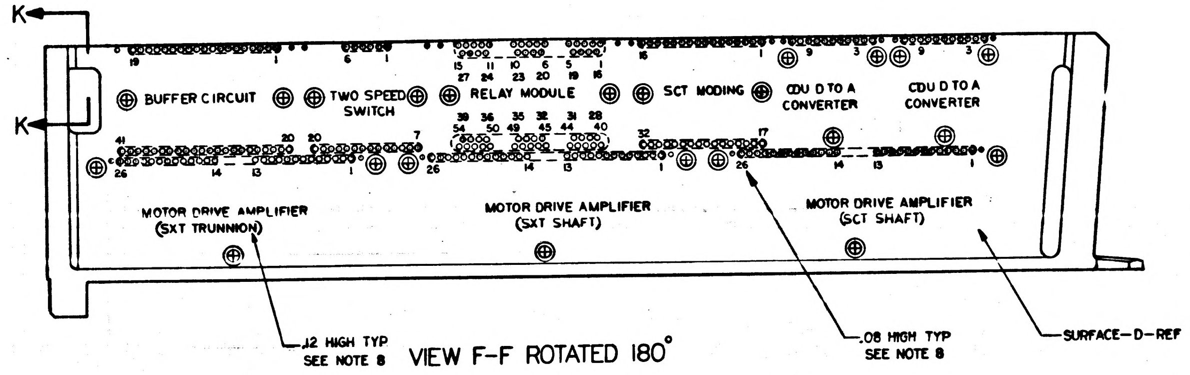
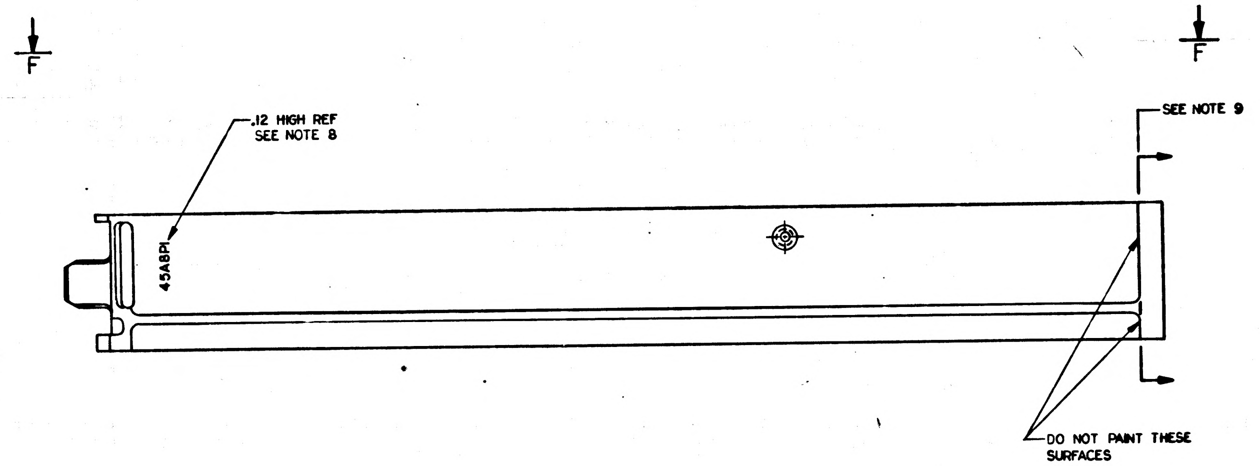
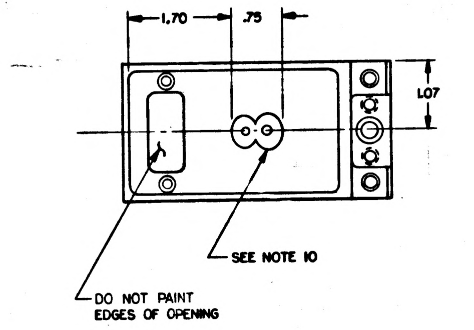

45A8J1
.12 HIGH
SEE NOTE 8

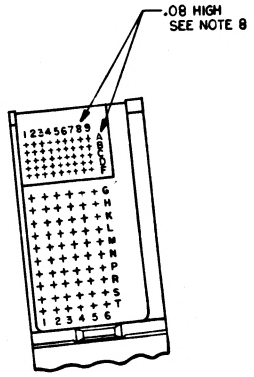
PARTIAL SECTION K-K


K
K
BUFFER CIRCUIT
TWO SPEED SWITCH
RELAY MODULE
SCT MODING
CDU D TO A CONVERTER
CDU D TO A CONVERTER
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
.12 HIGH TYP SEE NOTE 8
.08 HIGH TYP SEE NOTE 8
SURFACE-D-REF
19
1
6
15 11 10 6 5 1
27 24 23 20 19 16
16
9 3
39 36 35 32 31 28
54 50 49 45 44 40
41 20 20 7 32 17
26 14 13 1 26 14 13 1 26 14 13 1

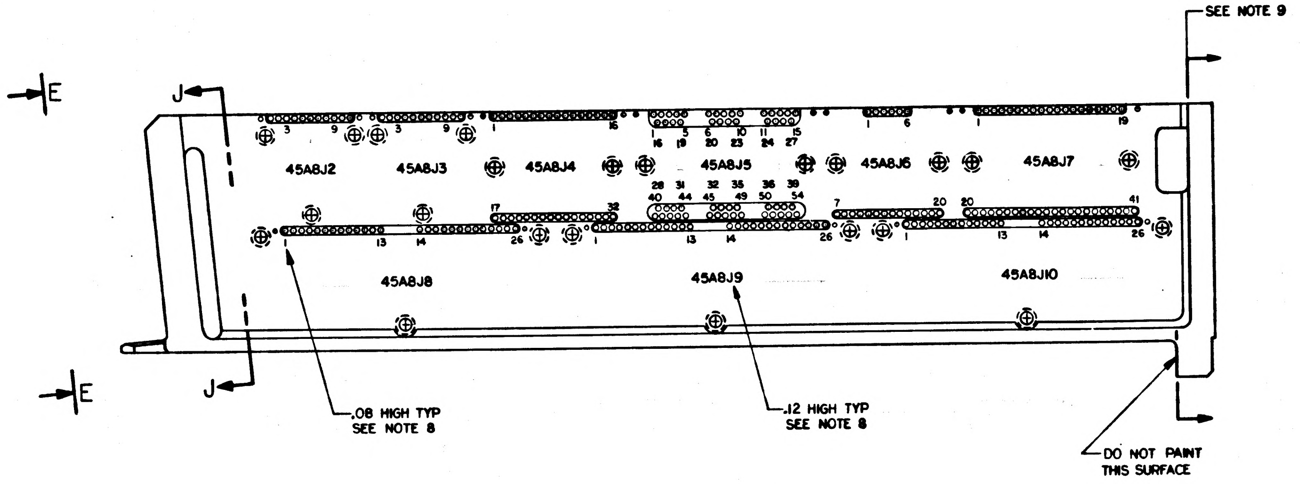
VIEW F-F ROTATED 180°

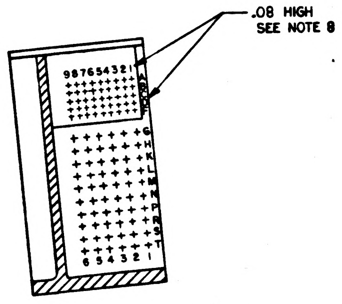

F
F
.12 HIGH REF
SEE NOTE 8
45A8P1
SEE NOTE 9
DO NOT PAINT THESE SURFACES


1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT EDGES OF OPENING


.08 HIGH
SEE NOTE 8
123456789
A B C D E F G H K L M N P R S T
123456

PARTIAL VIEW E-E


E
E
J
J
SEE NOTE 9
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
45A8J7
45A8J8
45A8J9
45A8J10
3 9 3 9 1 16
1 5 6 10 11 15
16 19 20 23 24 27
1 6 1 19
28 31 32 35 36 39
40 44 45 49 50 54
17 32 7 20 20 41
1 13 14 26 1 13 14 26 1 13 14 26
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
DO NOT PAINT THIS SURFACE


.08 HIGH
SEE NOTE 8
987654321
A B C D E F G H J K L M N P R S
654321

SECTION J-J

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

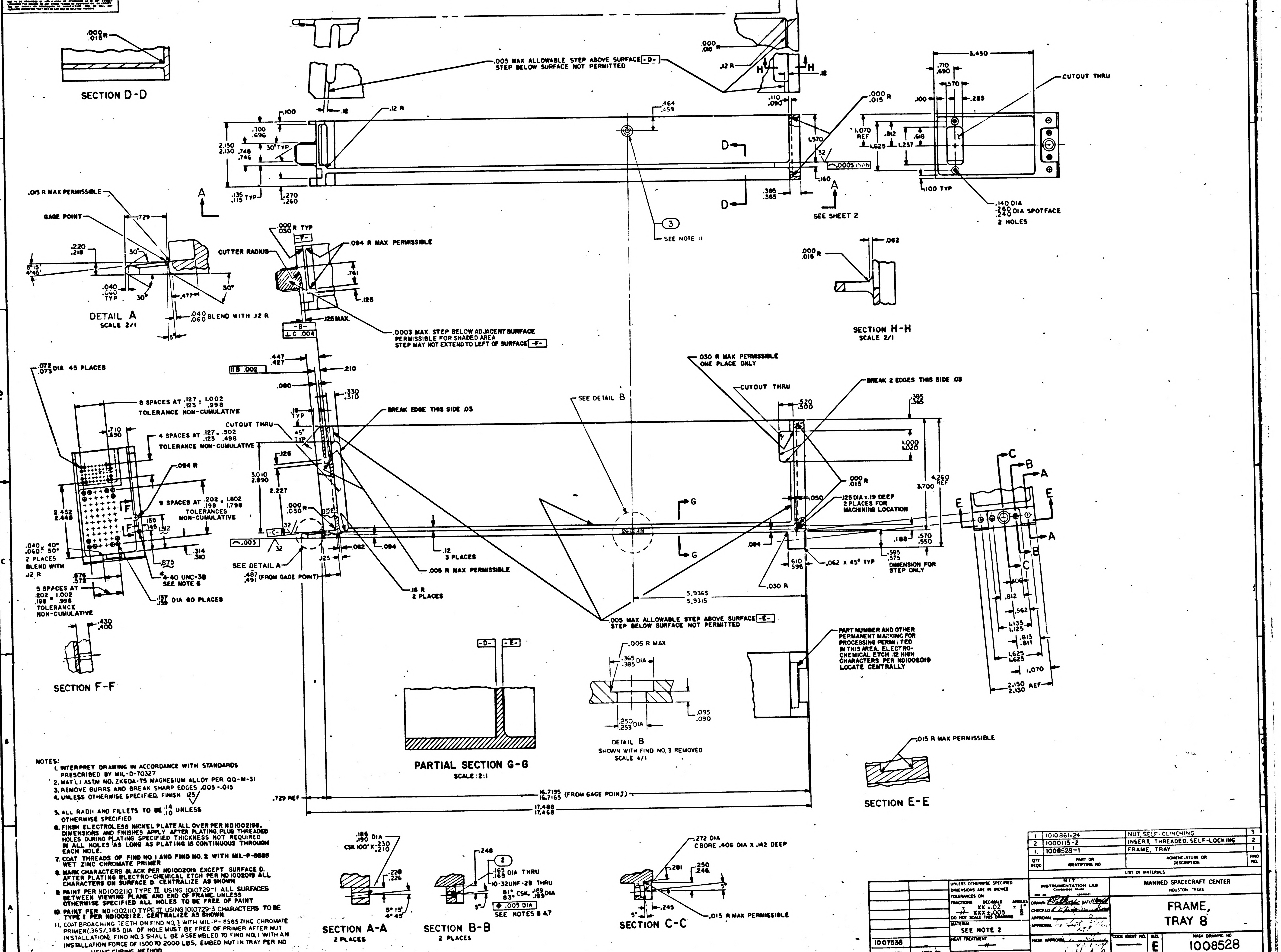
DRAWN A Vargas 3/6/64
CHECKED R. Kingsbury 11/2/64
APPROVED
APPROVED D. Test 12/1/64
APPROVED MIT W Kupfer 1 Dec 64
APPROVED MSC 12-1-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 8

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008528
SCALE 1/1
SHEET 3 OF 3

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15233		
B	REVISED PER TDRR 15950	11 FEB 68	


SECTION D-D
SECTION H-H
SCALE 2/1
DETAIL A
SCALE 2/1
SECTION F-F
PARTIAL SECTION G-G
SCALE :2:1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
SECTION E-E
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
SECTION C-C
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
CUTOUT THRU
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
SEE SHEET 2
SEE NOTE 11
.015 R MAX PERMISSIBLE
GAGE POINT
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCES NON-CUMULATIVE
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 PLACES
4-40 UNC-3B
SEE NOTE 6
BREAK EDGE THIS SIDE .03
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
BREAK 2 EDGES THIS SIDE .03
SEE DETAIL B
SEE DETAIL A
.125 DIA x .19 DEEP
2 PLACES FOR MACHINING LOCATION
DIMENSION FOR STEP ONLY
.062 x 45° TYP
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.12
3 PLACES
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
.487 .491 (FROM GAGE POINT)
5.9365 5.9315
.188 .190 DIA
CSK 100° x .230 .210
.165 DIA THRU
.169
10-32UNF-2B THRU
81° 83° CSK. .189 .199 DIA
.003 DIA
SEE NOTES 6 & 7
.272 DIA
CBORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.14}{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER(.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1.	1008528-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1° ½
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN [illegible] DATE [illegible]
CHECKED [illegible]
APPROVAL
APPROVAL [illegible]
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME, TRAY 8

CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1008528
SCALE 1/1
WT —
SHEET 1 OF 3

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REVISIONS 4-27

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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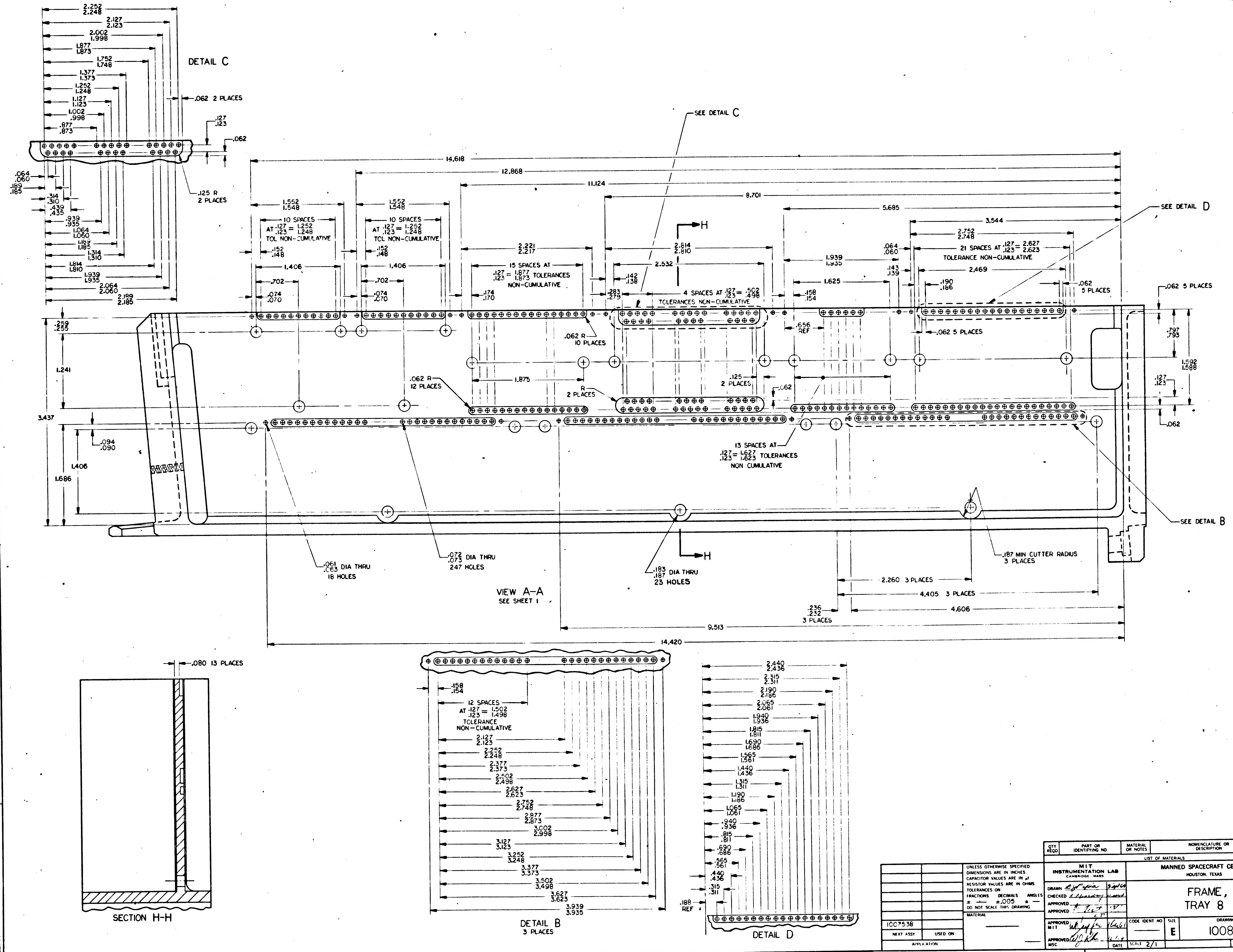
B		REVISED PER TDRR 15950	JW		11 FEB 65	


DETAIL C
.062 2 PLACES
.125 R 2 PLACES
SEE DETAIL C
SEE DETAIL D
SEE DETAIL B
14.618
12.868
11.124
8.701
5.685
3.544
10 SPACES AT .127/.123 = 1.252/1.248 TOL NON-CUMULATIVE
15 SPACES AT .127/.123 = 1.877/1.873 TOLERANCES NON-CUMULATIVE
4 SPACES AT .127/.123 = .502/.498 TOLERANCES NON-CUMULATIVE
21 SPACES AT .127/.123 = 2.627/2.623 TOLERANCE NON-CUMULATIVE
13 SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON CUMULATIVE
.062 R 10 PLACES
.062 R 12 PLACES
.125 R 2 PLACES
.062 5 PLACES
.656 REF
3.437
.061/.063 DIA THRU 18 HOLES
.072/.073 DIA THRU 247 HOLES
.183/.187 DIA THRU 23 HOLES
.187 MIN CUTTER RADIUS 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
4.606
.236/.232 3 PLACES
9.513
14.420
H
VIEW A-A
SEE SHEET 1
.080 13 PLACES
SECTION H-H
12 SPACES AT .127/.123 = 1.502/1.498 TOLERANCE NON-CUMULATIVE
DETAIL B
3 PLACES
.188 REF
DETAIL D

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN E.W. Papia 3 Apr 64
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

FRAME,
TRAY 8

CODE IDENT NO —
SIZE E
DRAWING NO. 1008528
SCALE 2/1
SHEET 2 OF 3

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REVISIONS 14527

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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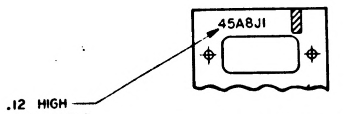
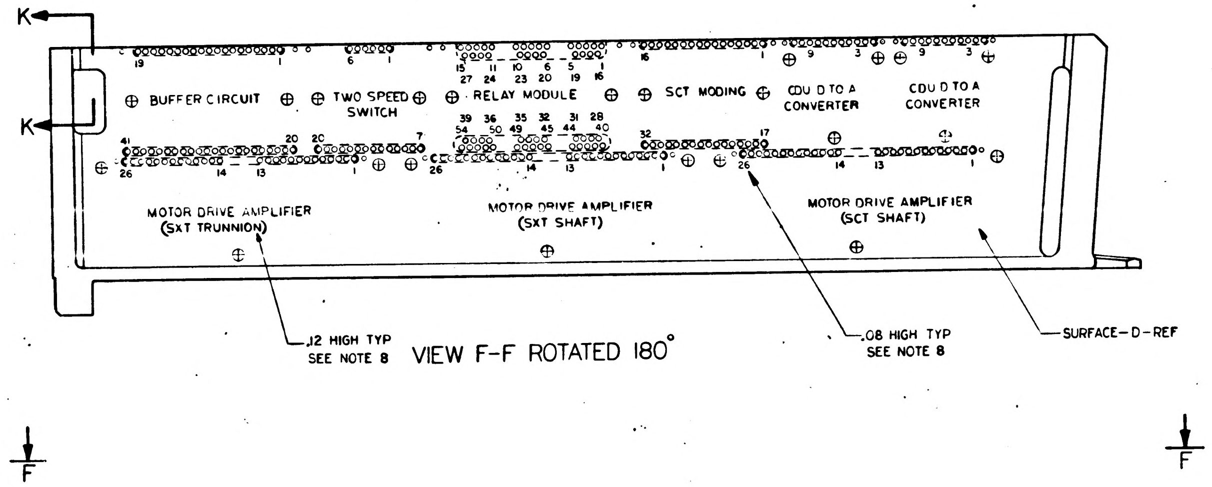
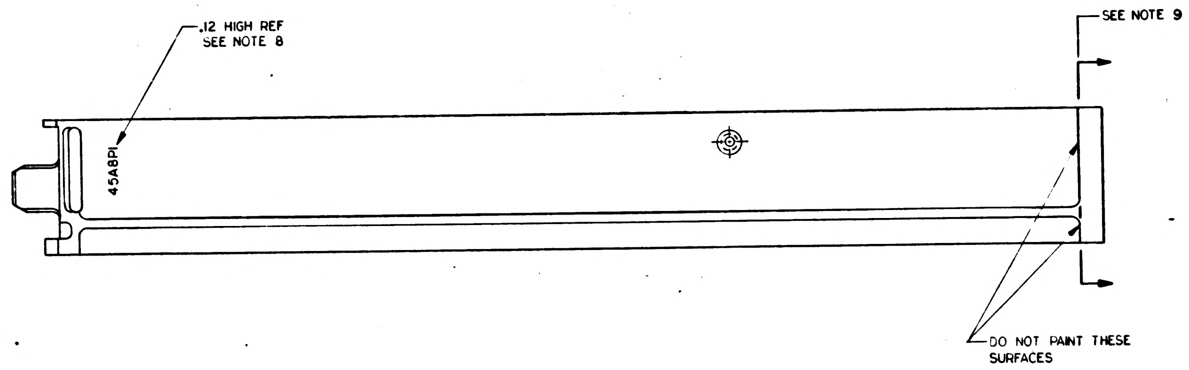
B		REVISED PER TDRR 15950	JW		11FEB65	

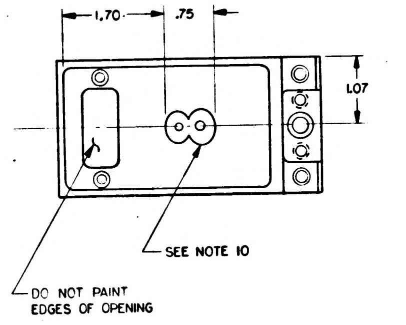

45A8J1
.12 HIGH
SEE NOTE 8

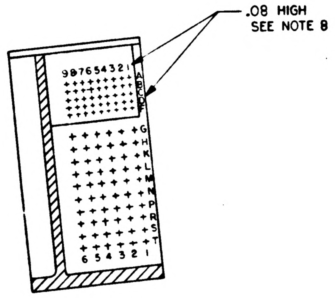
PARTIAL SECTION K-K


K
K
19
1
6
1
15 11 10 6 5 1
27 24 23 20 19 16
16
1
9
3
9
3
BUFFER CIRCUIT
TWO SPEED SWITCH
RELAY MODULE
SCT MODING
CDU D TO A CONVERTER
CDU D TO A CONVERTER
39 36 35 32 31 28
54 50 49 45 44 40
41
20
20
7
32
17
26
14
13
1
26
14
13
1
26
14
13
1
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
SURFACE-D-REF
F
F

VIEW F-F ROTATED 180°


.12 HIGH REF
SEE NOTE 8
45A8P1
SEE NOTE 9
DO NOT PAINT THESE SURFACES


1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING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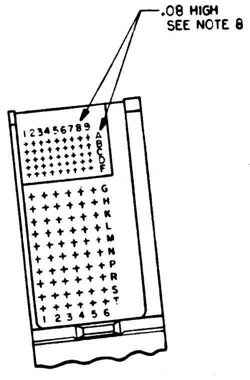
SEE NOTE 8
987654321
A
B
C
D
F
G
H
K
L
M
N
P
R
S
T
6 5 4 3 2 1

SECTION J-J


.08 HIGH
SEE NOTE 8
123456789
A
B
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D
F
G
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K
L
M
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P
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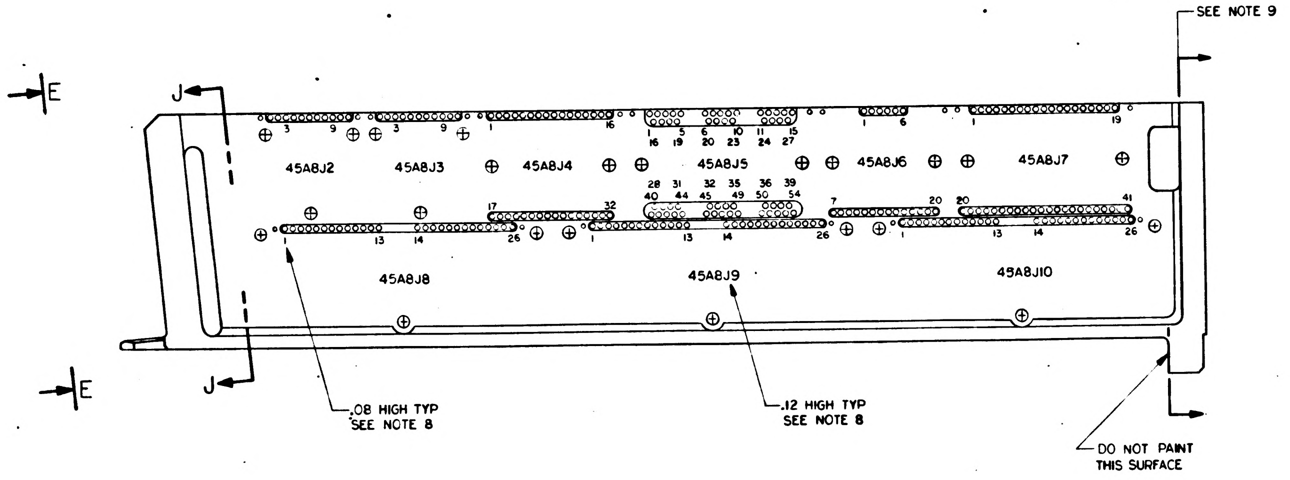
S
T
1 2 3 4 5 6

PARTIAL VIEW E-E


SEE NOTE 9
E
E
J
J
3
9
3
9
1
16
1 5 6 10 11 15
16 19 20 23 24 27
1
6
1
19
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
45A8J7
28 31 32 35 36 39
40 44 45 49 50 54
17
32
7
20
20
41
1
13
14
26
1
13
14
26
1
13
14
26
45A8J8
45A8J9
45A8J10
.08 HIGH TYP
SEE NOTE 8
.12 HIGH TYP
SEE NOTE 8
DO NOT PAINT
THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

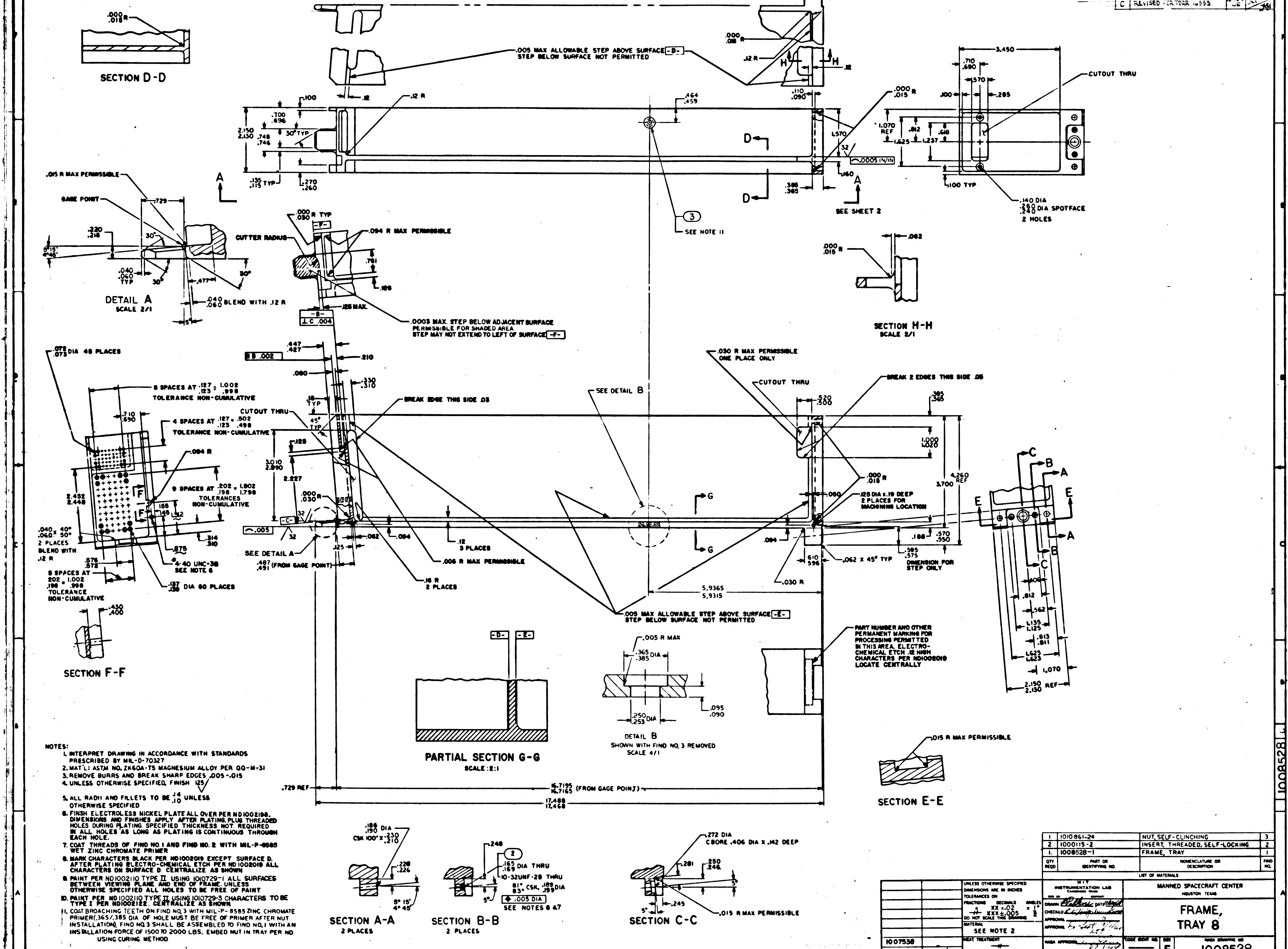
DRAWN		3
CHECKED		
APPROVED		
APPROVED		
APPROVED MIT	W. Coffey	
APPROVED MSC		12-1-64
		DATE

FRAME,
TRAY 8

CODE IDENT NO	SIZE	DRAWING NO
—	E	1008528

SCALE 1/1
SHEET 3 OF 3

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15233		
B	REVISED PER TDRR 15950	11 FEB 66	
C	REVISED PER TDRR 16333	25 FEB 66	


SECTION D-D
SECTION H-H
SCALE 2/1
DETAIL A
SCALE 2/1
SECTION F-F
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PARTIAL SECTION G-G
SCALE 2:1
SECTION E-E
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
SECTION C-C
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
CUTOUT THRU
SEE SHEET 2
SEE NOTE 11
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
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4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCES NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 .139 DIA 60 PLACES
BREAK EDGE THIS SIDE .03
BREAK 2 EDGES THIS SIDE .03
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
SEE DETAIL B
SEE DETAIL A
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.062 x 45° TYP
DIMENSION FOR STEP ONLY
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
.094 R MAX PERMISSIBLE
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
5.9365 5.9315
.487 .491 (FROM GAGE POINT)
GAGE POINT
CUTTER RADIUS
BLEND WITH .12 R
.272 DIA
CBORE .406 DIA x .142 DEEP
10-32UNF-2B THRU
SEE NOTES 6 & 7
CSK 100° x .230 .210

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.14}{.10}$ UNLESS OTHERWISE SPECIFIED
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7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008528-1	FRAME, TRAY	1

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± –
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT –
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL 2/11/66
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME,
TRAY 8

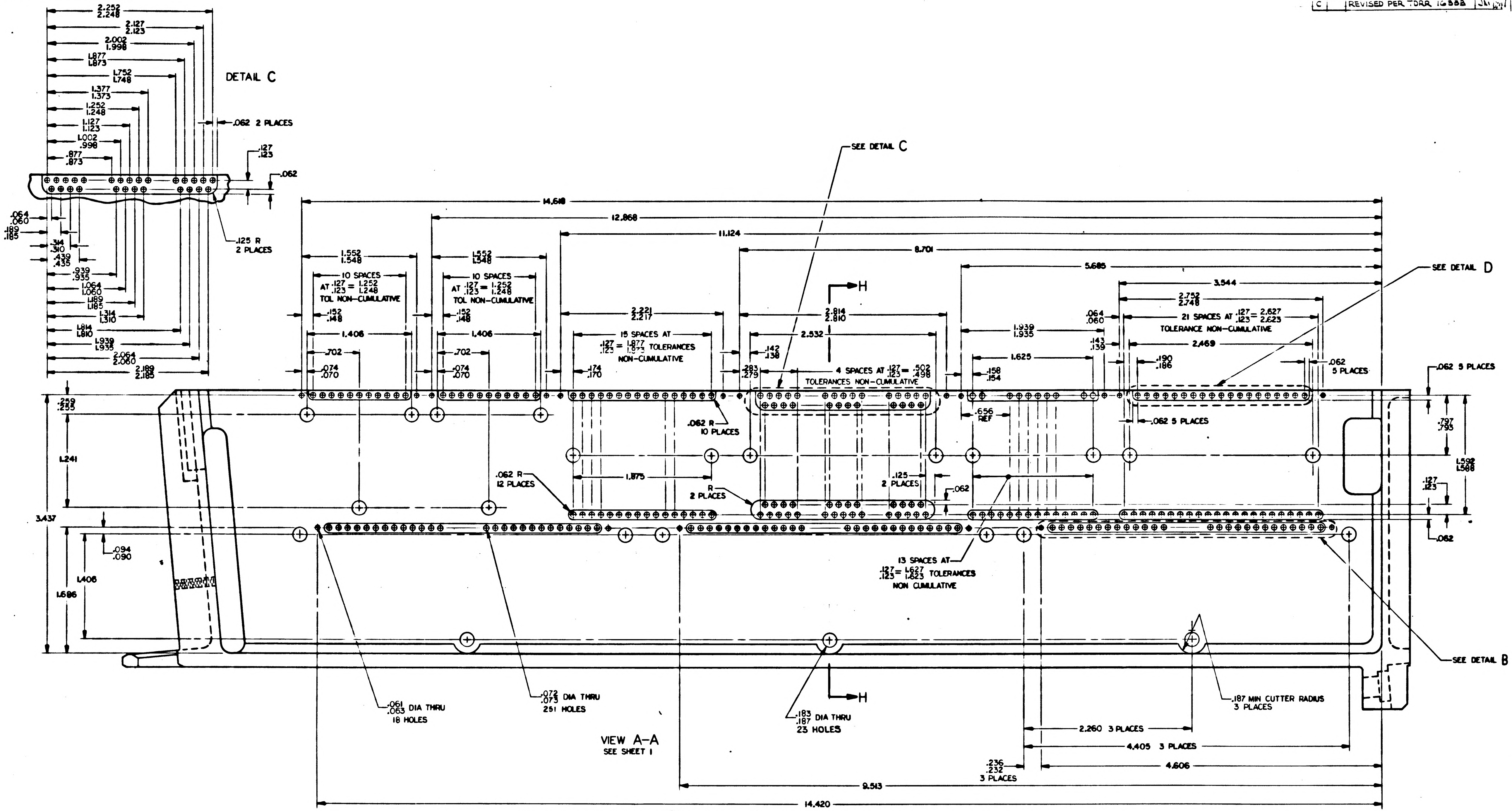
CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1008528
SCALE 1/1
WT —
SHEET 1 OF 3

1008528

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15233	LK			
B		REVISED PER TDRR 15950	JW		11 FEB	
C		REVISED PER TDRR 16383	JW		18 FEB 65	


DETAIL C
2.252
2.248
2.127
2.123
2.002
1.998
1.877
1.873
1.752
1.748
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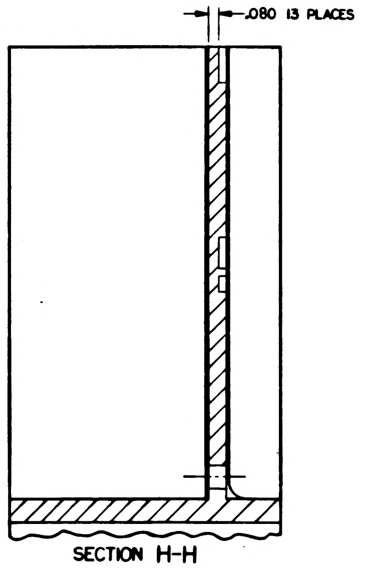
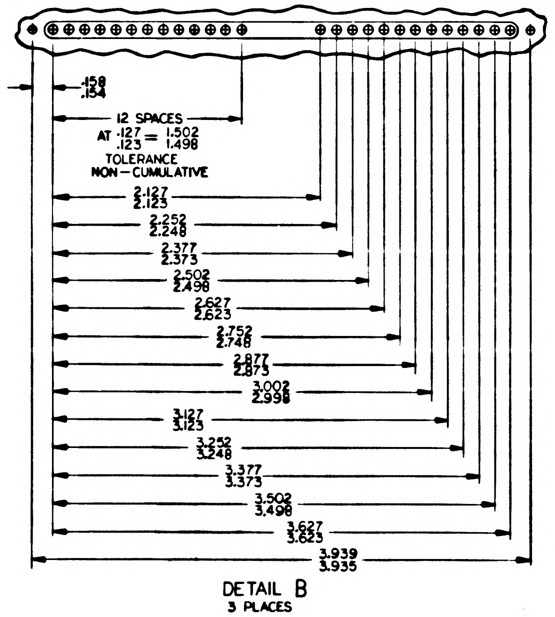
1.373
1.252
1.248
1.127
1.123
1.002
.998
.877
.873
.062 2 PLACES
.127
.123
.062
.064
.060
.189
.185
.314
.310
.439
.435
.939
.935
1.064
1.060
1.189
1.185
1.314
1.310
1.814
1.810
1.939
1.935
2.064
2.060
2.189
2.185
.125 R
2 PLACES
SEE DETAIL C
14.618
12.868
11.124
8.701
5.685
3.544
1.552
1.548
10 SPACES
AT .127/.123 = 1.252/1.248
TOL NON-CUMULATIVE
.152
.148
1.406
.702
.074
.070
2.221
2.217
15 SPACES AT
.127/.123 = 1.877/1.873 TOLERANCES
NON-CUMULATIVE
.174
.170
.283
.279
.142
.138
H
2.814
2.810
2.532
4 SPACES AT .127/.123 = .502/.498
TOLERANCES NON-CUMULATIVE
1.939
1.935
1.625
.158
.154
.656
REF
.064
.060
.143
.139
2.752
2.748
21 SPACES AT .127/.123 = 2.627/2.623
TOLERANCE NON-CUMULATIVE
2.469
.190
.186
.062
5 PLACES
SEE DETAIL D
.062 5 PLACES
.062 5 PLACES
.797
.793
1.592
1.588
.127
.123
.062
.259
.255
1.241
3.437
.062 R
10 PLACES
.062 R
12 PLACES
1.875
R
2 PLACES
.125
2 PLACES
.062
.094
.090
1.406
1.686
13 SPACES AT
.127/.123 = 1.627/1.623 TOLERANCES
NON CUMULATIVE
SEE DETAIL B
.061/.063 DIA THRU
18 HOLES
.072/.073 DIA THRU
251 HOLES
.183/.187 DIA THRU
23 HOLES
H
.187 MIN CUTTER RADIUS
3 PLACES
2.260 3 PLACES
4.405 3 PLACES
4.606
.236
.232
3 PLACES
9.513
14.420
VIEW A-A
SEE SHEET 1


.080 13 PLACES
SECTION H-H


.158
.154
12 SPACES
AT .127/.123 = 1.502/1.498
TOLERANCE
NON-CUMULATIVE
2.127
2.123
2.252
2.248
2.377
2.373
2.502
2.498
2.627
2.623
2.752
2.748
2.877
2.873
3.002
2.998
3.127
3.123
3.252
3.248
3.377
3.373
3.502
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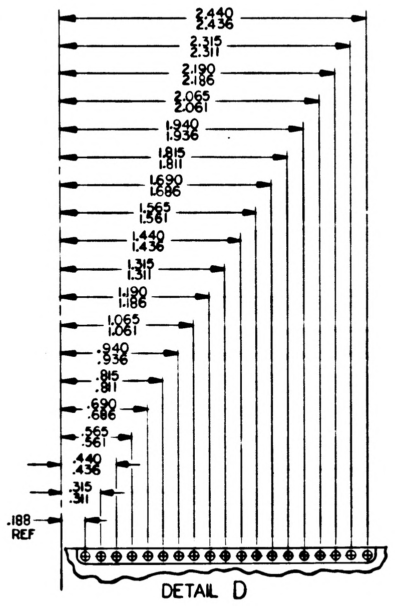
3.935
DETAIL B
3 PLACES


2.440
2.436
2.315
2.311
2.190
2.186
2.065
2.061
1.940
1.936
1.815
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1.690
1.686
1.565
1.561
1.440
1.436
1.315
1.311
1.190
1.186
1.065
1.061
.940
.936
.815
.811
.690
.686
.565
.561
.440
.436
.315
.311
.188
REF
DETAIL D

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN
CHECKED
APPROVED
APPROVED D. Test
APPROVED MIT
APPROVED MSC
DATE

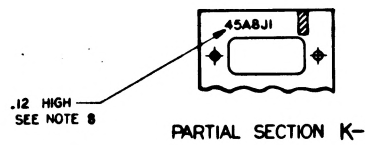
FRAME,
TRAY 8

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008528
SCALE 2/1
SHEET 2 OF 3

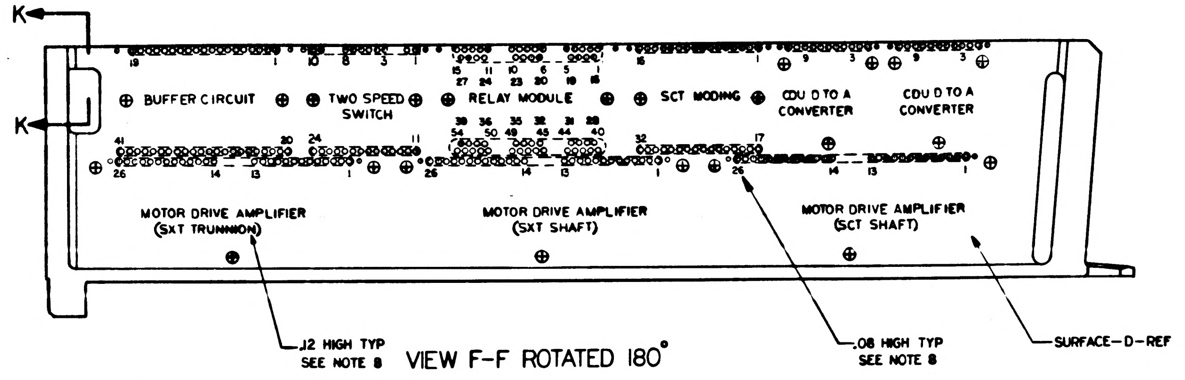
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

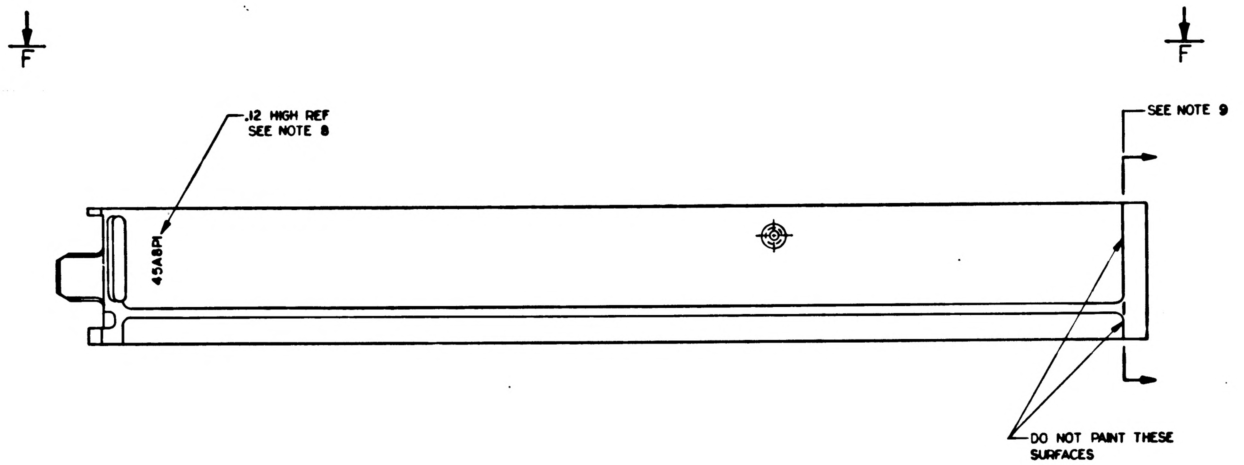
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15233	LK	RL	8 JAN 64	
B		REVISED PER TDRR 15950	JW	[illegible]	11 FEB 65	
C		REVISED PER TDRR 16333	JN	[illegible]	6 FEB 65	

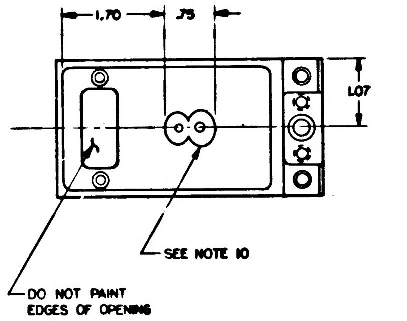

45A8J1
.12 HIGH
SEE NOTE 8

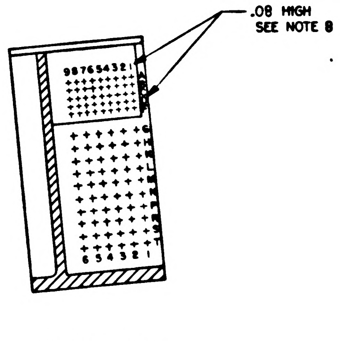
PARTIAL SECTION K-K


K
K
19
1
10
8
3
1
15 11 10 6 5 1
27 24 23 20 19 16
16
9 3
9 3
BUFFER CIRCUIT
TWO SPEED SWITCH
RELAY MODULE
SCT MODING
CDU D TO A CONVERTER
CDU D TO A CONVERTER
39 36 35 32 31 28
54 50 49 45 44 40
41
20 24
11
32
17
26 14 13 1
26 14 13 1
26 14 13 1
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
SURFACE-D-REF

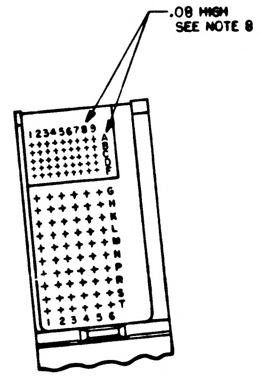
VIEW F-F ROTATED 180°


F
F
.12 HIGH REF
SEE NOTE 8
45A8P1
SEE NOTE 9
DO NOT PAINT THESE SURFACES

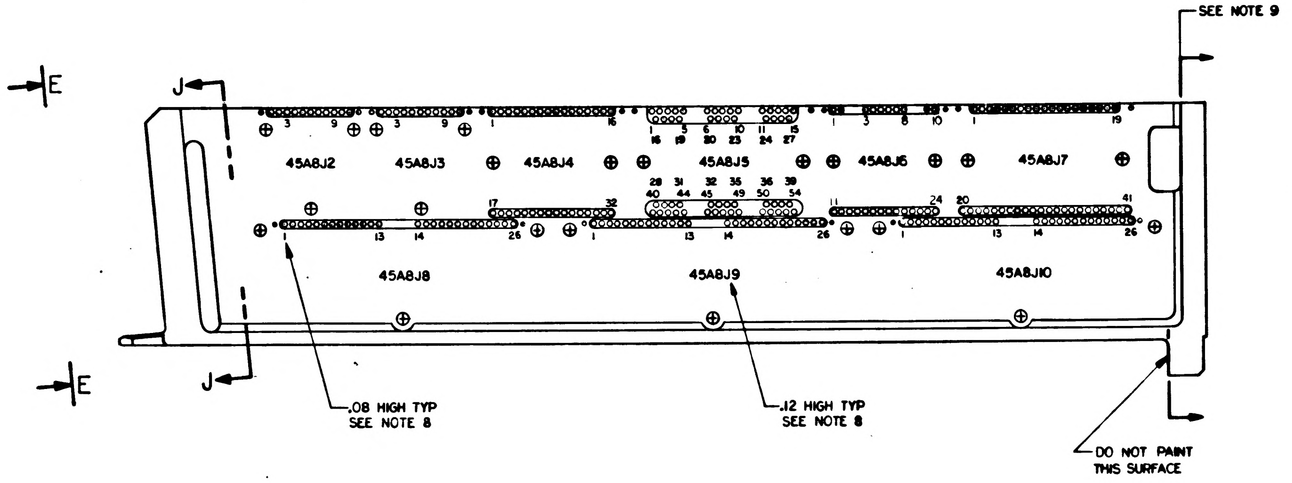

1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT EDGES OF OPENING


.08 HIGH
SEE NOTE 8
987654321

SECTION J-J


.08 HIGH
SEE NOTE 8
123456789

PARTIAL VIEW E-E


SEE NOTE 9
E
E
J
J
3 9
3 9
1 16
1 5 6 10 11 15
16 19 20 23 24 27
1 3 8 10
1 19
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
45A8J7
28 31 32 35 36 39
40 44 45 49 50 54
17 32
11 24
20 41
1 13 14 26
1 13 14 26
1 13 14 26
45A8J8
45A8J9
45A8J10
.08 HIGH TYP
SEE NOTE 8
.12 HIGH TYP
SEE NOTE 8
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	A J Rapia	3 Jan 64
CHECKED	R. Kingsbury	10 Oct 64
APPROVED		
APPROVED	D. Test	12/1/64
APPROVED MIT	W Hoffman	1 Oct 64
APPROVED MSC		12-1-64

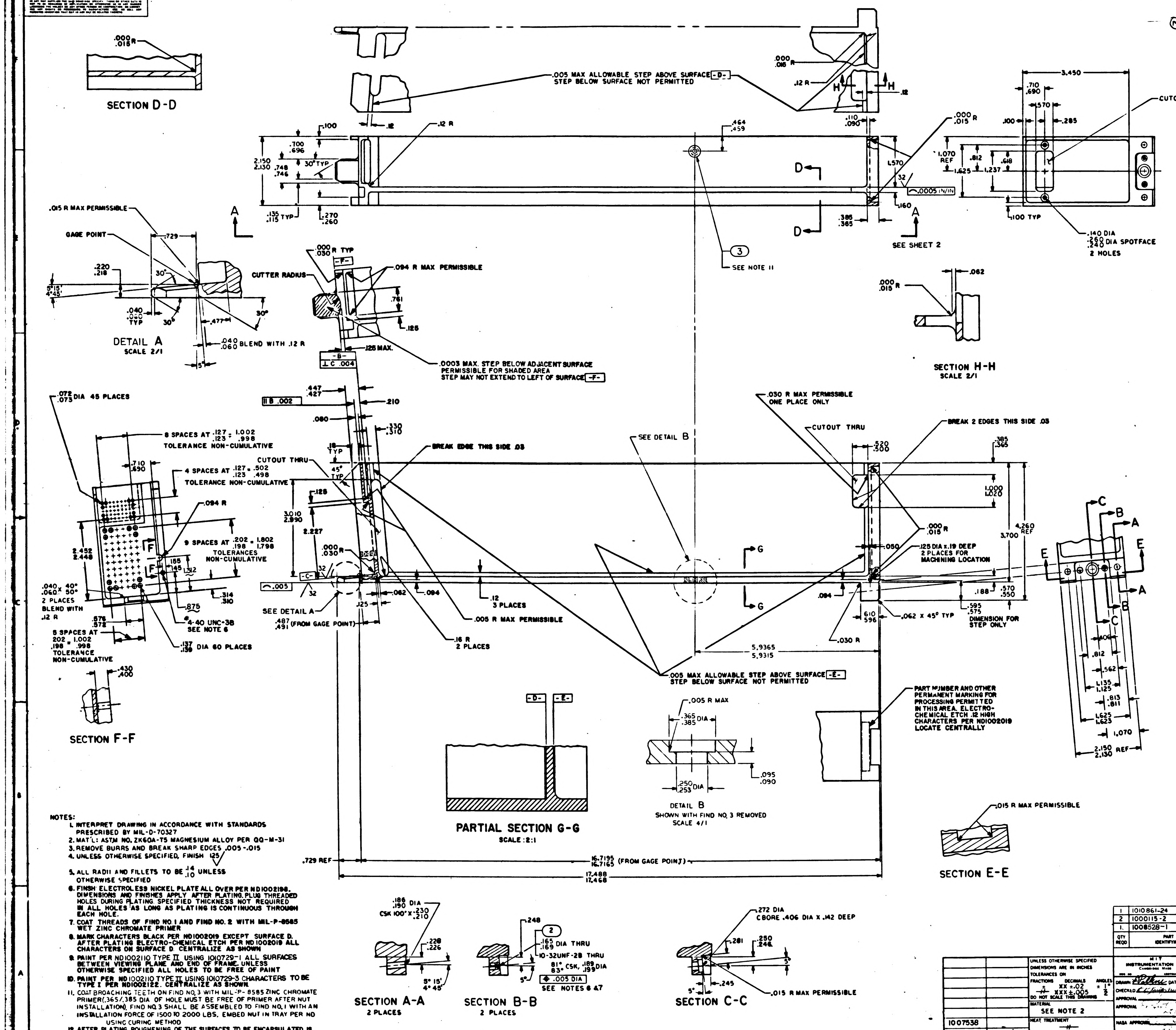
FRAME,
TRAY 8

CODE IDENT NO.	SIZE	DRAWING NO.
—	E	1008528

SCALE 1/1
SHEET 3 OF 3

1008528 C

SYM	DESCRIPTION	DATE	APPROVAL
	REVISED PER TDRR 15213		
B	REVISED PER TDRR 15950	11 FEB 68	
C	REVISED PER TDRR 16333		
D	REVISED PER TDRR 16592		


SECTION D-D
.000 R
.015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
3.450
CUTOUT THRU
.140 DIA
.260 DIA SPOTFACE
.240
2 HOLES
.100 TYP
SEE SHEET 2
SEE NOTE 11
.015 R MAX PERMISSIBLE
GAGE POINT
DETAIL A
SCALE 2/1
BLEND WITH .12 R
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SECTION H-H
SCALE 2/1
.072 DIA 45 PLACES
.075
8 SPACES AT .127 = 1.002
.123 .998
TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 = .502
.123 .498
TOLERANCE NON-CUMULATIVE
CUTOUT THRU
9 SPACES AT .202 = 1.802
.198 1.798
TOLERANCES NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 DIA 60 PLACES
.139
5 SPACES AT .202 = 1.002
.198 .998
TOLERANCE NON-CUMULATIVE
2 PLACES
BLEND WITH .12 R
SECTION F-F
BREAK EDGE THIS SIDE .03
SEE DETAIL A
.487 (FROM GAGE POINT)
.491
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
SEE DETAIL B
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
CUTOUT THRU
BREAK 2 EDGES THIS SIDE .03
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.062 x 45° TYP
DIMENSION FOR
STEP ONLY
.030 R
5.9365
5.9315
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
PARTIAL SECTION G-G
SCALE :2:1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.729 REF
16.7195 (FROM GAGE POINT)
16.7165
17.488
17.468
4.260 REF
3.700
2.150 REF
2.130
SECTION E-E
.015 R MAX PERMISSIBLE
SECTION A-A
2 PLACES
.186 DIA
.190
CSK 100° x .230
.210
SECTION B-B
2 PLACES
.165 DIA THRU
.169
10-32UNF-2B THRU
.189 DIA
.199
SEE NOTES 6 & 7
SECTION C-C
.272 DIA
CBORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008528-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

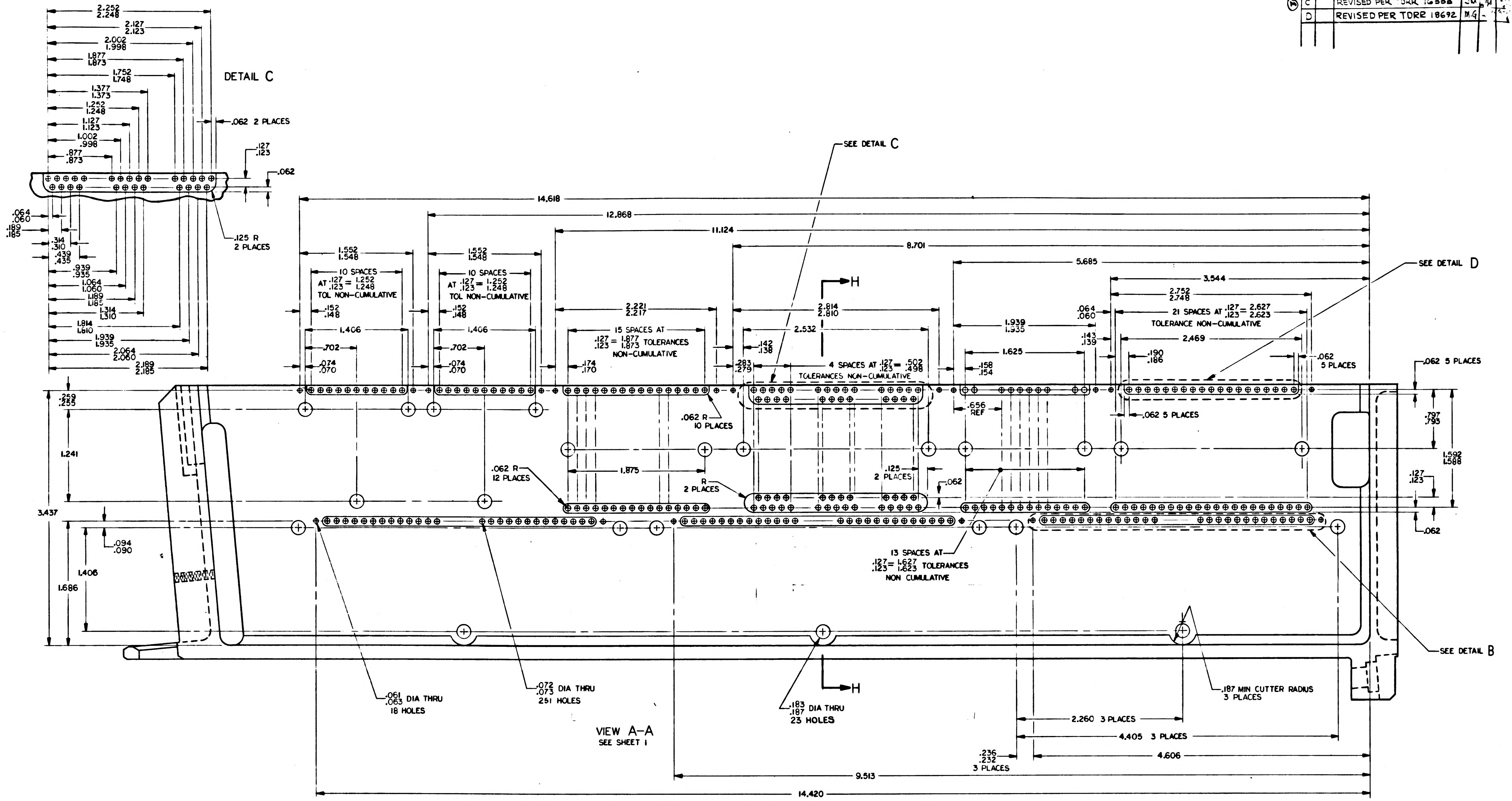
MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME,
TRAY 8

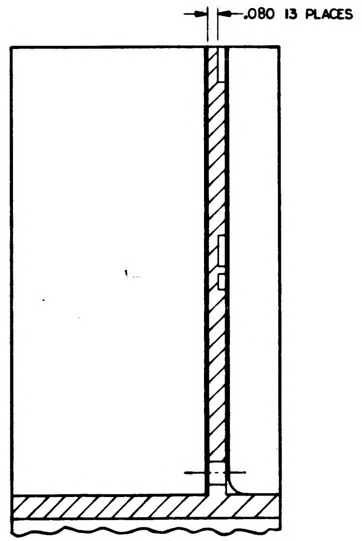
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008528
SCALE 1/1
WT
SHEET 1 OF 3

1008528 D

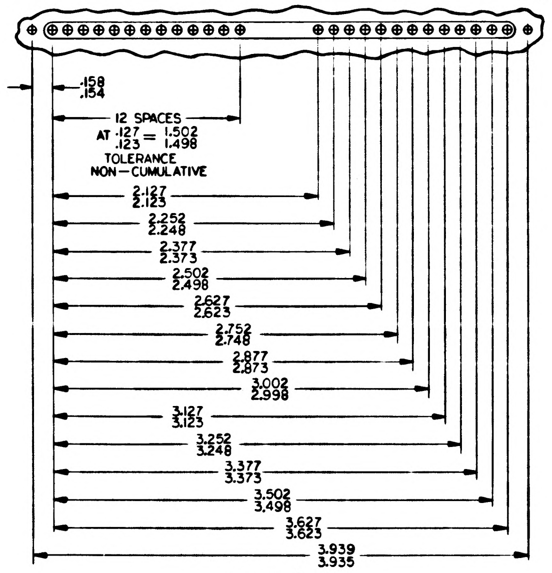
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


DETAIL C
2.252 2.248
2.127 2.123
2.002 1.998
1.877 1.873
1.752 1.748
1.377 1.373
1.252 1.248
1.127 1.123
1.002 .998
.877 .873
.062 2 PLACES
.127 .123
.062
.064 .060
.189 .185
.314 .310
.439 .435
.939 .935
1.064 1.060
1.189 1.185
1.314 1.310
1.814 1.810
1.939 1.935
2.064 2.060
2.189 2.185
.125 R 2 PLACES
SEE DETAIL C
14.618
12.868
11.124
8.701
5.685
3.544
SEE DETAIL D
1.552 1.548
10 SPACES AT .127 .123 = 1.252 1.248 TOL NON-CUMULATIVE
1.552 1.548
10 SPACES AT .127 .123 = 1.252 1.248 TOL NON-CUMULATIVE
.152 .148
.152 .148
1.406
1.406
.702
.702
.074 .070
.074 .070
2.221 2.217
15 SPACES AT .127 .123 = 1.877 1.873 TOLERANCES NON-CUMULATIVE
.174 .170
H
2.814 2.810
2.532
.142 .138
.283 .279
4 SPACES AT .127 .123 = .502 .498 TOLERANCES NON-CUMULATIVE
1.939 1.935
1.625
.158 .154
.656 REF
.064 .060
.143 .139
2.752 2.748
21 SPACES AT .127 .123 = 2.627 2.623 TOLERANCE NON-CUMULATIVE
2.469
.190 .186
.062 5 PLACES
.062 5 PLACES
.062 5 PLACES
.797 .793
1.592 1.588
.127 .123
.062
.259 .255
1.241
3.437
.062 R 10 PLACES
.062 R 12 PLACES
1.875
R 2 PLACES
.125 2 PLACES
.062
.094 .090
1.406
1.686
13 SPACES AT .127 .123 = 1.627 1.623 TOLERANCES NON CUMULATIVE
SEE DETAIL B
H
.061 .063 DIA THRU 18 HOLES
.072 .073 DIA THRU 251 HOLES
.183 .187 DIA THRU 23 HOLES
.187 MIN CUTTER RADIUS 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
4.606
.236 .232 3 PLACES
9.513
14.420

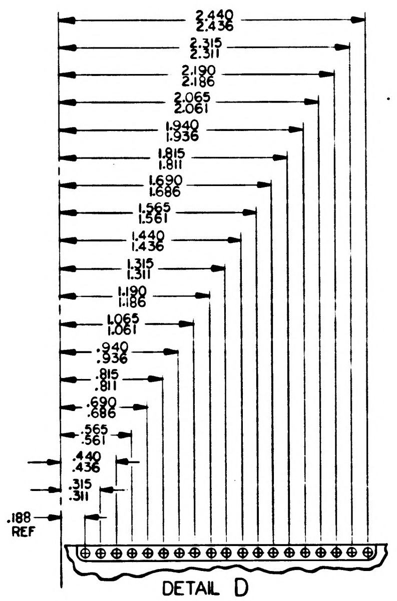
VIEW A-A
SEE SHEET 1


.080 13 PLACES

SECTION H-H


.158 .154
12 SPACES AT .127 .123 = 1.502 1.498 TOLERANCE NON-CUMULATIVE
2.127 2.123
2.252 2.248
2.377 2.373
2.502 2.498
2.627 2.623
2.752 2.748
2.877 2.873
3.002 2.998
3.127 3.123
3.252 3.248
3.377 3.373
3.502 3.498
3.627 3.623
3.939 3.935

DETAIL B
3 PLACES


2.440 2.436
2.315 2.311
2.190 2.186
2.065 2.061
1.940 1.936
1.815 1.811
1.690 1.686
1.565 1.561
1.440 1.436
1.315 1.311
1.190 1.186
1.065 1.061
.940 .936
.815 .811
.690 .686
.565 .561
.440 .436
.315 .311
.188 REF

DETAIL D

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15233	LK			
B		REVISED PER TDRR 15950	JW		11 FEB	
C		REVISED PER TDRR 16333	JM			
D		REVISED PER TDRR 18692	M.G			

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN B.J. Papia
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

FRAME,
TRAY 8

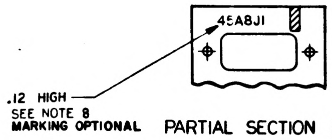
CODE IDENT NO. 80230
SIZE E
DRAWING NO. 1008528
SCALE 2/1
SHEET 2 OF 3

1008528

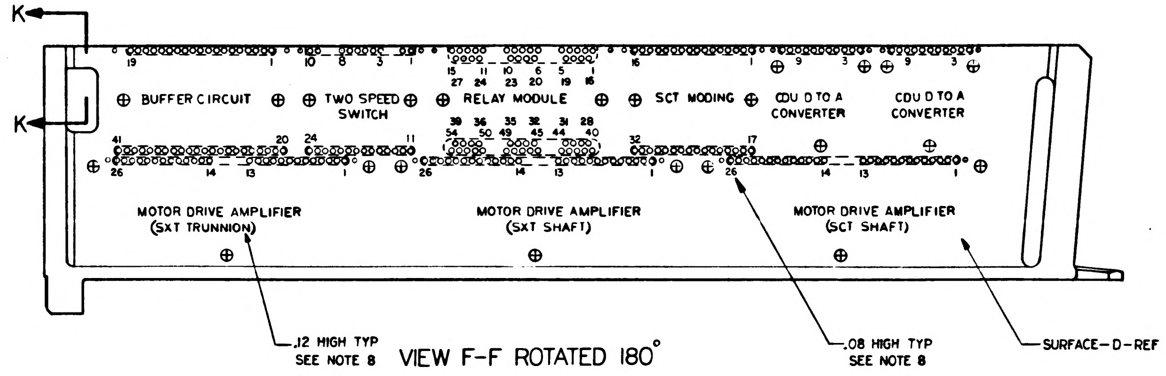
NOTICE WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

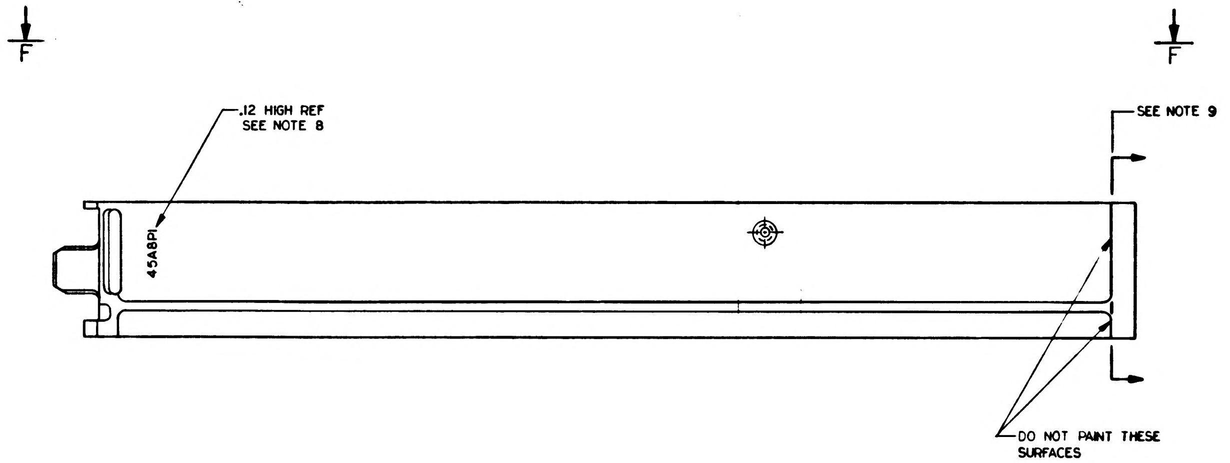
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15233	LK			
B		REVISED PER TDRR 15950	JW		11 FEB 65	
C		REVISED PER TDRR 16333	JN		15 FEB 65	
D		REVISED PER TDRR 18692	M.			

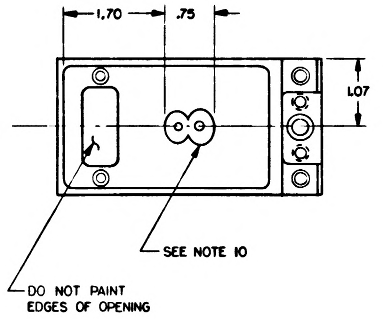

45A8J1
.12 HIGH
SEE NOTE 8
MARKING OPTIONAL

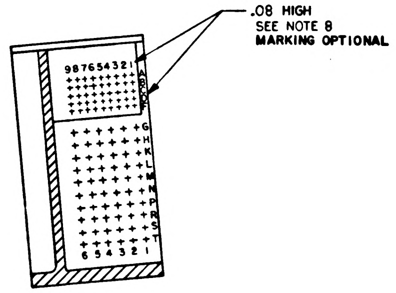
PARTIAL SECTION K-K


K
K
19
1
10
8
3
1
15 11 10 6 5 1
27 24 23 20 19 16
16
1
9
3
9
3
BUFFER CIRCUIT
TWO SPEED SWITCH
RELAY MODULE
SCT MODING
CDU D TO A CONVERTER
CDU D TO A CONVERTER
39 36 35 32 31 28
54 50 49 45 44 40
41
20
24
11
32
17
26
14
13
1
26
14
13
1
26
14
13
1
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
SURFACE-D-REF

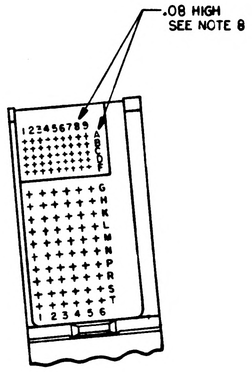
VIEW F-F ROTATED 180°


F
F
.12 HIGH REF
SEE NOTE 8
45A8P1
SEE NOTE 9
DO NOT PAINT THESE SURFACES

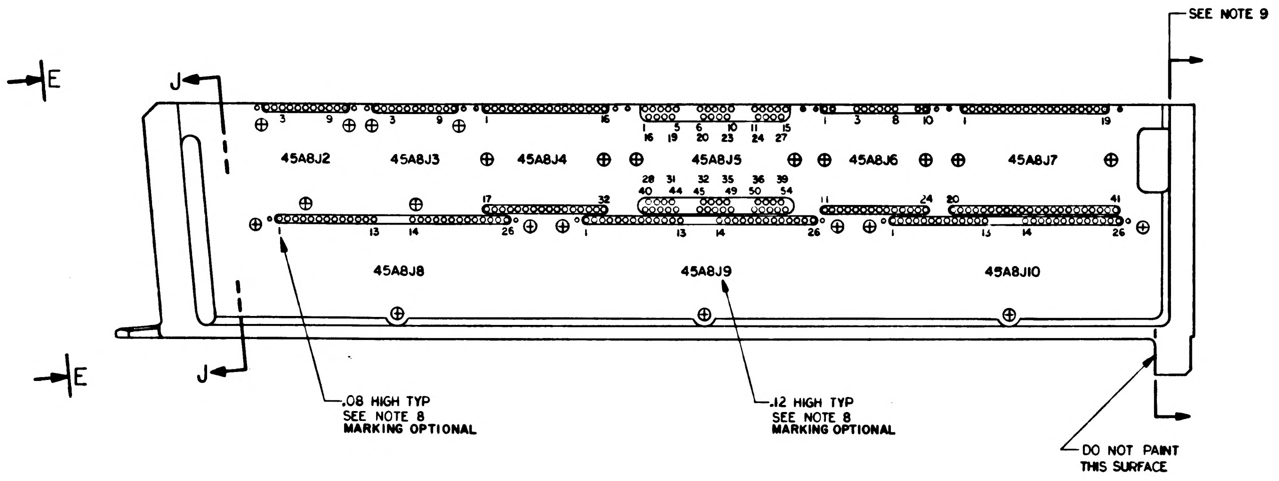

1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING


.08 HIGH
SEE NOTE 8
MARKING OPTIONAL
987654321
G
H
J
K
L
M
N
P
R
S
T
54321

SECTION J-J


.08 HIGH
SEE NOTE 8
123456789
ABCDEF
G
H
K
L
M
N
P
R
S
T
123456

PARTIAL VIEW E-E


SEE NOTE 9
E
E
J
J
3
9
3
9
1
16
1 5 6 10 11 15
16 19 20 23 24 27
1
3
8
10
1
19
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
45A8J7
28 31 32 35 36 39
40 44 45 49 50 54
17
32
11
24
20
41
1
13
14
26
1
13
14
26
1
13
14
26
45A8J8
45A8J9
45A8J10
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
DO NOT PAINT
THIS SURFACE

MARKING VIEWS

1008528 D

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — XX±.02 ± —
DO NOT SCALE THIS DRAWING

MATERIAL
—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

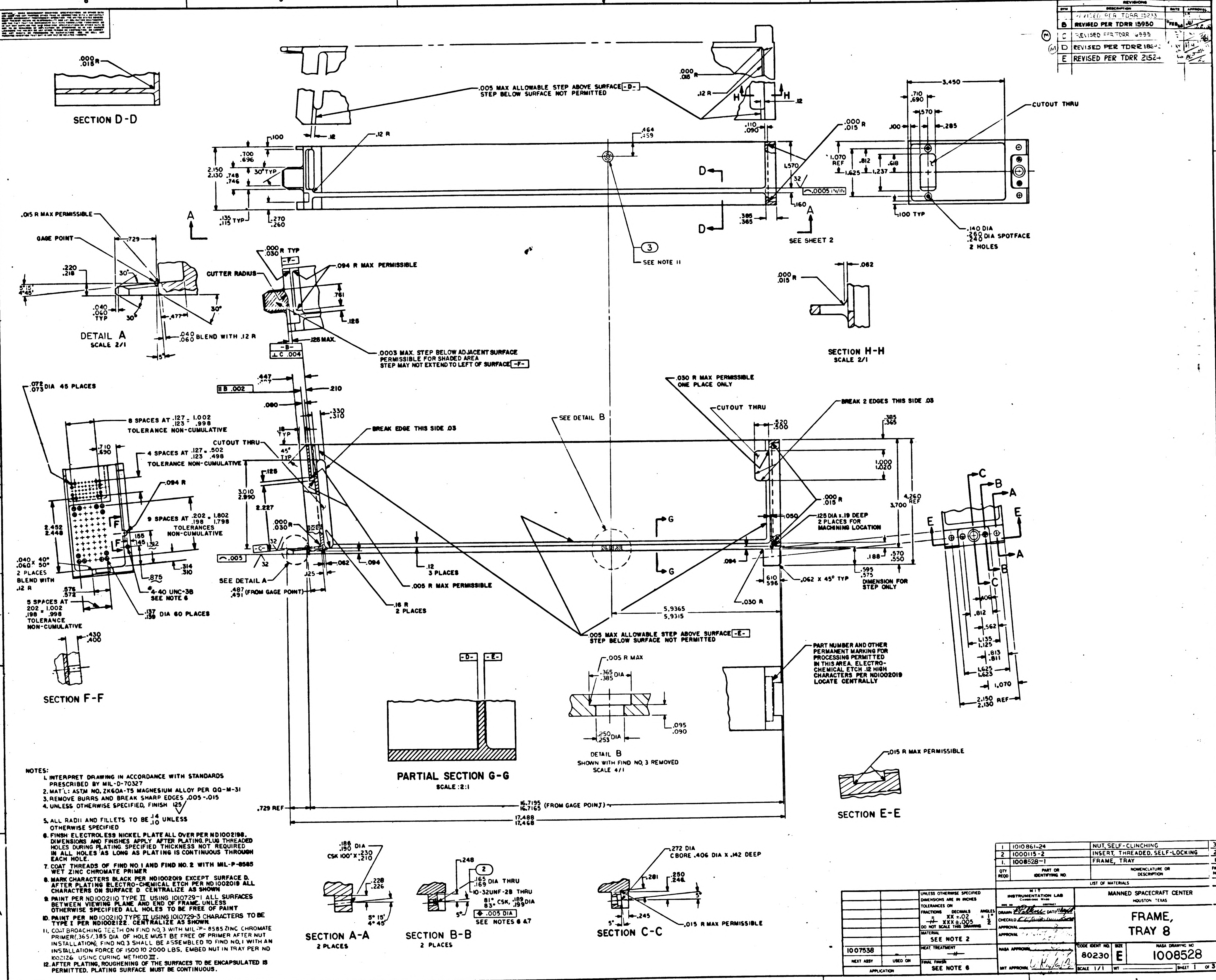
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN B J Papia 3-2-64
CHECKED
APPROVED
APPROVED
APPROVED MIT W. Wolff
APPROVED MSC
DATE

FRAME,
TRAY 8

CODE IDENT NO. 80230
SIZE E
DRAWING NO. 1008528
SCALE 1/1
SHEET 3 OF 3

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			
	REVISED PER TDRR 15233		
B	REVISED PER TDRR 15950	11 FEB 68	
C	REVISED PER TDRR 16333		
D	REVISED PER TDRR 186-		
E	REVISED PER TDRR 2152+		


SECTION D-D
.000 R .015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
H H
.12
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.464 .459
.100
.700 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.110 .090
1.570
32
.0005 IN/IN
.385 .365
.160
D
A
SEE SHEET 2
③ SEE NOTE 11
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
5°15' 4°45'
30°
.040 .060 TYP
.477
DETAIL A SCALE 2/1
.040 .060 BLEND WITH .12 R
.000 .030 R TYP
-F-
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.761
.125
.125 MAX.
-B-
⊥ C .004
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.000 R .015
.062
SECTION H-H SCALE 2/1
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998 TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 .123 = .502 .498 TOLERANCE NON-CUMULATIVE
.094 R
9 SPACES AT .202 .198 = 1.802 1.798 TOLERANCES NON-CUMULATIVE
2.452 2.448
.155 .145
.112
.040 .060 x 40° 50° 2 PLACES BLEND WITH .12 R
.875
.314 .310
.576 .572
4-40 UNC-3B SEE NOTE 6
5 SPACES AT .202 .198 = 1.002 .998 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 PLACES
.430 .400
SECTION F-F
.447
∥ B .002
.210
.080
.330 .310
.18 TYP
CUTOUT THRU
45° TYP
BREAK EDGE THIS SIDE .03
3.010 2.990
2.227
.000 .030 R
-C-
.005
SEE DETAIL A
.487 .491 (FROM GAGE POINT)
.125
.062
.094
.12 3 PLACES
.005 R MAX PERMISSIBLE
.16 R 2 PLACES
SEE DETAIL B
.030 R MAX PERMISSIBLE ONE PLACE ONLY
CUTOUT THRU
.520 .500
BREAK 2 EDGES THIS SIDE .03
.385 .365
1.000 1.020
4.260 REF
3.700
.000 R .015
.050
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
G
.094
.610 .596
.062 x 45° TYP
.188
.570 .550
.595 .575 DIMENSION FOR STEP ONLY
.030 R
5.9365 5.9315
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
C B A E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D- -E-
PARTIAL SECTION G-G SCALE 2:1
.005 R MAX
.365 .385 DIA
.250 .253 DIA
.095 .090
DETAIL B SHOWN WITH FIND NO. 3 REMOVED SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° x .230 .210
.228 .226
5° 15' 4° 45'
SECTION A-A 2 PLACES
.248
② .165 .169 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .199 DIA
⌖ .005 DIA
5°
SEE NOTES 6 & 7
SECTION B-B 2 PLACES
.272 DIA
C BORE .406 DIA x .142 DEEP
.281
.250 .248
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND 1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008528-1	FRAME, TRAY	1

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB CAMBRIDGE MASS
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

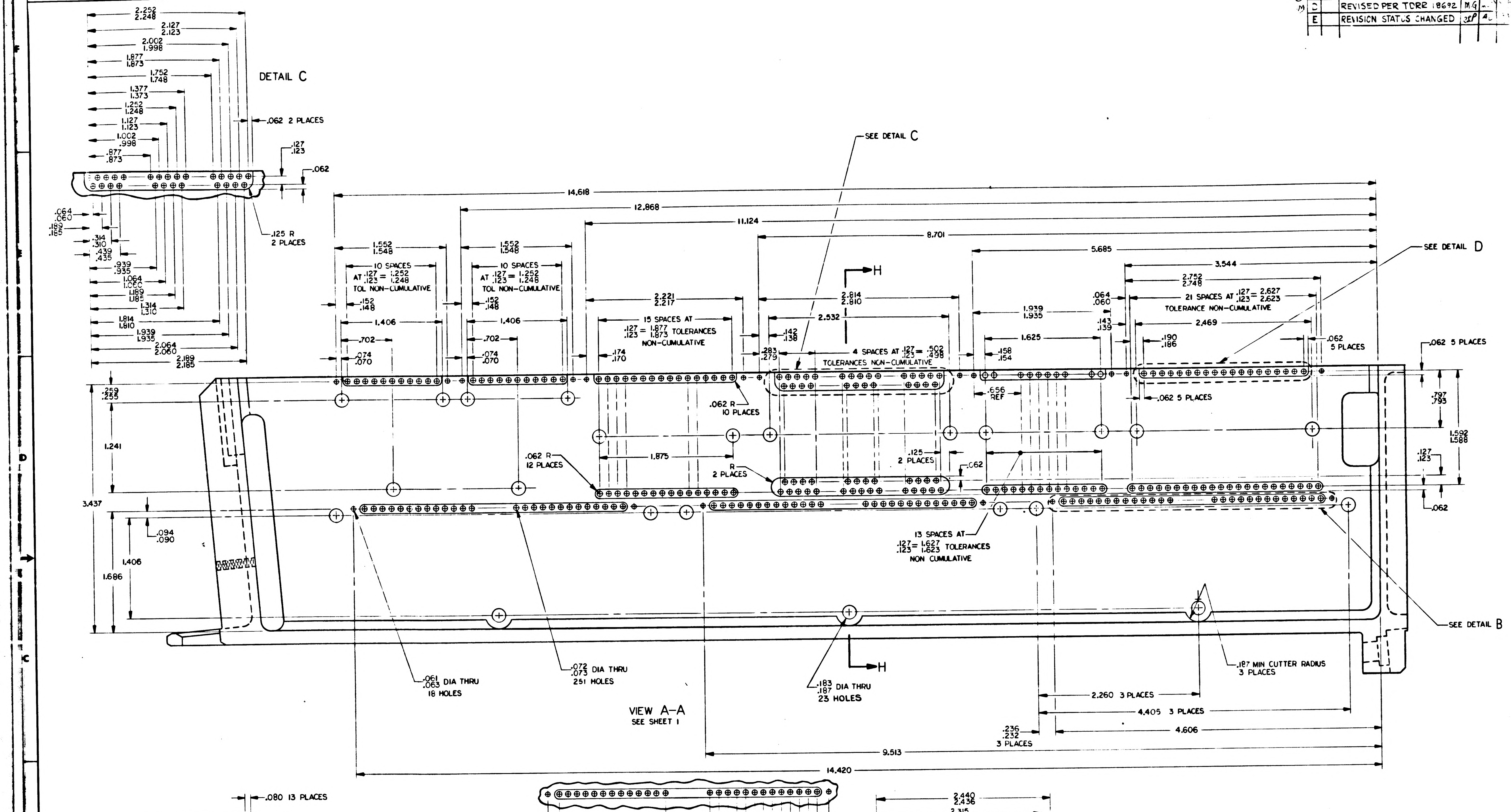
FRAME,
TRAY 8

CODE IDENT NO. 80230 SIZE E NASA DRAWING NO 1008528
SCALE 1/1 WT SHEET 1 OF 3

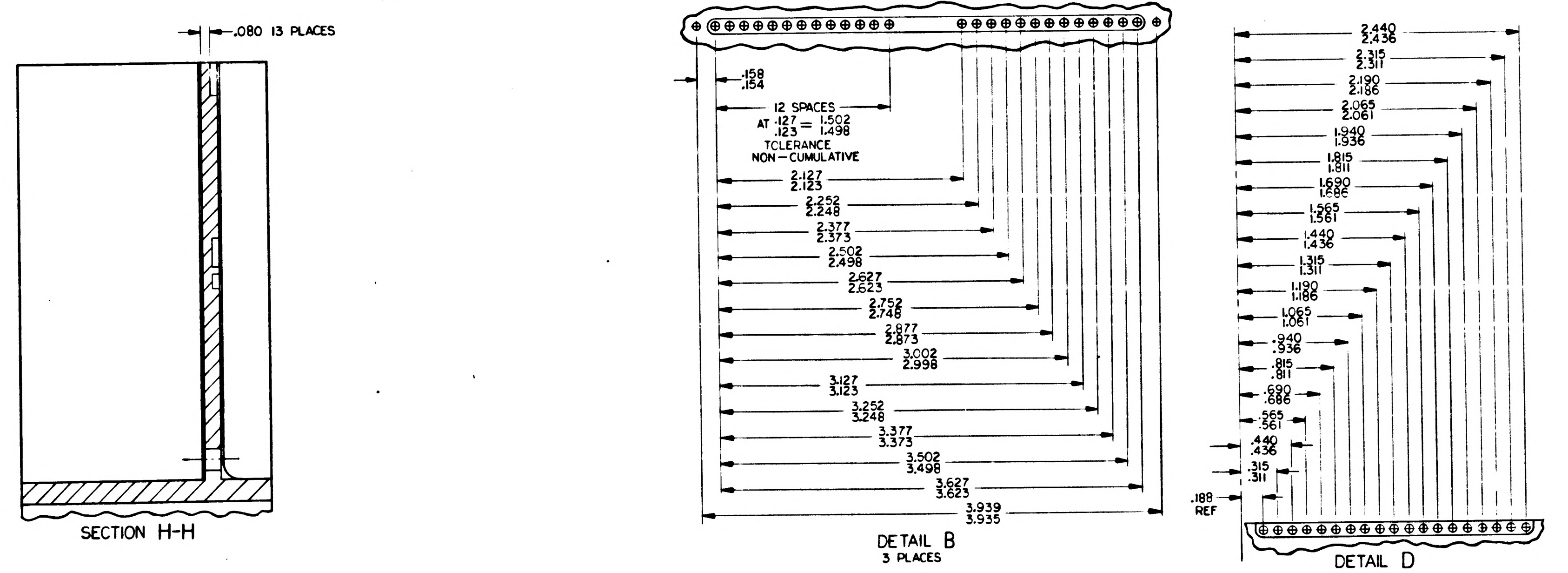
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15233	LK		[illegible]	
B		REVISED PER TDRR 15950	JW		11 FEB 65	
C		REVISED PER TDRR 16333	JM		FEB	
D		REVISED PER TDRR 18692	MG			
E		REVISION STATUS CHANGED				


DETAIL C
.062 2 PLACES
.125 R
2 PLACES
SEE DETAIL C
SEE DETAIL D
SEE DETAIL B
10 SPACES AT .127/.123 = 1.252/1.248 TOL NON-CUMULATIVE
15 SPACES AT .127/.123 = 1.877/1.873 TOLERANCES NON-CUMULATIVE
4 SPACES AT .127/.123 = .502/.498 TOLERANCES NON-CUMULATIVE
21 SPACES AT .127/.123 = 2.627/2.623 TOLERANCE NON-CUMULATIVE
13 SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON CUMULATIVE
.062 R 10 PLACES
.062 R 12 PLACES
R 2 PLACES
.125 2 PLACES
.062 5 PLACES
.656 REF
.187 MIN CUTTER RADIUS 3 PLACES
.061/.063 DIA THRU 16 HOLES
.072/.073 DIA THRU 251 HOLES
.183/.187 DIA THRU 23 HOLES
H
2.260 3 PLACES
4.405 3 PLACES
.236/.232 3 PLACES
14.618
12.868
11.124
8.701
5.685
3.544
9.513
14.420
4.606
3.437

VIEW A-A
SEE SHEET 1


.080 13 PLACES
12 SPACES AT .127/.123 = 1.502/1.498 TOLERANCE NON-CUMULATIVE
.158/.154
.188 REF

SECTION H-H

DETAIL B
3 PLACES

DETAIL D

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN C J Papia 3 Apr 64
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

FRAME,
TRAY 8

CODE IDENT NO 80230
SIZE E
DRAWING NO 1008528
SCALE 2/1
SHEET 2 OF 3

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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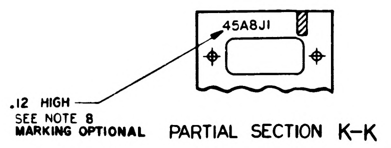
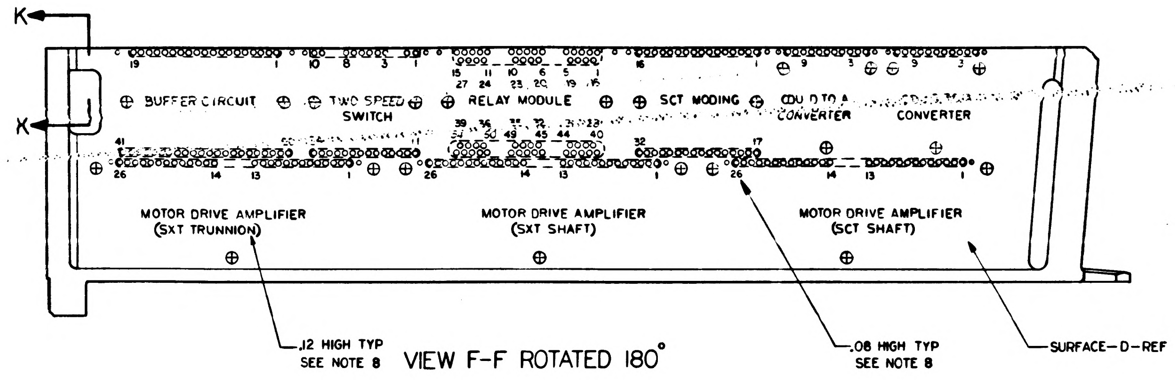
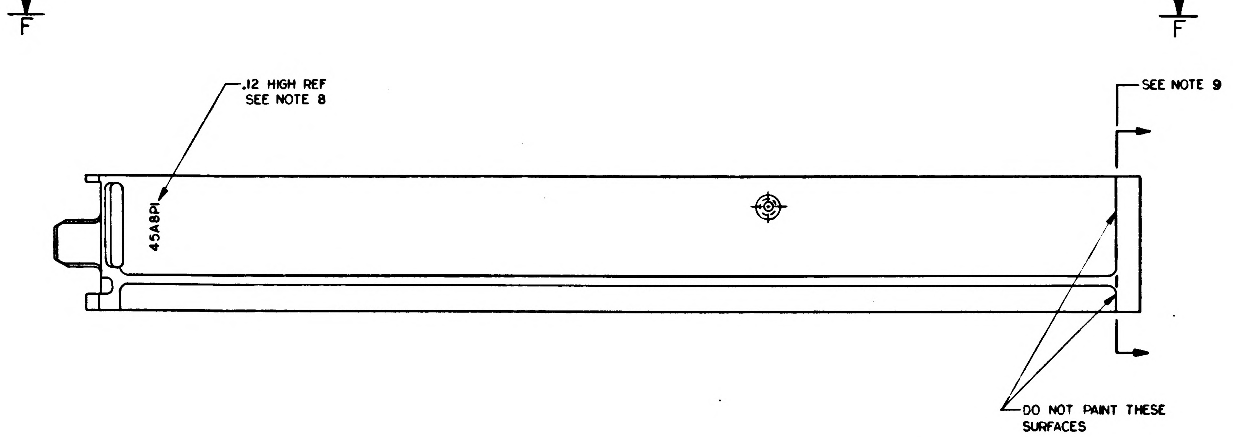
B		REVISED PER TDRR 15950	JW	[illegible]	11 FEB 65	
C		REVISED PER TDRR 16333	JN	[illegible]	5 FEB 65	
D		REVISED PER TDRR 18692	M G	[illegible]	[illegible]	
E		REVISION STATUS CHANGED	[illegible]	AU	[illegible]	

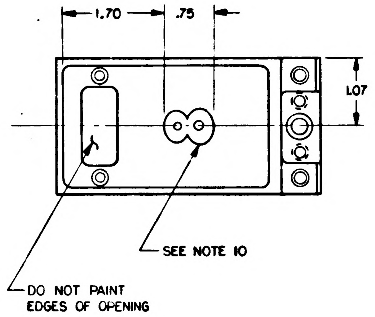

45A8J1
.12 HIGH
SEE NOTE 8
MARKING OPTIONAL

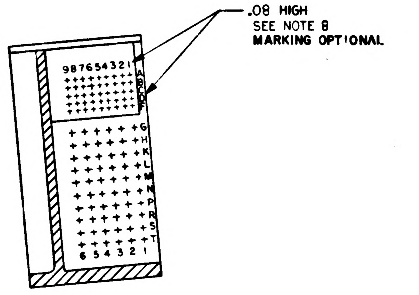
PARTIAL SECTION K-K


K
K
BUFFER CIRCUIT
TWO SPEED SWITCH
RELAY MODULE
SCT MODING
CDU D TO A CONVERTER
CONVERTER
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
SURFACE-D-REF

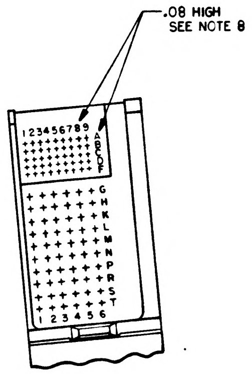
VIEW F-F ROTATED 180°


F
F
.12 HIGH REF
SEE NOTE 8
45A8P1
SEE NOTE 9
DO NOT PAINT THESE SURFACES


1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT EDGES OF OPENING


.08 HIGH
SEE NOTE 8
MARKING OPTIONAL
987654321

SECTION J-J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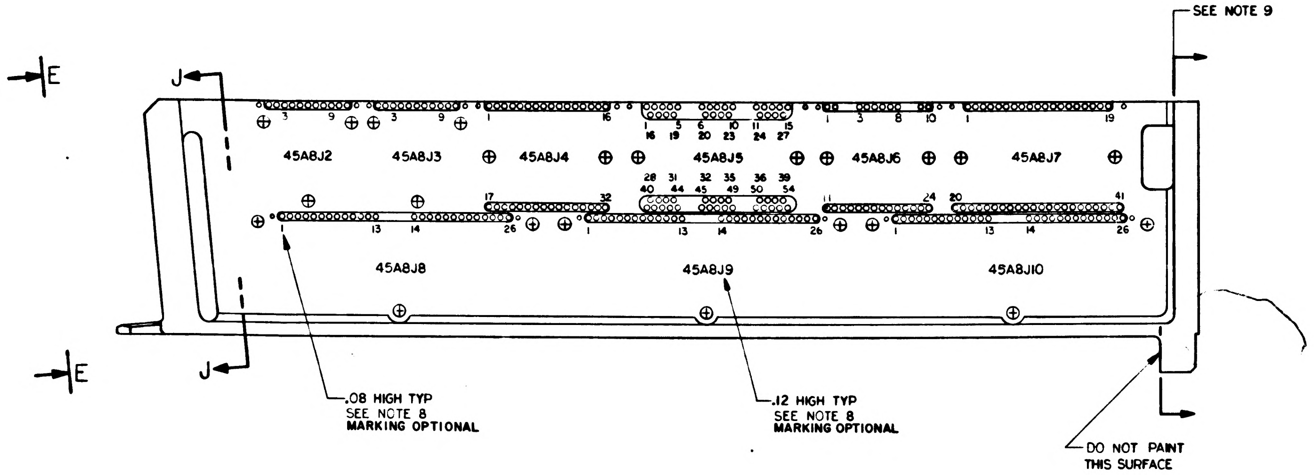
SEE NOTE 8
123456789

PARTIAL VIEW E-E


SEE NOTE 9
E
E
J
J
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
45A8J7
45A8J8
45A8J9
45A8J10
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

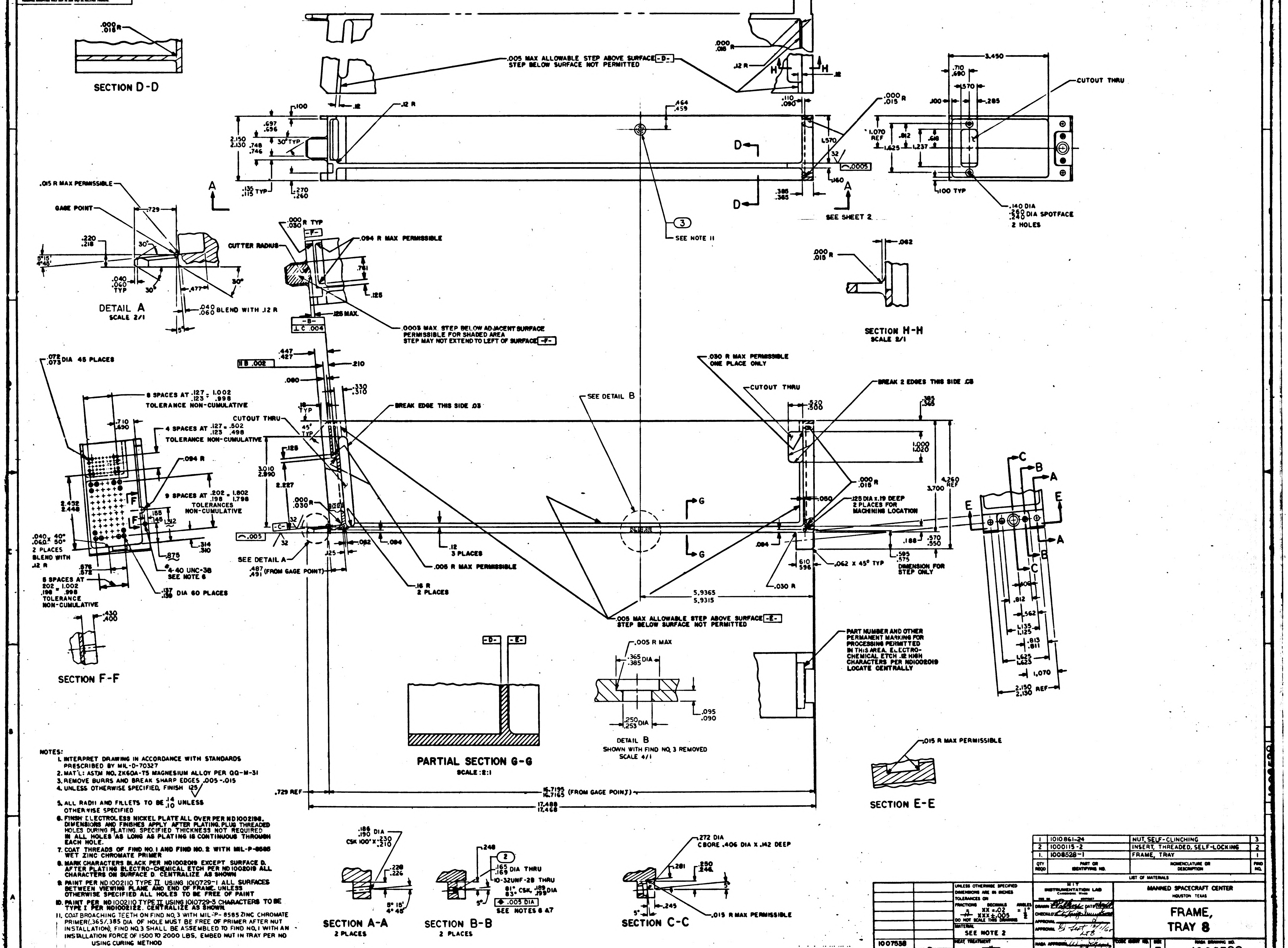
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN B. Papia 3/4/64
CHECKED [illegible] 11/64
APPROVED
APPROVED [illegible]
APPROVED MIT W. [illegible]
APPROVED MSC W. J. Rhine 12-1-64
DATE

FRAME,
TRAY 8

CODE IDENT NO 80230
SIZE E
DRAWING NO. 1008528
SCALE 1/1
SHEET 3 OF 3


SECTION D-D
.000 / .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
H H
3.450
CUTOUT THRU
.140 DIA / .260 / .240 DIA SPOTFACE 2 HOLES
D D A A
SEE SHEET 2
③ SEE NOTE 11
DETAIL A SCALE 2/1
GAGE POINT
.015 R MAX PERMISSIBLE
BLEND WITH .12 R
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0005 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SECTION H-H SCALE 2/1
.072 / .075 DIA 45 PLACES
8 SPACES AT .127 / .123 = 1.002 / .998 TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 / .125 = .502 / .498 TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 / .198 = 1.802 / 1.798 TOLERANCES NON-CUMULATIVE
#4-40 UNC-3B SEE NOTE 6
.137 / .139 DIA 60 PLACES
5 SPACES AT .202 / .198 = 1.002 / .998 TOLERANCE NON-CUMULATIVE
SECTION F-F
CUTOUT THRU
BREAK EDGE THIS SIDE .03
SEE DETAIL A
.487 / .491 (FROM GAGE POINT)
.005 R MAX PERMISSIBLE
.16 R 2 PLACES
.12 3 PLACES
SEE DETAIL B
G G
.030 R MAX PERMISSIBLE ONE PLACE ONLY
BREAK 2 EDGES THIS SIDE .03
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
.062 x 45° TYP
DIMENSION FOR STEP ONLY
5.9365 / 5.9315
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
C B A E
PARTIAL SECTION G-G SCALE :2:1
DETAIL B SHOWN WITH FIND NO. 3 REMOVED SCALE 4/1
.005 R MAX
.729 REF
16.7195 / 16.7165 (FROM GAGE POINT)
17.488 / 17.468
.015 R MAX PERMISSIBLE
SECTION E-E
SECTION A-A 2 PLACES
SECTION B-B 2 PLACES
SECTION C-C
.272 DIA CBORE .406 DIA X .142 DEEP
.165 / .169 DIA THRU 10-32UNF-2B THRU
SEE NOTES 6 & 7
MASTER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008528-1	FRAME, TRAY	1

LIST OF MATERIALS

1007538	—
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS
DRAWN
CHECKED
APPROVAL
APPROVAL 12/1/66
NASA APPROVAL 2-1-67
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

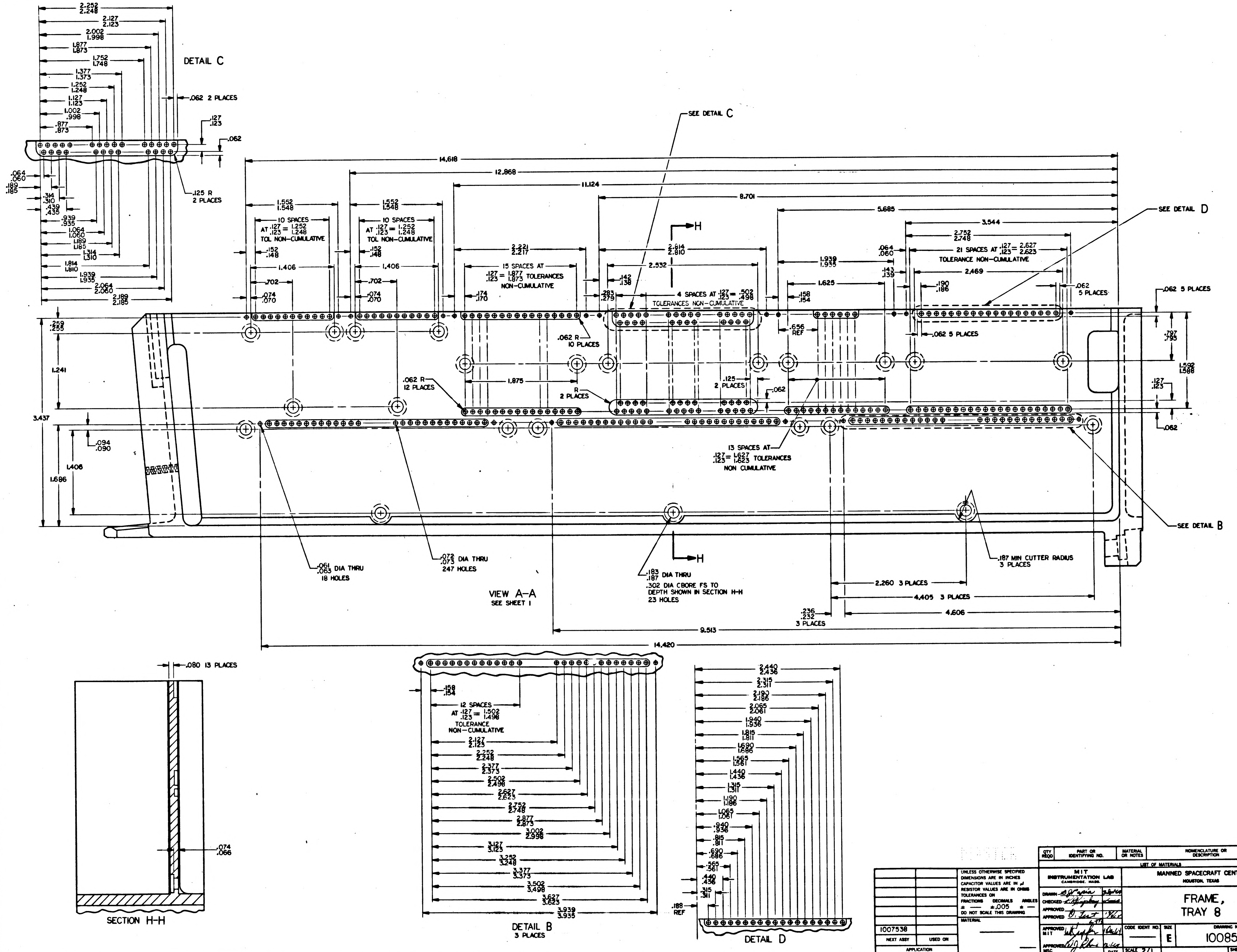
FRAME,
TRAY 8

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008528
SCALE 1/1 WT — SHEET 1 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1/627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


DETAIL C
2.252 2.248
2.127 2.123
2.002 1.998
1.877 1.873
1.752 1.748
1.377 1.373
1.252 1.248
1.127 1.123
1.002 .998
.877 .873
.062 2 PLACES
.127 .123
.062
.064 .060
.189 .185
.314 .310
.439 .435
.939 .935
1.064 1.060
1.189 1.185
1.314 1.310
1.814 1.810
1.939 1.935
2.064 2.060
2.189 2.185
.125 R 2 PLACES
SEE DETAIL C
SEE DETAIL D
SEE DETAIL B
14.618
12.868
11.124
8.701
5.685
3.544
1.552 1.548
10 SPACES AT .127 .123 = 1.252 1.248 TOL NON-CUMULATIVE
.152 .148
1.406
.702
.074 .070
2.221 2.217
15 SPACES AT .127 .123 = 1.877 1.873 TOLERANCES NON-CUMULATIVE
.174 .170
2.614 2.610
2.532
.142 .138
.283 .279
4 SPACES AT .127 .123 = .502 .498 TOLERANCES NON-CUMULATIVE
1.939 1.935
1.625
.158 .154
.656 REF
.064 .060
.143 .139
2.752 2.748
21 SPACES AT .127 .123 = 2.627 2.623 TOLERANCE NON-CUMULATIVE
2.469
.190 .186
.062 5 PLACES
.062 5 PLACES
.062 5 PLACES
.797 .793
1.592 1.588
.127 .123
.062
.062 R 10 PLACES
.062 R 12 PLACES
1.875
R 2 PLACES
.125 2 PLACES
.062
.259 .255
1.241
3.437
.094 .090
1.406
1.686
13 SPACES AT .127 .123 = 1.627 1.623 TOLERANCES NON CUMULATIVE
H
H
.061 .063 DIA THRU 18 HOLES
.072 .073 DIA THRU 247 HOLES
.183 .187 DIA THRU .302 DIA CBORE FS TO DEPTH SHOWN IN SECTION H-H 23 HOLES
.187 MIN CUTTER RADIUS 3 PLACES
VIEW A-A SEE SHEET 1
2.260 3 PLACES
4.405 3 PLACES
4.606
.236 .232 3 PLACES
9.513
14.420
.080 13 PLACES
.074 .066
SECTION H-H
.158 .154
12 SPACES AT .127 .123 = 1.502 1.498 TOLERANCE NON-CUMULATIVE
2.127 2.123
2.252 2.248
2.377 2.373
2.502 2.498
2.627 2.623
2.752 2.748
2.877 2.873
3.002 2.998
3.127 3.123
3.252 3.248
3.377 3.373
3.502 3.498
3.627 3.623
3.939 3.935
DETAIL B 3 PLACES
2.440 2.436
2.315 2.311
2.190 2.186
2.065 2.061
1.940 1.936
1.815 1.811
1.690 1.686
1.565 1.561
1.440 1.436
1.315 1.311
1.190 1.186
1.065 1.061
.940 .936
.815 .811
.690 .686
.565 .561
.440 .436
.315 .311
.188 REF
DETAIL D
6
5
4
3
2
1

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN S. J. Papia 3 Sept 64
CHECKED R. Kingsbury
APPROVED
APPROVED D. Test
APPROVED MIT 10 Dec 64
APPROVED MSC 12-1-64
DATE

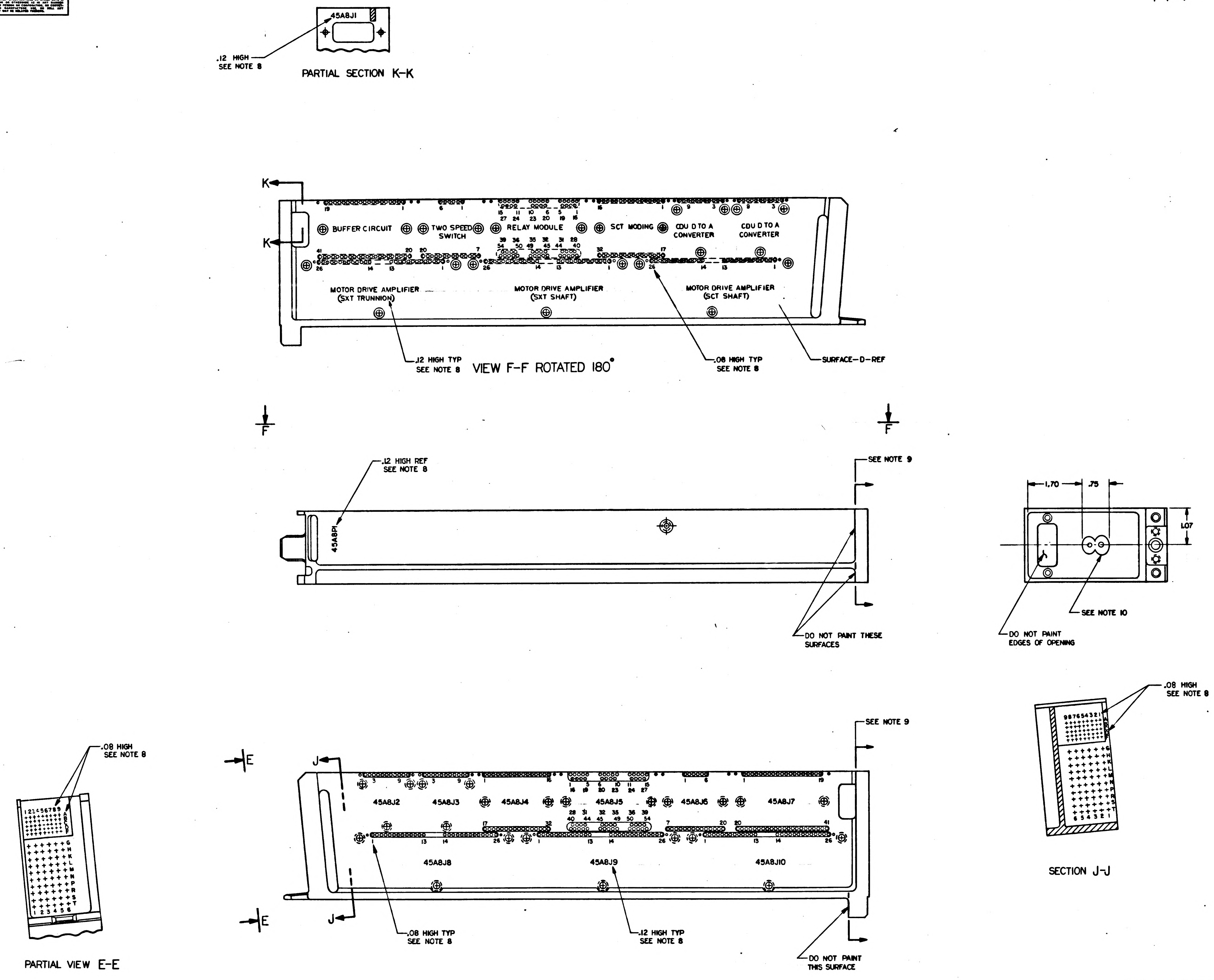
FRAME,
TRAY 8

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008528
SCALE 2/1
SHEET 2 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


45A8J1
.12 HIGH
SEE NOTE 8
PARTIAL SECTION K-K
K
K
BUFFER CIRCUIT
TWO SPEED SWITCH
RELAY MODULE
SCT MODING
CDU D TO A CONVERTER
CDU D TO A CONVERTER
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
.12 HIGH TYP
SEE NOTE 8
VIEW F-F ROTATED 180°
.08 HIGH TYP
SEE NOTE 8
SURFACE-D-REF
F
F
.12 HIGH REF
SEE NOTE 8
45A8P1
SEE NOTE 9
DO NOT PAINT THESE SURFACES
1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT EDGES OF OPENING
.08 HIGH
SEE NOTE 8
SECTION J-J
.08 HIGH
SEE NOTE 8
PARTIAL VIEW E-E
E
E
J
J
SEE NOTE 9
45A8J2
45A8J3
45A8J4
45A8J5
45A8J6
45A8J7
45A8J8
45A8J9
45A8J10
.08 HIGH TYP
SEE NOTE 8
.12 HIGH TYP
SEE NOTE 8
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — XX±.02 ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

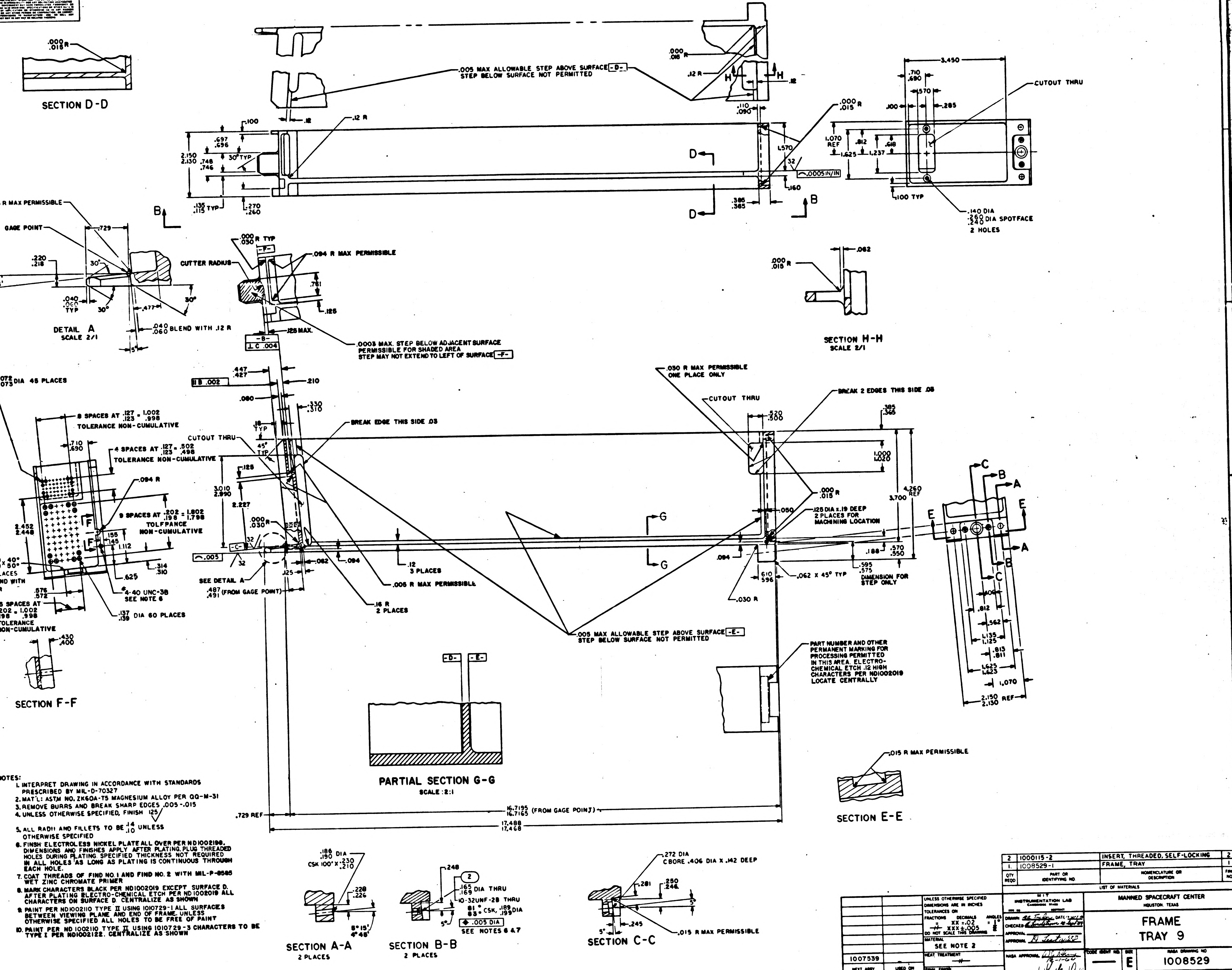
DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

FRAME,
TRAY 8

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008528
SCALE 1/1
SHEET 3 OF 3

1008528

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15229		



.000 .015 R
SECTION D-D
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
H
.110 .090
.000 .015 R
3.450
CUTOUT THRU
.710 .690
.570
.100
.285
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.100
.697 .696
30° TYP
2.150 2.130
.748 .746
.135 .115 TYP
.270 .260
D
B
1.570
.32
.0005 IN/IN
.160
.385 .365
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5°15' 4°45'
.040 .060 TYP
.477
DETAIL A
SCALE 2/1
.040 .060 BLEND WITH .12 R
5°
.000 .030 R TYP
-F-
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.781
.125
-B-
⊥ C .004
.125 MAX.
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.062
.000 .015 R
SECTION H-H
SCALE 2/1
.072 .075 DIA 48 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
.710 .690
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
.094 R
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
2.452 2.448
.155 .145
1.112
.040 x 40° .060 50°
2 PLACES
BLEND WITH .12 R
.625
.314 .310
#4-40 UNC-3B
SEE NOTE 6
.576 .572
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 PLACES
.430 .400
SECTION F-F
.447 .427
B .002
.210
.080
.330 .310
.18 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
.125
3.010 2.990
2.227
.000 .030 R
-C-
.005
SEE DETAIL A
.487 .491 (FROM GAGE POINT)
.062
.094
.12
3 PLACES
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
CUTOUT THRU
BREAK 2 EDGES THIS SIDE .03
.520 .500
.385 .365
1.000 1.020
4.260 REF
3.700
.000 .015 R
.050
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
G
.188
.570 .550
.595 .575
DIMENSION FOR STEP ONLY
.610 .596
.062 X 45° TYP
.030 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
C
A
E
.400
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D- -E-
PARTIAL SECTION G-G
SCALE :2:1
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°15' 4°45'
SECTION A-A
2 PLACES
.248
②
.165 .169 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .193 DIA
◆ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
C BORE .406 DIA X .142 DEEP
.281
.250 .246
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND 1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1.	1008529-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTE 2
HEAT TREATMENT: —
FINAL FINISH: SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN R.R. Taylor DATE 12 Sept 64
CHECKED 10 Sept 64
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

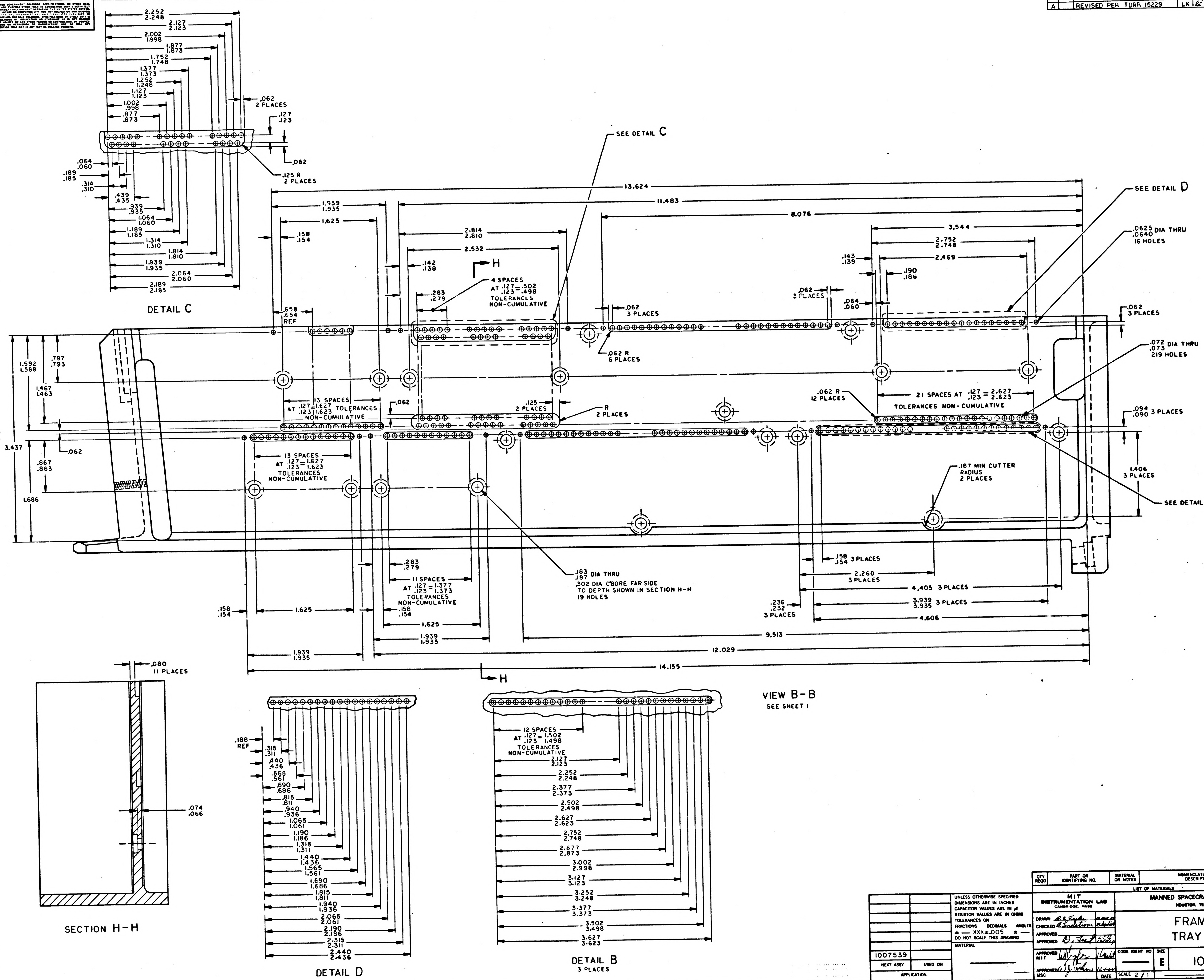
FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1008529
SCALE 1/1
WT —
SHEET 1 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK			



DETAIL C
2.252 / 2.248
2.127 / 2.123
2.002 / 1.998
1.877 / 1.873
1.752 / 1.748
1.377 / 1.373
1.252 / 1.248
1.127 / 1.123
1.002 / .998
.877 / .873
.062 2 PLACES
.127 / .123
.062
.125 R 2 PLACES
.064 / .060
.189 / .185
.314 / .310
.439 / .435
.939 / .935
1.064 / 1.060
1.189 / 1.185
1.314 / 1.310
1.814 / 1.810
1.939 / 1.935
2.064 / 2.060
2.189 / 2.185
SEE DETAIL C
SEE DETAIL D
13.624
11.483
8.076
1.939 / 1.935
1.625
.158 / .154
2.814 / 2.810
2.532
.142 / .138
H
4 SPACES AT .127 / .123 = .502 / .498 TOLERANCES NON-CUMULATIVE
.283 / .279
.658 / .654 REF
3.544
2.752 / 2.748
2.469
.143 / .139
.190 / .186
.062 3 PLACES
.064 / .060
.0625 / .0640 DIA THRU 16 HOLES
.062 3 PLACES
.062 R 6 PLACES
.072 / .073 DIA THRU 219 HOLES
.062 R 12 PLACES
21 SPACES AT .127 / .123 = 2.627 / 2.623
TOLERANCES NON-CUMULATIVE
.094 / .090 3 PLACES
1.592 / 1.588
.797 / .793
1.467 / 1.463
13 SPACES AT .127 / .123 = 1.627 / 1.623 TOLERANCES NON-CUMULATIVE
.062
.125 2 PLACES
R 2 PLACES
3.437
.062
.867 / .863
13 SPACES AT .127 / .123 = 1.627 / 1.623 TOLERANCES NON-CUMULATIVE
1.686
.187 MIN CUTTER RADIUS 2 PLACES
1.406 3 PLACES
SEE DETAIL B
.283 / .279
11 SPACES AT .127 / .123 = 1.377 / 1.373 TOLERANCES NON-CUMULATIVE
.158 / .154
.183 / .187 DIA THRU
.302 DIA C'BORE FAR SIDE TO DEPTH SHOWN IN SECTION H-H
19 HOLES
.158 / .154 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
3.939 / 3.935 3 PLACES
.236 / .232 3 PLACES
4.606
.158 / .154
1.625
1.625
1.939 / 1.935
9.513
1.939 / 1.935
12.029
14.155
H
VIEW B-B
SEE SHEET 1
.080 11 PLACES
.074 / .066
SECTION H-H
.188 REF
.315 / .311
.440 / .436
.565 / .561
.690 / .686
.815 / .811
.940 / .936
1.065 / 1.061
1.190 / 1.186
1.315 / 1.311
1.440 / 1.436
1.565 / 1.561
1.690 / 1.686
1.815 / 1.811
1.940 / 1.936
2.065 / 2.061
2.190 / 2.186
2.315 / 2.311
2.440 / 2.436
DETAIL D
12 SPACES AT .127 / .123 = 1.502 / 1.498 TOLERANCES NON-CUMULATIVE
2.127 / 2.123
2.252 / 2.248
2.377 / 2.373
2.502 / 2.498
2.627 / 2.623
2.752 / 2.748
2.877 / 2.873
3.002 / 2.998
3.127 / 3.123
3.252 / 3.248
3.377 / 3.373
3.502 / 3.498
3.627 / 3.623
DETAIL B
3 PLACES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XXX ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN
CHECKED A. Lindstrom
APPROVED
APPROVED D. Test
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008529
SCALE 2/1
SHEET 2 OF 3

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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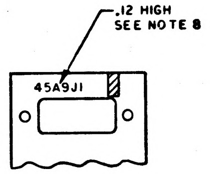
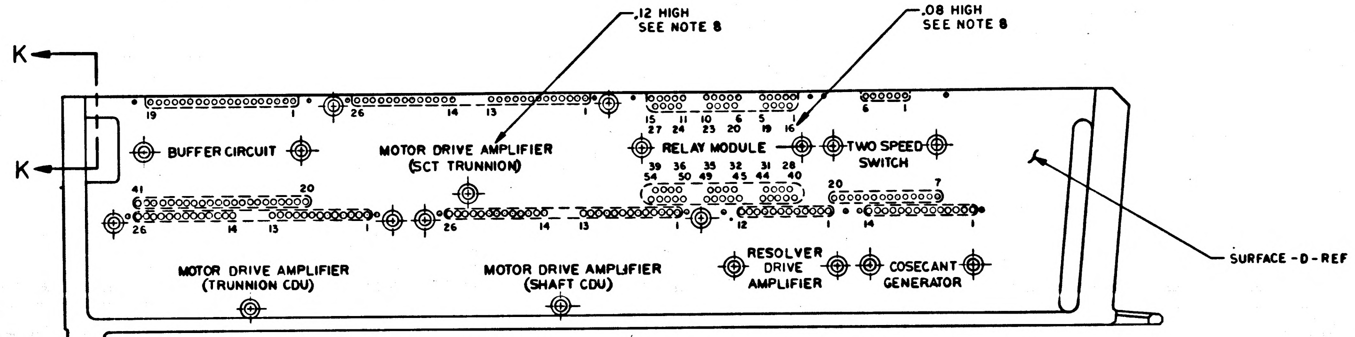
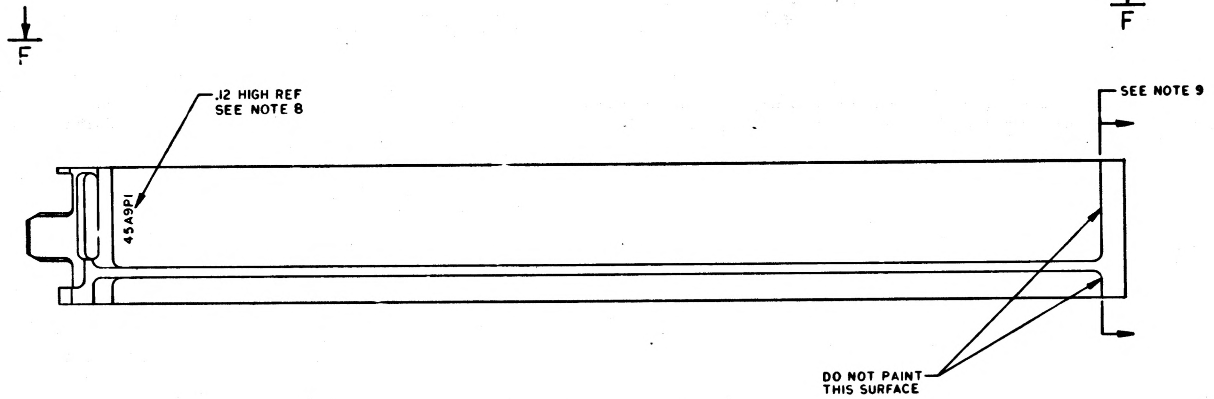
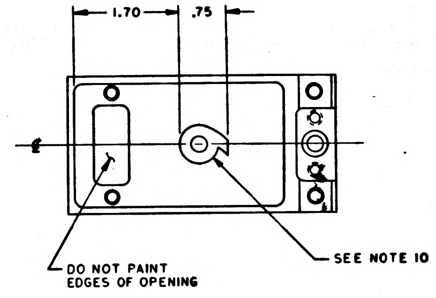

.12 HIGH
SEE NOTE 8
45A9J1

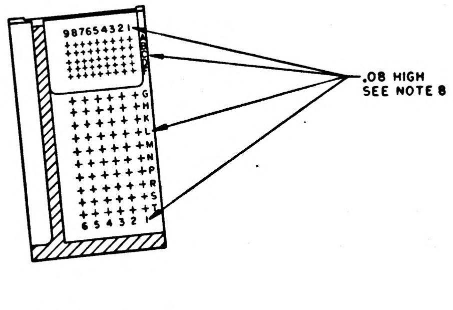
PARTIAL SECTION K-K


.12 HIGH
SEE NOTE 8
.08 HIGH
SEE NOTE 8
K
K
BUFFER CIRCUIT
MOTOR DRIVE AMPLIFIER
(SCT TRUNNION)
RELAY MODULE
TWO SPEED
SWITCH
MOTOR DRIVE AMPLIFIER
(TRUNNION CDU)
MOTOR DRIVE AMPLIFIER
(SHAFT CDU)
RESOLVER
DRIVE
AMPLIFIER
COSECANT
GENERATOR
SURFACE -D- REF
19
1
26
14
13
15 11 10 6 5 1
27 24 23 20 19 16
39 36 35 32 31 28
54 50 49 45 44 40
41
20
7
12

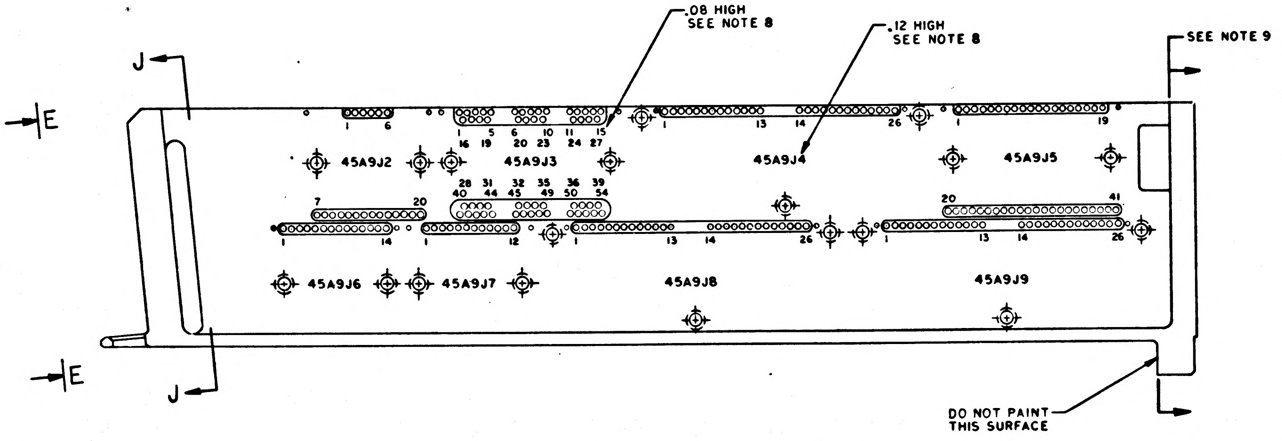
VIEW F-F
ROTATED 180°

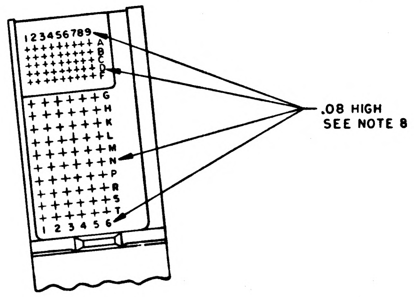

F
F
.12 HIGH REF
SEE NOTE 8
45A9P1
SEE NOTE 9
DO NOT PAINT
THIS SURFACE


1.70
.75
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10


987654321
.08 HIGH
SEE NOTE 8
G
H
K
L
M
N
P
R
S
T
65432

SECTION J-J


.08 HIGH
SEE NOTE 8
.12 HIGH
SEE NOTE 8
SEE NOTE 9
J
J
E
E
45A9J2
45A9J3
45A9J4
45A9J5
45A9J6
45A9J7
45A9J8
45A9J9
1 6
1 5 6 10 11 15
16 19 20 23 24 27
28 31 32 35 36 39
40 44 45 49 50 54
7 20
20 41
1 13 14 26
1 19
1 14
1 12
DO NOT PAINT
THIS SURFACE


123456789
A
B
G
H
K
L
M
N
P
R
S
T
123456
.08 HIGH
SEE NOTE 8

PARTIAL VIEW E-E

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

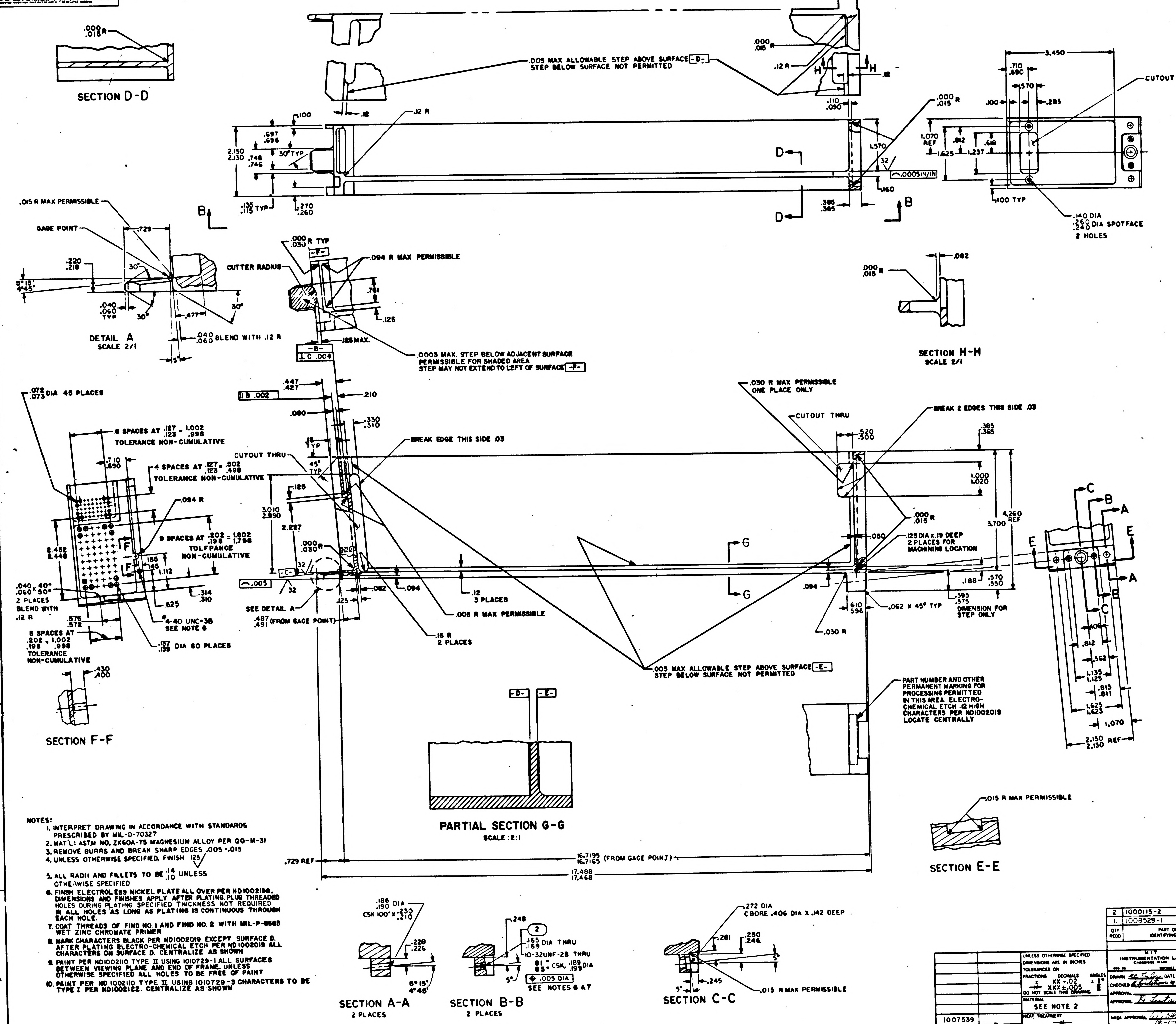
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN R.C. Taylor 21 AUG 63
CHECKED A. Lindstrom 13 Sept
APPROVED
APPROVED D. Test 458 11/1/64
APPROVED MIT W Kupfer 1 Dec 64
APPROVED MSC W J Kane 12-44
DATE

FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008529
SCALE 1/1
SHEET 3 OF 3

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15229		
B	REVISED PER TDRR 15472		


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.000 .015 R
.12 R
H H
.12
.110 .090
.100
.12
.12 R
.697 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
D
.570
32
⌒.0005 IN/IN
.160
.385 .365
D
B
B
.000 .015 R
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
5°15' 4°45'
30°
30°
30°
.040 .060 TYP
.477
.040 .060 BLEND WITH .12 R
5°
DETAIL A
SCALE 2/1
.000 .030 R TYP
-F-
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
-B-
⊥ C .004
.125 MAX.
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.000 .015 R
.062
SECTION H-H
SCALE 2/1
.447 .427
∥ B .002
.210
.080
.330 .310
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
.710 .690
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
.094 R
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
2.452 2.448
F
F
.155 .145
1.112
.040 .060 × 40° 50°
2 PLACES
BLEND WITH .12 R
.576 .572
.625
.314 .310
#4-40 UNC-3B
SEE NOTE 6
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
.137 .136 DIA 60 PLACES
.430 .400
SECTION F-F
.18 TYP
CUTOUT THRU
45° TYP
BREAK EDGE THIS SIDE .03
.125
3.010 2.990
2.227
.000 .030 R
-C-
32
32
⌒.005
SEE DETAIL A
.062
.094
.125
.487 .491 (FROM GAGE POINT)
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.12
3 PLACES
G
G
.030 R MAX PERMISSIBLE ONE PLACE ONLY
CUTOUT THRU
BREAK 2 EDGES THIS SIDE .03
.520 .500
.385 .365
1.000 1.020
4.260 REF
3.700
.000 .015 R
.050
.125 DIA × .19 DEEP
2 PLACES FOR MACHINING LOCATION
.094
.188
.570 .550
.610 .596
.062 X 45° TYP
.595 .575
DIMENSION FOR STEP ONLY
.030 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
C
B
A
E
E
A
B
C
.406
.812
.562
1.135 1.125
1.813 1.811
1.625 1.623
1.070
2.150 2.130 REF
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
-D-
-E-
PARTIAL SECTION G-G
SCALE 2:1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°15' 4°45'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .199 DIA
5°
⊕ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008529-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN RC Taylor DATE
CHECKED Lindstrom 10 Sept 64
APPROVAL
APPROVAL D. Lentini
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

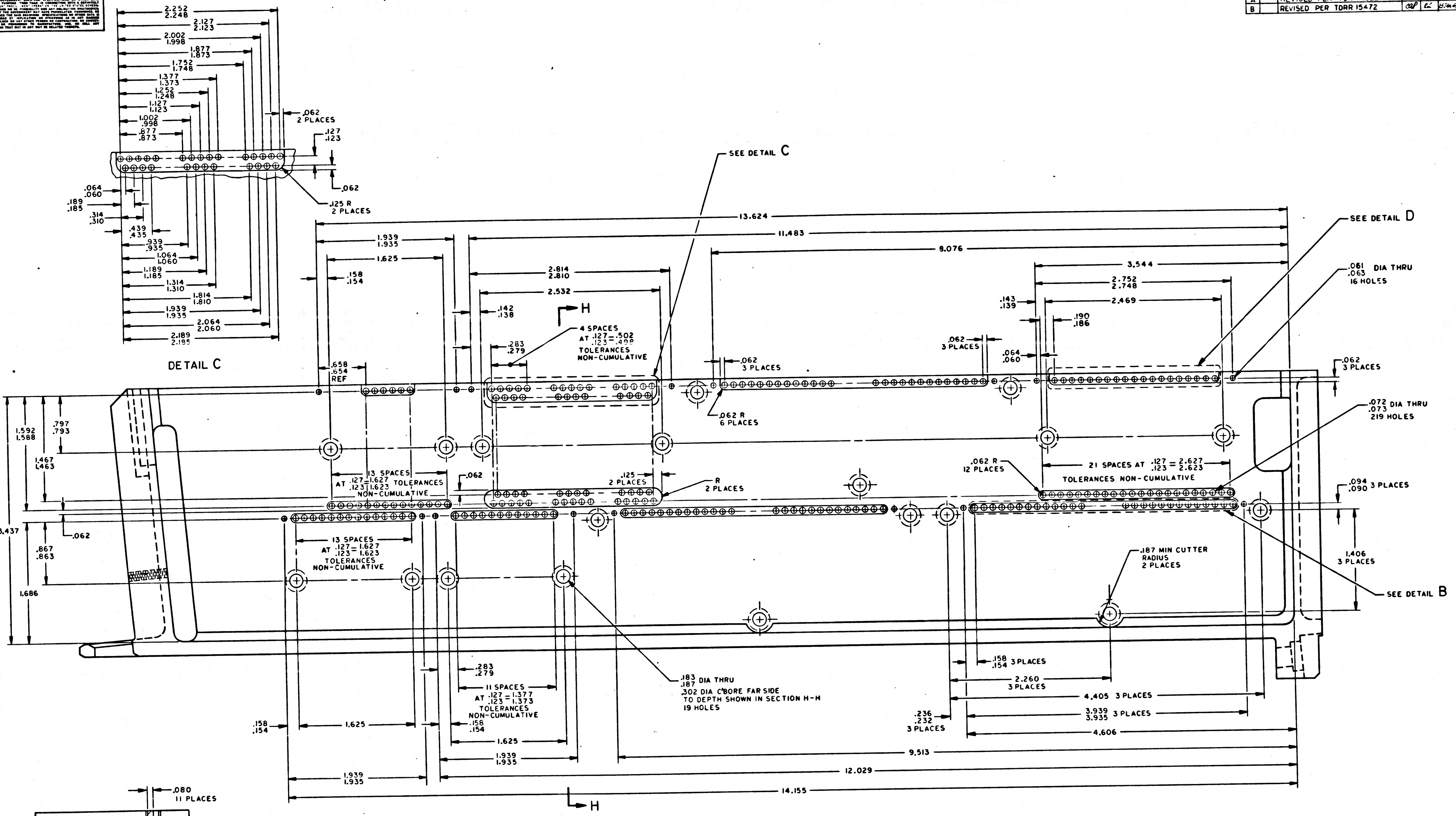
FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1008529
SCALE 1/1
WT —
SHEET 1 OF 3

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 17527

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK			
B		REVISED PER TDRR 15472				

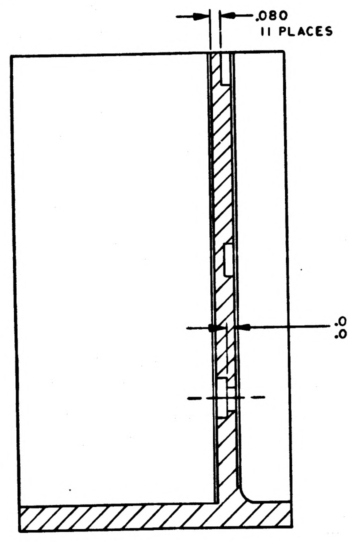


2.252 / 2.248
2.127 / 2.123
2.002 / 1.998
1.877 / 1.873
1.752 / 1.748
1.377 / 1.373
1.252 / 1.248
1.127 / 1.123
1.002 / .998
.877 / .873
.062 2 PLACES
.127 / .123
.062
.125 R 2 PLACES
.064 / .060
.189 / .185
.314 / .310
.439 / .435
.939 / .935
1.064 / 1.060
1.189 / 1.185
1.314 / 1.310
1.814 / 1.810
1.939 / 1.935
2.064 / 2.060
2.189 / 2.185

DETAIL C

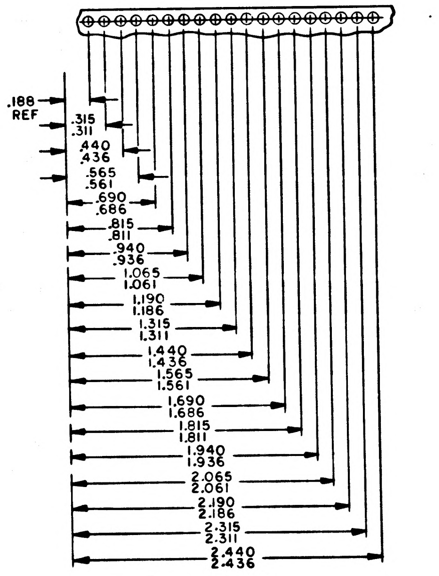
SEE DETAIL C
13.624
11.483
8.076
1.939 / 1.935
1.625
.158 / .154
2.814 / 2.810
2.532
.142 / .138
H
4 SPACES AT .127/.123 = .502/.498 TOLERANCES NON-CUMULATIVE
.283 / .279
.658 / .654 REF
.062 3 PLACES
.062 R 6 PLACES
SEE DETAIL D
3.544
2.752 / 2.748
2.469
.143 / .139
.190 / .186
.062 3 PLACES
.064 / .060
.061 / .063 DIA THRU 16 HOLES
.062 3 PLACES
.072 / .073 DIA THRU 219 HOLES
1.592 / 1.588
.797 / .793
1.467 / 1.463
13 SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
.062
.125 2 PLACES
R 2 PLACES
.062 R 12 PLACES
21 SPACES AT .127/.123 = 2.627/2.623 TOLERANCES NON-CUMULATIVE
.094 / .090 3 PLACES
3.437
.062
.867 / .863
1.686
13 SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
1.406 3 PLACES
.187 MIN CUTTER RADIUS 2 PLACES
SEE DETAIL B
.283 / .279
11 SPACES AT .127/.123 = 1.377/1.373 TOLERANCES NON-CUMULATIVE
.158 / .154
.183 / .187 DIA THRU .302 DIA C'BORE FAR SIDE TO DEPTH SHOWN IN SECTION H-H 19 HOLES
.158 / .154 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
.236 / .232 3 PLACES
3.939 / 3.935 3 PLACES
4.606
.158 / .154
1.625
1.625
1.939 / 1.935
9.513
1.939 / 1.935
12.029
14.155
H

VIEW B-B
SEE SHEET 1



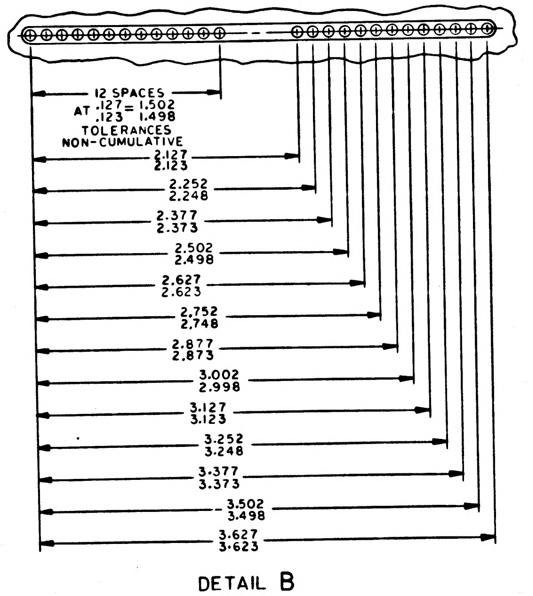
.080 11 PLACES
.074 / .066

SECTION H-H



.188 REF
.315 / .311
.440 / .436
.565 / .561
.690 / .686
.815 / .811
.940 / .936
1.065 / 1.061
1.190 / 1.186
1.315 / 1.311
1.440 / 1.436
1.565 / 1.561
1.690 / 1.686
1.815 / 1.811
1.940 / 1.936
2.065 / 2.061
2.190 / 2.186
2.315 / 2.311
2.440 / 2.436

DETAIL D



12 SPACES AT .127/.123 = 1.502/1.498 TOLERANCES NON-CUMULATIVE
2.127 / 2.123
2.252 / 2.248
2.377 / 2.373
2.502 / 2.498
2.627 / 2.623
2.752 / 2.748
2.877 / 2.873
3.002 / 2.998
3.127 / 3.123
3.252 / 3.248
3.377 / 3.373
3.502 / 3.498
3.627 / 3.623

DETAIL B
3 PLACES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XXX±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. C. Taylor
CHECKED A. Lindstrom
APPROVED
APPROVED D. Test
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008529
SCALE 2/1
SHEET 2 OF 3

1008529 B

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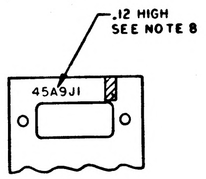
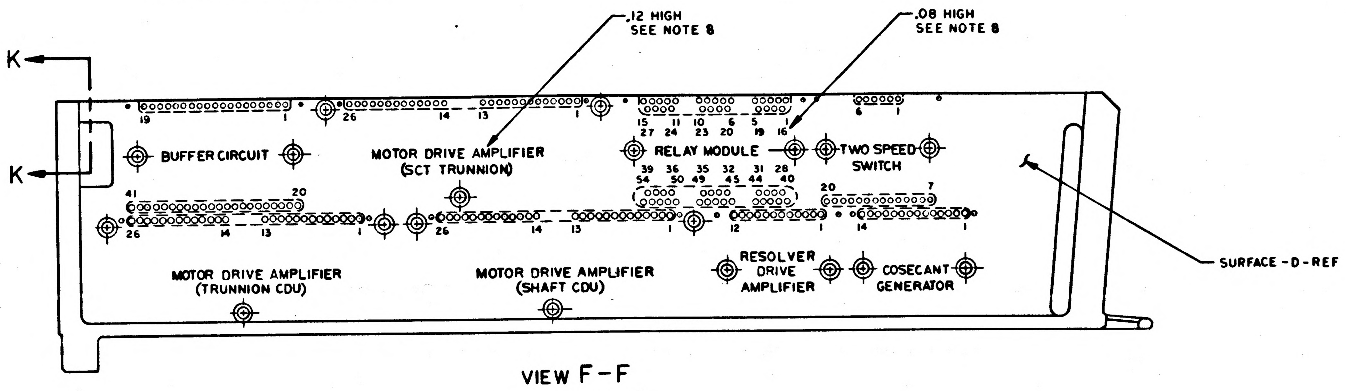
REVISIONS 11627

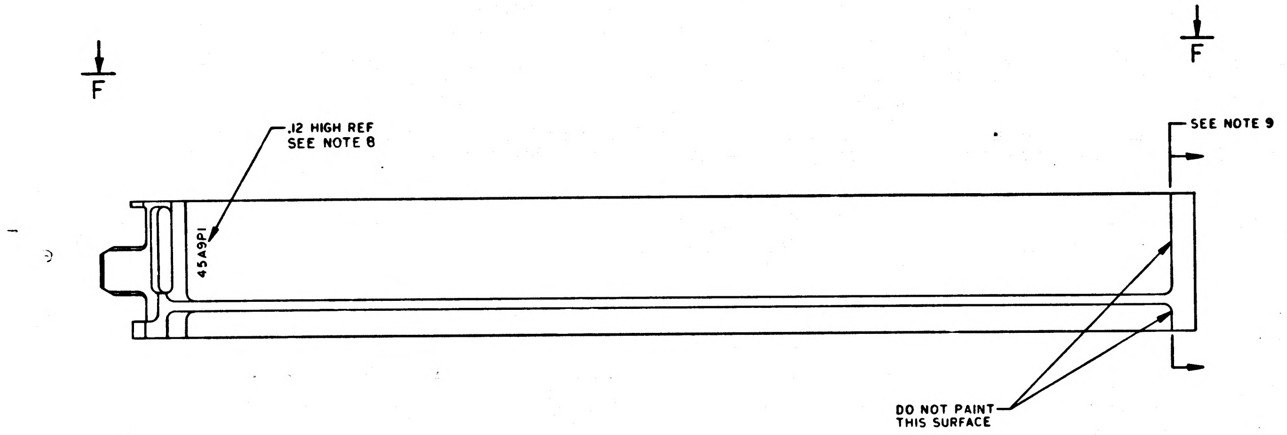
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK		6 JAN 65	
B		REVISED PER TDRR 15472	cap		25 JAN 65	

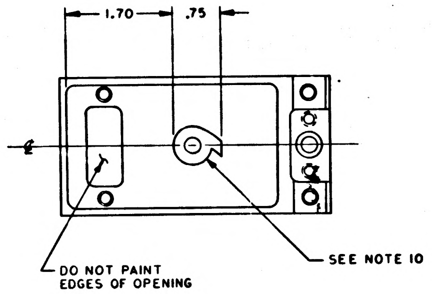

.12 HIGH
SEE NOTE 8
45A9J1

PARTIAL SECTION K–K


.12 HIGH
SEE NOTE 8
.08 HIGH
SEE NOTE 8
K
K
BUFFER CIRCUIT
MOTOR DRIVE AMPLIFIER
(SCT TRUNNION)
RELAY MODULE
TWO SPEED
SWITCH
SURFACE -D- REF
MOTOR DRIVE AMPLIFIER
(TRUNNION CDU)
MOTOR DRIVE AMPLIFIER
(SHAFT CDU)
RESOLVER
DRIVE
AMPLIFIER
COSECANT
GENERATOR

VIEW F–F
ROTATED 180°


F
F
.12 HIGH REF
SEE NOTE 8
45A9P1
SEE NOTE 9
DO NOT PAINT
THIS SURFACE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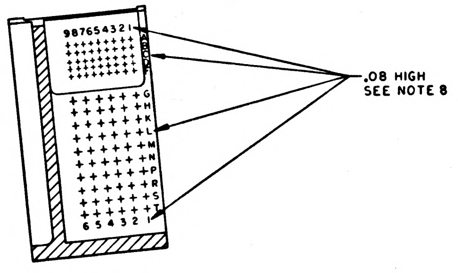
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10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.08 HIGH
SEE NOTE 8
G
H
K
L
M
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P
R
S
T
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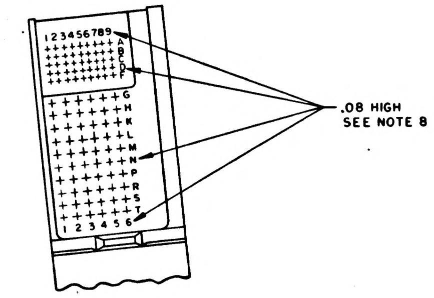
SECTION J–J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SEE NOTE 8
G
H
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R
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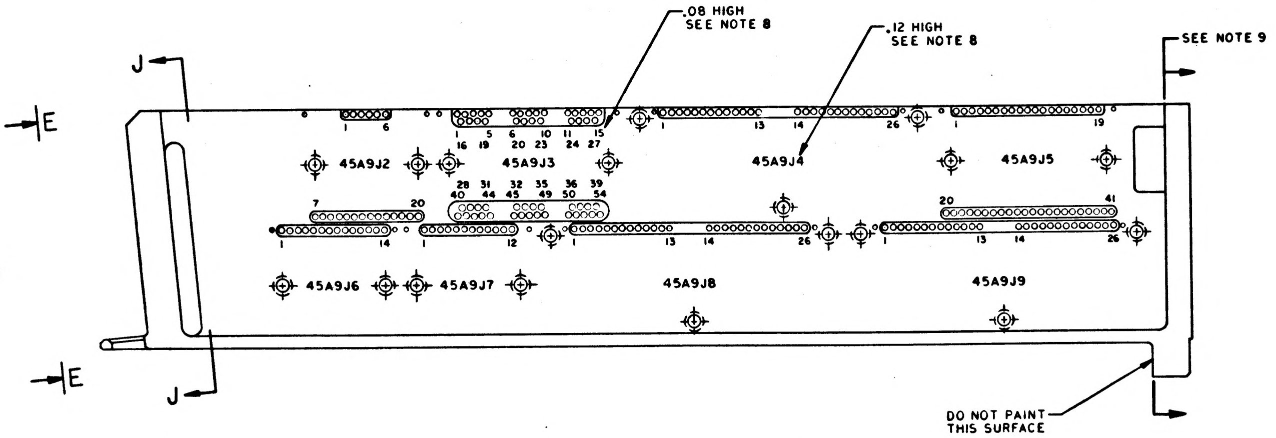
T
123456

PARTIAL VIEW E–E


.08 HIGH
SEE NOTE 8
.12 HIGH
SEE NOTE 8
SEE NOTE 9
J
J
E
E
45A9J2
45A9J3
45A9J4
45A9J5
45A9J6
45A9J7
45A9J8
45A9J9
DO NOT PAINT
THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — XX ± .02 ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.C. Taylor 21 MAR 64
CHECKED A. Lindstrom
APPROVED
APPROVED D. Test
APPROVED MIT W. Kupfer
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

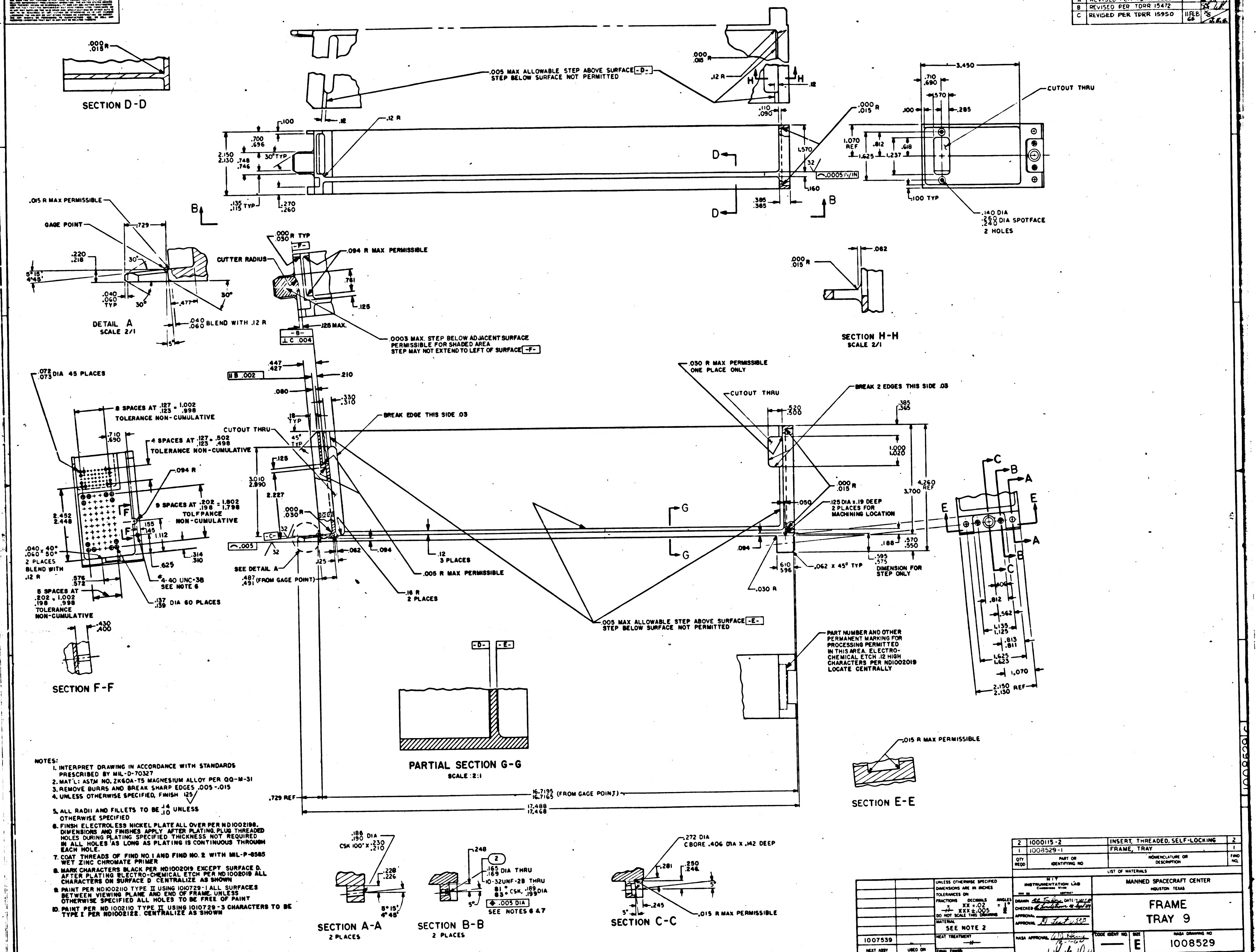
FRAME
TRAY 9

CODE IDENT NO.	SIZE	DRAWING NO.
—	E	1008529

SCALE 1/1 SHEET 3 OF 3

1008529 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15229		
B	REVISED PER TDRR 15472		
C	REVISED PER TDRR 15950	11 FEB 65	J.E.G.


SECTION D-D
.000 / .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
H H
.110 / .090
.100
2.150 / 2.130
.700 / .696
30° TYP
.748 / .746
.135 / .115 TYP
.270 / .260
D D
B B
L570
32
.0005 IN/IN
.160
.385 / .365
3.450
.710 / .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 / .240 DIA SPOTFACE 2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 / .218
5°15' / 4°45'
30°
.040 / .060 TYP
.477
.040 / .060 BLEND WITH .12 R
DETAIL A SCALE 2/1
.000 / .030 R TYP
-F-
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX.
-B-
⊥ C .004
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.062
SECTION H-H SCALE 2/1
.072 / .073 DIA 45 PLACES
8 SPACES AT .127 / .123 = 1.002 / .998 TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 / .123 = .502 / .498 TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 / .198 = 1.802 / 1.798 TOLERANCE NON-CUMULATIVE
.094 R
2.452 / 2.448
F F
.155 / .145
1.112
.625
.314 / .310
.040 x 40° / .060 x 50° 2 PLACES BLEND WITH .12 R
.576 / .572
#4-40 UNC-3B SEE NOTE 6
8 SPACES AT .202 / .198 = 1.002 / .998 TOLERANCE NON-CUMULATIVE
.137 / .139 DIA 60 PLACES
.447 / .427
.210
∥ B .002
.080
.330 / .310
.18 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
.125
3.010 / 2.990
2.227
.000 / .030 R
32
-C-
.005
SEE DETAIL A
.487 / .491 (FROM GAGE POINT)
.062
.094
.125
.12 3 PLACES
.005 R MAX PERMISSIBLE
.16 R 2 PLACES
G G
.030 R MAX PERMISSIBLE ONE PLACE ONLY
CUTOUT THRU
.520 / .500
BREAK 2 EDGES THIS SIDE .03
.385 / .365
1.000 / 1.020
4.260 REF
3.700
.000 / .015 R
.050
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
.188
.570 / .550
.094
.610 / .596
.062 x 45° TYP
.595 / .575 DIMENSION FOR STEP ONLY
.030 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
C B A E E A B C
.406
.812
.562
1.135 / 1.125
.813 / .811
1.625 / 1.623
1.070
2.150 / 2.130 REF
.430 / .400
SECTION F-F
-D- -E-
PARTIAL SECTION G-G SCALE: 2:1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 / 16.7165 (FROM GAGE POINT)
17.488 / 17.468
.186 / .190 DIA
CSK 100° x .230 / .210
.228 / .226
5°
6°15' / 4°45'
SECTION A-A 2 PLACES
.248
②
.165 / .169 DIA THRU
10-32UNF-2B THRU
81° / 83° CSK, .189 / .193 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B 2 PLACES
.272 DIA
CBORE .406 DIA x .142 DEEP
.281
.250 / .248
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND 1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008529-1	FRAME, TRAY	1

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB CAMBRIDGE MASS
DRAWN R.C. Taylor DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

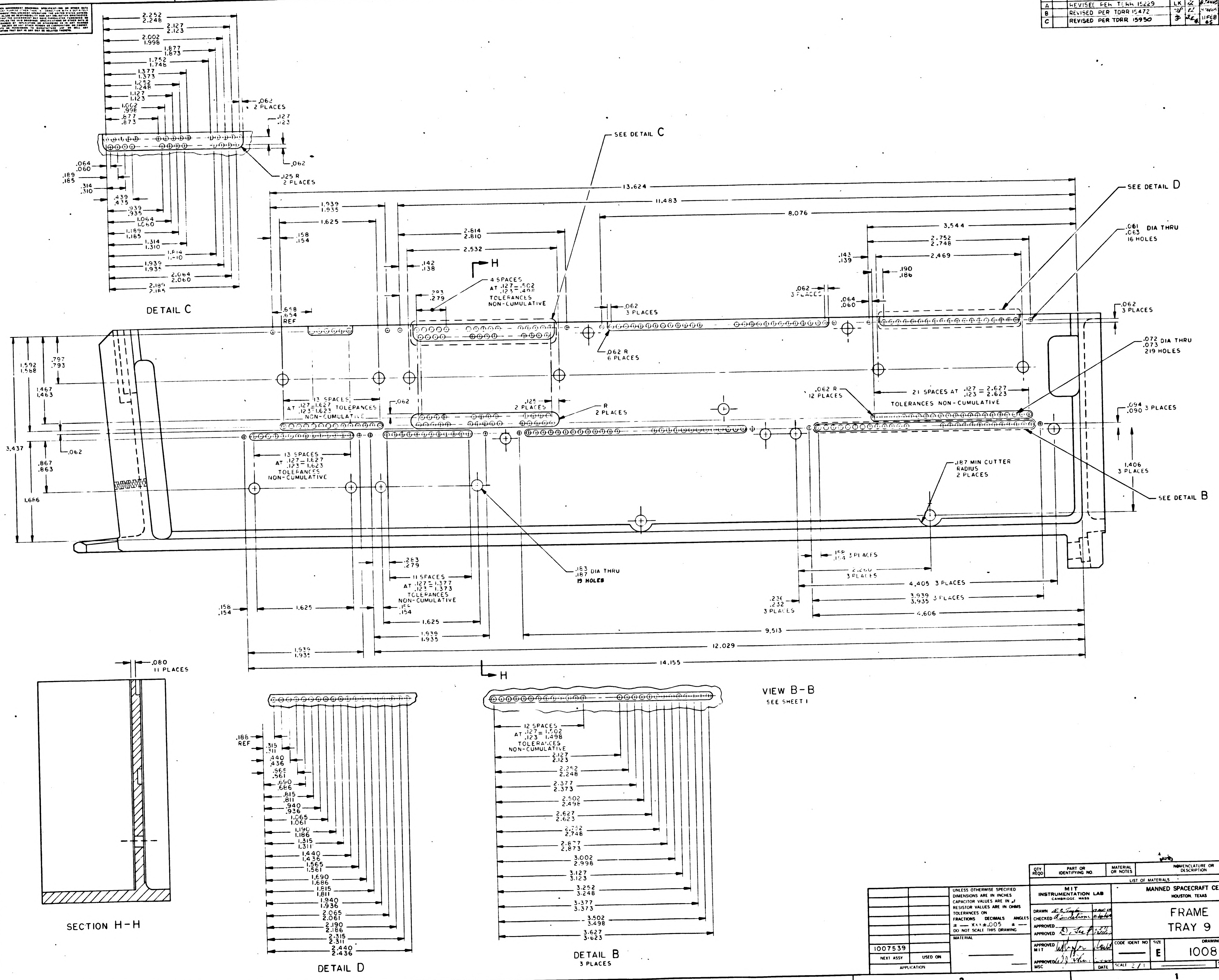
FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1008529
SCALE 1/1
WT —
SHEET 1 OF 3

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK		6 JAN 65	WR
B		REVISED PER TDRR 15472			25 JAN 65	WR
C		REVISED PER TDRR 15950		J.E.G.	11 FEB 65	



DETAIL C
2.252 2.248
2.127 2.123
2.002 1.998
1.877 1.873
1.752 1.748
1.377 1.373
1.252 1.248
1.127 1.123
1.002 .998
.877 .873
.062 2 PLACES
.127 .123
.062
.125 R 2 PLACES
.064 .060
.189 .185
.314 .310
.439 .435
.939 .935
1.064 1.060
1.189 1.185
1.314 1.310
1.814 1.810
1.939 1.935
2.064 2.060
2.189 2.185
SEE DETAIL C
SEE DETAIL D
13.624
11.483
8.076
1.939 1.935
1.625
.158 .154
2.814 2.810
2.532
.142 .138
H
4 SPACES AT .127 = .502 .123 = .498 TOLERANCES NON-CUMULATIVE
.283 .279
.658 .654 REF
.062 3 PLACES
.062 R 6 PLACES
3.544
2.752 2.748
2.469
.143 .139
.190 .186
.062 3 PLACES
.064 .060
.061 .063 DIA THRU 16 HOLES
.062 3 PLACES
.072 .073 DIA THRU 219 HOLES
1.592 1.588
.797 .793
1.467 1.463
3.437
.062
.867 .863
1.686
13 SPACES AT .127 = 1.627 .123 = 1.623 TOLERANCES NON-CUMULATIVE
.062
.125 2 PLACES
R 2 PLACES
.062 R 12 PLACES
21 SPACES AT .127 = 2.627 .123 = 2.623 TOLERANCES NON-CUMULATIVE
.094 .090 3 PLACES
13 SPACES AT .127 = 1.627 .123 = 1.623 TOLERANCES NON-CUMULATIVE
.187 MIN CUTTER RADIUS 2 PLACES
1.406 3 PLACES
SEE DETAIL B
.183 .187 DIA THRU 19 HOLES
.283 .279
11 SPACES AT .127 = 1.377 .123 = 1.373 TOLERANCES NON-CUMULATIVE
.158 .154
.158 .154
1.625
1.625
1.939 1.935
1.939 1.935
.158 .154 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
.236 .232 3 PLACES
3.939 3.935 3 PLACES
4.606
9.513
12.029
14.155
H
VIEW B-B
SEE SHEET 1
.080 11 PLACES
SECTION H-H
.186 REF
.315 .311
.440 .436
.565 .561
.690 .686
.815 .811
.940 .936
1.065 1.061
1.190 1.186
1.315 1.311
1.440 1.436
1.565 1.561
1.690 1.686
1.815 1.811
1.940 1.936
2.065 2.061
2.190 2.186
2.315 2.311
2.440 2.436
DETAIL D
12 SPACES AT .127 = 1.502 .123 = 1.498 TOLERANCES NON-CUMULATIVE
2.127 2.123
2.252 2.248
2.377 2.373
2.502 2.498
2.627 2.623
2.752 2.748
2.877 2.873
3.002 2.998
3.127 3.123
3.252 3.248
3.377 3.373
3.502 3.498
3.627 3.623
DETAIL B
3 PLACES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XXX ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN R. C. Taylor 13 AUG 64
CHECKED A. Lindstrom 15 Sept 64
APPROVED
APPROVED D. Tesi
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

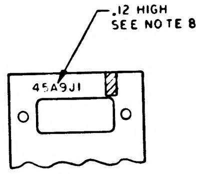
CODE IDENT NO —
SIZE E
DRAWING NO 1008529
SCALE 2/1
SHEET 2 OF 3

1008529 C

…ICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA …E USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY …LATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERN… …NT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; …D THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR … ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS …T TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER …CENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEY… … ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY …TENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK		8JAN65	
B		REVISED PER TDRR 15472			5JAN65	
C		REVISED PER TDRR 15950		J.E.G.	11FEB 65	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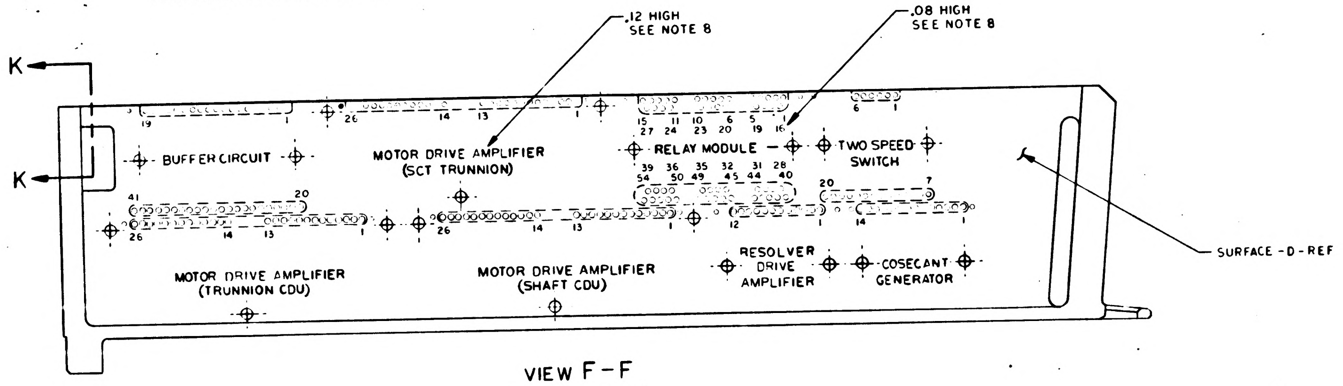
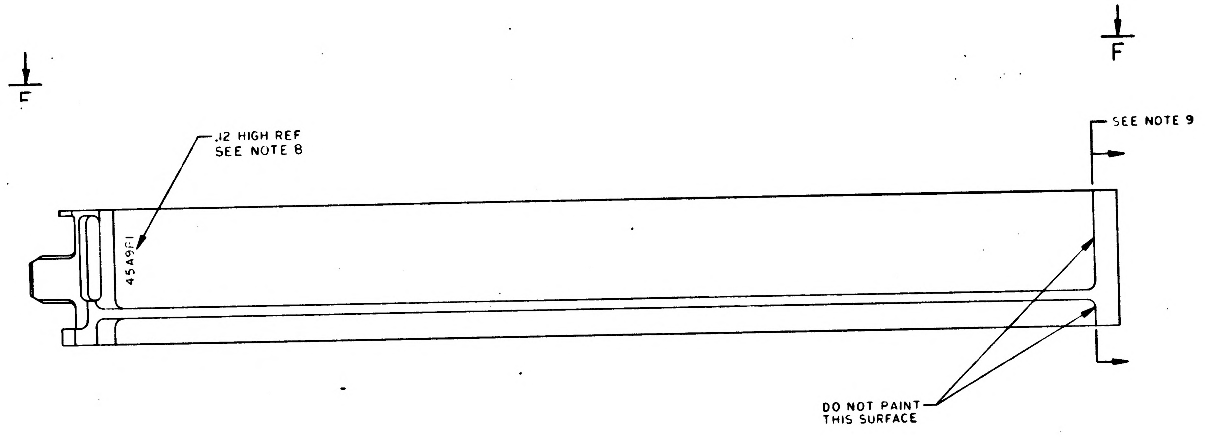
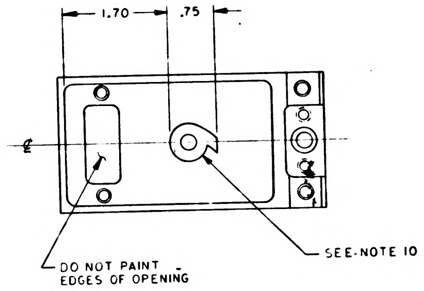
SEE NOTE 8
45A9J1

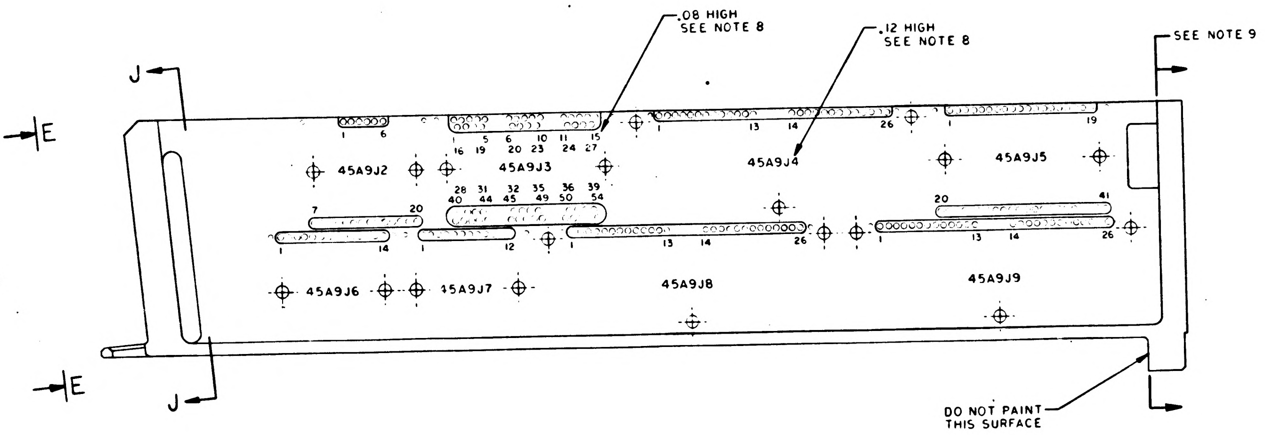
PARTIAL SECTION K-K


.12 HIGH
SEE NOTE 8
.08 HIGH
SEE NOTE 8
K
K
BUFFER CIRCUIT
MOTOR DRIVE AMPLIFIER
(SCT TRUNNION)
RELAY MODULE
TWO SPEED SWITCH
15 11 10 6 5 1
27 24 23 20 19 16
39 36 35 32 31 28
54 50 49 45 44 40
19
26 14 13 1
6 1
41 20
26 14 13 1
26 14 13 1
12 1
20 7
14 1
MOTOR DRIVE AMPLIFIER
(TRUNNION CDU)
MOTOR DRIVE AMPLIFIER
(SHAFT CDU)
RESOLVER DRIVE AMPLIFIER
COSECANT GENERATOR
SURFACE -D- REF

VIEW F-F
ROTATED 180°


F
F
.12 HIGH REF
SEE NOTE 8
45A9E1
SEE NOTE 9
DO NOT PAINT
THIS SURFACE


1.70
.75
℄
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10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SEE NOTE 8
.12 HIGH
SEE NOTE 8
SEE NOTE 9
J
J
E
E
1 6
1 5 6 10 11 15
16 19 20 23 24 27
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40 44 45 49 50 54
13 14 26
1 19
45A9J2
45A9J3
45A9J4
45A9J5
7 20
1 14
12
1 13 14 26
1 20 41
26
45A9J6
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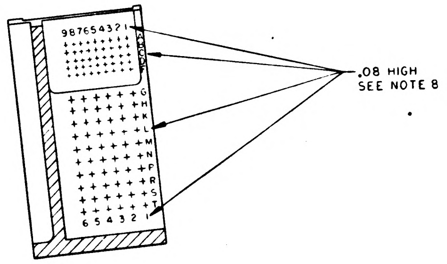
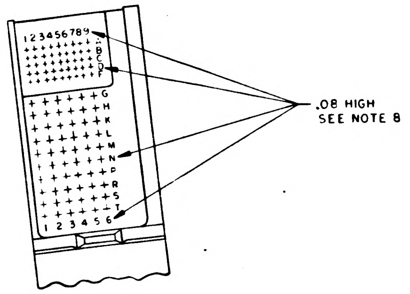
45A9J9
DO NOT PAINT
THIS SURFACE


987654321
.08 HIGH
SEE NOTE 8
G
H
K
M
N
P
R
S
6 5 4 3 2 1

SECTION J-J


123456789
.08 HIGH
SEE NOTE 8
G
H
K
M
N
P
R
S
1 2 3 4 5 6

PARTIAL VIEW E-E

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

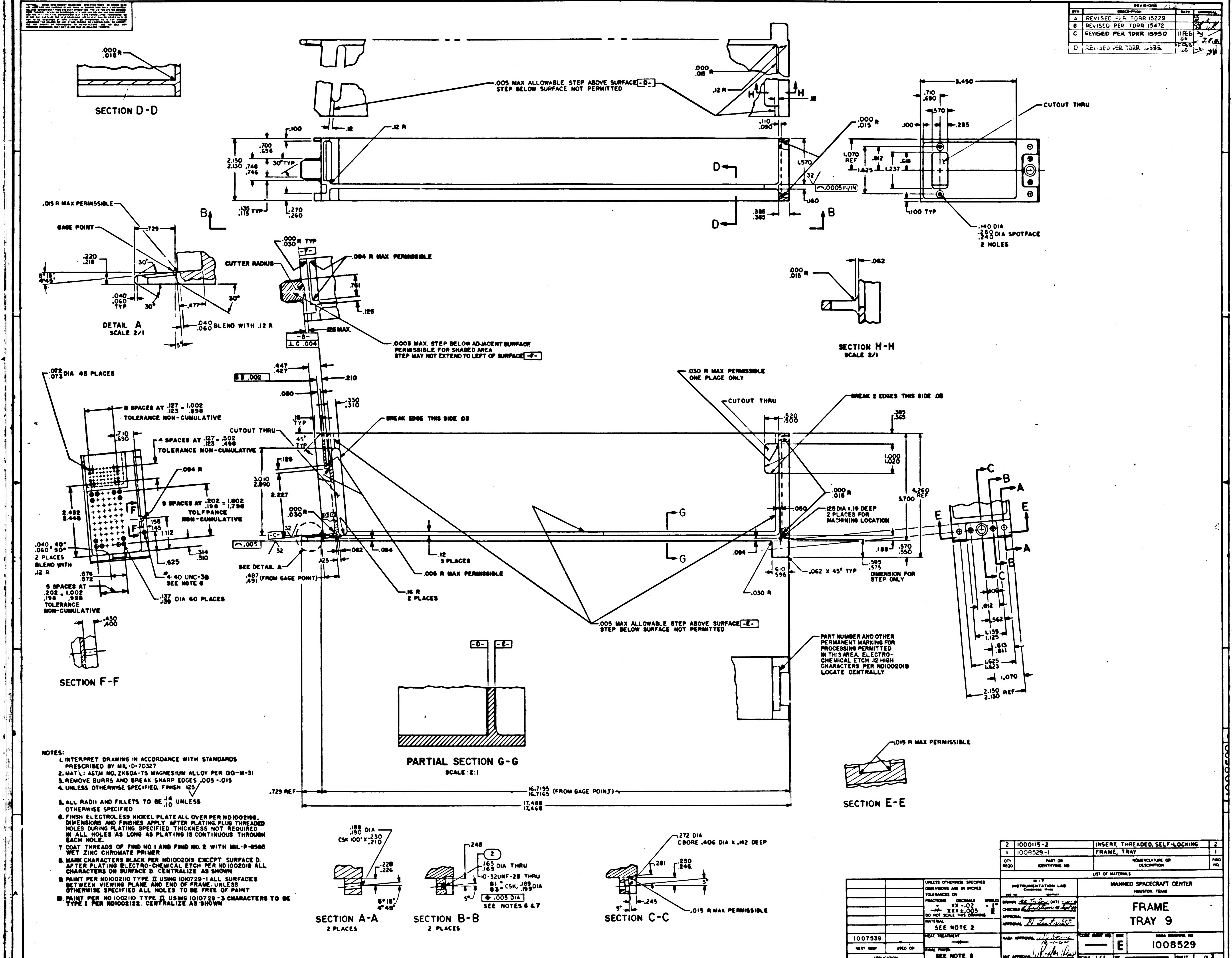
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. C. Taylor 21 AUG 64
CHECKED A. Lindstrom 18 Sep 64
APPROVED
APPROVED D. Lest 12/1/64
APPROVED MIT W. Cuffe
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

CODE IDENT NO —
SIZE E
DRAWING NO. 1008529
SCALE 1/1
SHEET 3 OF 3


SECTION D-D
.000 R .015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
CUTOUT THRU
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
DETAIL A
SCALE 2/1
GAGE POINT
.015 R MAX PERMISSIBLE
.040 .060 BLEND WITH .12 R
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SECTION H-H
SCALE 2/1
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 .139 DIA 60 PLACES
.030 R MAX PERMISSIBLE ONE PLACE ONLY
BREAK 2 EDGES THIS SIDE .03
BREAK EDGE THIS SIDE .03
.125 DIA x .19 DEEP
2 PLACES FOR MACHINING LOCATION
.062 x 45° TYP
DIMENSION FOR STEP ONLY
.006 R MAX PERMISSIBLE
.16 R 2 PLACES
.12 3 PLACES
SEE DETAIL A
.487 .491 (FROM GAGE POINT)
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION F-F
PARTIAL SECTION G-G
SCALE 2:1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
2.150 2.130 REF
.186 .190 DIA
CSK 100° x .230 .210
SECTION A-A
2 PLACES
.165 .169 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15229		
B	REVISED PER TDRR 15472		
C	REVISED PER TDRR 15950	11 FEB 65	J.F.G.
D	REVISED PER TDRR 16332	15 FEB 65	

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND 1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008529-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN R.C. Taylor
CHECKED
APPROVAL
APPROVAL D. Lester
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

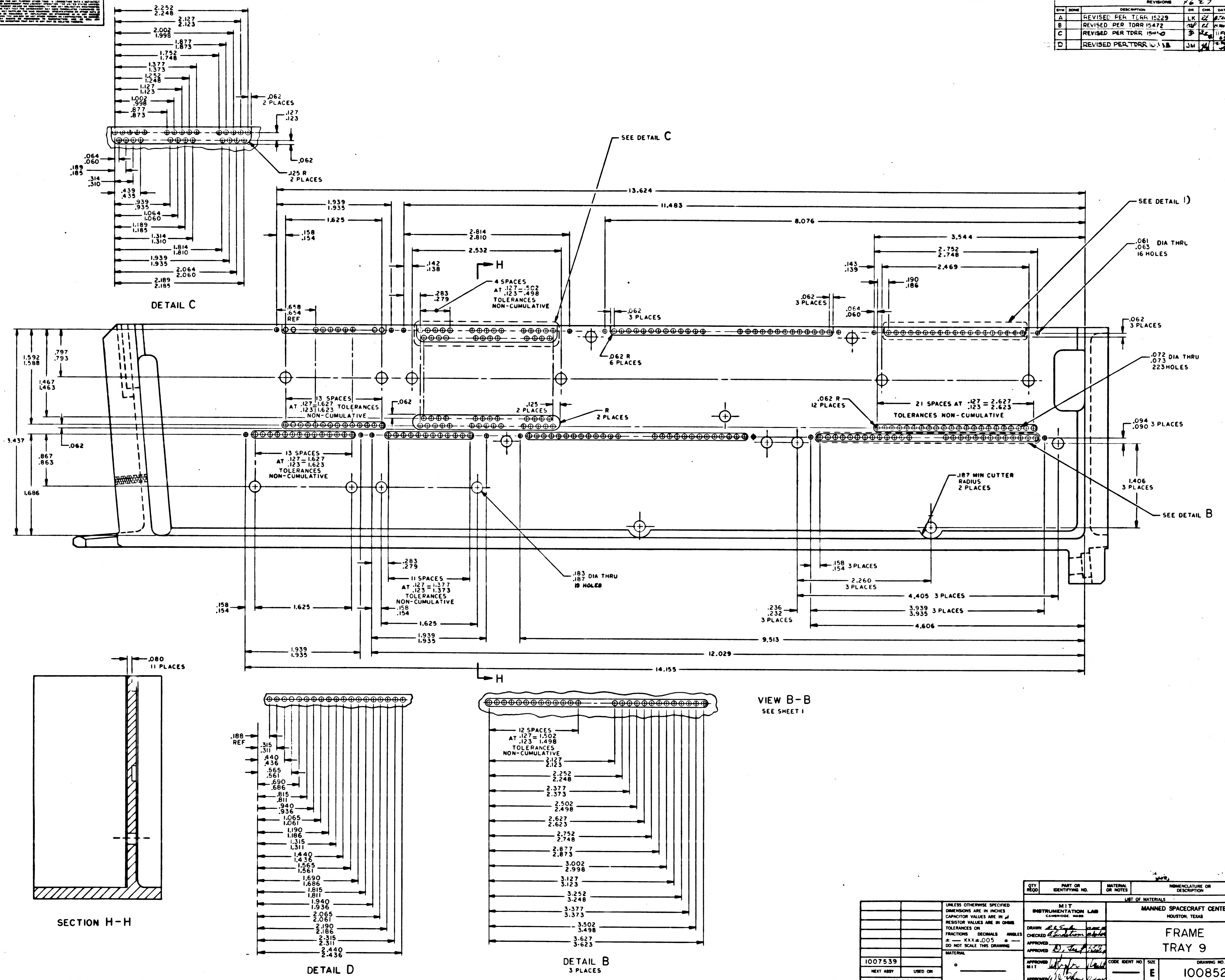
FRAME
TRAY 9

CODE IDENT NO. — SIZE E NASA DRAWING NO 1008529
SCALE 1/1 WT — SHEET 1 OF 3

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 4627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK			
B		REVISED PER TDRR 15472				
C		REVISED PER TDRR 15440			11 FEB 65	
D		REVISED PER TDRR 1[illegible]	JM			



6
5
4
3
2
1
DETAIL C
2.252 2.248
2.127 2.123
2.002 1.998
1.877 1.873
1.752 1.748
1.377 1.373
1.252 1.248
1.127 1.123
1.002 .998
.877 .873
.062 2 PLACES
.127 .123
.062
.125 R 2 PLACES
.064 .060
.189 .185
.314 .310
.439 .435
.939 .935
1.064 1.060
1.189 1.185
1.314 1.310
1.814 1.810
1.939 1.935
2.064 2.060
2.189 2.185
SEE DETAIL C
SEE DETAIL D
13.624
11.483
8.076
1.939 1.935
1.625
.158 .154
2.814 2.810
2.532
.142 .138
H
4 SPACES AT .127 = .502 .123 = .498 TOLERANCES NON-CUMULATIVE
.283 .279
.658 .654 REF
.062 3 PLACES
.062 R 6 PLACES
3.544
2.752 2.748
2.469
.143 .139
.190 .186
.062 3 PLACES
.064 .060
.061 .063 DIA THRU 16 HOLES
.062 3 PLACES
.072 .073 DIA THRU 223 HOLES
1.592 1.588
.797 .793
1.467 1.463
3.437
.062
13 SPACES AT .127 = 1.627 .123 = 1.623 TOLERANCES NON-CUMULATIVE
.062
.125 2 PLACES
R 2 PLACES
.062 R 12 PLACES
21 SPACES AT .127 = 2.627 .123 = 2.623 TOLERANCES NON-CUMULATIVE
.094 .090 3 PLACES
.867 .863
1.686
13 SPACES AT .127 = 1.627 .123 = 1.623 TOLERANCES NON-CUMULATIVE
.187 MIN CUTTER RADIUS 2 PLACES
1.406 3 PLACES
SEE DETAIL B
.183 .187 DIA THRU 19 HOLES
.283 .279
11 SPACES AT .127 = 1.377 .123 = 1.373 TOLERANCES NON-CUMULATIVE
.158 .154
1.625
.158 .154
1.625
1.939 1.935
.158 .154 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
.236 .232 3 PLACES
3.939 3.935 3 PLACES
4.606
9.513
1.939 1.935
12.029
14.155
H
VIEW B-B
SEE SHEET 1
.080 11 PLACES
SECTION H-H
.188 REF
.315 .311
.440 .436
.565 .561
.690 .686
.815 .811
.940 .936
1.065 1.061
1.190 1.186
1.315 1.311
1.440 1.436
1.565 1.561
1.690 1.686
1.815 1.811
1.940 1.936
2.065 2.061
2.190 2.186
2.315 2.311
2.440 2.436
DETAIL D
12 SPACES AT .127 = 1.502 .123 = 1.498 TOLERANCES NON-CUMULATIVE
2.127 2.123
2.252 2.248
2.377 2.373
2.502 2.498
2.627 2.623
2.752 2.748
2.877 2.873
3.002 2.998
3.127 3.123
3.252 3.248
3.377 3.373
3.502 3.498
3.627 3.623
DETAIL B 3 PLACES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XXX ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN
CHECKED A. Lindstrom
APPROVED
APPROVED D.
APPROVED MIT
APPROVED MSC
DATE

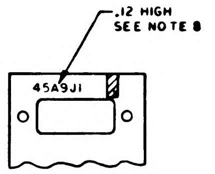
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

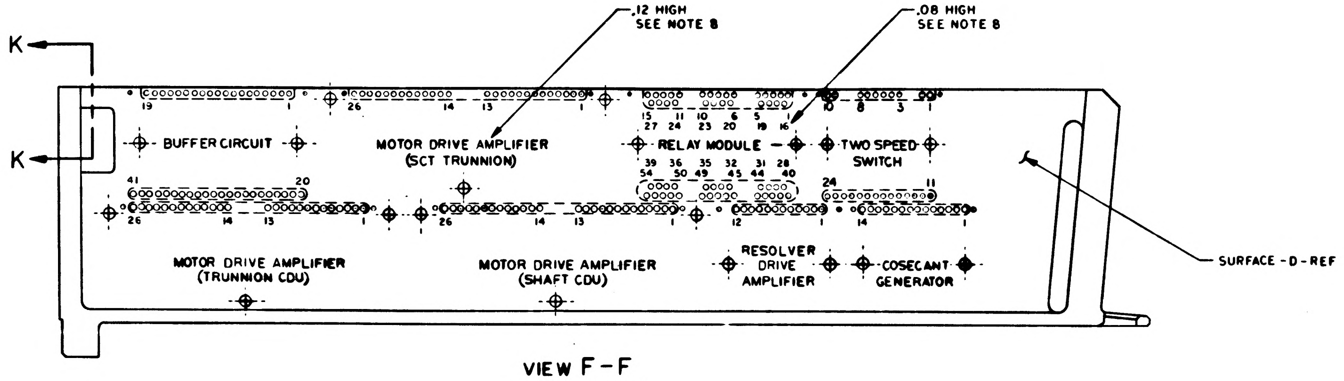
CODE IDENT NO. —
SIZE E
DRAWING NO. 1008529
SCALE 2/1
SHEET 2 OF 3

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

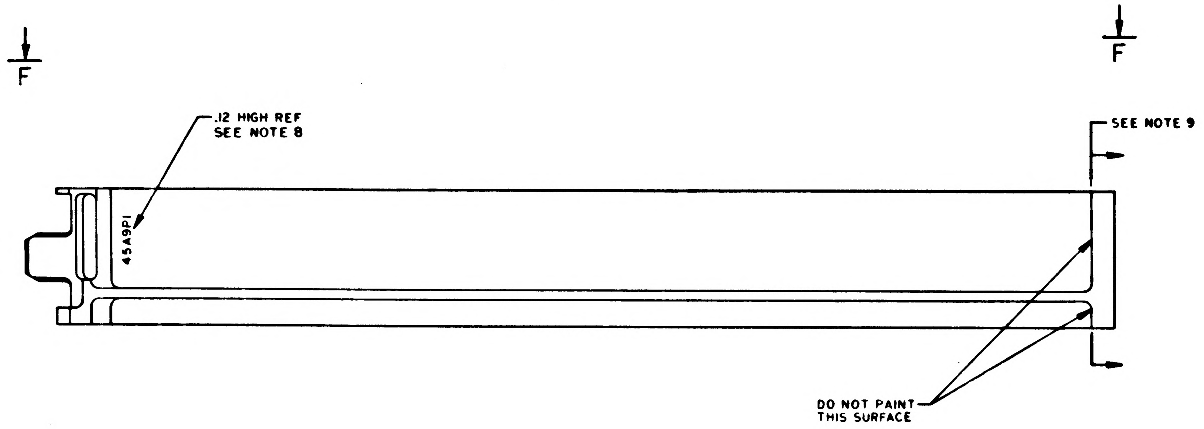
REVISIONS 1627						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK		8 JAN 65	WH
B		REVISED PER TDRR 15472	cap		25 JAN 65	
C		REVISED PER TDRR 15950		J.E.G.	11 FEB 65	
D		REVISED PER TDRR 16333	JM		15 FEB 65	

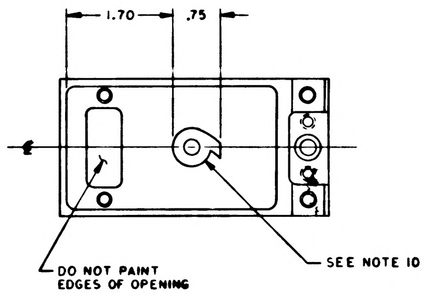

.12 HIGH
SEE NOTE 8
45A9J1

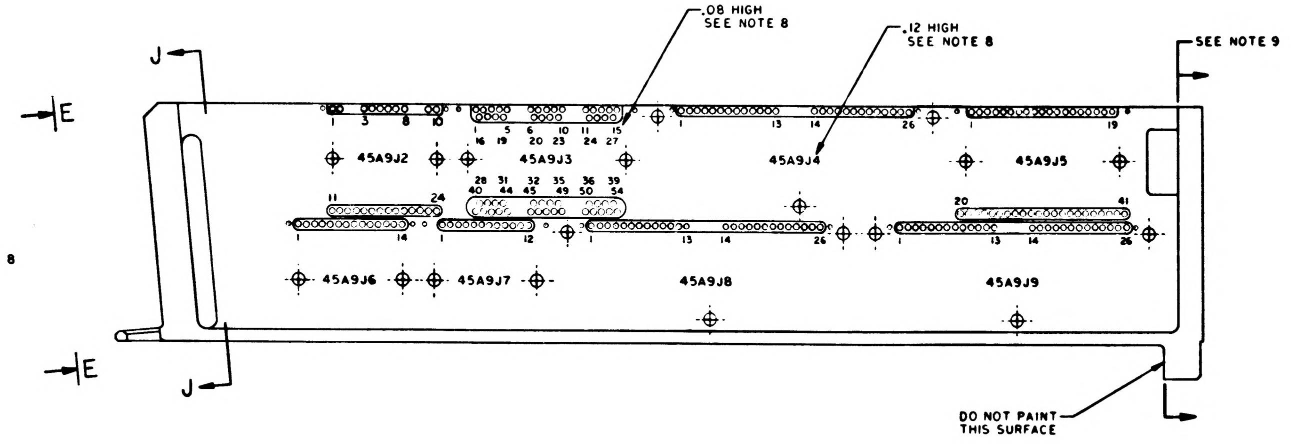
PARTIAL SECTION K-K

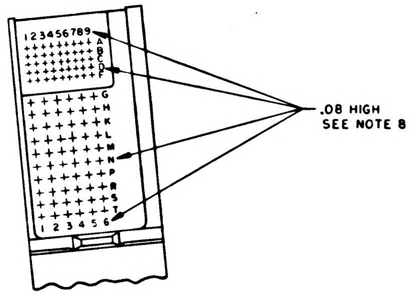

.12 HIGH
SEE NOTE 8
.08 HIGH
SEE NOTE 8
K
K
19
1
26
14
13
1
15 11 10 6 5 1
27 24 23 20 19 16
10 8 3 1
BUFFER CIRCUIT
MOTOR DRIVE AMPLIFIER
(SCT TRUNNION)
RELAY MODULE
TWO SPEED
SWITCH
39 36 35 32 31 28
54 50 49 45 44 40
41
20
24
11
26
14
13
1
26
14
13
1
12
1
14
1
MOTOR DRIVE AMPLIFIER
(TRUNNION CDU)
MOTOR DRIVE AMPLIFIER
(SHAFT CDU)
RESOLVER
DRIVE
AMPLIFIER
COSECANT
GENERATOR
SURFACE - D - REF

VIEW F-F
ROTATED 180°

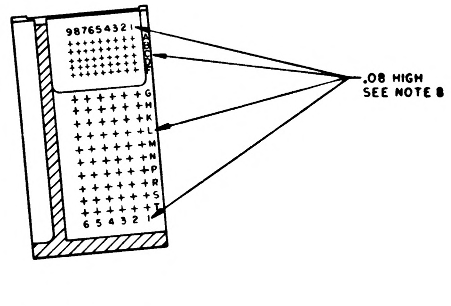

F
F
.12 HIGH REF
SEE NOTE 8
45A9P1
SEE NOTE 9
DO NOT PAINT
THIS SURFACE


1.70
.75
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10


.08 HIGH
SEE NOTE 8
.12 HIGH
SEE NOTE 8
SEE NOTE 9
J
J
E
E
1 3 8 10
1 5 6 10 11 15
16 19 20 23 24 27
1 13 14 26
1 19
45A9J2
45A9J3
45A9J4
45A9J5
28 31 32 35 36 39
40 44 45 49 50 54
11 24
20 41
1 14
1 12
1 13 14 26
1 13 14 26
45A9J6
45A9J7
45A9J8
45A9J9
DO NOT PAINT
THIS SURFACE


123456789
.08 HIGH
SEE NOTE 8
123456

PARTIAL VIEW E-E


987654321
.08 HIGH
SEE NOTE 8
G
H
K
L
M
N
P
R
S
T
654321

SECTION J-J

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — XX ± .02 ± —
DO NOT SCALE THIS DRAWING

MATERIAL
—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R.C. Taylor
CHECKED A. Lindstrom
APPROVED
APPROVED D. Tech 158
APPROVED MIT W Kupfer
APPROVED MSC W.G.Kane
DATE

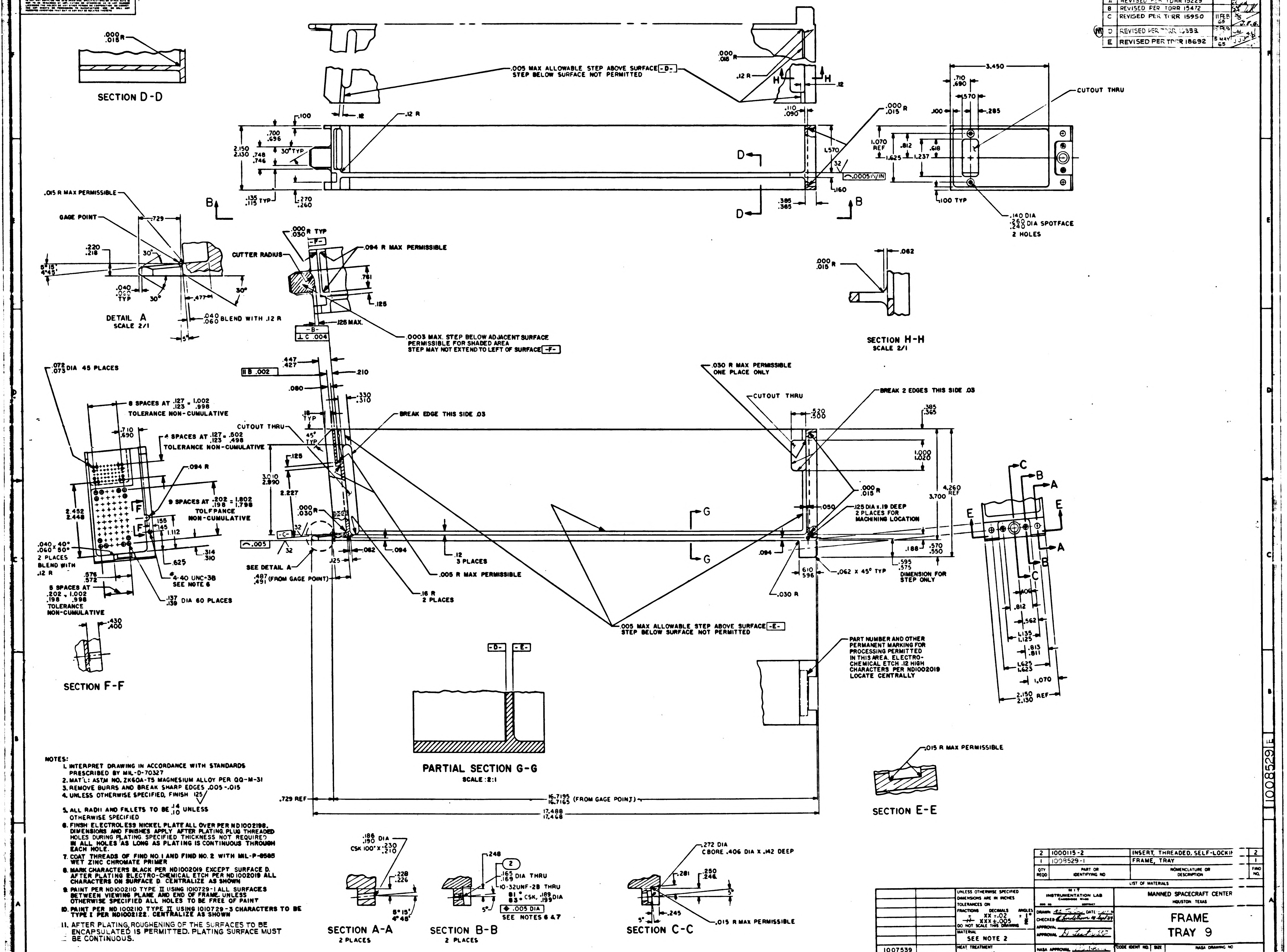
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008529
SCALE 1/1
SHEET 3 OF 3

1008529 D

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15229		
B	REVISED PER TDRR 15472		
C	REVISED PER TDRR 15950	11 FEB 65	J.E.G.
D	REVISED PER TDRR 16333	15 FEB	JM
E	REVISED PER TDRR 18692	5 MAY 65	JJJ


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
H
.000 .015 R
CUTOUT THRU
3.450
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.100 TYP
.0005 IN/IN
B
D
.015 R MAX PERMISSIBLE
GAGE POINT
.729
DETAIL A
SCALE 2/1
.040 .060 BLEND WITH .12 R
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.125 MAX.
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SECTION H-H
SCALE 2/1
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
.040 x 40° .060 x 50°
2 PLACES
BLEND WITH .12 R
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 .139 DIA 60 PLACES
SECTION F-F
CUTOUT THRU
BREAK EDGE THIS SIDE .03
SEE DETAIL A
.487 .491 (FROM GAGE POINT)
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.12
3 PLACES
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
BREAK 2 EDGES THIS SIDE .03
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.062 x 45° TYP
DIMENSION FOR STEP ONLY
.030 R
G
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
PARTIAL SECTION G-G
SCALE 2:1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° x .230 .210
SECTION A-A
2 PLACES
.165 .169 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .193 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C
1008529

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.14}{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN
11. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKI	2
1	1008529-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DATE
CHECKED 10 Sept 64
APPROVAL
APPROVAL
NASA APPROVAL 10-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

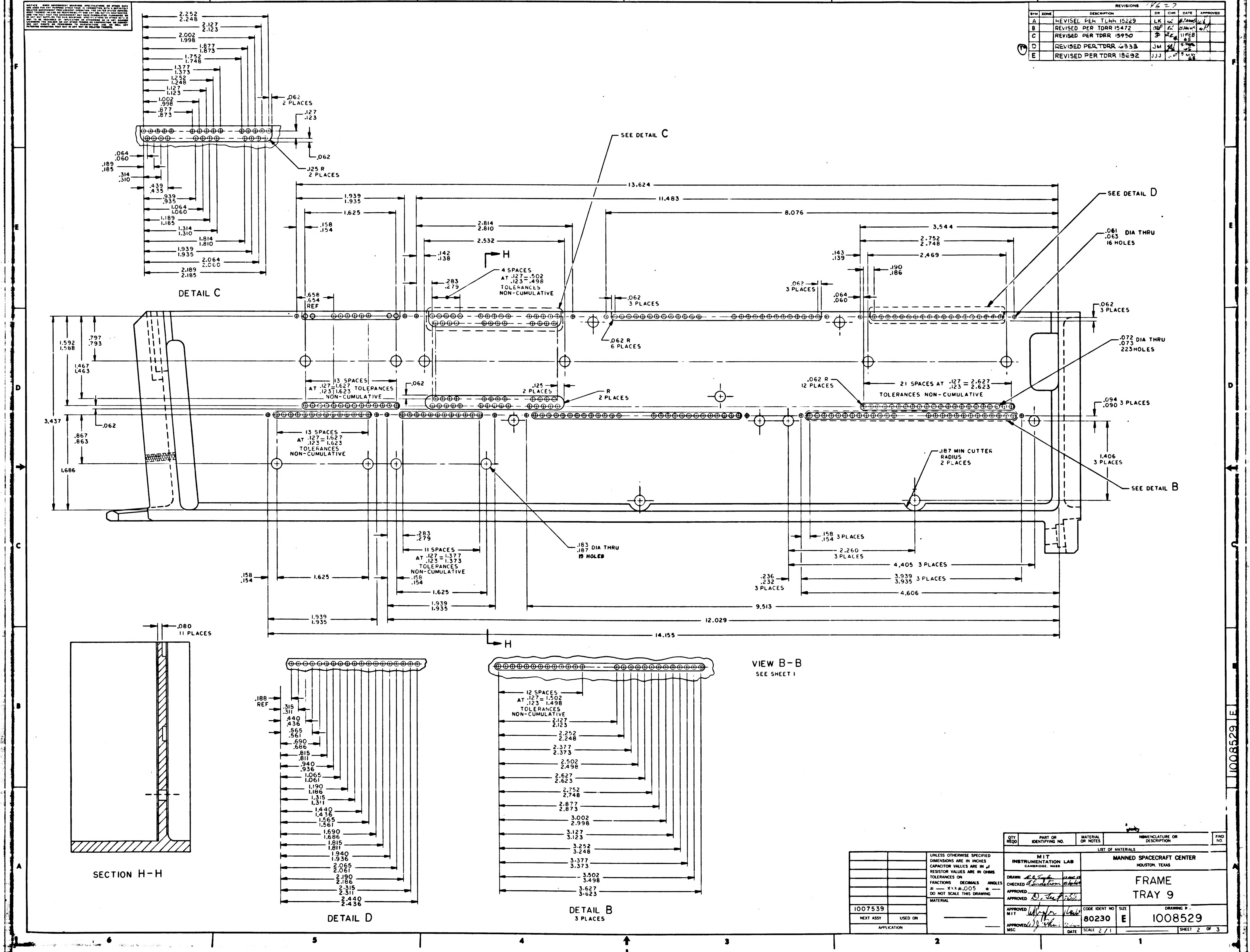
FRAME
TRAY 9

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008529
SCALE 1/1
WT —
SHEET 1 OF 3

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
A		REVISED PER TDRR 15229	LK		8 JAN 65		
B		REVISED PER TDRR 15472	CAP		25 JAN 65		
C		REVISED PER TDRR 15950		J.E.G.	11 FEB 65		
D		REVISED PER TDRR 16333	JM		5 FEB 65		
E		REVISED PER TDRR 18692	JJJ		5 MAY 65		



6
5
4
3
2
1
F
E
D
C
B
A
2.252
2.248
2.127
2.123
2.002
1.998
1.877
1.873
1.752
1.748
1.377
1.373
1.252
1.248
1.127
1.123
1.002
.998
.877
.873
.062
2 PLACES
.127
.123
.062
.125 R
2 PLACES
.064
.060
.189
.185
.314
.310
.439
.435
.939
.935
1.064
1.060
1.189
1.185
1.314
1.310
1.814
1.810
1.939
1.935
2.064
2.060
2.189
2.185
DETAIL C
SEE DETAIL C
13.624
11.483
1.939
1.935
1.625
.158
.154
8.076
2.814
2.810
2.532
.142
.138
H
4 SPACES
AT .127 = .502
.123 = .498
TOLERANCES
NON-CUMULATIVE
.283
.279
.658
.654
REF
.062
3 PLACES
.062 R
6 PLACES
.143
.139
.062
3 PLACES
.064
.060
3.544
2.752
2.748
2.469
.190
.186
SEE DETAIL D
.061
.063 DIA THRU
16 HOLES
.062
3 PLACES
.072
.073 DIA THRU
223 HOLES
1.592
1.588
.797
.793
1.467
1.463
13 SPACES
AT .127 = 1.627
.123 = 1.623 TOLERANCES
NON-CUMULATIVE
.062
.125
2 PLACES
R
2 PLACES
.062 R
12 PLACES
21 SPACES AT .127 = 2.627
.123 = 2.623
TOLERANCES NON-CUMULATIVE
.094
.090 3 PLACES
3.437
.062
.867
.863
13 SPACES
AT .127 = 1.627
.123 = 1.623
TOLERANCES
NON-CUMULATIVE
1.686
.187 MIN CUTTER
RADIUS
2 PLACES
1.406
3 PLACES
SEE DETAIL B
.183
.187 DIA THRU
19 HOLES
.283
.279
11 SPACES
AT .127 = 1.377
.123 = 1.373
TOLERANCES
NON-CUMULATIVE
.158
.154
.158
.154
1.625
1.625
1.939
1.935
.158
.154 3 PLACES
2.260
3 PLACES
4.405 3 PLACES
.236
.232
3 PLACES
3.939
3.935 3 PLACES
4.606
9.513
1.939
1.935
12.029
14.155
H
VIEW B-B
SEE SHEET 1
.080
11 PLACES
SECTION H-H
.188
REF
.315
.311
.440
.436
.565
.561
.690
.686
.815
.811
.940
.936
1.065
1.061
1.190
1.186
1.315
1.311
1.440
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1.690
1.686
1.815
1.811
1.940
1.936
2.065
2.061
2.190
2.186
2.315
2.311
2.440
2.436
DETAIL D
12 SPACES
AT .127 = 1.502
.123 = 1.498
TOLERANCES
NON-CUMULATIVE
2.127
2.123
2.252
2.248
2.377
2.373
2.502
2.498
2.627
2.623
2.752
2.748
2.877
2.873
3.002
2.998
3.127
3.123
3.252
3.248
3.377
3.373
3.502
3.498
3.627
3.623
DETAIL B
3 PLACES
1008529 E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XXX ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. C. Taylor
CHECKED A. Lindstrom
APPROVED
APPROVED D. Teal
APPROVED MIT
APPROVED MSC W. J.
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

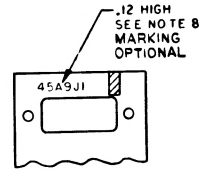
FRAME
TRAY 9

CODE IDENT NO	SIZE	DRAWING NO.
80230	E	1008529
SCALE 2/1		SHEET 2 OF 3

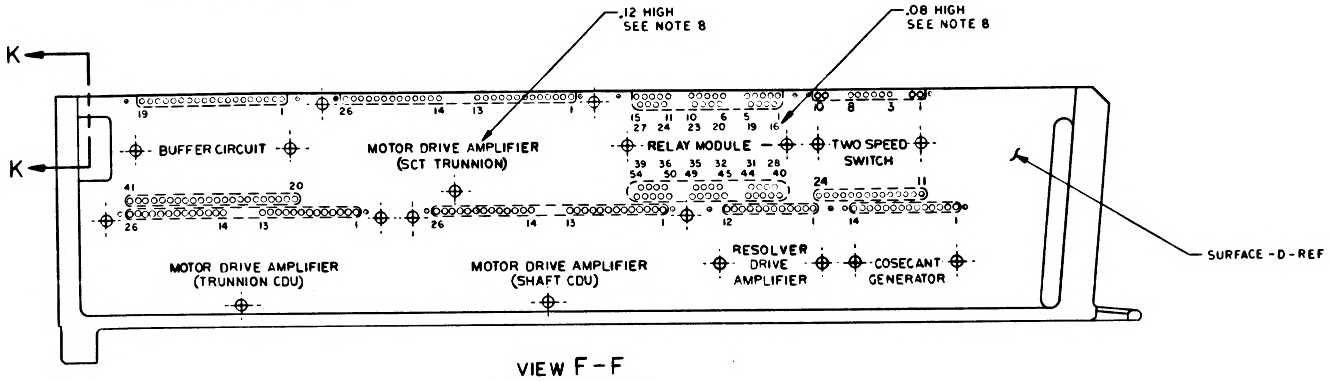
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 16627

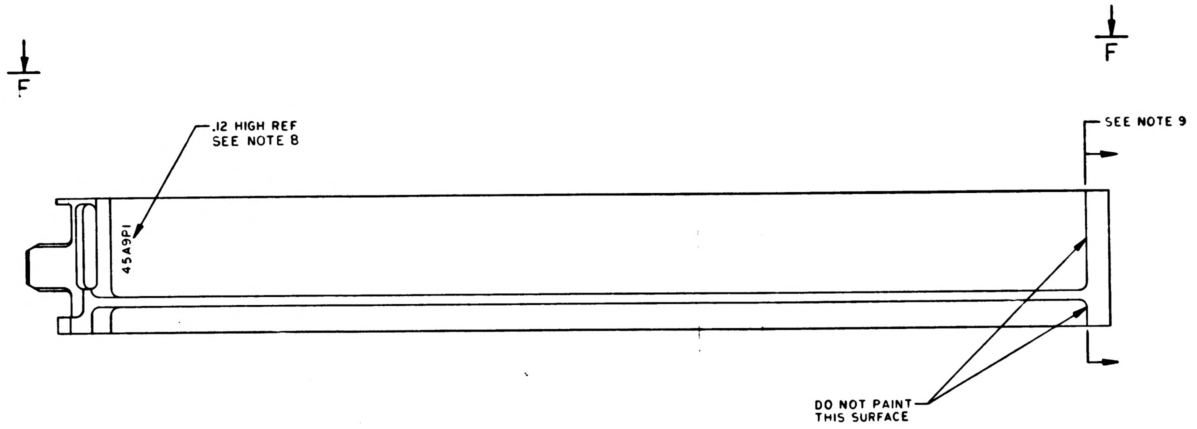
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15229	LK		8 JAN 65	
B		REVISED PER TDRR 15472			25 JAN 65	
C		REVISED PER TDRR 15950		J.E.G.	11 FEB 65	
D		REVISED PER TDRR 16333	JM		15 FEB 65	
E		REVISED PER TDRR 18692	JJJ		5 MAY 65	

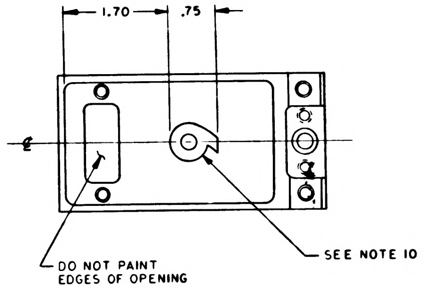

.12 HIGH
SEE NOTE 8
MARKING
OPTIONAL
45A9J1

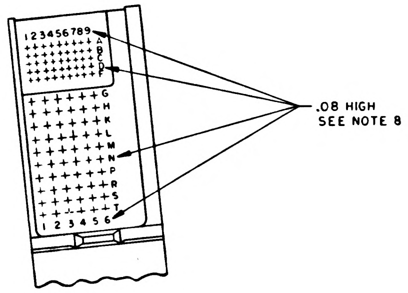
PARTIAL SECTION K-K


K
K
.12 HIGH
SEE NOTE 8
.08 HIGH
SEE NOTE 8
19
1
26
14
13
1
15 11 10 6 5 1
27 24 23 20 19 16
10 8 3 1
BUFFER CIRCUIT
MOTOR DRIVE AMPLIFIER
(SCT TRUNNION)
RELAY MODULE
TWO SPEED
SWITCH
39 36 35 32 31 28
54 50 49 45 44 40
41
20
24
11
26
14
13
1
26
14
13
1
12
1
14
1
SURFACE -D- REF
MOTOR DRIVE AMPLIFIER
(TRUNNION CDU)
MOTOR DRIVE AMPLIFIER
(SHAFT CDU)
RESOLVER
DRIVE
AMPLIFIER
COSECANT
GENERATOR

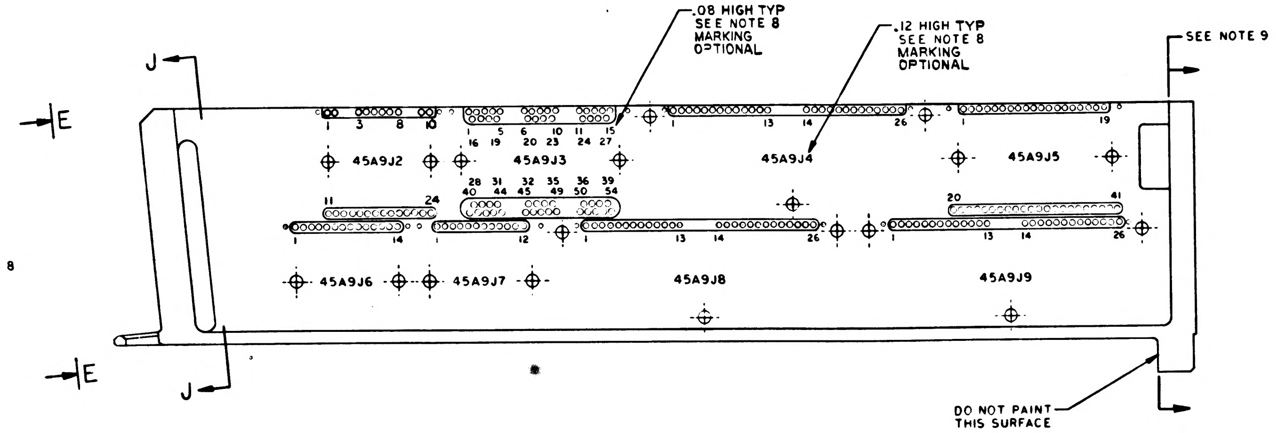
VIEW F-F
ROTATED 180°

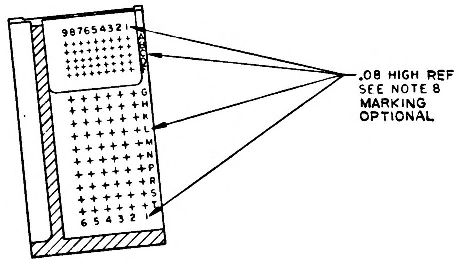

F
F
.12 HIGH REF
SEE NOTE 8
45A9P1
SEE NOTE 9
DO NOT PAINT
THIS SURFACE


1.70
.75
℄
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING


123456789
.08 HIGH
SEE NOTE 8
1 2 3 4 5 6

PARTIAL VIEW E-E


.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
SEE NOTE 9
J
J
E
E
1 3 8 10
1 5 6 10 11 15
16 19 20 23 24 27
1 13 14 26
1 19
45A9J2
45A9J3
45A9J4
45A9J5
28 31 32 35 36 39
40 44 45 49 50 54
11 24
20 41
1 14
1 12
1 13 14 26
1 13 14 26
45A9J6
45A9J7
45A9J8
45A9J9
DO NOT PAINT
THIS SURFACE


987654321
.08 HIGH REF
SEE NOTE 8
MARKING
OPTIONAL
6 5 4 3 2

SECTION J-J

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

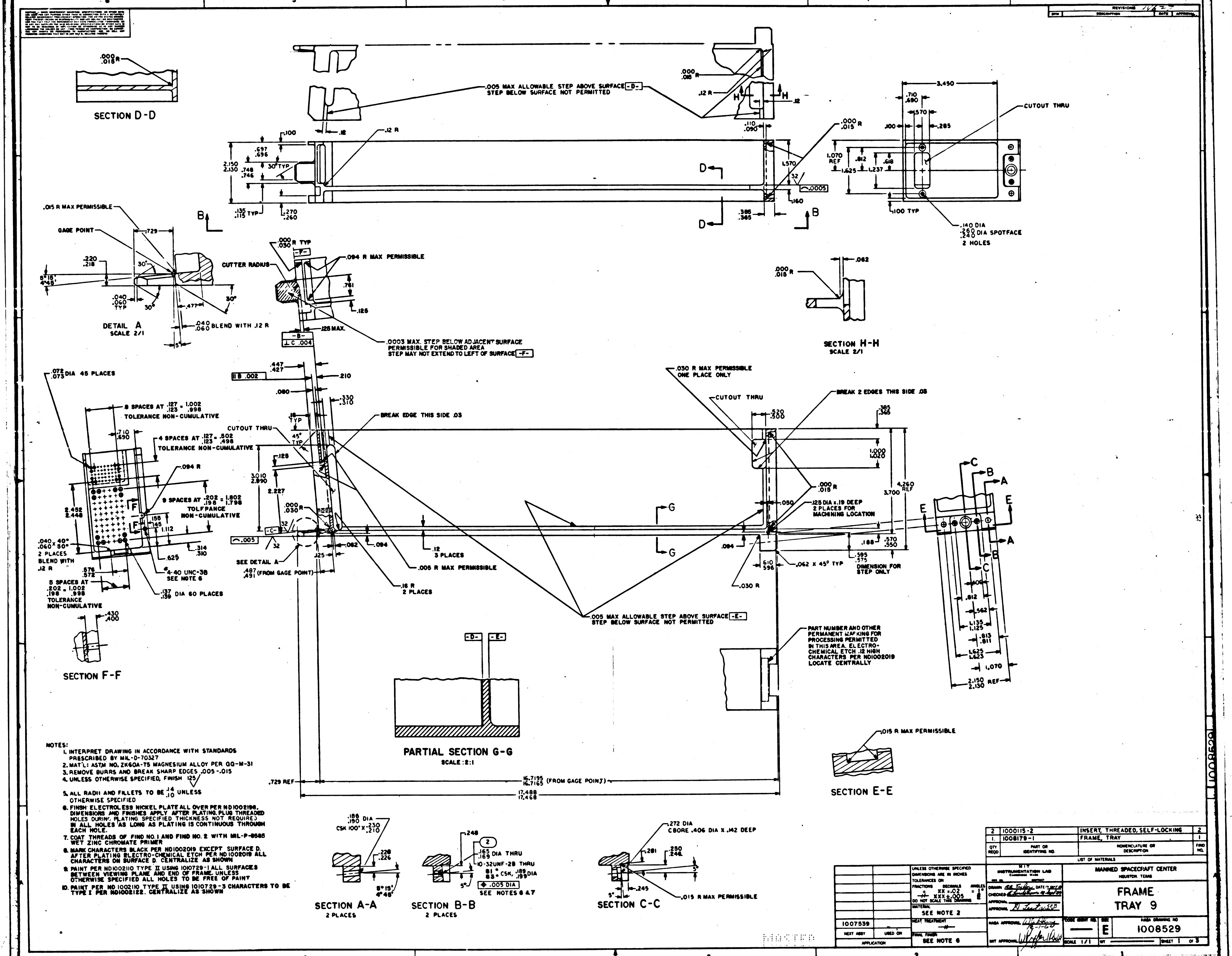
DRAWN R. C. Taylor 21 AUG 64
CHECKED A. Lindstrom
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

CODE IDENT NO 80230
SIZE E
DRAWING NO. 1008529
SCALE 1/1
SHEET 3 OF 3

1008529 E


SECTION D-D
.000 R
.015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
H
.12
.000 R
.015
D
B
SECTION H-H
SCALE 2/1
3.450
CUTOUT THRU
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.100 TYP
.015 R MAX PERMISSIBLE
GAGE POINT
DETAIL A
SCALE 2/1
BLEND WITH .12 R
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.072
.073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
2 PLACES
BLEND WITH .12 R
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137
.139 DIA 60 PLACES
SECTION F-F
CUTOUT THRU
BREAK EDGE THIS SIDE .03
SEE DETAIL A
.487
.491 (FROM GAGE POINT)
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.12
3 PLACES
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
CUTOUT THRU
BREAK 2 EDGES THIS SIDE .03
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.062 x 45° TYP
DIMENSION FOR
STEP ONLY
.030 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
G
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
PARTIAL SECTION G-G
SCALE: 2:1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
2.150
2.130 REF
.188
.190 DIA
CSK 100° x .230 .210
SECTION A-A
2 PLACES
10-32UNF-2B THRU
.165
.169 DIA THRU
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.14}_{.10}$ UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND 1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008179-1	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	—

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN AR Taylor DATE 12 SEPT 60
CHECKED
APPROVAL
APPROVAL D Lintin
NASA APPROVAL 12-1-60
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

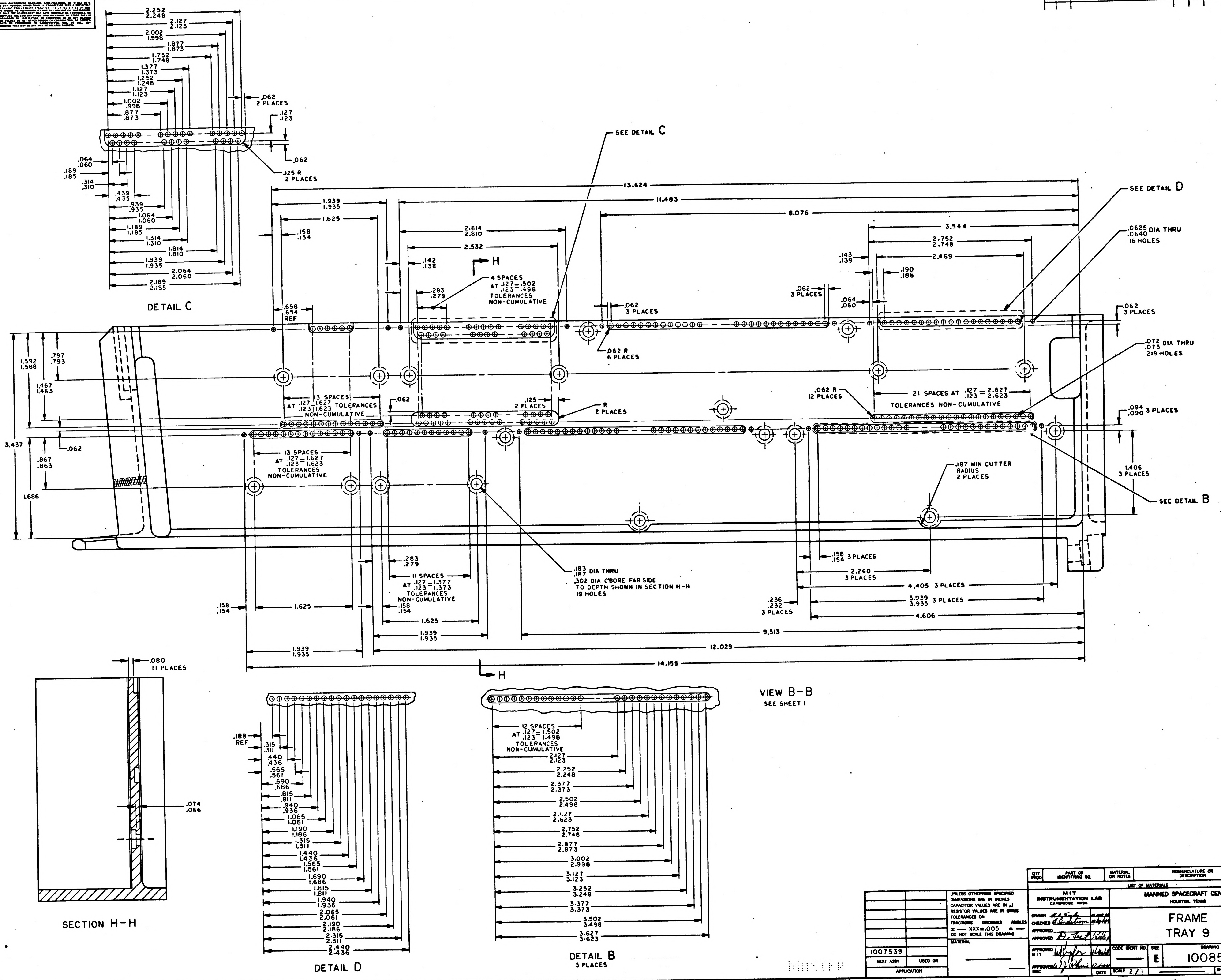
FRAME
TRAY 9

CODE IDENT NO. — SIZE E NASA DRAWING NO 1008529
SCALE 1/1 WT — SHEET 1 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED

REVISIONS 1V627



6
5
4
3
2
1
DETAIL C
2.252 / 2.248
2.127 / 2.123
2.002 / 1.998
1.877 / 1.873
1.752 / 1.748
1.377 / 1.373
1.252 / 1.248
1.127 / 1.123
1.002 / .998
.877 / .873
.062 2 PLACES
.127 / .123
.062
.125 R 2 PLACES
.064 / .060
.189 / .185
.314 / .310
.439 / .435
.939 / .935
1.064 / 1.060
1.189 / 1.185
1.314 / 1.310
1.814 / 1.810
1.939 / 1.935
2.064 / 2.060
2.189 / 2.185
SEE DETAIL C
SEE DETAIL D
SEE DETAIL B
13.624
11.483
8.076
1.939 / 1.935
1.625
.158 / .154
2.814 / 2.810
2.532
.142 / .138
H
4 SPACES AT .127/.123 = .502/.498 TOLERANCES NON-CUMULATIVE
.283 / .279
.658 / .654 REF
.062 3 PLACES
.062 R 6 PLACES
3.544
2.752 / 2.748
2.469
.143 / .139
.190 / .186
.062 3 PLACES
.064 / .060
.0625 / .0640 DIA THRU 16 HOLES
.062 3 PLACES
.072 / .073 DIA THRU 219 HOLES
1.592 / 1.588
.797 / .793
1.467 / 1.463
3.437
.062
.867 / .863
1.686
13 SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
.062
.125 2 PLACES
R 2 PLACES
.062 R 12 PLACES
21 SPACES AT .127/.123 = 2.627/2.623 TOLERANCES NON-CUMULATIVE
.094 / .090 3 PLACES
13 SPACES AT .127/.123 = 1.627/1.623 TOLERANCES NON-CUMULATIVE
.187 MIN CUTTER RADIUS 2 PLACES
1.406 3 PLACES
.283 / .279
11 SPACES AT .127/.123 = 1.377/1.373 TOLERANCES NON-CUMULATIVE
.183 / .187 DIA THRU .302 DIA C'BORE FAR SIDE TO DEPTH SHOWN IN SECTION H-H 19 HOLES
.158 / .154 3 PLACES
2.260 3 PLACES
4.405 3 PLACES
3.939 / 3.935 3 PLACES
.236 / .232 3 PLACES
4.606
.158 / .154
1.625
.158 / .154
1.625
1.939 / 1.935
9.513
1.939 / 1.935
12.029
14.155
H
VIEW B-B
SEE SHEET 1
.080 11 PLACES
.074 / .066
SECTION H-H
.188 REF
.315 / .311
.440 / .436
.565 / .561
.690 / .686
.815 / .811
.940 / .936
1.065 / 1.061
1.190 / 1.186
1.315 / 1.311
1.440 / 1.436
1.565 / 1.561
1.690 / 1.686
1.815 / 1.811
1.940 / 1.936
2.065 / 2.061
2.190 / 2.186
2.315 / 2.311
2.440 / 2.436
DETAIL D
12 SPACES AT .127/.123 = 1.502/1.498 TOLERANCES NON-CUMULATIVE
2.127 / 2.123
2.252 / 2.248
2.377 / 2.373
2.502 / 2.498
2.627 / 2.623
2.752 / 2.748
2.877 / 2.873
3.002 / 2.998
3.127 / 3.123
3.252 / 3.248
3.377 / 3.373
3.502 / 3.498
3.627 / 3.623
DETAIL B
3 PLACES

	QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — XXX±.005 ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN R. C. Tayl
CHECKED A. Lindstrom
APPROVED
APPROVED D. Teaf
APPROVED MIT
APPROVED MSC
DATE

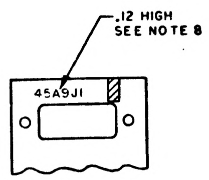
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008529
SCALE 2/1
SHEET 2 OF 3

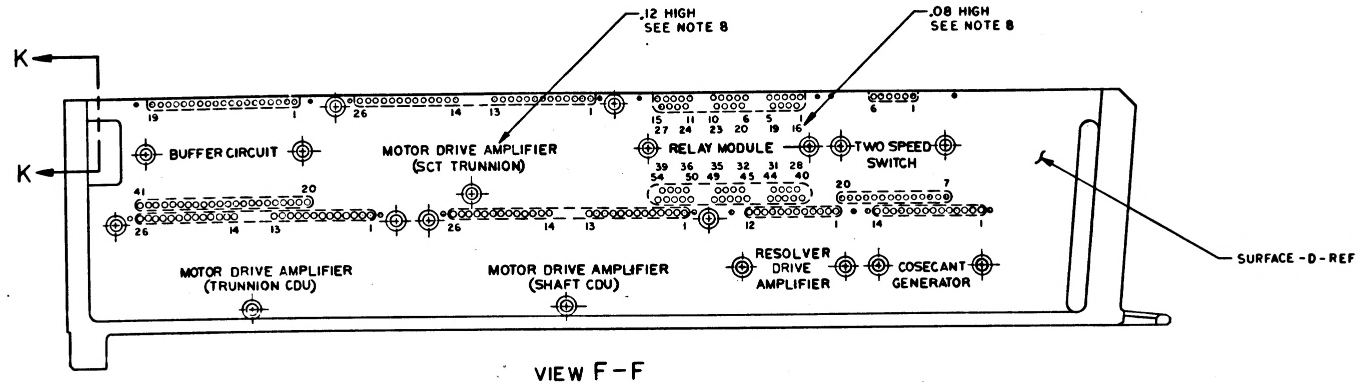
NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14527						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



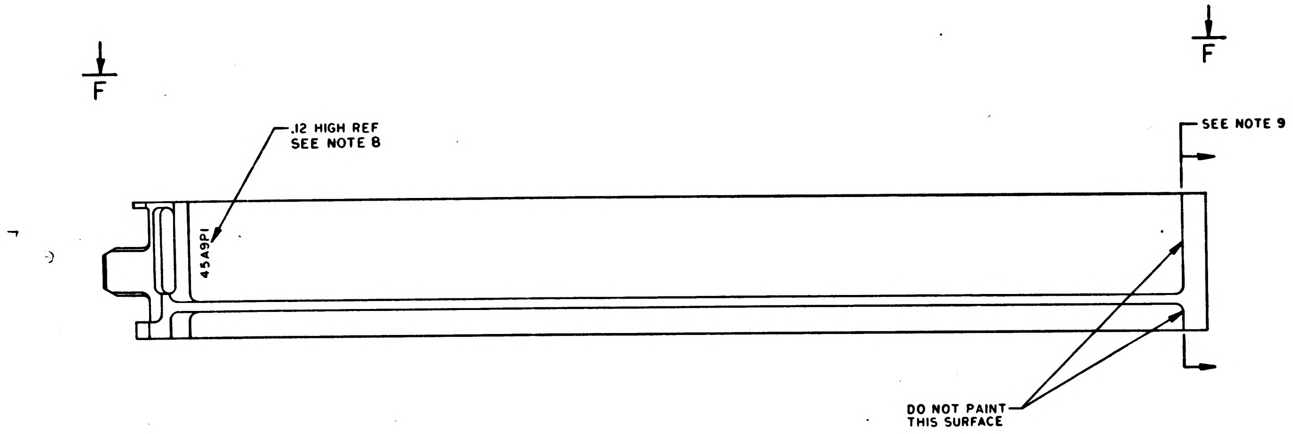
.12 HIGH
SEE NOTE 8
45A9J1

PARTIAL SECTION K-K

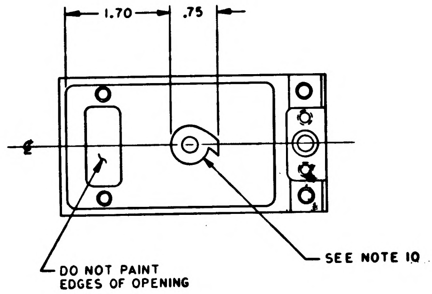


.12 HIGH
SEE NOTE 8
.08 HIGH
SEE NOTE 8
K
K
BUFFER CIRCUIT
MOTOR DRIVE AMPLIFIER
(SCT TRUNNION)
RELAY MODULE
TWO SPEED SWITCH
MOTOR DRIVE AMPLIFIER
(TRUNNION CDU)
MOTOR DRIVE AMPLIFIER
(SHAFT CDU)
RESOLVER DRIVE AMPLIFIER
COSECANT GENERATOR
SURFACE -D- REF

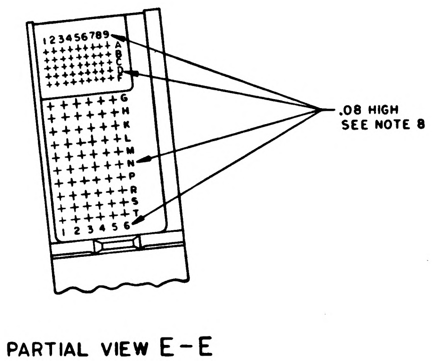
VIEW F-F
ROTATED 180°



F
F
.12 HIGH REF
SEE NOTE 8
45A9P1
SEE NOTE 9
DO NOT PAINT
THIS SURFACE

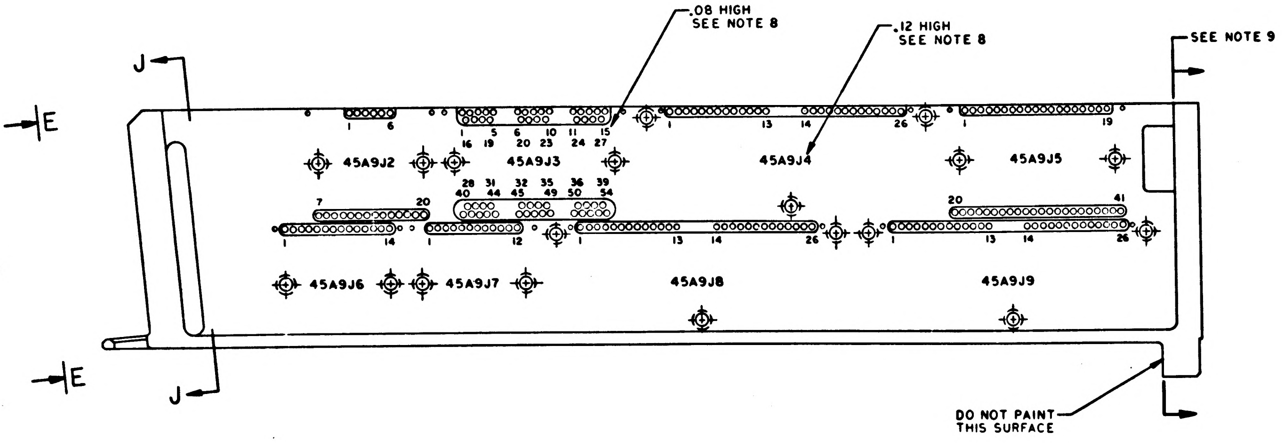


1.70
.75
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10

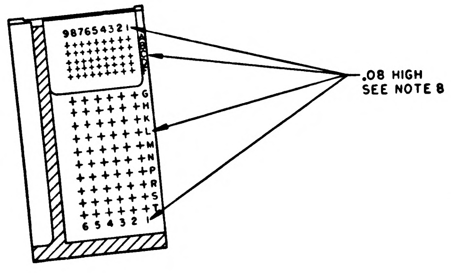


123456789
.08 HIGH
SEE NOTE 8

PARTIAL VIEW E-E



.08 HIGH
SEE NOTE 8
.12 HIGH
SEE NOTE 8
SEE NOTE 9
J
J
E
E
45A9J2
45A9J3
45A9J4
45A9J5
45A9J6
45A9J7
45A9J8
45A9J9
DO NOT PAINT
THIS SURFACE



987654321
.08 HIGH
SEE NOTE 8

SECTION J-J

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

NEXT ASSY	USED ON
1007539	

APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN A.C. Taylor
CHECKED A. Lindstrom
APPROVED
APPROVED D. Lee
APPROVED MIT W. Kupfer
APPROVED MSC W.J. Kane
DATE

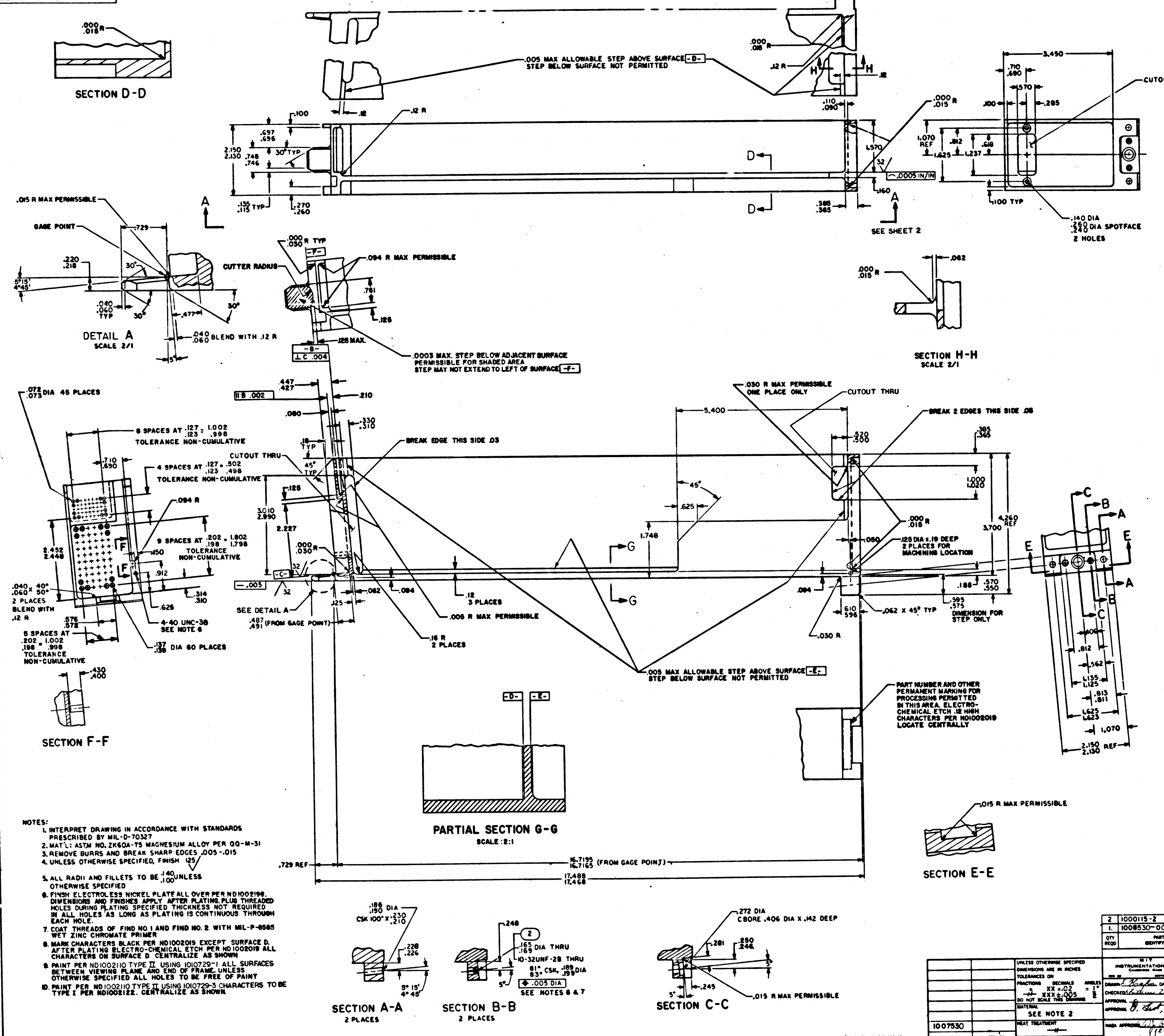
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 9

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008529
SCALE 1/1
SHEET 3 OF 3

1008529

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15232		


SECTION D-D
SECTION H-H
SCALE 2/1
DETAIL A
SCALE 2/1
SECTION F-F
PARTIAL SECTION G-G
SCALE :2:1
SECTION E-E
SECTION A-A
2 PLACES
SECTION B-B
2 PLACES
SECTION C-C
SEE SHEET 2
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
CUTOUT THRU
.140 DIA .260/.240 DIA SPOTFACE 2 HOLES
.072/.073 DIA 45 PLACES
.137/.139 DIA 60 PLACES
4-40 UNC-3B SEE NOTE 6
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.030 R MAX PERMISSIBLE ONE PLACE ONLY
BREAK 2 EDGES THIS SIDE .05
BREAK EDGE THIS SIDE .03
.015 R MAX PERMISSIBLE
.094 R MAX PERMISSIBLE
CUTTER RADIUS
GAGE POINT
16.7195/16.7165 (FROM GAGE POINT)
17.488/17.468
.729 REF
10-32UNF-2B THRU
.272 DIA CBORE .406 DIA x .142 DEEP
SEE NOTES 6 & 7

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.140}_{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008530-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN E. Kraha DATE 30 SEP 64
CHECKED 27 OCT 64
APPROVAL
APPROVAL D. Test 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME,
TRAY 10

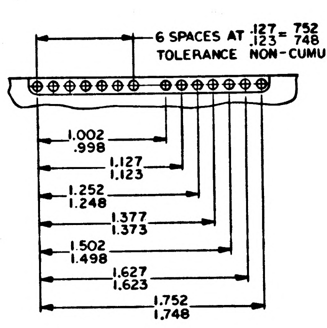
CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008530
SCALE 1/1
WT —
SHEET 1 OF 3

1008530 A

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

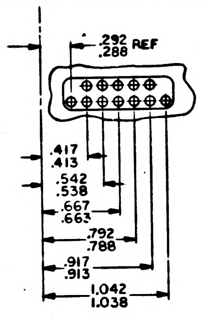
REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15232	LK	RL		LK



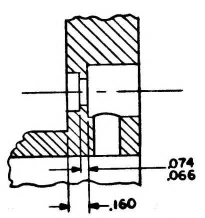
6 SPACES AT .127/.123 = .752/.748
TOLERANCE NON-CUMULATIVE
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
1.752/1.748

DETAIL B
3 PLACES

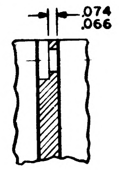


.292/.288 REF
.417/.413
.542/.538
.667/.663
.792/.788
.917/.913
1.042/1.038

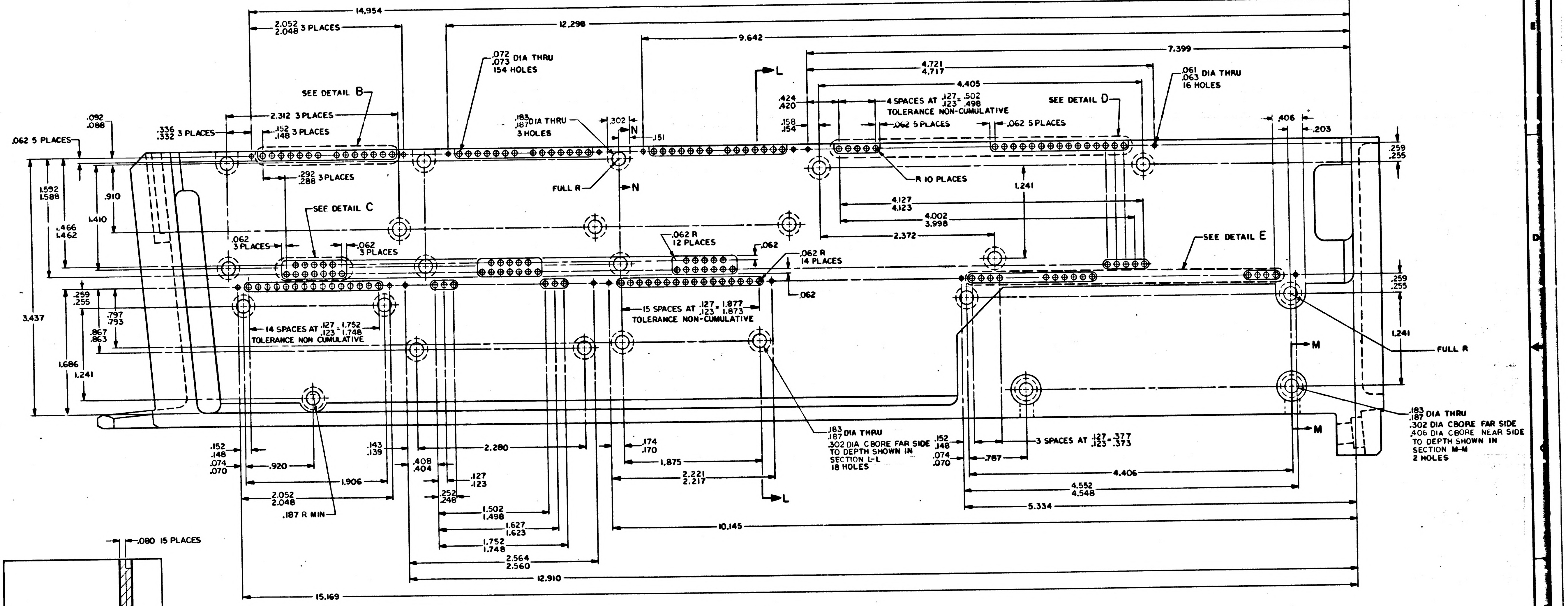
DETAIL C
3 PLACES



PARTIAL SECTION M-M

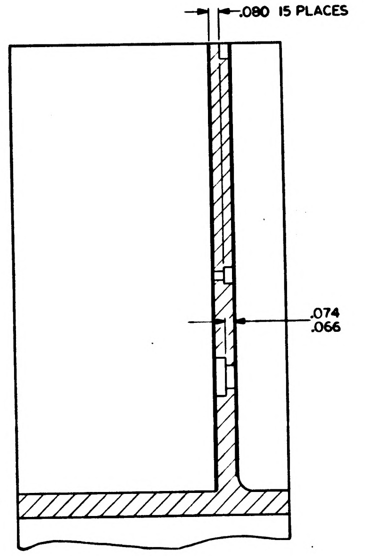


PARTIAL SECTION N-N



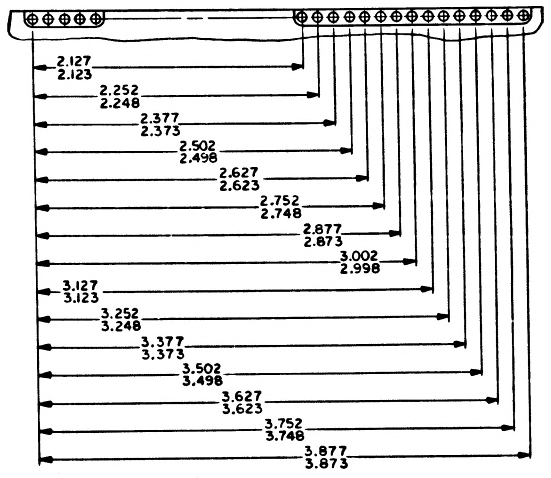
14.954
12.298
9.642
7.399
4.721/4.717
4.405
2.052/2.048 3 PLACES
.072/.073 DIA THRU 154 HOLES
.061/.063 DIA THRU 16 HOLES
SEE DETAIL B
SEE DETAIL C
SEE DETAIL D
SEE DETAIL E
4 SPACES AT .127/.123 = .502/.498
TOLERANCE NON-CUMULATIVE
.424/.420
.158/.154
.062 5 PLACES
.092/.088
.336/.332 3 PLACES
2.312 3 PLACES
.152/.148 3 PLACES
.183/.187 DIA THRU 3 HOLES
.302
.151
.406
.203
.259/.255
R 10 PLACES
FULL R
1.592/1.588
1.466/1.462
.910
1.410
.292/.288 3 PLACES
.062 3 PLACES
4.127/4.123
4.002/3.998
2.372
1.241
.062 R 12 PLACES
.062 R 14 PLACES
.062
15 SPACES AT .127/.123 = 1.877/1.873
TOLERANCE NON-CUMULATIVE
14 SPACES AT .127/.123 = 1.752/1.748
TOLERANCE NON CUMULATIVE
3.437
.259/.255
.797/.793
.867/.863
1.686
1.241
.183/.187 DIA THRU
.302 DIA CBORE FAR SIDE TO DEPTH SHOWN IN SECTION L-L
18 HOLES
.183/.187 DIA THRU
.302 DIA CBORE FAR SIDE
.406 DIA CBORE NEAR SIDE
TO DEPTH SHOWN IN SECTION M-M
2 HOLES
M
N
L
.152/.148
.074/.070
.920
1.906
2.052/2.048
.187 R MIN
.143/.139
.408/.404
.252/.248
.127/.123
2.280
1.502/1.498
1.627/1.623
1.752/1.748
2.564/2.560
.174/.170
1.875
2.221/2.217
10.145
12.910
15.169
3 SPACES AT .127/.123 = .377/.373
.787
4.406
4.552/4.548
5.334

VIEW A-A
SEE SHEET 1



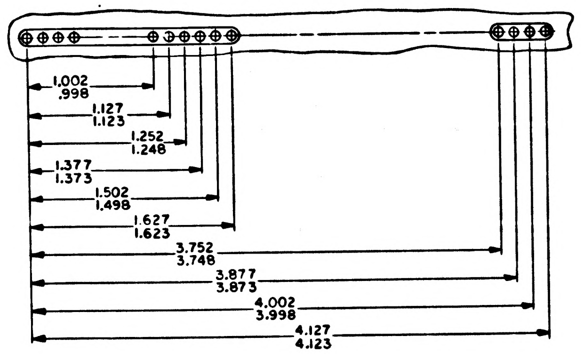
.080 15 PLACES
.074/.066

SECTION L-L



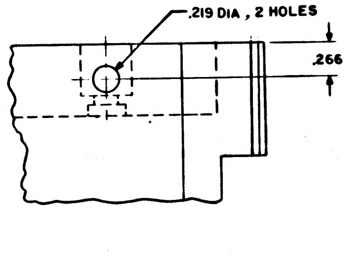
2.127/2.123
2.252/2.248
2.377/2.373
2.502/2.498
2.627/2.623
2.752/2.748
2.877/2.873
3.002/2.998
3.127/3.123
3.252/3.248
3.377/3.373
3.502/3.498
3.627/3.623
3.752/3.748
3.877/3.873

DETAIL D



1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123

DETAIL E



.219 DIA , 2 HOLES
.266

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —— DECIMALS ±.02 ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING

MATERIAL ——

1007530	
NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN L Krahn 30 SEP 64
CHECKED 27 OCT 64
APPROVED
APPROVED D. Test
APPROVED MIT
APPROVED MSC
DATE

FRAME,
TRAY 10

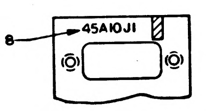
CODE IDENT NO. ——
SIZE E
DRAWING NO. 1008530
SCALE 2/1
SHEET 2 OF 3

1008530 A

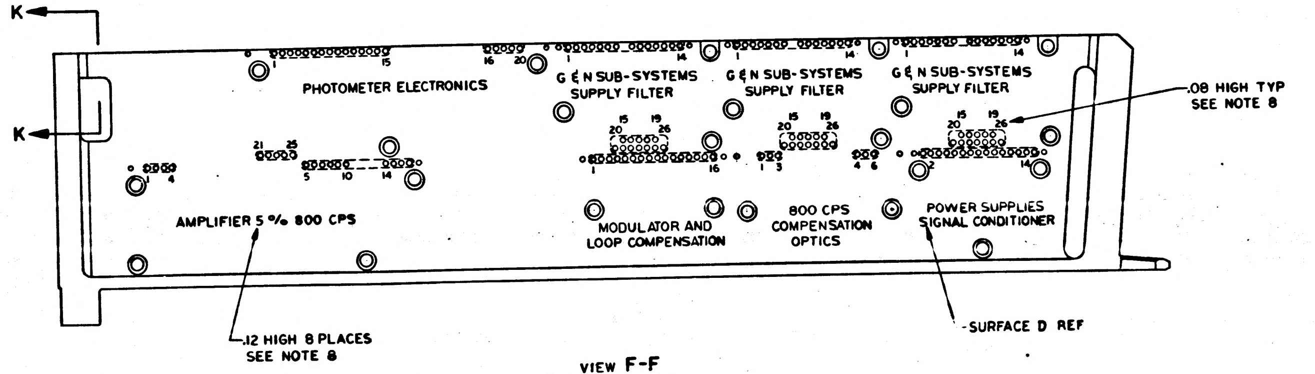
NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

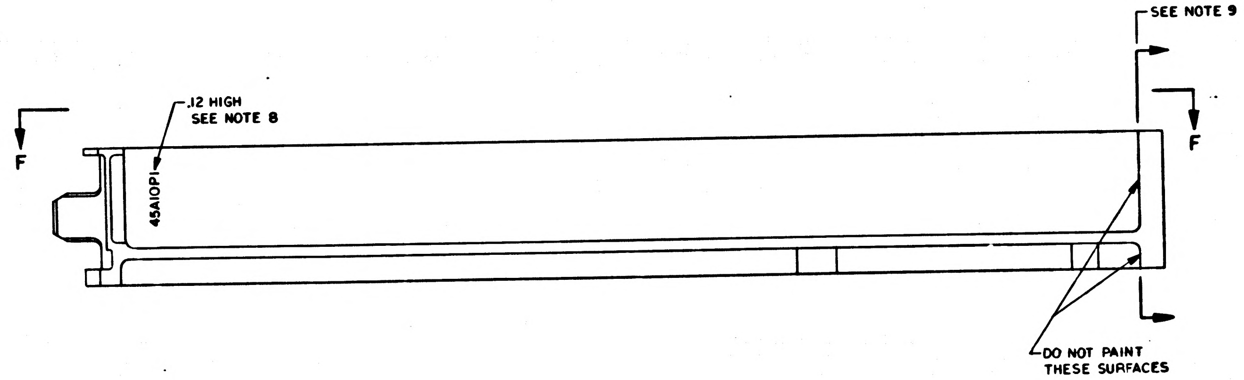
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15232	LK	RL	8 JAN 65	WK

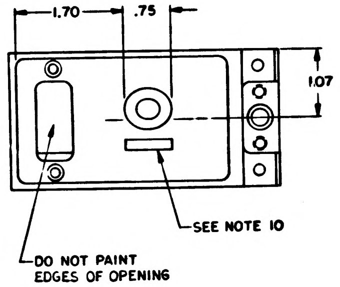

.12 HIGH
SEE NOTE 8
45A10J1

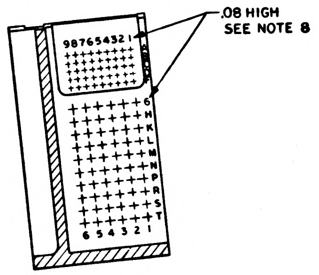
PARTIAL SECTION K-K


K
K
PHOTOMETER ELECTRONICS
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
.08 HIGH TYP
SEE NOTE 8
AMPLIFIER 5 % 800 CPS
MODULATOR AND LOOP COMPENSATION
800 CPS COMPENSATION OPTICS
POWER SUPPLIES SIGNAL CONDITIONER
.12 HIGH 8 PLACES
SEE NOTE 8
SURFACE D REF

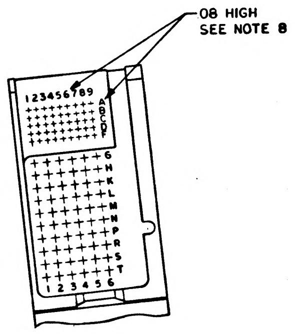
VIEW F-F
ROTATED 180°


SEE NOTE 9
.12 HIGH
SEE NOTE 8
F
F
45A10P1
DO NOT PAINT
THESE SURFACES

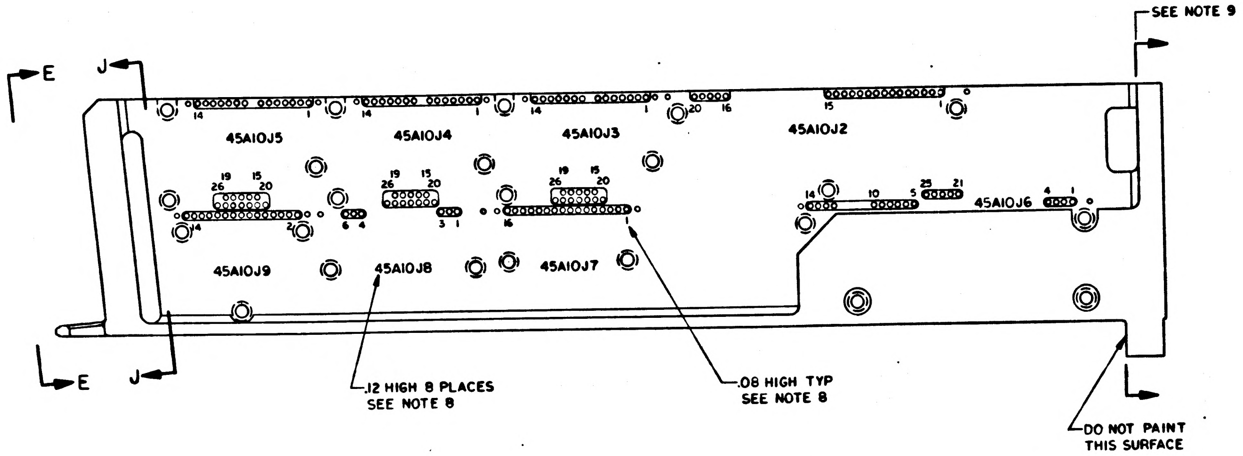

1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING


.08 HIGH
SEE NOTE 8
987654321
G H K L M N P R S T
6 5 4 3 2 1

SECTION J-J


.08 HIGH
SEE NOTE 8
123456789
G H K L M N P R S T
123456

PARTIAL VIEW E-E


SEE NOTE 9
E
J
45A10J5
45A10J4
45A10J3
45A10J2
45A10J6
45A10J9
45A10J8
45A10J7
E
J
.12 HIGH 8 PLACES
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
DO NOT PAINT
THIS SURFACE

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

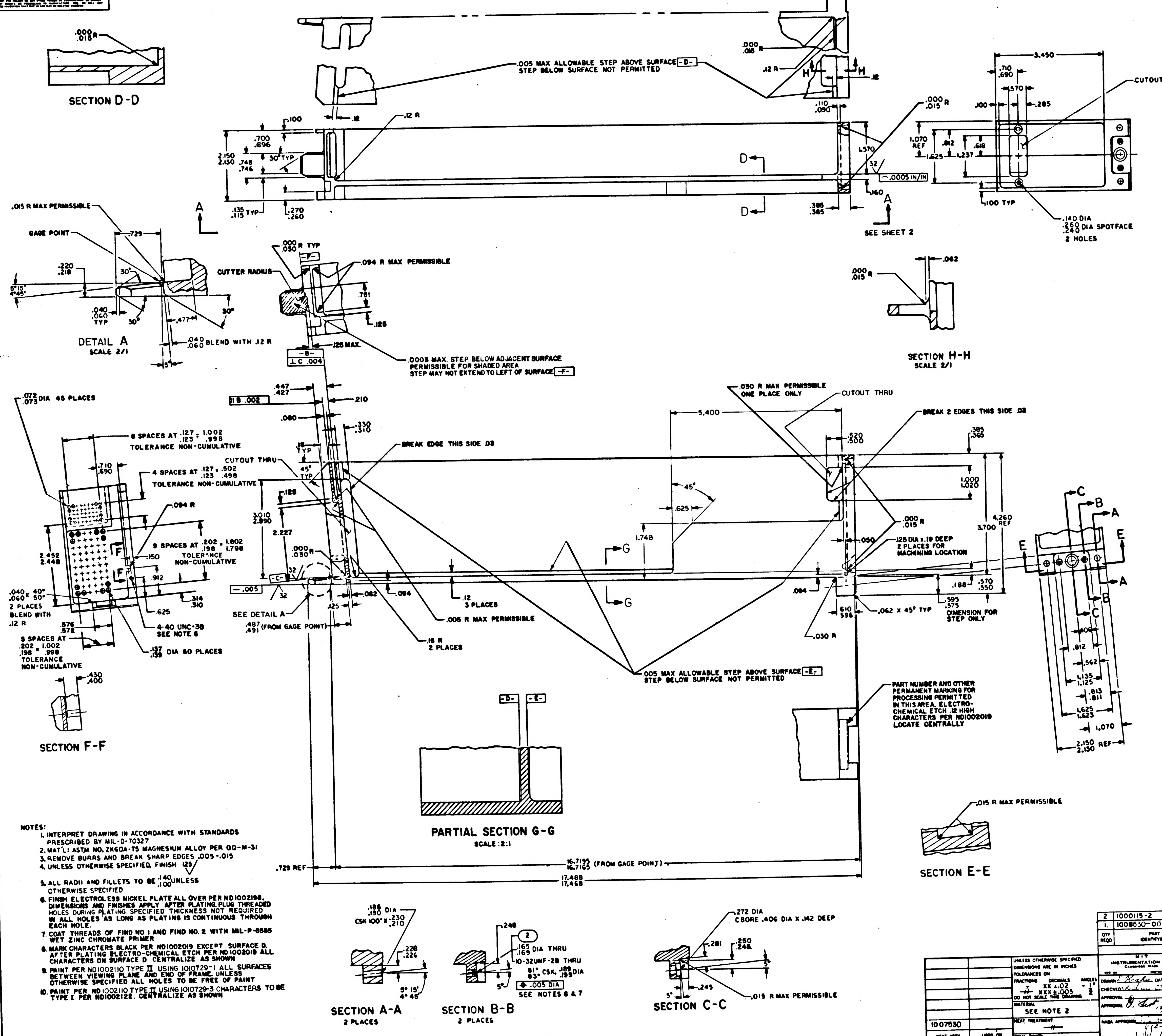
DRAWN E. Krahn 30 SEP 64
CHECKED R. Sitani 1 DEC 64
APPROVED
APPROVED D. Tost 1/4/65
APPROVED MIT W. Kupfer 1/4/65
APPROVED MSC W. J. Rhine 2-1-65
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 10

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008530
SCALE 1/1
SHEET 3 OF 3

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			
A	REVISED PER TDRR 15232		
B	REVISED PER TDRR 15950	11 FEB	


.000 .015 R
SECTION D-D
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.000 .016 R
.12 R
H
H
.12
.100
.12
.12 R
.700 .696
2.150 2.130
30° TYP
.748 .746
.135 .115 TYP
.270 .260
.110 .090
.000 .015 R
1.570
32
⌒ .0005 IN/IN
.160
.385 .365
D
D
A
A
SEE SHEET 2
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5°15' 4°45'
.040 .060 TYP
30°
.477
30°
DETAIL A
SCALE 2/1
.040 .060 BLEND WITH .12 R
5°
.000 .030 R TYP
-F-
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.761
.125
.125 MAX.
-B-
⊥ C .004
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.000 .015 R
.062
SECTION H-H
SCALE 2/1
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
.710 .690
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
.094 R
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
F
F
.150
.912
2.452 2.448
.040 .060 x 40° 50°
2 PLACES
BLEND WITH .12 R
.314 .310
.625
.576 .572
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 .139 DIA 60 PLACES
.430 .400
SECTION F-F
.447 .427
// B .002
.210
.080
.330 .310
.18 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
.125
3.010 2.990
2.227
.000 .030 R
32
-C-
— .005
32
.062
.094
.125
SEE DETAIL A
.487 .491 (FROM GAGE POINT)
.12
3 PLACES
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
CUTOUT THRU
5.400
BREAK 2 EDGES THIS SIDE .03
.520 .500
45°
.625
1.748
G
G
.385 .365
1.000 1.020
3.700
4.260 REF
.000 .015 R
.050
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.094
.188
.570 .550
.595 .575
DIMENSION FOR STEP ONLY
.610 .596
.062 X 45° TYP
.030 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
C
B
A
E
E
A
B
C
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D-
-E-
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
PARTIAL SECTION G-G
SCALE :2:1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5° 15' 4° 45'
SECTION A-A
2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .199 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $^{.140}_{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008530-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN I. Kogan DATE 30 SEP 64
CHECKED 27 OCT 64
APPROVAL
APPROVAL D. Test 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME,
TRAY 10

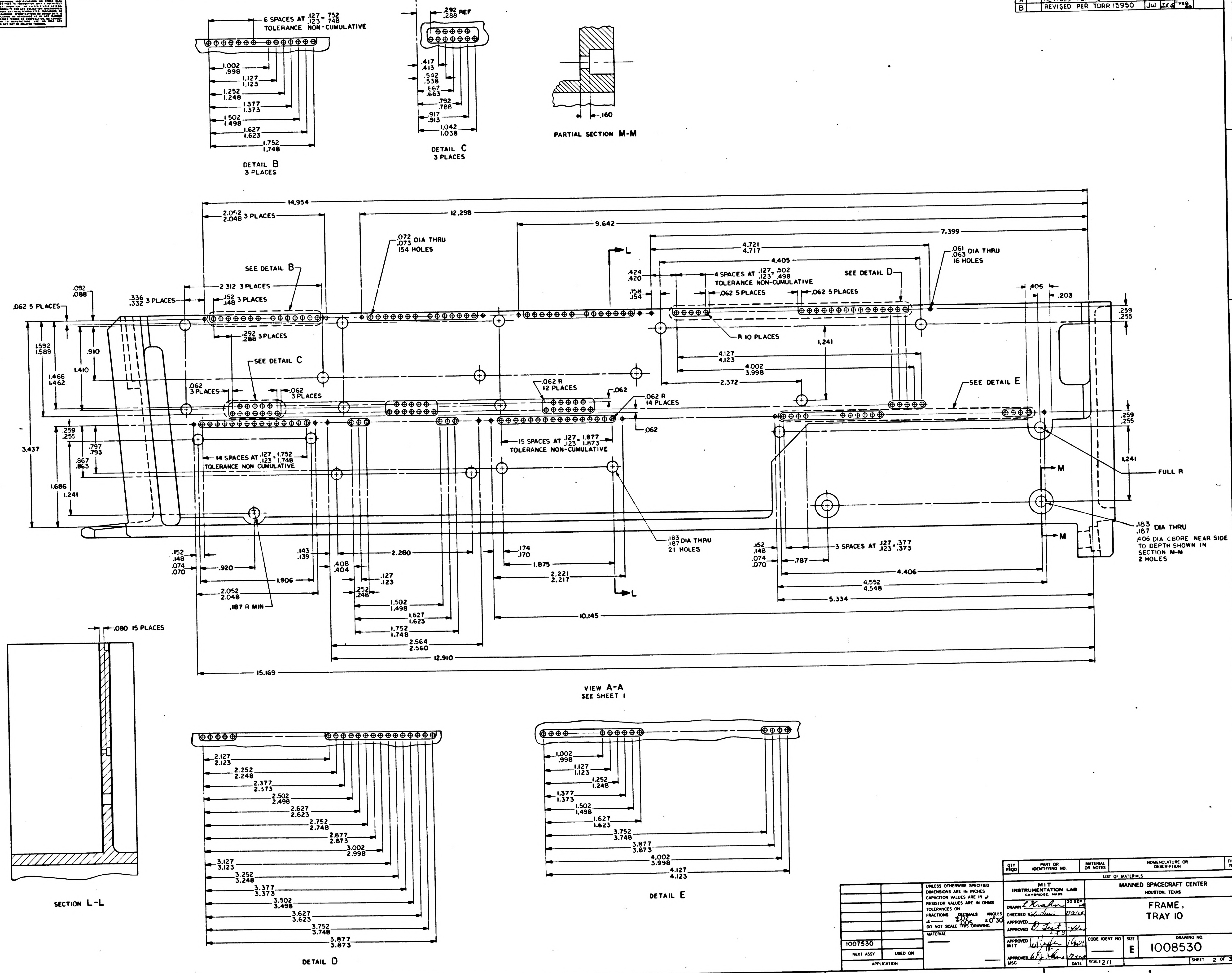
CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008530
SCALE 1/1
WT
SHEET 1 OF 3

1008530 B

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15232	LK	[illegible]	[illegible]	[illegible]
B		REVISED PER TDRR 15950	JW	J.E.G.	11 FEB 65	


6 SPACES AT .127/.123 = .752/.748
TOLERANCE NON-CUMULATIVE
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
1.752/1.748
DETAIL B
3 PLACES
.292/.288 REF
.417/.413
.542/.538
.667/.663
.792/.788
.917/.913
1.042/1.038
DETAIL C
3 PLACES
.160
PARTIAL SECTION M-M
14.954
12.298
9.642
7.399
2.052/2.048 3 PLACES
.072/.073 DIA THRU
154 HOLES
4.721/4.717
4.405
.061/.063 DIA THRU
16 HOLES
SEE DETAIL B
SEE DETAIL C
SEE DETAIL D
SEE DETAIL E
2.312 3 PLACES
.152/.148 3 PLACES
.336/.332 3 PLACES
.092/.088
.062 5 PLACES
.292/.288 3 PLACES
.424/.420
.158/.154
4 SPACES AT .127/.123 = .502/.498
TOLERANCE NON-CUMULATIVE
.062 5 PLACES
.406
.203
.259/.255
R 10 PLACES
1.241
4.127/4.123
4.002/3.998
2.372
1.592/1.588
.910
1.466/1.462
1.410
.062
3 PLACES
.062
3 PLACES
.062 R
12 PLACES
.062
.062 R
14 PLACES
.062
3.437
.259/.255
.797/.793
.867/.863
1.686
1.241
14 SPACES AT .127/.123 = 1.752/1.748
TOLERANCE NON CUMULATIVE
15 SPACES AT .127/.123 = 1.877/1.873
TOLERANCE NON-CUMULATIVE
L
M
FULL R
.183/.187 DIA THRU
.406 DIA CBORE NEAR SIDE
TO DEPTH SHOWN IN
SECTION M-M
2 HOLES
.183/.187 DIA THRU
21 HOLES
.152/.148
.074/.070
.920
.143/.139
.408/.404
2.280
.174/.170
1.875
2.221/2.217
.127/.123
1.906
.252/.248
2.052/2.048
.187 R MIN
1.502/1.498
1.627/1.623
1.752/1.748
2.564/2.560
10.145
12.910
15.169
3 SPACES AT .127/.123 = .377/.373
.787
4.406
4.552/4.548
5.334
VIEW A-A
SEE SHEET 1
.080 15 PLACES
SECTION L-L
2.127/2.123
2.252/2.248
2.377/2.373
2.502/2.498
2.627/2.623
2.752/2.748
2.877/2.873
3.002/2.998
3.127/3.123
3.252/3.248
3.377/3.373
3.502/3.498
3.627/3.623
3.752/3.748
3.877/3.873
DETAIL D
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123
DETAIL E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.02 ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L. Krahn 30 SEP
CHECKED [illegible] 22 OCT 64
APPROVED
APPROVED D. [illegible]
APPROVED MIT W. [illegible]
APPROVED MSC [illegible]
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 10

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008530
SCALE 2/1
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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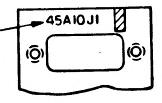
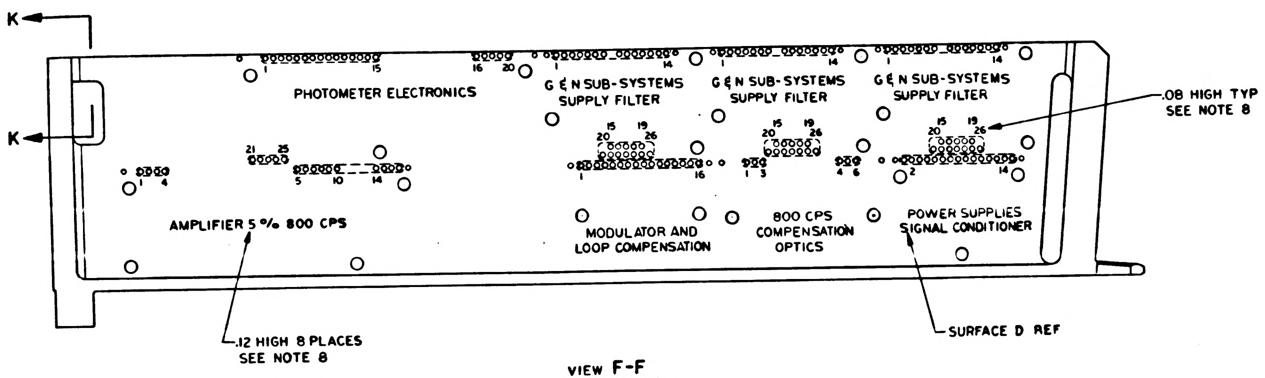
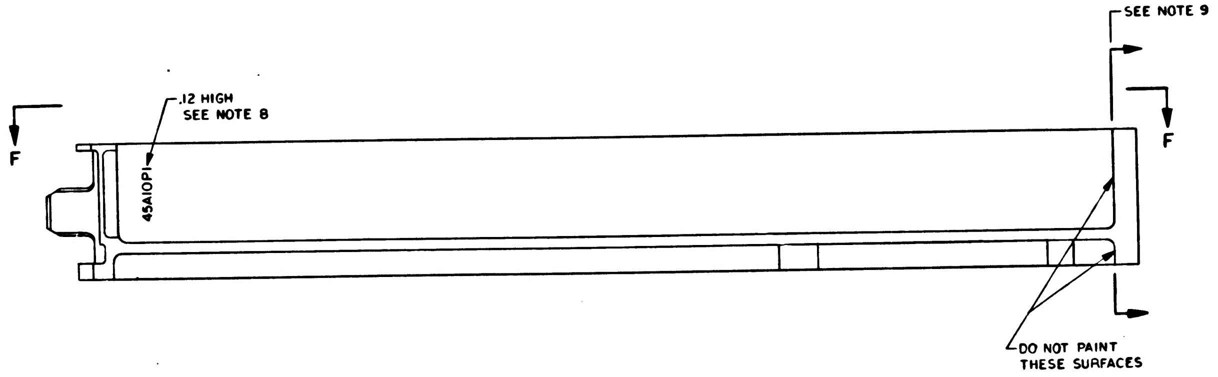
B		REVISED PER TDRR 15950	JW	JEG	11 FEB 65	

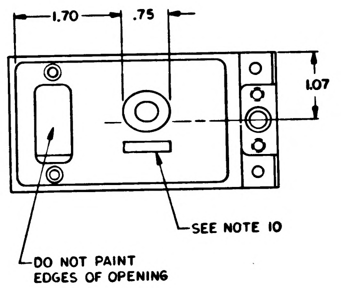

.12 HIGH
SEE NOTE 8
45A10J1

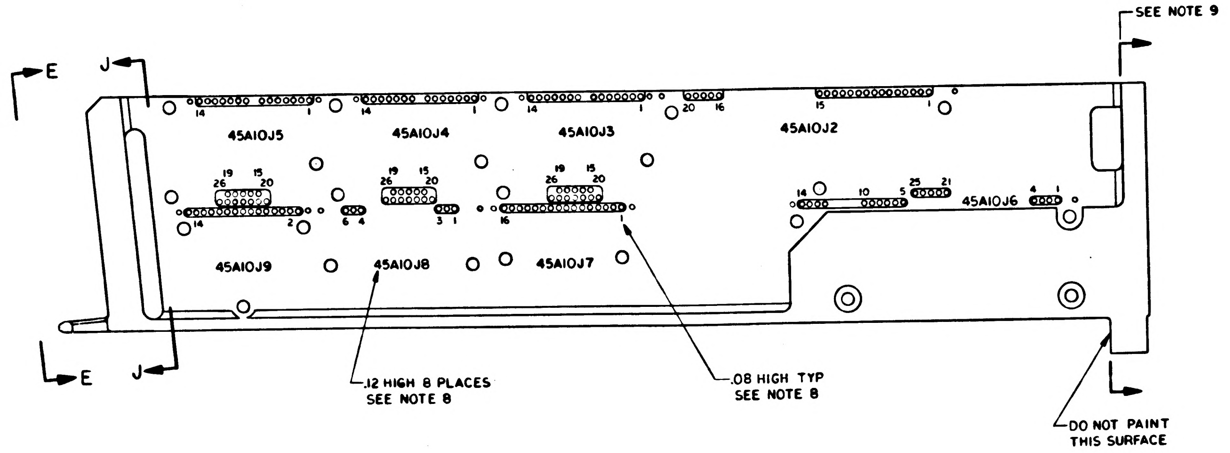
PARTIAL SECTION K-K

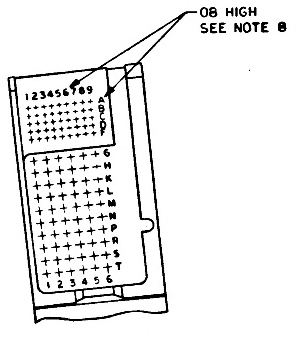

K
K
PHOTOMETER ELECTRONICS
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
.08 HIGH TYP
SEE NOTE 8
AMPLIFIER 5 % 800 CPS
MODULATOR AND LOOP COMPENSATION
800 CPS COMPENSATION OPTICS
POWER SUPPLIES SIGNAL CONDITIONER
.12 HIGH 8 PLACES
SEE NOTE 8
SURFACE D REF

VIEW F-F
ROTATED 180°

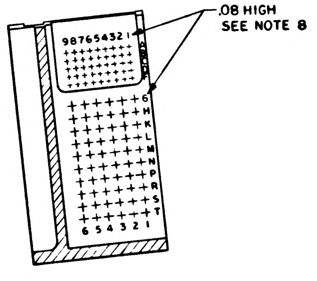

SEE NOTE 9
.12 HIGH
SEE NOTE 8
F
F
45A10P1
DO NOT PAINT
THESE SURFACES


1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING


SEE NOTE 9
E
J
45A10J5
45A10J4
45A10J3
45A10J2
45A10J6
45A10J9
45A10J8
45A10J7
E
J
.12 HIGH 8 PLACES
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
DO NOT PAINT
THIS SURFACE


.08 HIGH
SEE NOTE 8
123456789
A B C D F
G H K L M N P R S T
1 2 3 4 5 6

PARTIAL VIEW E-E


.08 HIGH
SEE NOTE 8
987654321
G H K L M N P R S T
6 5 4 3 2 1

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

		DATE
DRAWN	E. Krahn	30 SEP 64
CHECKED		1 DEC 64
APPROVED		
APPROVED	D. Test	12/16/64
APPROVED MIT	W. Kupfer	11 Jan 65
APPROVED MSC		2-1-65

FRAME
TRAY 10

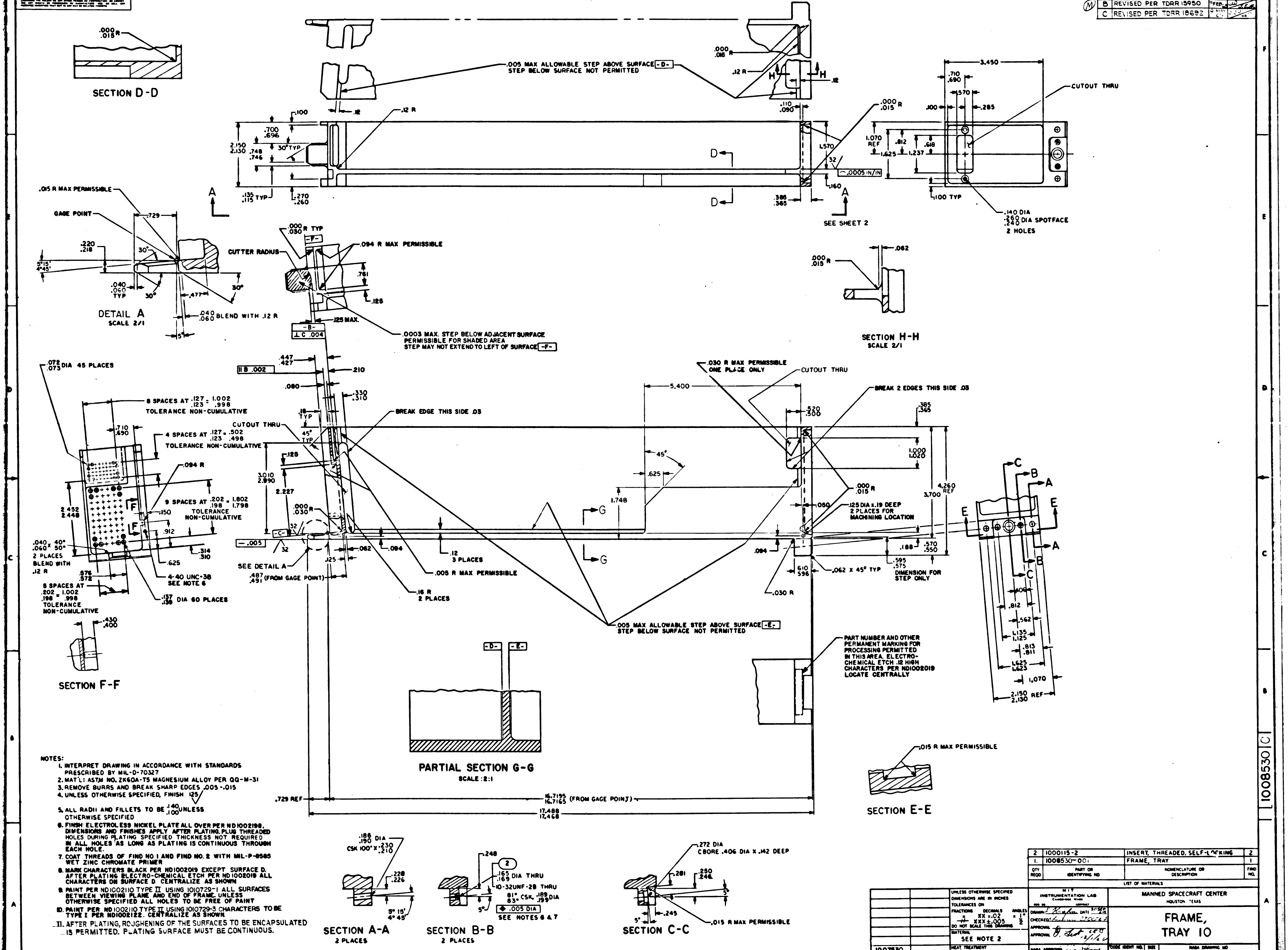
CODE IDENT NO.	SIZE	DRAWING NO.
—	E	1008530

SCALE 1/1 SHEET 3 OF 3

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15232		
B	REVISED PER TDRR 15950	11 FEB	
C	REVISED PER TDRR 18692	6 MAR	

Ⓜ



SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
H
3.450
CUTOUT THRU
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.100 TYP
SEE SHEET 2
.0005 IN/IN
DETAIL A
SCALE 2/1
.015 R MAX PERMISSIBLE
GAGE POINT
.040 .060 BLEND WITH .12 R
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SECTION H-H
SCALE 2/1
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 .139 DIA 60 PLACES
SECTION F-F
CUTOUT THRU
BREAK EDGE THIS SIDE .03
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
BREAK 2 EDGES THIS SIDE .03
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
SEE DETAIL A
.487 .491 (FROM GAGE POINT)
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.12
3 PLACES
.062 x 45° TYP
.595 .575
DIMENSION FOR
STEP ONLY
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
PARTIAL SECTION G-G
SCALE: 2:1
SECTION E-E
.015 R MAX PERMISSIBLE
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
SECTION A-A
2 PLACES
.188 .190 DIA
CSK 100° x .230 .210
SECTION B-B
2 PLACES
.165 .169 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION C-C
.272 DIA
CBORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINSH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. AFTER PLATING, ROJGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008530-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN DATE 30 SEP 64
CHECKED 22 OCT 64
APPROVAL
APPROVAL D. Fest 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME, TRAY 10

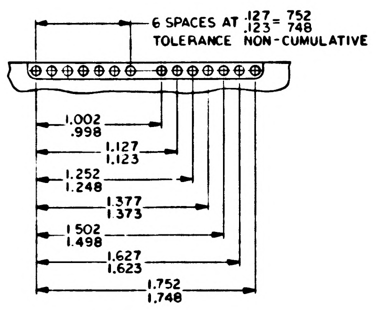
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008530
SCALE 1/1
WT —
SHEET 1 OF 3

1008530 C

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

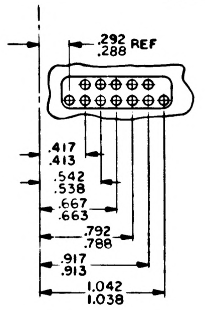
REVISIONS 1162

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15232	LK			
B		REVISED PER TDRR 15950	JW	J.E.G.	11 FEB 65	
C		REVISED PER TDRR 18692		mcM	6 MAY 65	



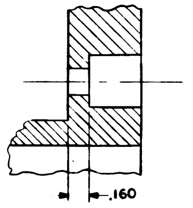
6 SPACES AT .127/.123 = .752/.748
TOLERANCE NON-CUMULATIVE
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
1.752/1.748

DETAIL B
3 PLACES

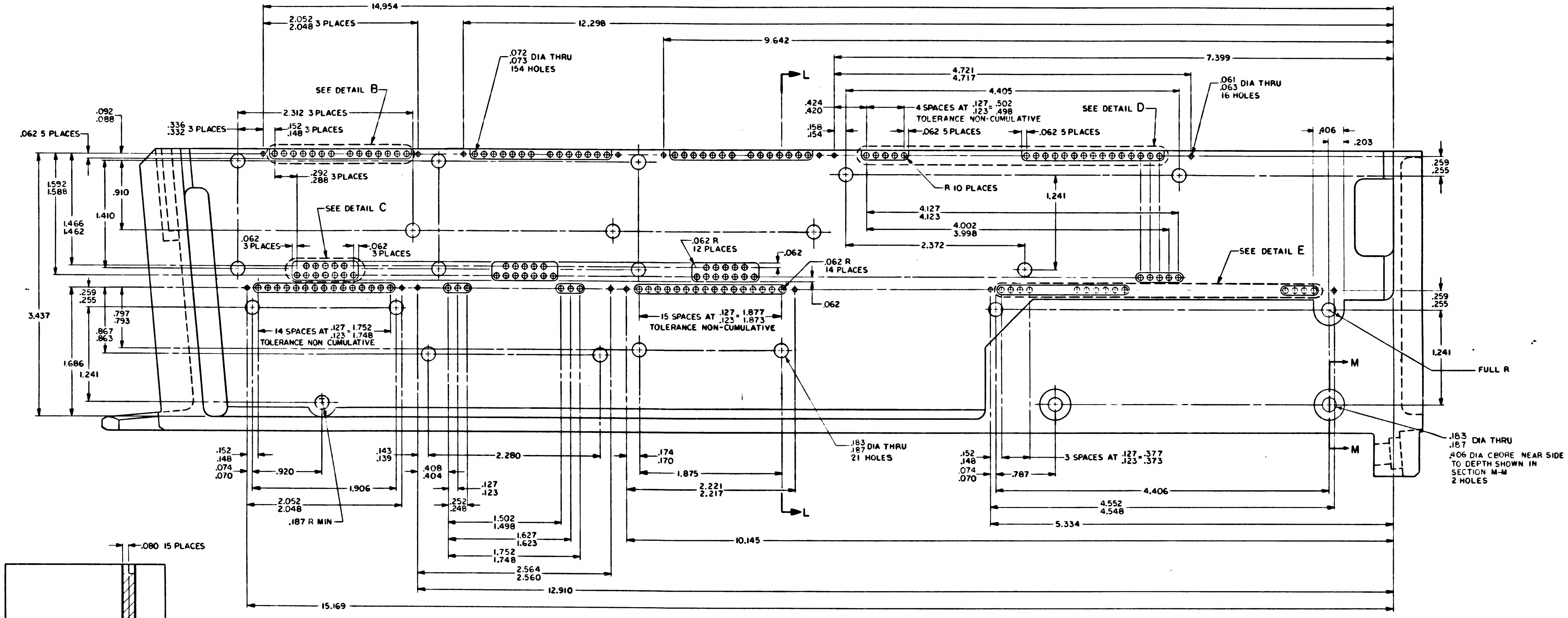


.292/.288 REF
.417/.413
.542/.538
.667/.663
.792/.788
.917/.913
1.042/1.038

DETAIL C
3 PLACES

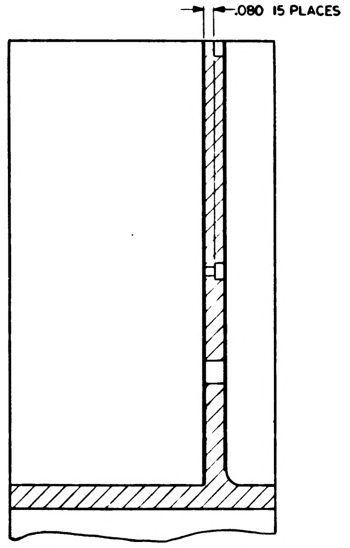


PARTIAL SECTION M-M



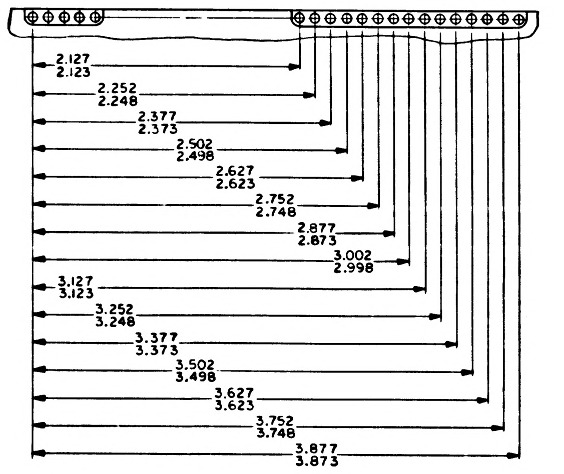
14.954
2.052/2.048 3 PLACES
12.298
9.642
.072/.073 DIA THRU 154 HOLES
7.399
L
4.721/4.717
4.405
.061/.063 DIA THRU 16 HOLES
SEE DETAIL B
2.312 3 PLACES
.092/.088
.336/.332 3 PLACES
.152/.148 3 PLACES
.062 5 PLACES
.424/.420
.158/.154
4 SPACES AT .127/.123 = .502/.498
TOLERANCE NON-CUMULATIVE
.062 5 PLACES
.062 5 PLACES
SEE DETAIL D
.406
.203
.259/.255
.292/.288 3 PLACES
R 10 PLACES
1.241
1.592/1.588
.910
SEE DETAIL C
4.127/4.123
4.002/3.998
1.466/1.462
1.410
.062 3 PLACES
.062 3 PLACES
.062 R 12 PLACES
.062
2.372
SEE DETAIL E
.062 R 14 PLACES
.062
.259/.255
.259/.255
.797/.793
15 SPACES AT .127/.123 = 1.877/1.873
TOLERANCE NON-CUMULATIVE
3.437
14 SPACES AT .127/.123 = 1.752/1.748
TOLERANCE NON CUMULATIVE
.867/.863
1.241
1.686
1.241
M
FULL R
.183/.187 DIA THRU 21 HOLES
.183/.187 DIA THRU
.406 DIA CBORE NEAR SIDE TO DEPTH SHOWN IN SECTION M-M
2 HOLES
M
.152/.148
.074/.070
.920
.143/.139
.408/.404
2.280
.174/.170
1.875
.152/.148
.074/.070
.787
3 SPACES AT .127/.123 = .377/.373
1.906
.127/.123
2.221/2.217
4.406
2.052/2.048
.252/.248
L
4.552/4.548
.187 R MIN
1.502/1.498
5.334
1.627/1.623
10.145
1.752/1.748
2.564/2.560
12.910
15.169

VIEW A-A
SEE SHEET 1



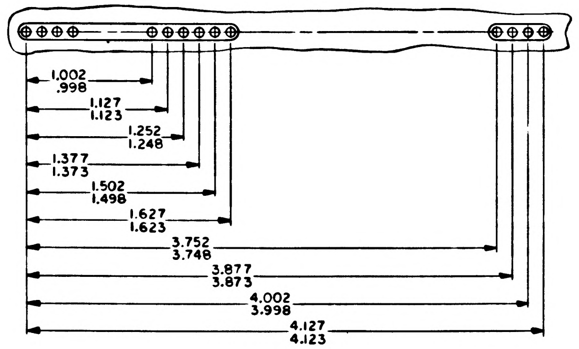
.080 15 PLACES

SECTION L-L



2.127/2.123
2.252/2.248
2.377/2.373
2.502/2.498
2.627/2.623
2.752/2.748
2.877/2.873
3.002/2.998
3.127/3.123
3.252/3.248
3.377/3.373
3.502/3.498
3.627/3.623
3.752/3.748
3.877/3.873

DETAIL D



1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123

DETAIL E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007530	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.02 ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L Krahn 30 SEP 64
CHECKED
APPROVED
APPROVED D. Teet
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 10

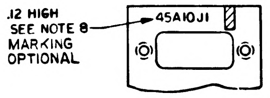
CODE IDENT NO. 80230
SIZE E
DRAWING NO. 1008530
SCALE 2/1
SHEET 2 OF 3

1008530 C

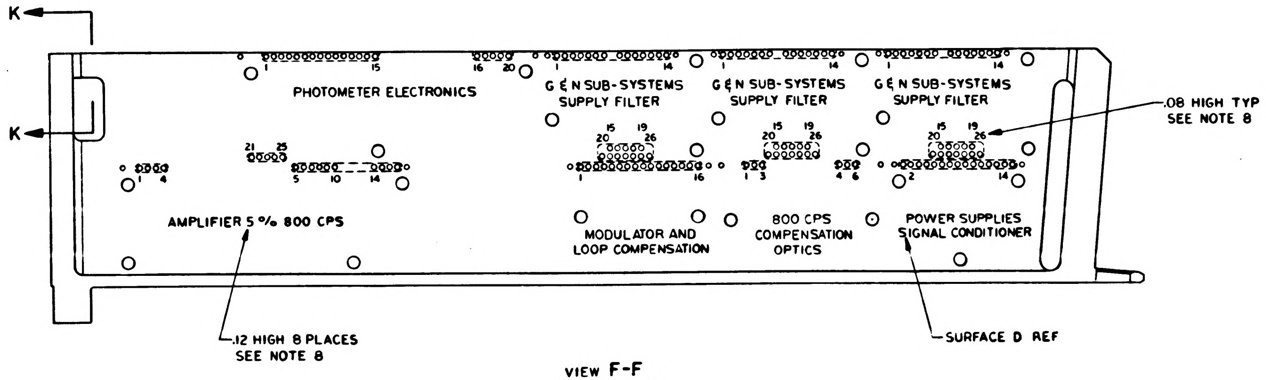
NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14627

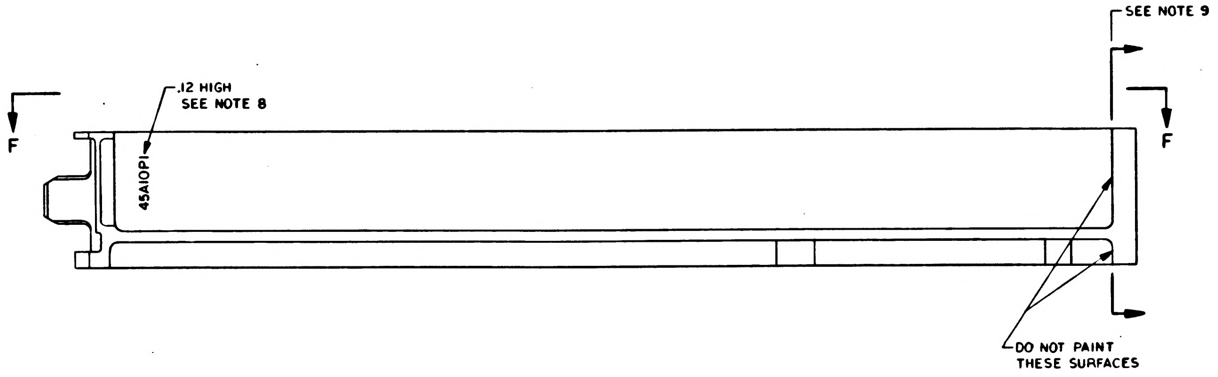
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15232	LK			WR
Ⓜ B		REVISED PER TDRR 15950	JW	J.E.G.	11 FEB 65	
C		REVISED PER TDRR 18692			6 MAY 65	

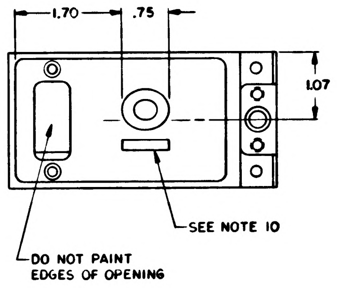

.12 HIGH
SEE NOTE 8
MARKING
OPTIONAL
45A10J1

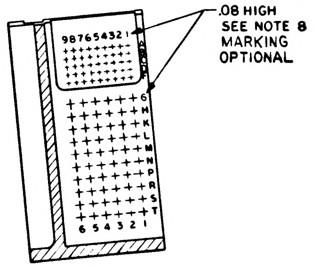
PARTIAL SECTION K-K


K
K
PHOTOMETER ELECTRONICS
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
.08 HIGH TYP
SEE NOTE 8
AMPLIFIER 5 % 800 CPS
MODULATOR AND LOOP COMPENSATION
800 CPS COMPENSATION OPTICS
POWER SUPPLIES SIGNAL CONDITIONER
.12 HIGH 8 PLACES
SEE NOTE 8
SURFACE D REF

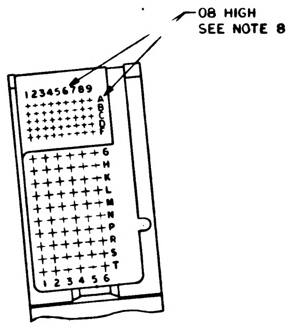
VIEW F-F
ROTATED 180°


SEE NOTE 9
.12 HIGH
SEE NOTE 8
F
F
45A10P1
DO NOT PAINT
THESE SURFACES

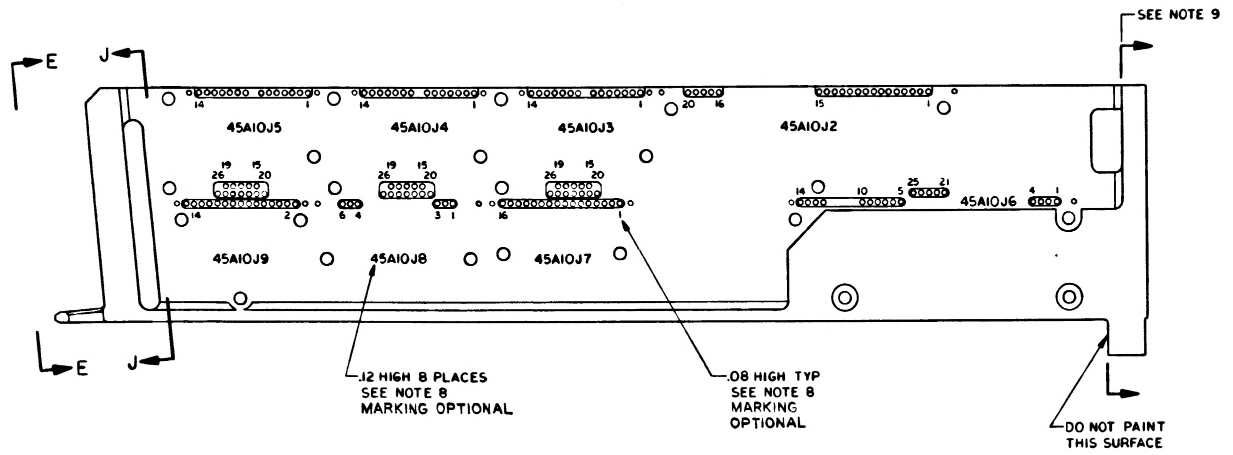

1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING


.08 HIGH
SEE NOTE 8
MARKING
OPTIONAL
987654321

SECTION J-J


.08 HIGH
SEE NOTE 8
123456789

PARTIAL VIEW E-E


SEE NOTE 9
E
J
E
J
45A10J5
45A10J4
45A10J3
45A10J2
45A10J6
45A10J9
45A10J8
45A10J7
.12 HIGH 8 PLACES
SEE NOTE 8
MARKING OPTIONAL
.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
DO NOT PAINT
THIS SURFACE

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX±.02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

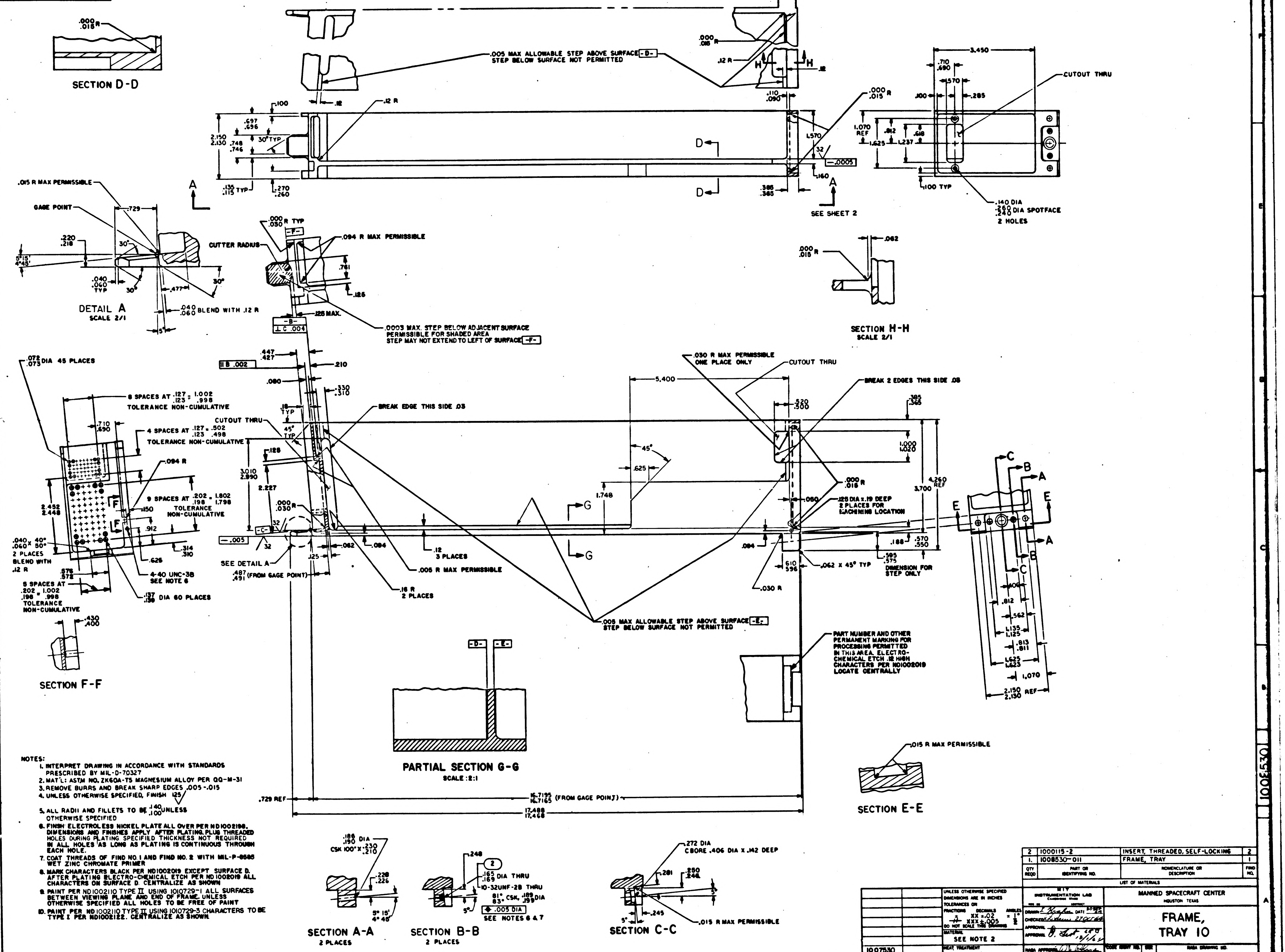
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	L. Krahn	30 SEP 64
CHECKED		
APPROVED		
APPROVED	D. Test	
APPROVED MIT	W Kayler	
APPROVED MSC		
		DATE

FRAME
TRAY 10

CODE IDENT NO.	SIZE	DRAWING NO.
80230	E	1008530
SCALE 1/1		SHEET 3 OF 3

1008530 C


SECTION D-D
.000 .015 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
CUTOUT THRU
SEE SHEET 2
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
DETAIL A
SCALE 2/1
.040 .060 BLEND WITH .12 R
CUTTER RADIUS
.094 R MAX PERMISSIBLE
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
SECTION H-H
SCALE 2/1
.072 .073 DIA 45 PLACES
8 SPACES AT .127 .123 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4 SPACES AT .127 .123 = .502 .498
TOLERANCE NON-CUMULATIVE
9 SPACES AT .202 .198 = 1.802 1.798
TOLERANCE NON-CUMULATIVE
5 SPACES AT .202 .198 = 1.002 .998
TOLERANCE NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 .136 DIA 60 PLACES
SECTION F-F
CUTOUT THRU
BREAK EDGE THIS SIDE .03
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
BREAK 2 EDGES THIS SIDE .03
.125 DIA x .19 DEEP
2 PLACES FOR LACHNING LOCATION
SEE DETAIL A
.487 .491 (FROM GAGE POINT)
.005 R MAX PERMISSIBLE
.16 R
2 PLACES
.12
3 PLACES
.062 x 45° TYP
DIMENSION FOR STEP ONLY
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019
LOCATE CENTRALLY
PARTIAL SECTION G-G
SCALE :2:1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7135 16.7165 (FROM GAGE POINT)
17.488 17.468
.186 .190 DIA
CSK 100° X .230 .210
SECTION A-A
2 PLACES
.165 .163 DIA THRU
10-32UNF-2B THRU
81° 83° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C
MASTER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125
5. ALL RADII AND FILLETS TO BE .140 .100 UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE.
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME. UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008530-011	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN E. Kraft DATE 30 SEP 64
CHECKED K. Adams 27 OCT 64
APPROVAL
APPROVAL D. Lest 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

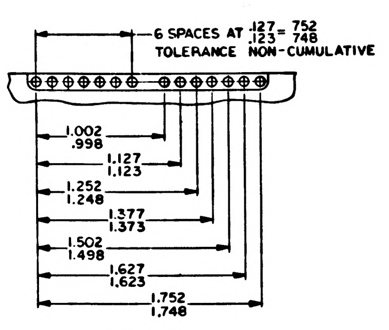
FRAME,
TRAY 10

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008530
SCALE 1/1
WT —
SHEET 1 OF 3

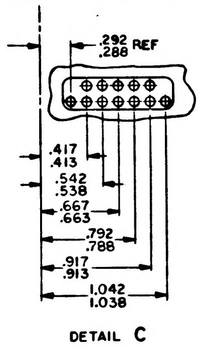
NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

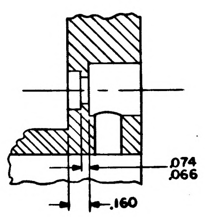
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


6 SPACES AT .127/.123 = .752/.748
TOLERANCE NON-CUMULATIVE
1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
1.752/1.748

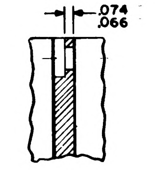
DETAIL B
3 PLACES


.292/.288 REF
.417/.413
.542/.538
.667/.663
.792/.788
.917/.913
1.042/1.038

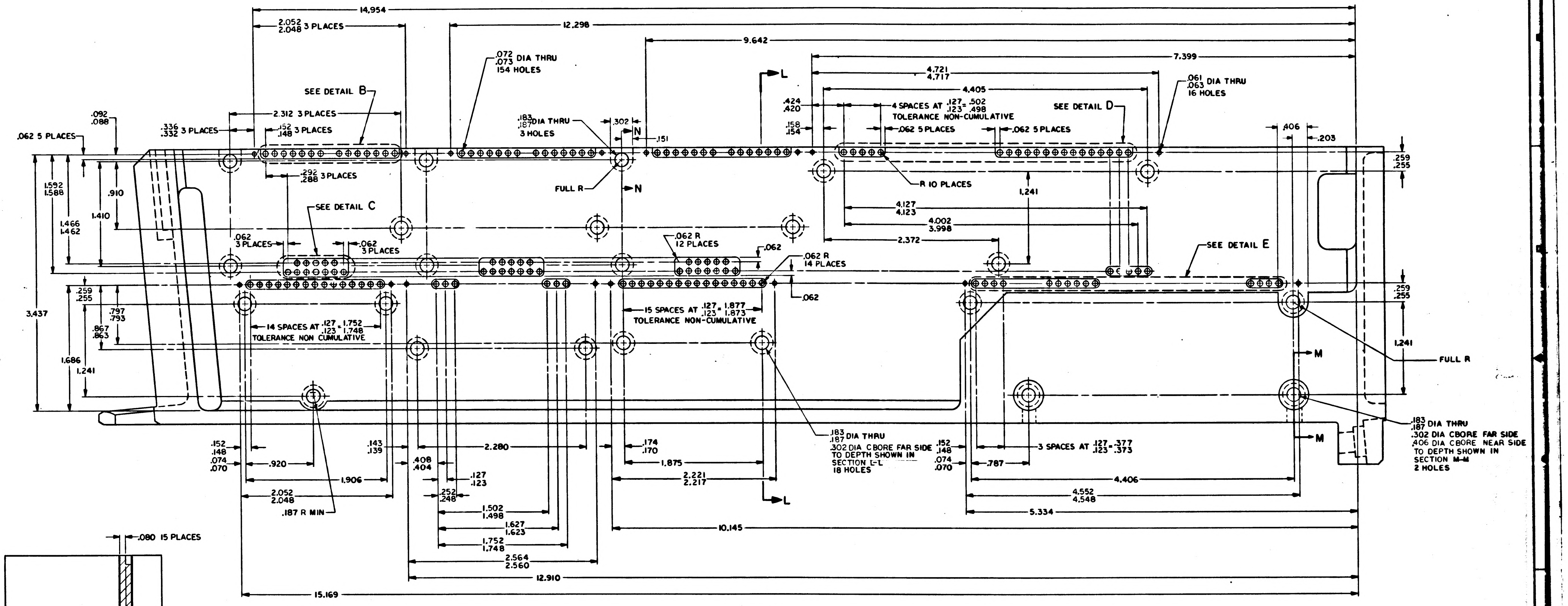
DETAIL C
3 PLACES



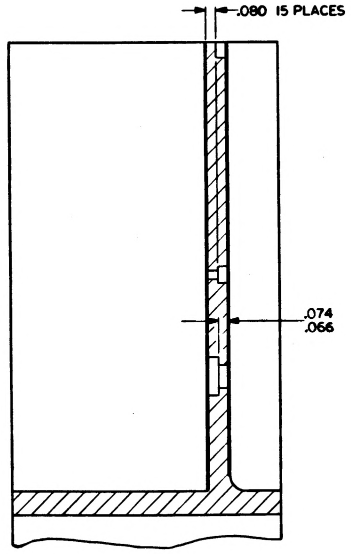
PARTIAL SECTION M-M



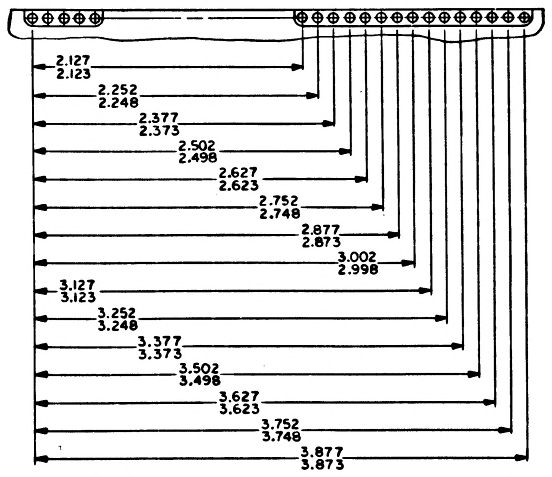
PARTIAL SECTION N-N


14.954
2.052/2.048 3 PLACES
12.298
9.642
7.399
.072/.073 DIA THRU
154 HOLES
4.721/4.717
4.405
.061/.063 DIA THRU
16 HOLES
SEE DETAIL B
2.312 3 PLACES
.092/.088
.336/.332 3 PLACES
.152/.148 3 PLACES
.062 5 PLACES
.183/.187 DIA THRU
3 HOLES
.302
N
.151
L
.424/.420
.158/.154
4 SPACES AT .127/.123 = .502/.498
TOLERANCE NON-CUMULATIVE
.062 5 PLACES
.062 5 PLACES
SEE DETAIL D
.406
.203
.259/.255
1.592/1.588
.910
1.466/1.462
1.410
.292/.288 3 PLACES
FULL R
N
R 10 PLACES
4.127/4.123
4.002/3.998
1.241
2.372
SEE DETAIL C
.062 3 PLACES
.062 3 PLACES
.062 R
12 PLACES
.062
.062 R
14 PLACES
SEE DETAIL E
3.437
.259/.255
.797/.793
.867/.863
1.686
1.241
14 SPACES AT .127/.123 = 1.752/1.748
TOLERANCE NON CUMULATIVE
15 SPACES AT .127/.123 = 1.877/1.873
TOLERANCE NON-CUMULATIVE
.062
.259/.255
1.241
FULL R
M
M
.183/.187 DIA THRU
.302 DIA CBORE FAR SIDE
.406 DIA CBORE NEAR SIDE
TO DEPTH SHOWN IN
SECTION M-M
2 HOLES
.183/.187 DIA THRU
.302 DIA CBORE FAR SIDE
TO DEPTH SHOWN IN
SECTION L-L
18 HOLES
.152/.148
.074/.070
.920
1.906
2.052/2.048
.187 R MIN
.143/.139
.408/.404
2.280
.127/.123
.252/.248
1.502/1.498
1.627/1.623
1.752/1.748
2.564/2.560
.174/.170
1.875
2.221/2.217
L
10.145
12.910
15.169
.152/.148
.074/.070
3 SPACES AT .127/.123 = .377/.373
.787
4.406
4.552/4.548
5.334

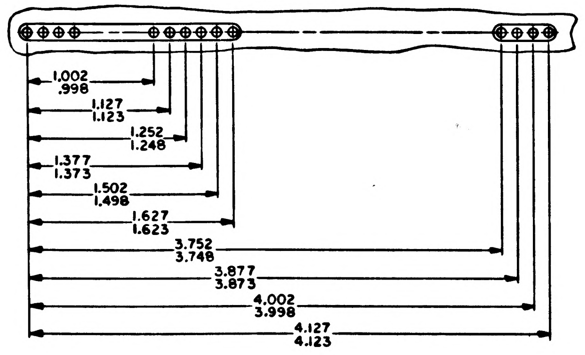
VIEW A-A
SEE SHEET 1


.080 15 PLACES
.074/.066

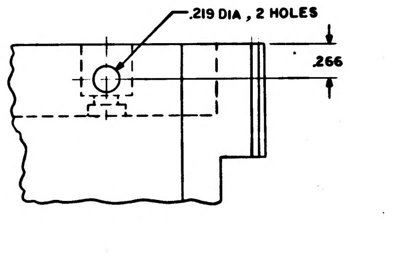
SECTION L-L


2.127/2.123
2.252/2.248
2.377/2.373
2.502/2.498
2.627/2.623
2.752/2.748
2.877/2.873
3.002/2.998
3.127/3.123
3.252/3.248
3.377/3.373
3.502/3.498
3.627/3.623
3.752/3.748
3.877/3.873

DETAIL D


1.002/.998
1.127/1.123
1.252/1.248
1.377/1.373
1.502/1.498
1.627/1.623
3.752/3.748
3.877/3.873
4.002/3.998
4.127/4.123

DETAIL E


.219 DIA, 2 HOLES
.266

1008530

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.02 ±.005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL
—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L Krahn 30 SEP 64
CHECKED R. Lizzan 27 OCT 64
APPROVED
APPROVED D. Test LTB
APPROVED MIT W. Gaffer
APPROVED MSC
DATE

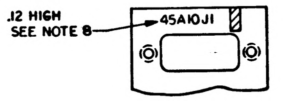
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 10

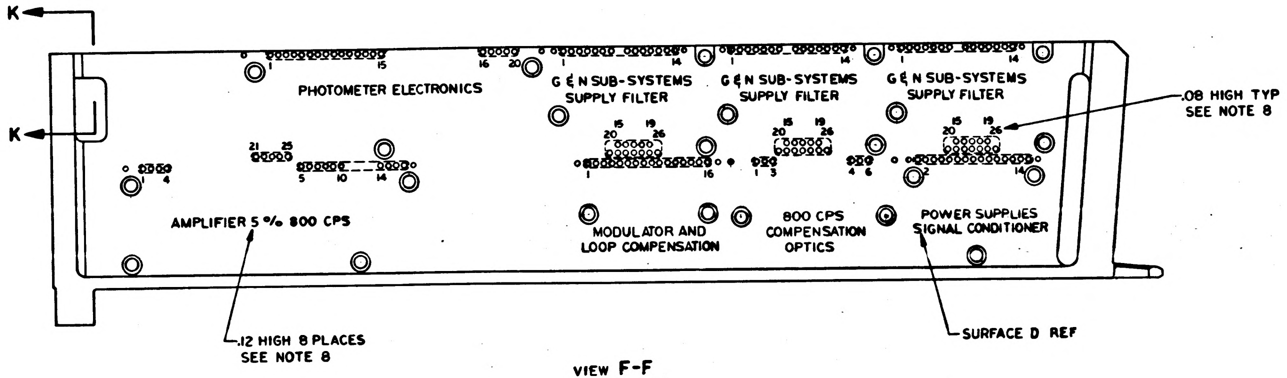
CODE IDENT NO. —
SIZE E
DRAWING NO. 1008530
SCALE 2/1
SHEET 2 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

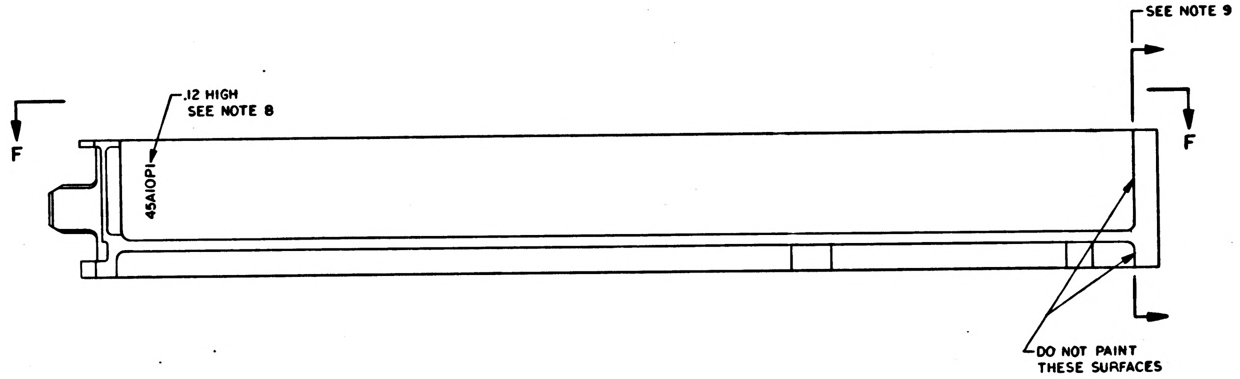
REVISIONS 14627						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED

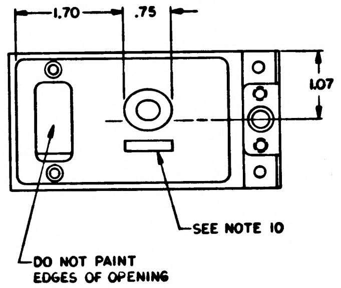

.12 HIGH
SEE NOTE 8
45A10J1

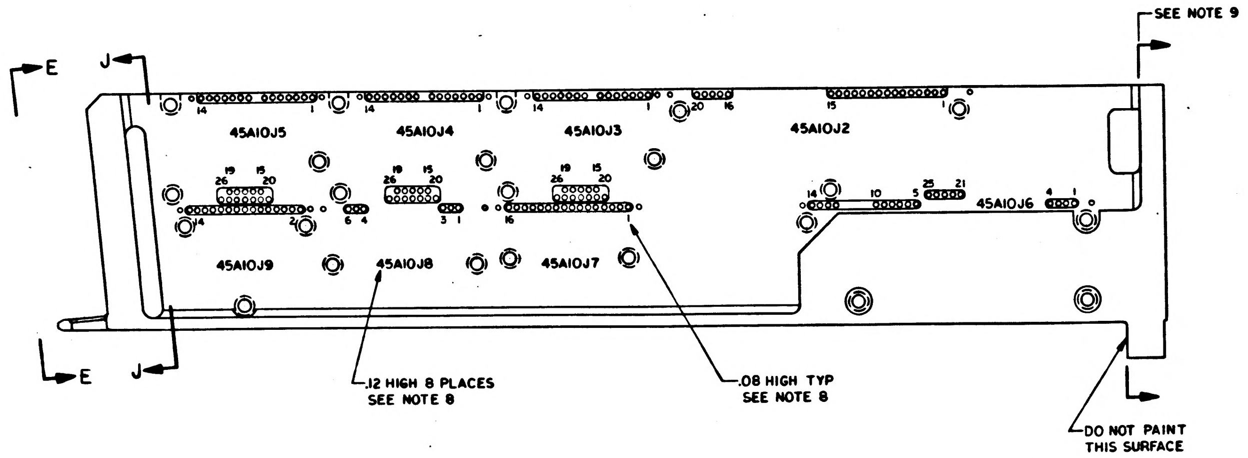
PARTIAL SECTION K-K

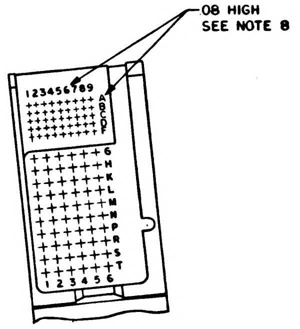

K
K
PHOTOMETER ELECTRONICS
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
G & N SUB-SYSTEMS SUPPLY FILTER
AMPLIFIER 5 % 800 CPS
MODULATOR AND LOOP COMPENSATION
800 CPS COMPENSATION OPTICS
POWER SUPPLIES SIGNAL CONDITIONER
.08 HIGH TYP
SEE NOTE 8
.12 HIGH 8 PLACES
SEE NOTE 8
SURFACE D REF

VIEW F-F
ROTATED 180°

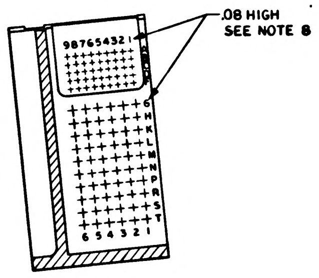

SEE NOTE 9
.12 HIGH
SEE NOTE 8
45A10P1
F
F
DO NOT PAINT
THESE SURFACES


1.70
.75
1.07
SEE NOTE 10
DO NOT PAINT
EDGES OF OPENING


SEE NOTE 9
E
J
E
J
45A10J5
45A10J4
45A10J3
45A10J2
45A10J6
45A10J9
45A10J8
45A10J7
.12 HIGH 8 PLACES
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
DO NOT PAINT
THIS SURFACE


.08 HIGH
SEE NOTE 8
123456789

PARTIAL VIEW E-E


.08 HIGH
SEE NOTE 8
987654321
654321

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — XX± .02 ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN E. Krahn 30 SEP 64
CHECKED 1 DEC 64
APPROVED
APPROVED D. Test
APPROVED MIT W. Kupfer 1 Dec 64
APPROVED MSC 12-1-64

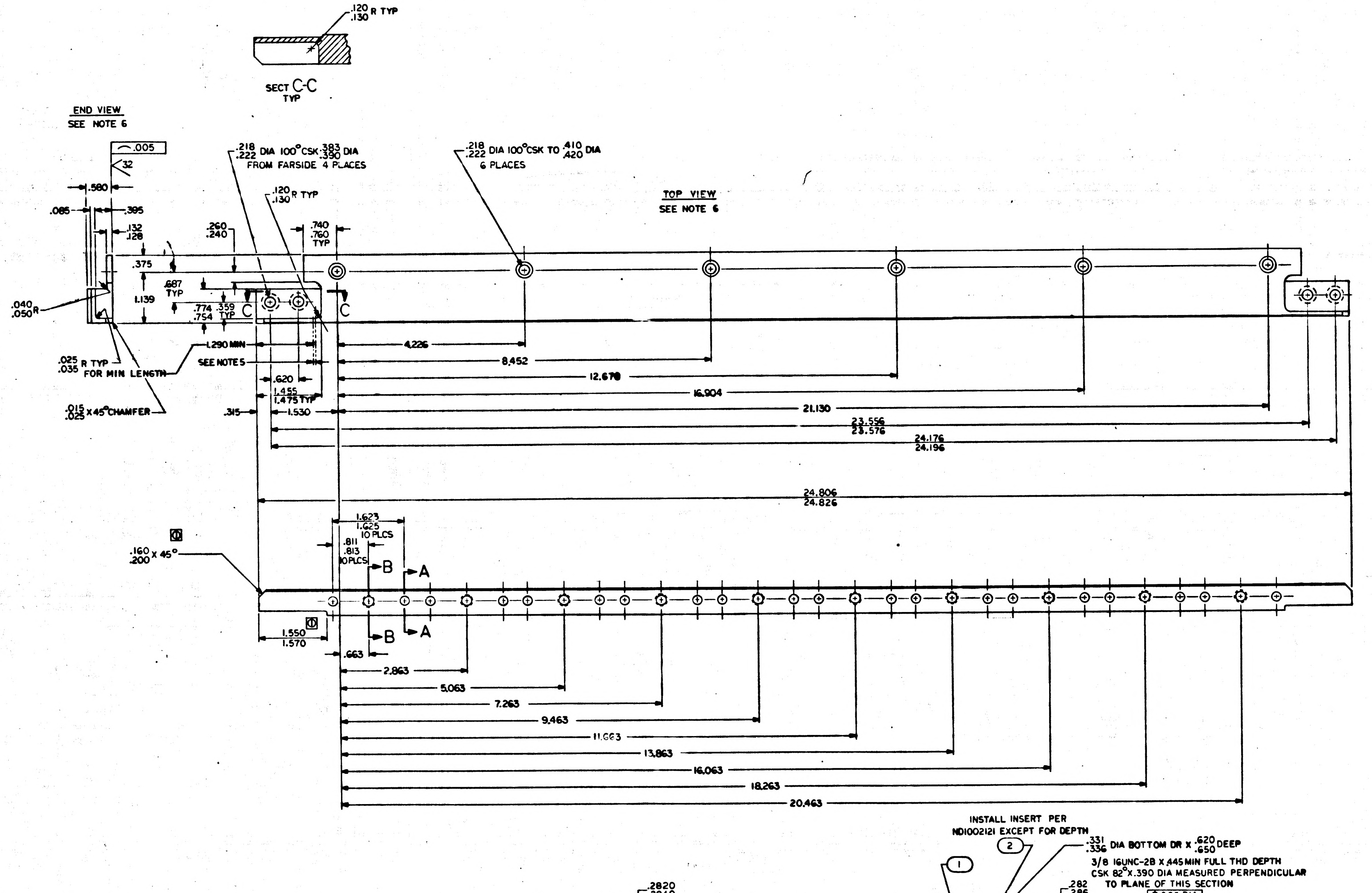
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

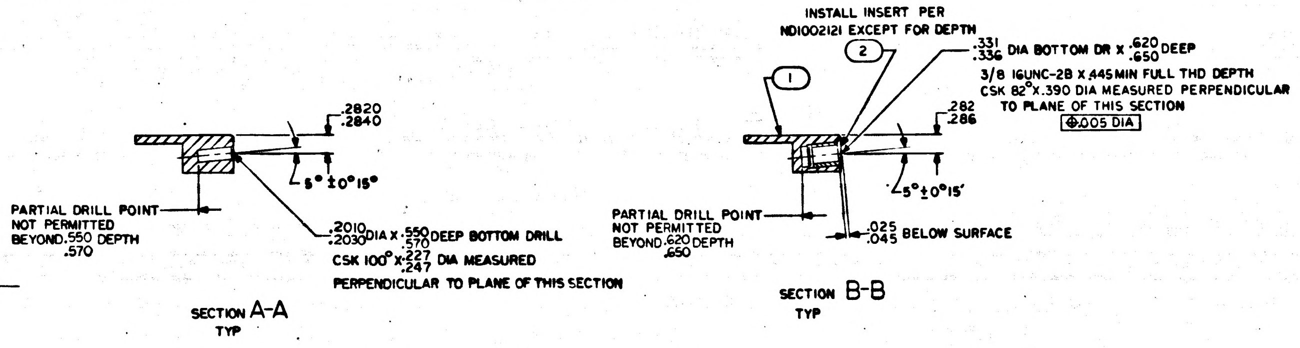
FRAME
TRAY 10

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008530
SCALE 1/1
SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1339F			
SYM	DESCRIPTION	DATE	APPROVAL


.120 .130 R TYP
SECT C-C TYP
END VIEW SEE NOTE 6
.005
32
.580
.085
.395
.132 .128
.375
1.139
.687 TYP
.040 .050 R
.025 .035 R TYP FOR MIN LENGTH
.015 .025 X 45° CHAMFER
.218 .222 DIA 100° CSK .383 .390 DIA FROM FARSIDE 4 PLACES
.120 .130 R TYP
.260 .240
.740 .760 TYP
.774 .754
.359 TYP
C
C
.218 .222 DIA 100° CSK TO .410 .420 DIA 6 PLACES
TOP VIEW SEE NOTE 6
1.290 MIN
SEE NOTES 5
.620
1.455 1.475 TYP
.315
1.530
4.226
8.452
12.678
16.904
21.130
23.556 23.576
24.176 24.196
24.806 24.826
1.623 1.625 10 PLCS
.811 .813 10 PLCS
.160 .200 X 45°
B
A
B
A
1.550 1.570
.663
2.863
5.063
7.263
9.463
11.663
13.863
16.063
18.263
20.463


.2820 .2840
5° ±0°15'
PARTIAL DRILL POINT NOT PERMITTED BEYOND .550 .570 DEPTH
.2010 .2030 DIA X .550 .570 DEEP BOTTOM DRILL
CSK 100° X .227 .247 DIA MEASURED
PERPENDICULAR TO PLANE OF THIS SECTION
SECTION A-A TYP
INSTALL INSERT PER ND1002121 EXCEPT FOR DEPTH
1
2
.331 .336 DIA BOTTOM DR X .620 .650 DEEP
3/8 16UNC-2B X .445 MIN FULL THD DEPTH
CSK 82° X .390 DIA MEASURED PERPENDICULAR
TO PLANE OF THIS SECTION
⊕.005 DIA
.282 .286
5° ±0°15'
PARTIAL DRILL POINT NOT PERMITTED BEYOND .620 .650 DEPTH
.025 .045 BELOW SURFACE
SECTION B-B TYP

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. 63 ALL OVER UNLESS OTHERWISE SPECIFIED
3. MAT'L: 2021563, BERYLLIUM, INSTRUMENT GRADE, HIGH STRENGTH ⓘ
4. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
5. BLEND SMOOTH .025 .035 R WITH .120 .130 R IN THIS LENGTH
6. ALL DIMENSIONS IN TOP AND END VIEWS ARE CONTROLLED BY ICD ______ IN OTHER AREAS OF THIS DRAWING, ⓘ DENOTES THOSE DIMENSIONS OR CHARACTERISTICS CONTROLLED BY ICD ______

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
10	NAS1394CA-4L	INSERT, SCREW, LOCKING	2
1	1008535-001	TOE CAP	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007580	
1007400	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS ±.005 .02 ANGLES ±1°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 3
HEAT TREATMENT ——
FINAL FINISH SEE NOTE 3

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Tom Gibbons DATE 31 JUL 64
CHECKED 3 Aug 64
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

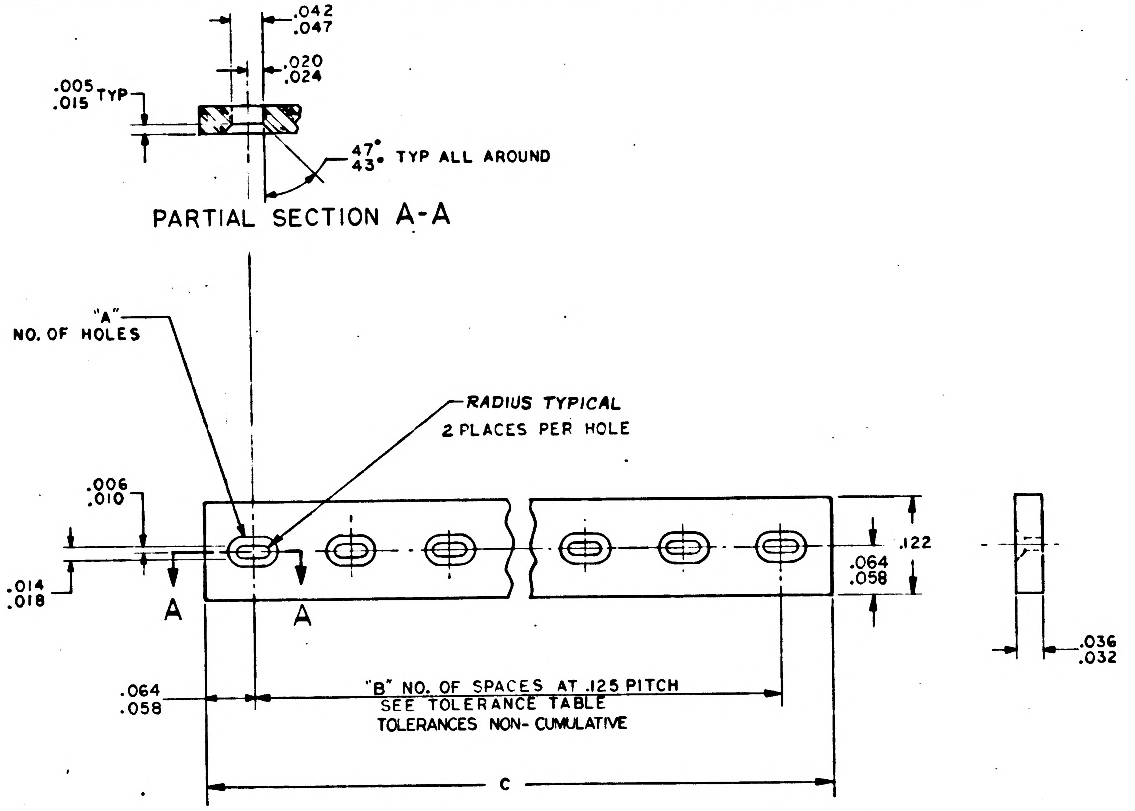
TOE CAP
POWER & SERVO ASSY

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008535
SCALE 1/1
WT ——
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	H.F.N./W.D.

DRAWING NO.	A NO. OF HOLES	B NO. OF SPACES	C	
1008540-1	1	NONE	.122	
-2	2	1	.247	
-3	3	2	.372	
-4	4	3	.497	
-5	5	4	.622	
-6	6	5	.747	
-7	7	6	.872	
-8	8	7	.997	
-9	9	8	1.122	
-10	10	9	1.247	
-11	11	10	1.372	
-12	12	11	1.497	
-13	13	12	1.622	
-14	14	13	1.747	
-15	15	14	1.872	


.042
.047
.020
.024
.005
.015 TYP
47°
43° TYP ALL AROUND
PARTIAL SECTION A-A
"A"
NO. OF HOLES
RADIUS TYPICAL
2 PLACES PER HOLE
.006
.010
.014
.018
A
A
.122
.064
.058
.036
.032
.064
.058
"B" NO. OF SPACES AT .125 PITCH
SEE TOLERANCE TABLE
TOLERANCES NON-CUMULATIVE
C

TOLERANCE TABLE	
SPACES 1 THRU 4	±.003
SPACES 5 THRU 8	±.006
SPACES 9 THRU 15	±.012

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. *MOLDING FLASH NOT TO EXCEED .003.*
4. IDENTIFY PER ND1002019

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT —

FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN DATE
CHECKED
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL W. J. 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008540
SCALE 10/1
WT
SHEET 1 OF 1

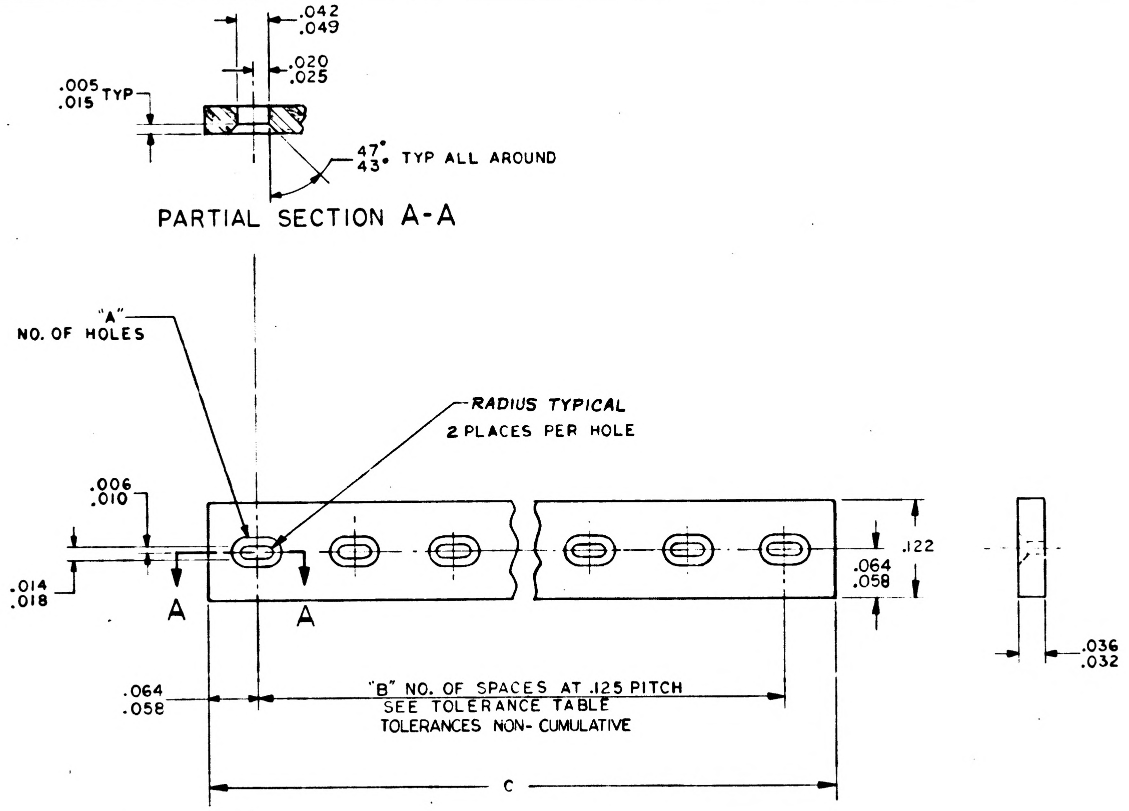
1008540 A

NOTICE WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 13375

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26 MAR -65	
B	REVISED PER TDRR 18528	27-APR -65	

DRAWING NO.	A NO. OF HOLES	B NO. OF SPACES	C	
1008540-1	1	NONE	.122	
-2	2	1	.247	
-3	3	2	.372	
-4	4	3	.497	
-5	5	4	.622	
-6	6	5	.747	
-7	7	6	.872	
-8	8	7	.997	
-9	9	8	1.122	
-10	10	9	1.247	
-11	11	10	1.372	
-12	12	11	1.497	
-13	13	12	1.622	
-14	14	13	1.747	
-15	15	14	1.872	


.042
.049
.020
.025
.005
.015 TYP
47°
43° TYP ALL AROUND
PARTIAL SECTION A-A
"A"
NO. OF HOLES
RADIUS TYPICAL
2 PLACES PER HOLE
.006
.010
.014
.018
A
A
.122
.064
.058
.036
.032
.064
.058
"B" NO. OF SPACES AT .125 PITCH
SEE TOLERANCE TABLE
TOLERANCES NON-CUMULATIVE
C

TOLERANCE TABLE	
SPACES 1 THRU 4	±.003
SPACES 5 THRU 8	±.006
SPACES 9 THRU 15	±.012

NOTES :

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. MOLDING FLASH NOT TO EXCEED .003.
4. IDENTIFY PER ND1002019

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

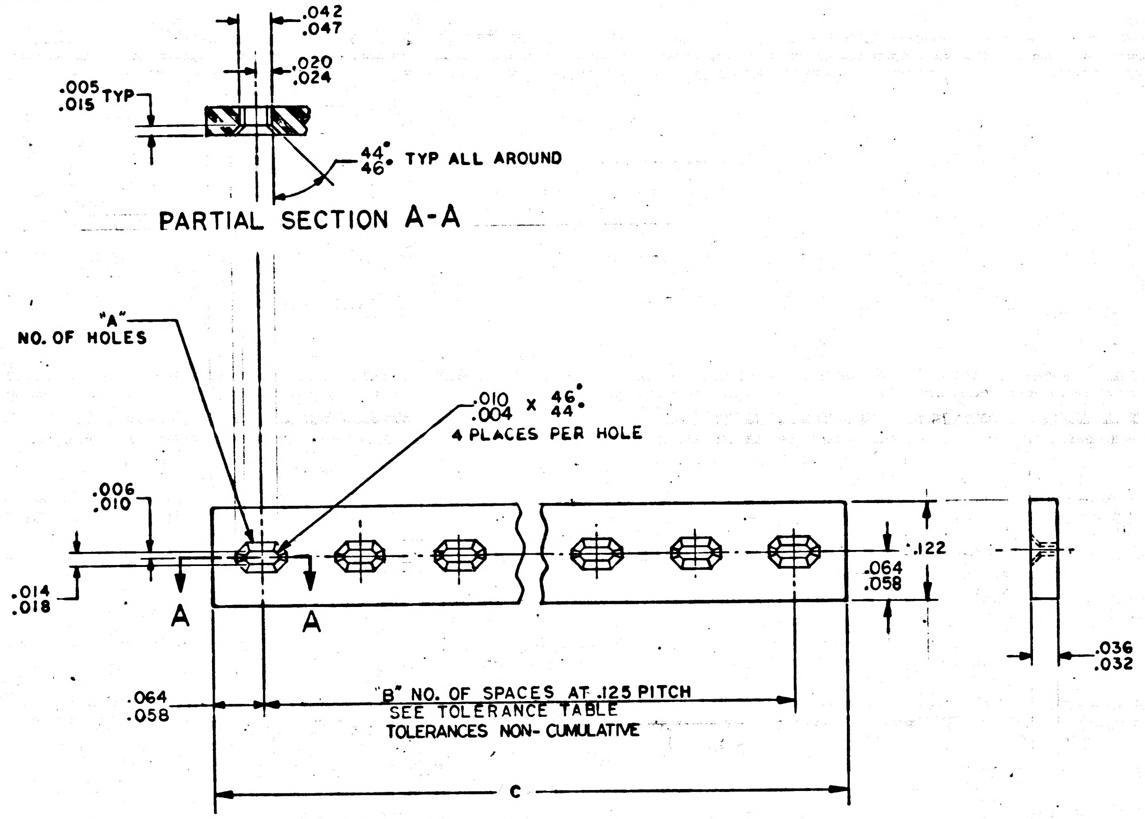
CODE IDENT NO. 80230
SIZE D
NASA DRAWING NO. 1008540
SCALE 10/1
WT
SHEET 1 OF 1

1008540 B

REVISIONS 13375			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DRAWING NO.	A NO. OF HOLES	B NO. OF SPACES	C	
1008540-1	1	NONE	.122	
-2	2	1	.247	
-3	3	2	.372	
-4	4	3	.497	
-5	5	4	.622	
-6	6	5	.747	
-7	7	6	.872	
-8	8	7	.997	
-9	9	8	1.122	
-10	10	9	1.247	
-11	11	10	1.372	
-12	12	11	1.497	
-13	13	12	1.622	
-14	14	13	1.747	
-15	15	14	1.872	


.042
.047
.020
.024
.005
.015 TYP
44°
46° TYP ALL AROUND
PARTIAL SECTION A-A
"A"
NO. OF HOLES
.010
.004 X 46°
44°
4 PLACES PER HOLE
.006
.010
.014
.018
A
A
.122
.064
.058
.036
.032
.064
.058
"B" NO. OF SPACES AT .125 PITCH
SEE TOLERANCE TABLE
TOLERANCES NON-CUMULATIVE
C

TOLERANCE TABLE	
SPACES 1 THRU 4	±.003
SPACES 5 THRU 8	±.006
SPACES 9 THRU 15	±.012

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. MUST BE FREE OF MOLDING FLASH
4. IDENTIFY PER ND1002019

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN DATE
CHECKED
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

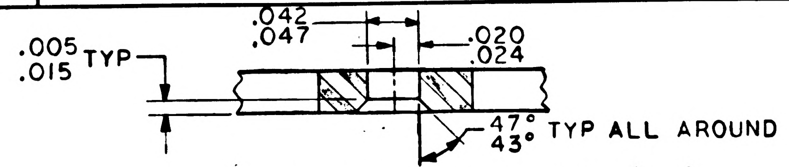
GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008540
SCALE 10/1
WT
SHEET 1 OF 1

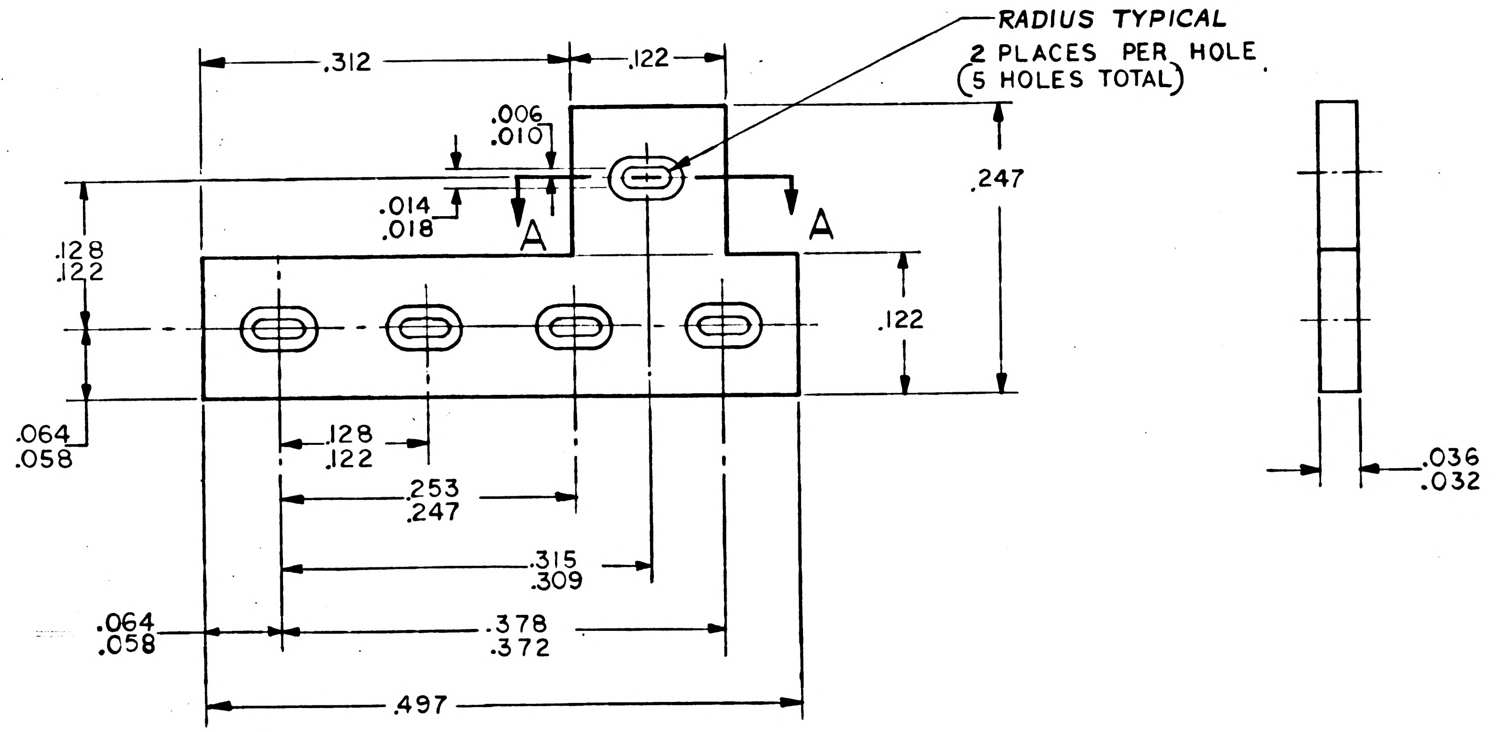
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008541 A

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR -65	A.7.W. / W.D.


.042
.047
.020
.024
.005
.015
TYP
47°
43°
TYP ALL AROUND

PARTIAL SECTION A-A


RADIUS TYPICAL
2 PLACES PER HOLE
(5 HOLES TOTAL)
.312
.122
.006
.010
.014
.018
A
A
.247
.128
.122
.122
.064
.058
.128
.122
.253
.247
.315
.309
.064
.058
.378
.372
.497
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007551	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS ±.005 ANGLES ± ——
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT ——

FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addams J. DATE 8-19-64
CHECKED K.P. King Sorry 21 Sep 64
APPROVAL
APPROVAL D. B. Test 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL J. Hafel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. ——
SIZE C
NASA DRAWING NO. 1008541
SCALE 10/1
WT ——
SHEET 1 OF 1

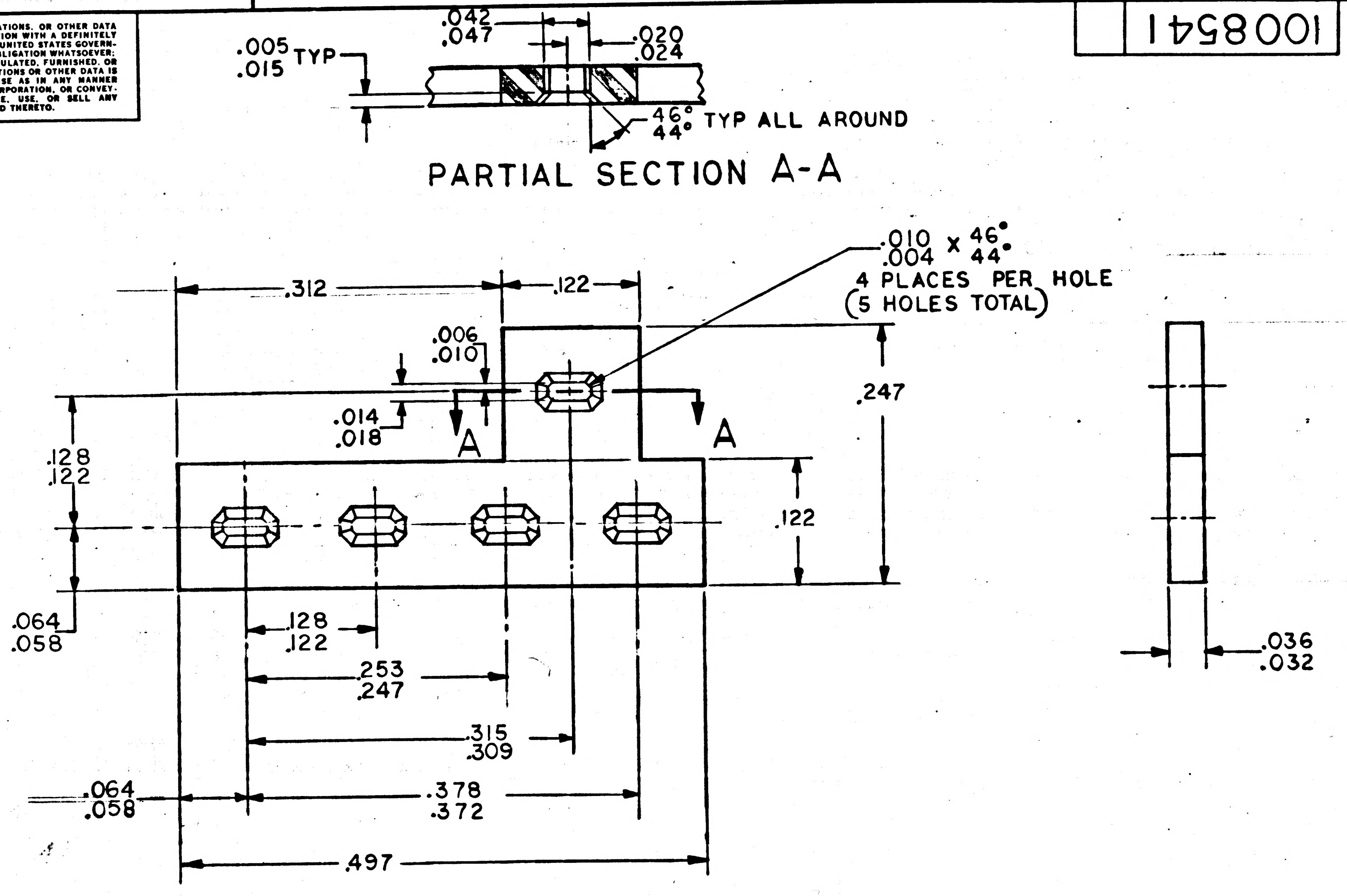
1008541

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008541

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL


.042
.047
.020
.024
.005
.015
TYP
46°
44°
TYP ALL AROUND
.010
.004
x
46°
44°
4 PLACES PER HOLE
(5 HOLES TOTAL)
.312
.122
.006
.010
.014
.018
A
A
.247
.128
.122
.122
.064
.058
.128
.122
.253
.247
.315
.309
.064
.058
.378
.372
.497
.036
.032

PARTIAL SECTION A-A

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007551	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS ±.005 ANGLES ± ——
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN DATE 8-19-64
CHECKED 21 Sep 64
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. ——
SIZE C
NASA DRAWING NO. 1008541
SCALE 10/1
WT ——
SHEET 1 OF 1

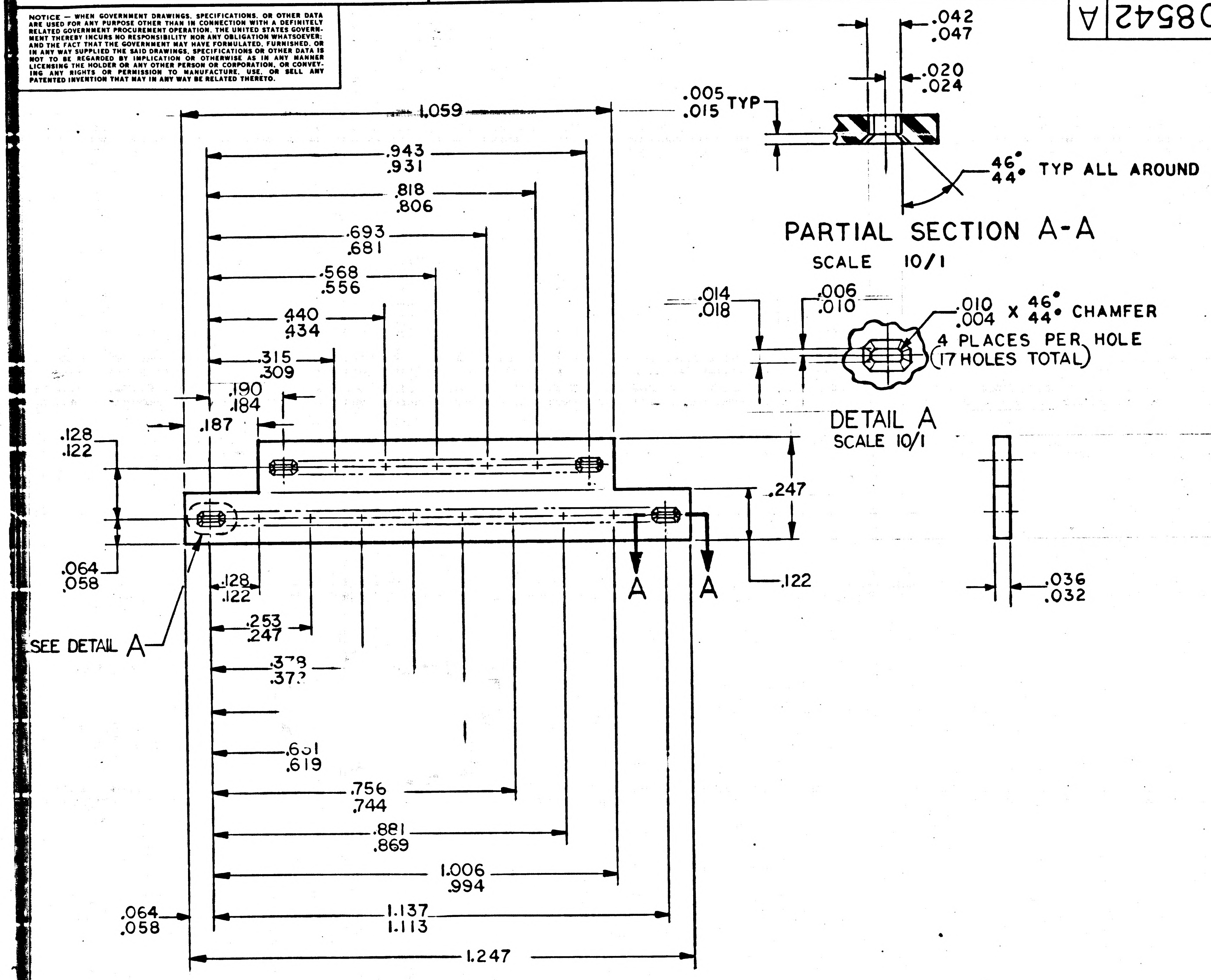
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008542 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15237	1/13/65	LK cc WR


4
3
2
1
.042
.047
.020
.024
.005
.015 TYP
46°
44° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
1.059
.943
.931
.818
.806
.693
.681
.568
.556
.440
.434
.315
.309
.190
.184
.187
.128
.122
.014
.018
.006
.010
.010
.004 X 46° 44° CHAMFER
4 PLACES PER HOLE
(17 HOLES TOTAL)
DETAIL A
SCALE 10/1
.247
.064
.058
.128
.122
A
A
.122
.036
.032
SEE DETAIL A
.253
.247
.378
.372
.631
.619
.756
.744
.881
.869
1.006
.994
.064
.058
1.137
1.113
1.247

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS 1, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTER

1007551	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —　DECIMALS ±.005　ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ____
FINAL FINISH ____

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.　CONTRACT
DRAWN A. Addario Jr.　DATE 8-19-64
CHECKED R.P. Kuprijanow 21 Sep 64
APPROVAL
APPROVAL D. Bastat 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL D. Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO.	SIZE	NASA DRAWING NO.
—	C	1008542

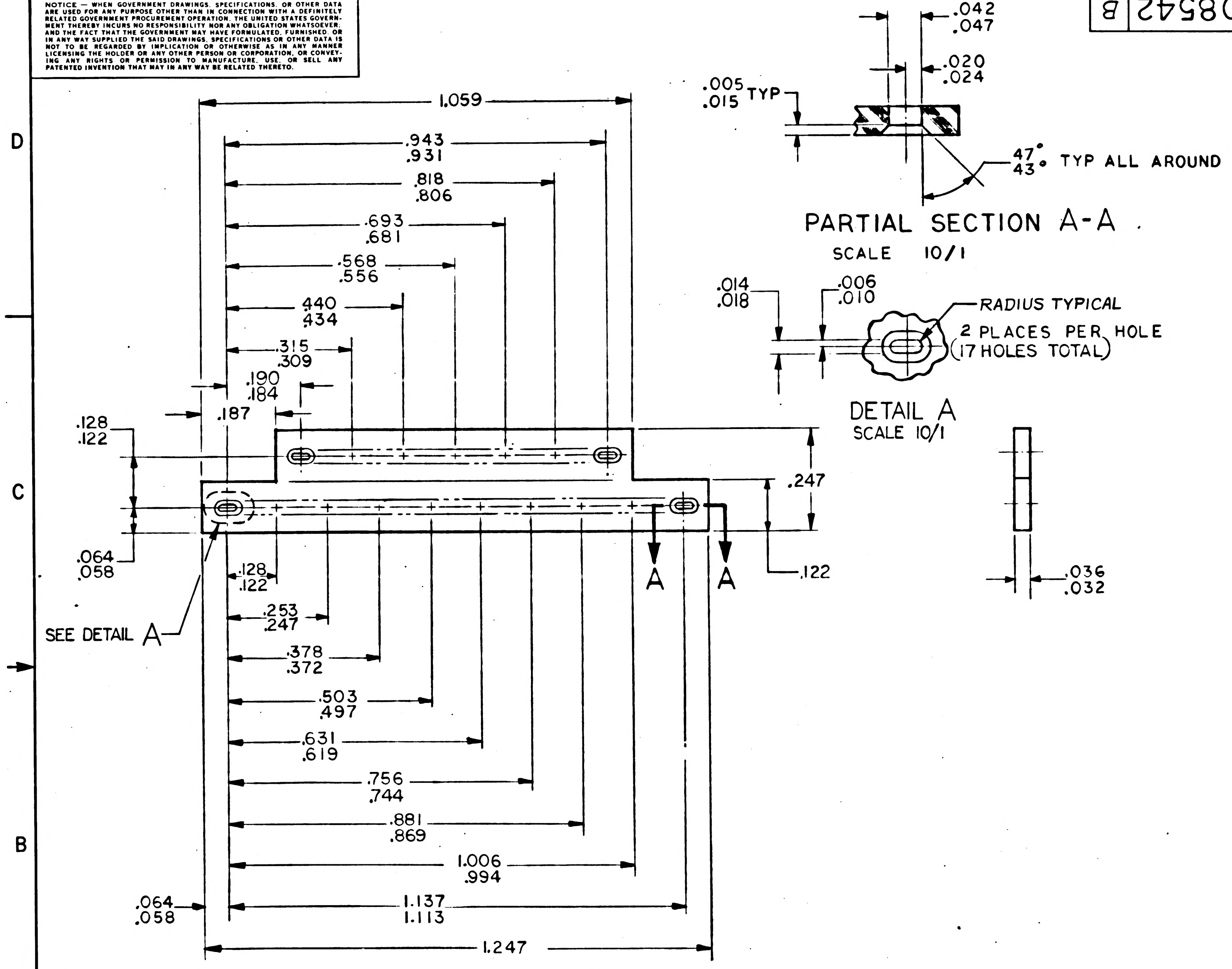
SCALE 5/1　WT ——　SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008542 B

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15237	1/13/65	LK WH
B	REVISED PER TDRR 17680	26-MAR-65	W.D.



.042
.047
.020
.024
.005
.015 TYP
47°
43° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.014
.018
.006
.010
RADIUS TYPICAL
2 PLACES PER HOLE
(17 HOLES TOTAL)
DETAIL A
SCALE 10/1
1.059
.943
.931
.818
.806
.693
.681
.568
.556
.440
.434
.315
.309
.190
.184
.187
.128
.122
.247
.064
.058
.128
.122
SEE DETAIL A
A
A
.122
.036
.032
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
.064
.058
1.137
1.113
1.247

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007551	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS . ± —
DECIMALS ±.005
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ———
FINAL FINISH ———

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN J. Addonizio Jr. DATE 8-19-64
CHECKED R.P. Kruszewski 21 Sep 64
APPROVAL
APPROVAL D. Hettiat 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL D. Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

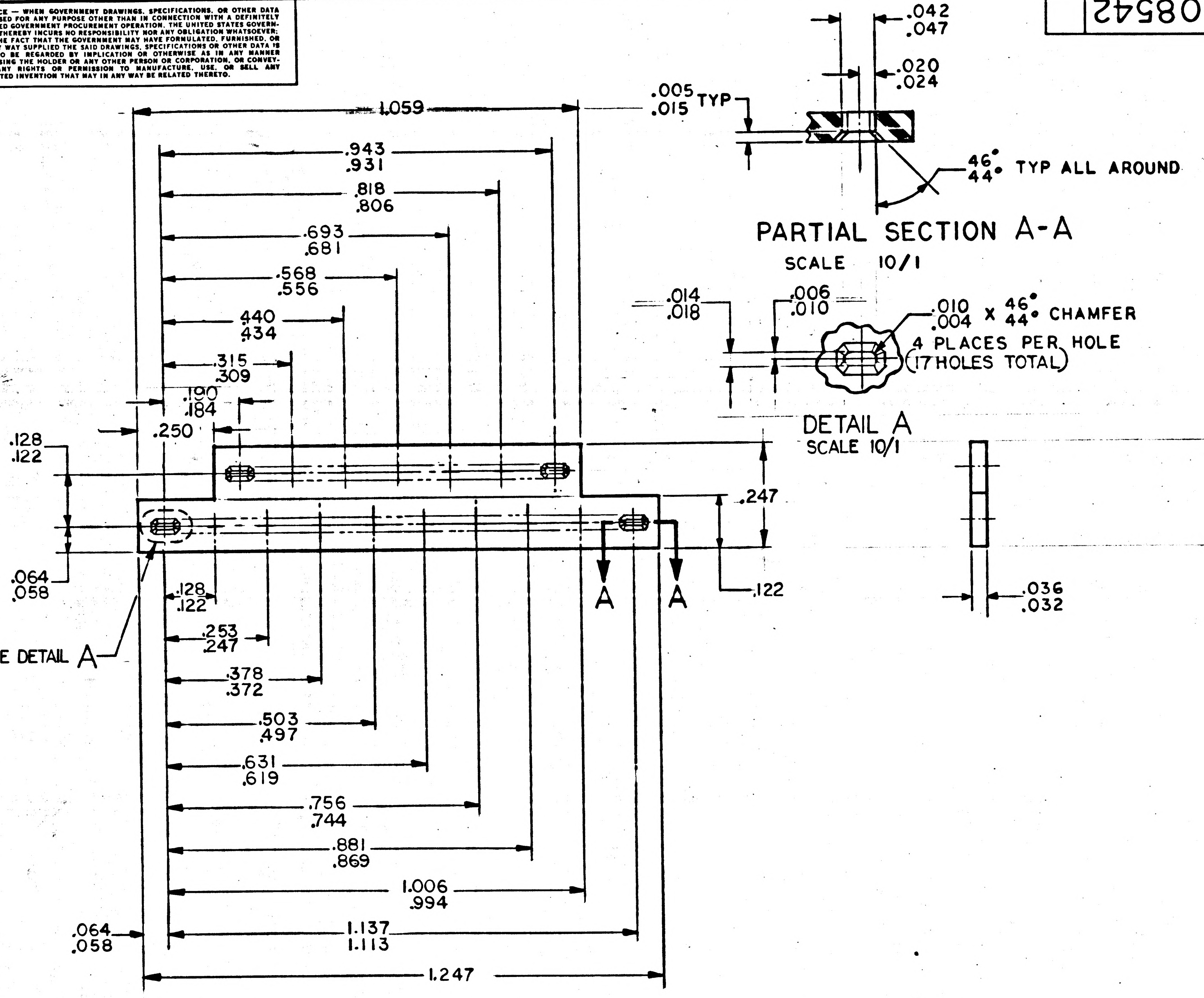
CODE IDENT NO. ———
SIZE C
NASA DRAWING NO. 1008542
SCALE 5/1
WT ———
SHEET 1 OF 1

1008542

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008542

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL


.042
.047
.020
.024
.005
.015 TYP
46°
44° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.014
.018
.006
.010
.010
.004 X 46° 44° CHAMFER
4 PLACES PER HOLE
(17 HOLES TOTAL)
DETAIL A
SCALE 10/1
1.059
.943
.931
.818
.806
.693
.681
.568
.556
.440
.434
.315
.309
.190
.184
.250
.128
.122
.247
.064
.058
.128
.122
A
A
.122
.036
.032
SEE DETAIL A
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
.064
.058
1.137
1.113
1.247

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

1007551	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addario Jr. DATE 8-19-64
CHECKED R.P. Kingsbury 21Sep64
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

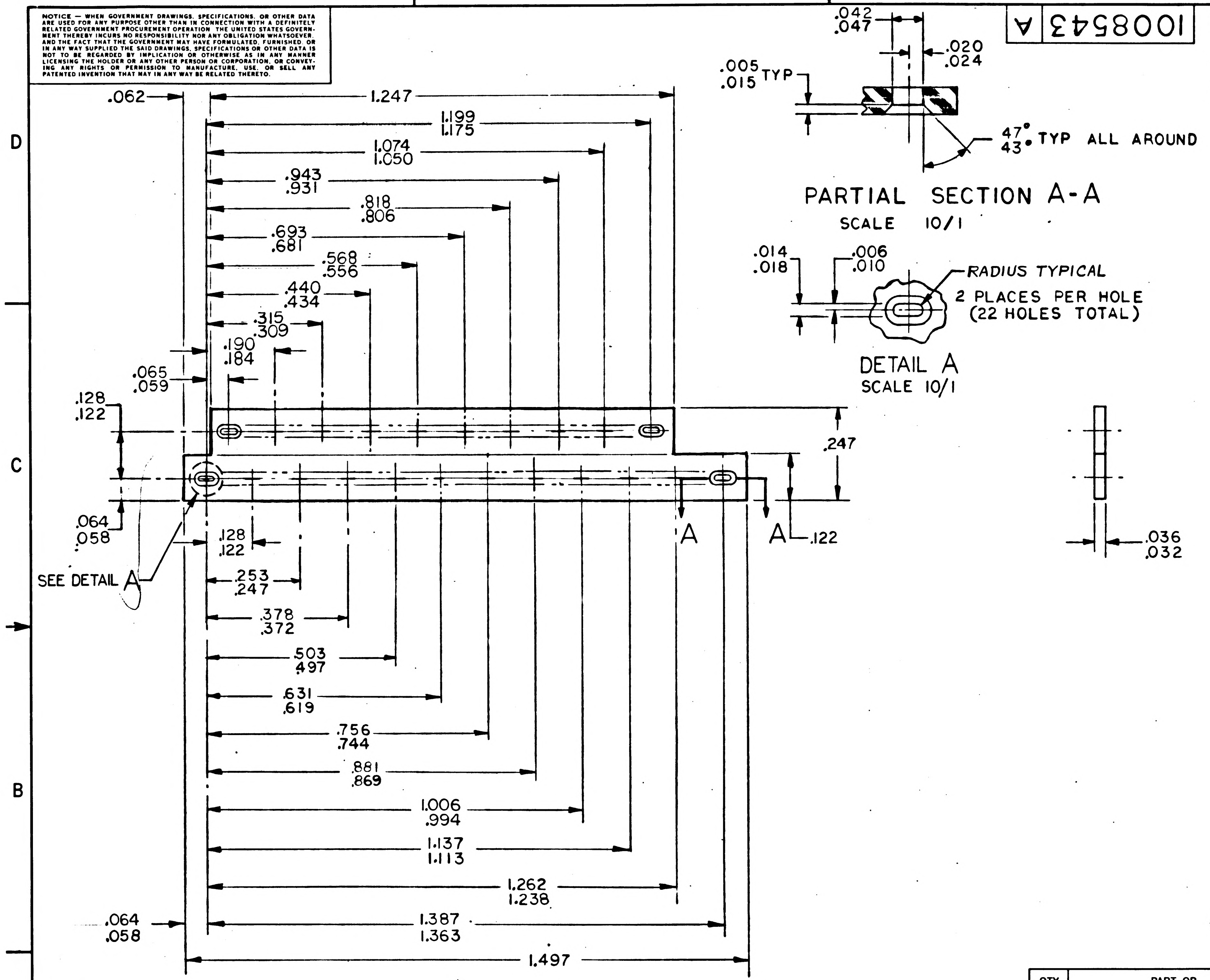
CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008542
SCALE 5/1
WT —
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008543 A

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	A.T.N. / W.D.



.062
1.247
1.199
1.175
1.074
1.050
.943
.931
.818
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.693
.681
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.556
.440
.434
.315
.309
.190
.184
.065
.059
.128
.122
.064
.058
SEE DETAIL A
.128
.122
.253
.247
.378
.372
.503
.497
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.619
.756
.744
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1.113
1.262
1.238
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1.387
1.363
1.497
A
A
.122
.247
.036
.032
.042
.047
.020
.024
.005
.015 TYP
47°
43° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.014
.018
.006
.010
RADIUS TYPICAL
2 PLACES PER HOLE
(22 HOLES TOTAL)
DETAIL A
SCALE 10/1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL :RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007551	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS . ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addone J. DATE 8-19-64
CHECKED R.P. Kingsbury 21 Sep 64
APPROVAL
APPROVAL D. Bittest 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL L. Nagel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008543
SCALE 5/1
WT —
SHEET 1 OF 1

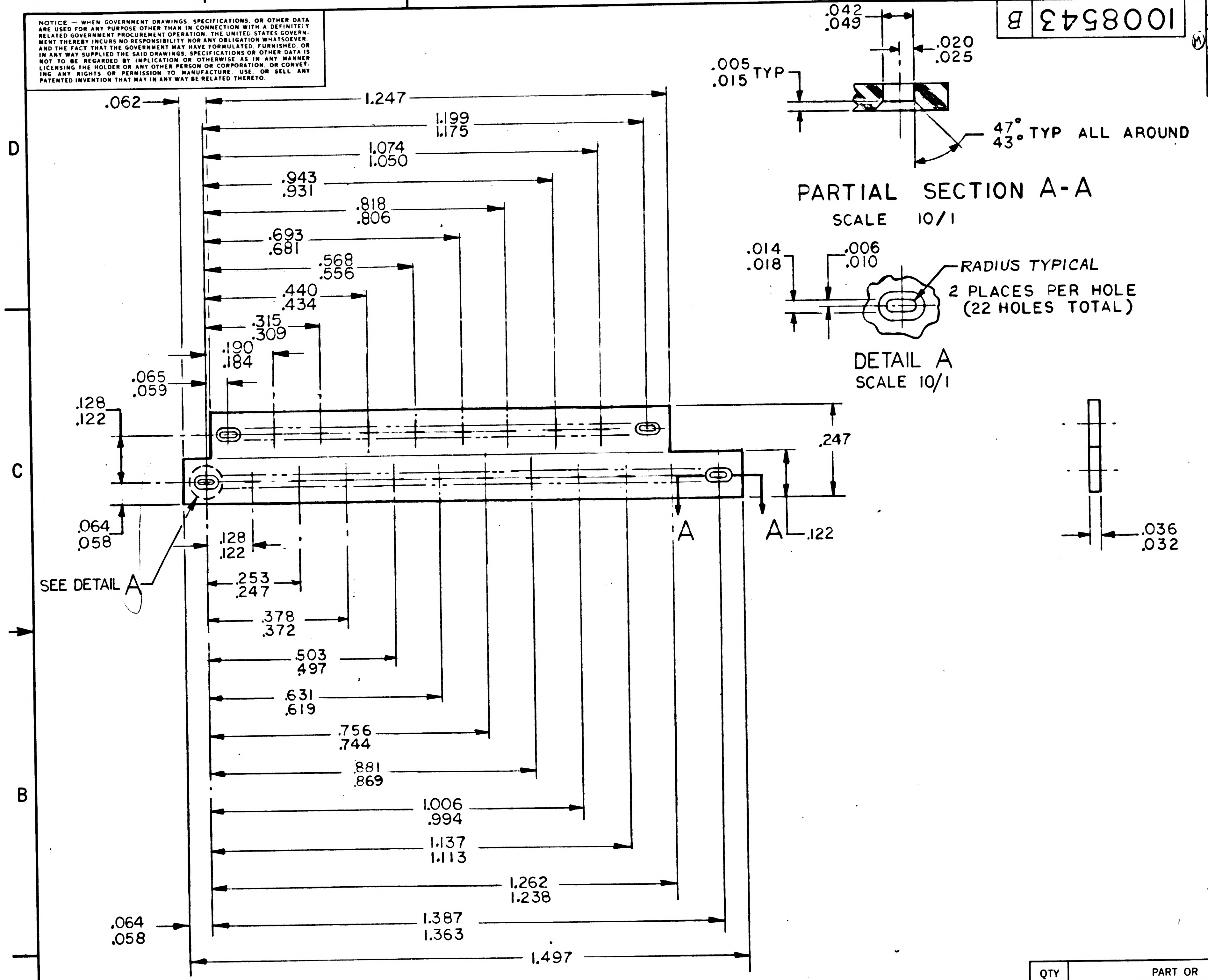
1008543

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008543 B

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	A.F.W. / W.D.
B	REVISED PER TDRR 18528	27-APR-65	A.F.W. / W.D.



.042
.049
.020
.025
.005
.015 TYP
47°
43° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.014
.018
.006
.010
RADIUS TYPICAL
2 PLACES PER HOLE
(22 HOLES TOTAL)
DETAIL A
SCALE 10/1
.062
1.247
1.199
1.175
1.074
1.050
.943
.931
.818
.806
.693
.681
.568
.556
.440
.434
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SEE DETAIL A
.253
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1.006
.994
1.137
1.113
1.262
1.238
1.387
1.363
.064
.058
1.497
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL :RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003.

1007551	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addone DATE 8-19-64
CHECKED R. P. Kingsbury 21 Sep 64
APPROVAL
APPROVAL D. Botest 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL R Nagel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

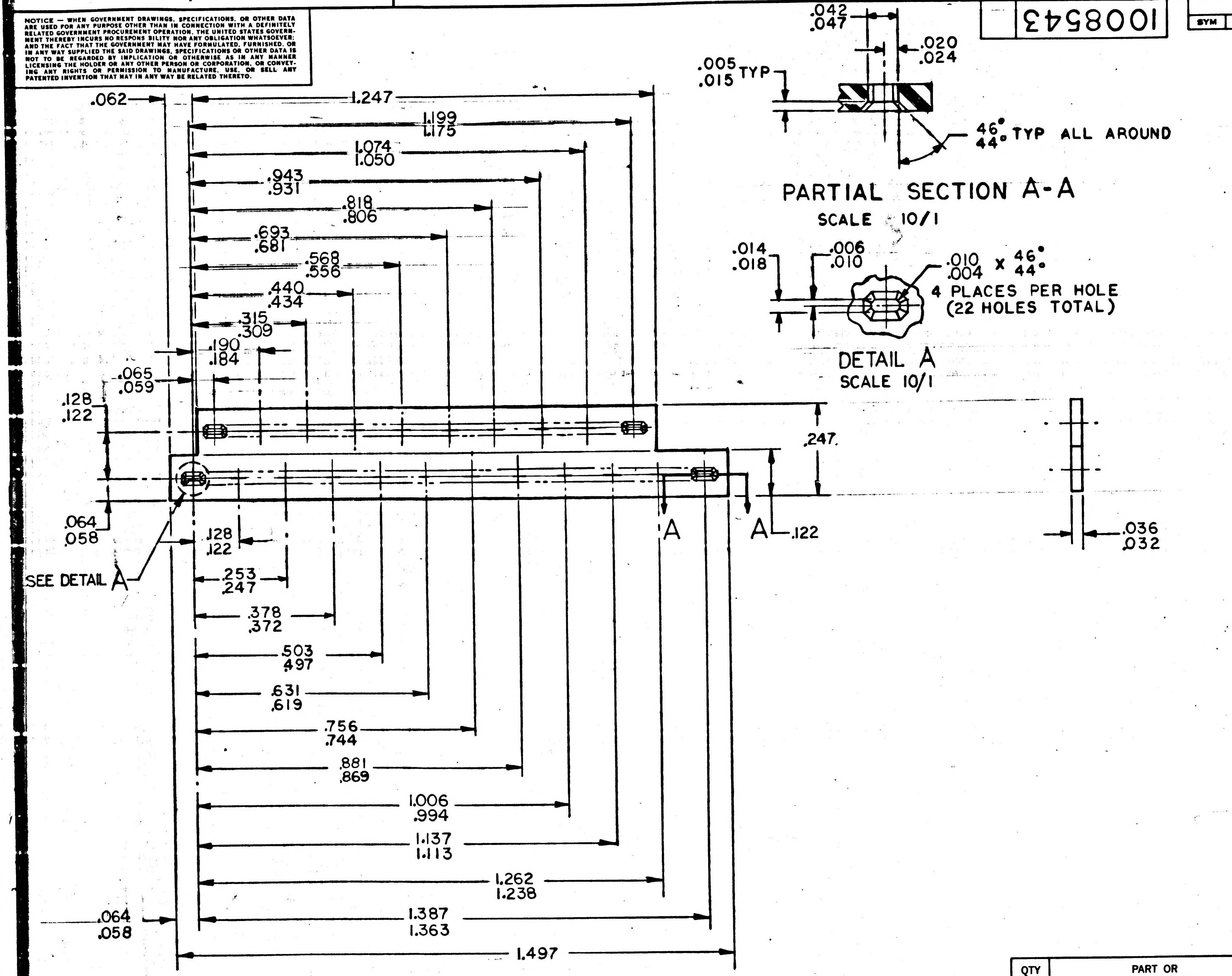
CODE IDENT NO. 80230 SIZE C NASA DRAWING NO. 1008543
SCALE 5/1 WT SHEET 1 OF 1

1008543

1008543

SYM	REVISIONS 13395 DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



.062
1.247
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1.074
1.050
.943
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.190
.184
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.064
.058
SEE DETAIL A
.128
.122
.253
.247
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.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.137
1.113
1.262
1.238
1.387
1.363
.064
.058
1.497
.247
A
A
.122
.042
.047
.020
.024
.005
.015 TYP
46°
44° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.014
.018
.006
.010
.010
.004 x 46°
44°
4 PLACES PER HOLE
(22 HOLES TOTAL)
DETAIL A
SCALE 10/1
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

1007551	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addoms Jr. DATE 8-19-64
CHECKED R. R. Kingsbury 21 Sept 64
APPROVAL
APPROVAL D. B. Test 10-9-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL L. Hazel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. — SIZE C NASA DRAWING NO. 1008543
SCALE 5/1 WT — SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008544 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
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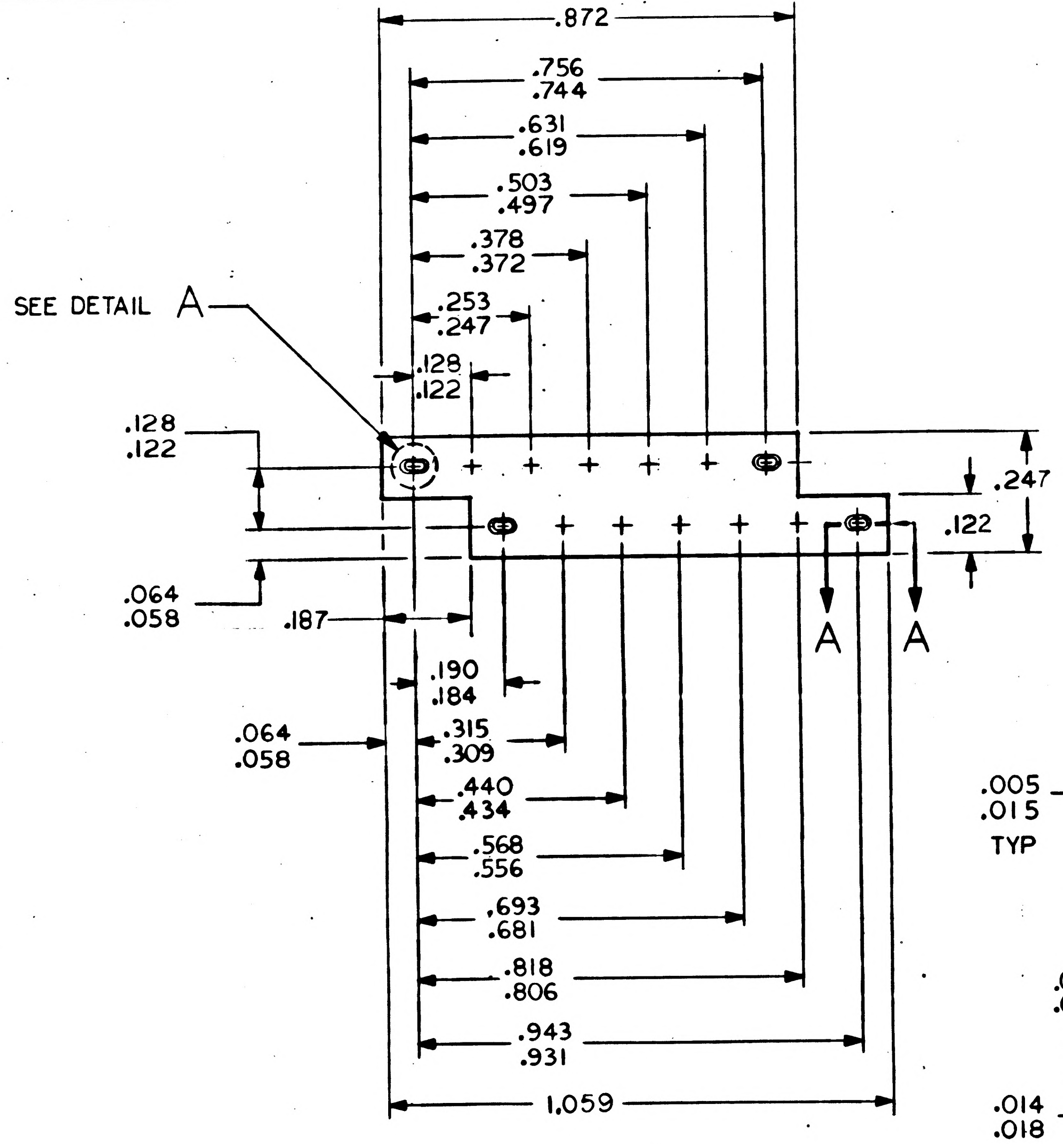
.872
.756
.744
.631
.619
.503
.497
.378
.372
.253
.247
.128
.122
SEE DETAIL A
.128
.122
.247
.122
.064
.058
.187
A
A
.190
.184
.315
.309
.064
.058
.440
.434
.568
.556
.693
.681
.818
.806
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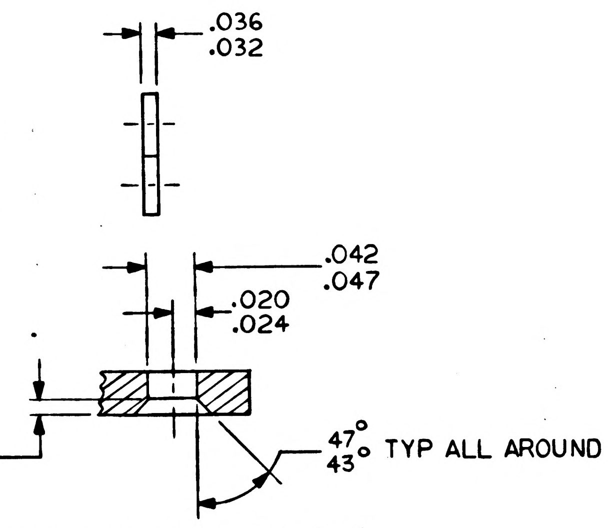
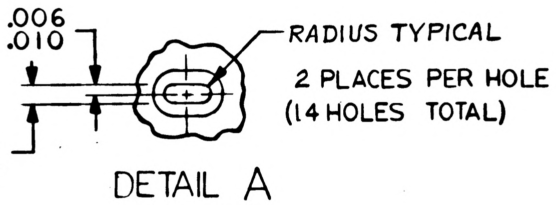
.931
1.059


.036
.032
.042
.047
.020
.024
.005
.015
TYP
47°
43°
TYP ALL AROUND

PARTIAL SECTION A-A
SCALE 10/1


.006
.010
.014
.018
RADIUS TYPICAL
2 PLACES PER HOLE
(14 HOLES TOTAL)

DETAIL A
SCALE 10/1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. MOLDING FLASH NOT TO EXCEED .003.
4. IDENTIFY PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007564	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN C.J. Berkeley DATE 8/20/64
CHECKED [illegible] 21 Sep 64
APPROVAL
APPROVAL [illegible] 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL [illegible] 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008544
SCALE 4/1
WT —
SHEET 1 OF 1

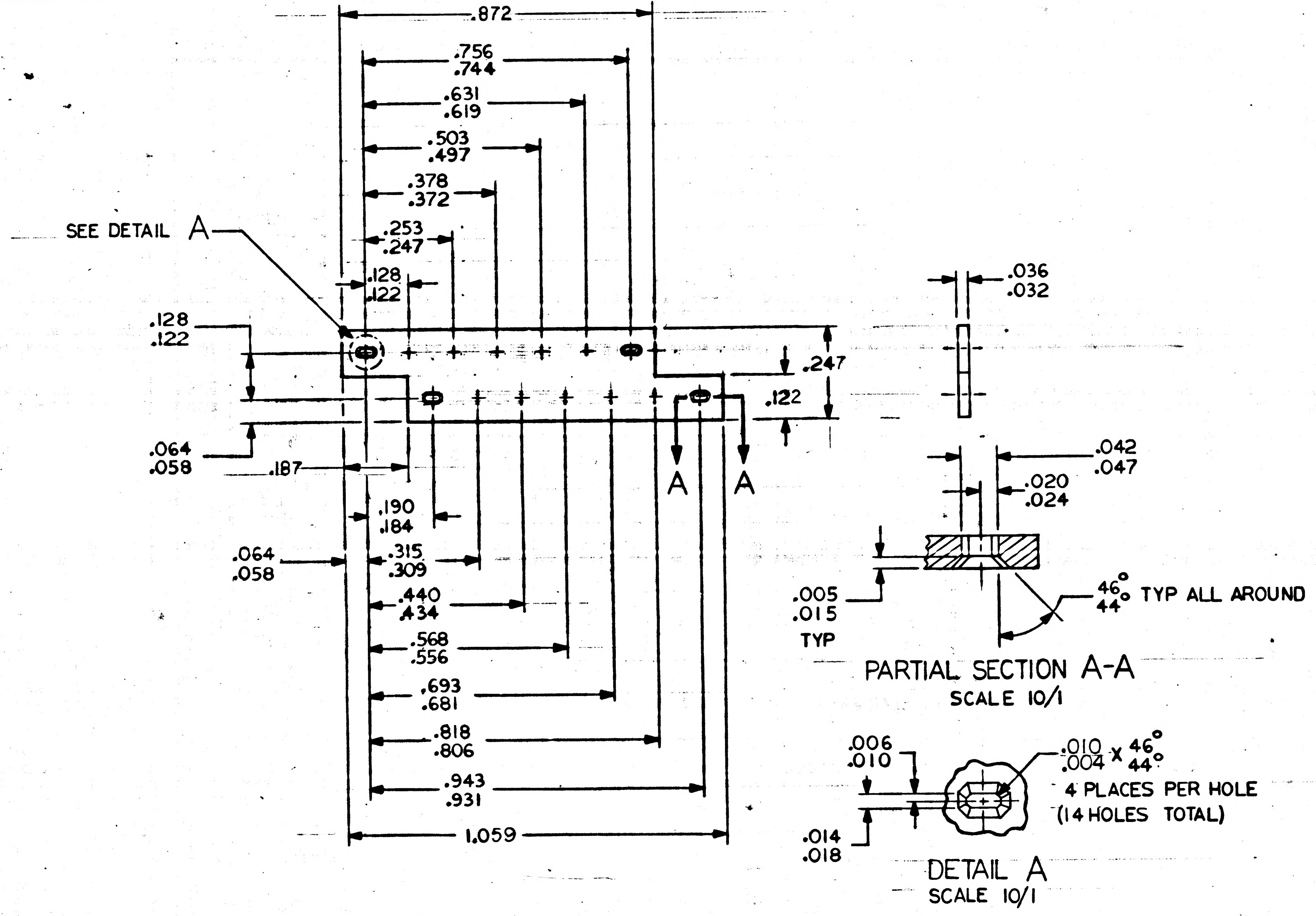
1008544

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008544

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL



.872
.756
.744
.631
.619
.503
.497
.378
.372
.253
.247
.128
.122
SEE DETAIL A
.128
.122
.247
.122
.064
.058
.187
A
A
.190
.184
.315
.309
.440
.434
.568
.556
.693
.681
.818
.806
.943
.931
.064
.058
1.059
.036
.032
.042
.047
.020
.024
.005
.015
TYP
46°
44°
TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.006
.010
.010
.004
X
46°
44°
4 PLACES PER HOLE
(14 HOLES TOTAL)
.014
.018
DETAIL A
SCALE 10/1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. MUST BE FREE OF MOLDING FLASH
4. IDENTIFY PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTER

NEXT ASSY	USED ON
1007564	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2

HEAT TREATMENT —

FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN P. J. Berkeley DATE 8/20/64
CHECKED R. P. Kingsbury 21 Sep 64
APPROVAL
APPROVAL D. A. Fast 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL D. Hazel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008544
SCALE 4/1
WT —
SHEET 1 OF 1

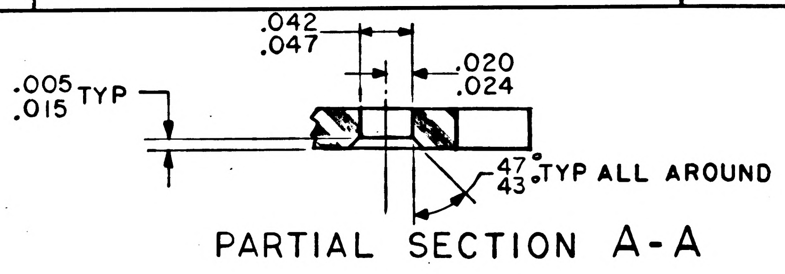
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008545 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	H.J.W. / W.P.


.042
.047
.020
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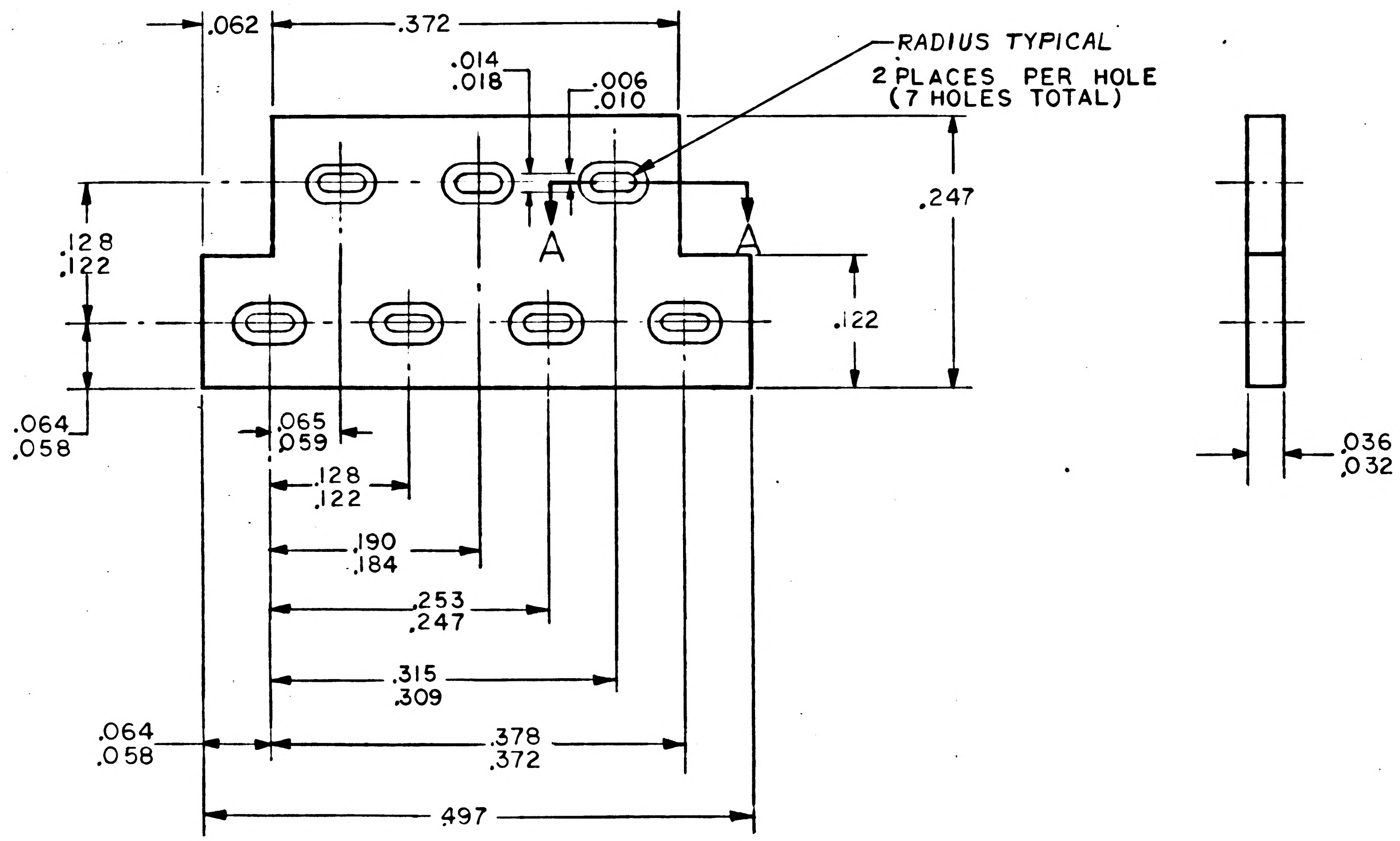
.015 TYP
47°
43° TYP ALL AROUND

PARTIAL SECTION A-A


.062
.372
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.006
.010
RADIUS TYPICAL
2 PLACES PER HOLE
(7 HOLES TOTAL)
.247
A
A
.128
.122
.122
.064
.058
.065
.059
.128
.122
.190
.184
.253
.247
.315
.309
.064
.058
.378
.372
.497
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. *MOLDING FLASH NOT TO EXCEED .003.*

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007518	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2

HEAT TREATMENT —

FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addorn Y. DATE 8-19-64
CHECKED R.P. Kingsbury 21 Sep 64
APPROVAL
APPROVAL D. B. Test 10-8-64

NASA APPROVAL W J Rhine 10-14-64

MIT APPROVAL D Hazel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

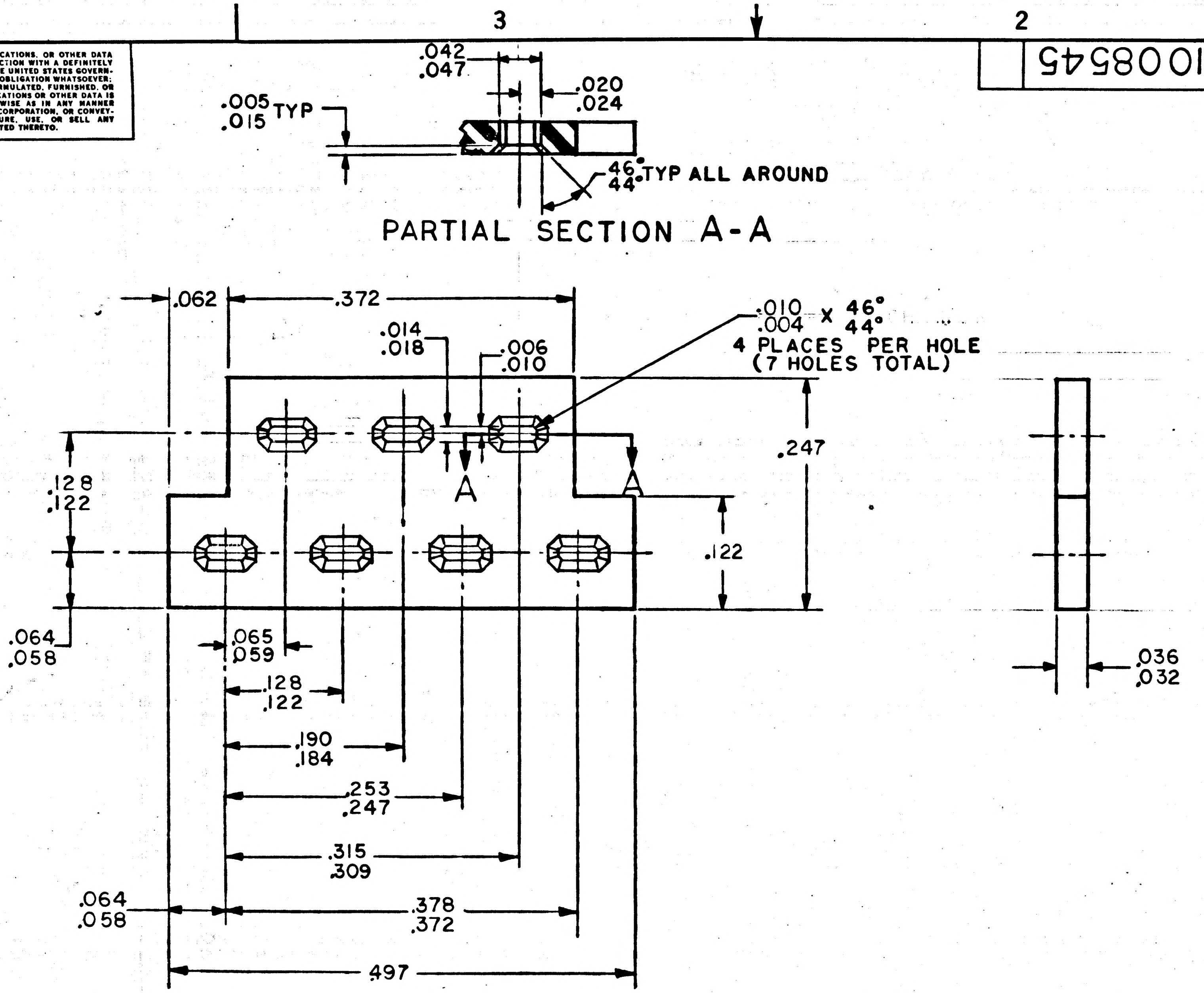
CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008545
SCALE 10/1
WT —
SHEET 1 OF 1

1008545

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008545

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL


.042
.047
.020
.024
.005
.015 TYP
46°
44° TYP ALL AROUND
PARTIAL SECTION A-A
.062
.372
.014
.018
.006
.010
.010
.004 X 46°
44°
4 PLACES PER HOLE
(7 HOLES TOTAL)
.247
A
A
.128
.122
.122
.064
.058
.065
.059
.128
.122
.190
.184
.253
.247
.315
.309
.064
.058
.378
.372
.497
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL :RUBBER PER MIL-R-5847 CLASS 1, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

MASTER

1007518	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addorio Jr. DATE 8-19-64
CHECKED R.P. Kingsbury 21 Sep 64
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —— SIZE C NASA DRAWING NO. 1008545
SCALE 10/1 WT —— SHEET 1 OF 1

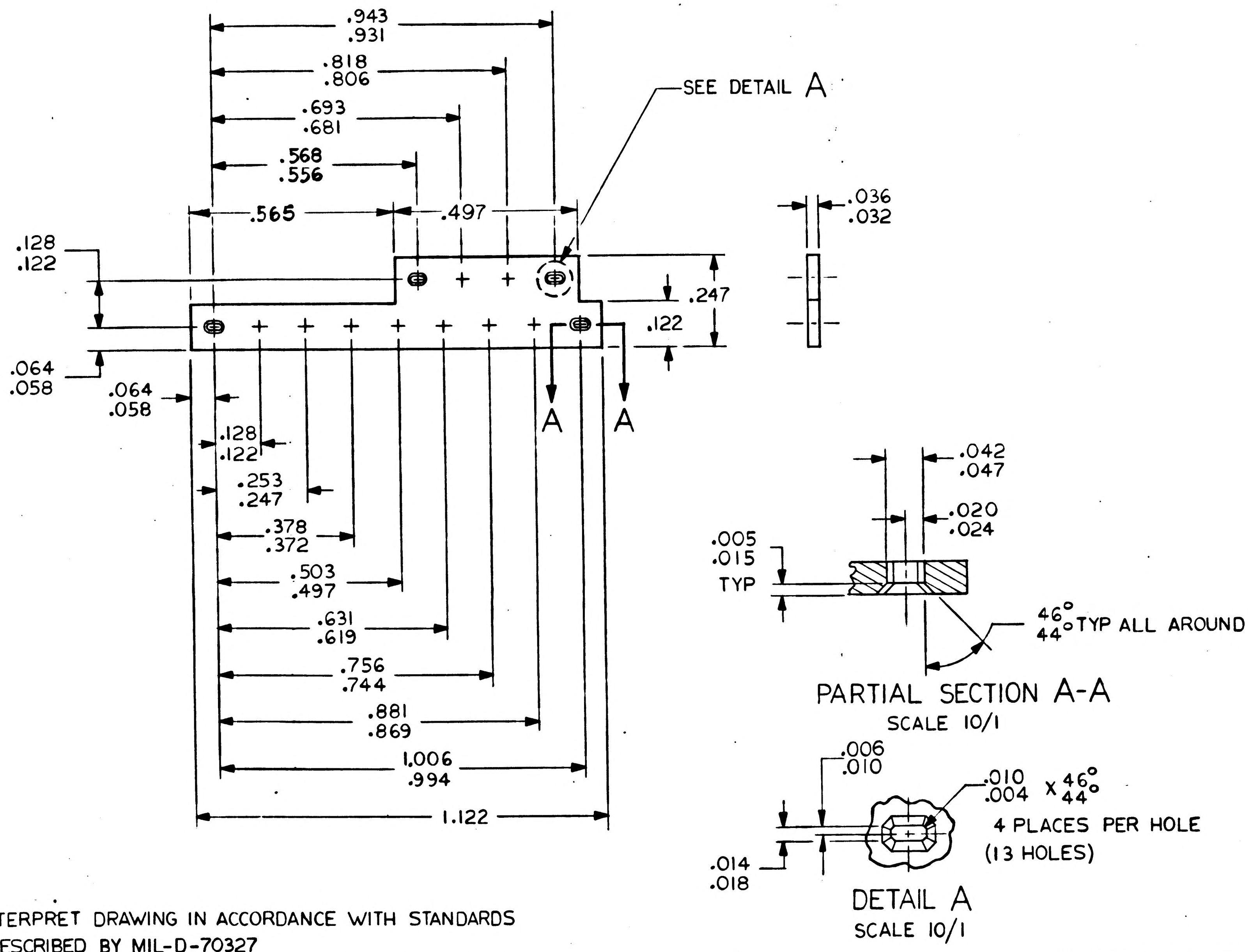
INCHES
0 1 2
PHOTOGRAPHIC SCALE

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008546 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16837	4 MAR 65	JHP PJ



.943
.931
.818
.806
.693
.681
.568
.556
.565
.497
SEE DETAIL A
.128
.122
.247
.122
.064
.058
.064
.058
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.122
A
A
.036
.032
.042
.047
.020
.024
.005
.015
TYP
46°
44° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.006
.010
.010
.004 X 46°
44°
4 PLACES PER HOLE
(13 HOLES)
.014
.018
DETAIL A
SCALE 10/1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. MUST BE FREE OF MOLDING FLASH
4. IDENTIFY PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007518	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN P. J. Berkeley DATE 8/21/64
CHECKED R. F. King Aug 21 1964
APPROVAL
APPROVAL D. B. Test 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL L Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008546
SCALE 4/1
WT —
SHEET 1 OF 1

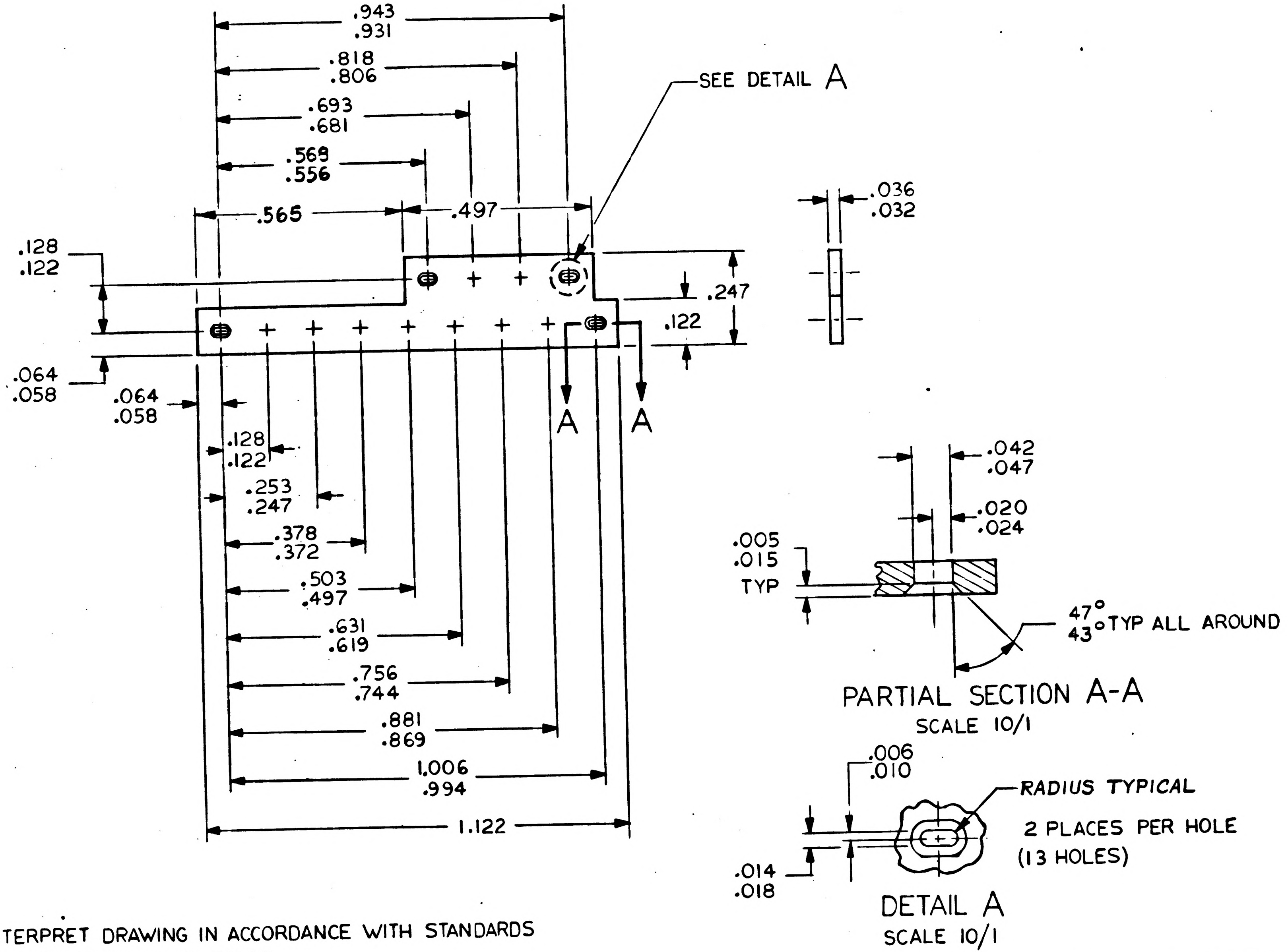
1008546 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008546 B

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16837	4 MAR 65	JHP PJ
B	REVISED PER TDRR 17680	26-MAR-65	H.F.W. W.D


.943
.931
.818
.806
.693
.681
.568
.556
.565
.497
SEE DETAIL A
.128
.122
.247
.122
.064
.058
.064
.058
.128
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.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.122
A
A
.036
.032
.042
.047
.020
.024
.005
.015
TYP
47°
43° TYP ALL AROUND
.006
.010
RADIUS TYPICAL
2 PLACES PER HOLE
(13 HOLES)
.014
.018

PARTIAL SECTION A-A
SCALE 10/1

DETAIL A
SCALE 10/1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. *MOLDING FLASH NOT TO EXCEED .003.*
4. IDENTIFY PER ND 1002019

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007518	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN [illegible] DATE 8/21/64
CHECKED [illegible] 21 Sep 64
APPROVAL
APPROVAL [illegible] 10-8-64
NASA APPROVAL [illegible] 10-14-64
MIT APPROVAL [illegible] 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. — SIZE C NASA DRAWING NO. 1008546
SCALE 4/1 WT — SHEET 1 OF 1

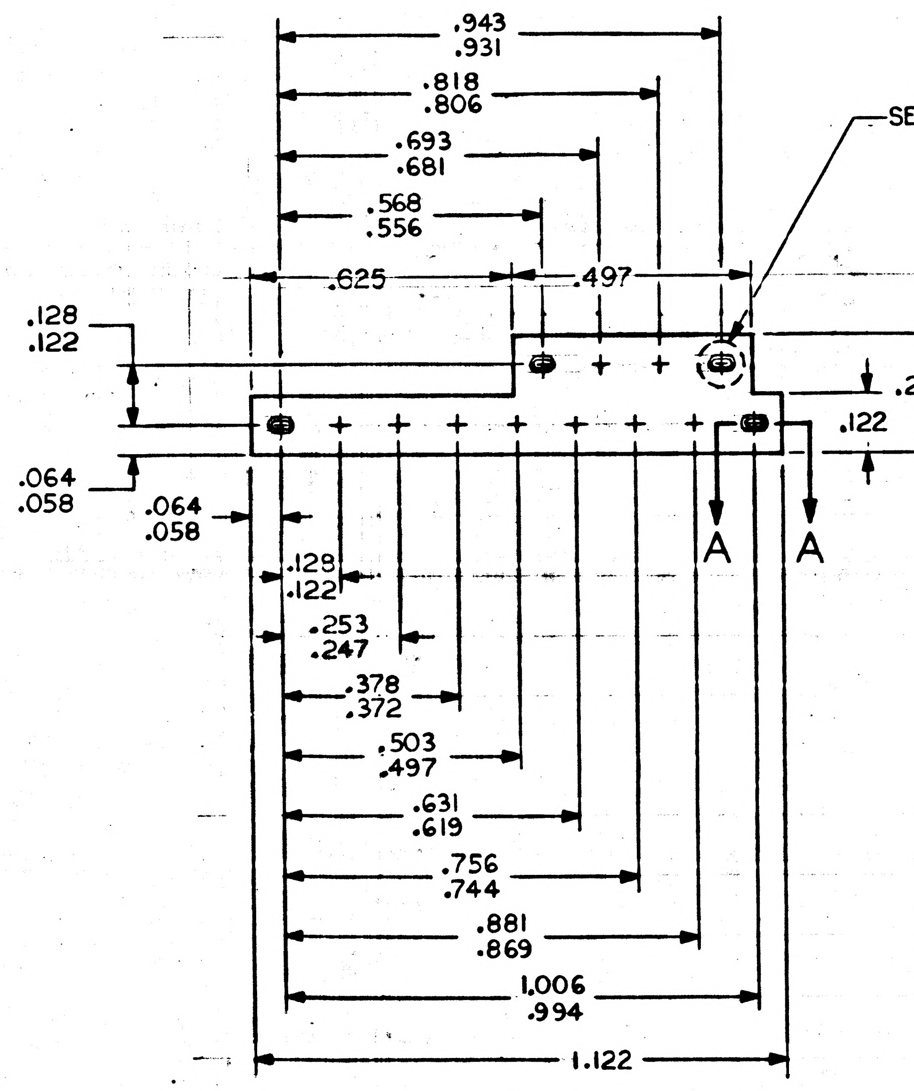
1008546

4 3 2 1

OTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA
RE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY
ELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERN-
ENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER;
ND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR
N ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS
OT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER
ICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEY-
NG ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY
ATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008546

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS 13375			


.943
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.818
.806
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.556
.625
.497
SEE DETAIL A
.128
.122
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.122
.064
.058
.064
.058
A
A
.128
.122
.253
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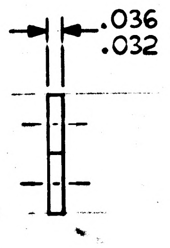
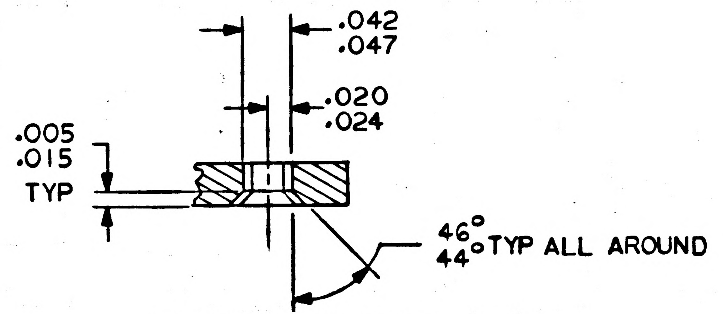
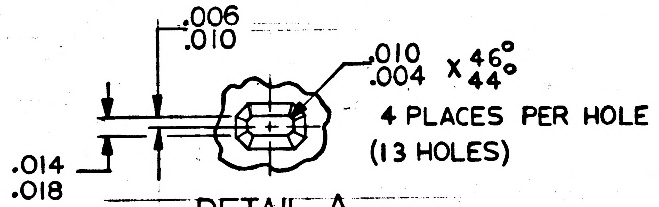
1.006
.994
1.122




.042
.047
.020
.024
.005
.015
TYP
46°
44° TYP ALL AROUND

PARTIAL SECTION A-A
SCALE 10/1


.006
.010
.010
.004 X 46° 44°
4 PLACES PER HOLE
(13 HOLES)
.014
.018

DETAIL A
SCALE 10/1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. MUST BE FREE OF MOLDING FLASH
4. IDENTIFY PER ND 1002019

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007518	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN DATE 9/21/64
CHECKED 21 Sep 64
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008546
SCALE 4/1
WT —
SHEET 1 OF 1

4 3 2 1

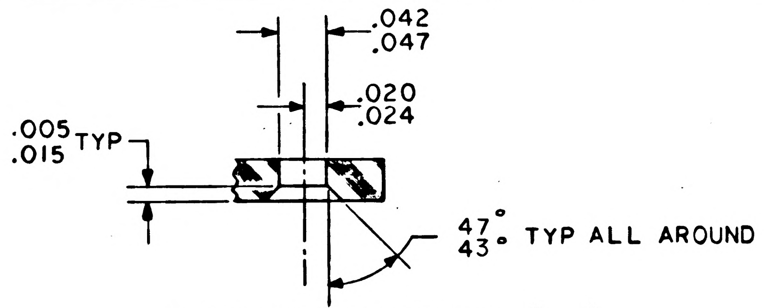
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008547 A

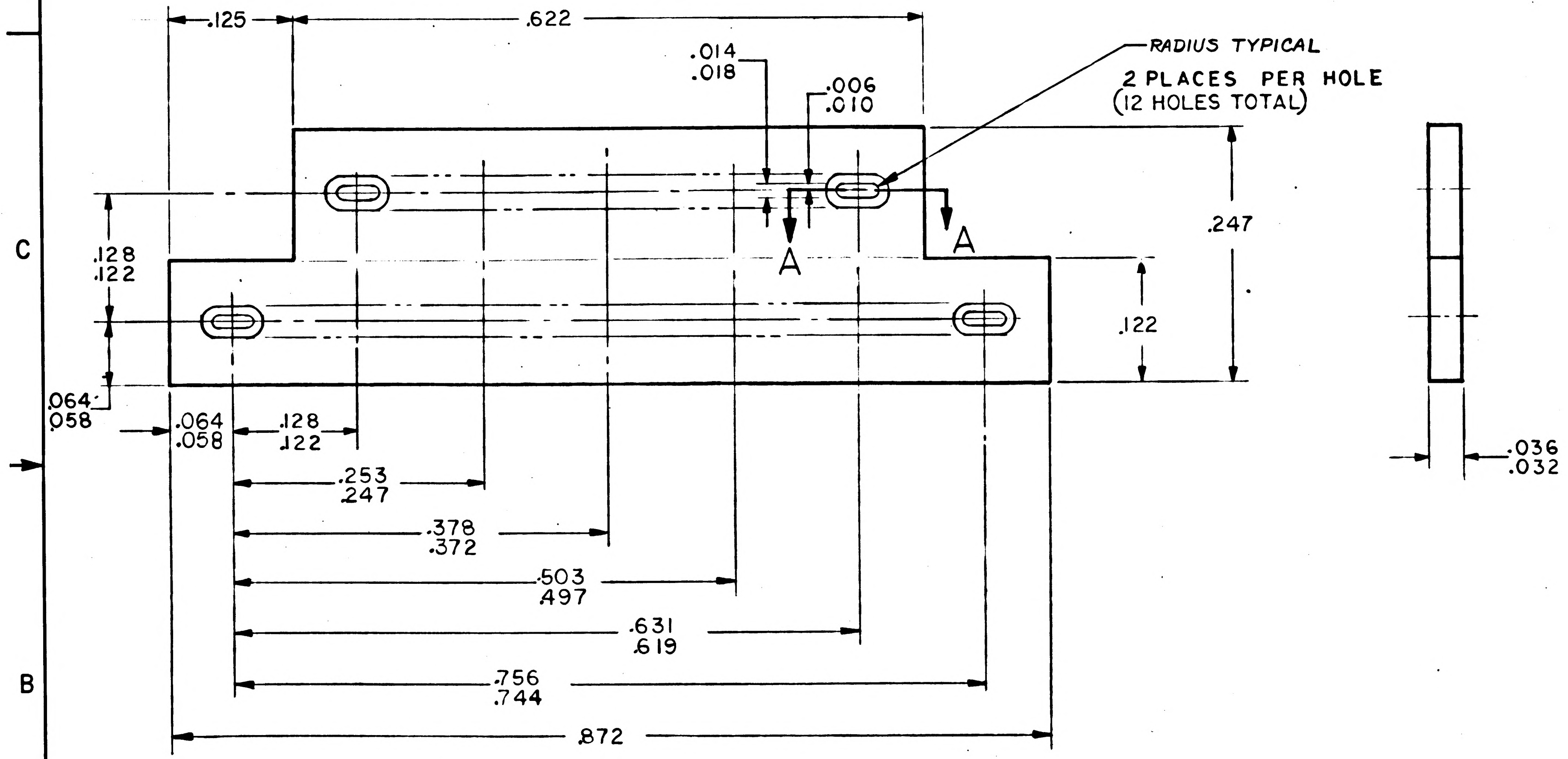
REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	K.T.W. / W.D.



.042
.047
.020
.024
.005
.015 TYP
47°
43° TYP ALL AROUND

PARTIAL SECTION A-A



.125
.622
.014
.018
.006
.010
RADIUS TYPICAL
2 PLACES PER HOLE
(12 HOLES TOTAL)
A
A
.247
.128
.122
.122
.064
.058
.064
.058
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.872
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. *MOLDING FLASH NOT TO EXCEED .003.*

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007590	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ______
FINAL FINISH ______

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addario Jr. DATE 8-19-64
CHECKED R. P. Kingsbury 21 Sep 64
APPROVAL ______
APPROVAL D. R. Test 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL D. Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

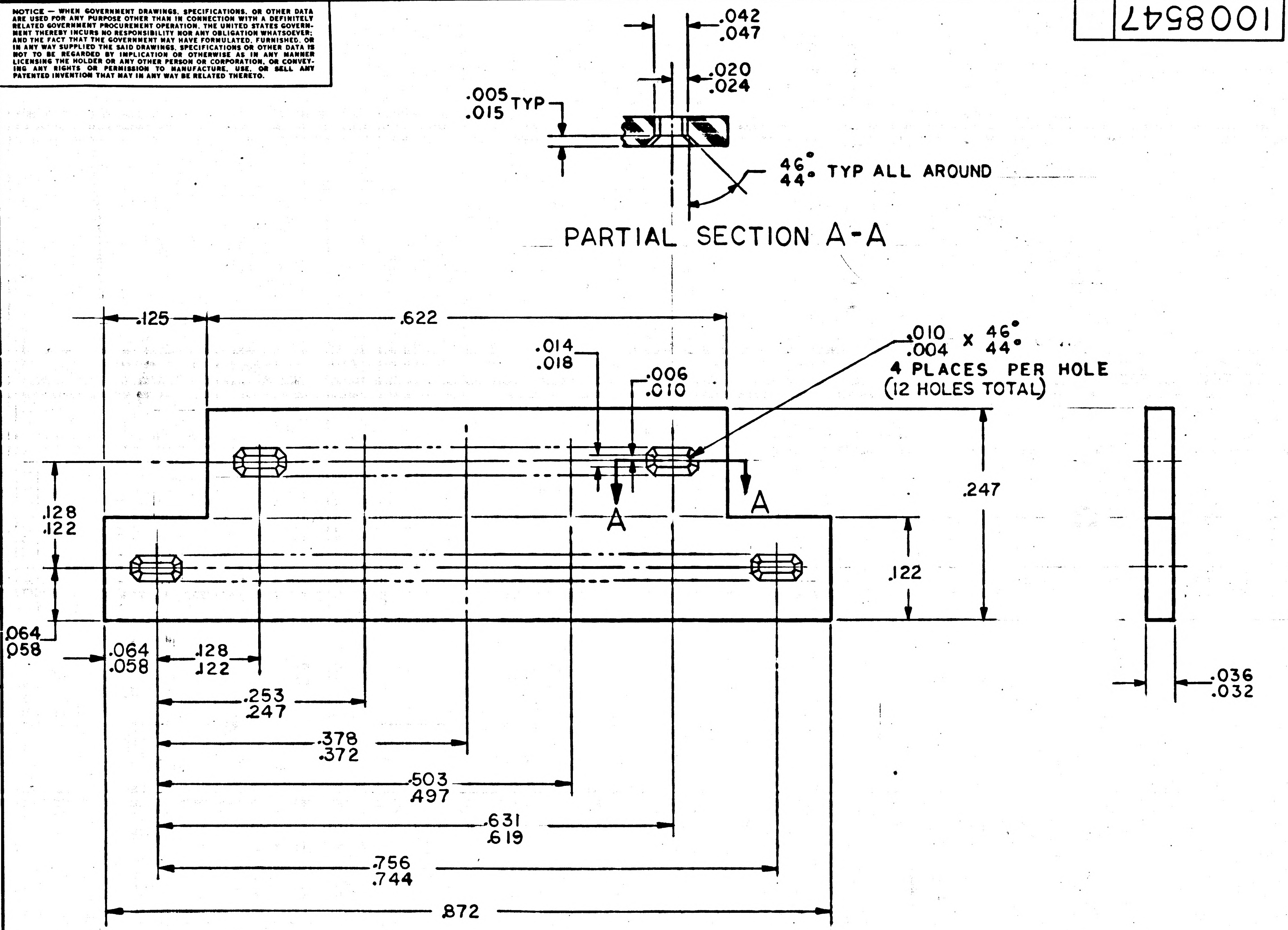
CODE IDENT NO. ——
SIZE C
NASA DRAWING NO. 1008547
SCALE 10/1
WT ——
SHEET 1 OF 1

1008547

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008547

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL


.042
.047
.020
.024
.005
.015 TYP
46°
44° TYP ALL AROUND
PARTIAL SECTION A-A
.125
.622
.014
.018
.006
.010
.010
.004 X 46°
44°
4 PLACES PER HOLE
(12 HOLES TOTAL)
A
A
.247
.128
.122
.122
.064
.058
.064
.058
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.872
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007590	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
± —	±.005	± —

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2

HEAT TREATMENT —

FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN A. Addario Jr. DATE 8-19-64
CHECKED R.P. Kingsbury 21 Sept 64
APPROVAL
APPROVAL D. R. Test 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D Hazel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008547
SCALE 10/1
WT —
SHEET 1 OF 1

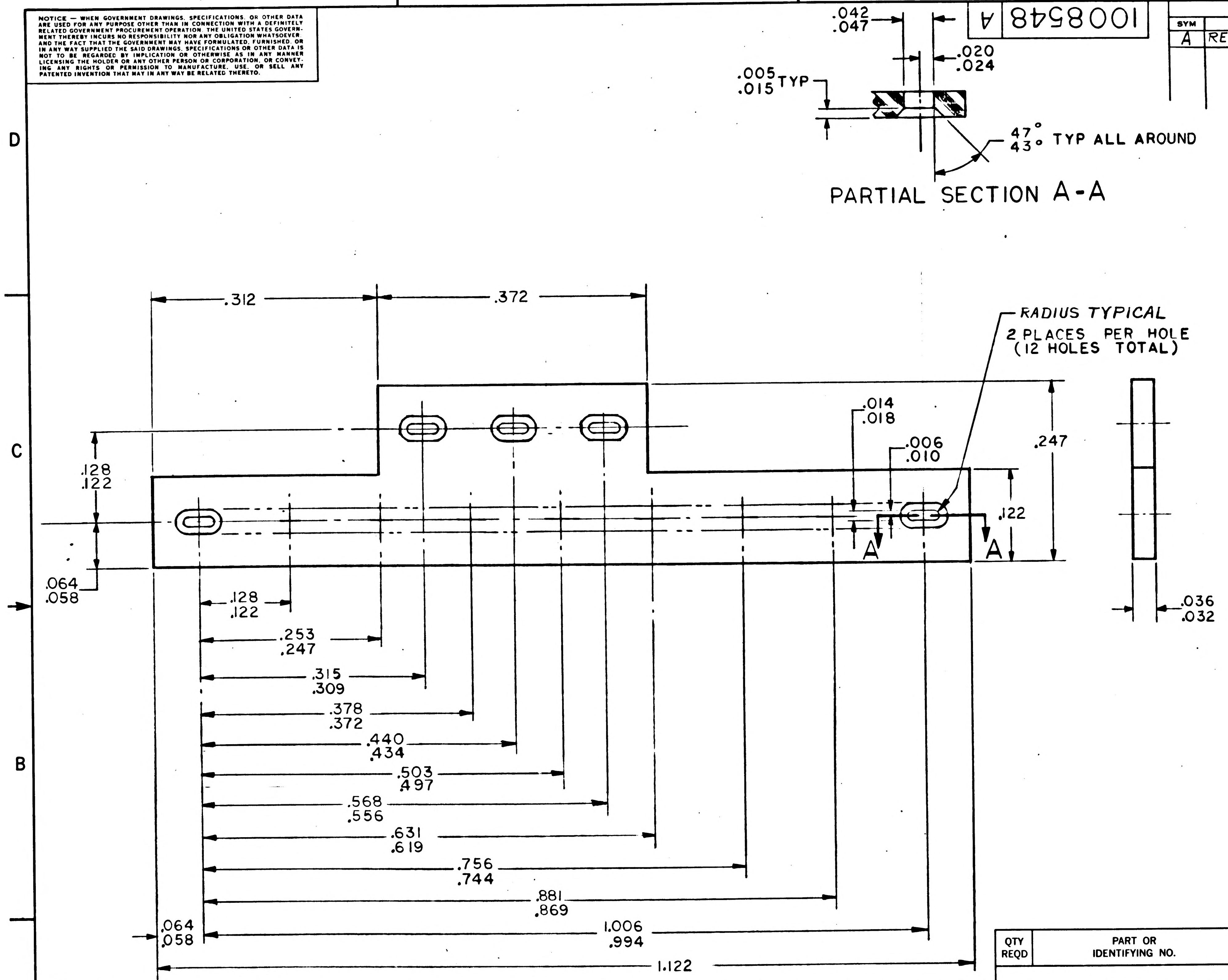
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008548 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	K.T.H. / W.D.



.042
.047
.020
.024
.005
.015 TYP
47°
43° TYP ALL AROUND
PARTIAL SECTION A-A
.312
.372
RADIUS TYPICAL
2 PLACES PER HOLE
(12 HOLES TOTAL)
.014
.018
.006
.010
.247
.122
.128
.122
A
A
.064
.058
.036
.032
.128
.122
.253
.247
.315
.309
.378
.372
.440
.434
.503
.497
.568
.556
.631
.619
.756
.744
.881
.869
.064
.058
1.006
.994
1.122

1008548

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND 1002019
4. MOLDING FLASH NOT TO EXCEED .003.

NEXT ASSY	USED ON
1007556	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
± —	±.005	± —

DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH ——

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN A Addors Jr DATE 8-19-64
CHECKED R.P. Kingsbury 21 Sept 64
APPROVAL
APPROVAL D.G. Test 10-9-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

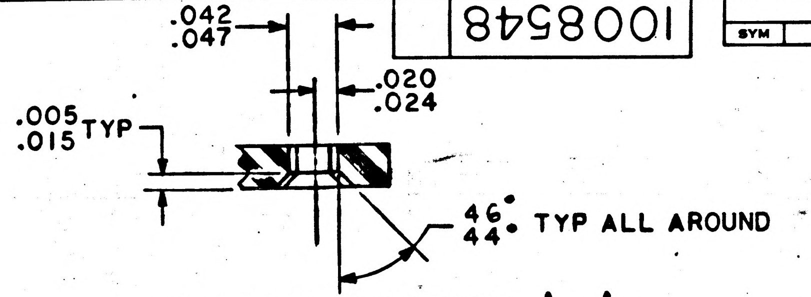
GASKET
CONNECTOR MINIATURE

CODE IDENT NO. ——
SIZE C
NASA DRAWING NO. 1008548
SCALE 10/1
WT ——
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008548

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL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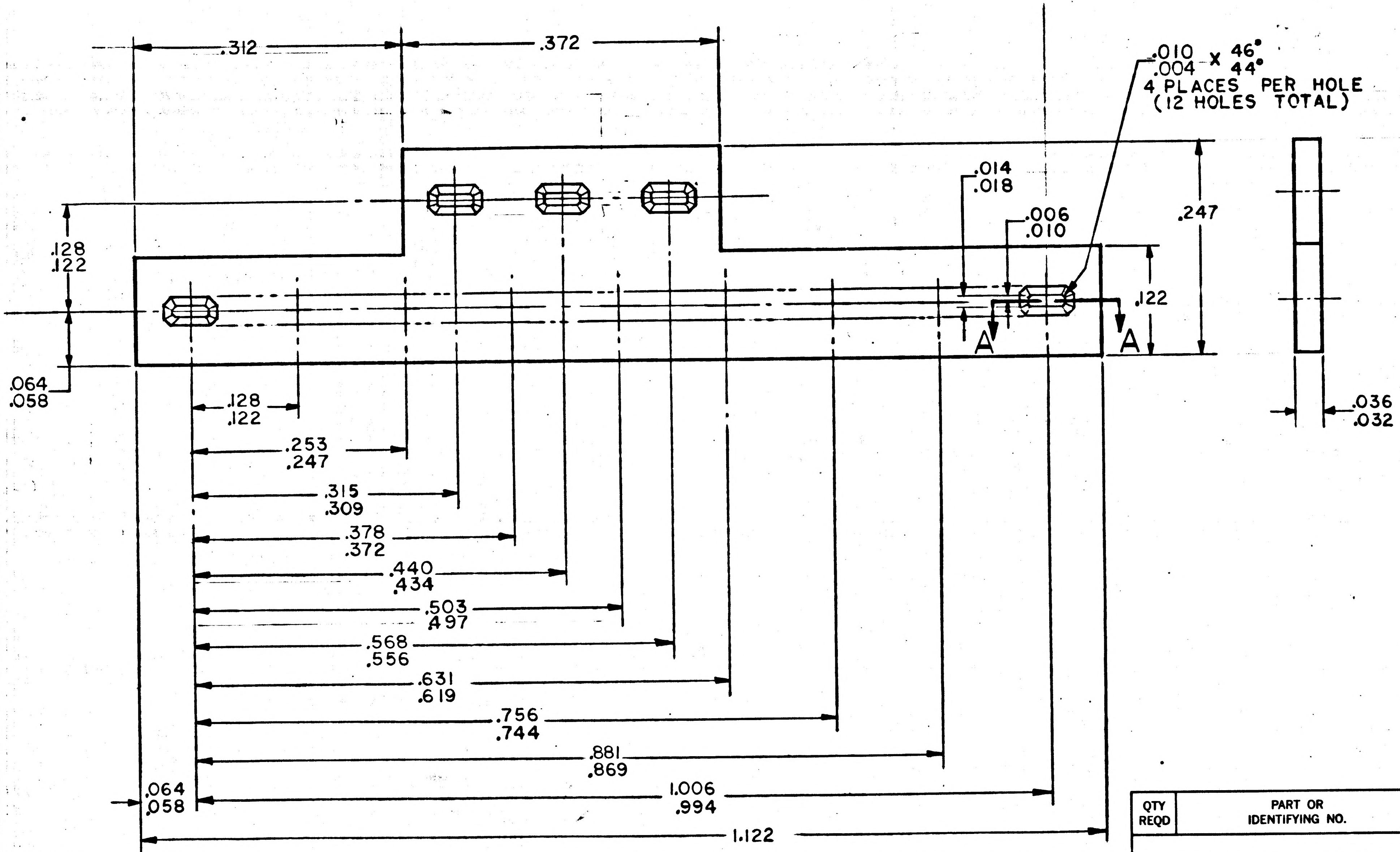
.047
.020
.024
.005
.015 TYP
46°
44° TYP ALL AROUND

PARTIAL SECTION A-A


.312
.372
.010 X 46°
.004 X 44°
4 PLACES PER HOLE
(12 HOLES TOTAL)
.014
.018
.006
.010
.247
.128
.122
.122
A
A
.064
.058
.036
.032
.128
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.869
1.006
.994
.064
.058
1.122

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND 1002019
4. MUST BE FREE OF MOLDING FLASH

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007556	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A Addario Jr DATE 8-19-64
CHECKED R.P. Kingsbury 21Sep64
APPROVAL
APPROVAL D.G. Hoag 10-9-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO.	SIZE	NASA DRAWING NO.	
——	C	1008548	
SCALE 10/1	WT ——		SHEET 1 OF 1

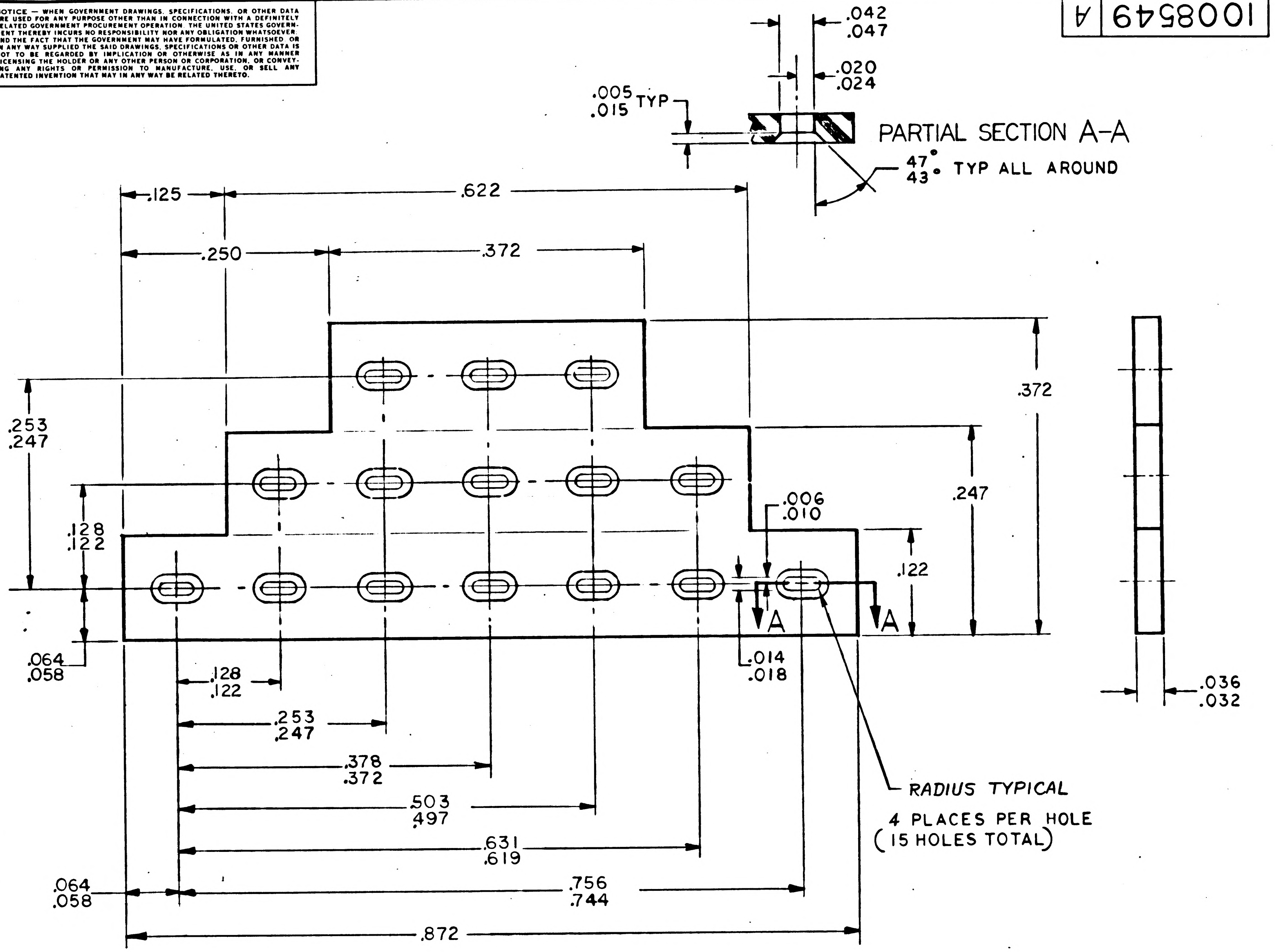
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008549 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	H.7.H / W.D.



.042
.047
.020
.024
.005
.015 TYP
PARTIAL SECTION A-A
47°
43° TYP ALL AROUND
.125
.622
.250
.372
.372
.253
.247
.247
.128
.122
.006
.010
.122
A
A
.064
.058
.014
.018
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.064
.058
.872
.036
.032
RADIUS TYPICAL
4 PLACES PER HOLE
(15 HOLES TOTAL)

1008549

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003.

1007561	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ______
FINAL FINISH ______

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN J Addario Jr DATE 8-19-64
CHECKED R. P. Kingsbury 21 Sep 64
APPROVAL ______
APPROVAL D. A. Test 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL D. Hazel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

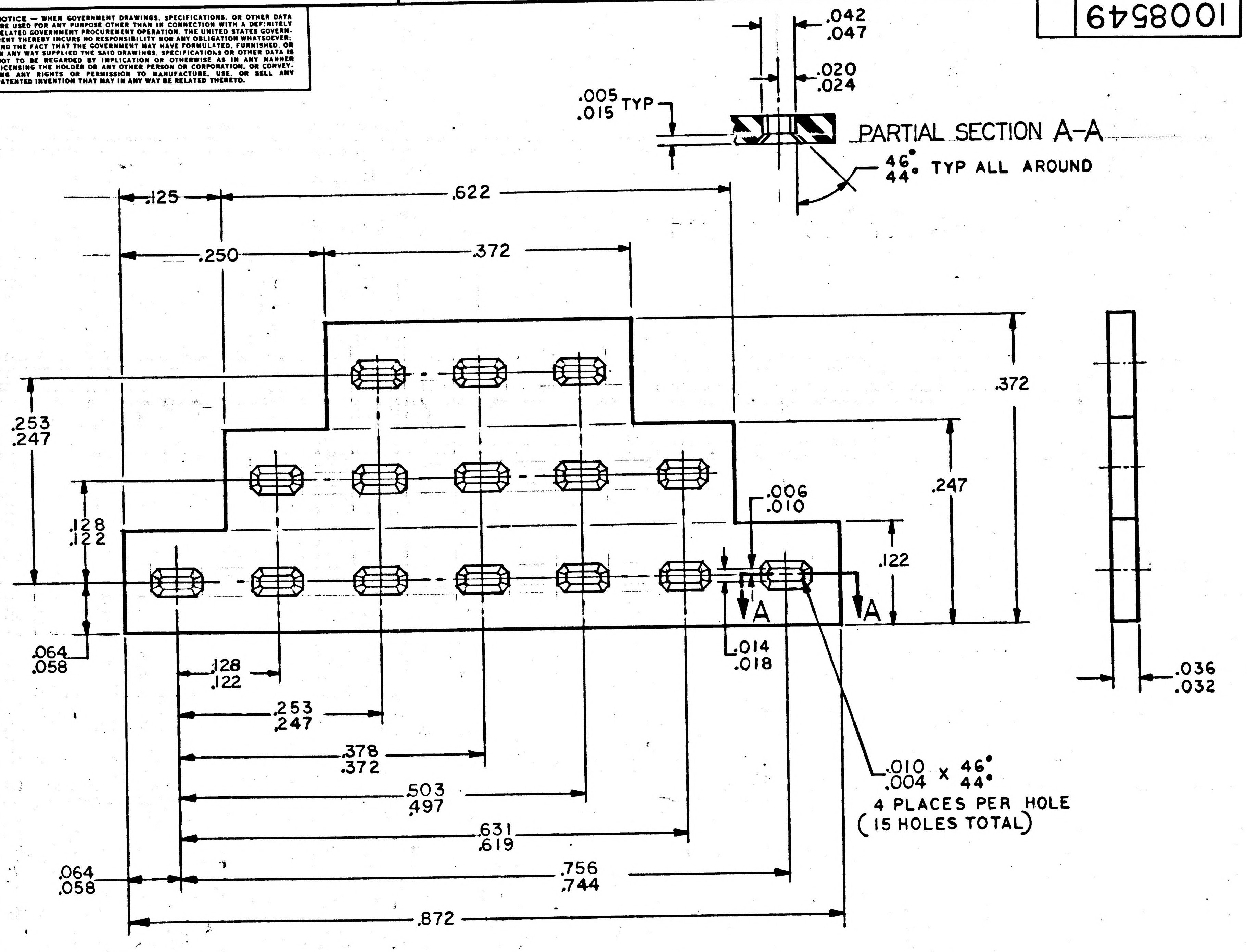
GASKET
CONNECTOR MINIATURE

CODE IDENT NO. ______
SIZE C
NASA DRAWING NO. 1008549
SCALE 10/1
WT ______
SHEET 1 OF 1

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL

1008549

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


.042
.047
.020
.024
.005
.015 TYP
PARTIAL SECTION A-A
46°
44° TYP ALL AROUND
.125
.622
.250
.372
.372
.253
.247
.247
.128
.122
.006
.010
.122
A
A
.064
.058
.014
.018
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.064
.058
.756
.744
.872
.010
.004 X 46°
44°
4 PLACES PER HOLE
(15 HOLES TOTAL)
.036
.032

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

MASTER

1007561	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS ±.005
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Addorio Jr DATE 8-19-64
CHECKED R.P. Kingsbury 21 Sep 64
APPROVAL
APPROVAL D. R. Test 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL L 7 Hafel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. ——
SIZE C
NASA DRAWING NO. 1008549
SCALE 10/1
WT ——
SHEET 1 OF 1

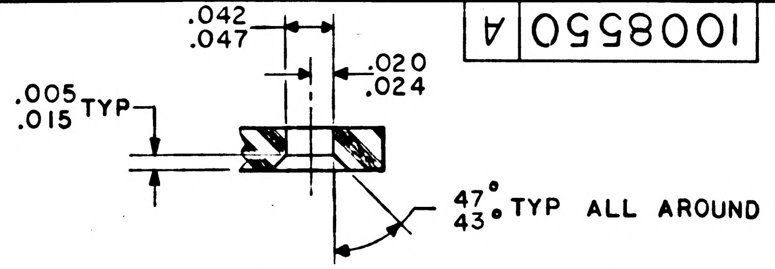
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

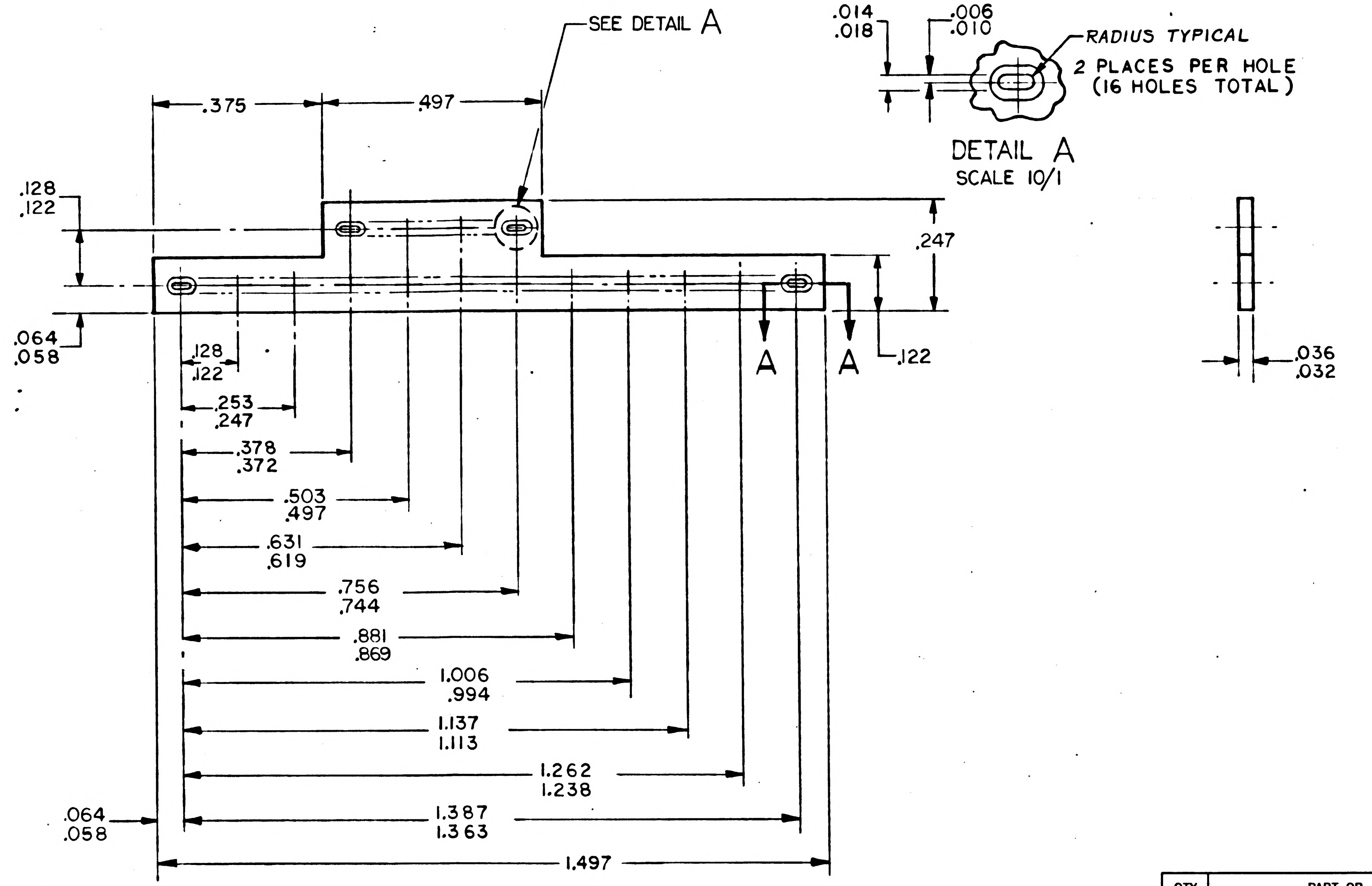
1008550 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	K.T.W. WJS


.042
.047
.020
.024
.005
.015 TYP
47°
43° TYP ALL AROUND

PARTIAL SECTION A-A
SCALE 10/1


SEE DETAIL A
.014
.018
.006
.010
RADIUS TYPICAL
2 PLACES PER HOLE
(16 HOLES TOTAL)
DETAIL A
SCALE 10/1
.375
.497
.128
.122
.247
.064
.058
A
A
.122
.036
.032
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.137
1.113
1.262
1.238
.064
.058
1.387
1.363
1.497

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS 1, GRADE 50
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007563	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addomy Jr. DATE 8-19-64
CHECKED R.P. Lange Jury 21 Sept
APPROVAL
APPROVAL D. R. Test 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D Hagel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

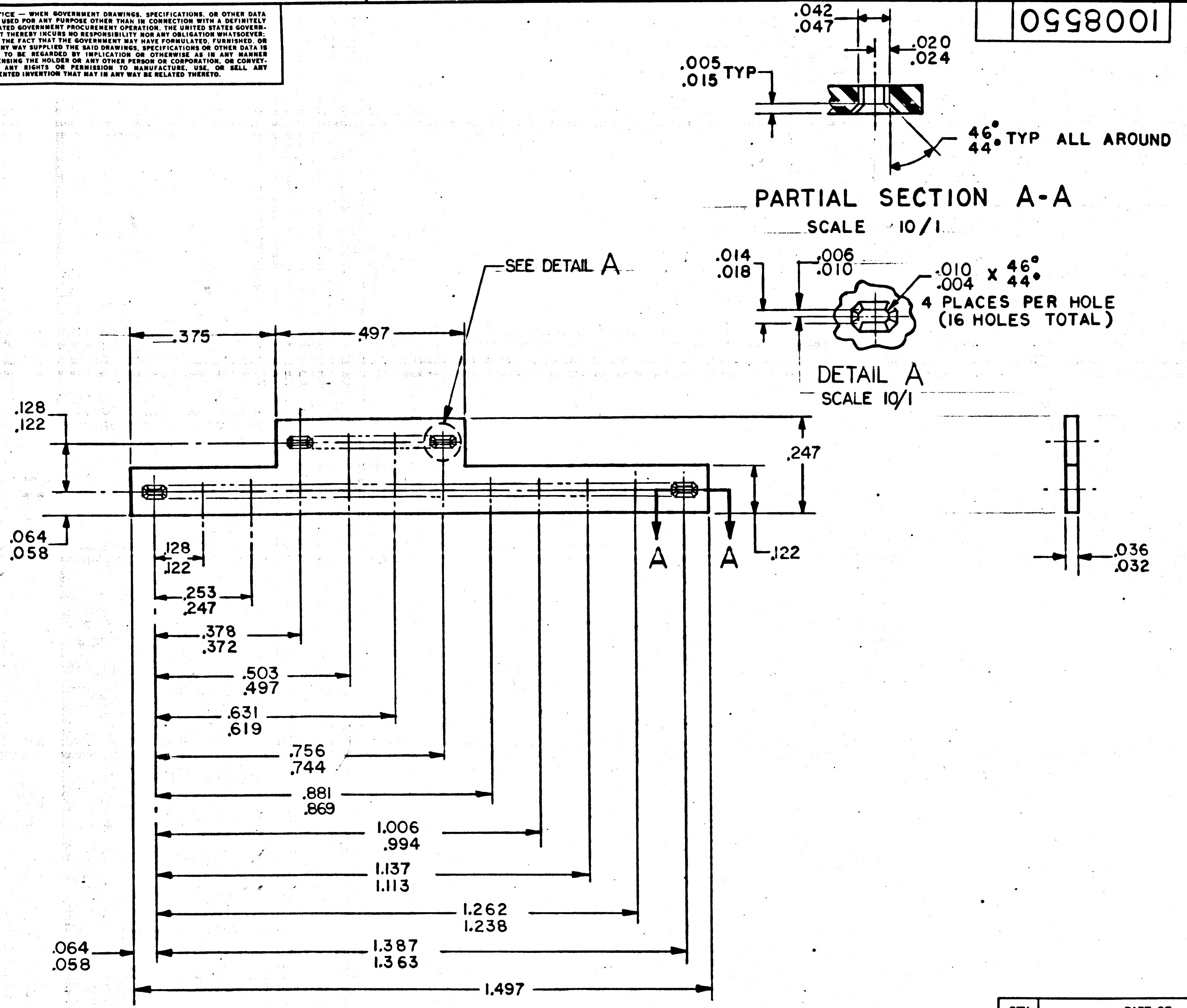
CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008550
SCALE 5/1
WT —
SHEET 1 OF 1

1008550

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008550

REVISIONS 13375			
SYM	DESCRIPTION	DATE	APPROVAL


.042
.047
.020
.024
.005
.015 TYP
46°
44° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
SEE DETAIL A
.014
.018
.006
.010
.010
.004 x 46°
44°
4 PLACES PER HOLE
(16 HOLES TOTAL)
DETAIL A
SCALE 10/1
.375
.497
.128
.122
.247
.064
.058
A
A
.122
.036
.032
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.137
1.113
1.262
1.238
1.387
1.363
.064
.058
1.497

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL : RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007563	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A Addario Jr DATE 8-19-64
CHECKED
APPROVAL
APPROVAL 10-8-64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

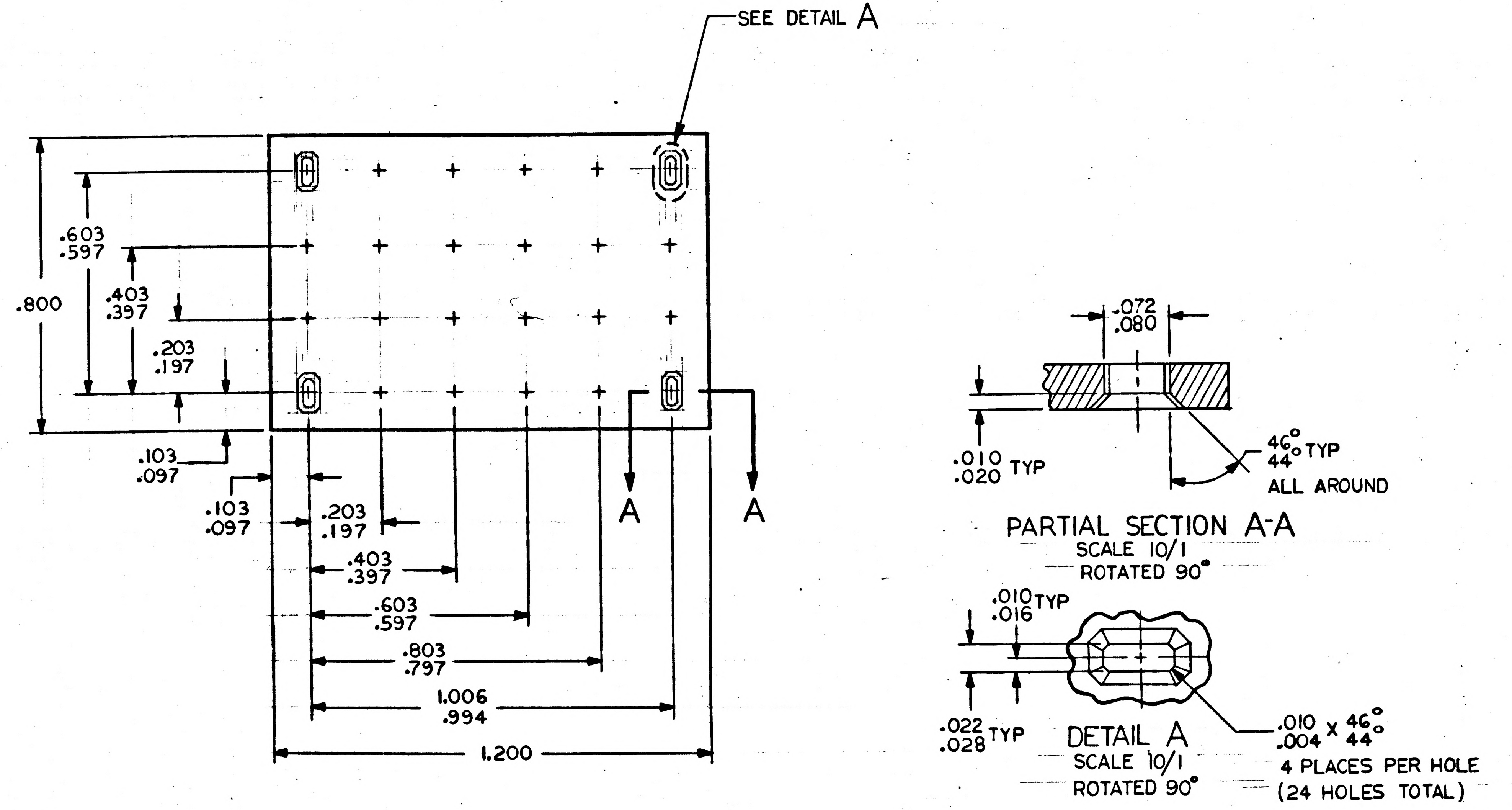
CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008550
SCALE 5/1 WT —
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1008551

REVISIONS 14085			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


SEE DETAIL A
.603
.597
.403
.397
.800
.203
.197
.103
.097
.103
.097
.203
.197
.403
.397
.603
.597
.803
.797
1.006
.994
1.200
A
A
.072
.080
.010
.020 TYP
46°
44° TYP
ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
ROTATED 90°
.010
.016 TYP
.022
.028 TYP
DETAIL A
SCALE 10/1
ROTATED 90°
.010
.004 X 46°
44°
4 PLACES PER HOLE
(24 HOLES TOTAL)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: MAKE FROM 1008552
3. MUST BE FREE OF MOLDING FLASH
4. IDENTIFY PER ND1002019

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007534	
1007533	
1007532	
1007531	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN L. T. Bartolory DATE 7/25/64
CHECKED R. P. Kingsbury 21SEP64
APPROVAL
APPROVAL D. R. Test 11/9/64
NASA APPROVAL W J Rhine 11-12-64
MIT APPROVAL 12/1/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR TRAY

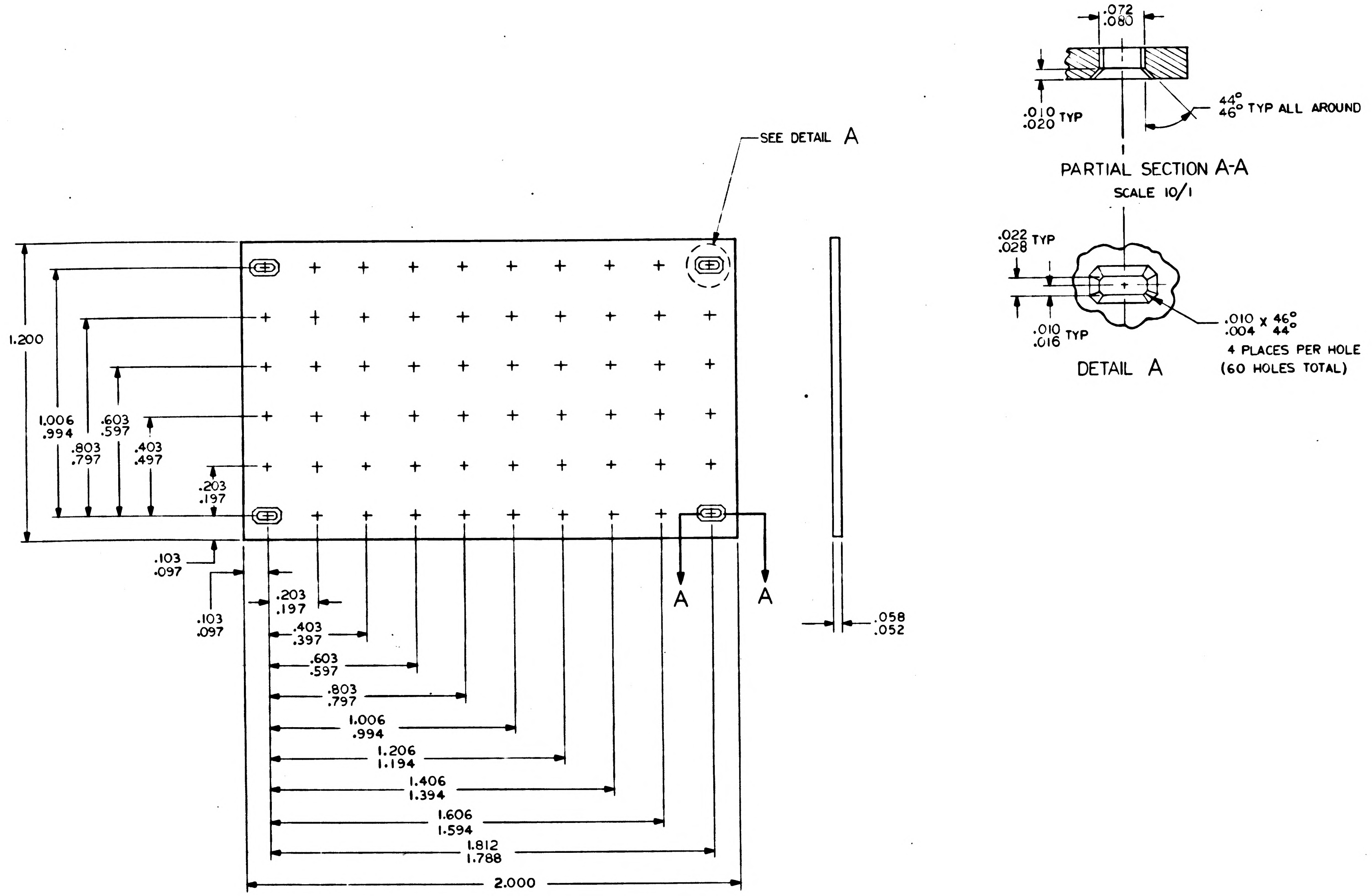
CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008551
SCALE 4/1
WT —
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 14085

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16833	4 MAR 65	R.W.T.


SEE DETAIL A
1.200
1.006
.994
.803
.797
.603
.597
.403
.497
.203
.197
.103
.097
.203
.197
.103
.097
.403
.397
.603
.597
.803
.797
1.006
.994
1.206
1.194
1.406
1.394
1.606
1.594
1.812
1.788
2.000
A
A
.058
.052
.072
.080
.010
.020 TYP
44°
46° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.022
.028 TYP
.010
.016 TYP
.010 x 46°
.004 x 44°
4 PLACES PER HOLE
(60 HOLES TOTAL)
DETAIL A

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS III, GRADE 25
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN E.T. Bickeley DATE 9/25/64
CHECKED K.P. Kingsbury 21 Oct 64
APPROVAL
APPROVAL D.A. Test 11/9/64
NASA APPROVAL W J Rhine 11-12-64
MIT APPROVAL 12 Nov 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR TRAY

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008552
SCALE 4/1
WT —
SHEET 1 OF 1

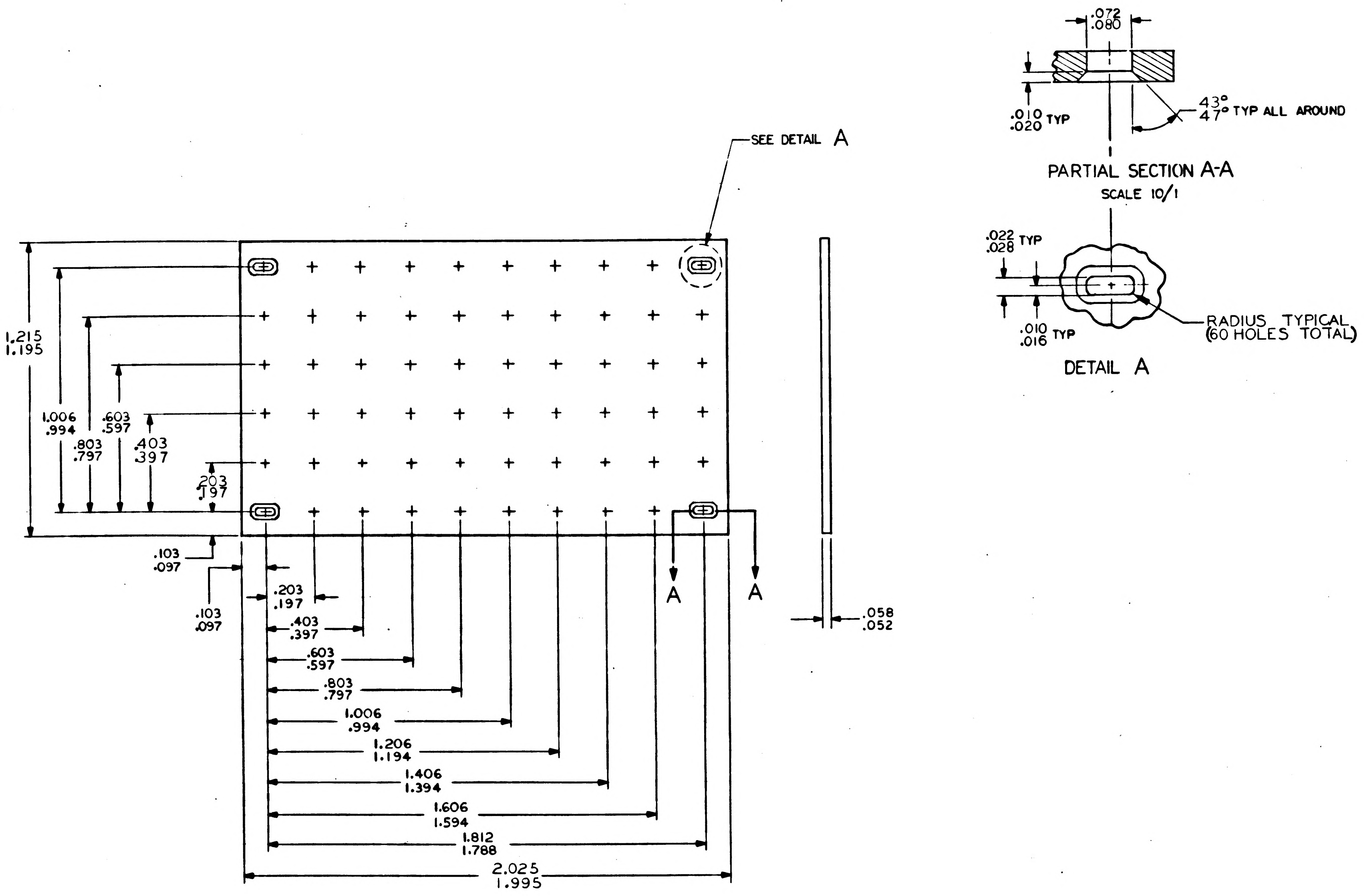
1008552 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14085

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16833	4 MAR 65	R.W.T. W.D.
B	REVISED PER TDRR 17631	24 MAR 65	DAS

Ⓜ



.072
.080
.010
.020 TYP
43°
47° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.022
.028 TYP
.010
.016 TYP
RADIUS TYPICAL
(60 HOLES TOTAL)
DETAIL A
SEE DETAIL A
1.215
1.195
1.006
.994
.803
.797
.603
.597
.403
.397
.203
.197
.103
.097
.103
.097
.203
.197
.403
.397
.603
.597
.803
.797
1.006
.994
1.206
1.194
1.406
1.394
1.606
1.594
1.812
1.788
2.025
1.995
A
A
.058
.052

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS III, GRADE 25
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS ±.005 ANGLES ± ——
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO.
CONTRACT
DRAWN E. J. Bakalar DATE 8/15/64
CHECKED R. P. Kingsbury
APPROVAL
APPROVAL 8/9/64
NASA APPROVAL W J Rhine 11-12-64
MIT APPROVAL 12 Nov 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

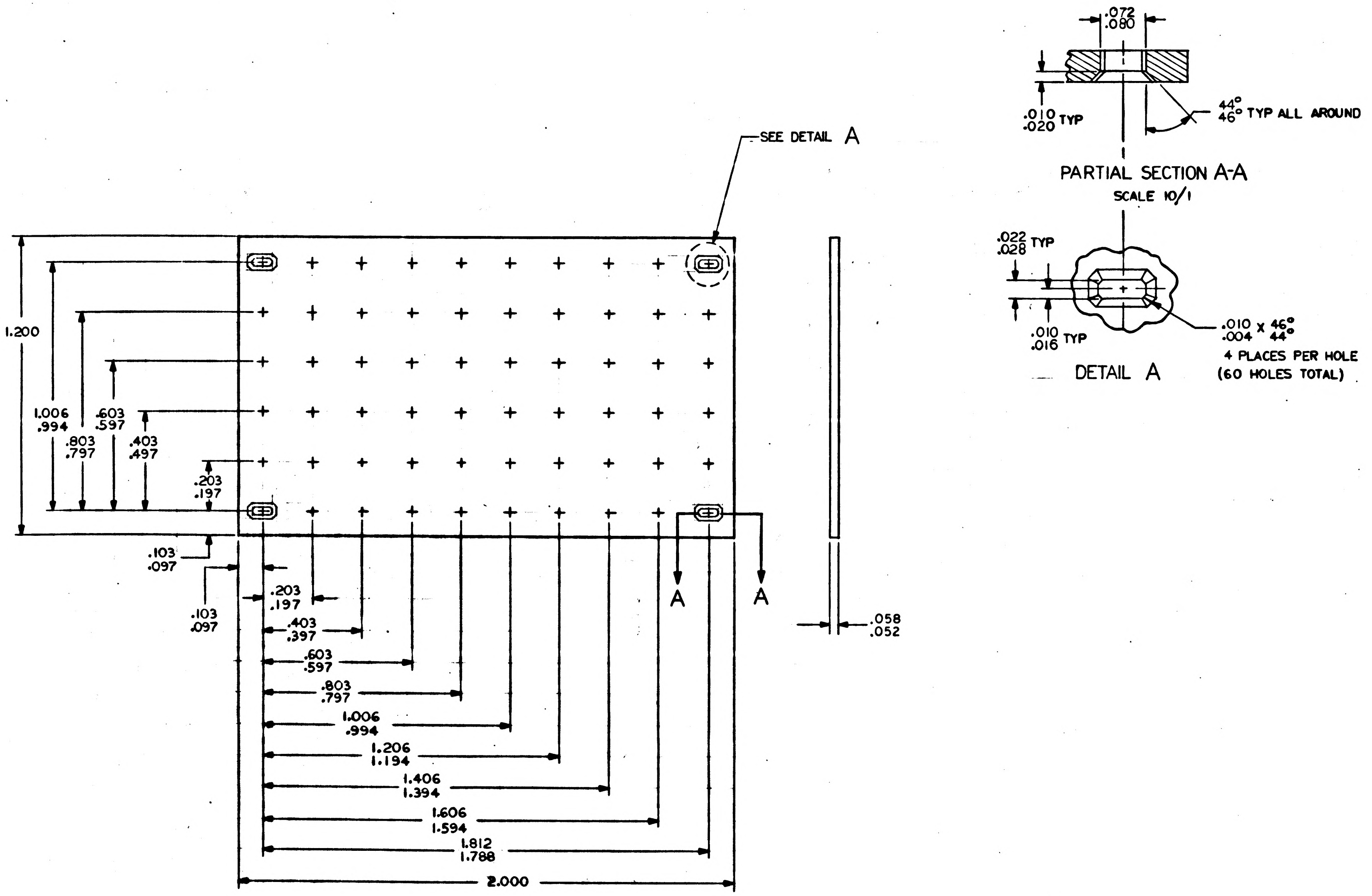
GASKET
CONNECTOR TRAY

CODE IDENT NO. ——
SIZE D
NASA DRAWING NO. 1008552
SCALE 4/1
WT ——
SHEET 1 OF 1

1008552 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14085			
SYM	DESCRIPTION	DATE	APPROVAL



.072
.080
.010
.020 TYP
44°
46° TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
.022
.028 TYP
.010
.016 TYP
DETAIL A
.010 x 46°
.004 x 44°
4 PLACES PER HOLE
(60 HOLES TOTAL)
SEE DETAIL A
1.200
1.006
.994
.803
.797
.603
.597
.403
.497
.203
.197
.103
.097
.103
.097
.203
.197
.403
.397
.603
.597
.803
.797
1.006
.994
1.206
1.194
1.406
1.394
1.606
1.594
1.812
1.788
2.000
A
A
.058
.052

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 25
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN P. J. Belcafay DATE 8/25/64
CHECKED R. P. Kingsbury 25 Aug 64
APPROVAL
APPROVAL D. A. Test 9/9/64
NASA APPROVAL W. J. Rhine 11-12-64
MIT APPROVAL 12 Nov 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR TRAY

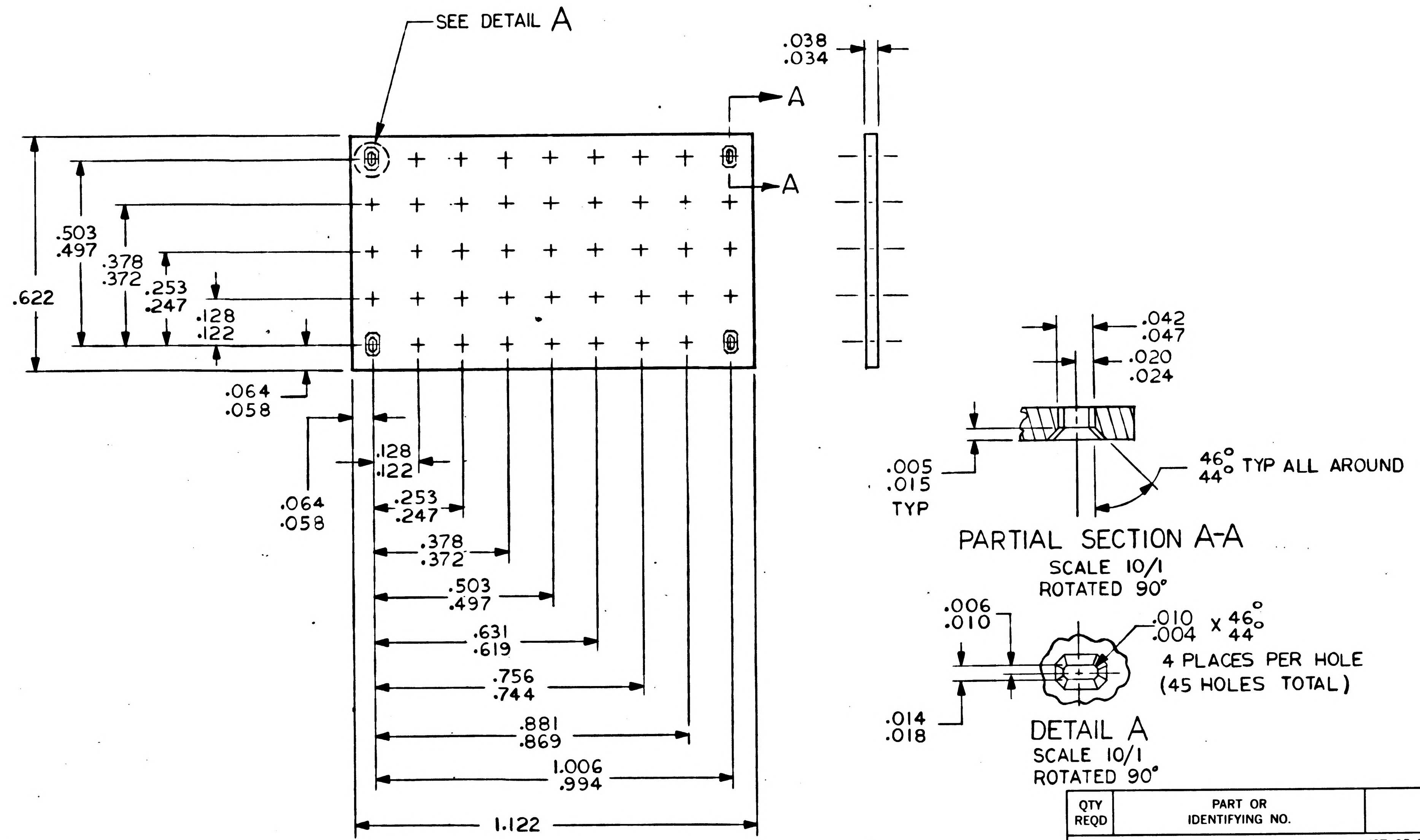
CODE IDENT NO. — SIZE D NASA DRAWING NO. 1008552
SCALE 4/1 WT — SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008553 A

REVISIONS 14085

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16829	4 MAR 65	JHR / PJ


SEE DETAIL A
A
A
.038
.034
.503
.497
.378
.372
.253
.247
.128
.122
.622
.064
.058
.064
.058
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.122
.042
.047
.020
.024
.005
.015
TYP
46°
44° TYP ALL AROUND
.006
.010
.010
.004 X 46°
44°
4 PLACES PER HOLE
(45 HOLES TOTAL)
.014
.018

PARTIAL SECTION A-A
SCALE 10/1
ROTATED 90°

DETAIL A
SCALE 10/1
ROTATED 90°

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS III, GRADE 25
3. MUST BE FREE OF MOLDING FLASH
4. IDENTIFY PER ND1002019

NEXT ASSY	USED ON
1007530	
1007539	
1007538	
1007537	
1007536	
1007535	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS ±.005 ANGLES ± ——
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN DATE 8/26/64
CHECKED
APPROVAL
APPROVAL 11/9/64
NASA APPROVAL 11-12-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINAT TRAY

CODE IDENT NO. ——
SIZE C
NASA DRAWING NO. 1008553
SCALE 4/1
WT ——
SHEET 1 OF 1

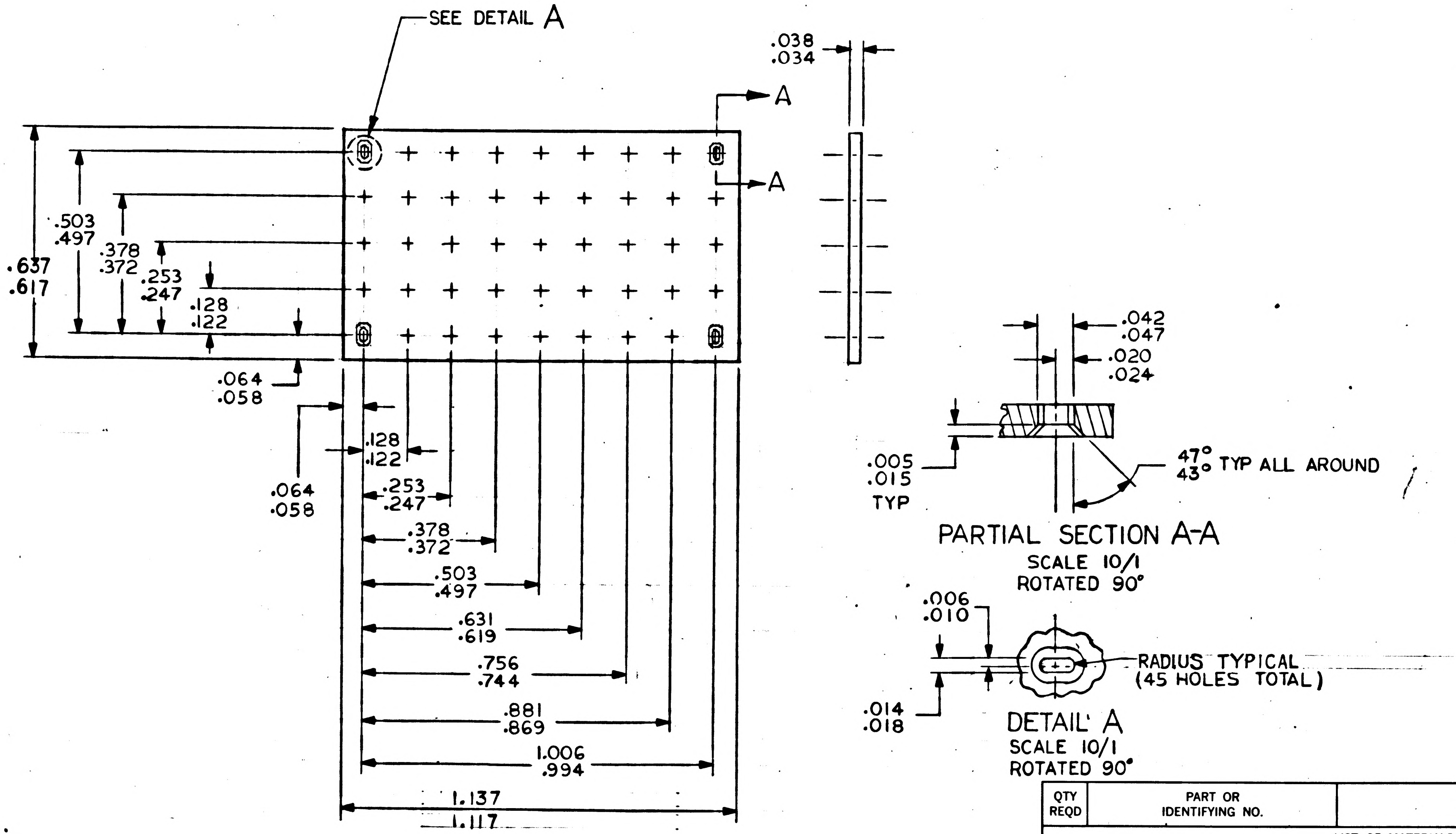
1008553 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008553 B

REVISIONS 14085

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16829	4 MAR 65	JHB PT
B	REVISED PER TDRR 17681	23 MAR 65	R.W.T. EF


SEE DETAIL A
A
A
.038
.034
.503
.497
.378
.372
.253
.247
.128
.122
.637
.617
.064
.058
.064
.058
.128
.122
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.137
1.117
.042
.047
.020
.024
.005
.015
TYP
47°
43° TYP ALL AROUND
.006
.010
.014
.018
RADIUS TYPICAL
(45 HOLES TOTAL)

PARTIAL SECTION A-A
SCALE 10/1
ROTATED 90°

DETAIL A
SCALE 10/1
ROTATED 90°

1008553

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS III, GRADE 25
3. MOLDING FLASH NOT TO EXCEED .003
4. IDENTIFY PER ND1002019

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	
1007539	
1007538	
1007537	
1007536	
1007535	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN L. J. Belkolan DATE 8/26/64
CHECKED 21 Sep 64
APPROVAL
APPROVAL D. B. Tait 11/9/64
NASA APPROVAL W J Rhine 11-12-64
MIT APPROVAL 12/4/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINAT TRAY

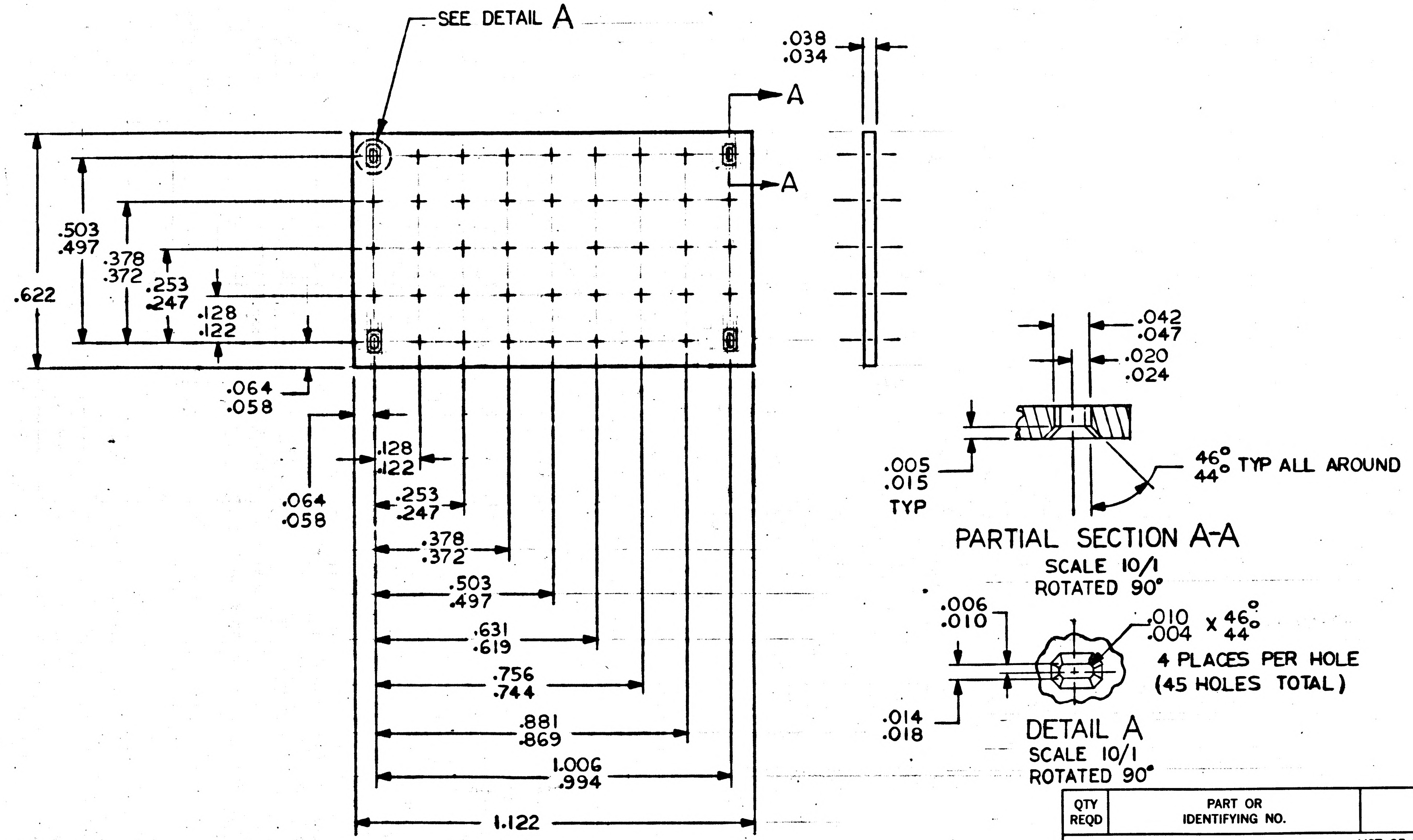
CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008553
SCALE 4/1
WT —
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008553

REVISIONS 14085

SYM	DESCRIPTION	DATE	APPROVAL


SEE DETAIL A
A
A
.038
.034
.503
.497
.378
.372
.253
.247
.128
.122
.622
.064
.058
.128
.122
.064
.058
.253
.247
.378
.372
.503
.497
.631
.619
.756
.744
.881
.869
1.006
.994
1.122
.042
.047
.020
.024
.005
.015
TYP
46°
44°
TYP ALL AROUND
PARTIAL SECTION A-A
SCALE 10/1
ROTATED 90°
.006
.010
.010
.004
X 46°
44°
4 PLACES PER HOLE
(45 HOLES TOTAL)
.014
.018
DETAIL A
SCALE 10/1
ROTATED 90°

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 25
3. MUST BE FREE OF MOLDING FLASH
4. IDENTIFY PER ND1002019

MASTER

NEXT ASSY	USED ON
1007530	
1007539	
1007538	
1007537	
1007536	
1007535	

APPLICATION

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS ±.005 ANGLES ± ——
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT ——
FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN L. J. Belgalen DATE 7/26/64
CHECKED R. P. Longsdung 21 Sep 64
APPROVAL
APPROVAL D. B. Test 11/9/64
NASA APPROVAL W J Rhine 11-12-64
MIT APPROVAL W [illegible] 12/4/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINAT TRAY

CODE IDENT NO. ——
SIZE C
NASA DRAWING NO. 1008553
SCALE 4/1
WT ——
SHEET 1 OF 1

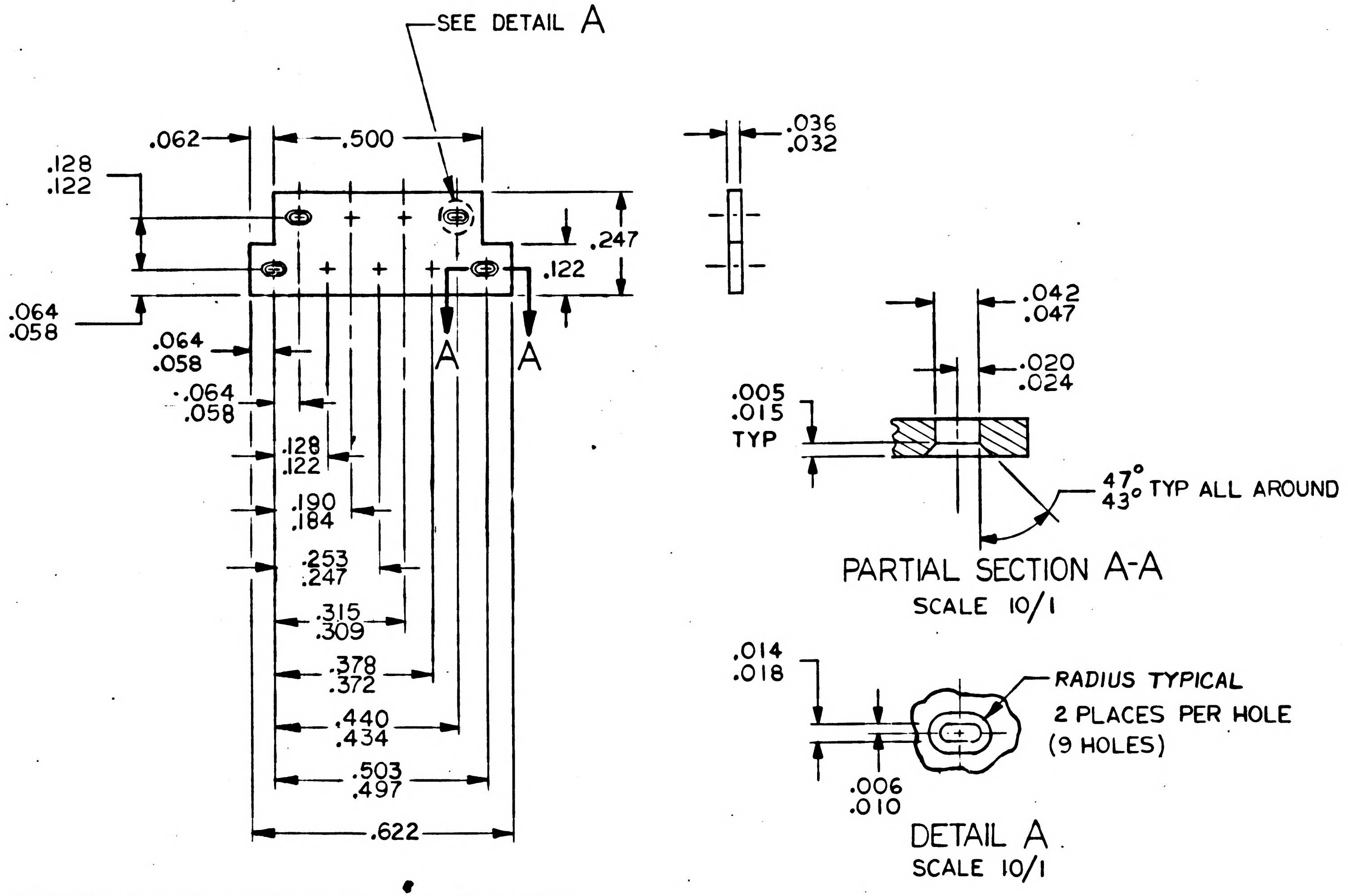
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008554 A

REVISIONS 13395

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17680	26-MAR-65	K.T. W.S.


SEE DETAIL A
.062
.500
.128
.122
.247
.122
.064
.058
.064
.058
.064
.058
.128
.122
.190
.184
.253
.247
.315
.309
.378
.372
.440
.434
.503
.497
.622
A
A
.036
.032
.042
.047
.020
.024
.005
.015
TYP
47°
43°
TYP ALL AROUND
.014
.018
RADIUS TYPICAL
2 PLACES PER HOLE
(9 HOLES)
.006
.010

PARTIAL SECTION A-A
SCALE 10/1

DETAIL A
SCALE 10/1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MOLDING FLASH NOT TO EXCEED .003.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007550	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS . ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Bakely DATE AUG 28, 1964
CHECKED R. P. Kingsbury 21 Sep 64
APPROVAL
APPROVAL A. R. Test 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL D. Nagel 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

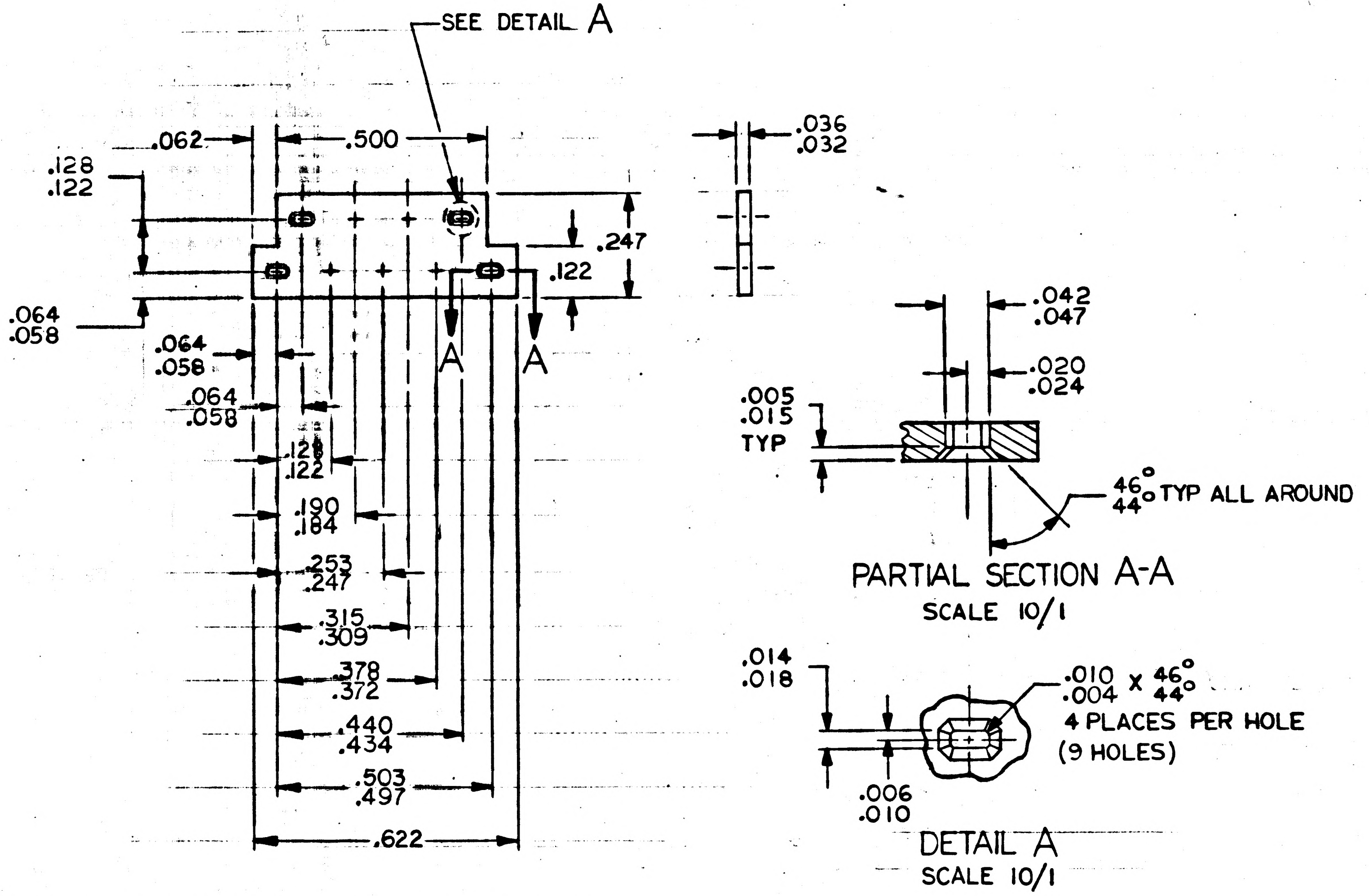
CODE IDENT NO. — SIZE C NASA DRAWING NO. 1008554
SCALE 4/1 WT — SHEET 1 OF 1

1008554

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008554

REVISIONS 13395			
SYM	DESCRIPTION	DATE	APPROVAL


SEE DETAIL A
.062
.500
.128
.122
.247
.122
.064
.058
.064
.058
.064
.058
A
A
.128
.122
.190
.184
.253
.247
.315
.309
.378
.372
.440
.434
.503
.497
.622
.036
.032
.042
.047
.020
.024
.005
.015
TYP
46°
44° TYP ALL AROUND
.014
.018
.010
.004 X 46°
44°
4 PLACES PER HOLE
(9 HOLES)
.006
.010

PARTIAL SECTION A-A
SCALE 10/1

DETAIL A
SCALE 10/1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: RUBBER PER MIL-R-5847 CLASS I, GRADE 50
3. IDENTIFY PER ND1002019
4. MUST BE FREE OF MOLDING FLASH

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

MASTER

1007550	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.005 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Bakeley DATE AUG 24, 1964
CHECKED R.P. Kingdumy 21 Sept 64
APPROVAL
APPROVAL A. R. Fost 10-8-64
NASA APPROVAL W. J. Rhine 10-14-64
MIT APPROVAL D. Nafel 10/14/64

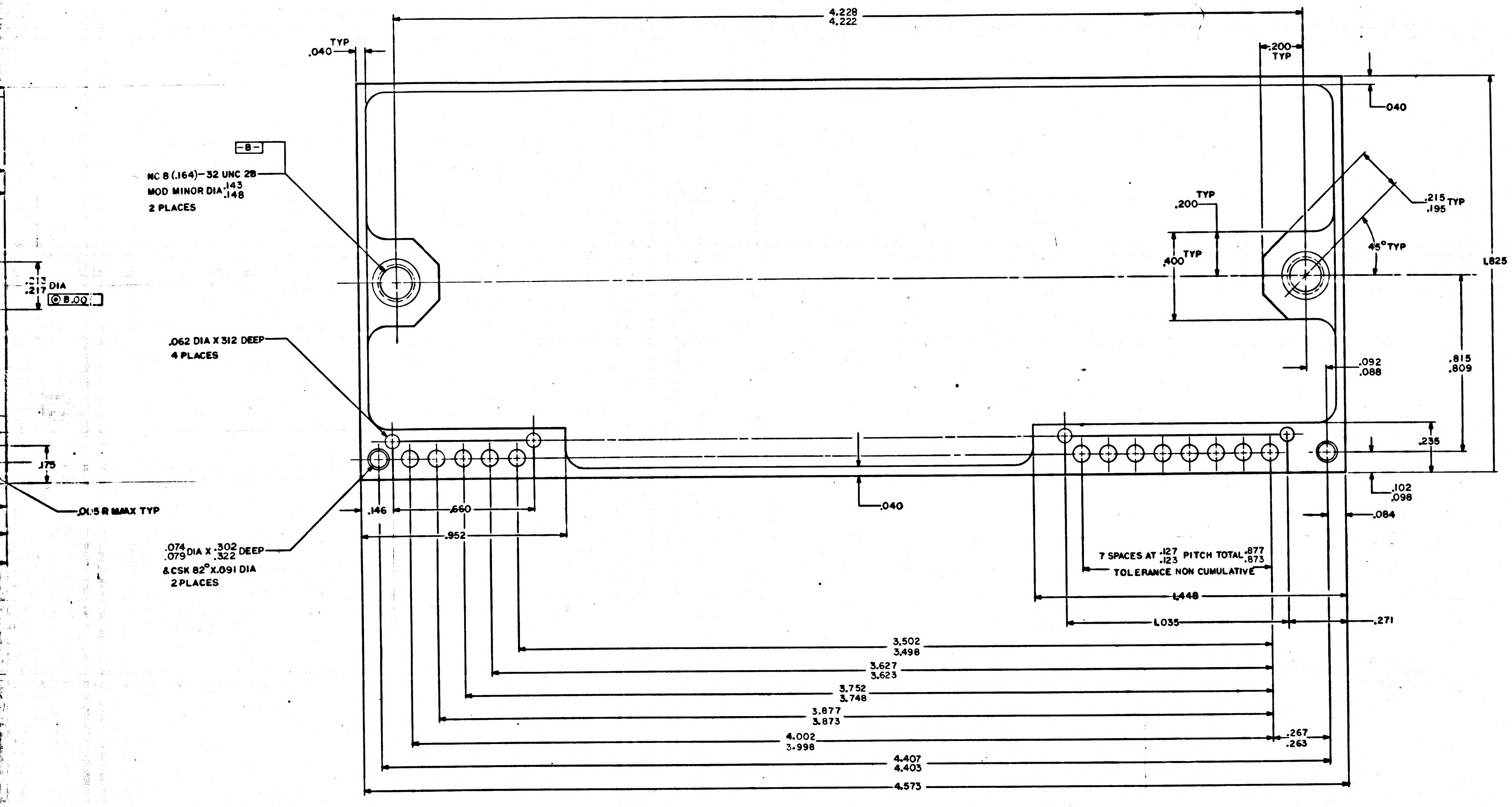
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET
CONNECTOR MINIATURE

CODE IDENT NO. —
SIZE C
NASA DRAWING NO. 1008554
SCALE 4/1
WT —
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS 14583			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15148	23 Dec 64	



4.228
4.222
.040
TYP
.200
TYP
.040
-B-
NC 8 (.164)-32 UNC 2B
MOD MINOR DIA .143 .148
2 PLACES
.213 .217 DIA
◎ B .00
.200
TYP
.400
TYP
.215 .195 TYP
45° TYP
1.825
.815
.809
.092
.088
.062 DIA X 312 DEEP
4 PLACES
.235
.175
.015 R MAX TYP
.102
.098
.040
.084
.146
.660
.952
.074 .079 DIA X .302 .322 DEEP
& CSK 82° X .091 DIA
2 PLACES
7 SPACES AT .127 .123 PITCH TOTAL .877 .873
TOLERANCE NON CUMULATIVE
1.448
1.035
.271
3.502
3.498
3.627
3.623
3.752
3.748
3.877
3.873
4.002
3.998
.267
.263
4.407
4.403
4.573

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS XX ±.02 XXX .005 ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH SEE NOTE 6

1007566	
NEXT ASSY	USED ON
APPLICATION	

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN W.F.Tracy DATE 9/24/64
CHECKED P. Lidonni 23 OCT 64
APPROVAL 2 NOV 64
APPROVAL 11-9-64
NASA APPROVAL W. J. Rhine 12-1-64
MIT APPROVAL 1 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

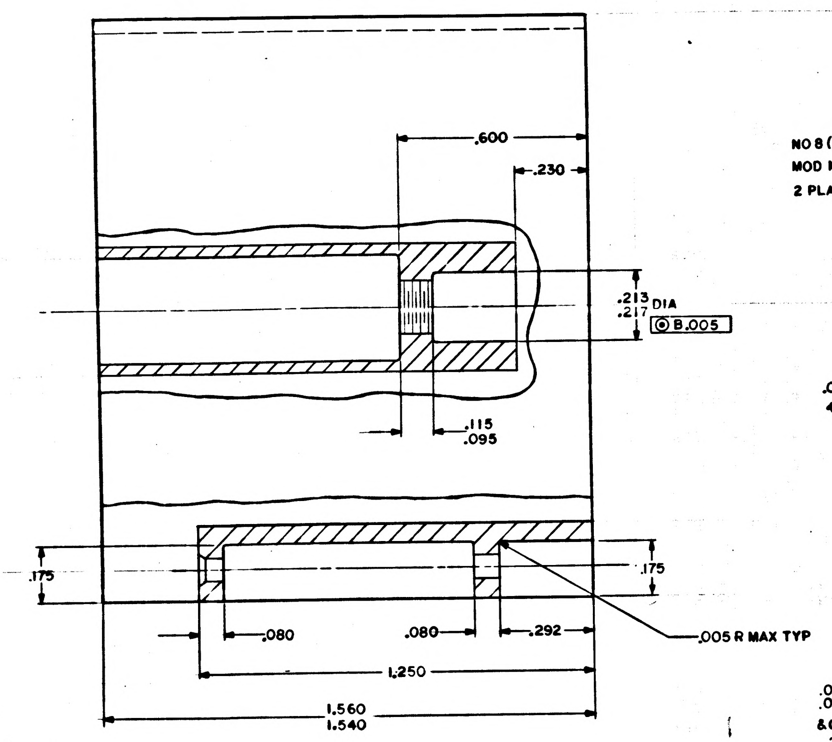
FRAME
TRACKER X CHANNEL

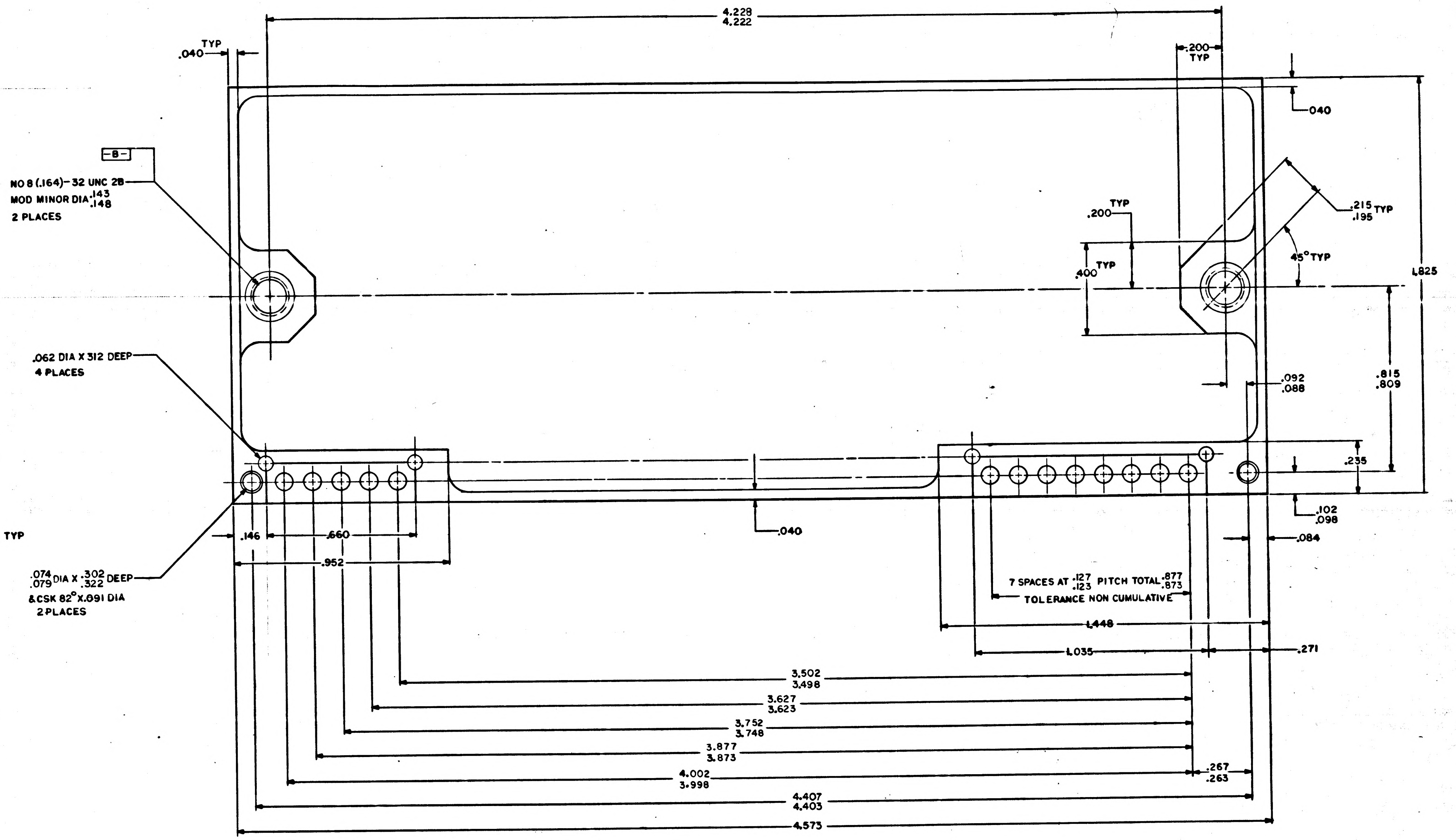
CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1008563
SCALE 5-1 | WT | SHEET 1 OF 1

1008563 A

MASTER

34


.600
.230
.213
.217
DIA
⊚ B .005
.115
.095
.175
.175
.080
.080
.292
.005 R MAX TYP
1.250
1.560
1.540


4.228
4.222
.040 TYP
.200 TYP
-B-
NO 8 (.164)-32 UNC 2B
MOD MINOR DIA .143 .148
2 PLACES
040
.200 TYP
.215 .195 TYP
.400 TYP
45° TYP
1.825
.062 DIA X 312 DEEP
4 PLACES
.092
.088
.815
.809
.235
.102
.098
.040
.084
.146
.660
.952
.074 .079 DIA X .302 .322 DEEP
& CSK 82° X .091 DIA
2 PLACES
7 SPACES AT .127 .123 PITCH TOTAL .877 .873
TOLERANCE NON CUMULATIVE
1.448
1.035
.271
3.502
3.498
3.627
3.623
3.752
3.748
3.877
3.873
4.002
3.998
.267
.263
4.407
4.403
4.573

.25 DIA
5 HOLES

⌒ .0010

MASTER

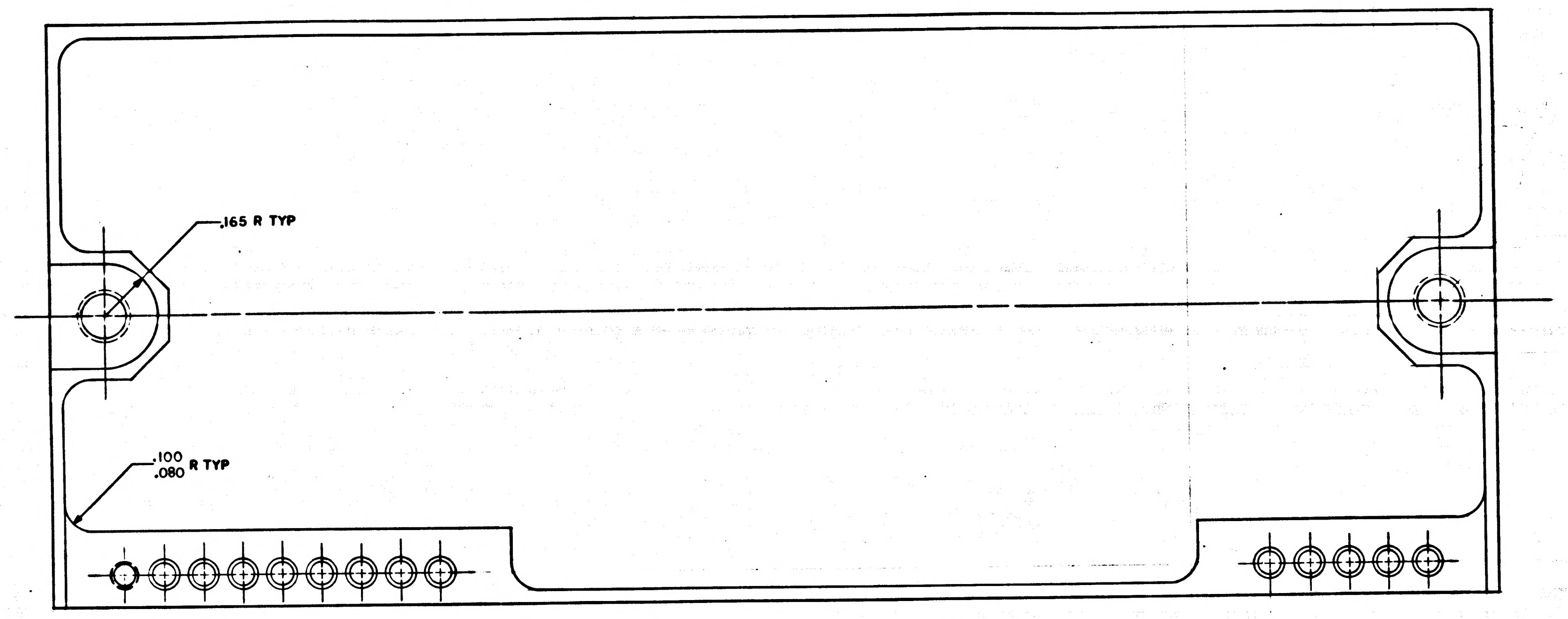
1007566		
NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ± .02 XXX .005
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT
FINAL FINISH SEE NOTE 6

QTY REQD

DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.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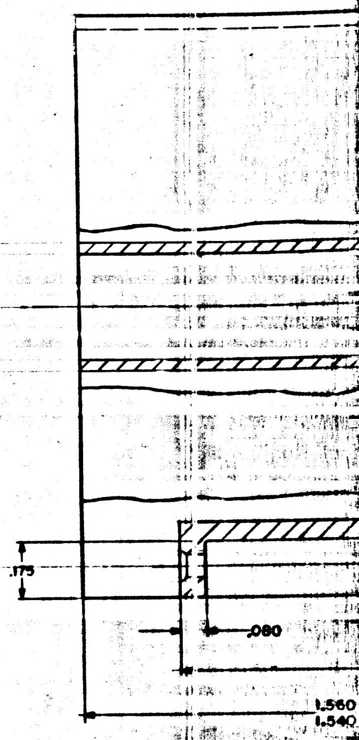
.100 .080 R TYP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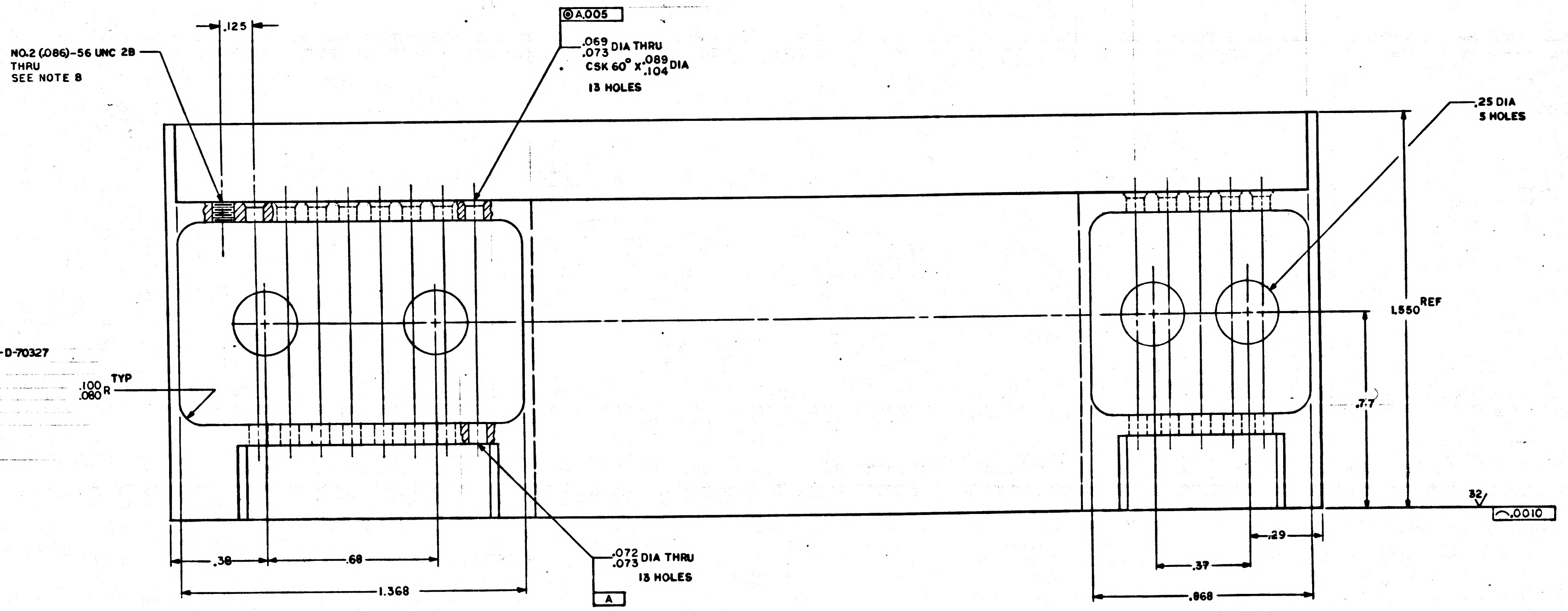
.080
1.560 1.540


.125
NO.2 (.086)-56 UNC 2B THRU SEE NOTE 8
◎ A .005
.069 .073 DIA THRU CSK 60° X .089 .104 DIA 13 HOLES
.25 DIA 5 HOLES
1.550 REF
.77
32
⌒ .0010
.100 .080 R TYP
.38
.68
1.368
.072 .073 DIA THRU 13 HOLES
A
.37
.29
.868

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5 PER QQ-M-31
3. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX
4. REMOVE ALL BURRS AND BREAK ALL SHARP EDGES .005/.015
5. UNLESS OTHERWISE SPECIFIED 125√ ALL OVER
6. FINISH: ANODIZE PER MIL-M-45202 TYPE I CLASS C
7. IDENTIFY PER ND 1002019
8. TAPPED HOLE TO BE FREE OF ANODIZE

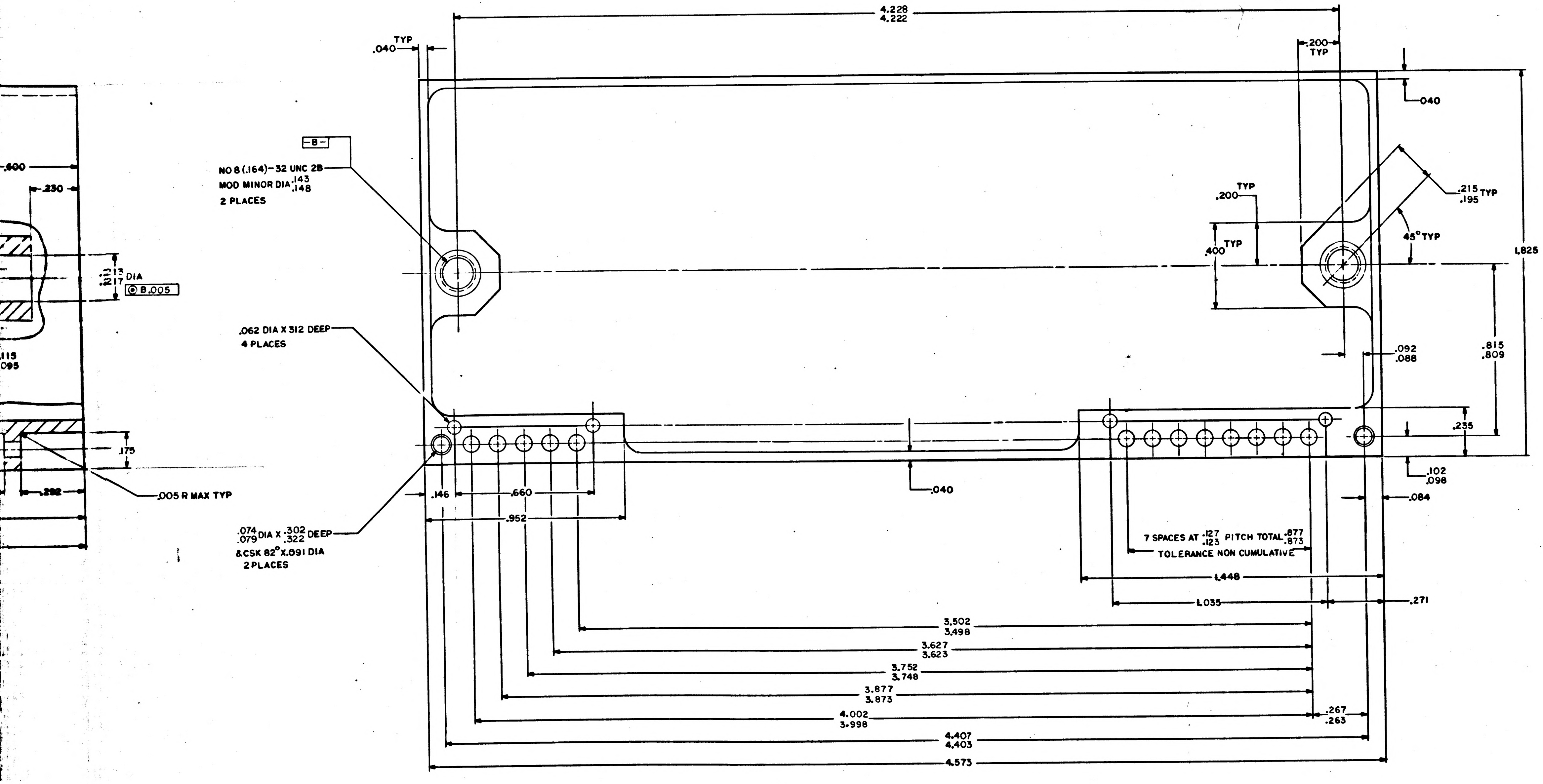
34

1008563 | A

F-1

REVISIONS 14583

SYM	DESCRIPTION	DATE	APPROVAL



.600
.230
.213
.217 DIA
◎ B .005
.115
.095
.175
.292
.005 R MAX TYP
-B-
NO 8 (.164)-32 UNC 2B
MOD MINOR DIA .143 .148
2 PLACES
.062 DIA X 312 DEEP
4 PLACES
.074 .079 DIA X .302 .322 DEEP
& CSK 82° X .091 DIA
2 PLACES
.040 TYP
4.228
4.222
.200 TYP
.040
.215 .195 TYP
45° TYP
.200 TYP
.400 TYP
1.825
.815
.809
.092
.088
.235
.102
.098
.084
.146
.660
.952
.040
7 SPACES AT .127 .123 PITCH TOTAL .877 .873
TOLERANCE NON CUMULATIVE
1.448
1.035
.271
3.502
3.498
3.627
3.623
3.752
3.748
3.877
3.873
4.002
3.998
.267
.263
4.407
4.403
4.573

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007566	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ± .02 XXX .005 ANGLES ± 1/2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
———

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

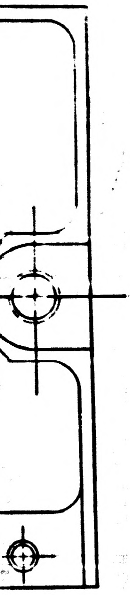
DRAWN NJ Tonge DATE 9/24/64
CHECKED R. Lindsay 23 OCT 64
APPROVAL 2 NOV 64
APPROVAL 11-9-64
NASA APPROVAL W.J. Rhine 12-7-64
MIT APPROVAL

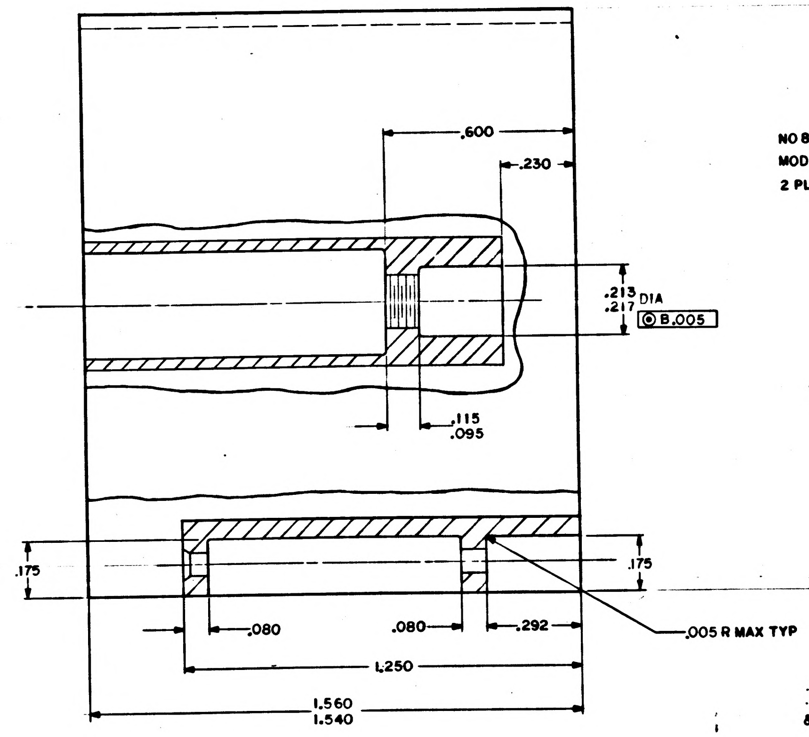
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

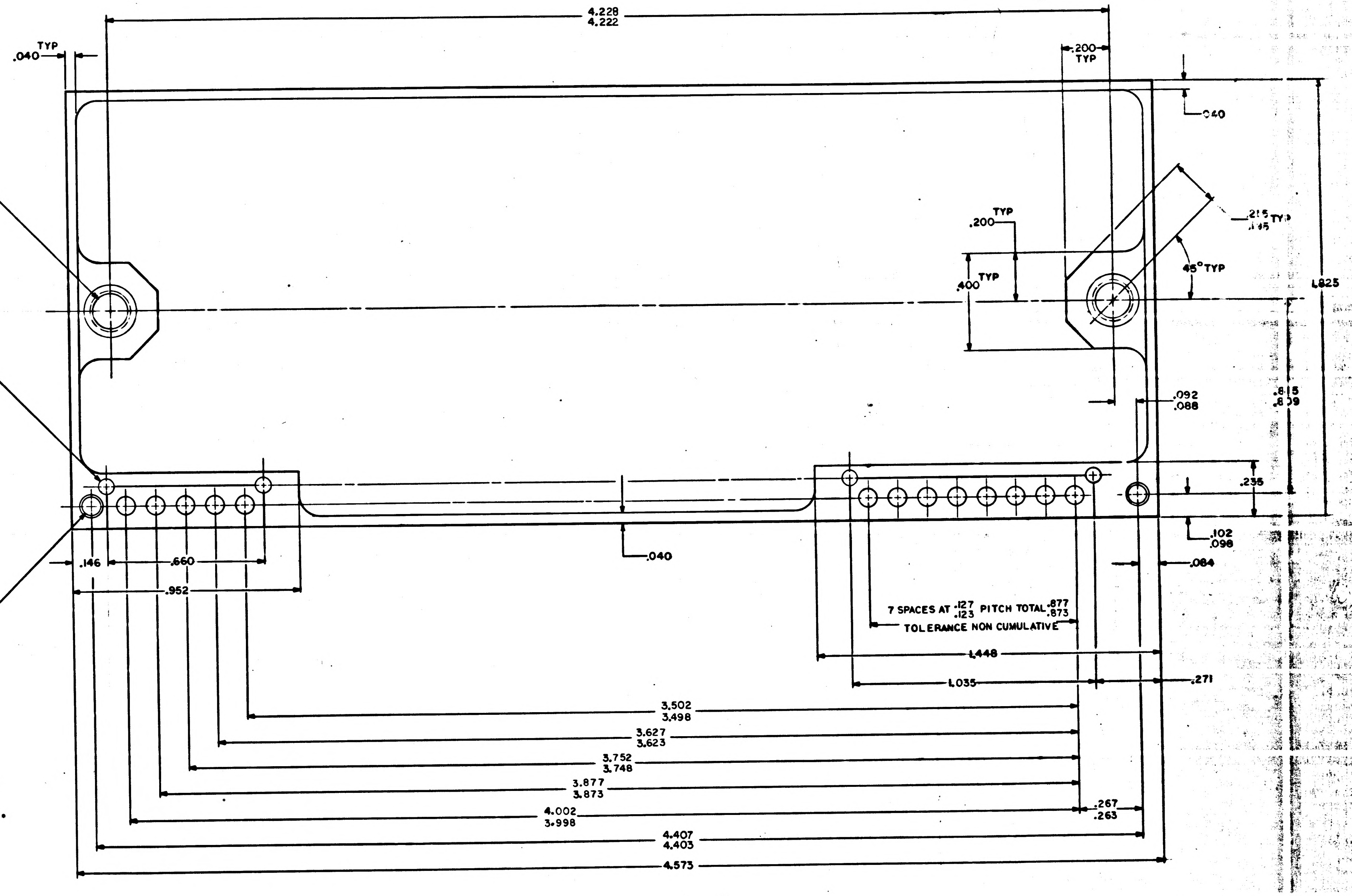
FRAME
TRACKER X CHANNEL

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1008563
SCALE 5-1
WT
SHEET 1 OF 1

㉞




.600
.230
.213
.217 DIA
◎ B .005
.115
.095
.175
.175
.080
.080
.292
1.250
1.560
1.540
.005 R MAX TYP


4.228
4.222
TYP
.040
.200
TYP
.040
-B-
NO 8 (.164)-32 UNC 2B
MOD MINOR DIA .143 .148
2 PLACES
.215 .145 TYP
TYP
.200
45° TYP
.400 TYP
1.825
.062 DIA X .312 DEEP
4 PLACES
.092
.088
.815
.809
.235
.102
.098
.074 .079 DIA X .302 .322 DEEP
& CSK 82° X .091 DIA
2 PLACES
.146
.660
.952
.040
.084
7 SPACES AT .127 .123 PITCH TOTAL .877 .873
TOLERANCE NON CUMULATIVE
1.448
1.035
.271
3.502
3.498
3.627
3.623
3.752
3.748
3.877
3.873
4.002
3.998
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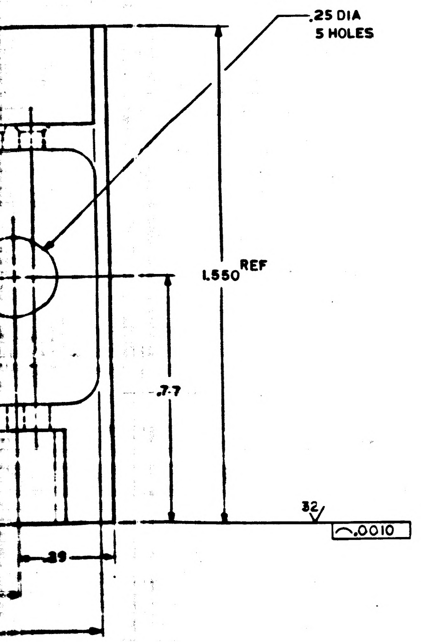
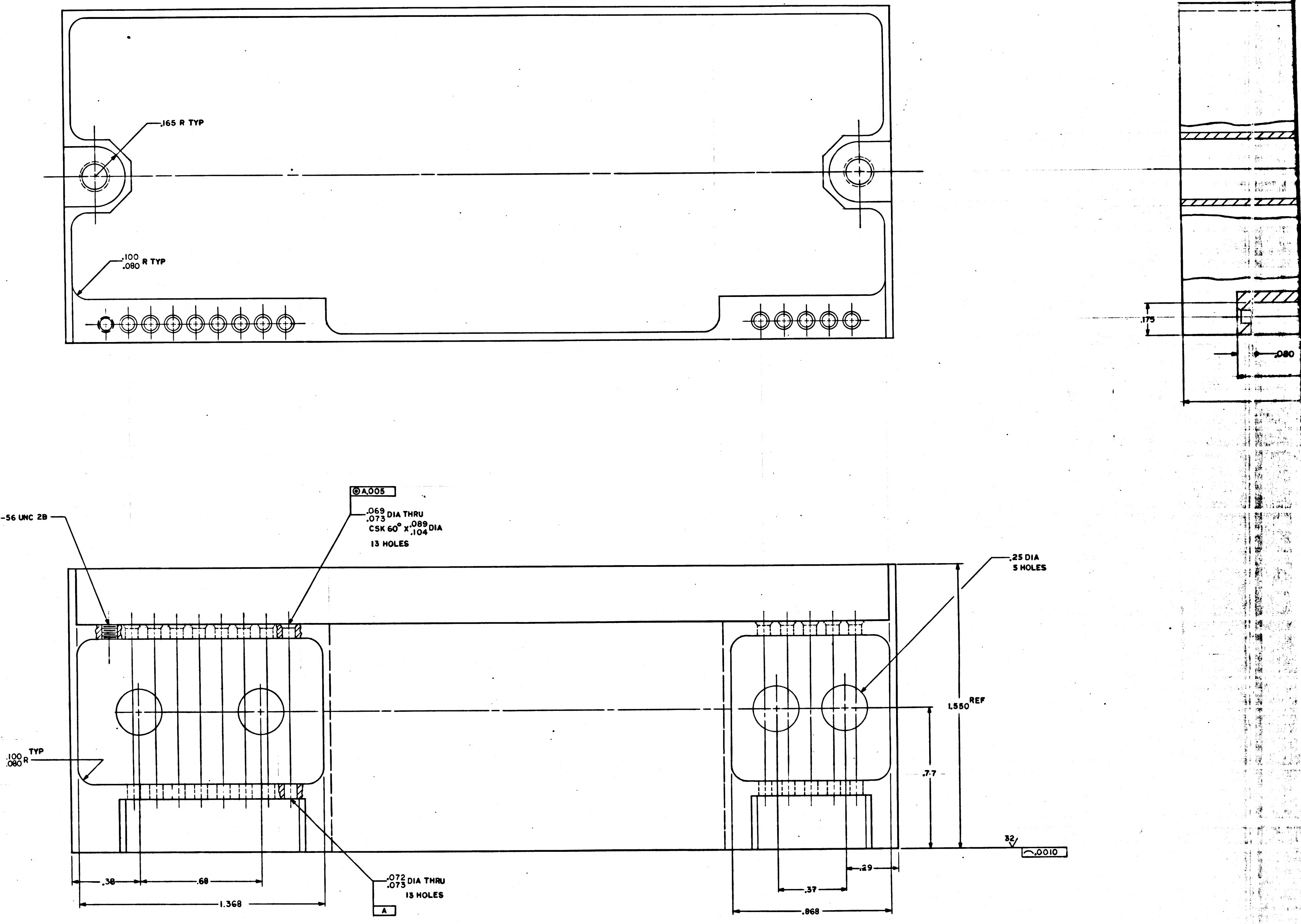
.263
4.407
4.403
4.573


.25 DIA
5 HOLES
1.550 REF
.77
.29
32
⌒.0010

MASTER

100?566

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


.165 R TYP
.100 .080 R TYP
.175
.080
⊚ A .005
NO.2 (.086)-56 UNC 2B THRU
.069 .073 DIA THRU
CSK 60° X .089 .104 DIA
13 HOLES
.25 DIA
5 HOLES
1.550 REF
.7.7
32
⌒.0010
.100 .080 R TYP
.38
.68
1.368
.072 .073 DIA THRU
13 HOLES
A
.37
.29
.868

NOTES:

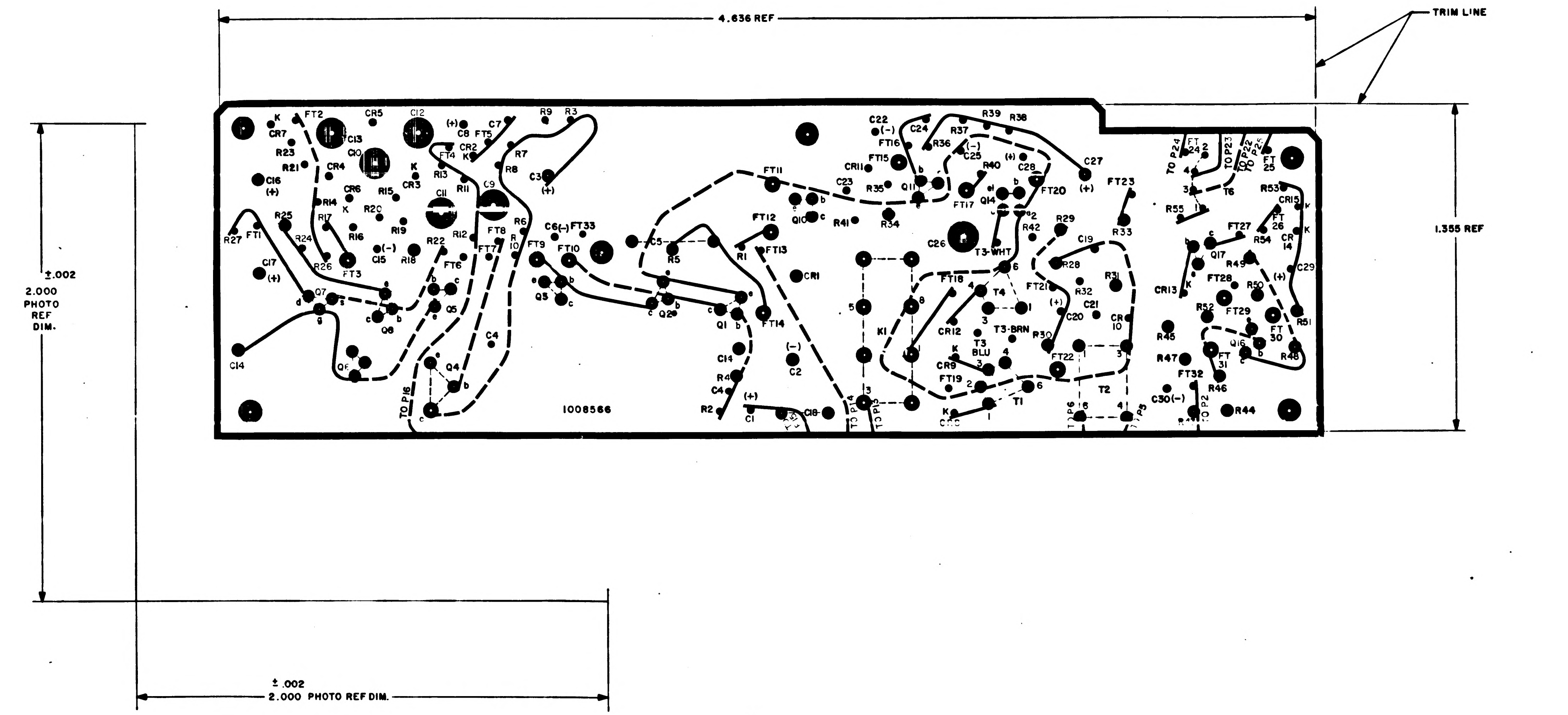
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5 PER QQ-M-31
3. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX
4. REMOVE ALL BURRS AND BREAK ALL SHARP EDGES .005/.015
5. UNLESS OTHERWISE SPECIFIED 125/ ALL OVER
6. FINISH: ANODIZE PER MIL-M-45202 TYPE I CLASS C
7. IDENTIFY PER ND 1002019

34

1008563

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 10796						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REPLACED WITH CHANGE BY REV. B PER TDRR 19777	A.N.		10 JUN 65	



TRIM LINE
4.636 REF
1.355 REF
±.002
2.000
PHOTO
REF
DIM.
±.002
2.000 PHOTO REF DIM.
1008566
FT1
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FT32
FT33
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CR15
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C30
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Q10
Q11
Q14
Q16
Q17
T1
T2
T3-WHT
T3-BRN
T3 BLU
T4
T6
K1
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R2
R3
R4
R5
R6
R7
R8
R9
R11
R12
R13
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R51
R52
R53
R54
R55
TO P16
TO P13
TO P24
TO P23
TO P22
TO P2
(+)
(-)

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIMLINE.
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

Ⓐ REPLACED WITH CHANGE BY REV B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Horgan 9-30-64
CHECKED
APPROVED Rumor 1 Dec 64
APPROVED D.B. Test 12/14/64
APPROVED MIT 15 Dec 64
APPROVED MSC W J Rhine 12-15-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

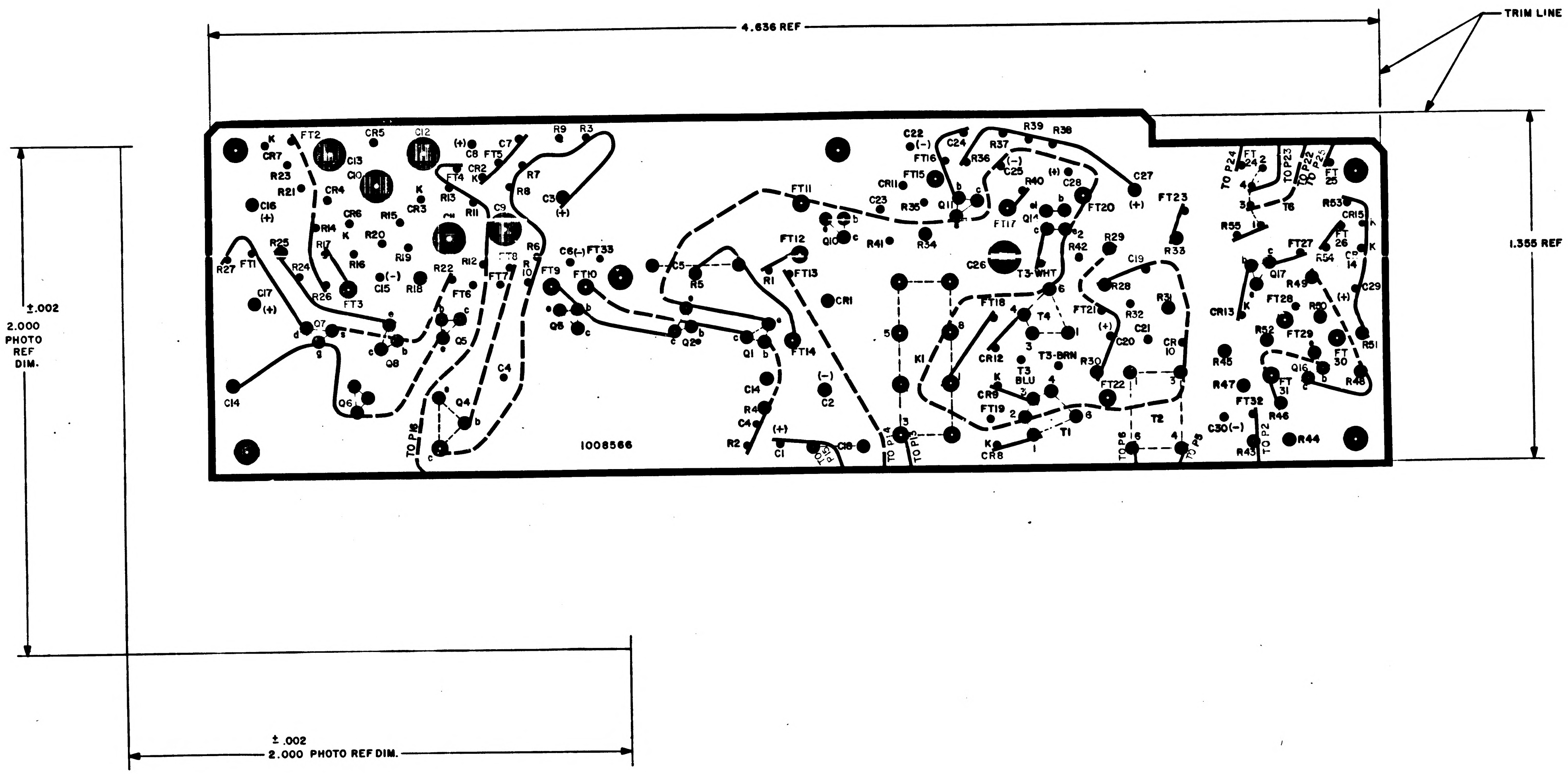
PHOTOGRAPHIC MASTER
WIRING BOARD TOP
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008564
SCALE 5/1
SHEET 1 OF 1

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14796

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIMLINE.
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Horgan 10-20-64
CHECKED R. Kingsbury
APPROVED Rinner 11 Dec 64
APPROVED D. A. Fist 12/14/64
APPROVED MIT W. Kupfer 15 Dec 64
APPROVED MSC W. J. Blair 12-15-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER WIRING BOARD TOP
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008564
SCALE 5/1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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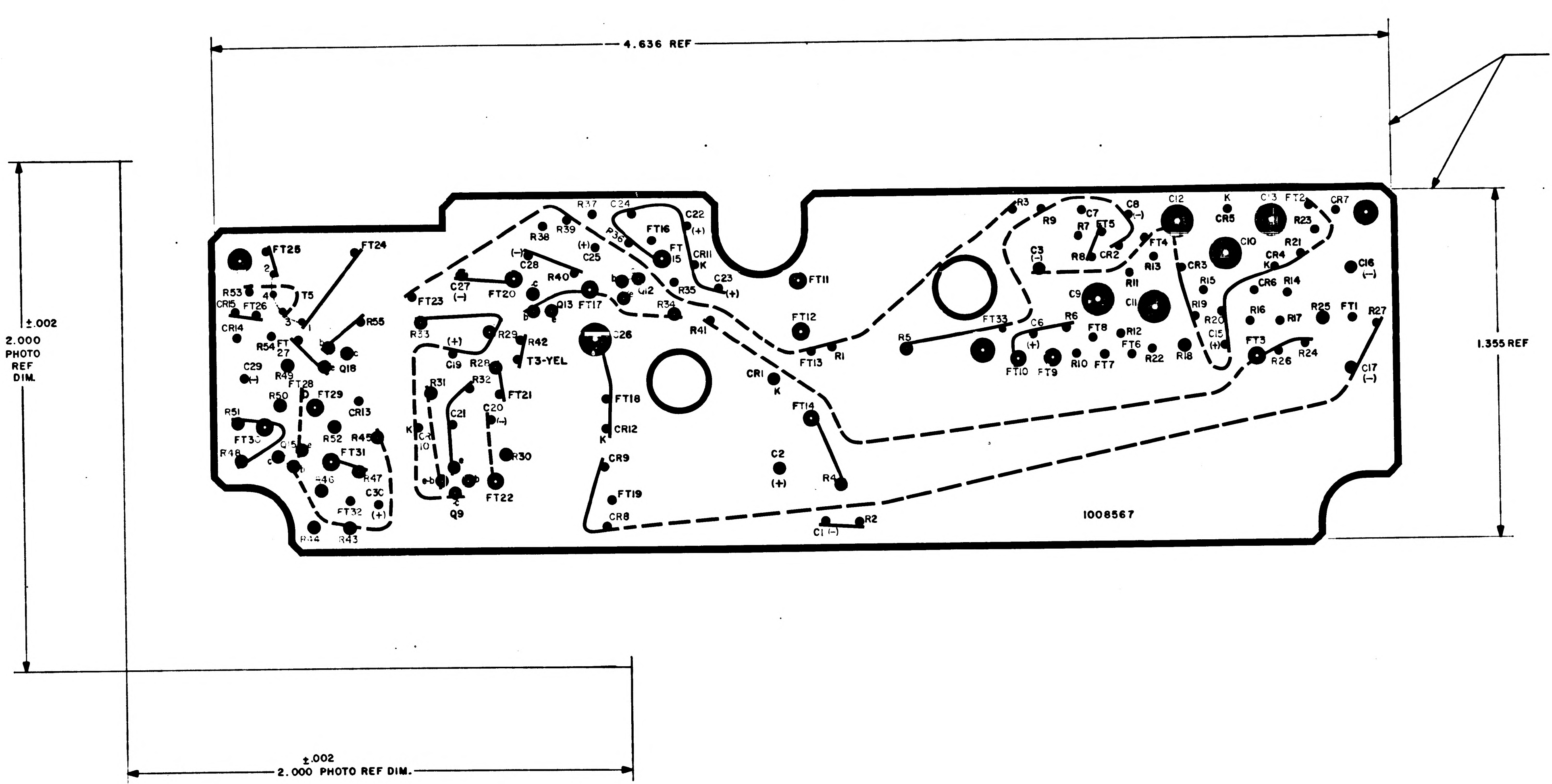

4.636 REF
TRIM LINE
1.355 REF
±.002
2.000
PHOTO
REF
DIM.
±.002
2.000 PHOTO REF DIM.
1008567
FT25
FT24
R53
CR15
FT26
T5
CR14
R54
FT 27
C29 (–)
R49
Q18
R55
FT28
R50
FT29
CR13
R51
FT30
R48
Q15
R52
R45
FT31
R46
R47
C30 (+)
FT32
R44
R43
FT23
C27 (–)
FT20
C28 (–)
R38
R39
R37
C24
(+) C25
R36
FT16
FT 15
C22 (+)
CR11
K
R40
Q13
FT17
Q12
R35
C23 (+)
R34
R33
(+)
R29
R42
T3-YEL
C19
R28
R31
R32
FT21
C21
C20 (–)
CR 10
K
R30
Q9
FT22
C26
FT18
CR12
K
CR9
FT19
CR8
R41
CR1
K
FT11
FT12
FT13
R1
FT14
C2 (+)
R4
C1 (–)
R2
R5
FT33
R3
R9
C7
R7
FT5
C8 (–)
C3 (–)
R8
CR2
FT4
R11
R13
C12
CR3
K
CR5
C13
FT2
CR7
R23
C10
R21
CR4
K
C16 (–)
C9
C11
R15
CR6
R14
R19
R20
C15 (+)
R16
R17
R25
FT1
R27
C6 (+)
R6
FT8
R12
FT6
FT10
FT9
R10
FT7
R22
R18
FT3
R26
R24
C17 (–)

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

Ⓐ REPLACED WITH CHANGE BY REV B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN W. Horgan 9-30-64
CHECKED 11 DEC 64
APPROVED 11 DEC 64
APPROVED
APPROVED MIT W Kupfer 15 Dec 64
APPROVED MSC W J 12-15-64
DATE

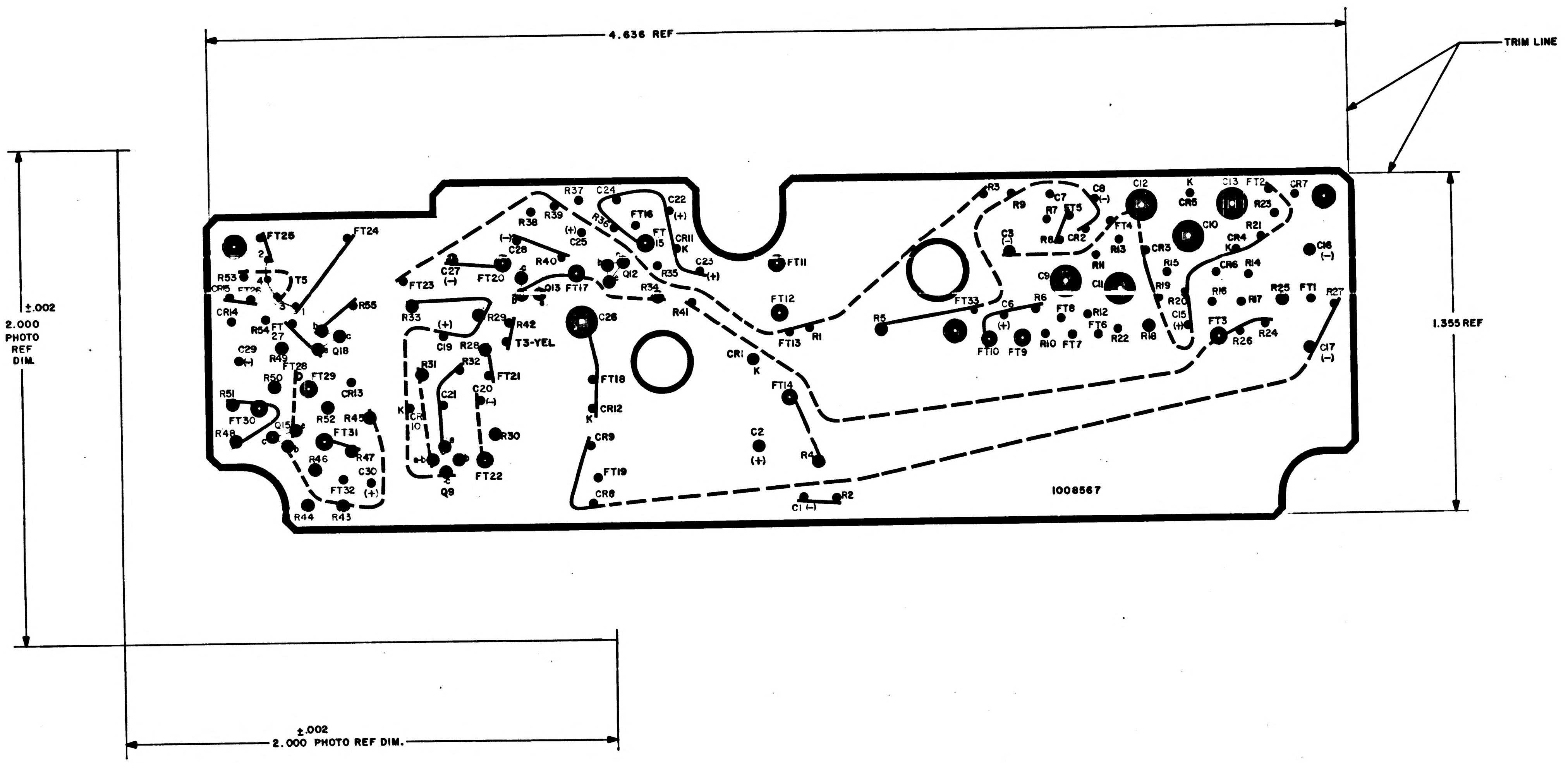
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD BOTTOM
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008565
SCALE 5/1
SHEET 1 OF 1

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


4.636 REF
TRIM LINE
1.355 REF
±.002
2.000
PHOTO
REF
DIM.
±.002
2.000 PHOTO REF DIM.
1008567
FT25
FT24
2
4
3
1
T5
R53
CR15
FT26
CR14
R54
FT
27
C29
(-)
R49
FT28
R50
FT29
CR13
R51
FT30
R48
Q15
R52
R45
FT31
R46
R47
C30
(+)
FT32
R44
R43
R55
Q18
FT23
C27
(-)
FT20
R33
R29
(+)
C19
R28
R42
T3-YEL
R31
R32
FT21
C21
C20
(-)
CR
10
K
R30
Q9
FT22
R37
C24
C22
(+)
R38
R39
R36
FT16
(+)
C25
(-)
C28
R40
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K
C23
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Q12
R35
Q13
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R34
R41
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FT18
CR12
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CR9
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CR8
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R1
CR1
K
FT14
C2
(+)
R4
C1 (-)
R2
R3
R9
C7
R7
FT5
C8
(-)
R8
CR2
C3
(-)
FT4
R13
R11
C12
K
CR5
C13
FT2
R23
CR7
C10
R21
CR4
K
C16
(-)
CR3
R15
CR6
R14
C9
C11
R19
R16
R17
R25
FT1
R27
R20
R5
FT33
C6
(+)
R6
FT8
R12
FT6
C15
(+)
FT3
R26
R24
FT10
FT9
R10
FT7
R22
R18
C17
(-)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				

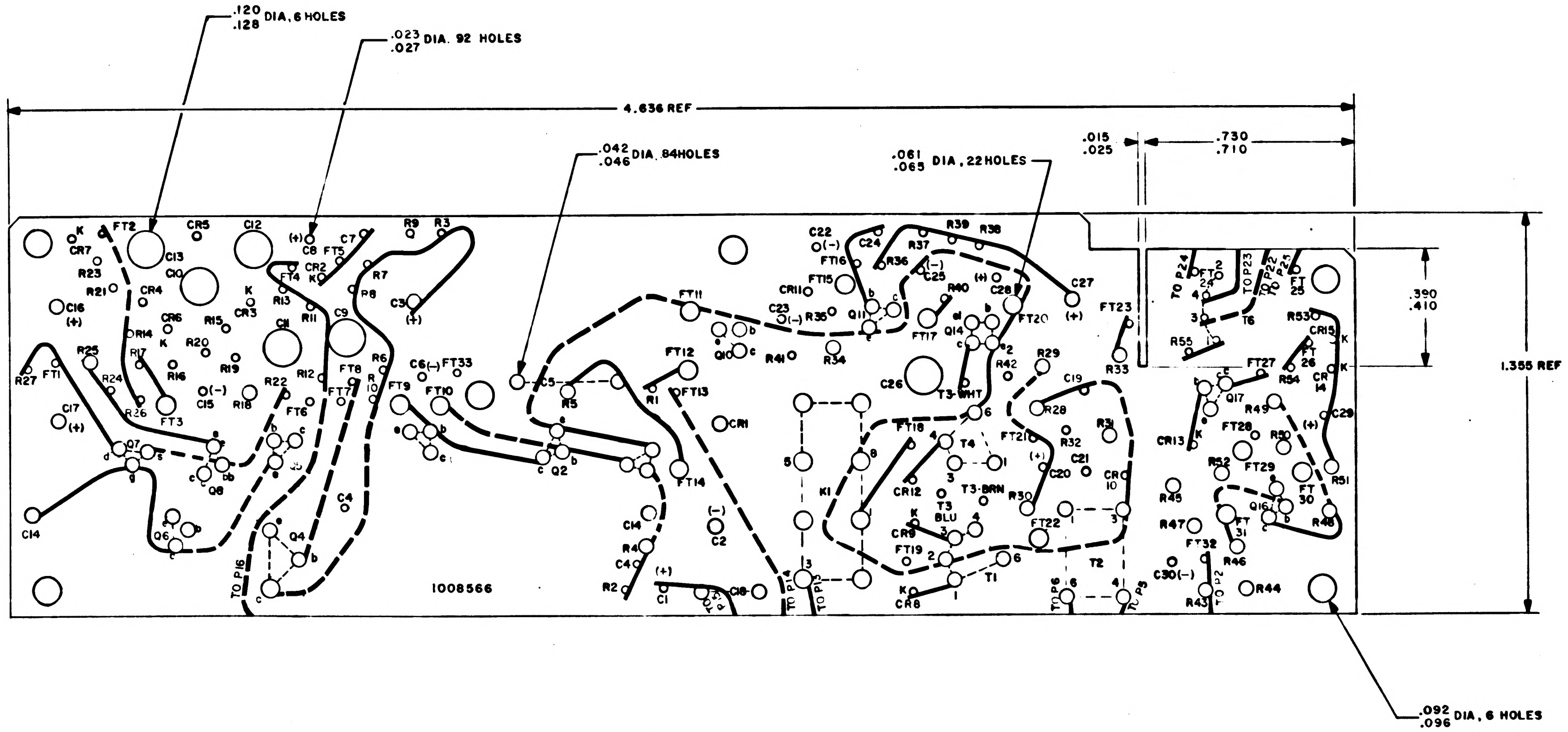
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES CAPACITOR VALUES ARE IN μf RESISTOR VALUES ARE IN OHMS TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL —	DRAWN W. Horgan 9-30-64 CHECKED R. Kingsley 1 DEC 64 APPROVED R. Huber 11 DEC 64 APPROVED D. A. Fast 12/4/64	PHOTOGRAPHIC MASTER WIRING BOARD BOTTOM PHOTOMETER ELECTRONICS
			APPROVED MIT W. Kupfer 15 Dec 64 APPROVED MSC W. J. Robins 12-1-64 DATE	CODE IDENT NO. — SIZE E DRAWING NO. 1008565 SCALE 5/1 SHEET 1 OF 1

1008565

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 11776

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REPLACED WITH CHANGE BY REV. B PER TDRR 19777			65	



.120 .128 DIA, 6 HOLES
.023 .027 DIA. 92 HOLES
4.636 REF
.042 .046 DIA. 84HOLES
.061 .065 DIA, 22 HOLES
.015 .025
.730 .710
.390 .410
1.355 REF
.092 .096 DIA, 6 HOLES
1008566
FT2
CR5
C12
C13
C10
CR7
R23
R21
CR4
C16 (+)
CR6
R15
CR3
C11
C9
R14
R17
K
R20
R19
R16
R25
R24
R27
FT1
R26
FT3
C15 (-)
R18
R22
C17 (+)
Q7
Q8
Q6
C14
(+) C8
C7
FT5
CR2
FT4
R13
R11
R12
FT6
FT7
FT8
R9
R3
R7
P8
C3 (+)
R6
R10
C4
Q4
TO P16
C6(-)
FT33
FT9
FT10
C5
R5
Q2
R1
FT13
FT12
FT11
FT14
CR1
C2 (-)
R4
C4
R2
C1 (+)
C18
TO P14
TO P13
TO P15
K1
Q10
R41
R34
C22 (-)
FT16
FT15
CR11
C23 (-)
R35
Q11
C24
R36
R37
R39
R38
C25 (-)
R40
C28
(+)
FT17
Q14
FT20
C27 (+)
C26
T3-WHT
R42
R29
FT18
T4
T3-BRN
T3 BLU
CR12
CR9
FT19
CR8
T1
FT21
R28
C19
R32
C21
C20 (+)
R31
R30
FT22
CR10
T2
TO P6
TO P5
R33
FT23
TO P24
FT 24
TO P23
TO P22
TO P25
FT 25
T6
R55
R53
CR15
FT 26
CR 14
FT27
R54
Q17
CR13
R49
C29 (+)
FT28
R50
R52
FT29
R45
R47
FT 30
R51
Q16
FT 31
R48
R46
FT32
C30(-)
R43
TO P2
R44

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL P 18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

REF DRAWING

DWG NO. 1008564 PHOTOGRAPHIC MASTER

Ⓐ REPLACED WITH CHANGE BY REV B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007559	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Morgan
CHECKED
APPROVED 11 Dec 64
APPROVED 12/14/64
APPROVED MIT
APPROVED MSC 12-15-64
DATE

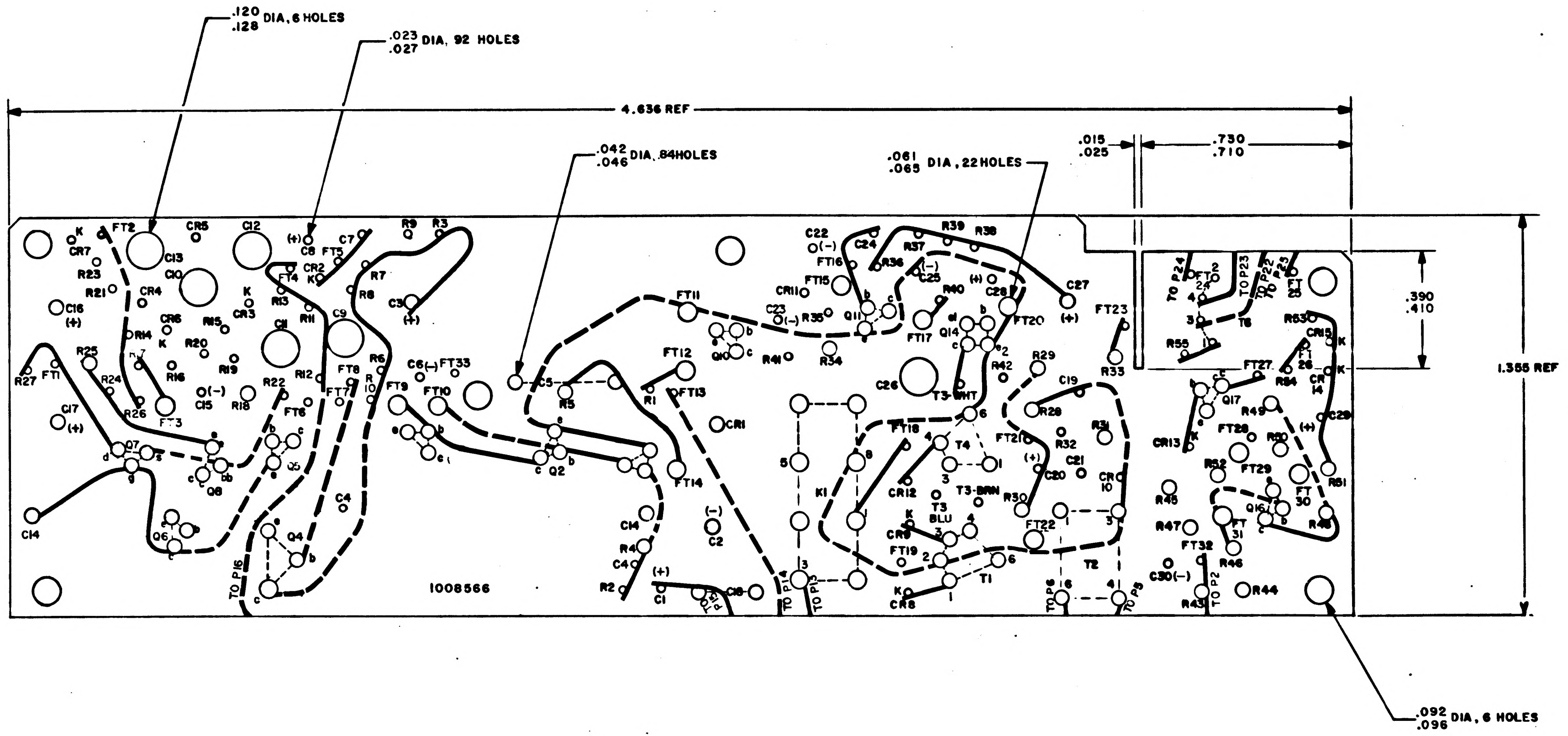
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD TOP
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008566
SCALE 5:1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS					
SYM	ZONE	DESCRIPTION	DR	CHK	DATE APPROVED



.120 .128 DIA, 6 HOLES
.023 .027 DIA, 92 HOLES
4.636 REF
.042 .046 DIA, 84HOLES
.061 .065 DIA, 22 HOLES
.015 .025
.730 .710
.390 .410
1.355 REF
.092 .096 DIA, 6 HOLES
1008566
K CR7 FT2 CR5 C12 (+) C8 FT5 C7 R9 R3
R23 C13 C10 CR2 K FT4 R7
R21 CR4 K CR3 R13 R8 C3 (+)
C16 (+) CR6 R15 R11 C9 C11
R14 K R20 R19
R25 R17 R16 R12 FT8 R6 C6(−) FT33
R27 FT1 R24 R26 FT3 C15 (−) R18 R22 FT7 R 10 FT9 FT10 C5 R5
C17 (+) FT6
Q7 d s g Q8 e c bb Q5 b c e Q2 b c e
C14 Q6 e b c C4 Q4 e b c TO P16
C22 (−) C24 R39 R38 R37 FT16 R36 (−) C25 (+) C28 C27 (+)
FT15 CR11 R40 FT20 FT23
C23 (−) R35 Q11 b c e FT17 Q14 d b c e2
FT11 Q10 b c e R41 R34 R42 R29 R33 R55
FT12 R1 FT13 CR1 C26 T3-WHT C19 R28
FT18 4 T4 1 3 6 8 FT21 (+) C20 C21 R32 R31 CR13
K1 5 CR12 T3-BRN T3 BLU R30 CR 10
FT14 C14 (−) C2 R4 C4 (+) C1 TO P15 C18 R2
K CR9 FT19 2 3 4 6 T1 FT22 T2 1 3 6 4
TO P14 TO P13 K CR8 TO P6 TO P5
TO P24 FT 24 2 4 3 TO P23 TO P22 TO P25 FT 25 T6 1
R53 CR15 K FT 26 FT27 R54 CR 14 K
Q17 b c e R49 C29 (+) FT28 R50
K R52 FT29 R51 FT 30 R45 Q16 e b c R48 R47 FT 31
FT32 R46 C30(−) TO P2 R43 R44

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL P 18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

REF DRAWING

DWG NO. 1008564 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007559	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN
CHECKED 11 Dec 64
APPROVED 11 Dec 64
APPROVED
APPROVED MIT
APPROVED MSC 12-15 64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

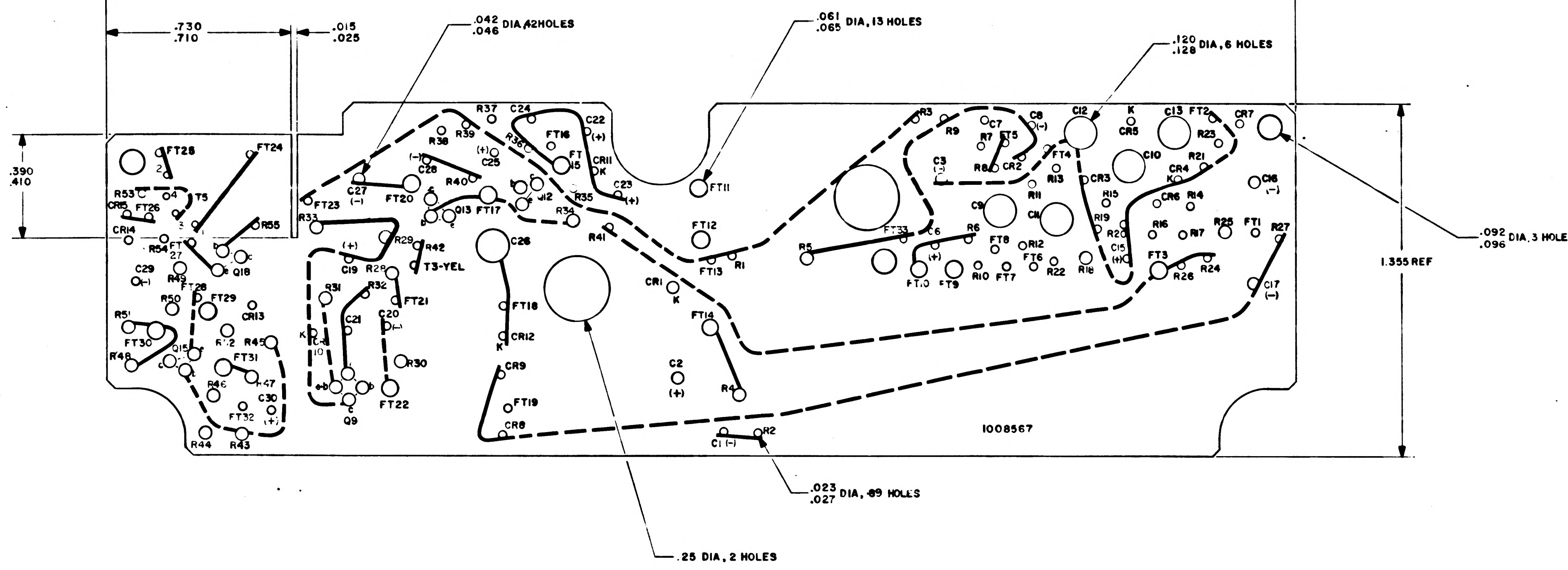
WIRING BOARD TOP
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008566
SCALE 2:1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REPLACED WITH CHANGE BY REV. B PER TDRR 19777	4 N			


4.636 REF
.730
.710
.015
.025
.042
.046 DIA, 42 HOLES
.061
.065 DIA, 13 HOLES
.120
.128 DIA, 6 HOLES
.092
.096 DIA, 3 HOLES
.390
.410
1.355 REF
.023
.027 DIA, 89 HOLES
.25 DIA, 2 HOLES
1008567
FT28
FT24
R53
Q4
T5
CR15
FT26
CR14
R55
R54
FT27
Q18
C29
R49
FT28
FT29
R50
CR13
R51
FT30
R52
R45
R48
Q15
FT31
R46
R47
C30
FT32
R44
R43
FT23
R33
C27
FT20
R38
C28
R40
R37
C24
R39
C25
FT16
FT15
C22
CR11
K
R36
Q13
FT17
Q12
R35
R34
C23
R29
R42
T3-YEL
C19
R28
R31
R32
FT21
C21
C20
CR10
R30
Q9
FT22
C26
FT18
CR12
CR9
FT19
CR8
R41
CR1
FT11
FT12
FT13
R1
FT14
C2
R4
C1 (−)
R2
R3
R9
C7
R7
FT5
C8
R8
CR2
C3
FT4
C12
CR5
C13
FT2
R23
CR7
C10
R21
CR4
CR3
R13
R11
C9
C11
R15
R19
CR6
R14
C16
R5
FT33
C6
R6
FT8
R12
FT6
R22
R18
R20
C15
R16
R17
R25
FT1
R27
FT10
FT9
R10
FT7
FT3
R26
R24
C17
(+)
(−)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1CO2133
4. MARK BLACK CHARACTERS PER ND1002019

REF DRAWING
DWG NO. 1008565 PHOTOGRAPHIC MASTER

Ⓐ REPLACED WITH CHANGE BY REV

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007559	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS XX± .02 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Horgan 9-29-69
CHECKED
APPROVED 11 Dec 69
APPROVED 12/10/69
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

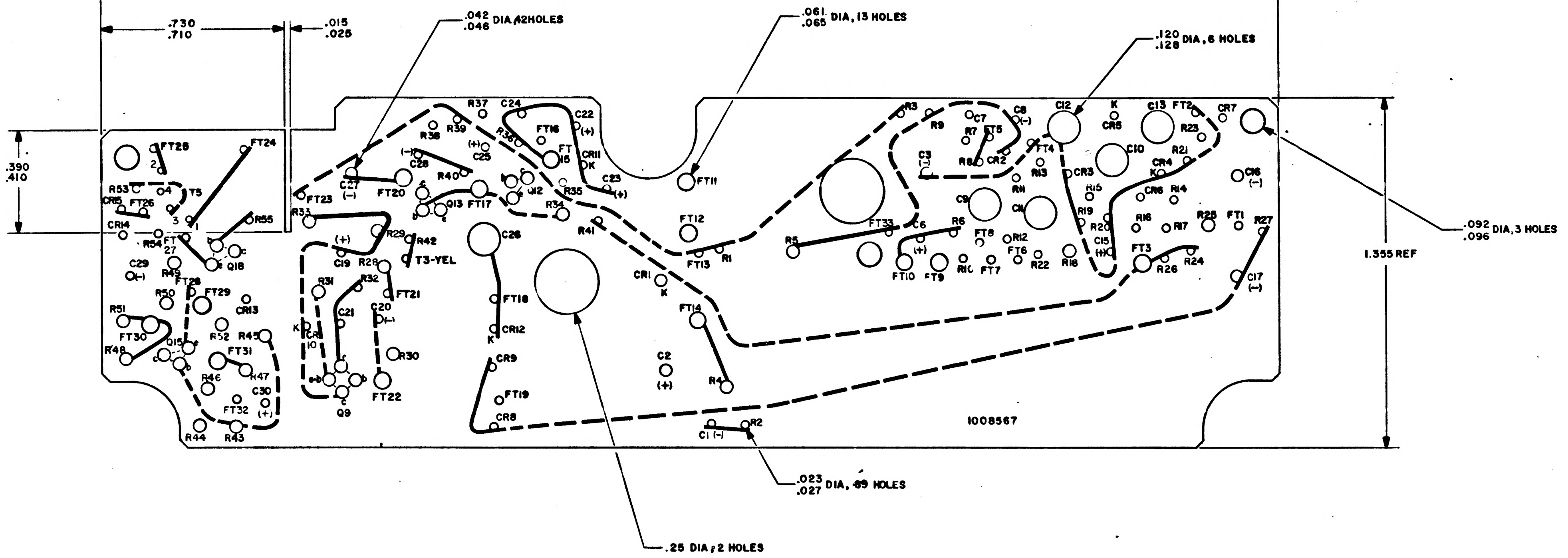
WIRING BOARD BOTTOM
PHOTOMETER ELECTRONICS

CODE IDENT NO —
SIZE E
DRAWING NO 1008567
SCALE 5:1
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14796

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


4.636 REF
.730
.710
.015
.025
.390
.410
1.355 REF
.042
.046 DIA, 42 HOLES
.061
.065 DIA, 13 HOLES
.120
.128 DIA, 6 HOLES
.092
.096 DIA, 3 HOLES
.023
.027 DIA, 89 HOLES
.25 DIA, 2 HOLES
1008567
FT25
FT24
R53
CR15
FT26
T5
CR14
R54
FT 27
R55
Q18
C29 (-)
R49
FT28
FT29
R50
CR13
R51
FT30
R48
Q15
R52
R45
FT31
R46
R47
C30 (+)
FT32
R44
R43
FT23
R33
C27 (-)
FT20
C28
R38
R39
R37
C24
R36
C25
R40
Q13
FT17
Q12
FT16
FT 15
C22 (+)
CR11 K
C23 (+)
R35
R34
R41
R29
R42
T3-YEL
C19
R28
R31
R32
FT21
C21
C20 (-)
CR 10
Q9
R30
FT22
C26
FT18
CR12
CR9
FT19
CR8
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CR1 K
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FT9
FT8
R10
FT7
R12
FT6
R22
R3
R9
C7
R7
FT5
R8
CR2
C3 (-)
C8 (-)
FT4
R13
R11
C9
C11
C12
CR3
R15
R19
R20
C15 (+)
R18
K
CR5
C10
C13
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R23
CR7
R21
CR4 K
CR6
R14
R16
R17
R25
FT1
R27
C16 (-)
C17 (-)
FT3
R26
R24

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

REF DRAWING
DWG NO. 1008565 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007559	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ±--- DECIMALS XX± .02 ANGLES ±—
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Horgan 9-29-6[illegible]
CHECKED [illegible] 11 Dec 6[illegible]
APPROVED [illegible] 11 Dec 6[illegible]
APPROVED [illegible] 12/18/6[illegible]
APPROVED MIT [illegible]
APPROVED MSC [illegible]
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

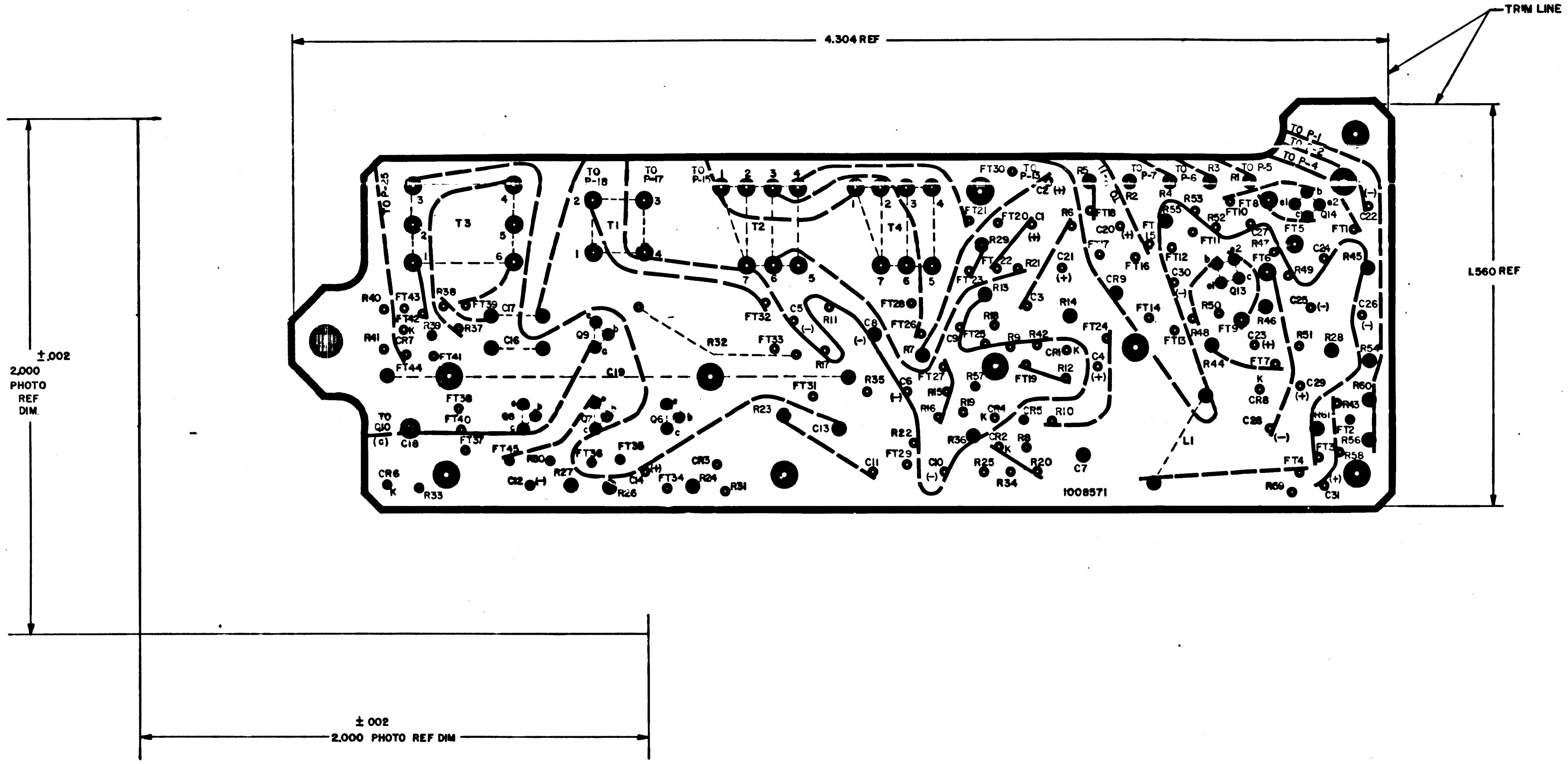
WIRING BOARD BOTTOM
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008567
SCALE 5/1
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1408Z

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15225	RTS			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4.304 REF
1.560 REF
±.002
2.000
PHOTO
REF
DIM
±.002
2.000 PHOTO REF DIM
TO P-1
TO P-2
TO P-4
TO P-5
TO P-6
TO P-7
TO P-13
TO P-14
TO P-17
TO P-18
TO P-25
TO C10 (c)
T1
T2
T3
T4
L1
Q9
Q13
Q14
R32
R35
R44
R45
R28
R23
R12
R14
R42
R57
CR1
CR6
CR7
C16
C18
C19
C7
C11
C13
C23
C29
C31
FT4
FT5
FT13
FT14
FT19
FT24
FT29
FT31
FT32
FT33
FT38
FT40
FT44
1008571

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN
CHECKED A. Lindstrom 26 Oct 64
APPROVED 4 Nov 64
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

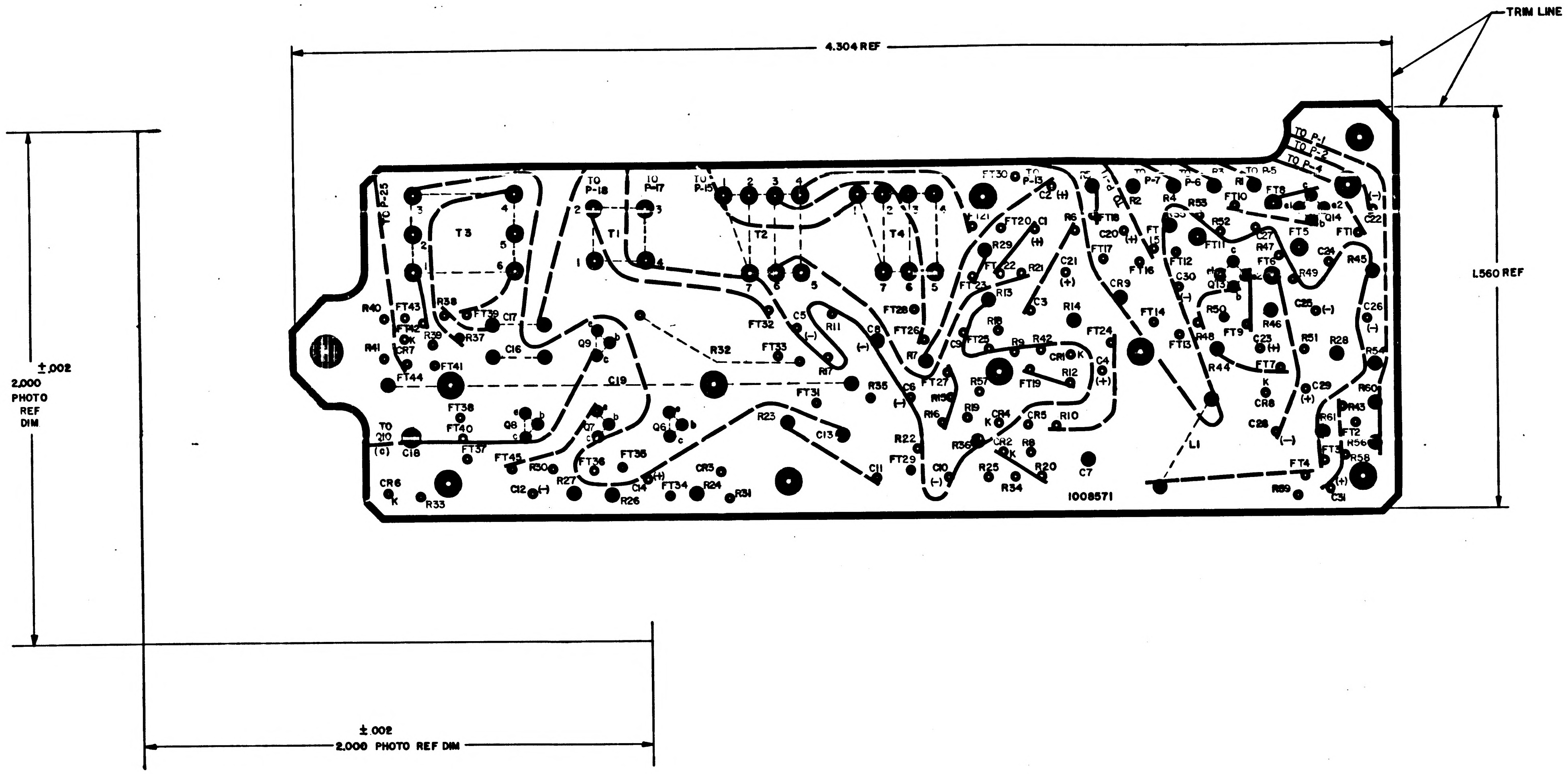
PHOTOGRAPHIC MASTER WIRING BOARD TOP
MOTOR DRIVE AMPLIFIER

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008570
SCALE 5/1
SHEET 1 OF 1

1008570 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


TRIM LINE
4.304 REF
1.560 REF
±.002
2.000
PHOTO
REF
DIM
±.002
2.000 PHOTO REF DIM
TO P-25
TO P-18
TO P-17
TO P-15
TO P-13
TO P-7
TO P-6
TO P-5
TO P-1
TO P-2
TO P-4
TO 210 (c)
T1
T2
T3
T4
Q7
Q8
Q9
Q13
Q14
L1
C2 (+)
C4 (+)
C6 (-)
C10 (-)
C12 (-)
C19
C21 (+)
R32
R23
R40
R41
R33
CR6
CR7
FT44
FT41
FT30
FT24
FT14
1008571
C7

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN
CHECKED A. Lindstrom
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

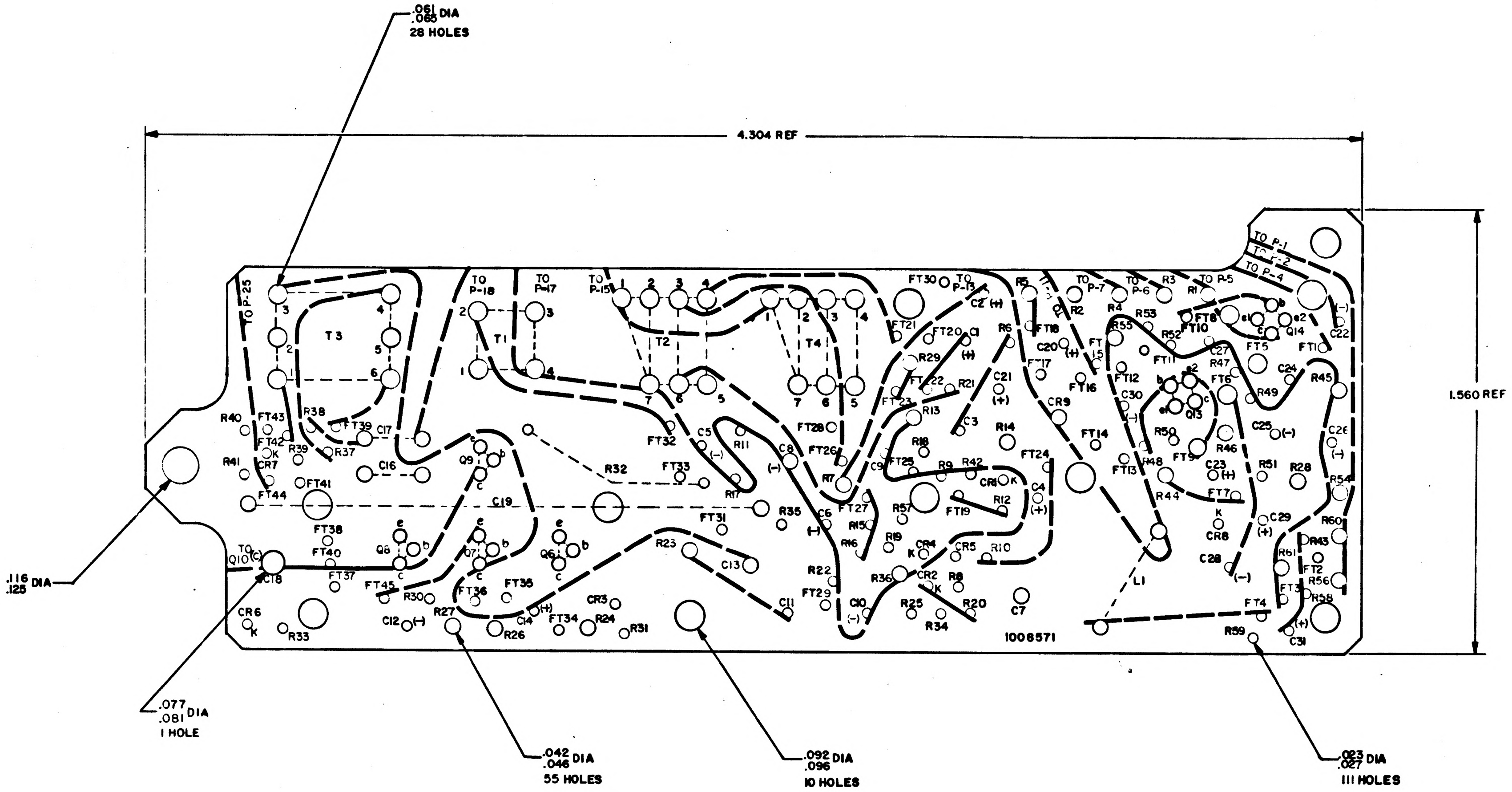
PHOTOGRAPHIC MASTE
WIRING BOARD TOP
MOTOR DRIVE AMPLIFIER

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008570
SCALE 5/1
SHEET

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS KSP2

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 15225	RTS	BK	5 Jan 65	



.061
.065 DIA
28 HOLES
4.304 REF
1.560 REF
.116
.125 DIA
.077
.081 DIA
1 HOLE
.042
.046 DIA
55 HOLES
.092
.096 DIA
10 HOLES
.023
.027 DIA
111 HOLES
TO P-25
TO P-18
TO P-17
TO P-15
TO P-13
TO P-7
TO P-6
TO P-5
TO P-1
TO P-2
TO P-4
TO Q10 (c)
T1
T2
T3
T4
L1
C19
R32
1008571

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

REF DWG:
DWG NO. 1008570 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007581	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —— DECIMALS ± —— ANGLES ± ——
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN R. Collins 13 Oct 64
CHECKED A. Lindstrom 28 Oct 64
APPROVED Rumer 4 NOV 64
APPROVED D.R. Teal 11-9-64
APPROVED MIT W. Trageser 12 Nov 64
APPROVED MSC W.J. Rhine 11-12-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

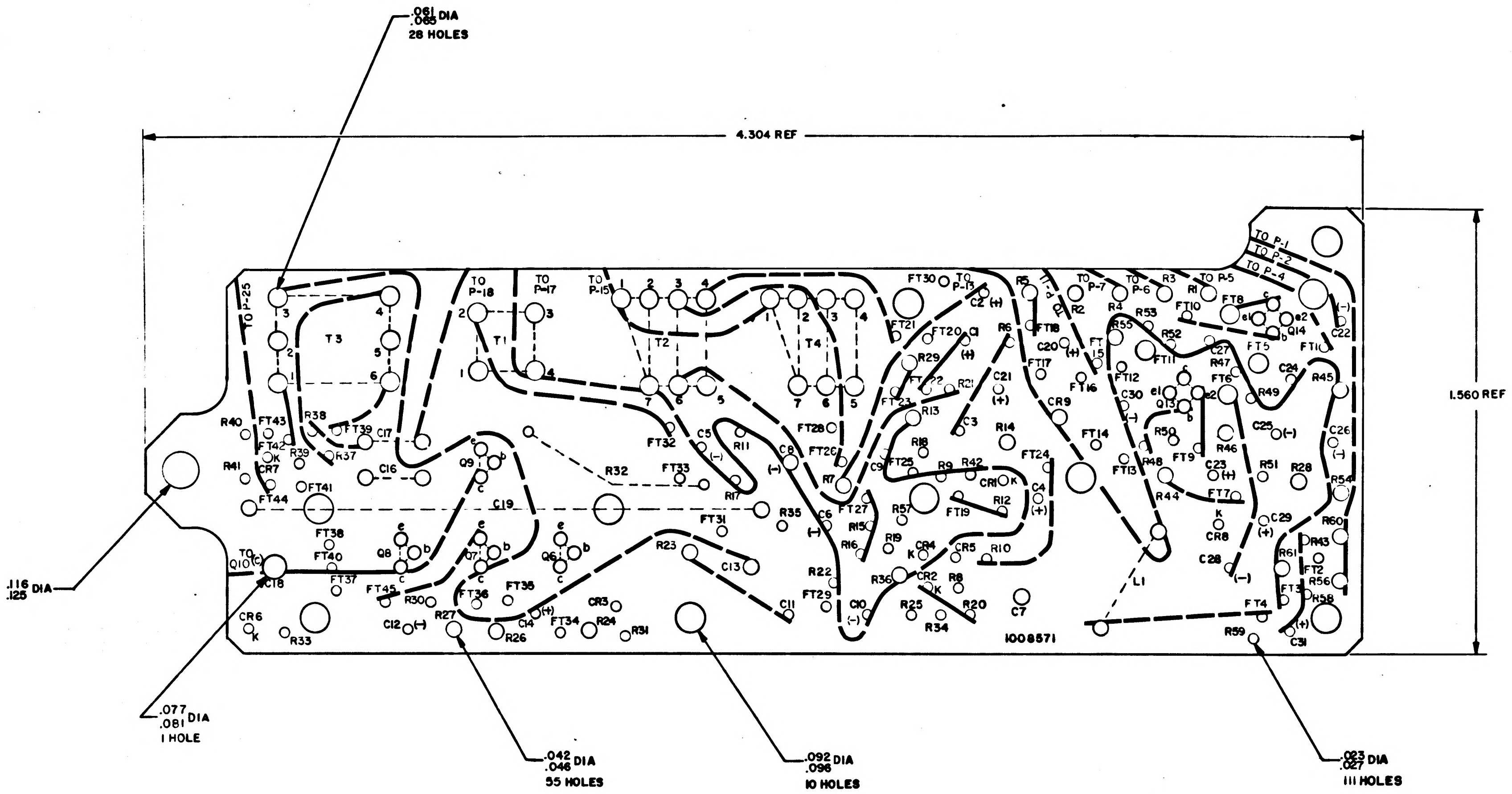
WIRING BOARD TOP
MOTOR DRIVE AMPLIFIER

CODE IDENT NO ——
SIZE E
DRAWING NO 1008571
SCALE 5/1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1K382

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



.061 DIA
.065
28 HOLES
4.304 REF
1.560 REF
.116 DIA
.125
.077 DIA
.081
1 HOLE
.042 DIA
.046
55 HOLES
.092 DIA
.096
10 HOLES
.023 DIA
.027
111 HOLES
TO P-25
TO P-18
TO P-17
TO P-15
TO P-14
TO P-7
TO P-6
TO P-5
TO P-1
TO P-2
TO P-4
T1
T2
T3
T4
L1
Q8
Q9
Q10
Q13
Q14
C19
R32
1008571

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

REF DWG:
DWG NO. 1008570 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007581	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN 13 Oct 64
CHECKED A. Lindstrom 28 Oct 64
APPROVED 4 Nov 64
APPROVED 11-9-64
APPROVED MIT
APPROVED MSC 11-12-64

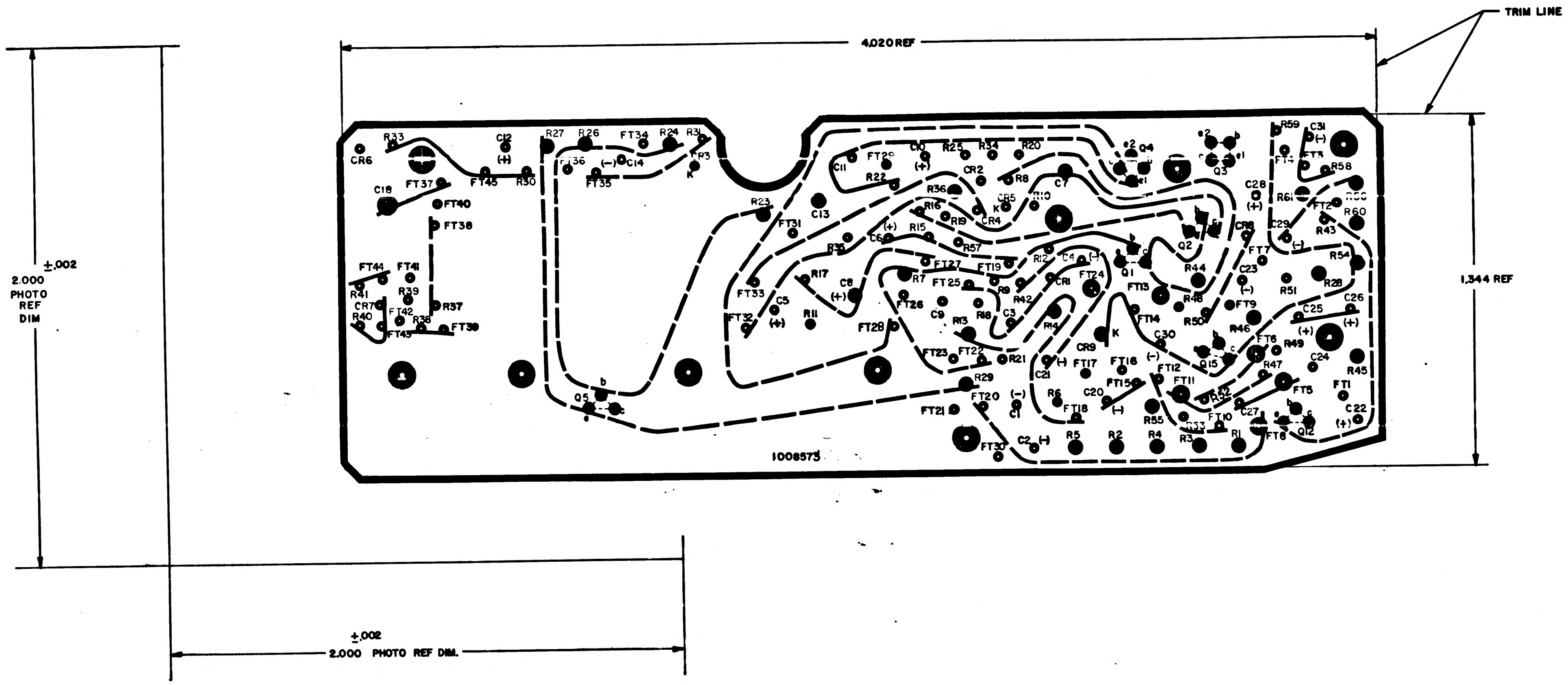
WIRING BOARD TOP
MOTOR DRIVE AMPLIFIER

CODE IDENT NO	SIZE	DRAWING NO
	E	1008571

SCALE 5/1 SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14882						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



TRIM LINE
4.020 REF
1.344 REF
±.002
2.000
PHOTO
REF
DIM
±.002
2.000 PHOTO REF DIM.
1008573
CR6
R33
C12
(+)
R27
R26
FT34
R24
R31
CR3
K
FT36
(–)
C14
FT35
C18
FT37
FT45
R30
FT40
FT38
FT44
FT41
R41
R39
CR7
R37
R40
FT42
R38
FT39
FT43
Q5
b
e
c
R23
C13
FT31
R35
R17
C8
(+)
FT33
C5
(+)
R11
FT32
C11
FT29
C10
(+)
R25
R34
R20
R22
CR2
R8
R36
C7
CR5
R10
R16
R19
CR4
K
C6
(+)
R15
R57
FT27
FT19
R12
C4
(–)
R7
FT25
R9
R42
CR1
FT24
FT26
C9
R13
R18
C3
R14
FT28
FT23
FT22
R21
CR9
K
C21
(–)
FT17
FT16
R29
FT20
(–)
C1
R6
FT18
C20
(–)
FT15
FT21
FT30
C2
(–)
R5
R2
R4
R55
R3
R53
FT10
R1
e2
Q4
e1
c
b
Q3
Q2
Q1
C28
(+)
CR8
FT7
R44
FT13
R48
R50
FT14
C23
(–)
FT9
R46
C30
(–)
Q15
FT12
FT11
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FT4
FT3
R58
R61
R56
FT2
R60
C29
(–)
R43
R54
R51
R28
C26
C25
(+)
(+)
FT6
R49
C24
R47
R45
FT5
FT1
Q12
C22
(+)

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L. Albini [illegible]
CHECKED A. Lindstrom 27 Oct 64
APPROVED Russo 9 Nov 64
APPROVED [illegible] 11-9-64
APPROVED MIT [illegible] 10 Nov 64
APPROVED MSC [illegible] 11-12-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

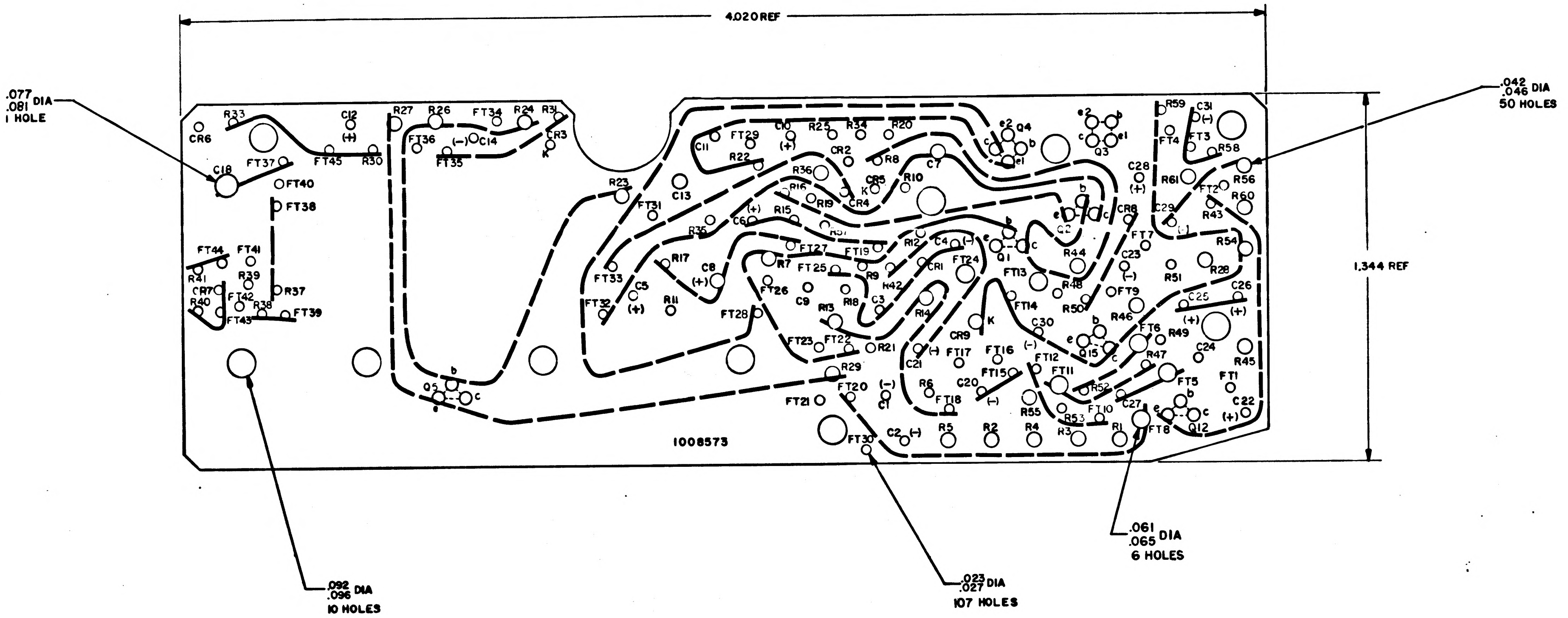
PHOTOGRAPHIC MASTER WIRING BOARD BOTTOM
MOTOR DRIVE AMPLIFIER

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008572
SCALE 5/1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1408²

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


4.020 REF
1.344 REF
.077
.081 DIA
1 HOLE
.042
.046 DIA
50 HOLES
.092
.096 DIA
10 HOLES
.023
.027 DIA
107 HOLES
.061
.065 DIA
6 HOLES
1008573
R33
C12
(+)
CR6
C18
FT37
FT45
R30
FT40
FT38
FT44
FT41
R41
R39
CR7
R37
R40
FT42
R38
FT39
FT43
R27
R26
FT34
R24
R31
CR3
K
FT36
(−)
C14
FT35
Q5
b
c
e
C11
FT29
C10
(+)
R25
R34
R20
R22
CR2
R8
C7
R23
C13
R36
CR5
K
R10
FT31
R16
R19
CR4
R35
(+)
C6
R15
R57
FT33
R17
C8
(+)
FT27
FT19
R12
C4
(−)
FT32
C5
(+)
R11
R7
FT25
R9
CR1
FT24
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R42
R18
C3
FT28
R13
R14
K
FT23
FT22
R21
CR9
C21
(−)
FT17
FT16
R29
FT20
(−)
C1
R6
FT18
C20
(−)
FT15
FT21
FT30
C2
(−)
R5
R2
R4
R55
R3
R53
FT10
R1
e2
Q4
c
b
e1
e2
b
c
e1
Q3
R59
C31
(−)
FT4
FT3
R58
C28
(+)
R61
R56
FT2
R60
b
e
c
Q2
CR8
C29
(−)
R43
e
b
c
Q1
R44
FT7
C23
(−)
R54
FT13
R48
R51
R28
FT14
R50
FT9
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R46
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FT6
R49
FT12
(−)
FT11
R52
R47
C24
R45
FT5
b
FT1
C27
e
c
C22
(+)
FT8
Q12

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

REF DWG:
DWG NO. 1008572 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007581	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN L. Paffini 13OCT64
CHECKED A. Lindstrom 28Oct64
APPROVED 4 Nov 64
APPROVED D. W. 11-9-64
APPROVED MIT
APPROVED MSC W. J. 4-12-64
DATE

WIRING BOARD BOTTOM
MOTOR DRIVE AMPLIFIER

CODE IDENT NO. —
SIZE E
DRAWING NO 1008573
SCALE 5/1
SHEET 1 OF 1

1008573

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14567

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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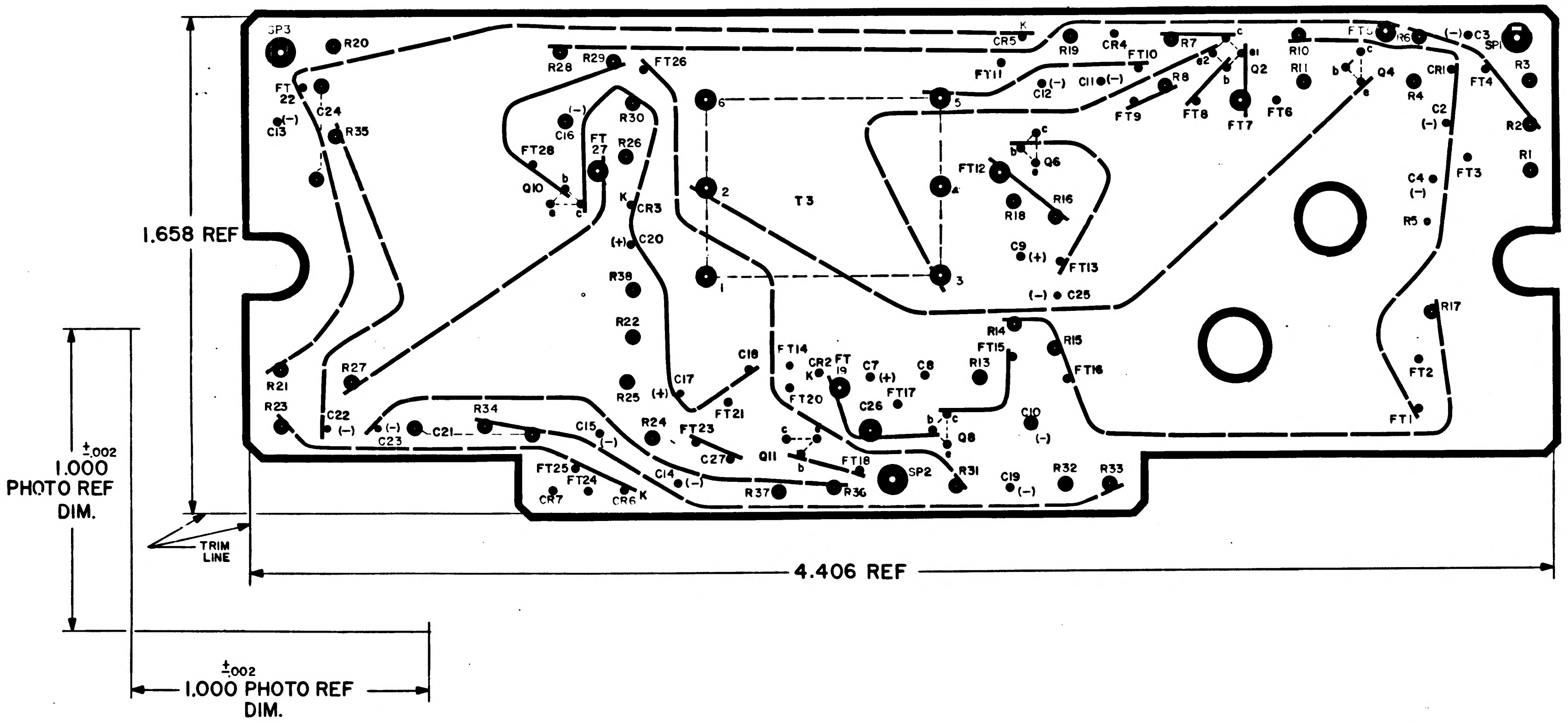
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FT 22
C24
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C13
R35
R28
R29
FT26
(−)
C16
R30
FT28
FT 27
R26
Q10
b
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c
K
CR3
(+)
C20
R38
R22
R21
R27
R25
(+)
C17
C18
R23
C22
(−)
C23
C21
R34
C15
(−)
R24
FT23
FT21
C27
C14
(−)
FT25
FT24
CR7
CR6
K
R37
R36
Q11
b
c
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FT18
SP2
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5
4
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T3
FT14
CR2
K
FT 19
FT20
C7
(+)
C8
C26
FT17
Q8
b
c
e
R31
C19
(−)
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(−)
R13
FT15
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FT16
(−) C25
C9
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FT13
R16
R18
FT12
Q6
b
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CR5
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FT11
R19
CR4
FT10
C12
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(−)
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b
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SP1
CR1
FT4
R3
R4
C2
(−)
R2
R1
FT3
C4
(−)
R5
R17
FT2
FT1
1.658 REF
±.002
1.000
PHOTO REF
DIM.
TRIM
LINE
4.406 REF
±.002
1.000 PHOTO REF
DIM.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

Ⓐ REPLACED WITH CHANGE BY REV B

1008576 A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN Louis Alonge
CHECKED
APPROVED
APPROVED 11-9-64
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

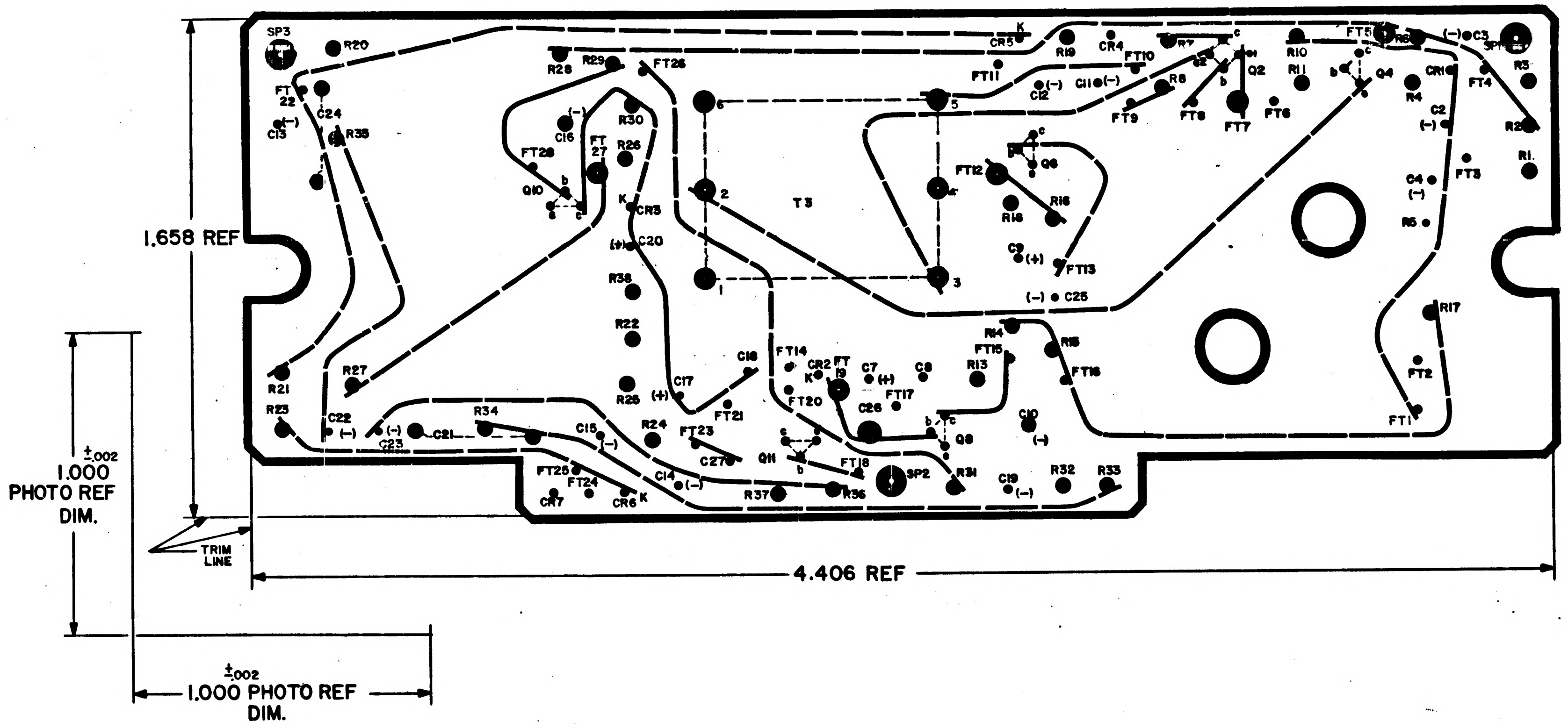
PHOTOGRAPHIC MASTER
WIRING BOARD (BOTTOM)
TRACKER X CHANNEL

CODE IDENT NO 80230
SIZE E
DRAWING NO 1008576
SCALE 5/1
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 143P3

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



1.658 REF
±.002
1.000
PHOTO REF
DIM.
TRIM
LINE
4.406 REF
±.002
1.000 PHOTO REF
DIM.
SP3
SP2
SP1
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R1
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R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
C2 (−)
C3 (−)
C4 (−)
C7 (+)
C8
C9 (+)
C10 (−)
C11 (−)
C12 (−)
C13 (−)
C14 (−)
C15 (−)
C16 (−)
C17 (+)
C18
C19 (−)
C20 (+)
C21
C22 (−)
C23 (−)
C24
C25 (−)
C26
C27
CR1
CR2 K
CR3 K
CR4
CR5 K
CR6 K
CR7
Q2
Q4
Q6
Q8
Q10
Q11
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FT26
FT 27
FT28

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN [illegible] [illegible]
CHECKED [illegible] [illegible]
APPROVED [illegible] 3 NOV 64
APPROVED [illegible] 11-9-64
APPROVED MIT [illegible] [illegible]
APPROVED MSC [illegible] 12-1-64
DATE

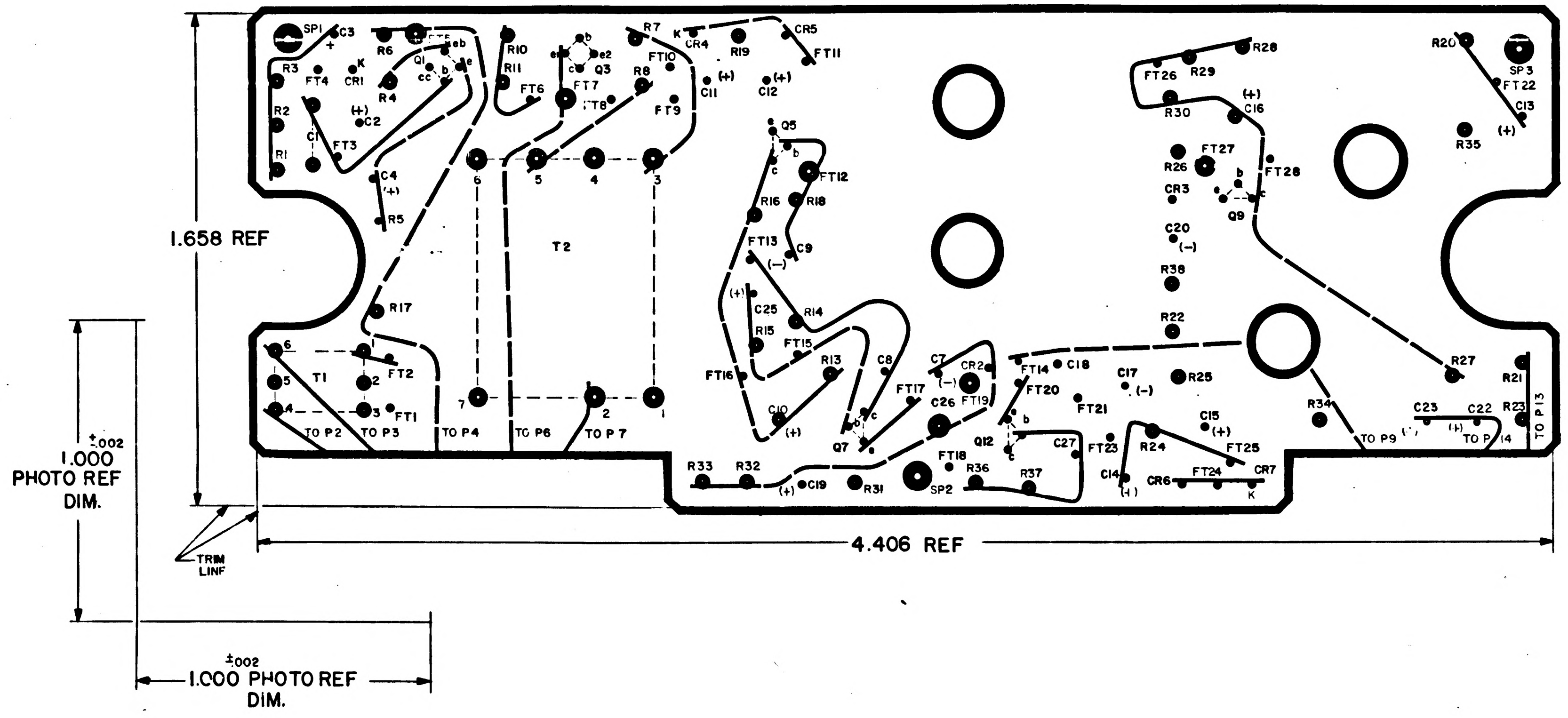
PHOTOGRAPHIC MASTER
WIRING BOARD (BOTTOM)
TRACKER X CHANNEL

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008576
SCALE 8/1
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14543

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
A		REPLACED WITH CHANGE BY REV. B PER TDRR 20123	A.N.		23 JUN 64		


SP1
C3
+
R6
FT5
eb
e
Q1
b
cc
R3
FT4
K
CR1
R4
R2
(+)
C2
C1
FT3
R1
C4
(+)
R5
R10
R11
FT6
b
e
e2
c
Q3
FT7
FT8
R7
K
CR4
R8
FT10
FT9
R19
CR5
FT11
C11
(+)
C12
(+)
6
5
4
3
T2
1.658 REF
R17
6
5
4
T1
1
2
3
FT2
FT1
7
2
1
TO P2
TO P3
TO P4
TO P6
TO P 7
Q5
b
c
FT12
R16
R18
FT13
C9
(−)
(+)
C25
R14
R15
FT15
R13
FT16
C10
(+)
C8
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c
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C26
FT19
FT18
Q12
b
e
c
R33
R32
(+)
C19
R31
SP2
R36
R37
C27
FT14
FT20
C18
C17
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FT21
R25
FT23
R24
C15
(+)
FT25
C14
(+)
CR6
FT24
CR7
K
R28
FT26
R29
R30
(+)
C16
FT27
R26
FT28
CR3
b
e
c
Q9
C20
(−)
R38
R22
R34
TO P9
R27
C23
C22
(+)
TO P 14
R21
R23
TO P 13
R20
SP3
FT22
C13
(+)
R35
4.406 REF
TRIM LINE
±.002
1.000 PHOTO REF DIM.
±.002
1.000 PHOTO REF DIM.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

Ⓐ REPLACED WITH CHANGE BY REV B

1008577 A

QTY REQD	PART OR IDENTIFYING NO	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN Louis B Lowe
CHECKED
APPROVED
APPROVED
APPROVED MIT W Kupfer
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

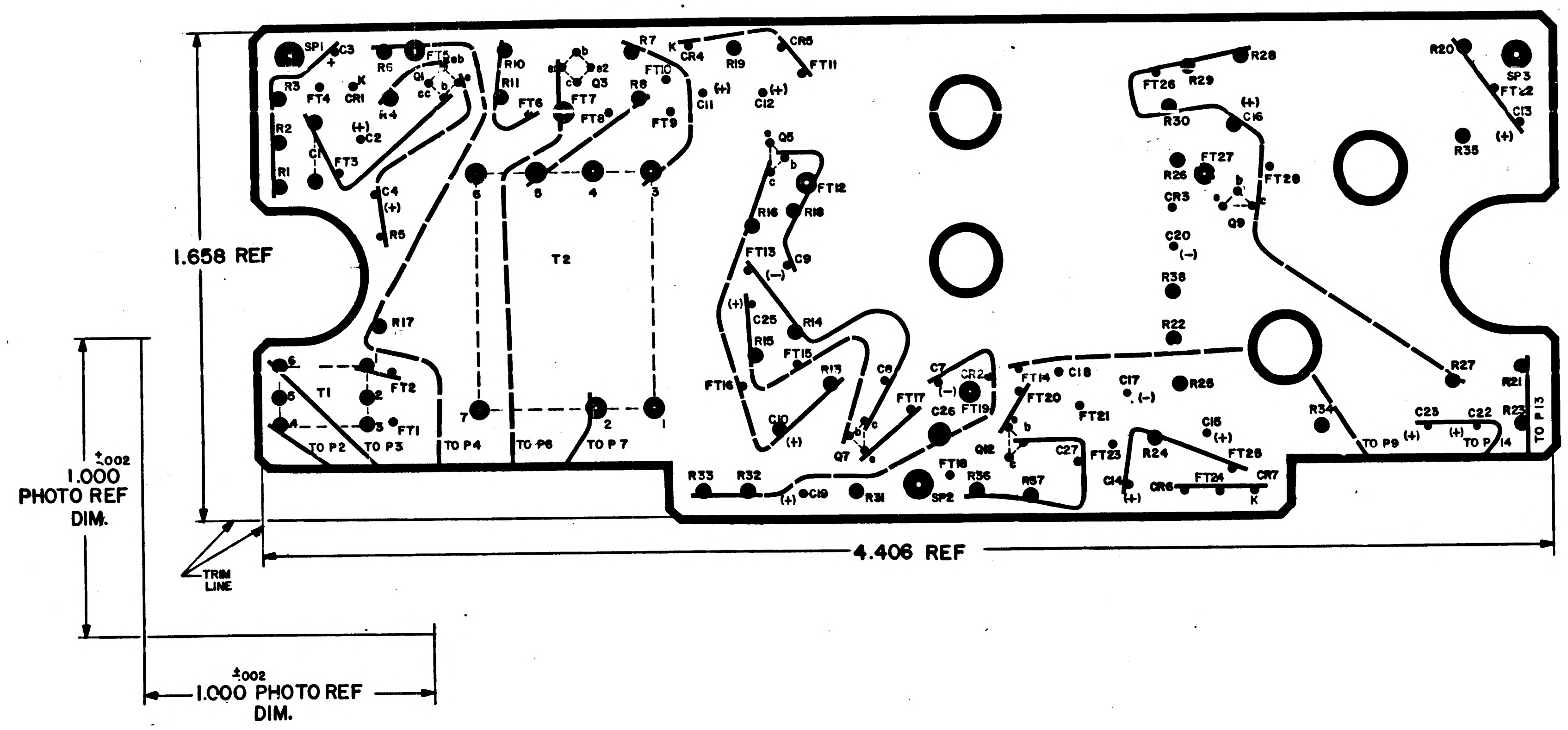
PHOTOGRAPHIC MASTER
WIRING BOARD (TOP)
TRACKER X CHANNEL

CODE IDENT NO 80230
SIZE E
DRAWING NO 1008577
SCALE 5/1
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


SP1
C3
R6
FT5
Q1
R10
R11
FT6
FT7
Q3
R7
K
CR4
R19
CR5
FT11
FT10
R8
R3
FT4
CR1
R4
C11
C12
FT8
FT9
R2
(+)
C2
C1
FT3
R1
C4
(+)
R5
6
5
4
3
T2
Q5
FT12
R16
R18
FT13
C9
(−)
(+)
C25
R14
R15
FT15
FT16
R13
C8
C10
(+)
Q7
FT17
C7
(−)
CR2
C26
FT19
FT14
C18
FT20
C17
(−)
FT21
Q12
C27
FT23
C14
(+)
CR6
FT24
CR7
K
R24
C15
(+)
FT25
R25
R22
R38
C20
(−)
CR3
R26
FT27
Q9
FT28
R30
FT26
R29
R28
(+)
C16
R20
SP3
FT22
C13
(+)
R35
R27
R21
R23
TO P13
R34
(+)
C23
C22
(+)
TO P14
TO P9
R17
T1
FT2
FT1
TO P2
TO P3
TO P4
TO P6
TO P7
7
2
1
R33
R32
(+)
C19
R31
SP2
R36
R37
1.658 REF
±.002
1.000
PHOTO REF
DIM.
TRIM
LINE
4.406 REF
±.002
1.000 PHOTO REF
DIM.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	Lewis A. Wood	16 Sep 64
CHECKED	R. Erdmann	28 OCT 64
APPROVED		3 NOV 64
APPROVED		11-9-64
APPROVED MIT	W. Kupfer	1 Dec 64
APPROVED MSC	W. J. Klein	12-4-64
	DATE	

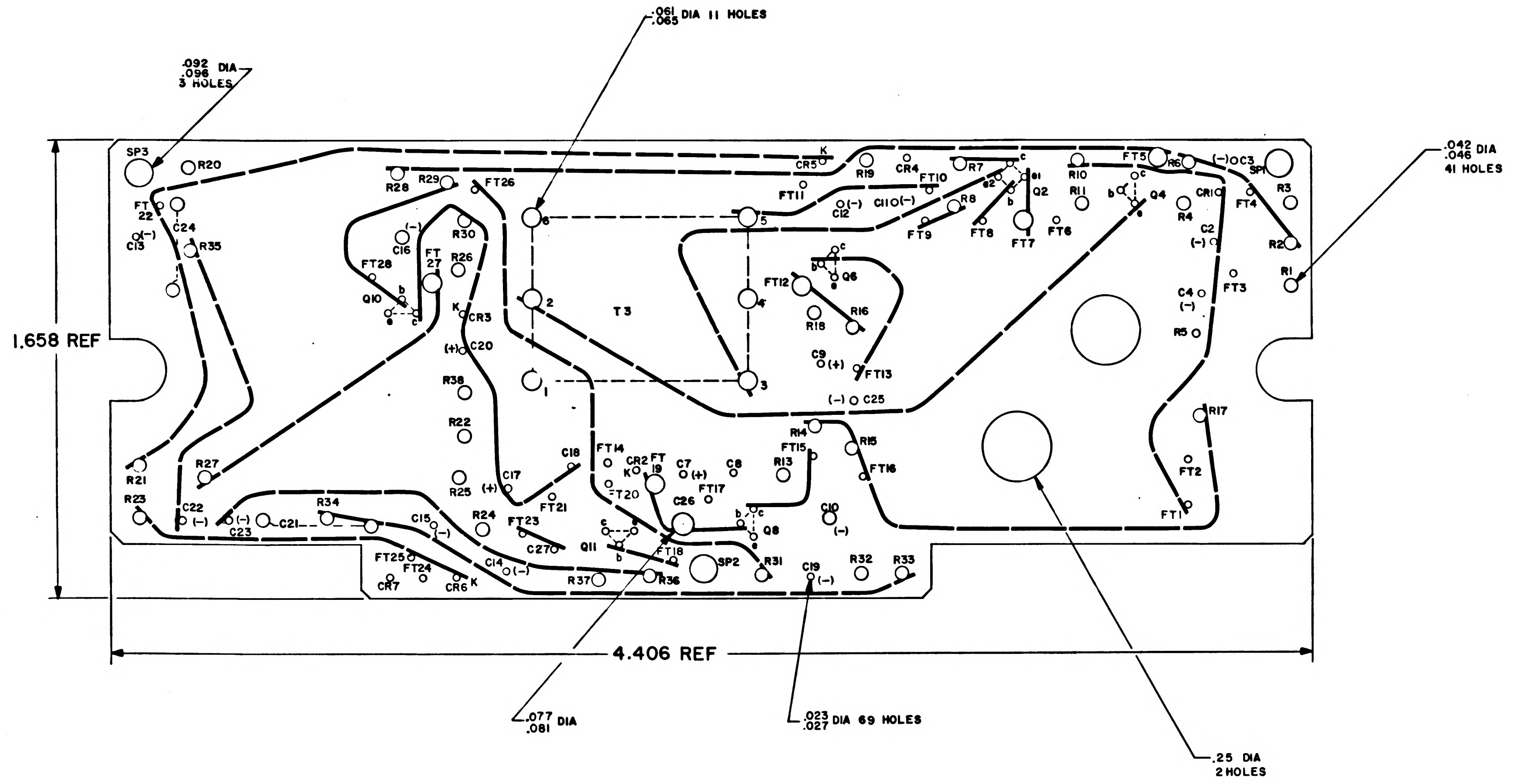
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD (TOP)
TRACKER X CHANNEL

CODE IDENT NO.	SIZE	DRAWING NO.
—	E	1008577
SCALE 5/1	—	SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REPLACED WITH CHANGE BY REV. B PER TDRR 20123	A.N			


.061
.065 DIA 11 HOLES
.092 DIA
.096
3 HOLES
.042 DIA
.046
41 HOLES
1.658 REF
4.406 REF
.077 DIA
.081
.023
.027 DIA 69 HOLES
.25 DIA
2 HOLES
T3
SP1
SP2
SP3
R1
R2
R3
R4
R5
R6
R7
R8
R10
R11
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
C2
C3
C4
C7
C8
C9
C10
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
C24
C25
C26
C27
CR1
CR2
CR3
CR4
CR5
CR6
CR7
Q2
Q4
Q6
Q8
Q10
Q11
FT1
FT2
FT3
FT4
FT5
FT6
FT7
FT8
FT9
FT10
FT11
FT12
FT13
FT14
FT15
FT16
FT17
FT18
FT19
FT20
FT21
FT22
FT23
FT24
FT25
FT26
FT27
FT28

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

Ⓐ REPLACED WITH CHANGE BY REV B

REF DWG:
DWG NO. 1008576 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007566	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD (BOTTOM)
TRACKER X CHANNEL

CODE IDENT NO.	SIZE	DRAWING NO.
80230	E	1008578

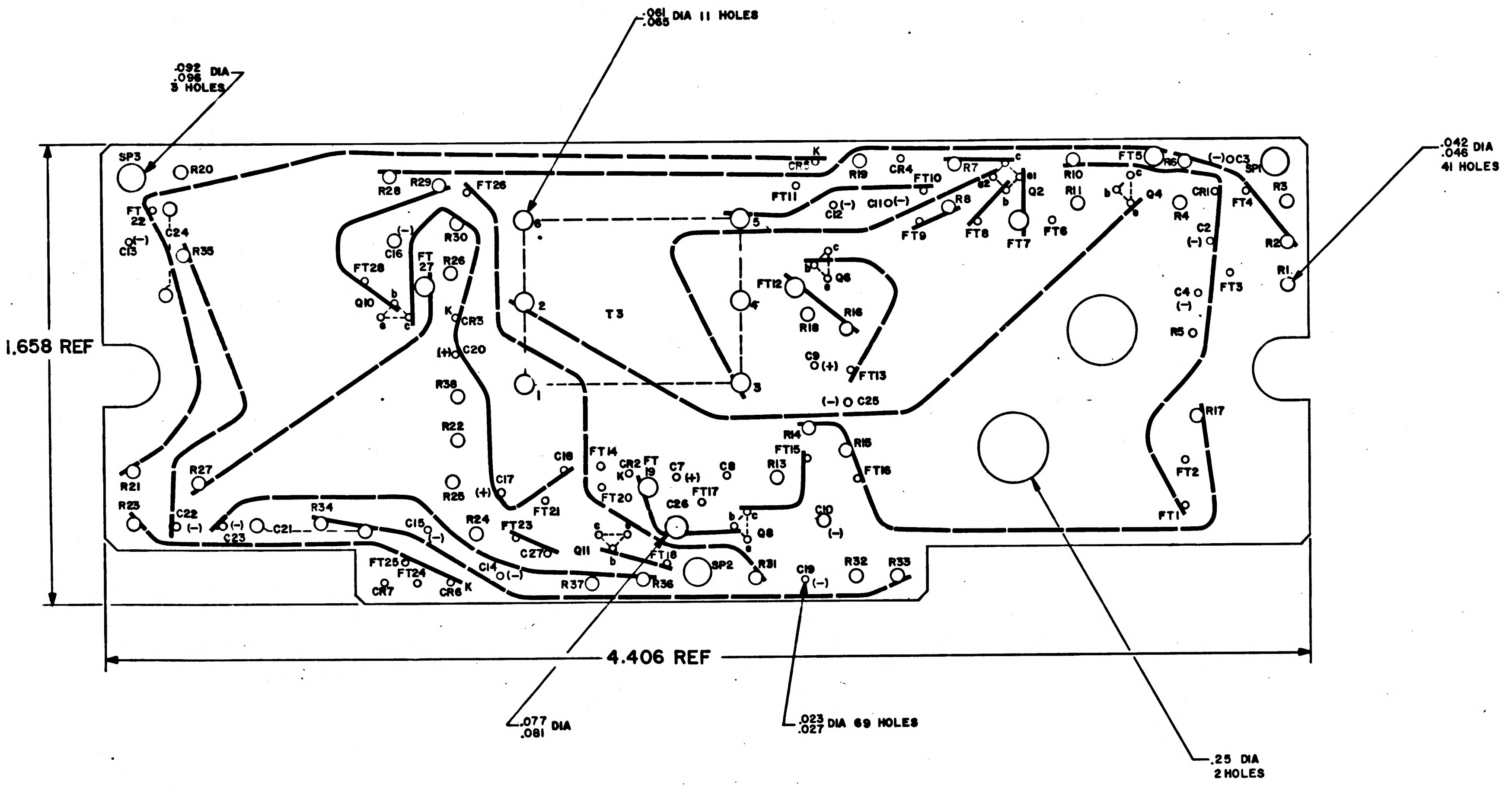
SCALE 5/1 SHEET 1 OF 1

1008578

NOTICE WHEN GOVERNMENT DRAWINGS SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14583

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


.092 / .096 DIA 3 HOLES
.061 / .065 DIA 11 HOLES
.042 / .046 DIA 41 HOLES
.077 / .081 DIA
.023 / .027 DIA 69 HOLES
.25 DIA 2 HOLES
1.658 REF
4.406 REF
SP3
R20
FT 22
C24
C13 (−)
R35
R21
R27
R23
C22 (−)
(−) C23
C21
R34
C15 (−)
R28
R29
FT26
C16 (−)
FT28
Q10
b
e
c
FT 27
R30
R26
K CR3
(+) C20
R38
R22
R25
C17 (+)
C18
FT21
R24
FT23
C27
FT25
FT24
CR7
CR6 K
C14 (−)
Q11
R37
R36
FT18
SP2
T3
6
2
1
5
4
3
K CR5
R19
CR4
FT10
FT11
C12 (−)
C11 (−)
R7
R8
FT9
FT8
FT7
Q2
e1
e2
FT6
R10
R11
Q4
FT5
R6
(−) C3
SP1
CR1
FT4
R3
R4
C2 (−)
R2
R1
FT3
C4 (−)
R5
FT12
Q6
R18
R16
C9 (+)
FT13
(−) C25
R14
R15
FT15
FT16
R13
FT14
CR2 K
FT 19
C7 (+)
C8
FT17
FT20
C26
Q8
C10 (−)
R31
C19 (−)
R32
R33
R17
FT2
FT1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

REF DWG:
DWG NO. 1008576 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007566	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN Louis [illegible]
CHECKED [illegible] 28 OCT 64
APPROVED [illegible] 3 Nov 64
APPROVED [illegible] 11-9-64
APPROVED MIT [illegible] 1 Dec 64
APPROVED MSC [illegible] 12-1-64
DATE

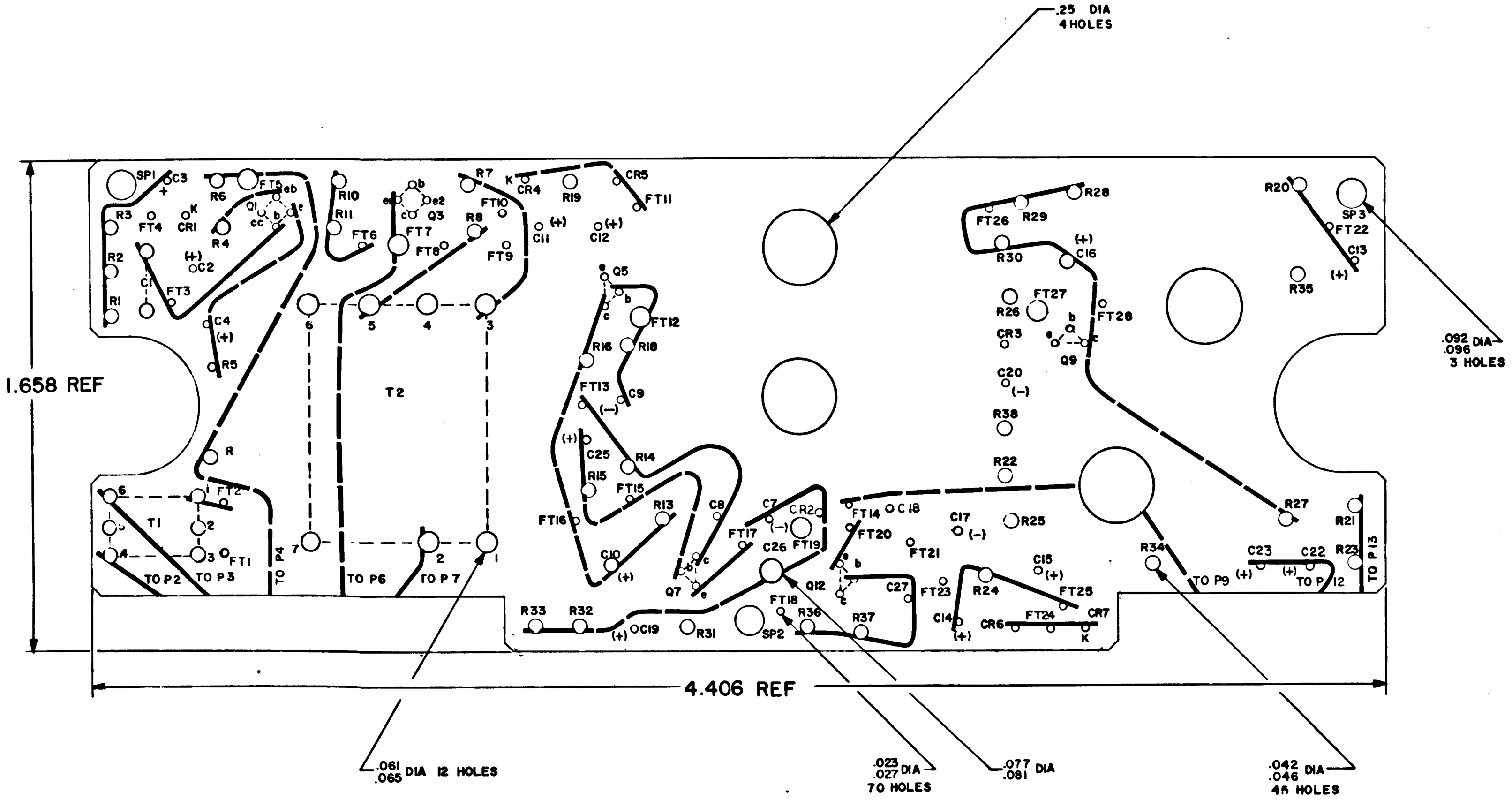
WIRING BOARD (BOTTOM)
TRACKER X CHANNEL

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008578
SCALE 5/1
SHEET 1 OF 1

NOTICE WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REPLACED WITH CHANGE BY REV. B PER TDRR 20123	A.N.			


.25 DIA
4 HOLES
1.658 REF
SP1
C3
R6
FT5
eb
Q1
cc
b
e
R3
FT4
CR1
K
R4
R2
(+)
C2
C1
FT3
R1
C4
(+)
R5
R
R10
R11
FT6
e1
b
e2
c
Q3
FT7
FT8
R7
R8
FT10
FT9
K
CR4
R19
CR5
FT11
C11
(+)
C12
(+)
6
5
4
3
T2
7
2
1
6
T1
2
4
3
FT1
FT2
TO P2
TO P3
TO P4
TO P6
TO P7
Q5
e
b
c
FT12
R16
R18
FT13
C9
(−)
(+)
C25
R14
R15
FT15
FT16
R13
C8
C10
(+)
Q7
b
c
e
C7
(−)
CR2
FT17
C26
FT19
Q12
FT18
R36
R37
R33
R32
(+)
C19
R31
SP2
FT14
C18
FT20
e
b
c
FT21
C17
(−)
R25
C27
FT23
R24
C15
(+)
FT25
C14
(+)
CR6
FT24
CR7
K
R28
FT26
R29
R30
(+)
C16
FT27
R26
FT28
CR3
b
Q
e
c
Q9
C20
(−)
R38
R22
R34
TO P9
R27
R20
SP3
FT22
C13
(+)
R35
R21
C23
C22
(+)
(+)
TO P12
R23
TO P13
.092 DIA
.096
3 HOLES
4.406 REF
.061 DIA 12 HOLES
.065
.023 DIA
.027
70 HOLES
.077 DIA
.081
.042 DIA
.046
45 HOLES

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

Ⓐ REPLACED WITH CHANGE BY REV B

REF DWG:
DWG NO. 1008577 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007566	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BO/ RD(TOP)
TRACKER X :HANNEL

CODE IDENT NO	SIZE	DRAWING NO
80230	E	1008579

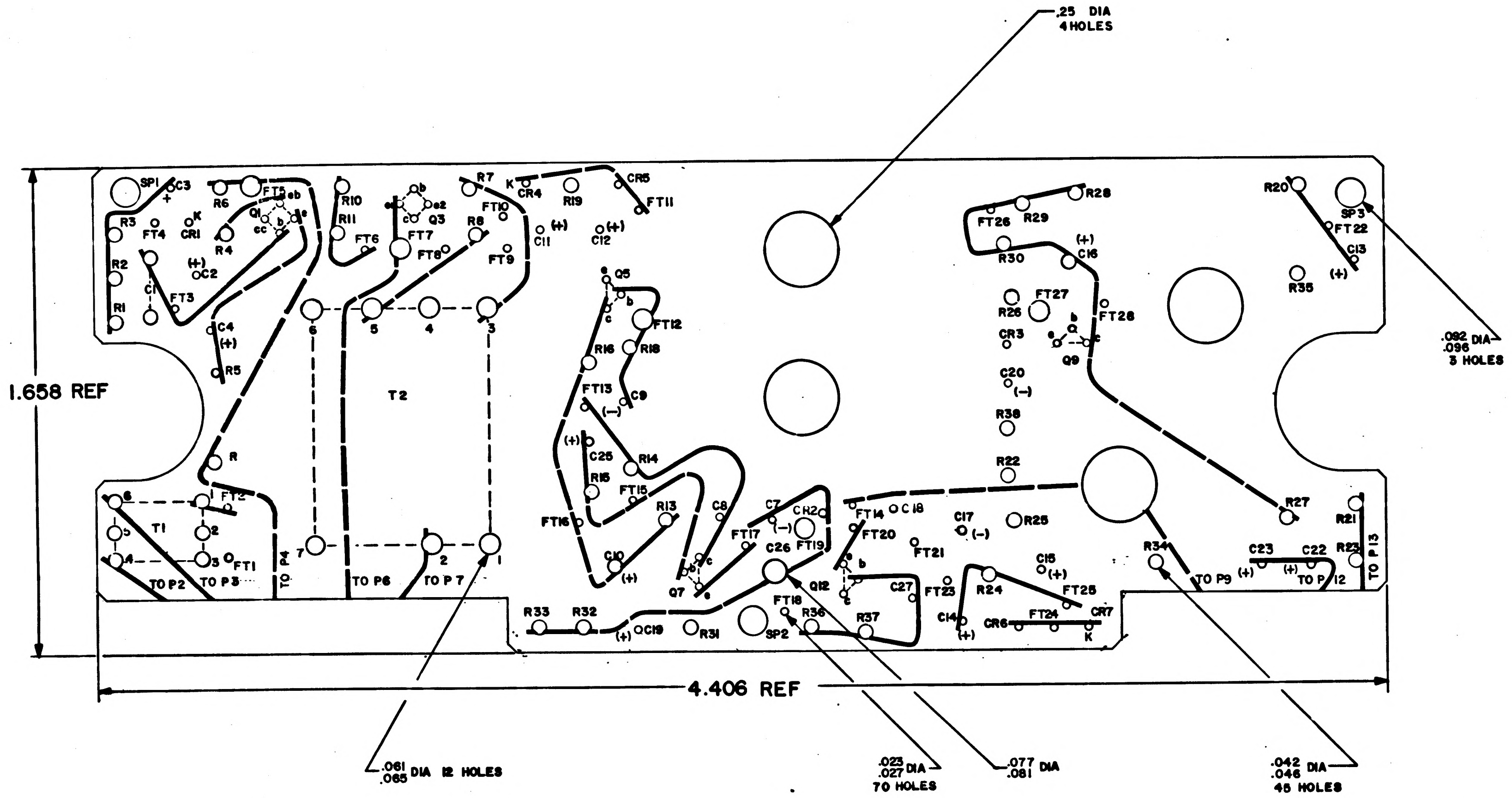
SCALE 5/1 — SHEET 1 OF 1

1008579 A

NOTICE WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14523

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


.25 DIA
4 HOLES
1.658 REF
4.406 REF
.092 DIA
.096
3 HOLES
.061
.065 DIA 12 HOLES
.023
.027 DIA
70 HOLES
.077 DIA
.081
.042 DIA
.046
45 HOLES
SP1
C3
R3
FT4
CR1
K
R6
FT5
Q1
R4
(+)
C2
R2
R1
C1
FT3
C4
(+)
R5
R
R10
R11
FT6
Q3
FT7
FT8
R8
FT9
R7
K
CR4
R19
CR5
FT11
FT10
C11
(+)
C12
(+)
T2
6
5
4
3
T1
FT2
FT1
TO P2
TO P3
TO P4
7
2
1
TO P6
TO P7
Q5
FT12
R16
R18
FT13
C9
(–)
(+)
C25
R14
R15
FT15
FT16
R13
C10
(+)
C8
Q7
C7
(–)
CH2
FT17
C26
FT19
R33
R32
(+)
C19
R31
SP2
FT18
R36
Q12
R37
C27
FT14
C18
FT20
FT21
C17
(–)
R25
FT23
C14
(+)
R24
C15
(+)
FT25
CR6
FT24
CR7
K
FT26
R29
R28
R30
(+)
C16
R26
FT27
FT28
CR3
Q9
C20
(–)
R38
R22
R20
SP3
FT22
C13
(+)
R35
R27
R21
R34
TO P9
C23
(+)
C22
(+)
TO P 12
R23
TO P 13

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

REF DWG:
DWG NO. 1008577 PHOTOGRAPHIC MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007566	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ±.010 ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2
—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN		
CHECKED		20 OCT 64
APPROVED	Kilmer	3 NOV 64
APPROVED		11-9-64
APPROVED MIT		1 Dec 64
APPROVED MSC		12-1-64
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD (TOP)
TRACKER X CHANNEL —

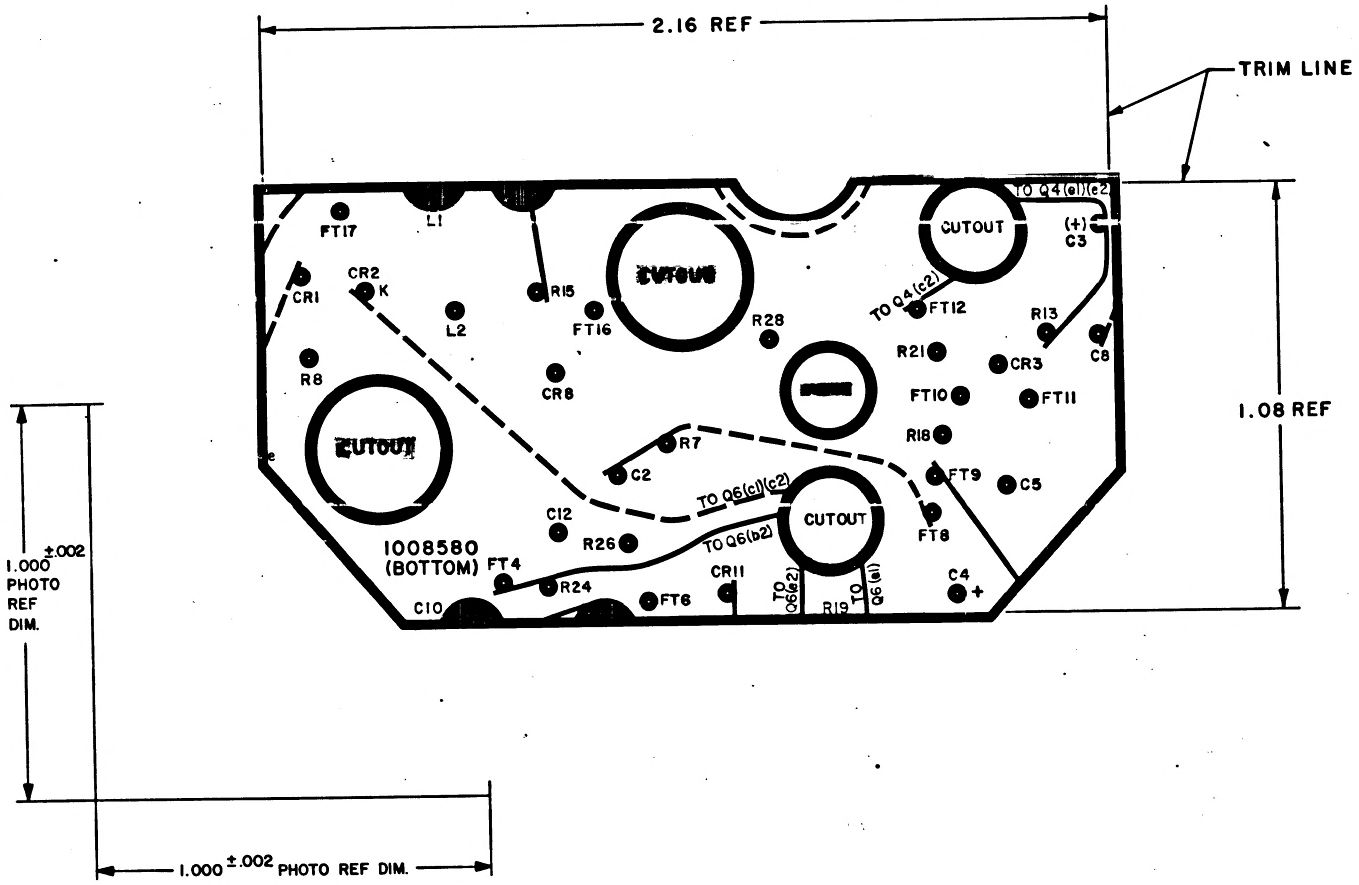
CODE IDENT NO.	SIZE	DRAWING NO.
—	E	1008579
SCALE 5/1	—	SHEET 1 OF 1

1008579

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 14699

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 19309	21 JUL 65	A.N.


2.16 REF
TRIM LINE
1.08 REF
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.
1008580 (BOTTOM)
CUTOUT
CUTOUT
CUTOUT
CUTOUT
TO Q4(e1)(c2)
(+) C3
TO Q4(c2)
TO Q6(c1)(c2)
TO Q6(b2)
TO Q6(e2)
TO Q6(e1)
FT17
L1
CR1
CR2
K
L2
R15
FT16
R28
FT12
R13
R21
CR3
C8
R8
CR8
FT10
FT11
R18
R7
C2
FT9
C5
C12
R26
FT8
C4
+
FT4
R24
CR11
FT6
C10
R19

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340 TYPE IB CLASS 2 STYLE IA
6. ● .045/.055 DIA PUNCH ALL HOLES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007527	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN C.A. Liestie DATE 29 OCT 64
CHECKED A. Lindstrom 13 Nov '64
APPROVAL J.M. Blyholl 2 DEC 64
APPROVAL D.A. Test 12/4/64

NASA APPROVAL W.J. Rhine 12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR, BOTTOM PHOTOGRAPHIC MASTER
BINARY CURRENT SWITCH

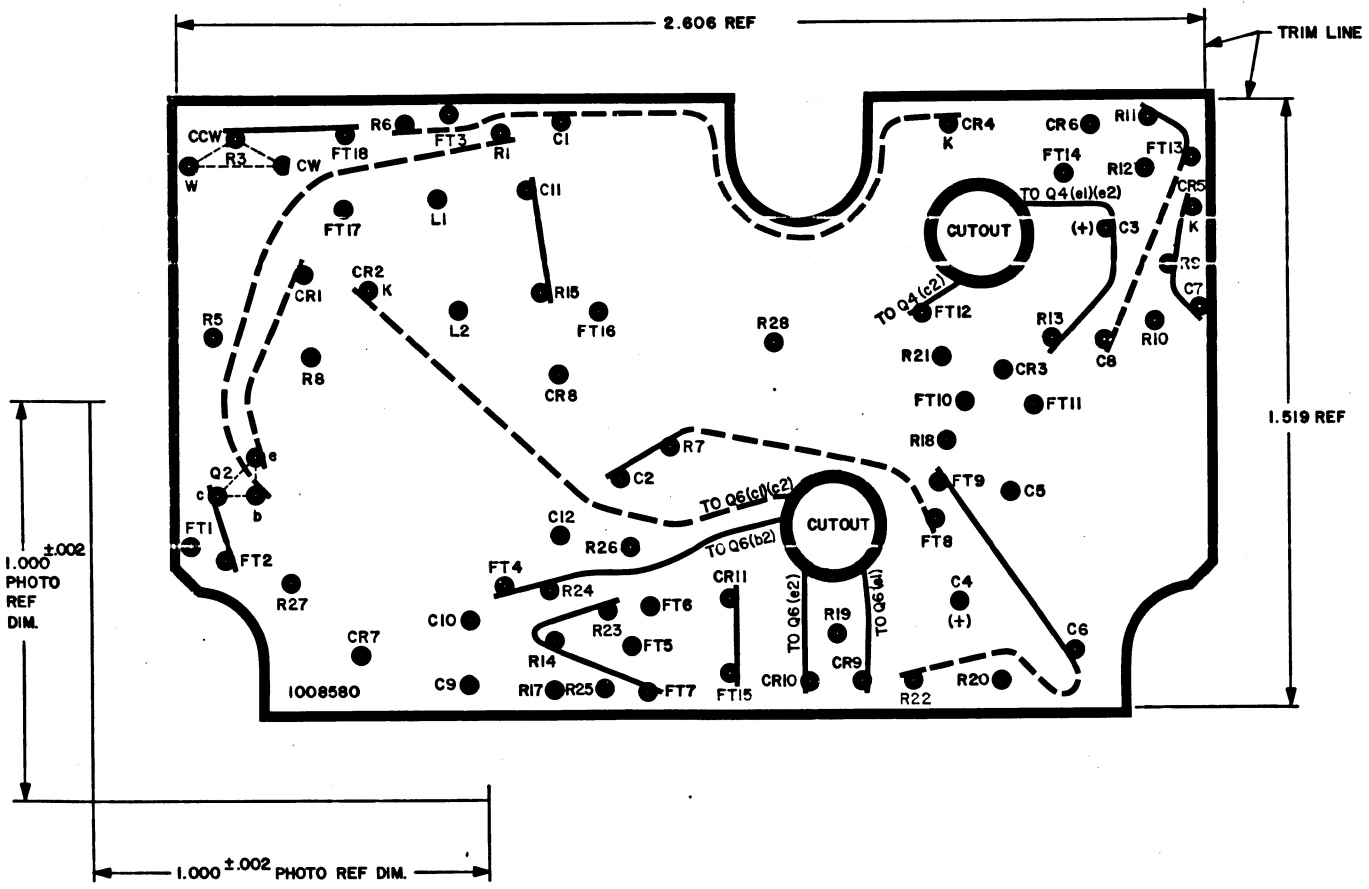
CODE IDENT NO	SIZE	NASA DRAWING NO
80230	D	1008580

SCALE 5/1 WT SHEET 1 OF 1

1008580 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14699			
SYM	DESCRIPTION	DATE	APPROVAL


2.606 REF
TRIM LINE
1.519 REF
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.
CCW
R3
W
CW
FT18
R6
FT3
R1
C1
C11
FT17
L1
CR4
K
CR6
R11
FT14
FT13
R12
CUTOUT
TO Q4(e1)(e2)
(+)
C3
CR5
K
R9
C7
CR1
CR2
K
R15
L2
FT16
R28
TO Q4(c2)
FT12
R13
R10
C8
R5
R8
CR8
R21
CR3
FT10
FT11
R18
Q2
e
c
b
R7
C2
FT9
C5
TO Q6(c1)(c2)
CUTOUT
TO Q6(b2)
C12
FT1
FT2
R26
FT8
FT4
R24
CR11
C4
(+)
R27
C10
R23
FT6
TO Q6(e2)
R19
TO Q6(e1)
C6
CR7
R14
FT5
CR10
CR9
R20
1008580
C9
R17
R25
FT7
FT15
R22

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340 TYPE IB CLASS 2 STYLE IA
6. ● .045/.055 DIA PUNCH ALL HOLES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007527	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 5
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN C. A. Lestic DATE 29 OCT 64
CHECKED A. Lindstrom 13 Nov 64
APPROVAL J. M. Dinphal 2 DEC 64
APPROVAL D. R. Test 12/4/64
NASA APPROVAL W. J. Rhine 12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR, BOTTOM PHOTOGRAPHIC MASTER

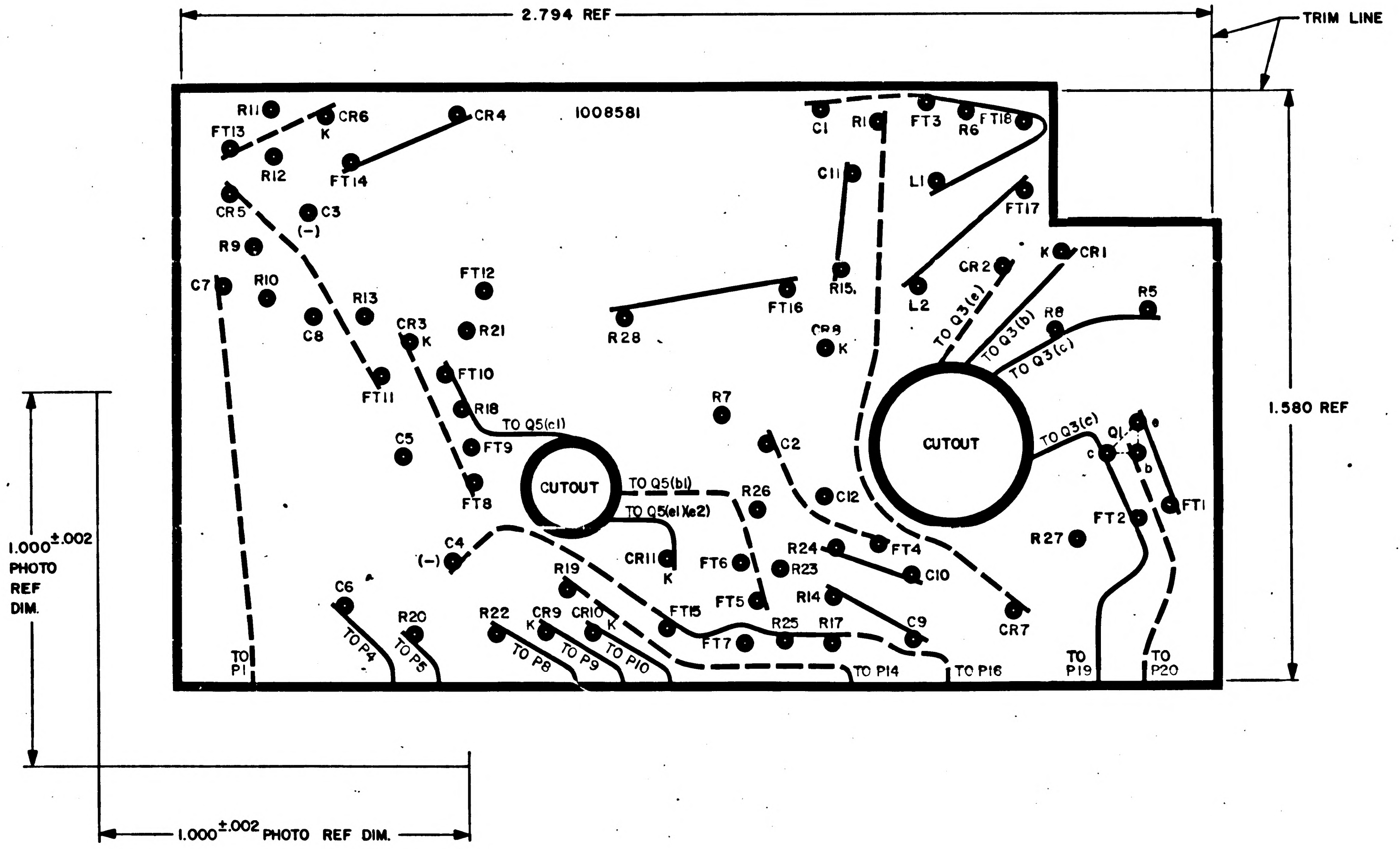
BINARY CURRENT SWITCH

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008580
SCALE 5/1
WT —
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 4699			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16828	5 MAR 65	A.N. CW


2.794 REF
TRIM LINE
1.580 REF
1.000±.002 PHOTO REF DIM.
1.000±.002 PHOTO REF DIM.
1008581
R11
CR6
K
CR4
FT13
R12
FT14
CR5
C3
(-)
R9
C7
R10
C8
R13
FT11
CR3
K
FT12
R21
FT10
R18
TO Q5(c1)
C5
FT9
FT8
CUTOUT
TO Q5(b1)
TO Q5(e1)(e2)
C4
(-)
C6
R20
R22
CR9
K
CR10
K
R19
CR11
K
TO P1
TO P4
TO P5
TO P8
TO P9
TO P10
R28
FT16
R7
C1
R1
FT3
R6
FT18
C11
L1
FT17
R15
L2
CR2
K
CR1
CR8
K
TO Q3(e)
TO Q3(b)
R8
TO Q3(c)
R5
CUTOUT
TO Q3(c)
Q1
e
c
b
FT1
FT2
R27
C2
C12
R26
R24
FT4
C10
FT6
R23
R14
FT5
FT15
R25
R17
C9
CR7
FT7
TO P14
TO P16
TO P19
TO P20

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340 TYPE IB CLASS 2 STYLE IA
6. ● .045/.055 DIA PUNCH ALL HOLES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

1007527	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS — ANGLES —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 5
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN C.A. Prestia DATE 2 NOV 64
CHECKED A. Lindstrom 13 Nov '64
J.M. BLYSHAK 3 DEC 64
APPROVAL
APPROVAL D.A. Test 12/9/64
NASA APPROVAL W. J. [illegible] 1/2/65
MIT APPROVAL W. Kupfer E. [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR, TOP PHOTOGRAPHIC MASTER

BINARY CURRENT SWITCH

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008581
SCALE 5/1
WT —
SHEET 1 OF 1

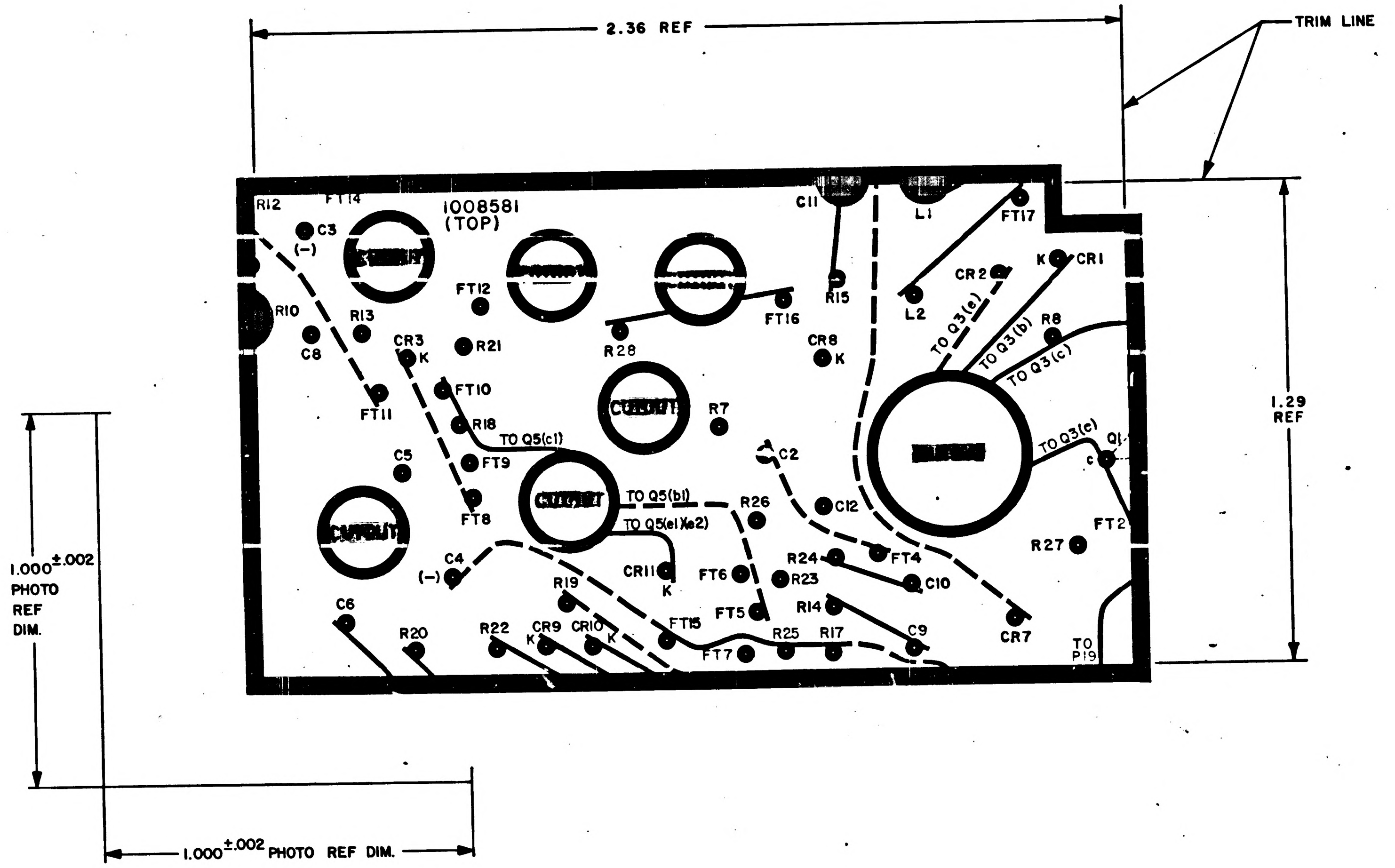
1008581 A

NOTICE -- WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 4699

(W) 6-11-65

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16828	5 MAR 65	A.N. CW
B	REVISED PER TDRR 19310	22 JUL 65	A.N. CW


2.36 REF
TRIM LINE
1.29 REF
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.
1008581 (TOP)
R12
FT14
C3
(-)
R10
C8
R13
FT11
CR3
K
R21
FT12
FT10
R18
TO Q5(c1)
FT9
C5
FT8
C4
(-)
C6
R20
R22
CR9
K
CR10
K
R19
R28
FT16
R7
TO Q5(b1)
TO Q5(e1)(e2)
CR11
K
FT6
FT5
FT15
FT7
R26
R25
R17
C11
R15
CR8
K
C2
C12
R24
R23
R14
FT4
C10
C9
L1
L2
FT17
CR2
K
CR1
R8
TO Q3(e)
TO Q3(b)
TO Q3(c)
TO Q3(c)
Q1
c
FT2
R27
CR7
TO P19

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340 TYPE IB CLASS 2 STYLE IA
6. ● .045/.055 DIA PUNCH ALL HOLES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007527	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ——— DECIMALS ± ——— ANGLES ± ———
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
HEAT TREATMENT ———
FINAL FINISH ———

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN C.A. Presti DATE 2 NOV 64
CHECKED A. Lindstrom 13 Nov 64
J. M. BLYTHAM 3 DEC 64
APPROVAL
APPROVAL D. A. Test 12/4/64
NASA APPROVAL W. J. Rhine 1/24-64
MIT APPROVAL W. Kupfer 8 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

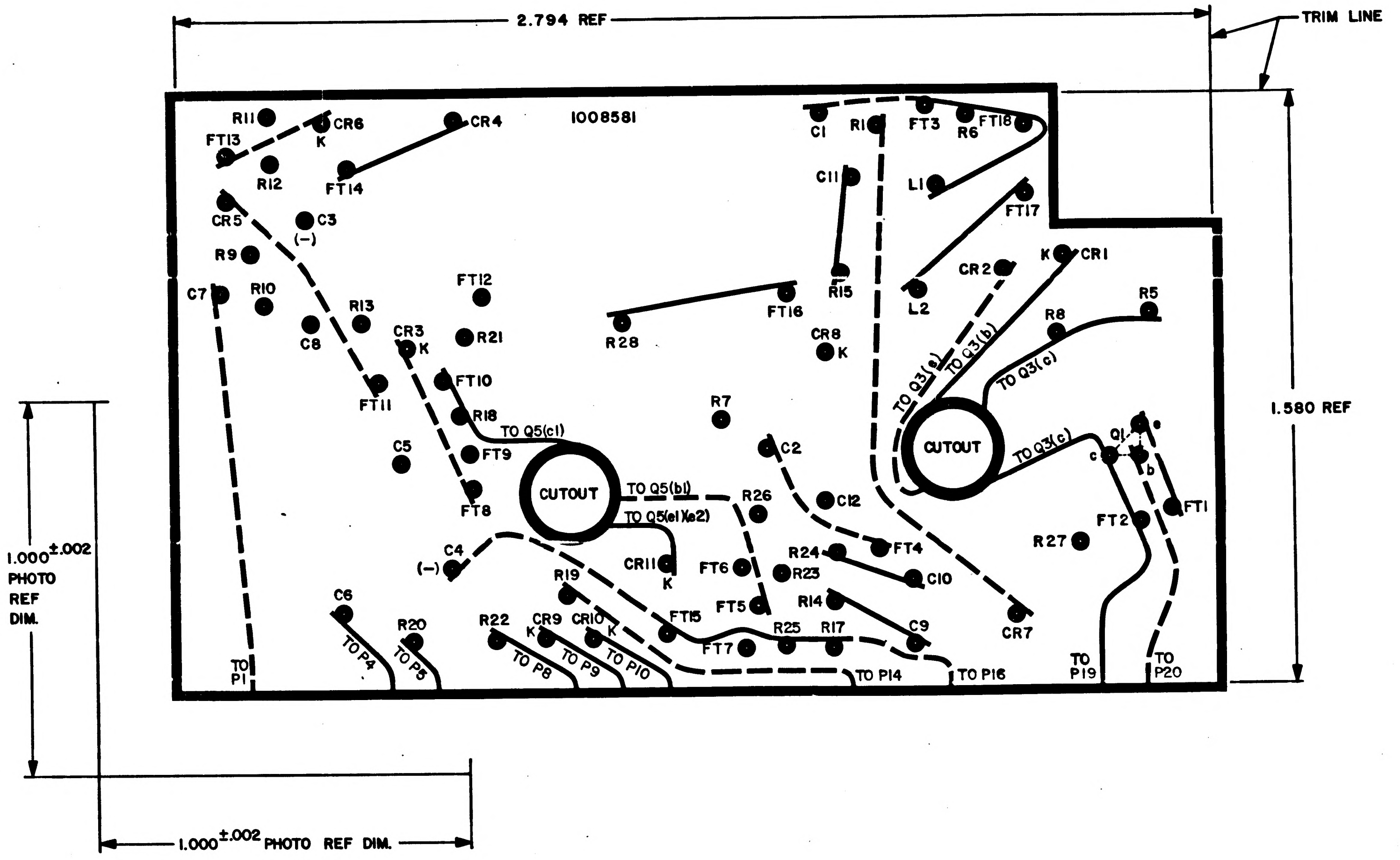
INSULATOR, TOP PHOTOGRAPHIC MASTER
BINARY CURRENT SWITCH

CODE IDENT NO. 80230
SIZE D
NASA DRAWING NO. 1008581
SCALE 5/1
WT ———
SHEET 1 OF 1

1008581 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14699			
SYM	DESCRIPTION	DATE	APPROVAL


2.794 REF
TRIM LINE
1.580 REF
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.
1008581
R11
CR6
K
CR4
FT13
R12
FT14
CR5
C3
(−)
R9
C7
R10
R13
C8
FT12
R21
CR3
K
FT10
FT11
R18
TO Q5(c1)
C5
FT9
FT8
CUTOUT
TO Q5(b1)
TO Q5(e1)(e2)
C4
(−)
R19
CR11
K
C6
R20
R22
CR9
K
CR10
K
FT15
TO P1
TO P4
TO P5
TO P8
TO P9
TO P10
R28
FT16
R7
C1
R1
FT3
R6
FT18
C11
L1
FT17
R15
L2
CR2
K
CR1
R5
CR8
K
R8
TO Q3(e)
TO Q3(b)
TO Q3(c)
CUTOUT
TO Q3(c)
Q1
e
c
b
FT1
FT2
R27
C2
R26
C12
FT6
R24
R23
FT4
C10
FT5
R14
R25
R17
C9
FT7
CR7
TO P14
TO P16
TO P19
TO P20

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340 TYPE IB CLASS 2 STYLE IA
6. ● .045/.055 DIA PUNCH ALL HOLES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007527	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE NOTE 5
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN C. A. Piestig DATE 2 Nov 64
CHECKED A. Lindstrom 13 Nov '64
J. M. BLYSHAK 3 DEC 64
APPROVAL
APPROVAL D. A. Test 12/4/64
NASA APPROVAL W J Rhine 12-8-64
MIT APPROVAL W Kupfer 8 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR, TOP PHOTOGRAPHIC MASTER

BINARY CURRENT SWITCH

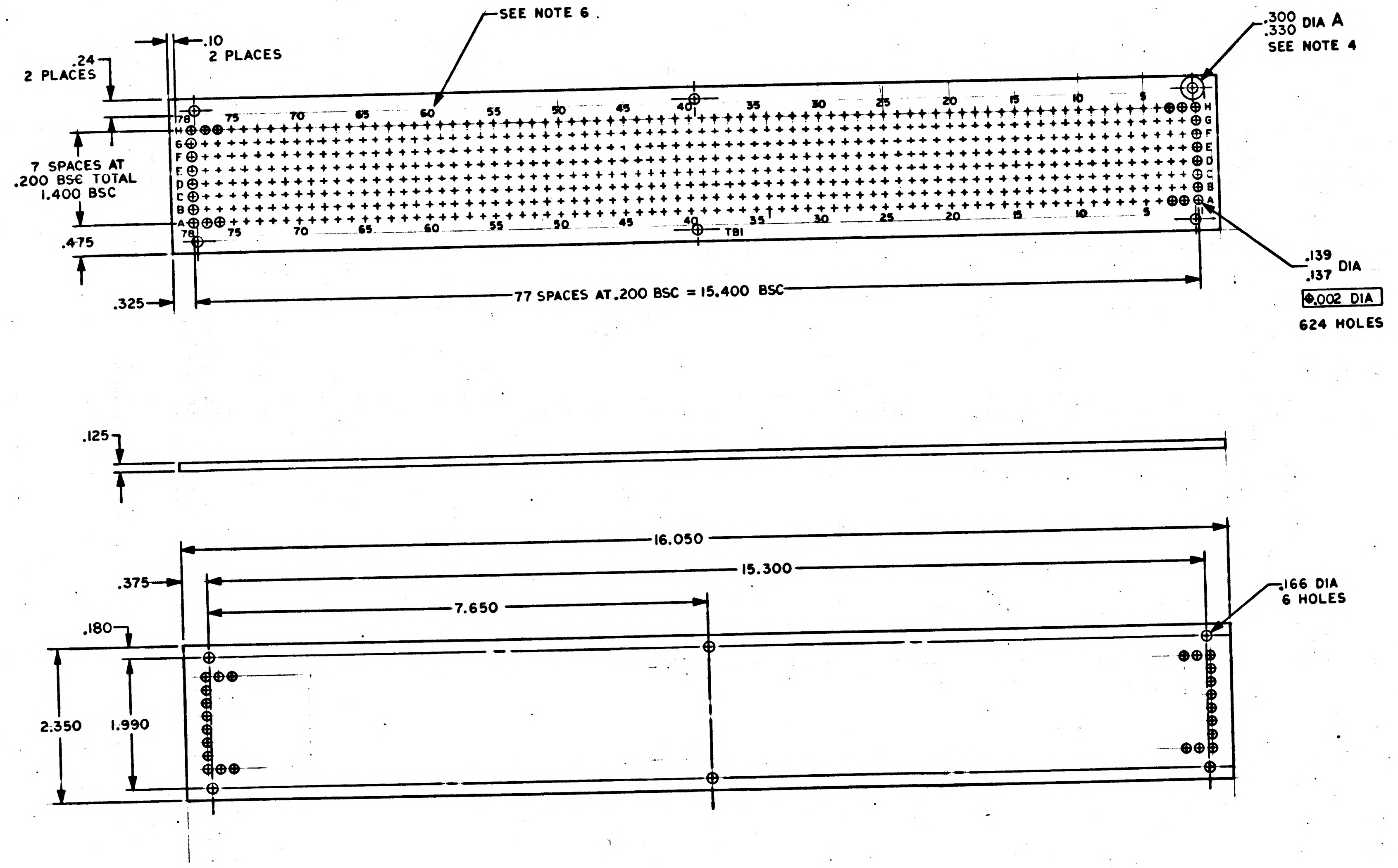
CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008581
SCALE 5/1
WT —
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

— WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA
D FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY
GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERN-
EREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER;
FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR
WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS
AS REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER
NG THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEY-
Y RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY
D INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14447

SYM	DESCRIPTION	DATE	APPROVAL


SEE NOTE 6
.10
2 PLACES
.24
2 PLACES
.300
.330 DIA A
SEE NOTE 4
7 SPACES AT
.200 BSC TOTAL
1.400 BSC
.475
.325
77 SPACES AT .200 BSC = 15.400 BSC
.139
.137 DIA
⌖.002 DIA
624 HOLES
H
G
F
E
D
C
B
A
78
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
1
TB1
.125
16.050
15.300
7.650
.375
.180
2.350
1.990
.166 DIA
6 HOLES

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: ALUMINUM ALLOY 6061-T6 PER QQ-A-250/11
3. FINISH: ANODIZE PER MIL-A-8625, TYPE II, DYED BLACK, SEE NOTE 4
4. DIA A TO BE FREE OF ANODIZE
5. REMOVE ALL BURRS AND BREAK SHARP EDGES .005/.015
6. MARK .060/.100 WHITE PER ND1002019

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007583	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.01 XXX .005
ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 3

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN P.B. Goguen DATE 13 AUG 64
CHECKED R. Lirkins 13 NOV 64
APPROVAL
APPROVAL D.R. Test 11/23/64
NASA APPROVAL
MIT APPROVAL W. Kupfer 24 Nov 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

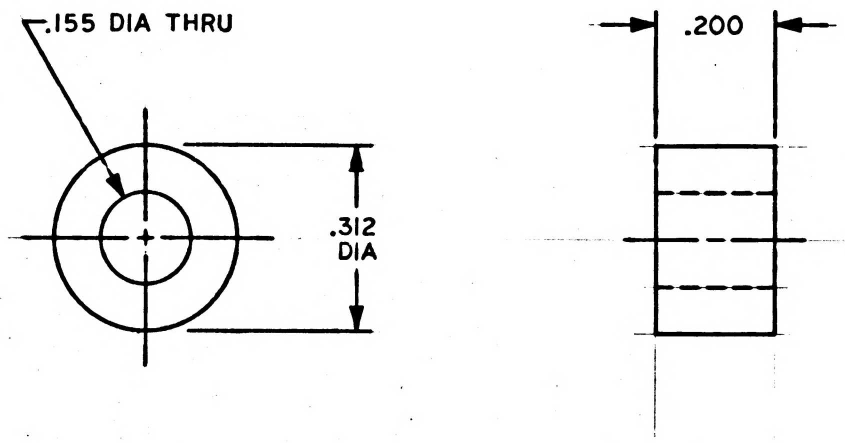
PLATE, CONNECTOR
624 PINS
PSA END CONNECTOR

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008582
SCALE 1/1
WT —
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14447

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: ALUMINUM ALLOY 6061-T6 PER QQ-A-250/11
3. UNLESS OTHERWISE SPECIFIED, 125√ ALL OVER
4. REMOVE ALL BURRS AND BREAK SHARP EDGES .005 TO .015
5. FINISH: ANODIZE PER MIL-A-8625, TYPE II, DYED BLACK

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —
DECIMALS ±.005
ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

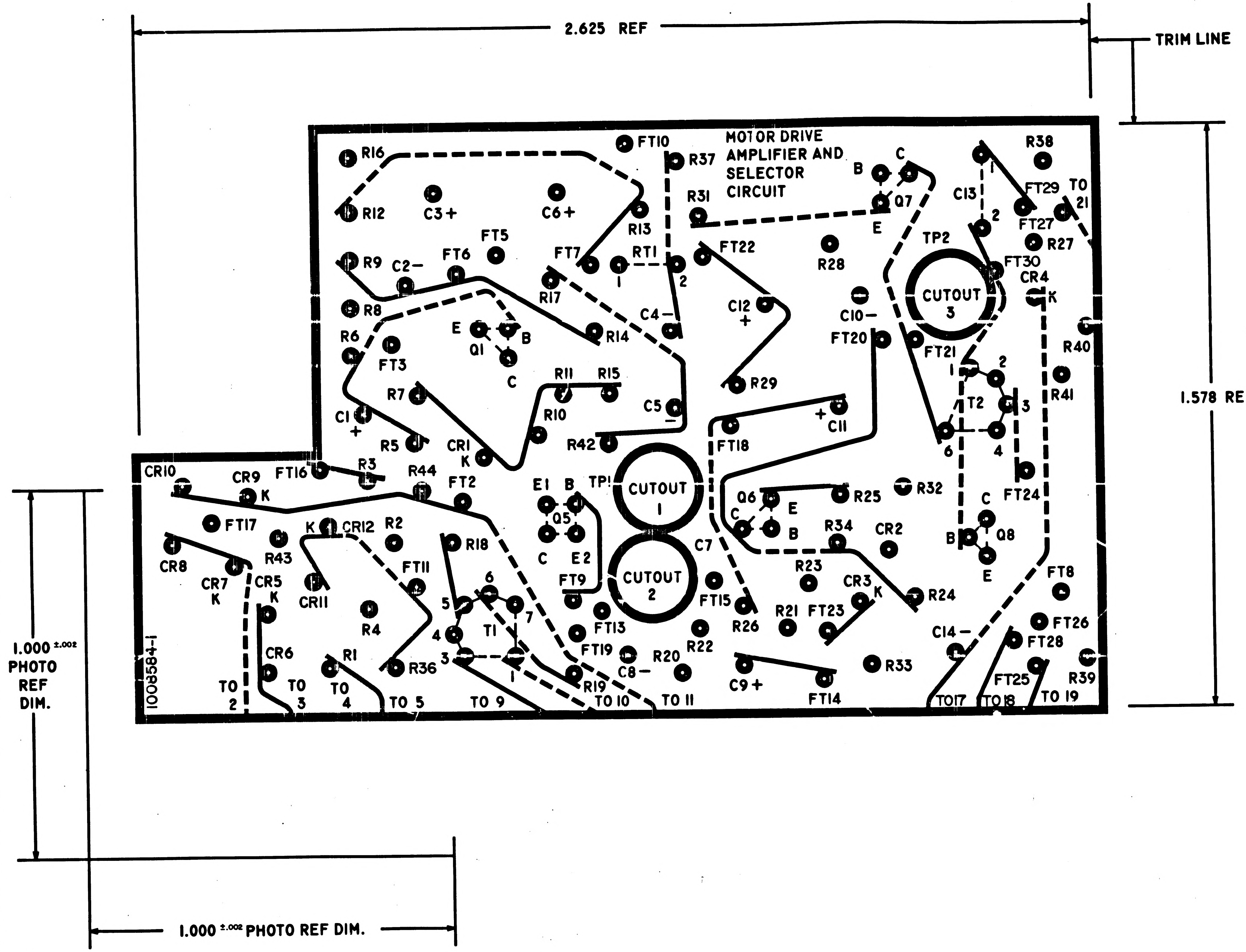
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Ken Healy 3 NOV 64
CHECKED 3 NOV 64
APPROVED
APPROVED D. R. Test 11/23/64
APPROVED MIT W. Cufer 24 Nov 64
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SPACER
PSA END CONNECTOR

CODE IDENT NO. —
SIZE C
DRAWING NO. 1008583
SCALE 5/1
SHEET 1 OF 1


2.625 REF
TRIM LINE
1.578 REF
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT
1008584-1
CUTOUT 1
CUTOUT 2
CUTOUT 3
TP1
TP2
R16
R12
R9
R8
R6
C3+
C6+
FT5
FT6
C2−
FT3
E
B
C
Q1
R7
C1
+
R5
CR1
K
R11
R15
R10
R42
C5
FT10
R37
R31
R13
FT7
RT1
1
2
R17
R14
C4−
FT22
C12
+
R29
R28
C10−
FT20
+ C11
FT18
B
C
Q7
E
C13
1
2
R38
FT29
TO 21
FT27
R27
FT30
CR4
K
FT21
R40
R41
T2
1
2
3
4
6
FT24
C
Q8
B
E
FT8
FT26
FT28
CR10
CR9
K
FT16
R3
R44
FT2
FT17
K
CR12
R2
R18
CR8
R43
CR7
K
CR5
K
CR11
FT11
R4
CR6
R1
R36
T1
1
3
4
5
6
7
E1
B
Q5
C
E2
FT9
FT13
FT19
C8−
R20
R22
R19
C7
FT15
R26
R21
FT23
CR3
K
R24
Q6
C
E
B
R25
R32
R34
CR2
R23
C9+
FT14
R33
C14−
FT25
R39
TO 2
TO 3
TO 4
TO 5
TO 9
TO 10
TO 11
TO 17
TO 18
TO 19

NOTES -

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL FILM .006/.008 THICK L-F-340 TYPE, IB, CLASS 2, STYLE IA.
3. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY DEMENSIONAL STABILITY SHALL NOT EXCEED .001 PER INCH
4. CUT TO WITHIN .010 OF TRIMLINE.
5. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
6. BROKEN LINES DENOTE SLEEVING.
7. ● PUNCH ALL HOLES $^{.048}_{.050}$ DIAMETER

1007557	
NEXT ASSY	USED ON
APPLICATION	

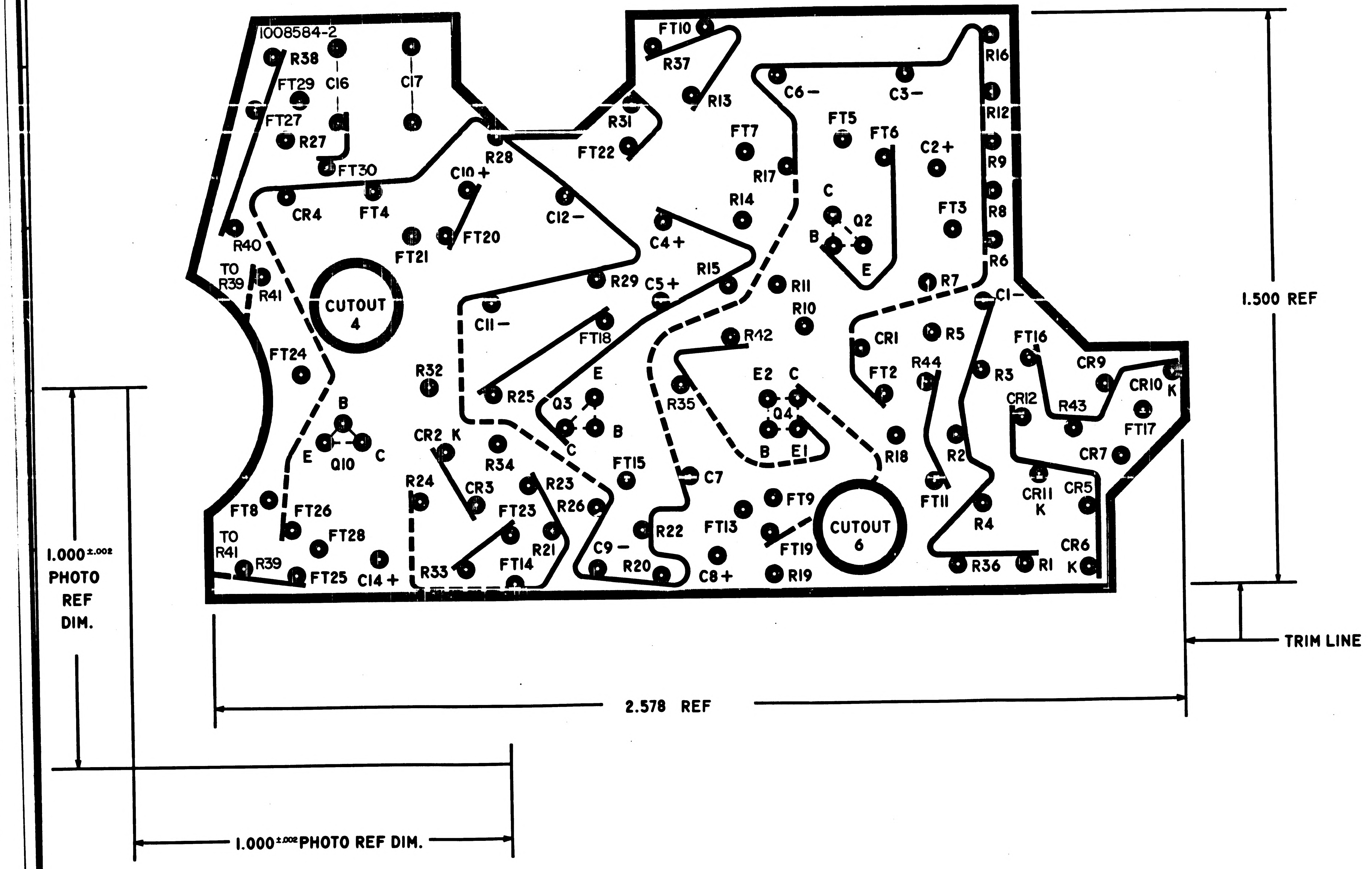
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± . ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION GMC
MILWAUKEE WISCONSIN
ACSP PN
DRAWN G. Munson DATE
CHECKED
APPROVAL E. J. Siolek 17 Nov 64
APPROVAL 11/17/64
NASA APPROVAL
MIT APPROVAL 17 Nov 64

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

INSULATOR
PHOTOGRAPHIC MASTER
MOTOR DRIVE AMPLIFIER AND
SELECTOR CIRCUIT

CODE IDENT NO
SIZE E
1008584
SCALE 10:1
SHEET 1 OF 1


1008584-2
R38
C16
C17
FT29
FT27
R27
FT30
CR4
FT4
R40
TO R39
R41
CUTOUT 4
FT24
B
E
Q10
C
FT8
FT26
FT28
TO R41
R39
FT25
C14 +
R28
C10 +
FT20
FT21
C12 –
R29
C11 –
R32
FT18
R25
CR2 K
R34
CR3
R24
R23
FT23
R26
R21
R33
FT14
FT10
R37
R13
R31
FT22
FT7
R17
R14
C4 +
R15
C5 +
Q3
E
B
C
FT15
R35
C7
R22
FT13
C9 –
R20
C8 +
C6 –
C3 –
FT5
FT6
C2 +
C
Q2
B
E
FT3
R11
R10
R42
E2
C
Q4
B
E1
R18
FT9
FT19
R19
CUTOUT 6
R16
R12
R9
R8
R6
R7
C1 –
CR1
R5
FT2
R44
R3
FT16
CR9
CR10
K
R43
CR12
FT17
R2
CR7
FT11
CR11
K
CR5
R4
R36
R1
CR6
K
1.500 REF
TRIM LINE
2.578 REF
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.

1007557	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE WISCONSIN
ACSP PN
DRAWN W. Munson DATE 13 NOV 64
CHECKED
APPROVAL [illegible] 17 Nov 64
APPROVAL D. [illegible] 11/17/64
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 17 Nov 64

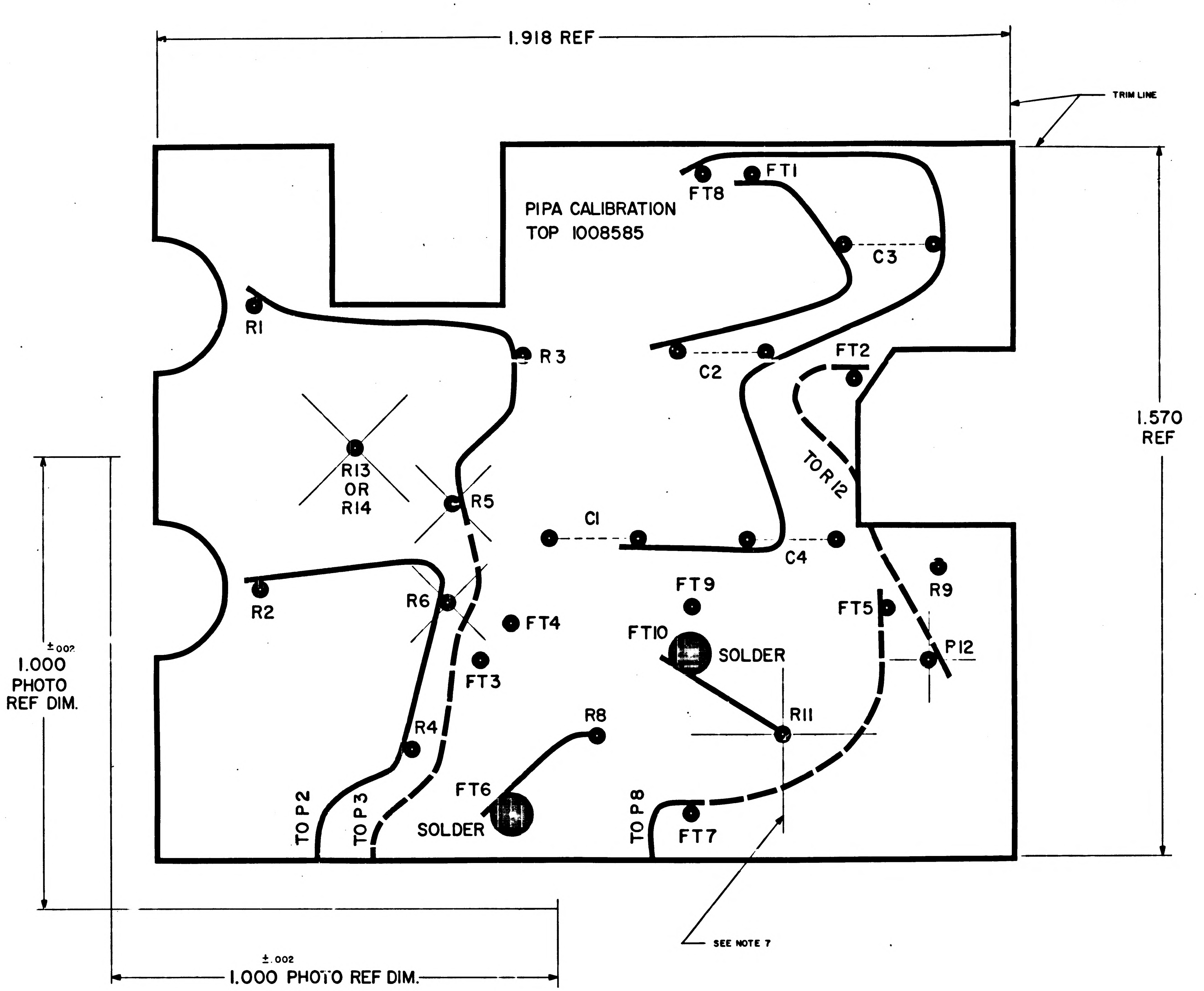
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

INSULATOR PHOTOGRAPHIC MASTER MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT

CODE IDENT NO
SIZE E
1008584
SCALE 10:1
SHEET 2 OF 2

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 17628	A.N.		25 MAR 65	



1.918 REF
TRIM LINE
PIPA CALIBRATION
TOP 1008585
FT1
FT8
C3
R1
R3
C2
FT2
R13
OR
R14
R5
TO R12
1.570
REF
C1
C4
R2
R6
FT9
FT5
R9
FT4
FT10
SOLDER
P12
±.002
1.000
PHOTO
REF DIM.
FT3
R4
R8
R11
FT6
TO P2
TO P3
SOLDER
TO P8
FT7
SEE NOTE 7
±.002
1.000 PHOTO REF DIM.

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL - D - 70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340, TYPE IB, CLASS 2, STYLE IA
6. ● .045/.055 DIA PUNCH EXCEPT FT6 AND FT10 TO BE .109 DIA
7. CUT ALONG LINES AS SHOWN TO ALLOW COMPONENTS TO BE REMOVED, 5 PLACES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007509	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN	I. Crowley	10 Nov 64
CHECKED		
APPROVED	J. M. BEYSHAK	3 DEC 64
APPROVED	B. M. Test	4/64
APPROVED MIT	W. Koffer	
APPROVED MSC		
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR TOP
PHOTOGRAPHIC MASTER
PIPA CALIBRATION MODULE

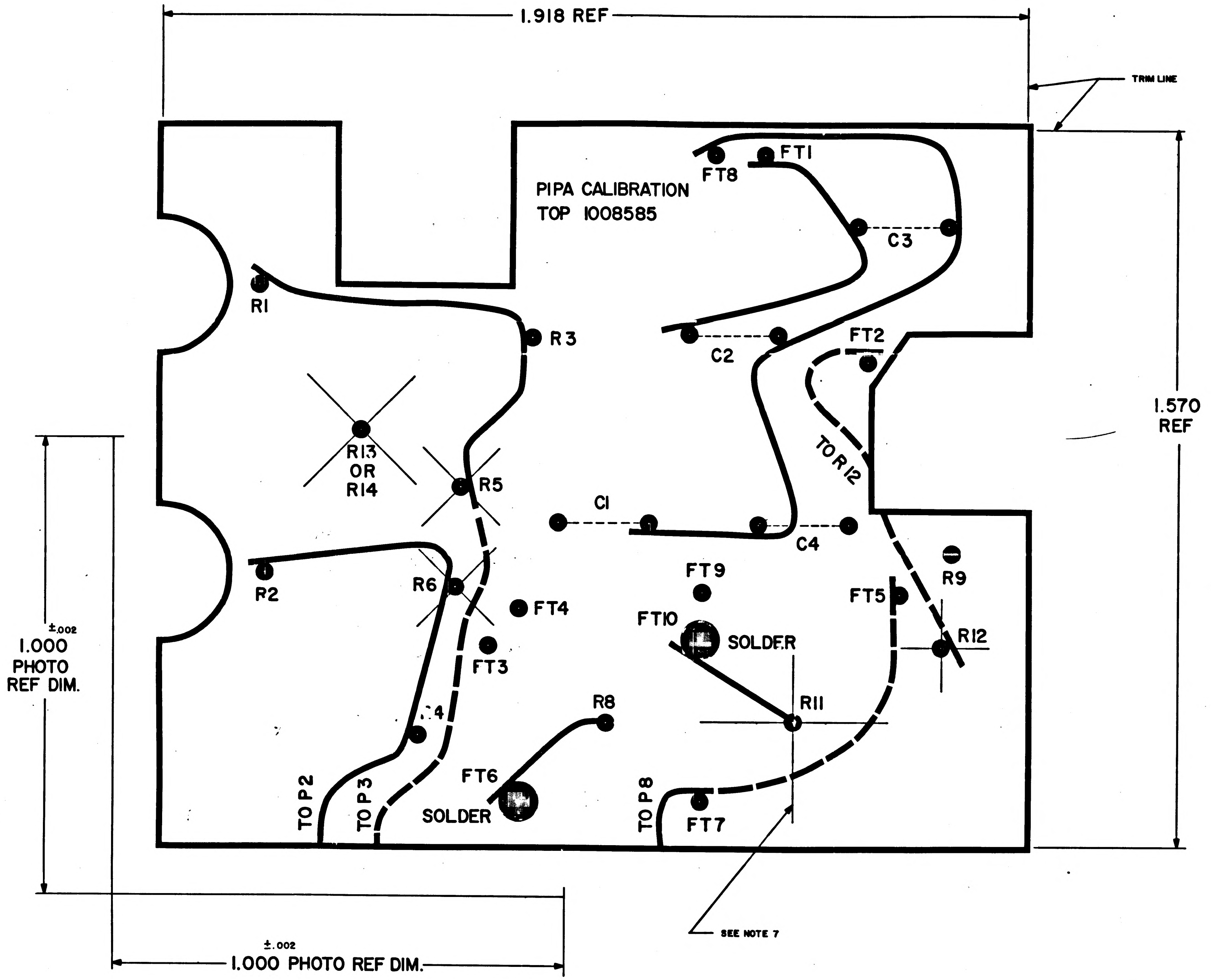
CODE IDENT NO	SIZE	DRAWING NO
	E	1008585

SCALE 10/1
SHEET 1 OF 1

1008585 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14705						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


1.918 REF
TRIM LINE
PIPA CALIBRATION
TOP 1008585
FT1
FT8
C3
R1
R3
C2
FT2
1.570
REF
R13
OR
R14
R5
TO R12
C1
C4
R2
R6
FT4
FT9
FT5
R9
±.002
1.000
PHOTO
REF DIM.
FT10
SOLDER
R12
FT3
R11
4
R8
FT6
SOLDER
TO P2
TO P3
TO P8
FT7
SEE NOTE 7
±.002
1.000 PHOTO REF DIM.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340, TYPE IB, CLASS 2, STYLE IA
6. ● .046/.056 DIA PUNCH
7. CUT ALONG LINES AS SHOWN TO ALLOW COMPONENTS TO BE REMOVED, 5 PLACES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007509	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 5

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

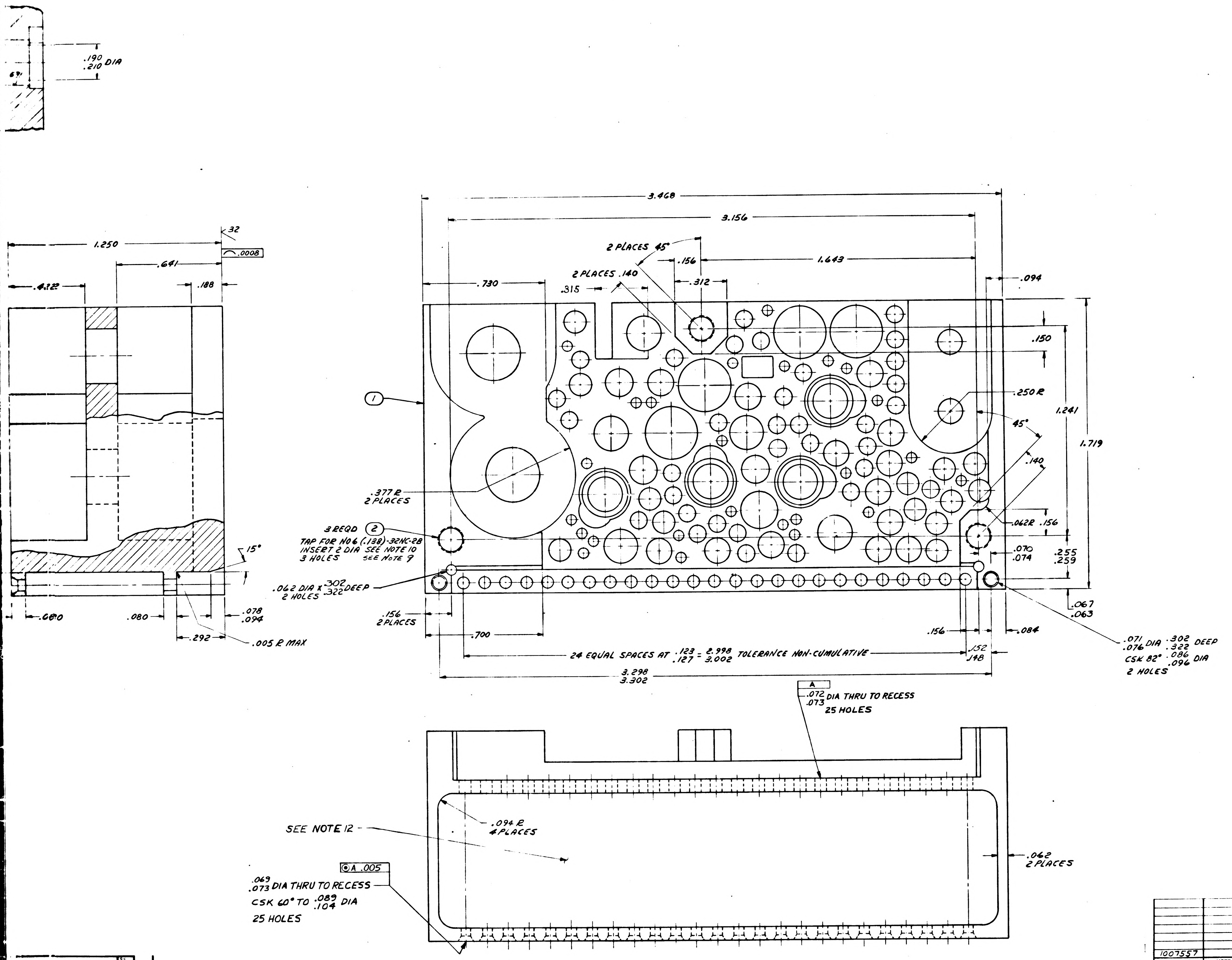
DRAWN 10 Nov 64
CHECKED
APPROVED J.M. BLYSHAK 3 Dec 64
APPROVED 12/4/64
APPROVED MIT
APPROVED MSC 12-8-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR TOP
PHOTOGRAPHIC MASTER
PIPA CALIBRATION MODULE

CODE IDENT NO.
SIZE E
DRAWING NO. 1008585
SCALE 10/1
SHEET 1 OF 1

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A		REVISED PER TDRR 19360		2 … 65	



.190
.210 DIA
1.250
.641
.188
.422
32
.0008
15°
.078
.094
.080
.080
.292
.005 R MAX
3.468
3.156
2 PLACES 45°
.156
1.643
2 PLACES .140
.312
.730
.315
.094
.150
.250 R
1.241
1.719
45°
.140
①
.377 R
2 PLACES
3 REQD ②
TAP FOR NO 6 (.138)-32NC-2B
INSERT 2 DIA SEE NOTE 10
3 HOLES SEE NOTE 9
.062 DIA X .302 .322 DEEP
2 HOLES
.062R .156
.070
.074
.255
.259
.067
.063
.156
2 PLACES
.700
.156
.084
24 EQUAL SPACES AT .123 .127 = 2.998 3.002 TOLERANCE NON-CUMULATIVE
.152
.148
3.298
3.302
.071 DIA .076 .302 .322 DEEP
CSK 82° .086 .096 DIA
2 HOLES
A
.072 .073 DIA THRU TO RECESS
25 HOLES
SEE NOTE 12
.094 R
4 PLACES
.062
2 PLACES
⊚ A .005
.069 .073 DIA THRU TO RECESS
CSK 60° TO .089 .104 DIA
25 HOLES

ITEM NO	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
2	3	MS21209-C0620	INSERT, SCREW-LOCKING
1	1	1008586-1	HEATSINK

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1007557	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ − XX ± .02 + ½°
− − XXX ± .005 − ½°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN W. Munson DATE 10 NOV 64
CHECKED
APPROVAL 17 Nov 64
APPROVAL D. B. … 11/17/64
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

HEATSINK -
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT

CODE IDENT NO 80230
SIZE J
1008586
SCALE 5:1
SHEET 1

1008586

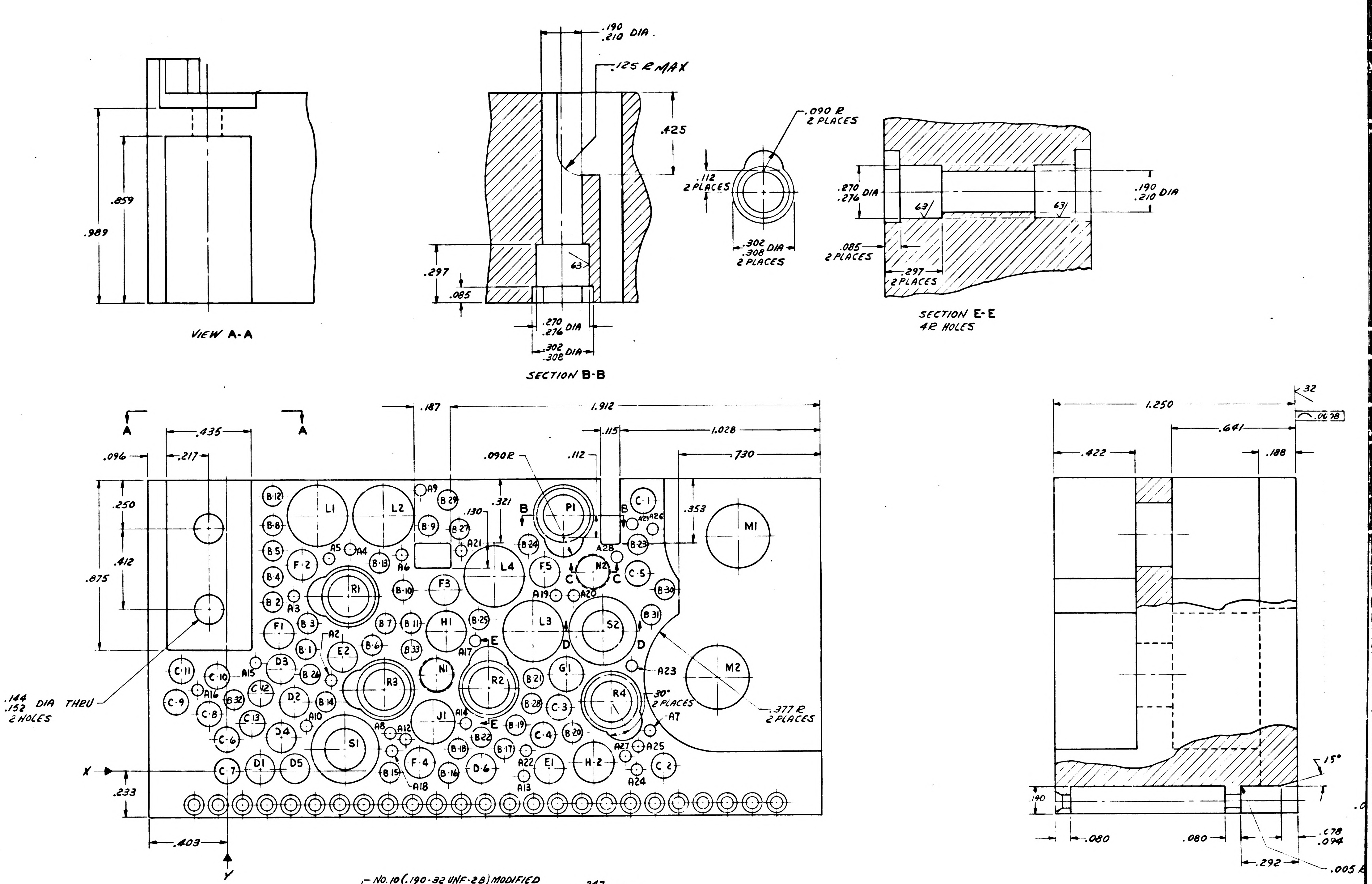
2-/-1008586

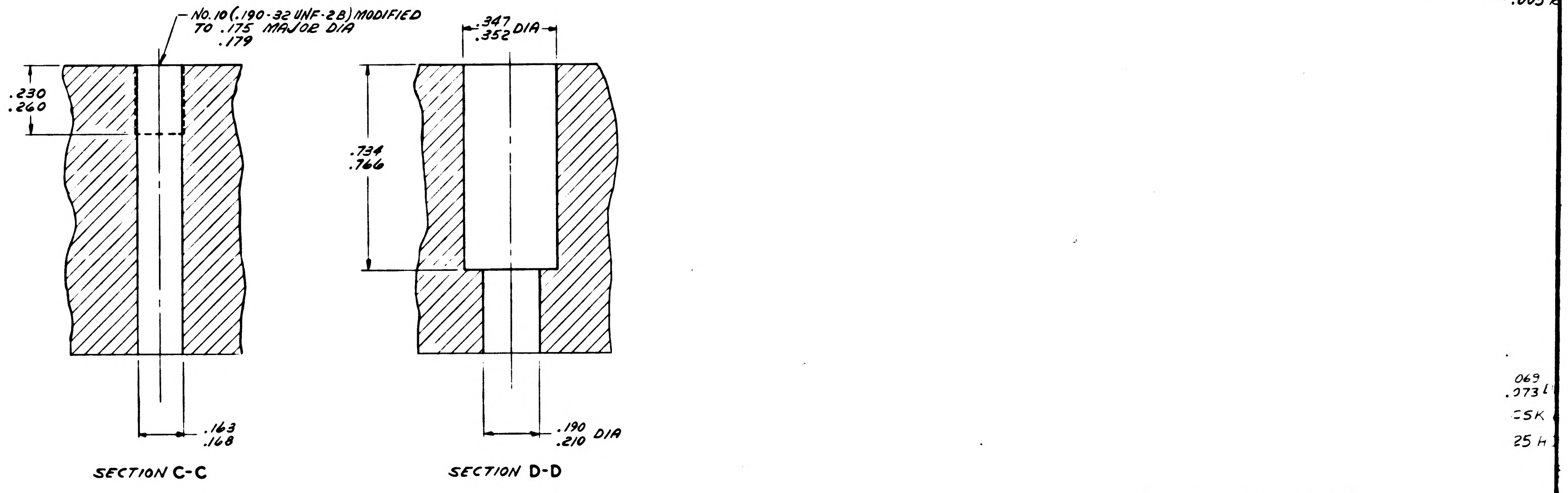
SEE NOTE 13

HOLE IDENT	X DIM	Y DIM		HOLE DIA	QTY
A1				.058 .062	27
A2	0.540	0.460			
A3	0.350	0.890			
A4	0.640	1.130			
A5	0.530	1.080			
A6	0.900	1.100			
A7	2.180	0200			
A8	0.840	0.190			
A9	1.000	1.430			
A10	0.410	0.230			
A11					
A12	0.920	0.160			
A13	1.530	-0.030			
A14	1.230	0.240			
A15	0.150	0.550			
A16	-0.150	0.410			
A17	1.280	0.660			
A18	0.850	0.100			
A19	1.700	0.890			
A20	1.790	0.890			
A21	1.210	1.120			
A22	1.540	0.100			
A23	2.090	0.530			
A24	2.110	0.000			
A25	2.120	0.120			
A26	2.200	1.230			
A27	2.050	0.070			
A28	2.010	1.080			
A29	2.090	1.250			
B1	0.410	0.620		.100 .104	33
B2	0.240	0.860			
B3	0.420	0.750			
B4	0.240	0.990			
B5	0.240	1.120			
B6	0.750	0.640			
B7	0.820	0.750			
B8	0.240	1.250			
B9	1.040	1.250			
B10	0.910	0.920			
B11	0.950	0.750			
B12	0.240	1.400			
B13	0.790	1.060			
B14	0.510	0.350			
B15	0.840	-0.010			
B16	1.140	-0.010			
B17	1.430	0.110			
B18	1.190	0.110			
B19	1.490	0.230			
B20	1.780	0.190			
B21	1.580	0.470			
B22	1.310	0.170			
B23	2.120	1.150			
B24	1.560	1.150			
B25	1.300	0.770			
B26	0.430	0.490			
B27	1.200	1.230			
B28	1.570	0.340			
B29	1.140	1.380			
B30	2.260	0.920			
B31	2.190	0.790			
B32	0.035	0.365			
B33	0.950	0.615			
C1	2.150	1.370		.127 .131	5
C2	2.250	0.020			
C3	1.710	0.320			
C4	1.630	0.180			
C5	2.120	1.000			

SEE NOTE 13

HOLE IDENT	X DIM	Y DIM		HOLE DIA	QTY
C6	0.000	0.160		.127 .131	8
C7	0.000	0.000			
C8	-0.090	0.290			
C9	-0.260	0.350			
C10	-0.050	0.480			
C11	-0.230	0.510			
C12	0.173	0.395			
C13	0.130	0.245			
D1	0.170	0.010		.146 .150	6
D2	0.350	0.350			
D3	0.280	0.520			
D4	0.280	0.170			
D5	0.350	0.010			
D6	1.310	0.010			
E1	1.660	0.010		.151 .155	2
E2	0.600	0.580			
F1	0.270	0.700		.153 .157	5
F2	0.390	1.050			
F3	1.120	0.920			
F4	0.990	0.040			
F5	1.640	1.010			
G1	1.750	0.490		.165 .169	1
H1	1.130	0.710		.202 .205	2
H2	1.890	0.040			
J1	1.060	0.250		.220 .224	1
L1	0.470	1.300		.306 .313	4
L2	0.810	1.300			
L3	1.580	0.710			
L4	1.380	0.990			
M1	2.640	1.190		.321 .327	2
M2	2.530	0.470			
N1	1.080	0.490		SEE SECT C-C	2
N2	1.890	1.010			
P1	1.740	1.300		SEE SECT B-B	1
R1	0.630	0.890		SEE SECT E-E	4
R2	1.350	0.420			
R3	0.810	0.410			
R4	1.980	0.350			
S1	0.610	0.110		SEE SECT D-D	2
S2	1.940	0.710			


VIEW A-A
.859
.989
.190 .210 DIA.
.125 R MAX
.425
.297
.085
63
.270 .276 DIA
.302 .308 DIA
SECTION B-B
.090 R 2 PLACES
.112 2 PLACES
.302 .308 DIA 2 PLACES
.270 .276 DIA
.190 .210 DIA
63
.085 2 PLACES
.297 2 PLACES
SECTION E-E 4R HOLES
A A
.435
.096
.217
.187
1.912
.115
1.028
.090R
.112
.730
.321
.130
.353
.250
.412
.875
.233
.403
X
Y
B B
C C
D D
E E
.144 .152 DIA THRU 2 HOLES
30° 2 PLACES
.377 R 2 PLACES
L1 L2 L3 L4 M1 M2 N1 N2 P1 R1 R2 R3 R4 S1 S2 J1 H1 H-2 G1 E1 E2 F1 F-2 F3 F-4 F5 D1 D2 D3 D4 D5 D-6 C-1 C2 C-3 C-4 C-5 C-6 C-7 C-8 C-9 C-10 C-11 C12 C13
A2 A3 A4 A5 A6 A7 A8 A9 A10 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25 A26 A27 A28
B1 B2 B3 B4 B5 B-6 B7 B8 B9 B-10 B11 B12 B13 B14 B15 B-16 B17 B-18 B-19 B20 B21 B22 B23 B24 B25 B26 B27 B28 B29 B30 B31 B32 B33
1.250
32
.0008
.641
.422
.188
15°
.140
.080
.080
.292
.078 .094
.005


NO. 10 (.190-32 UNF-2B) MODIFIED TO .175 MAJOR DIA .179
.230 .260
.163 .168
SECTION C-C
.347 .352 DIA
.734 .766
.190 .210 DIA
SECTION D-D
.069 .073
CSK
25

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5 PER QQ-M-31A.
3. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX.
4. FLATNESS TO BE WITHIN .010.
5. UNLESS OTHERWISE SPECIFIED SURFACE ROUGHNESS MUST NOT EXCEED 125√.
6.
7. ALL FLAT SURFACES TO BE SQUARE AND OR PARALLEL WITHIN .010.
8. REMOVE ALL BURRS AND BREAK SHARP EDGES .005-.015.
9. COAT THREADS AND ITEM NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER.
10. INSTALL ITEM NO 2 PER MS 33646, BREAK OFF DRIVING TANG
11. FINISH: PLUG INSERT HOLES AND ANODIZE PER MIL-M-45202, TYPE I, CLASS "C".
12. IDENTIFY USING PART NO. AND REV LETTER PER ND1002019
13. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR ON AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART
14. APPLY A 31 MIN WIDTH PERIMETER OF ADHESIVE AND COATING MATERIAL PER ND1002187 TYPE II TO THE TWO SURFACES WITH COMPONENT HOLES WHICH ARE .188 AND 1.25 FROM THE HELICOIL MOUNTING SURFACE.

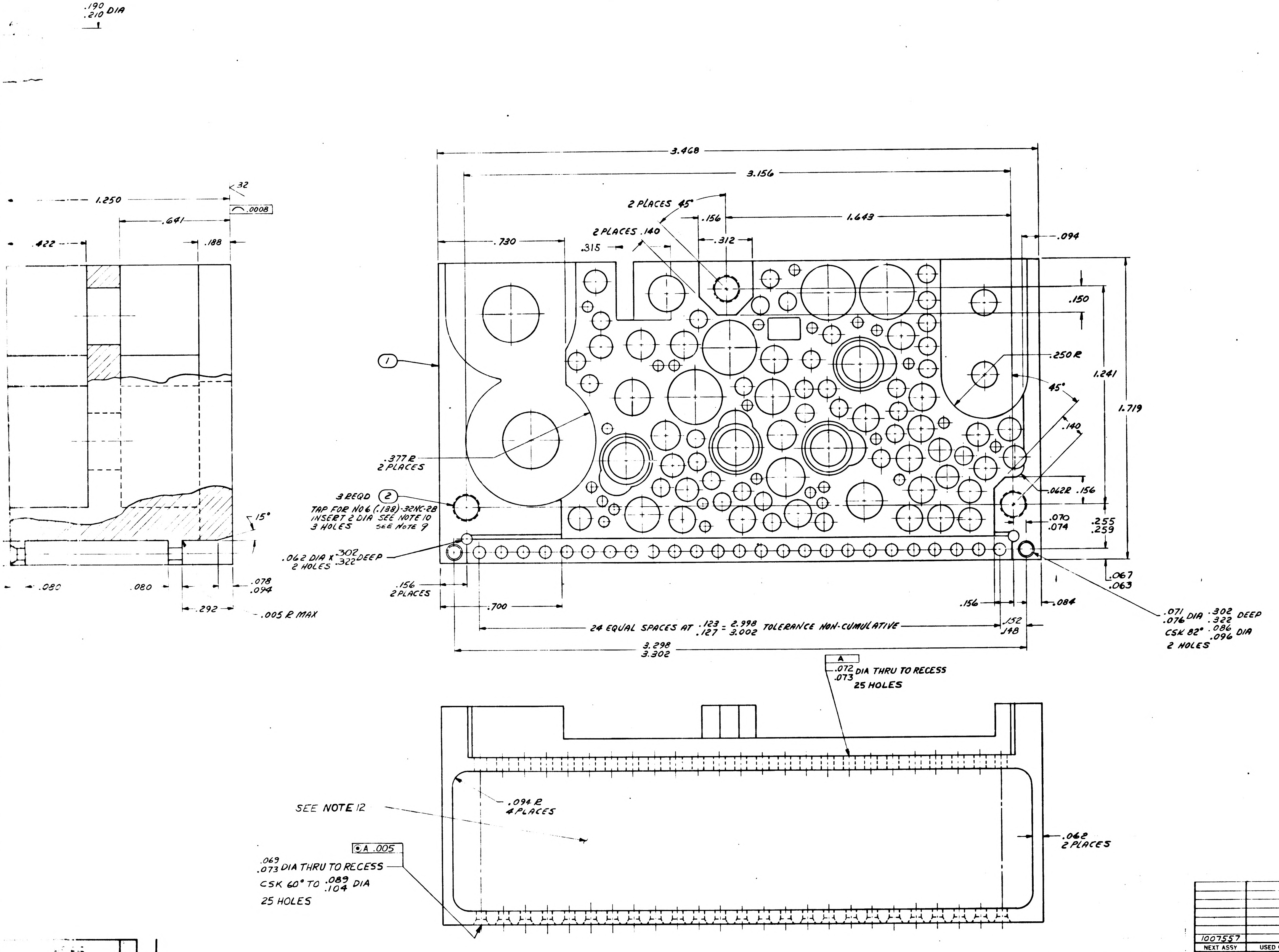
1008586

MIL 1050J2 D

1/1008586

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A		REVISED PER TDRR 19960		2 JUN 65	
B		REVISED PER TDRR 24554			



.190
.210 DIA
1.250
32
.0008
.641
.422
.188
15°
.080
.080
.078
.094
.292
.005 R MAX
3.468
3.156
2 PLACES 45°
.156
1.643
2 PLACES .140
.730
.315
.312
.094
.150
1
.250 R
1.241
1.719
45°
.140
.377 R
2 PLACES
3 REQD
2
TAP FOR NO 6 (.138)-32NC-2B
INSERT 2 DIA SEE NOTE 10
3 HOLES SEE NOTE 9
.062 R .156
.070
.074
.255
.259
.062 DIA X .302 .322 DEEP
2 HOLES
.067
.063
.156
2 PLACES
.700
.156
.084
.071 .076 DIA .302 .322 DEEP
CSK 82° .086 .096 DIA
2 HOLES
24 EQUAL SPACES AT .123 .127 = 2.998 3.002 TOLERANCE NON-CUMULATIVE
.152
.148
3.298
3.302
A
.072 .073 DIA THRU TO RECESS
25 HOLES
SEE NOTE 12
.094 R
4 PLACES
.062
2 PLACES
A .005
.069 .073 DIA THRU TO RECESS
CSK 60° TO .089 .104 DIA
25 HOLES

ITEM NO	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
2	3	MS21209-C0620	INSERT, SCREW-LOCKING
1	1	1008586-1	HEATSINK

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1007557	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ − XX ± .02 + 1/2°
− − XXX ± .005 − 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN W. Munson DATE 10 NOV 64
CHECKED
APPROVAL 17 NOV 64
APPROVAL 11/17/64
NASA APPROVAL
MIT APPROVAL 17 Nov 64

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

HEATSINK -
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT

CODE IDENT NO 80230
SIZE J
1008586
SCALE 5:1

1008586 B

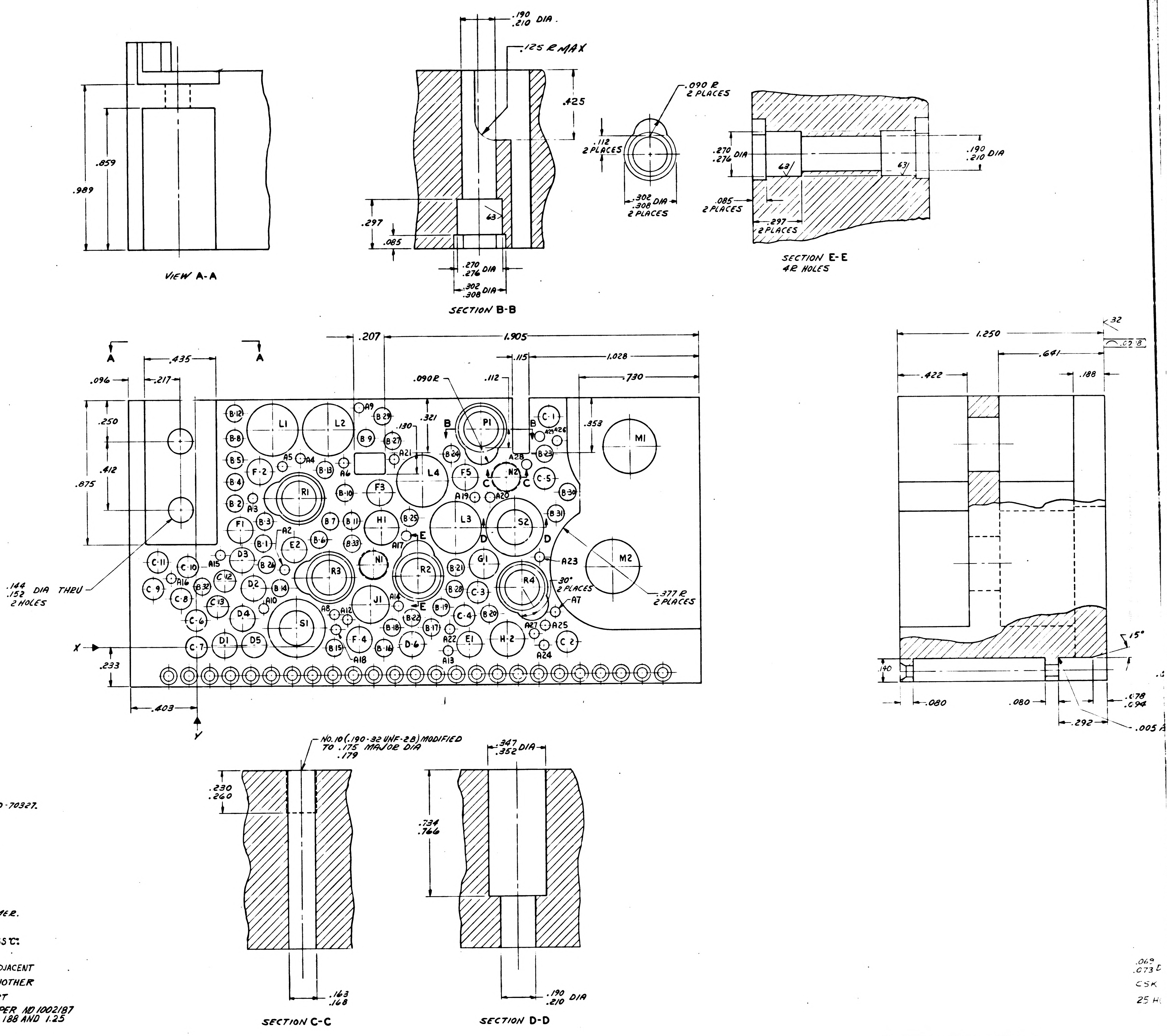
2/1008586

SEE NOTE 13

HOLE IDENT	X DIM	Y DIM		HOLE DIA	QTY
A1				.058 .062	27
A2	0.540	0.460			
A3	0.350	0.890			
A4	0.640	1.130			
A5	0.530	1.080			
A6	0.900	1.100			
A7	2.180	0200			
A8	0.840	0.190			
A9	1.000	1.430			
A10	0.410	0.230			
A11					
A12	0.920	0.160			
A13	1.530	-0.030			
A14	1.230	0.240			
A15	0.150	0.550			
A16	-0.150	0.410			
A17	1.280	0.660			
A18	0.850	0.100			
A19	1.700	0.890			
A20	1.790	0.890			
A21	1.210	1.120			
A22	1.540	0.100			
A23	2.090	0.530			
A24	2.110	0.000			
A25	2.120	0.120			
A26	2.200	1.230			
A27	2.050	0.070			
A28	2.010	1.080			
A29	2.090	1.250			
B1	0.410	0.620		.100 .104	33
B2	0.240	0.860			
B3	0.420	0.750			
B4	0.240	0.990			
B5	0.240	1.120			
B6	0.750	0.640			
B7	0.820	0.750			
B8	0.240	1.250			
B9	1.040	1.250			
B10	0.910	0.920			
B11	0.950	0.750			
B12	0.240	1.400			
B13	0.790	1.060			
B14	0.510	0.350			
B15	0.840	-0.010			
B16	1.140	-0.010			
B17	1.430	0.110			
B18	1.190	0.110			
B19	1.490	0.230			
B20	1.780	0.190			
B21	1.580	0.470			
B22	1.310	0.170			
B23	2.120	1.150			
B24	1.560	1.150			
B25	1.300	0.770			
B26	0.430	0.490			
B27	1.200	1.230			
B28	1.570	0.340			
B29	1.140	1.380			
B30	2.260	0.920			
B31	2.190	0.790			
B32	0.035	0.365			
B33	0.950	0.615			
C1	2.150	1.370		.127 .131	5
C2	2.250	0.020			
C3	1.710	0.320			
C4	1.630	0.180			
C5	2.120	1.000			

SEE NOTE 13

HOLE IDENT	X DIM	Y DIM		HOLE DIA	QTY
C6	0.000	0.160		.127 .131	8
C7	0.000	0.000			
C8	-0.090	0.290			
C9	-0.260	0.350			
C10	-0.050	0.480			
C11	-0.230	0.510			
C12	0.173	0.395			
C13	0.130	0.245			
D1	0.170	0.010		.146 .150	6
D2	0.350	0.350			
D3	0.280	0.520			
D4	0.280	0.170			
D5	0.350	0.010			
D6	1.310	0.010			
E1	1.660	0.010		.151 .155	2
E2	0.600	0.580			
F1	0.270	0.700		.153 .157	5
F2	0.390	1.050			
F3	1.120	0.920			
F4	0.990	0.040			
F5	1.640	1.010			
G1	1.750	0.490		.165 .169	1
H1	1.130	0.710		.202 .205	2
H2	1.890	0.040			
J1	1.060	0.250		.220 .224	1
L1	0.470	1.300		.306 .313	4
L2	0.810	1.300			
L3	1.580	0.710			
L4	1.380	0.990			
M1	2.640	1.190		.321 .327	2
M2	2.530	0.470			
N1	1.080	0.490		SEE SECT C-C	2
N2	1.890	1.010			
P1	1.740	1.300		SEE SECT B-B	1
R1	0.630	0.890		SEE SECT E-E	4
R2	1.350	0.420			
R3	0.810	0.410			
R4	1.980	0.350			
S1	0.610	0.110		SEE SECT D-D	2
S2	1.940	0.710			

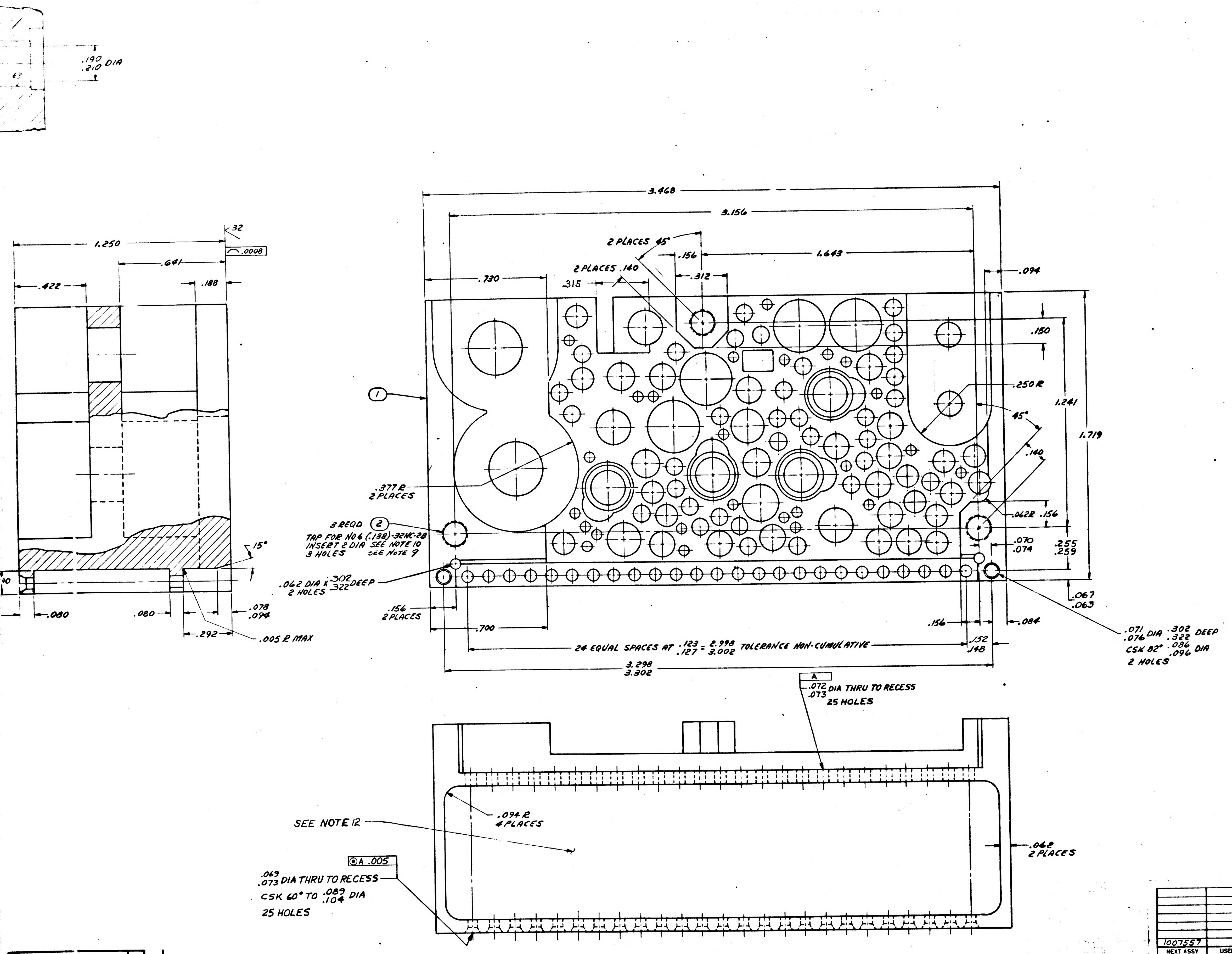


VIEW A-A
.989
.859
SECTION B-B
.190 .210 DIA.
.125 R MAX
.425
.297
.085
.270 .276 DIA
.302 .308 DIA
63
.090 R 2 PLACES
.112 2 PLACES
.302 .308 DIA 2 PLACES
.270 .276 DIA
.190 .210 DIA
.085 2 PLACES
.297 2 PLACES
SECTION E-E 4R HOLES
A
A
.435
.217
.096
.250
.412
.875
.207
1.905
.115
1.028
.112
.730
.090R
.321
.130
.353
B
B
C
C
D
D
E
E
.144 .152 DIA THRU 2 HOLES
30° 2 PLACES
.377 R 2 PLACES
X
Y
.233
.403
1.250
.641
.422
.188
.32
15°
.190
.080
.080
.078 .094
.292
.005
NO.10 (.190-32 UNF-2B) MODIFIED TO .175 .179 MAJOR DIA
.230 .260
.163 .168
SECTION C-C
.347 .352 DIA
.734 .766
.190 .210 DIA
SECTION D-D

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5 PER QQ-M-31A.
3. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX.
4. FLATNESS TO BE WITHIN .010.
5. UNLESS OTHERWISE SPECIFIED SURFACE ROUGHNESS MUST NOT EXCEED $\sqrt{}^{125}$.
6.
7. ALL FLAT SURFACES TO BE SQUARE AND OR PARALLEL WITHIN .010.
8. REMOVE ALL BURRS AND BREAK SHARP EDGES .005-.015.
9. COAT THREADS AND ITEM NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER.
10. INSTALL ITEM NO 2 PER MS 33646, BREAK OFF DRIVING TANG
11. FINISH: PLUG INSERT HOLES AND ANODIZE PER MIL-M-45202, TYPE I, CLASS "C".
12. IDENTIFY USING PART NO. AND REV LETTER PER ND1002019
13. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR ON AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART
14. APPLY A 31 MIN WIDTH PERIMETER OF ADHESIVE AND COATING MATERIAL PER ND 1002187 TYPE II TO THE TWO SURFACES WITH COMPONENT HOLES WHICH ARE .188 AND 1.25 FROM THE HELICOIL MOUNTING SURFACE.

1008586


.190
.210 DIA
1.250
.641
32
.0008
.422
.188
15°
.080
.080
.078
.094
.292
.005 R MAX
3.468
3.156
2 PLACES 45°
.156
1.643
2 PLACES .140
.312
.730
.315
.094
.150
.250 R
1.241
1.719
45°
.140
①
.377 R
2 PLACES
.062 R .156
3 REQD ②
TAP FOR NO 6 (.138)-32NC-2B
INSERT 2 DIA SEE NOTE 10
3 HOLES SEE NOTE 9
.070
.074
.255
.259
.062 DIA X .302 .322 DEEP
2 HOLES
.067
.063
.156
2 PLACES
.156
.084
.700
24 EQUAL SPACES AT .123 .127 = 2.998 3.002 TOLERANCE NON-CUMULATIVE
.152
.148
3.298
3.302
.071 .076 DIA .302 .322 DEEP
CSK 82° .086 .096 DIA
2 HOLES
A
.072 .073 DIA THRU TO RECESS
25 HOLES
SEE NOTE 12
.094 R
4 PLACES
.062
2 PLACES
⊙ A .005
.069 .073 DIA THRU TO RECESS
CSK 60° TO .089 .104 DIA
25 HOLES

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD

ITEM NO.	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
2	3	MS21209-C0620	INSERT, SCREW-LOCKING
1	1	1008586-1	HEATSINK

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
1007557	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ − XX ± .02 + ½°
− − XXX ± .005 − ½°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN W. Munson DATE 10 NOV 64
CHECKED
APPROVAL E J Siolek 17 Nov 64
APPROVAL D. E. Frost 11/17/64
NASA APPROVAL W G 11-17-64
MIT APPROVAL W Kupfer 17 Nov 64

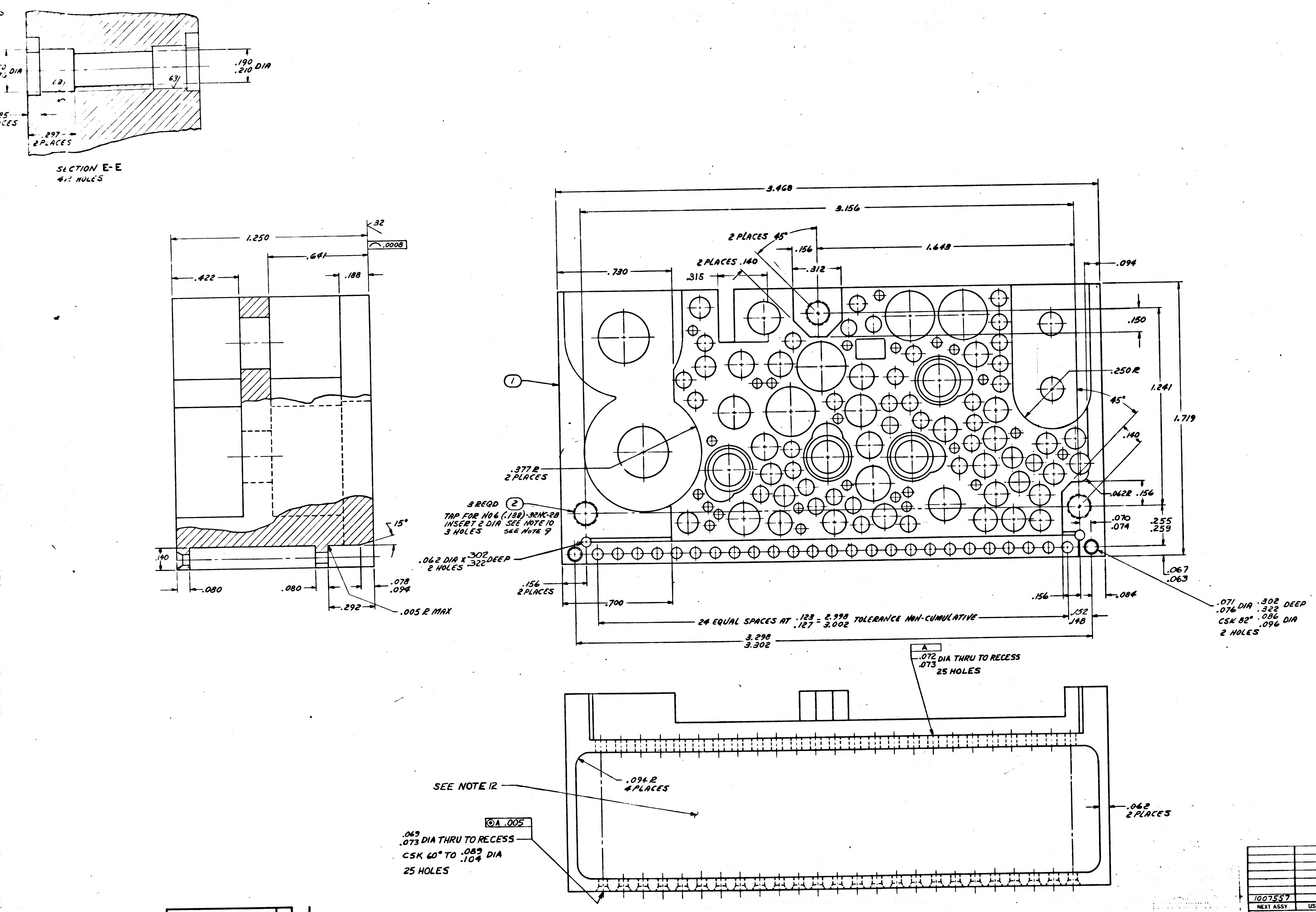
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

HEATSINK -
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT

CODE IDENT NO. SIZE J 1008586
SCALE 5:1 SHEET 1

1008586

SYM	ZONE	REVISIONS DESCRIPTION	CHG NO	DATE	APPD



.190
.210 DIA
297
2 PLACES
SECTION E-E
4 HOLES
1.250
.641
.422
.188
32
.0008
15°
.140
.080
.080
.078
.094
.292
.005 R MAX
3.468
3.156
2 PLACES 45°
.156
1.649
2 PLACES .140
.312
.730
.315
.094
.150
.250 R
45°
1.241
1.719
.140
①
.377 R
2 PLACES
3 REQD ②
TAP FOR NO 6 (.138)-32NC-2B
INSERT 2 DIA SEE NOTE 10
3 HOLES SEE NOTE 9
.062R .156
.070
.074
.255
.259
.062 DIA x .302 .322 DEEP
2 HOLES
.067
.063
.156
2 PLACES
.156
.084
.700
.071 DIA .076 .302 .322 DEEP
CSK 82° .086 .096 DIA
2 HOLES
24 EQUAL SPACES AT .123 .127 = 2.998 3.002 TOLERANCE NON-CUMULATIVE
.152
.148
3.298
3.302
A
.072 .073 DIA THRU TO RECESS
25 HOLES
.094 R
4 PLACES
SEE NOTE 12
.062
2 PLACES
A .005
.069 .073 DIA THRU TO RECESS
CSK 60° TO .089 .104 DIA
25 HOLES

ITEM NO.	NO. REQD	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION
2	3	MS21209-C0620	INSERT, SCREW-LOCKING
1	1	1008586-1	HEATSINK

LIST OF PARTS AND MATERIALS

1007557	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ − XX ± .02 + 1/2°
− − XXX ± .005 − 1/2°
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN W. Munson DATE 10 NOV 64
CHECKED
APPROVAL 17 Nov 64
APPROVAL 11/17/64
NASA APPROVAL W. G.
MIT APPROVAL W Kupfer 17 Nov 64

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

HEATSINK -
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT

CODE IDENT NO. SIZE J 1008586
SCALE 5:1 SHEET

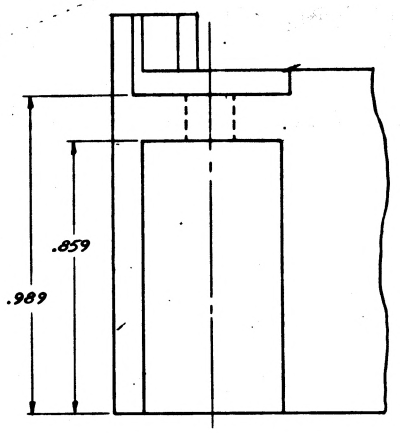
E-2

SEE NOTE 13

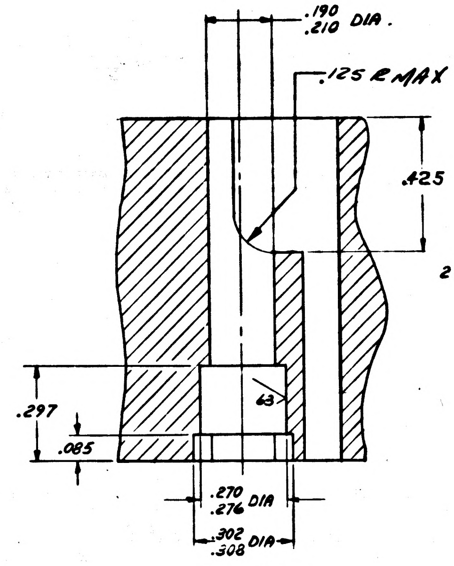
HOLE IDENT	X DIM	Y DIM		HOLE DIA	QTY
A1				.058 .062	27
A2	0.540	0.460			
A3	0.350	0.890			
A4	0.640	1.130			
A5	0.530	1.080			
A6	0.900	1.100			
A7	2.180	0200			
A8	0.840	0.190			
A9	1.000	1.430			
A10	0.410	0.230			
A11					
A12	0.920	0.160			
A13	1.530	-0.030			
A14	1.230	0.240			
A15	0.150	0.550			
A16	-0.150	0.410			
A17	1.280	0.660			
A18	0.850	0.100			
A19	1.700	0.890			
A20	1.790	0.890			
A21	1.210	1.120			
A22	1.540	0.100			
A23	2.090	0.530			
A24	2.110	0.000			
A25	2.120	0.120			
A26	2.200	1.230			
A27	2.050	0.070			
A28	2.010	1.080			
A29	2.090	1.250			
B1	0.410	0.620		.100 .104	33
B2	0.240	0.860			
B3	0.420	0.750			
B4	0.240	0.990			
B5	0.240	1.120			
B6	0.750	0.640			
B7	0.820	0.750			
B8	0.240	1.250			
B9	1.040	1.250			
B10	0.910	0.920			
B11	0.950	0.750			
B12	0.240	1.400			
B13	0.790	1.060			
B14	0.510	0.350			
B15	0.840	-0.010			
B16	1.140	-0.010			
B17	1.430	0.110			
B18	1.190	0.110			
B19	1.490	0.230			
B20	1.780	0.190			
B21	1.580	0.470			
B22	1.310	0.170			
B23	2.120	1.150			
B24	1.560	1.150			
B25	1.300	0.770			
B26	0.430	0.490			
B27	1.200	1.230			
B28	1.570	0.340			
B29	1.140	1.380			
B30	2.260	0.920			
B31	2.190	0.790			
B32	0.035	0.365			
B33	0.950	0.615			
C1	2.150	1.370		.127 .131	5
C2	2.250	0.020			
C3	1.710	0.320			
C4	1.630	0.180			
C5	2.120	1.000			

SEE NOTE 13

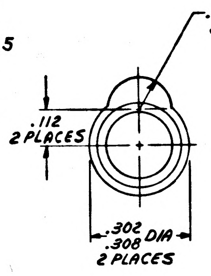
HOLE IDENT	X DIM	Y DIM		HOLE DIA	QTY
C6	0.000	0.160		.127 .131	8
C7	0.000	0.000			
C8	-0.090	0.290			
C9	-0.260	0.350			
C10	-0.050	0.480			
C11	-0.230	0.510			
C12	0.173	0.395			
C13	0.130	0.245			
D1	0.170	0.010		.146 .150	6
D2	0.350	0.350			
D3	0.280	0.520			
D4	0.280	0.170			
D5	0.350	0.010			
D6	1.310	0.010			
E1	1.660	0.010		.151 .155	2
E2	0.600	0.580			
F1	0.270	0.700		.153 .157	5
F2	0.390	1.050			
F3	1.120	0.920			
F4	0.990	0.040			
F5	1.640	1.010			
G1	1.750	0.490		.165 .169	1
H1	1.130	0.710		.202 .205	2
H2	1.890	0.040			
J1	1.060	0.250		.220 .224	1
L1	0.470	1.300		.306 .313	4
L2	0.810	1.300			
L3	1.580	0.710			
L4	1.380	0.990			
M1	2.640	1.190		.321 .327	2
M2	2.530	0.470			
N1	1.080	0.490		SEE SECT C-C	2
N2	1.890	1.010			
P1	1.740	1.300		SEE SECT B-B	1
R1	0.630	0.890		SEE SECT E-E	4
R2	1.350	0.420			
R3	0.810	0.410			
R4	1.980	0.350			
S1	0.610	0.110		SEE SECT D-D	2
S2	1.940	0.710			

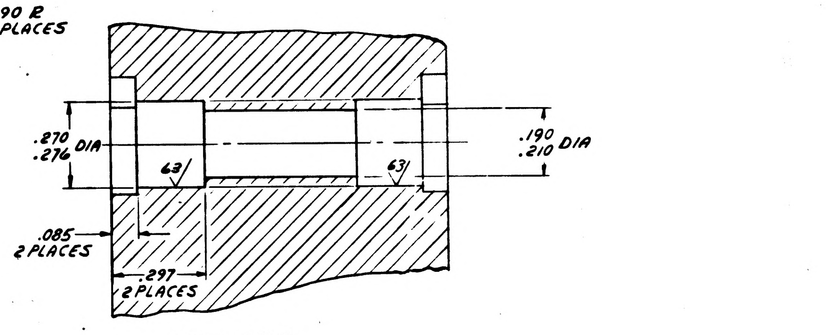


VIEW A-A

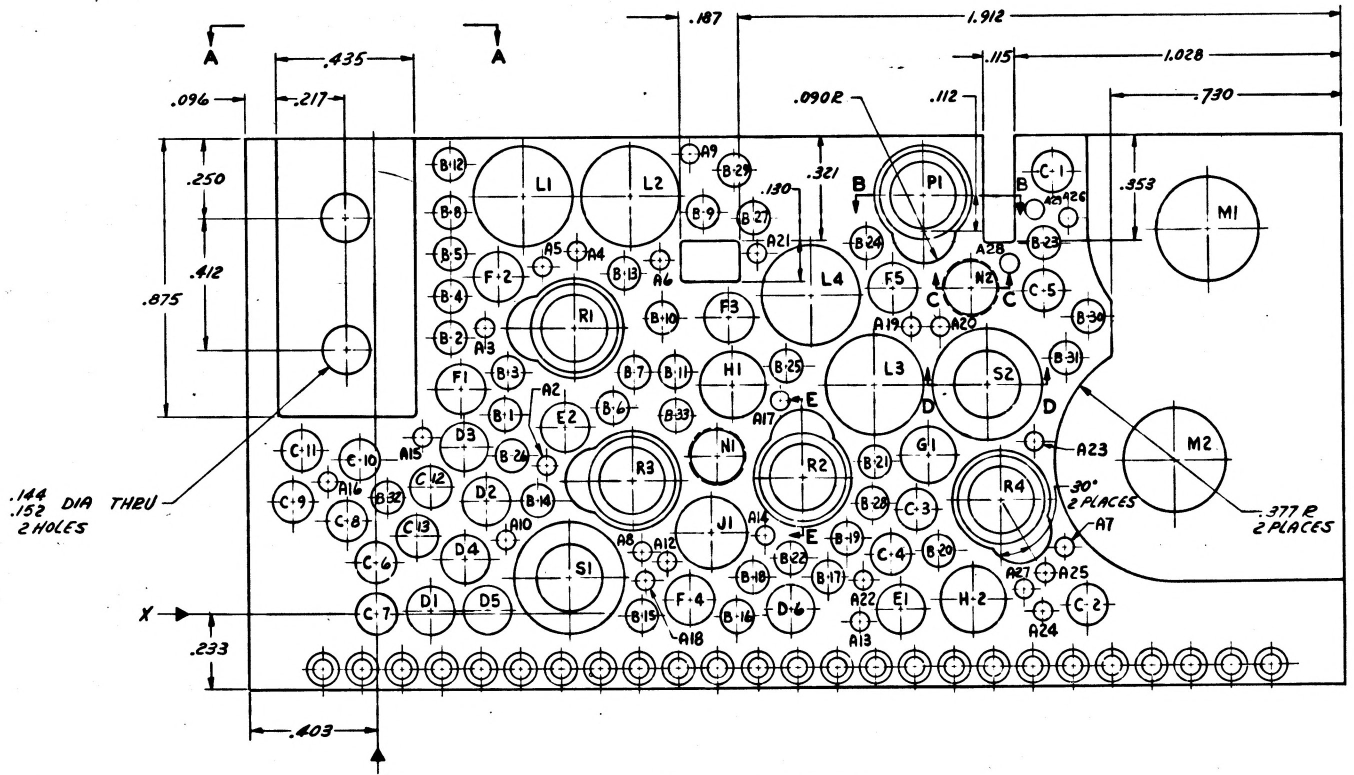

.190
.210 DIA.
.125 R MAX
.425
63
.297
.085
.270
.276 DIA
.302
.308 DIA

SECTION B-B


.090 R
2 PLACES
.112
2 PLACES
.302
.308 DIA
2 PLACES


.270
.276 DIA
63
63
.190
.210 DIA
.085
2 PLACES
.297
2 PLACES

SECTION E-E
4R HOLES


A
A
.435
.096
.217
.250
.412
.875
.144
.152 DIA THRU
2 HOLES
X
.233
.403
Y
.187
1.912
.115
1.028
.090R
.112
.730
.321
.130
.353
B
B
C
C
D
D
E
E
L1
L2
L4
L3
P1
M1
M2
N1
N2
R1
R2
R3
R4
S1
S2
F1
F2
F3
F4
F5
H1
H2
G1
J1
E1
E2
D1
D2
D3
D4
D5
D6
C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10
C-11
C12
C13
A2
A3
A4
A5
A6
A7
A8
A9
A10
A12
A13
A14
A15
A16
A17
A18
A19
A20
A21
A22
A23
A24
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A26
A27
A28
A29
B-1
B-2
B-3
B-4
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B-13
B-14
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B-20
B-21
B-22
B-23
B-24
B-25
B-26
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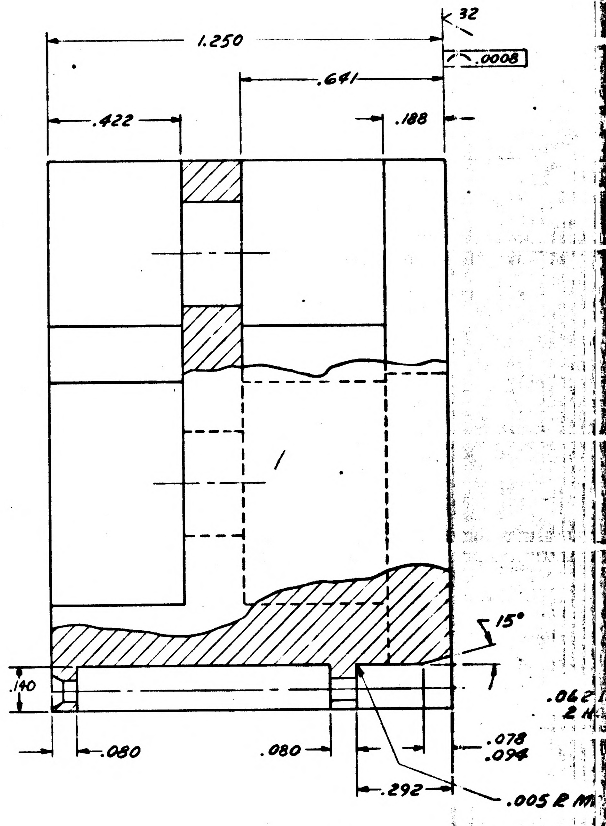
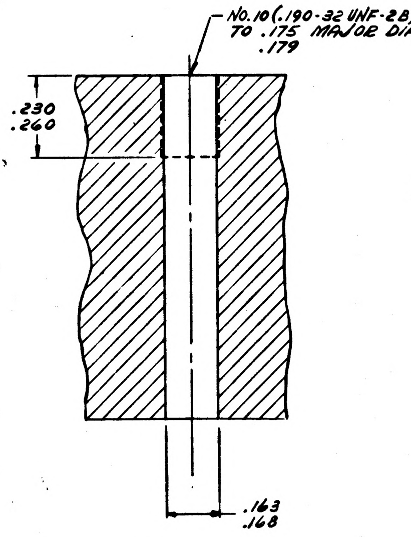
B-28
B-29
B-30
B-31
B32
B33
30°
2 PLACES
.377 R
2 PLACES

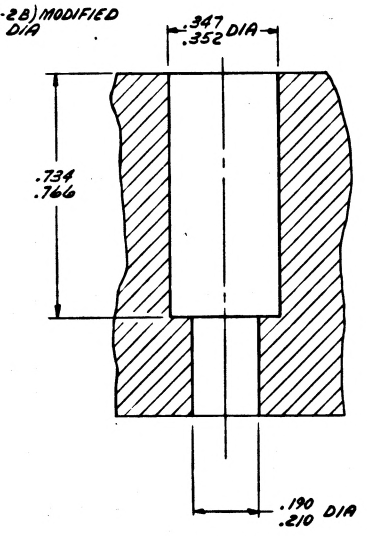

1.250
32
.0008
.641
.422
.188
15°
.140
.080
.080
.062
2
.078
.094
.292
.005 R M

.063
.073 DIA T
CSK 60°
25 HOLE

SE


No.10 (.190-32 UNF-2B) MODIFIED
TO .175 MAJOR DIA
.179
.230
.260
.163
.168

SECTION C-C


.347
.352 DIA
.734
.766
.190
.210 DIA

SECTION D-D

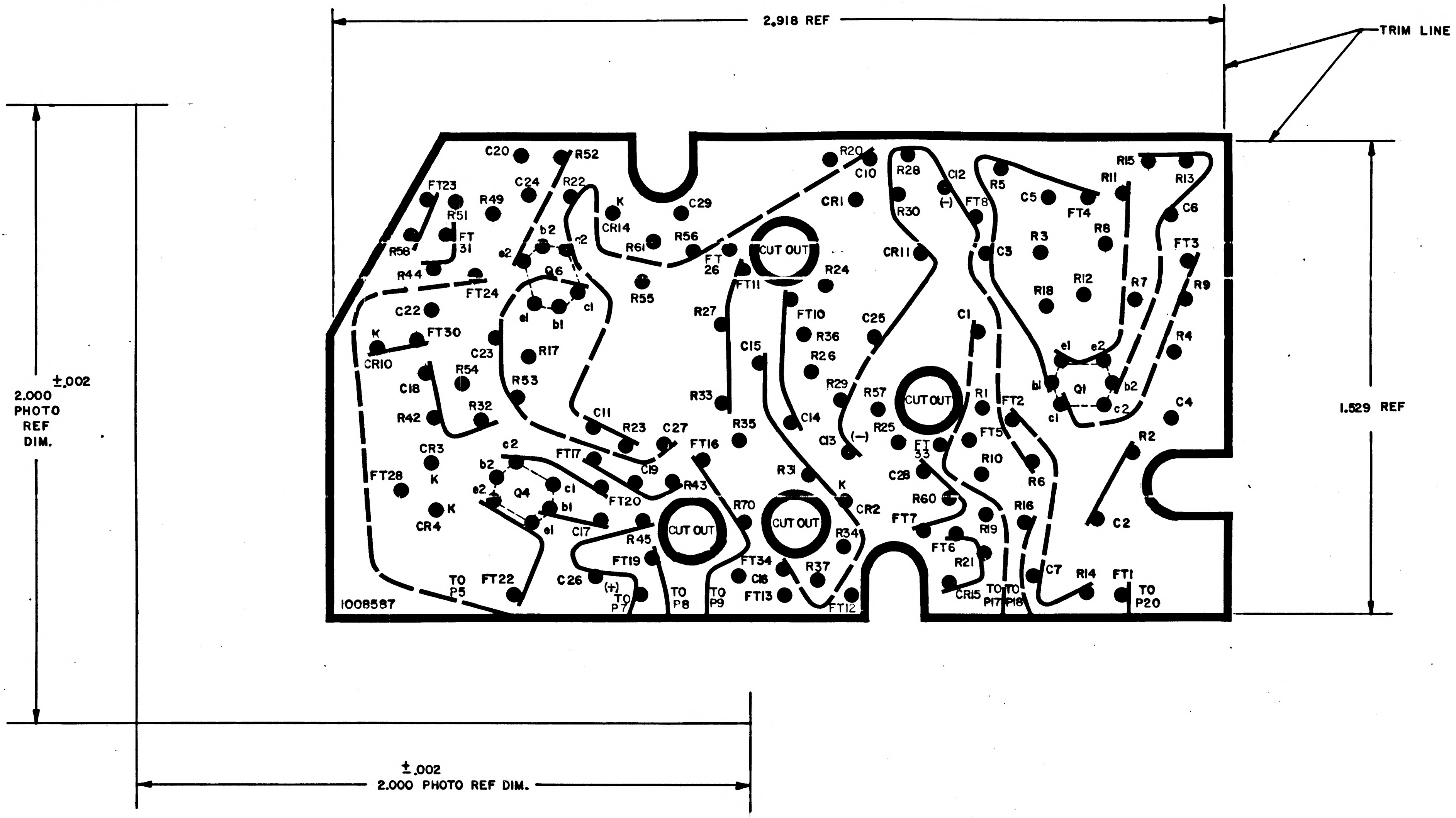
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: MAGNESIUM ALLOY ZK-60A-T5 PER QQ-M-31A.
3. UNLESS OTHERWISE SPECIFIED ALL FILLETS AND RADII .010 MAX.
4. FLATNESS TO BE WITHIN .010.
5. UNLESS OTHERWISE SPECIFIED SURFACE ROUGHNESS MUST NOT EXCEED 125/√.
6.
7. ALL FLAT SURFACES TO BE SQUARE AND OR PARALLEL WITHIN .010.
8. REMOVE ALL BURRS AND BREAK SHARP EDGES .005-.015.
9. COAT THREADS AND ITEM NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER.
10. INSTALL ITEM NO 2 PER MS 33646, BREAK OFF DRIVING TANG
11. FINISH: PLUG INSERT HOLES AND ANODIZE PER MIL-M-3171A, TYPE IV.
12. IDENTIFY USING PART NO. AND REV LETTER PER ND1002019
13. THE DRILLING OF ANY COMPONENT HOLE CAUSING VISIBLE DEFORMATION IN AN ADJACENT HOLE OR ON AN EXTERNAL SURFACE OR ACTUAL BREAKOUT OF THE HOLE INTO ANOTHER HOLE OR EXTERNAL SURFACE SHALL BE CAUSE FOR REJECTION OF THIS PART

1008586

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14707			
SYM	DESCRIPTION	DATE	APPROVAL


2.918 REF
TRIM LINE
1.529 REF
±.002
2.000
PHOTO
REF
DIM.
±.002
2.000 PHOTO REF DIM.
1008587
CUT OUT
CUT OUT
CUT OUT
CUT OUT
C20 R52 FT23 C24 R22 R49 R51 FT 31 K CR14 C29 R58 e2 b2 c2 R61 R56 FT 26 R44 Q6 R55 FT24 FT11 R24 C22 e1 b1 c1 R27 FT10 C25 K FT30 R17 C15 R36 CR10 C23 R26 R54 R29 C18 R53 R57 R42 R32 R33 C11 R23 C27 C14 R25 CR3 C19 FT16 R35 C13 (−) c2 FT17 K b2 R43 R31 e2 Q4 c1 FT20 R70 CR2 K b1 CR4 e1 C17 R45 R34 FT19 FT34 R37 C26 C8 TO P5 FT22 (+) TO P7 TO P8 TO P9 FT13 FT12
R20 C10 R28 C12 CR1 (−) R5 R30 FT8 C5 R11 R15 R13 FT4 C6 R3 R8 CR11 C3 FT3 R18 R12 R7 R9 C1 e1 e2 R4 b1 Q1 b2 R1 FT2 c1 c2 C4 CUT OUT FT5 R2 FT 33 C28 R10 R6 R60 FT7 R16 C2 R19 FT6 R21 C7 R14 FT1 CR15 TO P17 TO P18 TO P20

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340 TYPE IB, CLASS 2, STYLE IA
6. ● .045/.055 DIA PUNCH ALL HOLES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007519	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN E. Pollini DATE 20 Nov 64
CHECKED R. Rosenberg 24 Nov 64
J.M. BLYSHAK 3 DEC 64
APPROVAL
APPROVAL D. Hoag 12/4/64
NASA APPROVAL W. J. Rhine 12-8-64
MIT APPROVAL W Kupfer 8 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR, TOP PHOTOGRAPHIC MASTER
INTERROGATOR

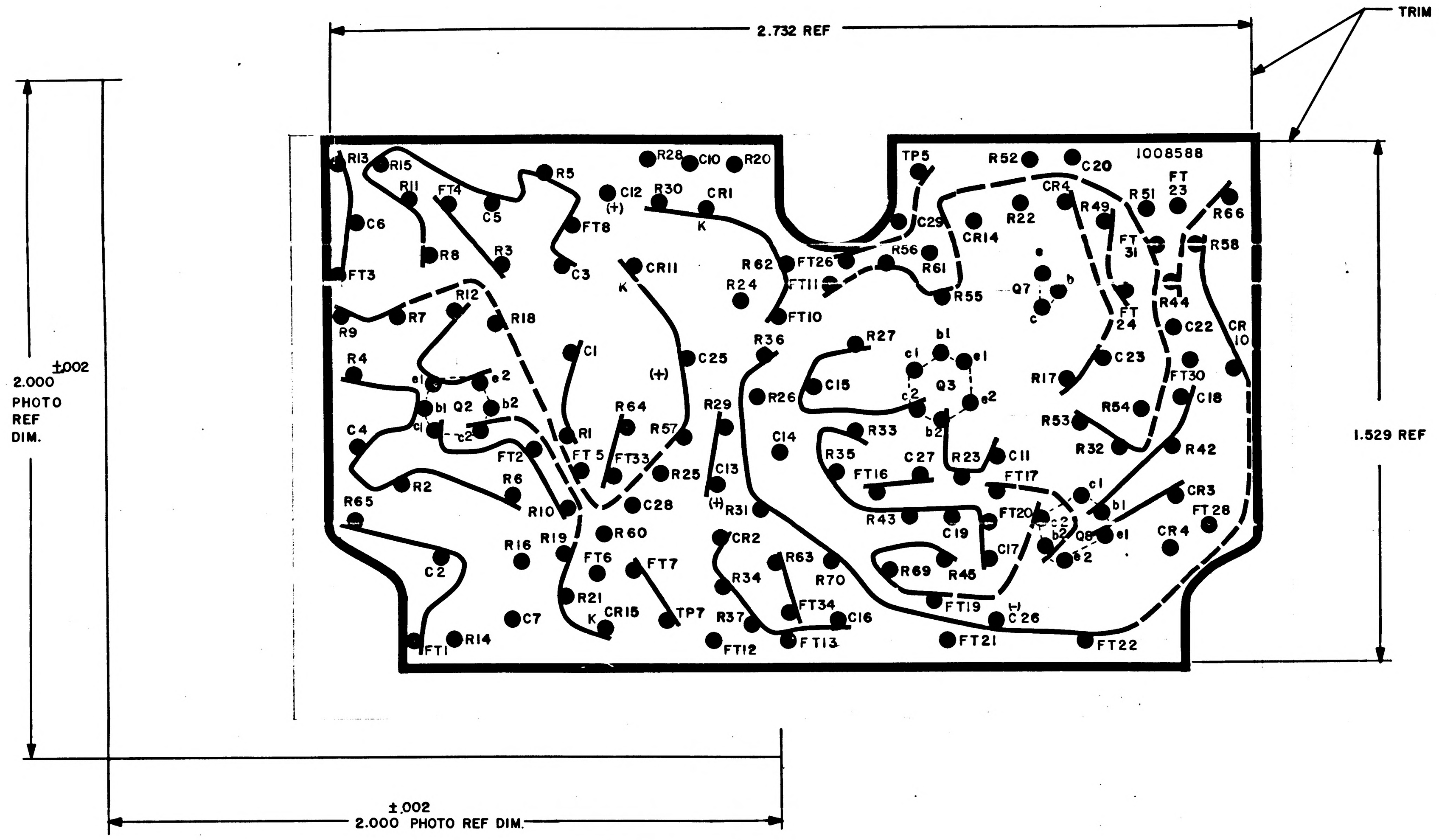
CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008587
SCALE 5/1
WT
SHEET 1 OF 1

1008587

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1/4/704			
SYM	DESCRIPTION	DATE	APPROVAL


2.732 REF
TRIM LINE
2.000 ±.002 PHOTO REF DIM.
1.529 REF
±.002 2.000 PHOTO REF DIM.
1008588
R13 R15 R11 FT4 C5 R5 R28 C10 R20 C12 (+) R30 CR1 K
C6 R8 R3 FT8 C3 CR11 K R62 FT26 FT11 R24 FT10
FT3 R12 R18 R9 R7 C1 C25 (+) R36 R27
R4 e2 b1 Q2 b2 c1 c2 R64 R29 R26 C15 b1 c1 e1 Q3 c2 e2 b2
C4 FT2 R1 FT5 FT33 R57 R25 C14 R33 R35 C27 R23 C11
R2 R6 R10 C28 C13 (+) R31 FT16 FT17
R65 R16 R19 R60 CR2 R43 C19 FT20
C2 FT6 FT7 R63 R34 R70 R69 R45 C17
R21 C7 CR15 K TP7 R37 FT34 C16 FT19 (-) C26
FT1 R14 FT12 FT13 FT21 FT22
TP5 R52 C20 C29 R22 CR14 CR4 R49 R51 FT 23 R66
R56 R61 R55 Q7 b c FT 31 R58
FT 24 R44 C22 CR 10
C23 R17 FT30 C18 R54 R53 R32 R42
c1 b1 e1 c2 b2 Q8 e2 CR3 FT28 CR4

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
5. MATERIAL: FILM .006/.008 THICK PER L-F-340 TYPE IB, CLASS 2, STYLE IA
6. ● .045/.055 DIA PUNCH ALL HOLES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007519	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Addario DATE 25 Nov 64
CHECKED J. M. BLYTHE 3 DEC 64
APPROVAL
APPROVAL D. R. Test 12/4/64
NASA APPROVAL W. J. Rhine 12-8-64
MIT APPROVAL W. Kupfer 8 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR, BOTTOM PHOTOGRAPHIC MASTER
INTERROGATOR

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1008588
SCALE 5/1
WT —
SHEET 1 OF 1

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
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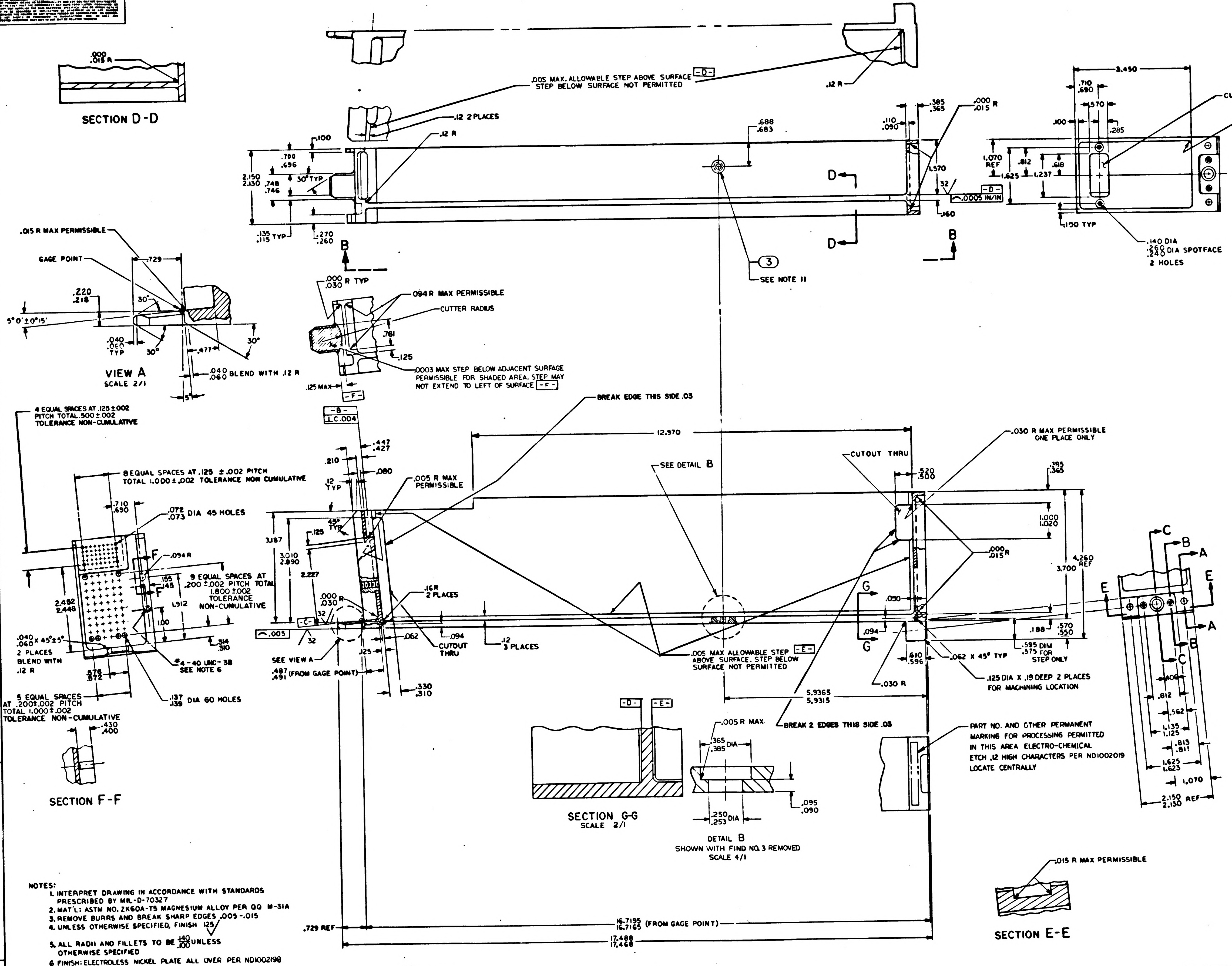
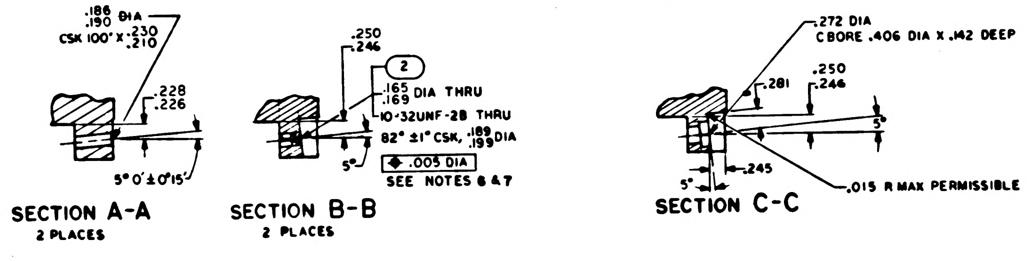

SECTION D-D
.000 .015 R
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.12 R
.100
.700 .696
2.150 2.130
.748 .746
30° TYP
.135 .115 TYP
.270 .260
.688 .683
.110 .090
.385 .365
.000 .015 R
.570
32
.160
.0005 IN/IN
D
B
3
SEE NOTE 11
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
.06 R TYP 4 PLACES
1.070 REF
.812
.618
1.625
1.237
.150 TYP
.140 DIA
.260 .240 DIA SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
30°
5° 0' ± 0° 15'
.040 .060 TYP
30°
.477
30°
.040 .060 BLEND WITH .12 R
5°
VIEW A
SCALE 2/1
.000 .030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.761
.125
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.125 MAX
-F-
BREAK EDGE THIS SIDE .03
-B-
⊥ C .004
.447 .427
.210
.080
.12 TYP
.005 R MAX PERMISSIBLE
12.970
SEE DETAIL B
CUTOUT THRU
.520 .500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.395 .365
4 EQUAL SPACES AT .125 ±.002
PITCH TOTAL .500 ±.002
TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH
TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.710 .690
.072 .073 DIA 45 HOLES
F
.094 R
.155 .145
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
2.482 2.448
1.912
1.00
.040 .060 × 45° ± 5°
2 PLACES
BLEND WITH .12 R
4-40 UNC-3B
SEE NOTE 6
.314 .310
.375 .372
.137 .139 DIA 60 HOLES
5 EQUAL SPACES AT .200 ±.002 PITCH
TOTAL 1.000 ±.002
TOLERANCE NON-CUMULATIVE
.430 .400
SECTION F-F
3.187
.125
45° TYP
3.010 2.990
2.227
.000 .030 R
.16 R 2 PLACES
32
-C-
.005
32
.094
.062
CUTOUT THRU
.12 3 PLACES
SEE VIEW A
.125
.487 .491 (FROM GAGE POINT)
.330 .310
.005 MAX ALLOWABLE STEP -E-
ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
1.000 1.020
.000 .015 R
4.260 REF
3.700 REF
G
.090
.094
G
.188
.570 .550
.595 DIM .575 FOR STEP ONLY
.610 .596
.062 × 45° TYP
.030 R
.125 DIA × .19 DEEP 2 PLACES FOR MACHINING LOCATION
5.9365 5.9315
BREAK 2 EDGES THIS SIDE .03
C
B
A
E
E
A
B
C
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
-D- -E-
.005 R MAX
.365 .385 DIA
.095 .090
.250 .253 DIA
SECTION G-G
SCALE 2/1
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHRACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO.3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO.3 SHALL BE ASSEMBLED TO FIND NO.1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD


.186 .190 DIA
CSK 100° × .230 .210
.228 .226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.250 .246
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
5°
◆ .005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008590-001	FRAME, TRAY	1

LIST OF MATERIALS

1007535	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN DATE
CHECKED
APPROVAL
APPROVAL E Test 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 5

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008590
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

14627

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
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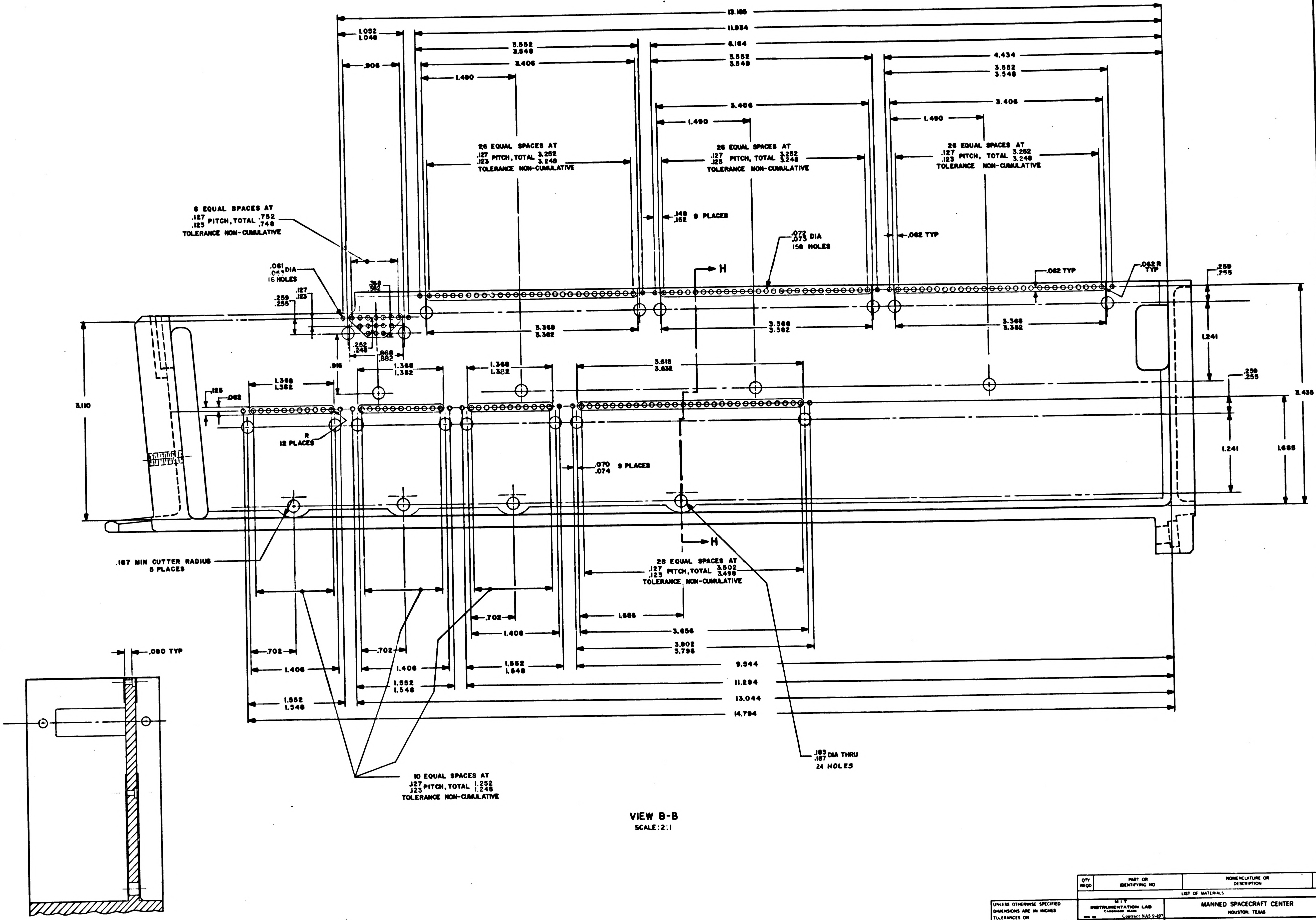

13.186
11.934
8.184
4.434
1.052
1.048
.906
3.552
3.548
3.406
1.490
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
.148 .152 9 PLACES
.072 .075 DIA 158 HOLES
.062 TYP
.062 R TYP
.061 .063 DIA 16 HOLES
.259 .255
.127 .123
.318 .312
.252 .248
.868 .882
3.368 3.382
.916
1.368 1.382
3.618 3.632
1.241
3.435
1.665
3.110
.125
.062
R 12 PLACES
.070 .074 9 PLACES
H
.187 MIN CUTTER RADIUS 5 PLACES
28 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.502 3.498 TOLERANCE NON-CUMULATIVE
.702
1.406
1.552 1.548
1.656
3.656
3.802 3.798
9.544
11.294
13.044
14.794
10 EQUAL SPACES AT .127 .123 PITCH, TOTAL 1.252 1.248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU 24 HOLES
.080 TYP

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ± .02 XXX ± .005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT INSTRUMENTATION LAB
Cambridge Mass
Contract NAS 9-497

DRAWN J Brigham DATE 11/18/64
CHECKED R. P. [illegible] 24 Nov 64
APPROVAL
APPROVAL E. [illegible] 12/1/64
NASA APPROVAL W. J. [illegible] 12-1-64
MIT APPROVAL

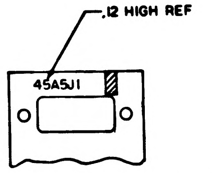
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 5

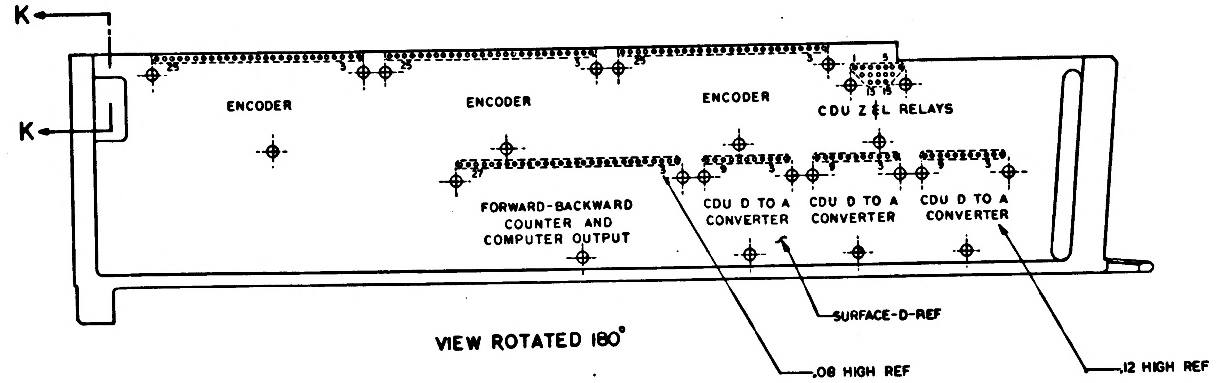
CODE IDENT NO —
SIZE E
NASA DRAWING NO 1008590
SCALE 2:1
WT
SHEET 2 OF 3

NOTICE — [illegible]

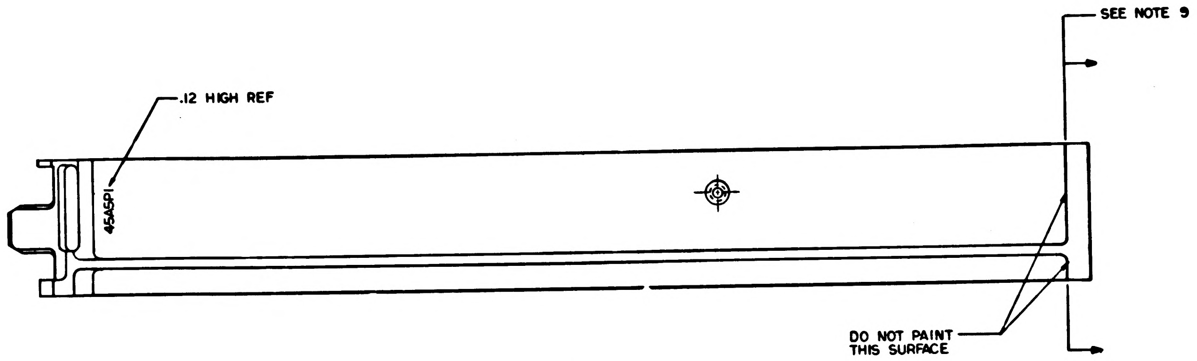
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15950	10 FEB 65	

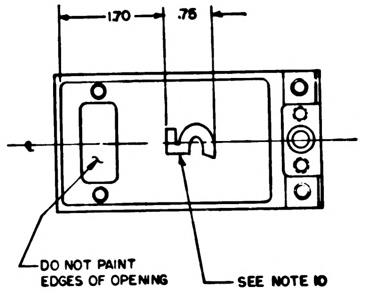

.12 HIGH REF
45A5J1

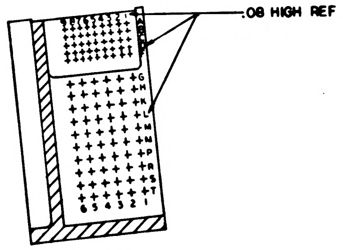
PARTIAL SECTION K-K


K
K
ENCODER
ENCODER
ENCODER
CDU Z & L RELAYS
FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
CDU D TO A CONVERTER
CDU D TO A CONVERTER
CDU D TO A CONVERTER
SURFACE-D-REF
.08 HIGH REF
.12 HIGH REF

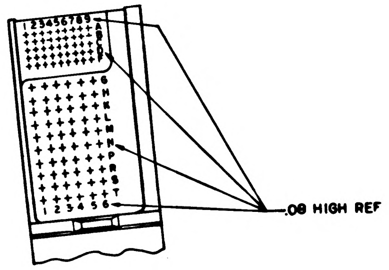
VIEW ROTATED 180°

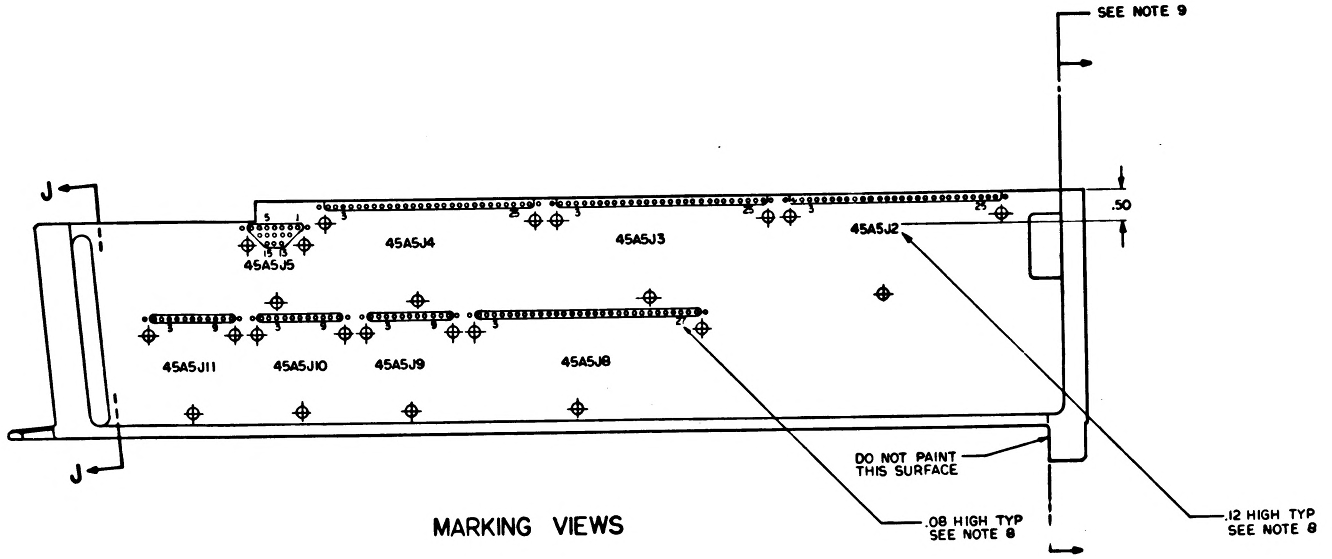

SEE NOTE 9
.12 HIGH REF
45A5P1
DO NOT PAINT THIS SURFACE


1.70
.75
DO NOT PAINT EDGES OF OPENING
SEE NOTE 10



SECTION J-J




SEE NOTE 9
J
J
.50
45A5J5
45A5J4
45A5J3
45A5J2
45A5J11
45A5J10
45A5J9
45A5J8
DO NOT PAINT THIS SURFACE
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

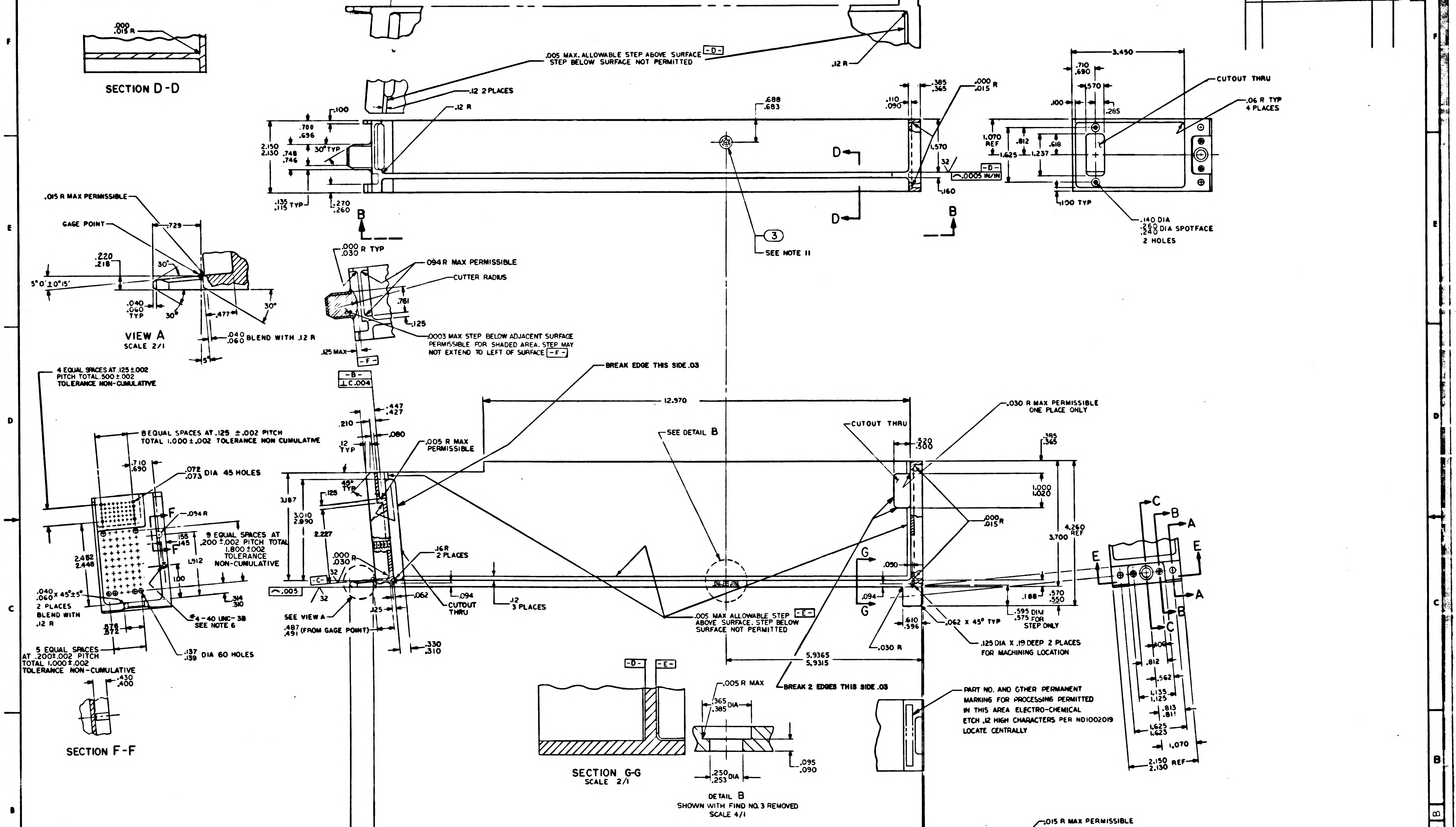
M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN F. Brigham DATE 11/10/64
CHECKED 29 Nov 64
APPROVAL
APPROVAL 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

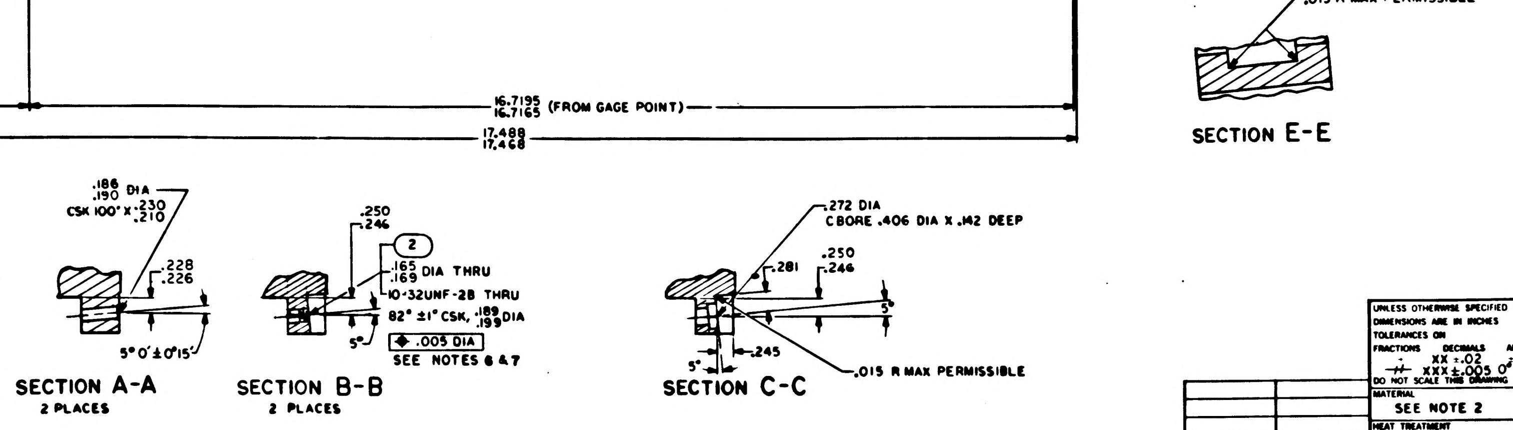
FRAME,
TRAY 5

CODE IDENT NO —
SIZE E
NASA DRAWING NO. 1008590
SCALE 1/1
WT
SHEET 3 OF 3

REV	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15950	10-FEB	
B	REVISED PER TDRR 18692	5 MAY 65	



SECTION D-D
.000 .015 R
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
3.450
CUTOUT THRU
.06 R TYP 4 PLACES
.140 DIA .260 .240 DIA SPOTFACE 2 HOLES
.100 TYP
SEE NOTE 11
VIEW A SCALE 2/1
GAGE POINT
.015 R MAX PERMISSIBLE
.040 .060 BLEND WITH .12 R
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
BREAK EDGE THIS SIDE .03
4 EQUAL SPACES AT .125 ±.002 PITCH TOTAL .500 ±.002 TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.072 .073 DIA 45 HOLES
9 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.800 ±.002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3B SEE NOTE 6
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
.137 .139 DIA 60 HOLES
SECTION F-F
12.970
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.005 R MAX PERMISSIBLE
.16R 2 PLACES
.12 3 PLACES
SEE VIEW A
.487 .491 (FROM GAGE POINT)
.005 MAX ALLOWABLE STEP -E- ABOVE SURFACE. STEP BELOW SURFACE NOT PERMITTED
.062 X 45° TYP
.595 .575 DIM FOR STEP ONLY
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
5.9365 5.9315
BREAK 2 EDGES THIS SIDE .03
SECTION G-G SCALE 2/1
.005 R MAX
DETAIL B SHOWN WITH FIND NO. 3 REMOVED SCALE 4/1
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
2.150 2.130 REF



.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.015 R MAX PERMISSIBLE
SECTION E-E
.186 .190 DIA CSK 100° X .230 .210
5° 0' ±0°15'
SECTION A-A 2 PLACES
.165 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK. .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B 2 PLACES
.272 DIA CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHRACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO.3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO.3 SHALL BE ASSEMBLED TO FIND NO.1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008590-001	FRAME, TRAY	1

LIST OF MATERIALS

1007535	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS XX ±.02, XXX ±.005 — ANGLES 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN — DATE
CHECKED
APPROVAL
APPROVAL E. Leet 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL W Cupper 1 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 5

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008590
SCALE 1/1
WT
SHEET 1 OF 3

1C08590 B

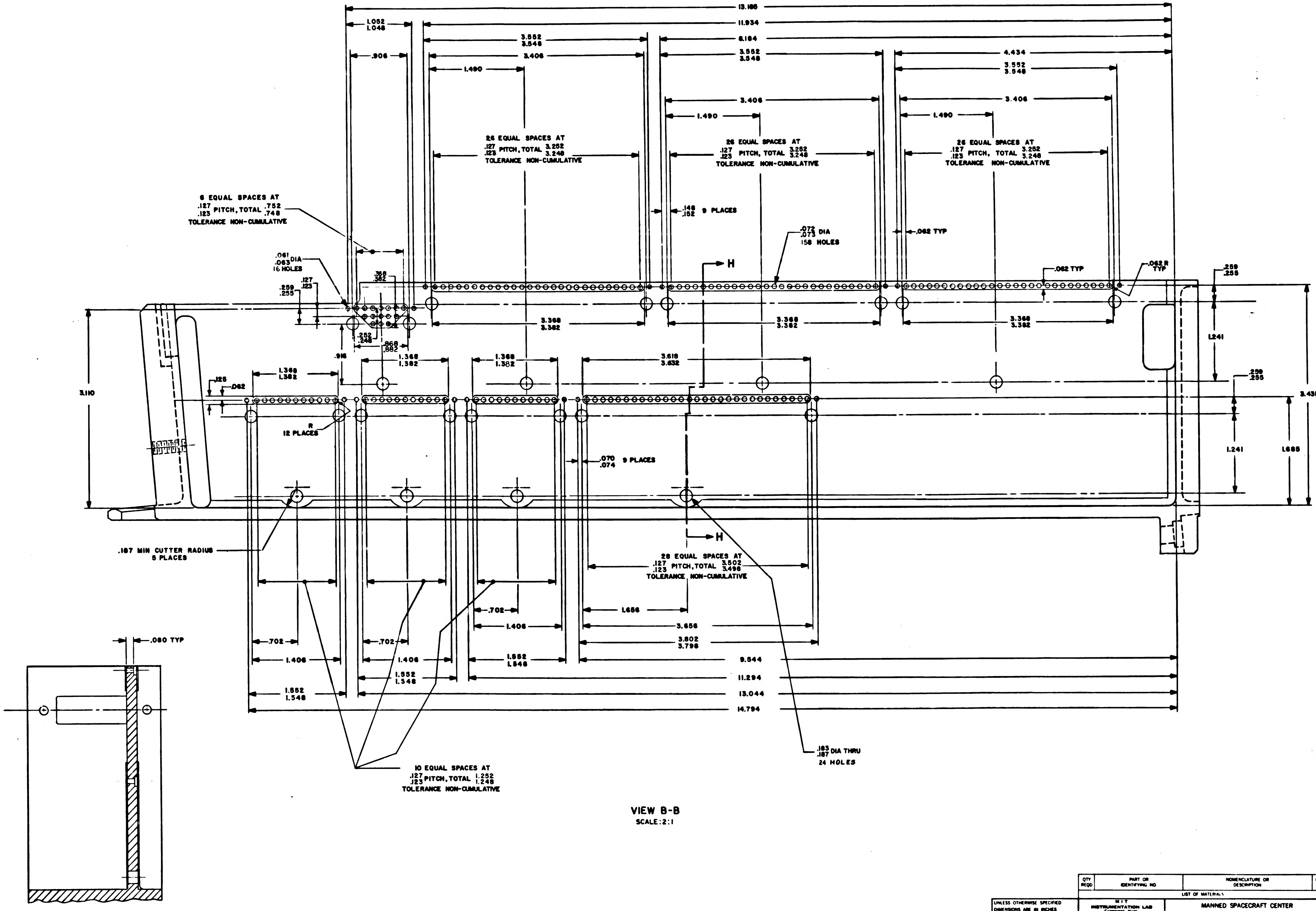
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

46 27

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD
A		REVISED PER TDRR 15950	16 FEB	M. G.
B		REVISED PER TDRR 18692	5 MAY 65	A.N.

Ⓜ



13.186
1.052
1.048
11.934
3.552
3.548
.906
3.406
8.184
4.434
1.490
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
.148 .152 9 PLACES
.072 .073 DIA 158 HOLES
.062 TYP
.062 R TYP
H
.061 .063 DIA 16 HOLES
.368 .382
.127 .123
.259 .255
.252 .248
.868 .882
.916
3.368
3.382
1.368
1.382
3.618
3.632
1.241
3.435
1.685
3.110
.125
.062
R 12 PLACES
.070 .074 9 PLACES
.187 MIN CUTTER RADIUS 5 PLACES
28 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.502 3.498 TOLERANCE NON-CUMULATIVE
.702
1.406
1.656
3.656
3.802
3.798
1.552
1.548
9.544
11.294
13.044
14.794
10 EQUAL SPACES AT .127 .123 PITCH, TOTAL 1.252 1.248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU 24 HOLES
.080 TYP

VIEW B-B
SCALE:2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ‡ DECIMALS XX ± .02 XXX ± .005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL ‡

HEAT TREATMENT ‡

FINAL FINISH ‡

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN J. Brigham DATE 11/19/64
CHECKED R. Kumpf 24 Nov 64
APPROVAL
APPROVAL D. Test 12/1/64

NASA APPROVAL W. J. Rhine 12-1-64

MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

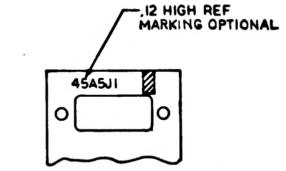
CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008590
SCALE 2:1
WT
SHEET 2 OF 3

1008590 B

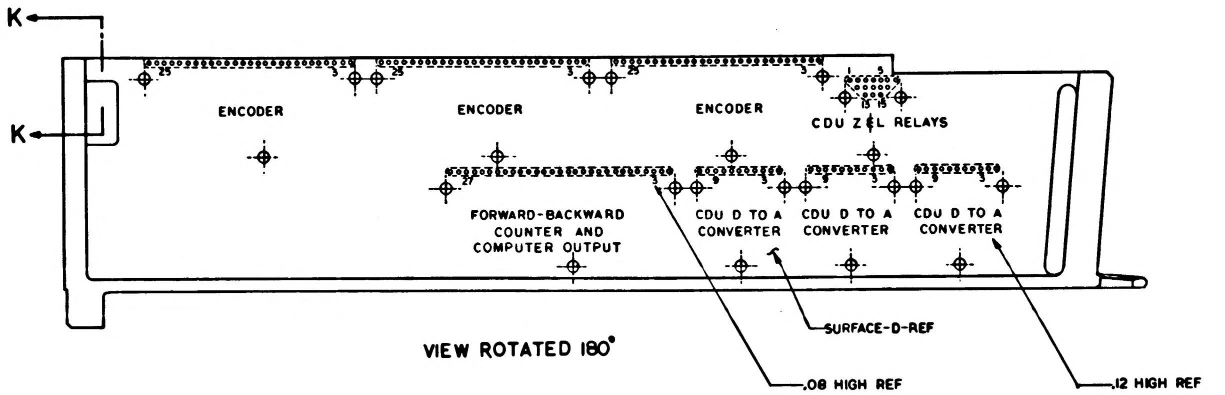
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 19627

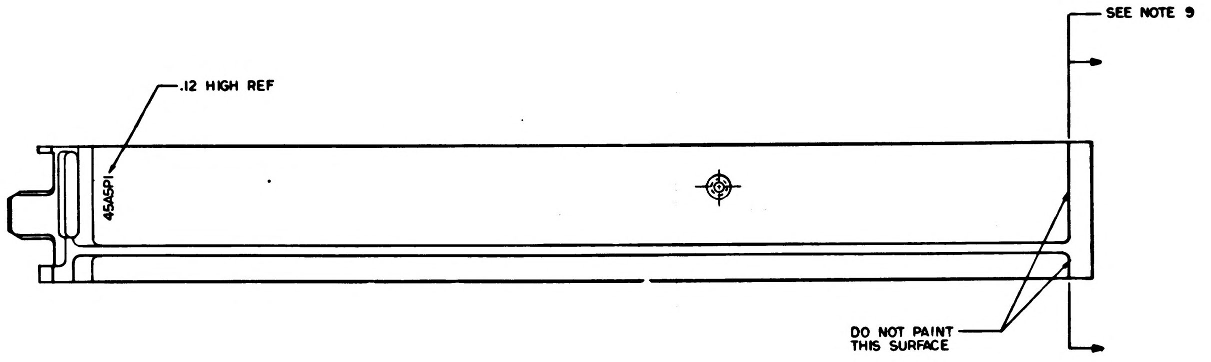
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15950	10 FEB 65	
B	REVISED PER TDRR 18692	5 MAY 65	A.N

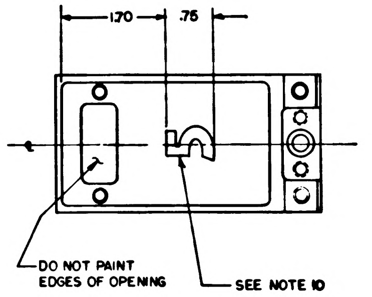

.12 HIGH REF
MARKING OPTIONAL
45A5J1

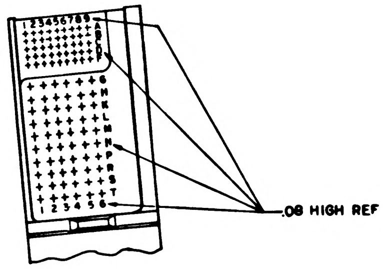
PARTIAL SECTION K-K

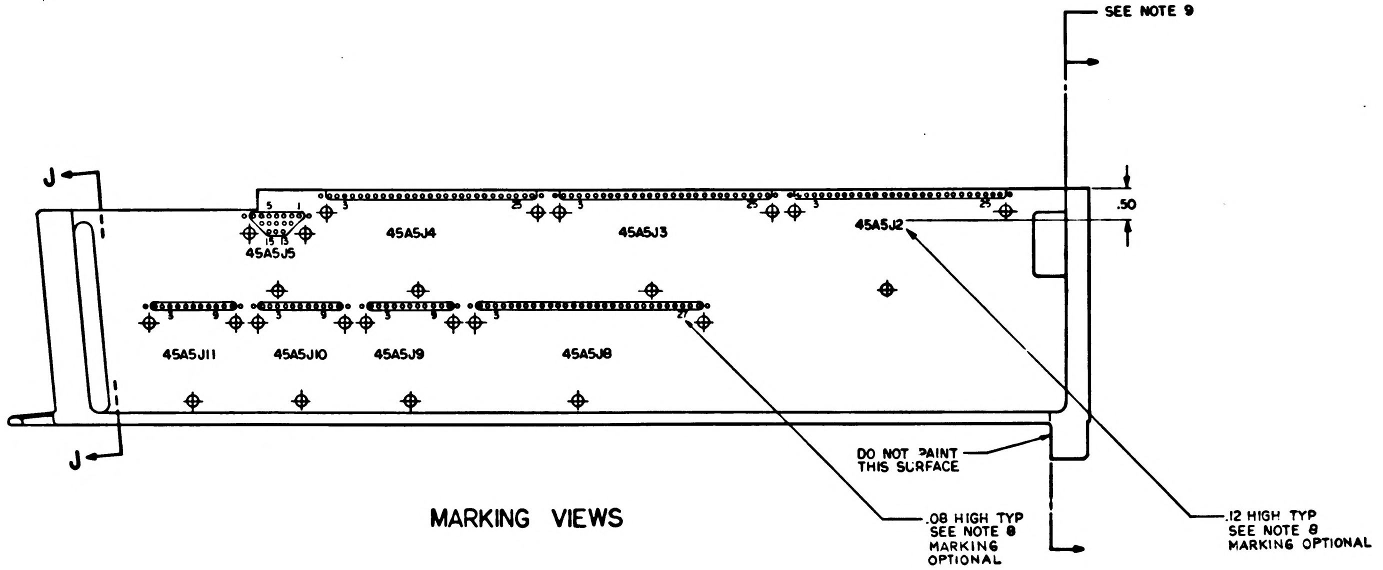

K
K
25
3
25
3
25
3
25
1
5
15
ENCODER
ENCODER
ENCODER
CDU Z&L RELAYS
27
FORWARD-BACKWARD
COUNTER AND
COMPUTER OUTPUT
CDU D TO A
CONVERTER
CDU D TO A
CONVERTER
CDU D TO A
CONVERTER
SURFACE-D-REF
.08 HIGH REF
.12 HIGH REF

VIEW ROTATED 180°

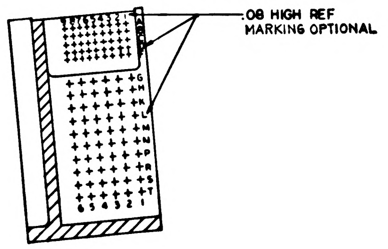

SEE NOTE 9
.12 HIGH REF
45A5P1
DO NOT PAINT
THIS SURFACE


1.70
.75
DO NOT PAINT
EDGES OF OPENING
SEE NOTE 10




SEE NOTE 9
J
J
.50
45A5J5
45A5J4
45A5J3
45A5J2
45A5J11
45A5J10
45A5J9
45A5J8
DO NOT PAINT
THIS SURFACE
.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL

MARKING VIEWS


.08 HIGH REF
MARKING OPTIONAL

SECTION J-J

1008590 B

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

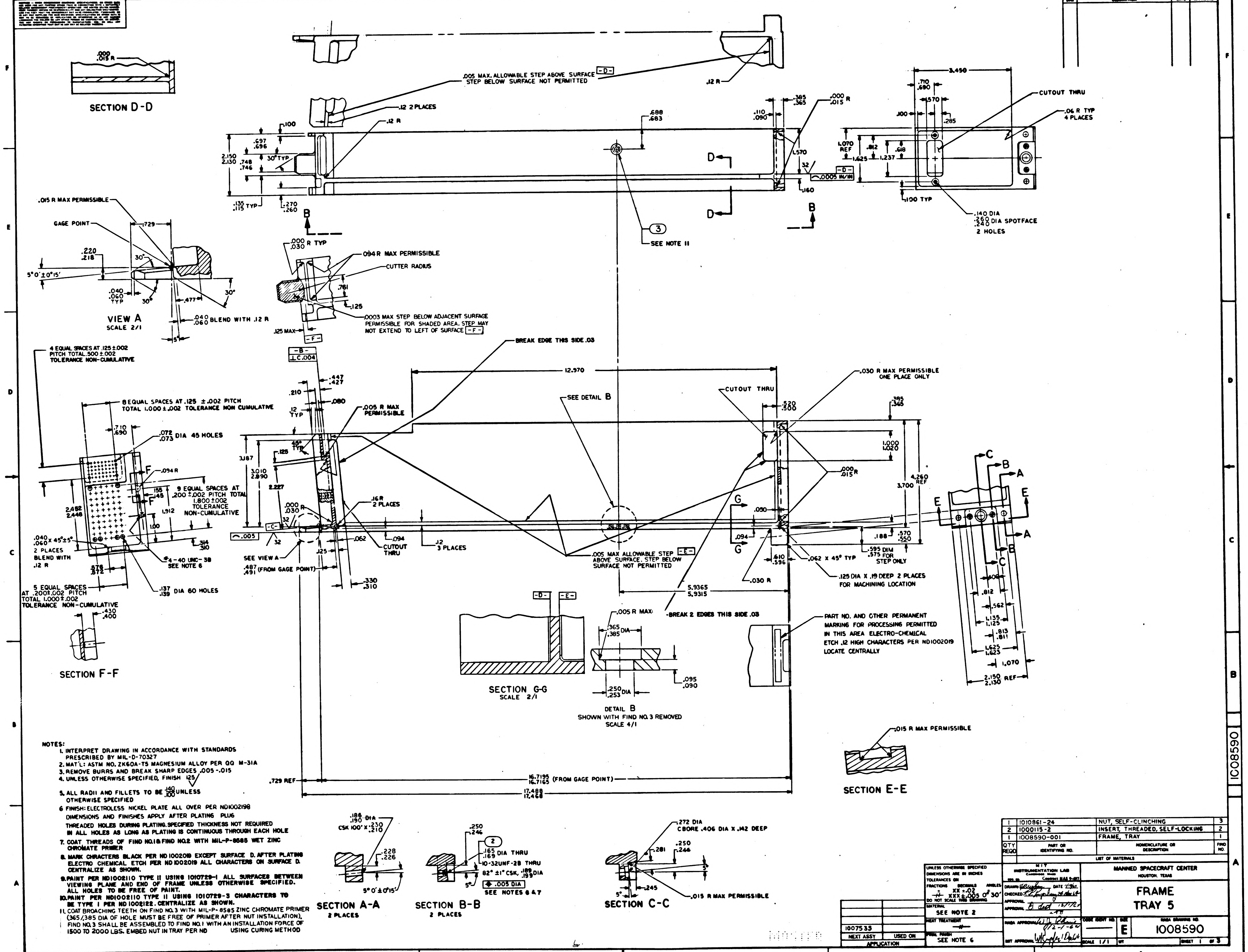
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Brigham DATE 11/19/64
CHECKED 29 Nov 64
APPROVAL
APPROVAL
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO. 1008590
SCALE 1/1
WT
SHEET 3 OF 3


SECTION D-D
.000
.015 R
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.12 2 PLACES
.12 R
.100
3.450
CUTOUT THRU
.06 R TYP
4 PLACES
.140 DIA
.260
.240 DIA SPOTFACE
2 HOLES
.100 TYP
.0005 IN/IN
.160
SEE NOTE 11
.015 R MAX PERMISSIBLE
GAGE POINT
VIEW A
SCALE 2/1
5°0'±0°15'
BLEND WITH .12 R
.000
.030 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.0003 MAX STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA. STEP MAY
NOT EXTEND TO LEFT OF SURFACE -F-
.125 MAX
BREAK EDGE THIS SIDE .03
4 EQUAL SPACES AT .125±.002
PITCH TOTAL .500±.002
TOLERANCE NON-CUMULATIVE
8 EQUAL SPACES AT .125 ±.002 PITCH
TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.072
.073 DIA 45 HOLES
9 EQUAL SPACES AT
.200±.002 PITCH TOTAL
1.800±.002
TOLERANCE
NON-CUMULATIVE
.040
.060 X 45°±5°
2 PLACES
BLEND WITH
.12 R
#4-40 UNC-3B
SEE NOTE 6
.137
.139 DIA 60 HOLES
5 EQUAL SPACES
AT .200±.002 PITCH
TOTAL 1.000±.002
TOLERANCE NON-CUMULATIVE
SECTION F-F
12.970
SEE DETAIL B
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.005 R MAX
PERMISSIBLE
.16 R
2 PLACES
CUTOUT
THRU
.12
3 PLACES
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.005 MAX ALLOWABLE STEP -E-
ABOVE SURFACE. STEP BELOW
SURFACE NOT PERMITTED
.062 X 45° TYP
.595 DIM
.575 FOR
STEP ONLY
.125 DIA X .19 DEEP 2 PLACES
FOR MACHINING LOCATION
.030 R
5.9365
5.9315
.005 R MAX
-BREAK 2 EDGES THIS SIDE .03
SECTION G-G
SCALE 2/1
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT
MARKING FOR PROCESSING PERMITTED
IN THIS AREA ELECTRO-CHEMICAL
ETCH .12 HIGH CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195
16.7165 (FROM GAGE POINT)
17.488
17.468
.186
.190 DIA
CSK 100°X .230
.210
SECTION A-A
2 PLACES
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189
.199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO.2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHRACTERS BLACK PER ND 1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTERS TO BE TYPE I PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO.3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO.3 SHALL BE ASSEMBLED TO FIND NO.1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND USING CURING METHOD

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008590-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN DATE 1/1/64
CHECKED 24 Nov 64
APPROVAL
APPROVAL B. Test 12/1/64
NASA APPROVAL 12-1-64
MIT APPROVAL 1 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME
TRAY 5

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008590
SCALE 1/1
WT
SHEET 1 OF 3

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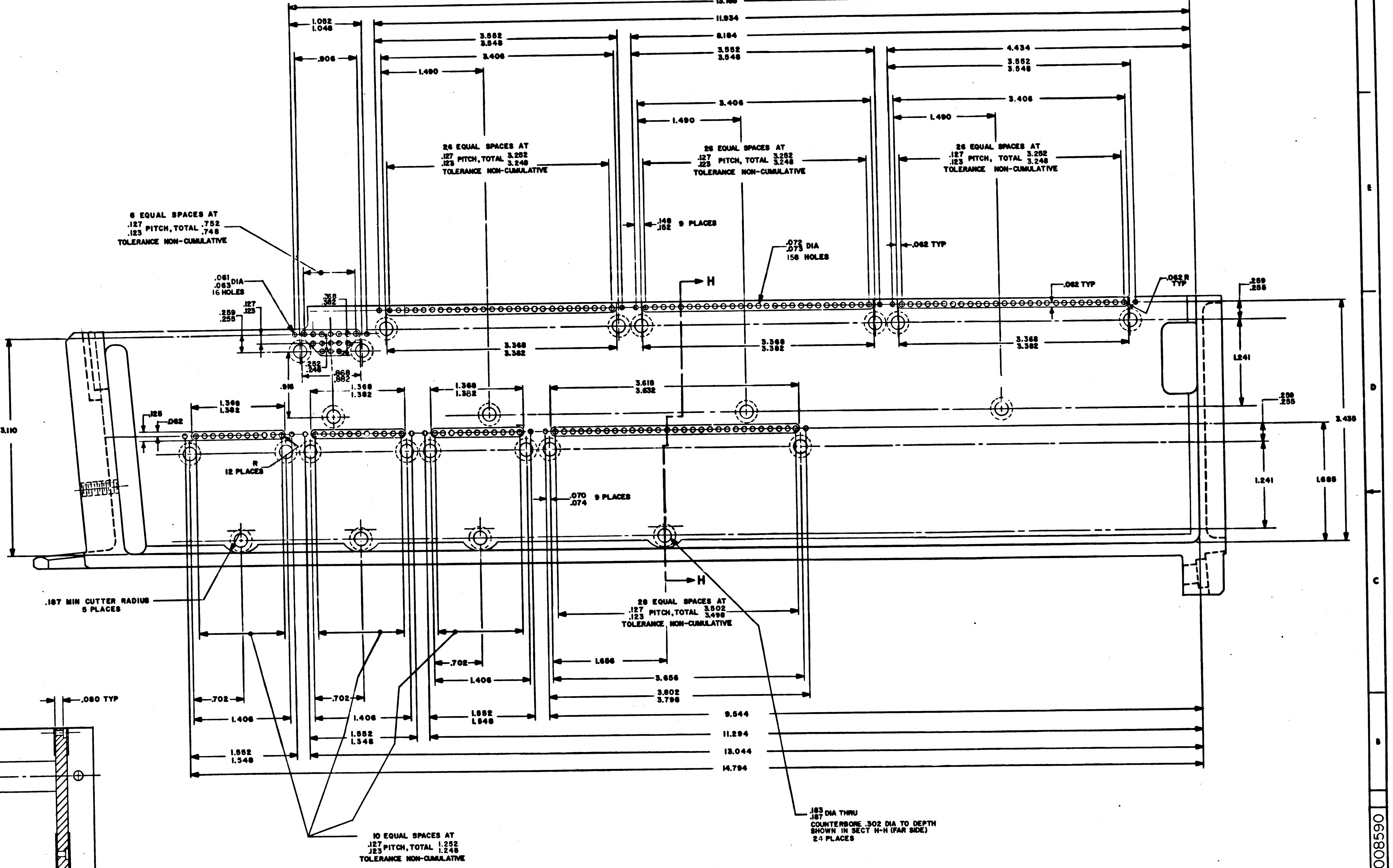
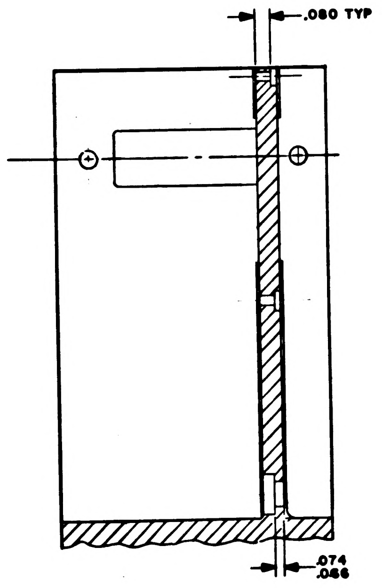

13.166
11.934
8.184
4.434
1.052 1.048
.906
3.552 3.548
3.406
1.490
26 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
6 EQUAL SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
.148 .152 9 PLACES
.072 .073 DIA 158 HOLES
.062 TYP
.062 R TYP
.061 .063 DIA 16 HOLES
.368 .382
.127 .123
.259 .255
.252 .248
.868 .882
.916
H
3.368 3.382
1.368 1.382
3.618 3.632
1.241
.259 .255
3.438
1.686
3.110
.125
.062
R 12 PLACES
.070 .074 9 PLACES
.187 MIN CUTTER RADIUS 5 PLACES
28 EQUAL SPACES AT .127 .123 PITCH, TOTAL 3.502 3.498 TOLERANCE NON-CUMULATIVE
.702
1.406
1.552 1.548
1.656
3.656
3.802 3.798
9.544
11.294
13.044
14.794
10 EQUAL SPACES AT .127 .123 PITCH, TOTAL 1.252 1.248 TOLERANCE NON-CUMULATIVE
.183 .187 DIA THRU COUNTERBORE .302 DIA TO DEPTH SHOWN IN SECT H-H (FAR SIDE) 24 PLACES

VIEW B-B
SCALE:2:1


.080 TYP
.074 .066

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. Contract NAS 9-497
DRAWN J Brigham DATE 11/19/64
CHECKED R. P. ... 24 Nov 64
APPROVAL
APPROVAL D. Test 12/1/64
NASA APPROVAL W. J. Rhine 12-1-64
MIT APPROVAL

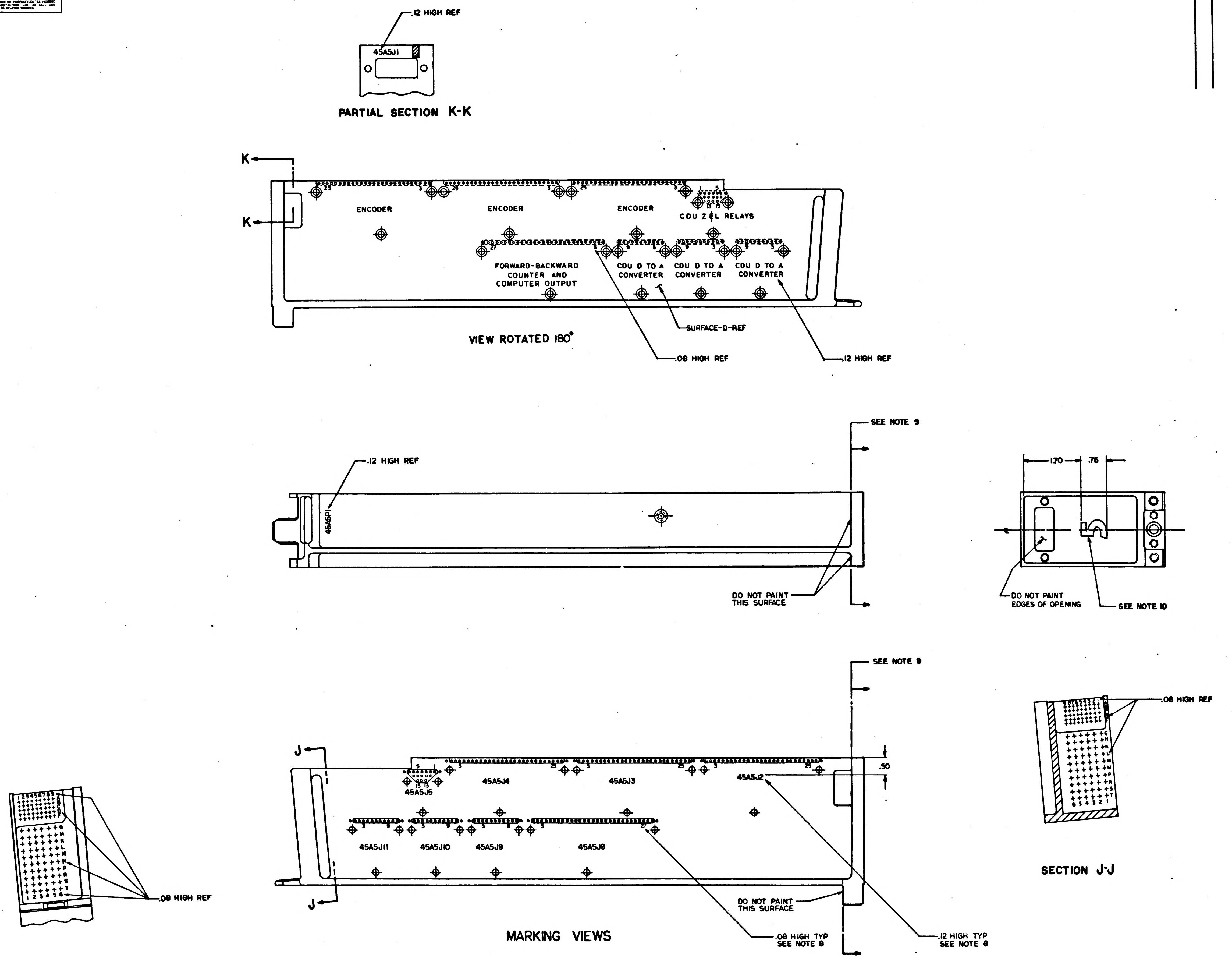
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 5

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008590
SCALE 2:1
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


.12 HIGH REF
45A5J1
PARTIAL SECTION K-K
K
K
ENCODER
ENCODER
ENCODER
CDU Z & L RELAYS
FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
CDU D TO A CONVERTER
CDU D TO A CONVERTER
CDU D TO A CONVERTER
SURFACE-D-REF
VIEW ROTATED 180°
.08 HIGH REF
.12 HIGH REF
SEE NOTE 9
.12 HIGH REF
45A5P1
DO NOT PAINT THIS SURFACE
1.70
.76
DO NOT PAINT EDGES OF OPENING
SEE NOTE 10
SEE NOTE 9
.08 HIGH REF
J
J
45A5J4
45A5J3
45A5J2
45A5J5
45A5J11
45A5J10
45A5J9
45A5J8
.50
SECTION J-J
.08 HIGH REF
DO NOT PAINT THIS SURFACE
MARKING VIEWS
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN H Brigham DATE 11/10/64
CHECKED
APPROVAL
APPROVAL D. Hart 12/1/64
LSB
NASA APPROVAL W. J. Rhine 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

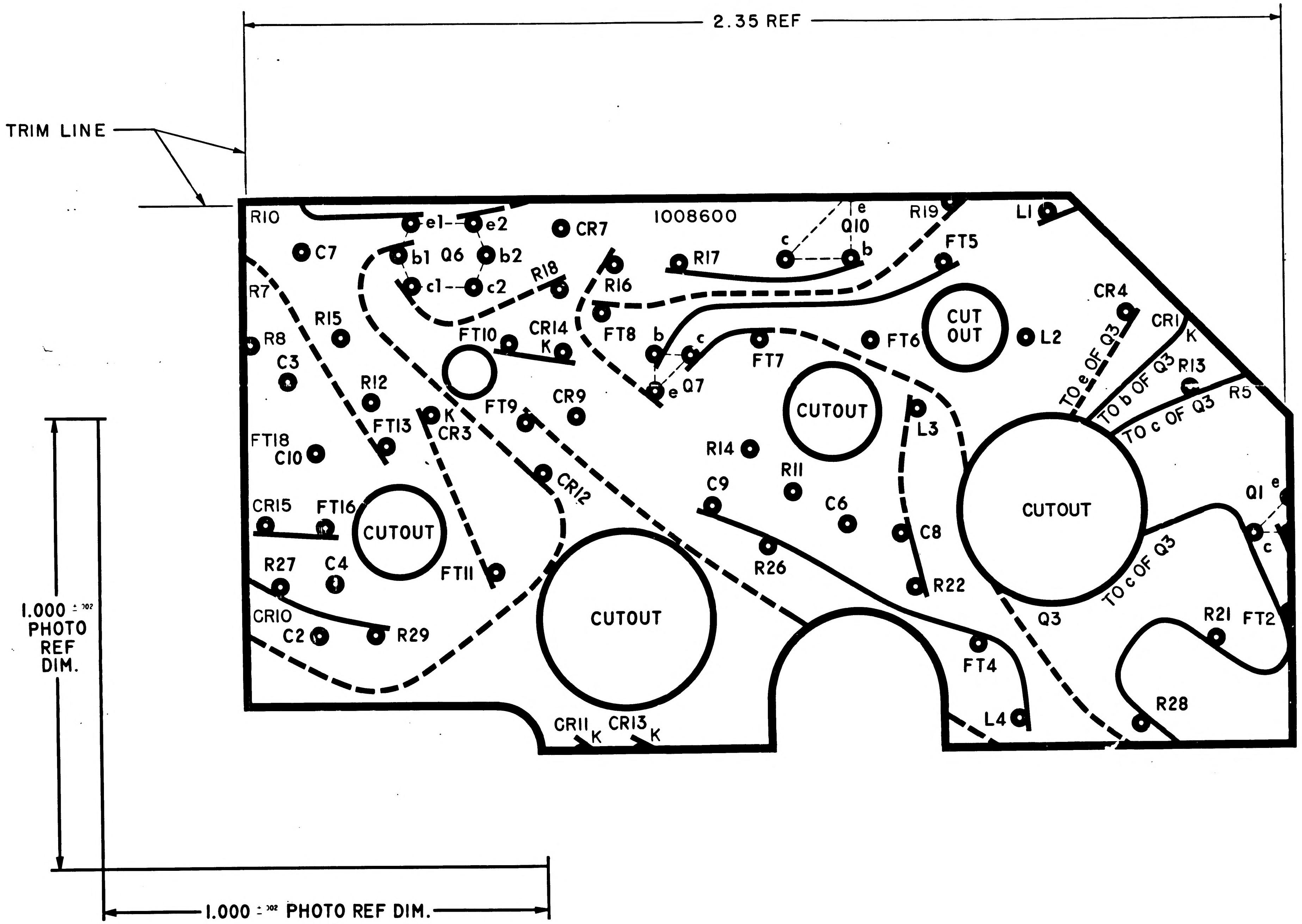
FRAME, TRAY 5

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1008590
SCALE 1/1
WT
SHEET 3 OF 3

1008590

6-30-65

A	REVISED PER TDRR 19314	30 JUN 65	A.N.


2.35 REF
TRIM LINE
1008600
R10
C7
e1
e2
b1
Q6
b2
c1
c2
CR7
R17
c
e
Q10
b
R19
L1
FT5
R7
R18
R16
R8
R15
FT10
CR14
K
FT8
b
c
Q7
e
FT7
FT6
CUT OUT
L2
CR4
CR1
K
R13
R5
C3
R12
CR9
CUTOUT
TO e OF Q3
TO b OF Q3
TO c OF Q3
FT18
C10
FT13
K
CR3
FT9
R14
L3
CR12
R11
C9
C6
CUTOUT
Q1
e
c
CR15
FT16
CUTOUT
C8
R27
C4
FT11
R26
R22
CUTOUT
TO c OF Q3
Q3
CR10
C2
R29
R21
FT2
FT4
R28
L4
CR11
K
CR13
K
1.000 ± .002 PHOTO REF DIM.
1.000 ± .002 PHOTO REF DIM.

NOTES:

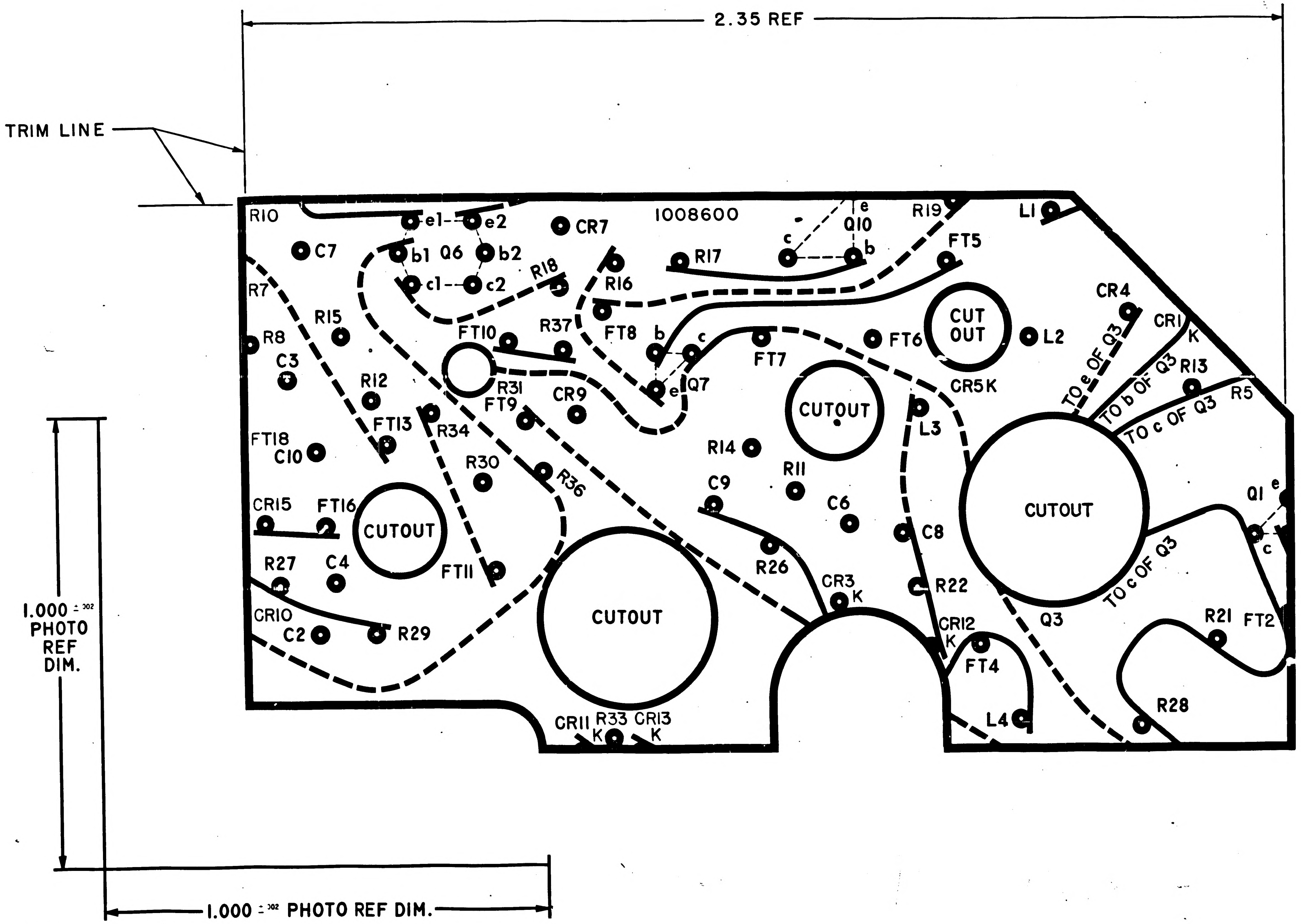
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY PROCESS OR METHOD, SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: .006/.008 THICK PLASTIC SHEET SENSITIZED DIMENSIONALLY STABLE PER L-F-340 TYPE I SUBTYPE B, CLASS II, STYLE IA.
6. ● .045/.050 DIA PUNCH ALL HOLES

1007516	SEE NOTE 5	M.I.T. INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER	
NEXT ASSY / USED ON	NAS 9-497	R. Baker 28 JUL 64	INSULATOR PHOTOGRAPHIC MASTER	
APPLICATION		A. Udovich 2 OCT 64	TERNARY CURRENT SWITCH COMPUTER OUTPUT	
		J.M. BLYSHAK DEC 64		
		D. Hoag 12/4/64		
		12-8-64	80230	E 1008600
			10:1	1 OF 1

6-30-65RC

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A		REVISED PER TDRR 19314		30 JUN 65	A.N.
B		REVISED PER TDRR 22860		17 SEP 65	WY

REVISIONS 14708



2.35 REF
TRIM LINE
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.
1008600
R10
C7
R7
R8
R15
C3
R12
FT13
FT18
C10
CR15
FT16
CUTOUT
R27
C4
CR10
C2
R29
e1
e2
b1
Q6
b2
c1
c2
R18
FT10
R37
R31
FT9
R34
R30
R36
FT11
CR7
R16
FT8
CR9
b
c
e
Q7
R17
c
e
Q10
b
R19
FT5
L1
CUT OUT
FT6
L2
FT7
CUTOUT
CR5K
L3
R14
C9
R11
C6
R26
CR3 K
C8
R22
CR12 K
FT4
L4
CUTOUT
CR11 K
R33
CR13 K
CR4
CR1 K
TO e OF Q3
TO b OF Q3
R13
TO c OF Q3
R5
CUTOUT
Q1
e
c
TO c OF Q3
Q3
R21
FT2
R28

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY PROCESS OR METHOD, SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: .006/.008 THICK PLASTIC SHEET SENSITIZED DIMENSIONALLY STABLE PER L-F-340 TYPE I SUBTYPE B, CLASS II, STYLE IA.
6. ◉ .045/.050 DIA PUNCH ALL HOLES

NEXT ASSY	USED ON
1007516	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN R. Barker DATE 28 JUL 64
CHECKED A. Udomich 2 OCT 64
J. M. BLYSBAF 3 DEC 64
APPROVAL
APPROVAL D. Abbott 12/4/64
NASA APPROVAL W. J. Rhine 12-8-64
MIT APPROVAL W. Kupfer

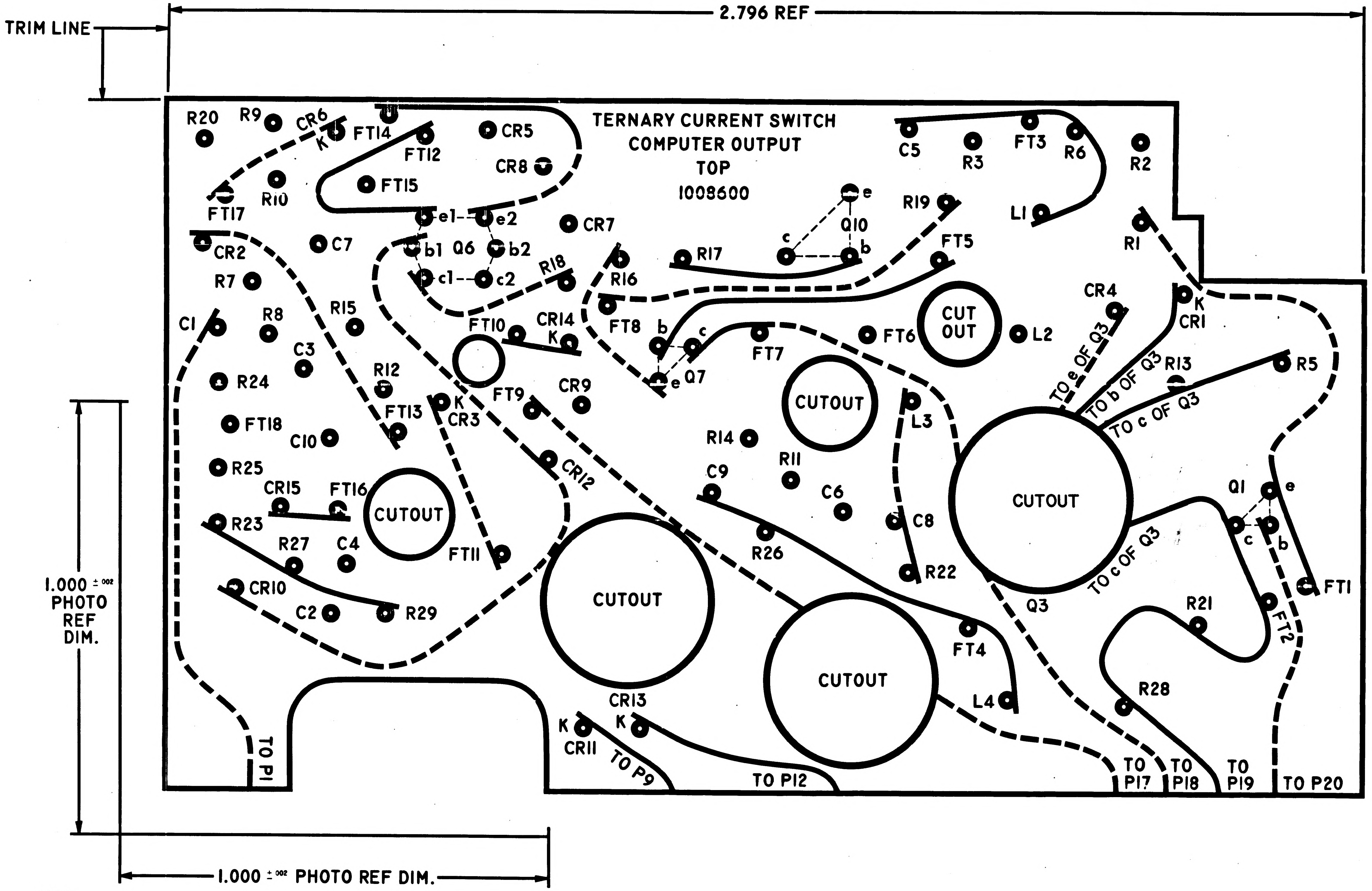
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR PHOTOGRAPHIC MASTER
TERNARY CURRENT SWITCH COMPUTER OUTPUT

CODE IDENT NO. 80230 SIZE E 1008600
SCALE 10:1 SHEET 1 OF 1

1008600 B

REVISIONS 14701					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD


TRIM LINE
2.796 REF
TERNARY CURRENT SWITCH
COMPUTER OUTPUT
TOP
1008600
R20
R9
CR6
K
FT14
FT12
CR5
CR8
FT15
R10
FT17
e1
e2
b1
Q6
b2
c1
c2
CR7
C7
CR2
R7
R18
R16
R17
c
Q10
e
b
R19
FT5
C5
R3
FT3
R6
R2
L1
R1
C1
R8
R15
C3
FT10
CR14
K
FT8
b
c
e
Q7
FT7
FT6
CUT OUT
L2
CR4
K
CR1
R13
R5
TO e OF Q3
TO b OF Q3
TO c OF Q3
R24
R12
FT13
K
CR3
FT9
CR9
CUTOUT
L3
FT18
C10
R14
R11
R25
CR12
C9
C6
CR15
FT16
CUTOUT
C8
CUTOUT
Q1
e
c
b
R23
R26
R22
FT1
R27
C4
FT11
CUTOUT
TO c OF Q3
Q3
R21
FT2
CR10
C2
R29
FT4
CUTOUT
R28
L4
CR13
K
K
CR11
TO P9
TO P12
TO P1
TO P17
TO P18
TO P19
TO P20
1.000 ± .002 PHOTO REF DIM.
1.000 ± .002 PHOTO REF DIM.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY PROCESS OR METHOD, SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. CUT TO WITHIN .010 OF TRIM LINE
4. MAKE MASTER PATTERN POSITIVE FILMS TO DIMENSIONS SHOWN
5. MATERIAL: .006/.008 THICK PLASTIC SHEET SENSITIZED DIMENSIONALLY STABLE PER L-F-340 TYPE I SUBTYPE B, CLASS II, STYLE IA.
6. ◉ .045/.050 DIA PUNCH ALL HOLES

1007516	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 5
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP P/N
DRAWN R. Bubke DATE 28 JUL 64
CHECKED A. Udovich 2 OCT 64
J. M. BLYSAAK 3 DEC 64
APPROVAL
APPROVAL D. Pitest 12/4/64
NASA APPROVAL W. J. Kline 12-7-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

INSULATOR PHOTOGRAPHIC MASTER
TERNARY CURRENT SWITCH COMPUTER OUTPUT

CODE IDENT NO
SIZE E
1008600
SCALE 10:1
SHEET 1 OF 1

1008604

APPLICATION		REVISIONS 14793			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
1007536-011	1007576-011	A	REPLACED BY REV(B) WITH CHANGE PER TDRR 21291	30 JUL 65	RLP / P7

Ⓐ **REPLACED WITH CHANGE BY REV** Ⓑ

Charleston
16 Nov 64

REV STATUS OF SHEETS	REV	A	+	+	+	+	+	+
	SHEET	1	2	3	4	5	6	7

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN G. Murray DATE 22 OCT 64
CHECKED J. GRIEB 16 NOV 64
APPROVAL 16 Nov 64
APPROVAL 17 Nov 64
12/14/64

NASA APPROVAL 12-15-64
MIT APPROVAL 15 Dec 64

CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS "D"
(TRAY 6)

CODE IDENT NO.	SIZE		REV
	A	1008604	A

SCALE –

SHEET 1 OF 7

PENNANT NOTE GENERAL NOTES

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.
2 SEE CONDUCTOR CHART, PENNANT NOTE 2.
3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6 SPIRALLING OF THE MARKING IS ALLOWED.
7 LACE HARNESS USING ITEM 2.
8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10 GRID MODULE IS 1 INCH.
11 UNLESS OTHERWISE SPECIFIED ---
FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .25 INCH
END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .12 INCH.
12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
15 ASSEMBLE PER ND1002032

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008604
SCALE-NONE	REV LTR +	SHEET 2 OF 7

PENNANT NOTE GENERAL NOTES

16 GRID IS SHOWN FOR DIMENSIONING PURPOSES.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008604
SCALE-NONE	REV LTR +	SHEET 3 OF 7

1008604

APPLICATION	
NEXT ASSY	USED ON
1007536-011	1007576-011

REVISIONS 14793

SYM	DESCRIPTION	DATE	APPROVAL

REV							
SHEET							
REV STATUS REV	+	+	+	+	+	+	+
OF SHEETS SHEET	1	2	3	4	5	6	7

Charleston 16 Nov 64

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN G. Murray 22 OCT 64
CHECKED J. GRIEB 16 NOV 64
APPROVAL R Oaberg 16 Nov 64
APPROVAL [illegible] 17 NOV 64
NASA APPROVAL [illegible] 12-15-64
MIT APPROVAL [illegible] 15 Dec 64
CONTRACT NAS 9-497

WIRING HARNESS "D"
(TRAY 6)

CODE IDENT NO.
SIZE A
1008604
REV
SCALE -
SHEET 1 OF 7

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE, 12 FEET 6 INCHES TOTAL LENGTH
14	2	AR	1012507	TAPE, LACING AND TYING

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008604
SCALE-NONE	REV LTR +	SHEET 4 OF 7

GUX

WIRING HARNESS D

+ 1008604

CONDUCTOR			FROM						TO					
INDIVIDUAL LENGTH			CUT WIRE OR SHIELD				TERMINATION SPEC. 1▷		CUT WIRE OR SHIELD				TERMINATION SPEC 1▷	
			STRIP WIRE OR JACKET						STRIP WIRE OR JACKET					
NUMBER	ITEM NO.	2▷	CIRCUIT POINT	2▷	TIN	2▷	ITEM NO.	NO.	CIRCUIT POINT	2▷	TIN	2▷	ITEM NO.	NO.
D 1	1		45A6P1-G 4	20	N			18	45A6J9-14	20	N			44
D 2	1		45A6P1-H 3	20	N			19	45A6J9-13	20	N			43
D 3	1		45A6P1-H 1	20	N			20	45A6J9-27	20	N			42
D 4	1		45A6P1-A 9	20	N			3	45A6J9-12	20	N			41
D 5	1		45A6P1-D 8	20	N			10	45A6J9-26	20	N			40
D 6	1		45A6P1-G 2	20	N			16	45A6J9-11	20	N			39
D 7	1		45A6P1-A 8	20	N			2	45A6J9-25	20	N			38
D 8	1		45A6P1-B 9	20	N			6	45A6J9- 9	20	N			36
D 9	1		45A6P1-G 3	20	N			17	45A6J9-22	20	N			35
D 10	1		45A6P1-G 1	20	N			15	45A6J9- 8	20	N			34
D 11	1		45A6P1-D 9	20	N			11	45A6J9-21	20	N			33
D 12	1		45A6P1-F 7	20	N			12	45A6J9-20	20	N			32
D 13	1		45A6P1-F 8	20	N			13	45A6J9- 6	20	N			31
D 14	1		45A6P1-F 9	20	N			14	45A6J9- 5	20	N			30
D 15	1		45A6P1-B 7	20	N			14	45A6J9-17	20	N			28
D 16	1		45A6P1-A 7	20	N			1	45A6J9-16	20	N			27
D 17	1		45A6P1-D 7	20	N			9	45A6J9- 3	20	N			26
D 18	1		45A6P1-B 8	20	N			5	45A6J9-15	20	N			25

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A

1008604

SCALE - NONE | REV LTR + | SHEET 5 OF 7

MIL 2085 - 4-63 WIR

GUX

WIRING HARNESS D

+ 1008604

CONDUCTOR			FROM						TO					
INDIVIDUAL LENGTH			CUT WIRE OR SHIELD				TERMINATION SPEC. 1▷		CUT WIRE OR SHIELD				TERMINATION SPEC 1▷	
			STRIP WIRE OR JACKET						STRIP WIRE OR JACKET					
NUMBER	ITEM NO.	2▷	CIRCUIT POINT	2▷	TIN	2▷	ITEM NO.	NO.	CIRCUIT POINT	2▷	TIN	2▷	ITEM NO.	NO.
D 19	1		45A6P1-C 8	20	N			7	45A6J9- 2	20	N			24
D 20	1		45A6P1-C 9	20	N			8	45A6J9- 1	20	N			23
D 21	1		45A6J9-23	20	N			37	45A6J5- 7	20	N			21
D 22	1		45A6J9-18	20	N			29	45A6J5- 8	20	N			22

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A

1008604

SCALE - NONE | REV LTR + | SHEET 6 OF 7

MIL 2085 - 4-63 WIR

APPLICATION	
NEXT ASSY	USED ON

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15953	8 Feb '65	KH [illegible]

REV																			
SHEET																			
REV STATUS	REV	A	+	+	+	+	A	A	A	A									
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9									

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Knotek DATE 9 NOV 64
CHECKED [illegible] 24 Nov 64
APPROVAL R. Doberg 30 Nov 64
APPROVAL [illegible] 2DEC64
NASA APPROVAL [illegible] 12-2-64
MIT APPROVAL [illegible] 23 [illegible]
CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "A"
(TRAY 8)

CODE IDENT NO. SIZE 1008611 REV A

SCALE ___ SHEET 1 OF 9

PENNANT GENERAL NOTES

NOTE	
1	SEE CONDUCTOR CHART. PENNANT NOTE 1.
2	SEE CONDUCTOR CHART. PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 3.
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER ND1002019.
9	SOLDER PER ND1002071 USING ITEMS 4 AND 5.
10	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
11	GRID IS SHOWN FOR DIMENSIONING PURPOSES.
12	GRID MODULE IS 1 INCH BASIC.
13	UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.
14	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
15	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

PENNANT GENERAL NOTES

NOTE	
16	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
17	ASSEMBLE HARNESS PER ND1002032.
18	ASSEMBLE ITEM 3 PER ND1002206.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
15	1	1	1010848- 2	WIRE, 30 FEET TOTAL LENGTH
15	2	9	1010738- 6	CONTACT, CRIMP TYPE SOCKET
16	3	AR	1012507-002	TAPE, LACING AND TYING

GVF WIRING HARNESS A + 1008611

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	FROM TERMINATION SPEC. ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 1	1	45A8P1-G6	20N		4	45A8J3- 4	20N		29
A 2	1	45A8P1-G5	20N		5	45A8J3- 2	20N		27
A 3	1	45A8P1-G4	20N		6	45A8J2- 4	20N		21
A 4	1	45A8P1-G3	20N		7	45A8J2- 2	20N		19
A 5	1	45A8P1-H6	20N		1	45A8J3- 8	20N		34
A 6	1	45A8P1-H4	20N		2	45A8J2- 8	20N		24
A 7	1	45A8P1-H1	20N		3	45A8J3- 8	20N		35
A 8	1	45A8P1-A3	20N		16	45A8J5-19	20N		54
A 9	1	45A8P1-A2	20N		17	45A8J5- 5	20N		55
A 10	1	45A8P1-A1	20N		18	45A8J5- 1	20N		48
A 11	1	45A8P1-C9	20N		10	45A8J1- 8	08N	2	85
A 12	1	45A8P1-C8	20N		11	45A8J1- 7	08N	2	86
A 13	1	45A8P1-C7	20N		12	45A8J1- 6	08N	2	87
A 14	1	45A8P1-C2	20N		13	45A8J5-10	20N		65
A 15	1	45A8P1-C1	20N		14	45A8J5-23	20N		64
A 16	1	45A8P1-F5	20N		8	45A8J4-13	20N		45
A 17	1	45A8P1-F4	20N		7	45A8J4-12	20N		44
A 18	1	45A8P1-B1	20N		15	45A8J5-16	20N		50

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE-NONE | REV LTR + | SHEET 5 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	FROM TERMINATION SPEC. ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 19	1	45A8J2- 1	20N		20	45A8J3- 1	20N		28
A 20	1	45A8J2- 6	20N		22	45A8J3- 6	20N		30
A 21	1	45A8J2- 7	20N		23	45A8J3- 7	20N		32
A 22	1	45A8J2- 8	20N		25	45A8J9-17	20N		104
A 23	1	45A8J2- 9	20N		26	45A8J5-31	20N		106
A 24	1	45A8J3- 6	20N		31	45A8J4- 7	20N		41
A 25	1	45A8J3- 7	20N		33	45A8J4- 4	20N		39
A 26	1	45A8J3- 8	20N		36	45A8J5-45	20N		105
A 27	1	45A8J3- 9	20N		37	45A8J5-40	20N		107
A 28	1	45A8J4- 3	20N		38	45A8J4-15	20N		47
A 29	1	45A8J4- 6	20N		40	45A8J4- 9	20N		42
A 30	1	45A8J4-10	20N		43	45A8J5- 6	20N		57
A 31	1	45A8J4-14	20N		46	45A8J4-23	20N		112
A 32	1	45A8J5- 1	20N		49	45A8J6- 14	20N		102
A 33	1	45A8J5- 2	20N		51	45A8J5-21	20N		61
A 34	1	45A8J5-17	20N		52	45A8J6- 12	20N		113
A 35	1	45A8J5-18	20N		53	45A8J6- 9	20N		73
A 36	1	45A8J5- 5	20N		56	45A8J6-11	20N		103

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE-NONE | REV LTR A | SHEET 6 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	FROM TERMINATION SPEC. ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 37	1	45A8J5- 6	20N		58	45A8J6- 22	20N		98
A 38	1	45A8J5-20	20N		59	45A8J4-25	20N		111
A 39	1	45A8J5- 7	20N		60	45A8J6- 24	20N		97
A 40	1	45A8J5-21	20N		62	45A8J5-11	20N		66
A 41	1	45A8J5- 9	20N		63	45A8J6- 1	20N		71
A 42	1	45A8J5-12	20N		67	45A8J9- 1	20N		110
A 43	1	45A8J5-12	20N		68	45A8J7-25	20N		95
A 44	1	45A8J5-25	20N		69	45A8J9- 2	20N		109
A 45	1	45A8J5-14	20N		70	45A8J9- 7	20N		108
A 46	1	45A8J6- 8	20N		72	45A8J6- 21	20N		99
A 47	1	45A8J6- 10	20N		74	45A8J10-17	20N		94
A 48	1	45A8J7- 1	20N		75	45A8J7- 7	20N		79
A 49	1	45A8J7- 3	20N		76	45A8J1- 1	08N	2	89
A 50	1	45A8J7- 5	20N		77	45A8J1- 2	08N	2	90
A 51	1	45A8J7- 7	20N		78	45A8J10-13	20N		96
A 52	1	45A8J7-10	20N		80	45A8J1-11	08N	2	91
A 53	1	45A8J7-11	20N		81	45A8J10- 1	20N		100
A 54	1	45A8J7-12	20N		82	45A8J1-10	08N	2	92

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE-NONE | REV LTR A | SHEET 7 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	FROM TERMINATION SPEC. ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2 / TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 55	1	45A8J7-15	20N		83	45A8J1-23	08N	2	93
A 56	1	45A8J7-17	20N		84	45A8J1- 9	08N	2	88
A 57	1	45A8J6-10	20N		114	45A8J6-20	20N		101

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

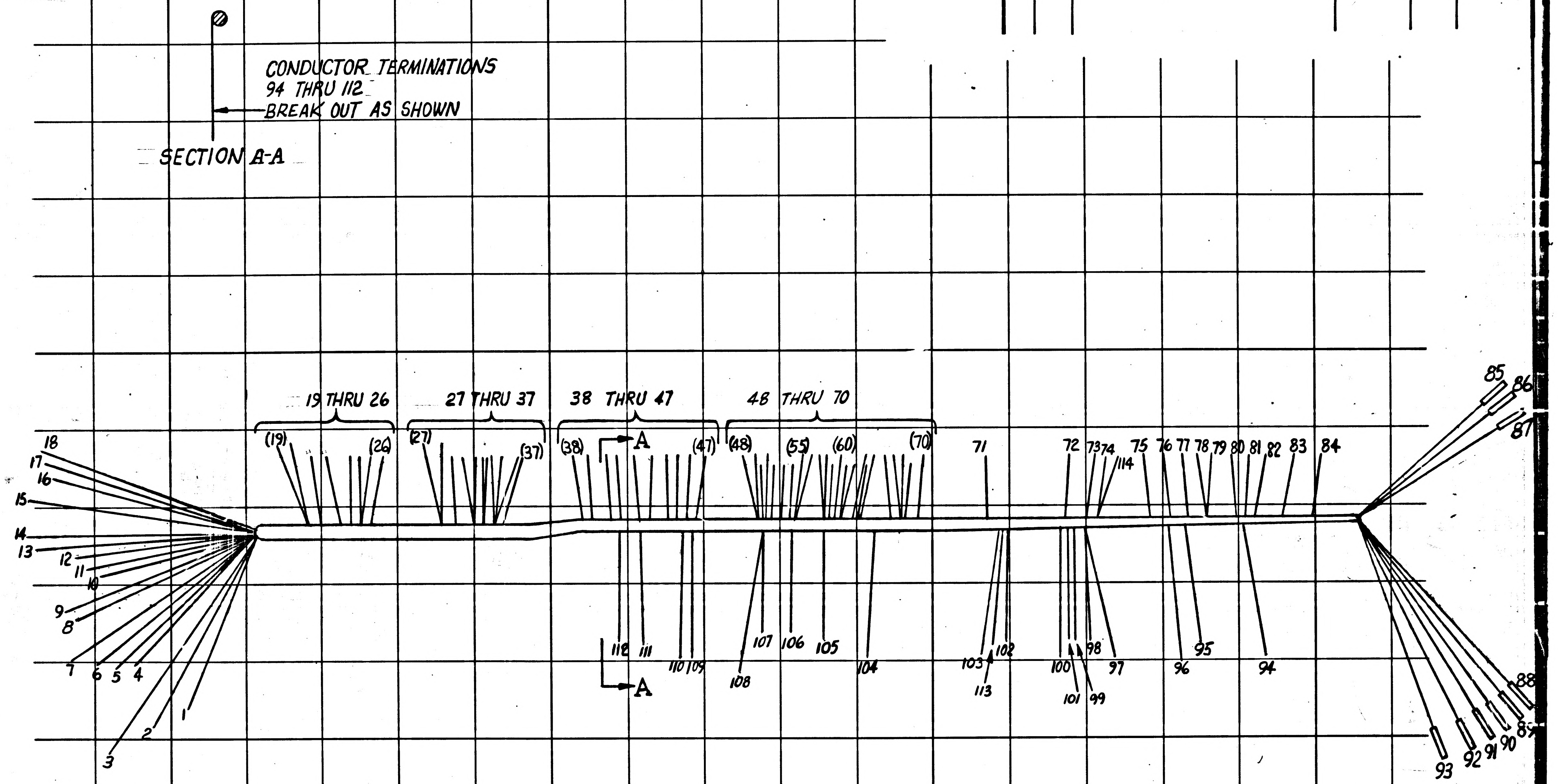
MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE-NONE | REV LTR A | SHEET 8 OF 9

MIL 2085 - 4-63 WIR

1198001

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		REVISED PER TDRR 15953		8/26/65	KH WR

REVISIONS 15116



CONDUCTOR TERMINATIONS
94 THRU 112
BREAK OUT AS SHOWN
SECTION A-A
19 THRU 26
27 THRU 37
38 THRU 47
48 THRU 70
(19) (26) (27) (37) (38) (47) (48) (55) (60) (70)
A
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
71 72 73 74 114 75 76 77 78 79 80 81 82 83 84
85 86 87 88 89 90 91 92 93
94 95 96 97 98 99 100 101 102 103 113
104 105 106 107 108 109 110 111 112

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C. Krotek DATE 6 NOV 64
CHECKED Kuna 24 Nov 64
APPROVAL R Ogberg 30 Nov 64
APPROVAL
NASA APPROVAL WJ Rhine 12-23-64
MIT APPROVAL W Kupfer 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS "A"
(TRAY 8)

CODE IDENT NO.
SIZE C
1008611
SCALE FULL
SHEET 9 OF 9

APPLICATION	
NEXT ASSY	USED ON

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15953	8 Feb 65	KH WK
B	REVISED PER TDRR 17976	6 APR 65	JJJ C7P

REV										
SHEET										
REV STATUS OF SHEETS	REV	B	+	+	+	B	A	A	A	A
	SHEET	1	2	3	4	5	6	7	8	9

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN C. Knotek DATE 9 NOV. 64
CHECKED 24 Nov 64
APPROVAL R Osberg 30 Nov 64
APPROVAL 2DEC64

WIRE HARNESS "A"
(TRAY 8)

NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64

CODE IDENT NO.

SIZE

1008611

REV B

CONTRACT NAS 9-497

SCALE ___

SHEET 1 OF 9

GVF WIRING HARNESS A + 1008611

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC 1 ITEM NO.	NO.
A 19	1		45A8J2- 1	20N		20	45A8J3- 1	20N		28
A 20	1		45A8J2- 6	20N		22	45A8J3- 6	20N		30
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A 22	1		45A8J2- 8	20N		25	45A8J9-17	20N		104
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A 30	1		45A8J4-10	20N		43	45A8J5- 6	20N		57
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A 35	1		45A8J5-18	20N		53	45A8J6- 9	20N		73
A 36	1		45A8J5- 5	20N		56	45A8J6-11	20N		103

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008611
SCALE - NONE	REV LTR A	SHEET 6 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC 1 ITEM NO.	NO.
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A 38	1		45A8J5-20	20N		59	45A8J4-25	20N		111
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A 40	1		45A8J5-21	20N		62	45A8J5-11	20N		66
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A 48	1		45A8J7- 1	20N		75	45A8J7- 7	20N		79
A 49	1		45A8J7- 3	20N		76	45A8J1- 1	08N	2	89
A 50	1		45A8J7- 5	20N		77	45A8J1- 2	08N	2	90
A 51	1		45A8J7- 7	20N		78	45A8J10-13	20N		96
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A 53	1		45A8J7-11	20N		81	45A8J10- 1	20N		100
A 54	1		45A8J7-12	20N		82	45A8J1-10	08N	2	92

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MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008611
SCALE - NONE	REV LTR A	SHEET 7 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC 1 ITEM NO.	NO.
A 55	1		45A8J7-15	20N		83	45A8J1-23	08N	2	93
A 56	1		45A8J7-17	20N		84	45A8J1- 9	08N	2	88
A 57	1		45A8J6-10	20N		114	45A8J6 -20	20N		101

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

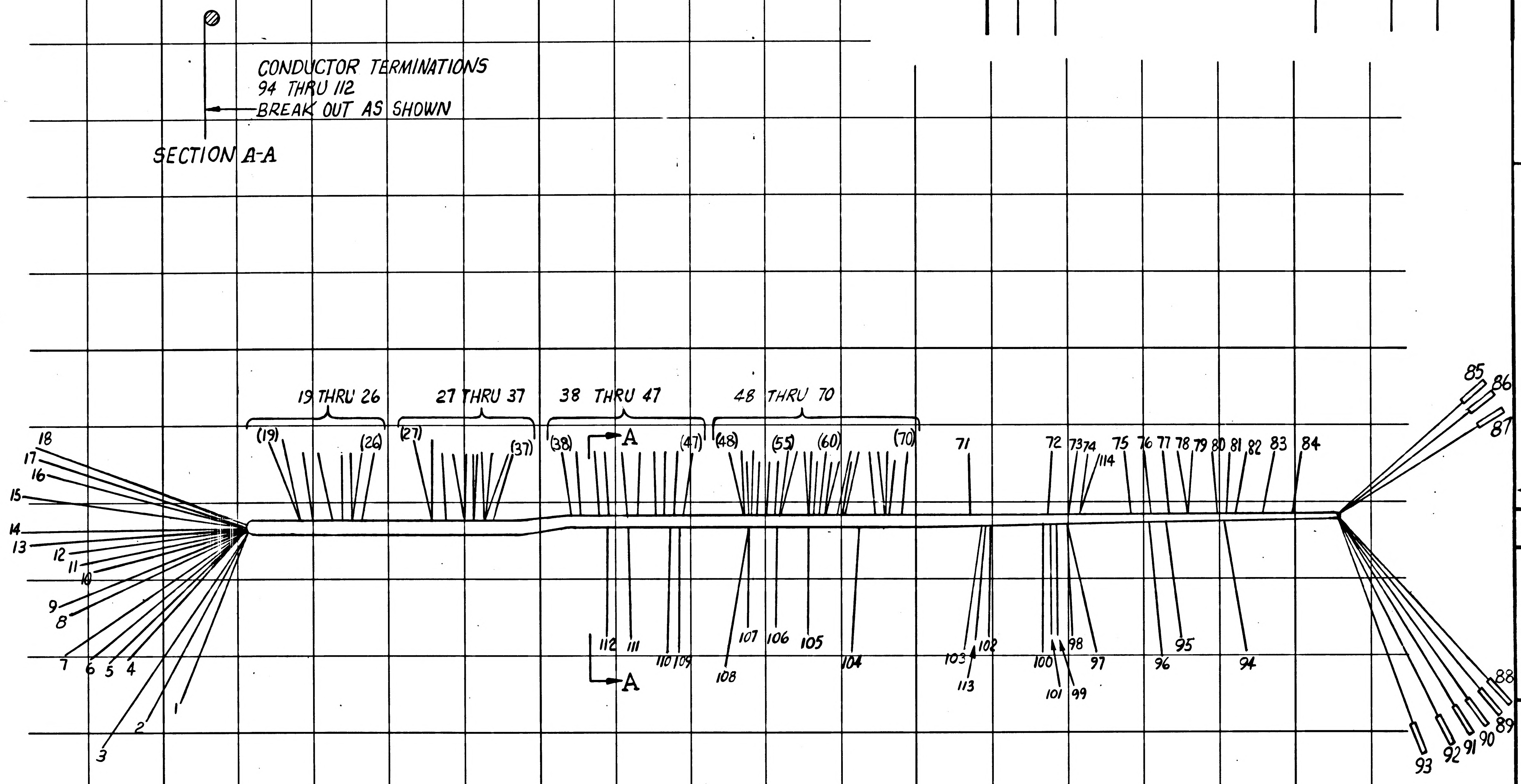
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008611
SCALE - NONE	REV LTR A	SHEET 8 OF 9

MIL 2085 - 4-63 WIR

1198001

SYM	ZONE	DESCRIPTION		DATE	APPD.
A		REVISED PER TDRR 15953	CHG NO.	8 Feb 65	KH WR

REVISIONS 15118



CONDUCTOR TERMINATIONS
94 THRU 112
BREAK OUT AS SHOWN
SECTION A-A
19 THRU 26
27 THRU 37
38 THRU 47
48 THRU 70
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1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C. Krotek DATE 6 NOV 64
CHECKED Luna 24 NOV 64
APPROVAL R Ogberg 30 Nov 64
APPROVAL
NASA APPROVAL W J Kline 12-23-64
MIT APPROVAL W Kupfer 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS "A"
(TRAY 8)

CODE IDENT NO.
SIZE C
1008611
SCALE FULL
SHEET 9 OF 9

1008611

MIL 1077C—P

APPLICATION		REVISIONS 15116			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
		A	REVISED PER TDRR 15953	8 Feb 65	KH WK
	Ⓜ	B	REVISED PER TDRR 17976	6 APR 65	J J J C&P
		C	REVISED PER TDRR 18824	10-MAY 65	M.G.

REV											
SHEET											
REV STATUS OF SHEETS	REV			C	+	+	+	B	C	A	A	A
	SHEET			1	2	3	4	5	6	7	8	9

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Knotek DATE 9 NOV. 64
CHECKED 24 NOV 64
APPROVAL R. Ossberg 30 Nov 64
APPROVAL 2 DEC 64

NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64

CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "A"
(TRAY 8)

CODE IDENT NO. 80230

SIZE

1008611

REV C

SCALE ___

SHEET 1 OF 9

GVF WIRING HARNESS A + 1008611

PENNANT GENERAL NOTES

NOTE

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 3.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER ND1002019.

9 SOLDER PER ND1002071 USING ITEMS 4 AND 5.

10 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

11 GRID IS SHOWN FOR DIMENSIONING PURPOSES.

12 GRID MODULE IS 1 INCH BASIC.

13 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

14 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

15 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE - NONE | REV LTR + | SHEET 2 OF 9

GVF WIRING HARNESS A + 1008611

PENNANT GENERAL NOTES

NOTE

16 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

17 ASSEMBLE HARNESS PER ND1002032.

18 ASSEMBLE ITEM 3 PER ND1002206.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE - NONE | REV LTR + | SHEET 3 OF 9

GVF WIRING HARNESS A + 1008611

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
15	1	1	1010848- 2	WIRE, 30 FEET TOTAL LENGTH
15	2	9	1010738- 6	CONTACT, CRIMP TYPE SOCKET
16	3	AR	1012507-002	TAPE, LACING AND TYING

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE - NONE | REV LTR + | SHEET 4 OF 9

GVF WIRING HARNESS A ≠B 1008611

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2>	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2>	TIN 2>	TERMINATION SPEC. 1> ITEM NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2>	TIN 2>	TERMINATION SPEC 1> ITEM NO.	NO.
A 1	1		45A8P1-G6	20	N		4	45A8J3- 4	20	N		29
A 2	1		45A8P1-G5	20	N		5	45A8J3- 2	20	N		27
A 3	1		45A8P1-G4	20	N		6	45A8J2- 4	20	N		21
A 4	1		45A8P1-G3	20	N		7	45A8J2- 2	20	N		19
A 5	1		45A8P1-H6	20	N		1	45A8J3- 8	20	N		34
A 6	1		45A8P1-H4	20	N		2	45A8J2- 8	20	N		24
A 7	1		45A8P1-H1	20	N		3	45A8J3- 8	20	N		35
A 8	1		45A8P1-A3	20	N		16	45A8J5-19	20	N		54
A 9	1		45A8P1-A2	20	N		17	45A8J5- 5	20	N		55
A 10	1		45A8P1-A1	20	N		18	45A8J5- 1	20	N		48
A 11	1		45A8P1-C9	20	N		10	45A8J1- 8	08	N	2	85
A 12	1		45A8P1-C8	20	N		11	45A8J1- 7	08	N	2	86
A 13	1		45A8P1-C7	20	N		12	45A8J1- 6	08	N	2	87
A 14	1		45A8P1-C2	20	N		13	45A8J5-10	20	N		65
A 15	1		45A8P1-C1	20	N		14	45A8J5-23	20	N		64
A 16	1		45A8P1-F5	20	N		8	45A8J4-13	20	N		45
A 17	1		45A8P1-F4	20	N		9	45A8J4-12	20	N		44
A 18	1		45A8P1-B1	20	N		15	45A8J5-16	20	N		50

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE - NONE | REV LTR ≠B | SHEET 5 OF 9

GVF WIRING HARNESS A ✱C 1008611

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN / 2	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN / 2	TERMINATION SPEC 1 ITEM NO.	NO.
A 19	1		45A8J2- 1	20N		20	45A8J3- 1	20N		28
A 20	1		45A8J2- 6	20N		22	45A8J3- 6	20N		30
A 21	1		45A8J2- 7	20N		23	45A8J3- 7	20N		32
A 22	1		45A8J2- 8	20N		25	45A8J9-17	20N		104
A 23	1		45A8J2- 9	20N		26	45A8J5-31	20N		106
A 24	1		45A8J3- ~~6~~ 7	20N		~~31~~ 33	45A8J4- 7	20N		41
A 25	1		45A8J3- ~~7~~ 6	20N		~~33~~ 31	45A8J4- 4	20N		39
A 26	1		45A8J3- 8	20N		36	45A8J5-45	20N		105
A 27	1		45A8J3- 9	20N		37	45A8J5-40	20N		107
A 28	1		45A8J4- 3	20N		38	45A8J4-15	20N		47
A 29	1		45A8J4- 6	20N		40	45A8J4- 9	20N		42
A 30	1		45A8J4-10	20N		43	45A8J5- 6	20N		57
A 31	1		45A8J4-14	20N		46	45A8J4-23	20N		112
A 32	1		45A8J5- 1	20N		49	45A8J6- 14	20N		102
A 33	1		45A8J5- 2	20N		51	45A8J5-21	20N		61
A 34	1		45A8J5-17	20N		52	45A8J6- 12	20N		113
A 35	1		45A8J5-18	20N		53	45A8J6- 9	20N		73
A 36	1		45A8J5- 5	20N		56	45A8J6-11	20N		103

1 > THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 > DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611

SCALE - NONE | REV LTR C | SHEET 6 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN / 2	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN / 2	TERMINATION SPEC 1 ITEM NO.	NO.
A 37	1		45A8J5- 6	20N		58	45A8J6- 22	20N		98
A 38	1		45A8J5-20	20N		59	45A8J4-25	20N		111
A 39	1		45A8J5- 7	20N		60	45A8J6- 24	20N		97
A 40	1		45A8J5-21	20N		62	45A8J5-11	20N		66
A 41	1		45A8J5- 9	20N		63	45A8J6- 1	20N		71
A 42	1		45A8J5-12	20N		67	45A8J9- 1	20N		110
A 43	1		45A8J5-12	20N		68	45A8J7-25	20N		95
A 44	1		45A8J5-25	20N		69	45A8J9- 2	20N		109
A 45	1		45A8J5-14	20N		70	45A8J9- 7	20N		108
A 46	1		45A8J6- 8	20N		72	45A8J6- 21	20N		99
A 47	1		45A8J6- 10	20N		74	45A8J10-17	20N		94
A 48	1		45A8J7- 1	20N		75	45A8J7- 7	20N		79
A 49	1		45A8J7- 3	20N		76	45A8J1- 1	08N	2	89
A 50	1		45A8J7- 5	20N		77	45A8J1- 2	08N	2	90
A 51	1		45A8J7- 7	20N		78	45A8J10-13	20N		96
A 52	1		45A8J7-10	20N		80	45A8J1-11	08N	2	91
A 53	1		45A8J7-11	20N		81	45A8J10- 1	20N		100
A 54	1		45A8J7-12	20N		82	45A8J1-10	08N	2	92

1 > THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 > DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611

SCALE - NONE | REV LTR A | SHEET 7 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN / 2	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN / 2	TERMINATION SPEC 1 ITEM NO.	NO.
A 55	1		45A8J7-15	20N		83	45A8J1-23	08N	2	93
A 56	1		45A8J7-17	20N		84	45A8J1- 9	08N	2	88
A 57	1		45A8J6-10	20N		114	45A8J6-20	20N		101

1 > THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 > DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

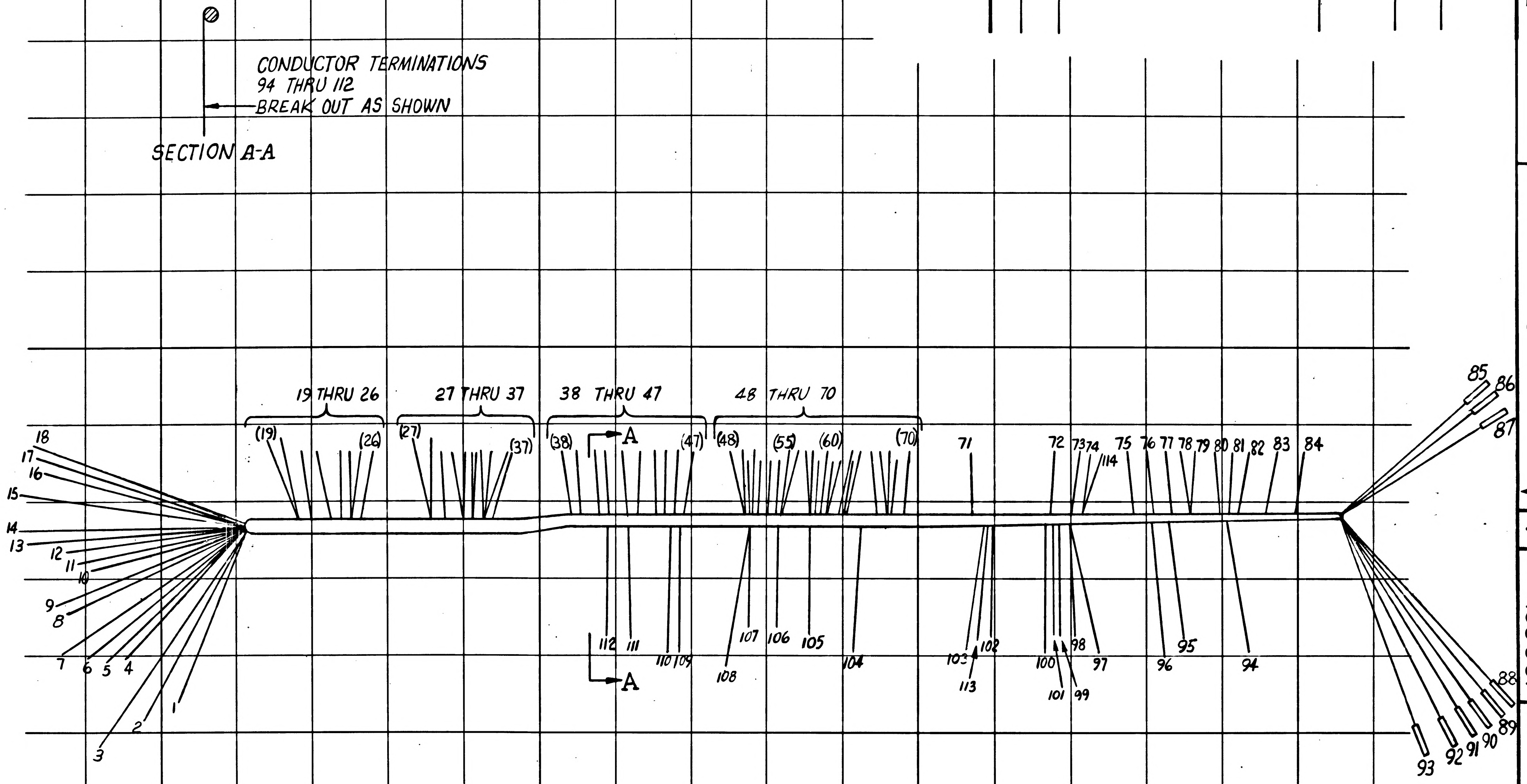
MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611

SCALE - NONE | REV LTR A | SHEET 8 OF 9

MIL 2085 - 4-63 WIR

1198001

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD
A		REVISED PER TDRR 15953		8/21/65	KH WR


CONDUCTOR TERMINATIONS
94 THRU 112
BREAK OUT AS SHOWN
SECTION A-A
19 THRU 26
27 THRU 37
38 THRU 47
48 THRU 70
(19)
(26)
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114

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Krotek DATE 6 NOV 64
CHECKED Luna 24 Nov 64
APPROVAL R Osberg 30 Nov 64
APPROVAL
NASA APPROVAL W J Kline 12-23-64
MIT APPROVAL W Kupfer 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS "A"
(TRAY 8)

CODE IDENT NO. 80230
SIZE C
1008611
SCALE FULL
SHEET 9 OF 9

MIL 1077C—F

1008611

APPLICATION	
NEXT ASSY	USED ON

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15953	8 Feb 65	KH WK
B	REVISED PER TDRR 17976	6 APR 65	JJJ C7P
C	REVISED PER TDRR 18824	10-MAY 65	M. G.
D	REPLACED WITH CHANGE BY REV E PER TDRR 22305	16 SEP 65	B.

REPLACED WITH CHANGE BY REV E

REV STATUS OF SHEETS										
REV	D	+	+	+	B	C	A	D	D
SHEET	1	2	3	4	5	6	7	8	9

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Knotek DATE 9 NOV. 64
CHECKED 24 NOV 64
APPROVAL R Osberg 30 Nov 64
APPROVAL 2 DEC 64

NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64

CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "A"
(TRAY 8)

CODE IDENT NO.	SIZE		REV
80230		1008611	D

SCALE ___

SHEET 1 OF 9

APPLICATION	
NEXT ASSY	USED ON

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL

REV STATUS OF SHEETS									
REV	+	+	+	+	+	+	+	+	+
SHEET	1	2	3	4	5	6	7	8	9

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN C. Knotek 9 NOV 64
CHECKED 24 Nov 64
APPROVAL 30 Nov 64
JPH 12/3/64
APPROVAL 2 DEC 64
NASA APPROVAL 12-3-64
MIT APPROVAL
CONTRACT NAS 9-497

WIRE HARNESS "A" (TRAY 8)

CODE IDENT NO. | SIZE | 1008611 | REV

SCALE ___ SHEET 1 OF 9

GVF WIRING HARNESS A + 1008611

PENNANT GENERAL NOTES

NOTE	
1	SEE CONDUCTOR CHART. PENNANT NOTE 1.
2	SEE CONDUCTOR CHART. PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 3.
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER ND1002019.
9	SOLDER PER ND1002071 USING ITEMS 4 AND 5.
10	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
11	GRID IS SHOWN FOR DIMENSIONING PURPOSES.
12	GRID MODULE IS 1 INCH BASIC.
13	UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.
14	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
15	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE-NONE | REV LTR + | SHEET 2 OF 9

MIL 2084 4-63

GVF WIRING HARNESS A + 1008611

PENNANT GENERAL NOTES

NOTE	
16	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
17	ASSEMBLE HARNESS PER ND1002032.
18	ASSEMBLE ITEM 3 PER ND1002206.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE-NONE | REV LTR + | SHEET 3 OF 9

MIL 2084 4-63

GVF WIRING HARNESS A + 1008611

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
15	1	1	1010848- 2	WIRE, 30 FEET TOTAL LENGTH
15	2	9	1010738- 6	CONTACT, CRIMP TYPE SOCKET
16	3	AR	1012507-002	TAPE, LACING AND TYING

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008611
SCALE-NONE | REV LTR + | SHEET 4 OF 9

MIL 2084 4-63

GVF WIRING HARNESS A + 1008611

CONDUCTOR			FROM						TO					
NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
A 1	1		45A8P1-G6	20	N			4	45A8J3- 4	20	N			29
A 2	1		45A8P1-G5	20	N			5	45A8J3- 2	20	N			27
A 3	1		45A8P1-G4	20	N			6	45A8J2- 4	20	N			21
A 4	1		45A8P1-G3	20	N			7	45A8J2- 2	20	N			19
A 5	1		45A8P1-H6	20	N			1	45A8J3- 8	20	N			34
A 6	1		45A8P1-H4	20	N			2	45A8J2- 8	20	N			24
A 7	1		45A8P1-H1	20	N			3	45A8J3- 8	20	N			35
A 8	1		45A8P1-A3	20	N			16	45A8J5-19	20	N			54
A 9	1		45A8P1-A2	20	N			17	45A8J5- 5	20	N			55
A 10	1		45A8P1-A1	20	N			18	45A8J5- 1	20	N			48
A 11	1		45A8P1-C9	20	N			10	45A8J1- 8	08	N		2	85
A 12	1		45A8P1-C8	20	N			11	45A8J1- 7	08	N		2	86
A 13	1		45A8P1-C7	20	N			12	45A8J1- 6	08	N		2	87
A 14	1		45A8P1-C2	20	N			13	45A8J5-10	20	N			65
A 15	1		45A8P1-C1	20	N			14	45A8J5-23	20	N			64
A 16	1		45A8P1-F5	20	N			8	45A8J4-13	20	N			45
A 17	1		45A8P1-F4	20	N			7	45A8J4-12	20	N			44
A 18	1		45A8P1-B1	20	N			15	45A8J5-16	20	N			50

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A 1008611
SCALE-NONE REV LTR + SHEET 5 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR			FROM						TO					
NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
A 19	1		45A8J2- 1	20	N			20	45A8J3- 1	20	N			28
A 20	1		45A8J2- 6	20	N			22	45A8J3- 6	20	N			30
A 21	1		45A8J2- 7	20	N			23	45A8J3- 7	20	N			32
A 22	1		45A8J2- 8	20	N			25	45A8J9-17	20	N			104
A 23	1		45A8J2- 9	20	N			26	45A8J5-31	20	N			106
A 24	1		45A8J3- 6	20	N			31	45A8J4- 7	20	N			41
A 25	1		45A8J3- 7	20	N			33	45A8J4- 4	20	N			39
A 26	1		45A8J3- 8	20	N			36	45A8J5-45	20	N			105
A 27	1		45A8J3- 9	20	N			37	45A8J5-40	20	N			107
A 28	1		45A8J4- 3	20	N			38	45A8J4-15	20	N			47
A 29	1		45A8J4- 6	20	N			40	45A8J4- 9	20	N			42
A 30	1		45A8J4-10	20	N			43	45A8J5- 6	20	N			57
A 31	1		45A8J4-14	20	N			46	45A8J4-23	20	N			112
A 32	1		45A8J5- 1	20	N			49	45A8J6- 7	20	N			103
A 33	1		45A8J5- 2	20	N			51	45A8J5-21	20	N			61
A 34	1		45A8J5-17	20	N			52	45A8J6-10	20	N			102
A 35	1		45A8J5-18	20	N			53	45A8J6- 1	20	N			71
A 36	1		45A8J5- 5	20	N			56	45A8J6-11	20	N			101

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A 1008611
SCALE-NONE REV LTR + SHEET 6 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR			FROM						TO					
NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
A 37	1		45A8J5- 6	20	N			58	45A8J6-17	20	N			99
A 38	1		45A8J5-20	20	N			59	45A8J4-25	20	N			111
A 39	1		45A8J5- 7	20	N			60	45A8J6-18	20	N			98
A 40	1		45A8J5-21	20	N			62	45A8J5-11	20	N			66
A 41	1		45A8J5- 9	20	N			63	45A8J6- 3	20	N			72
A 42	1		45A8J5-12	20	N			67	45A8J9- 1	20	N			110
A 43	1		45A8J5-12	20	N			68	45A8J7-25	20	N			95
A 44	1		45A8J5-25	20	N			69	45A8J9- 2	20	N			109
A 45	1		45A8J5-14	20	N			70	45A8J9- 7	20	N			108
A 46	1		45A8J6- 5	20	N			73	45A8J6-20	20	N			97
A 47	1		45A8J6- 6	20	N			74	45A8J10-17	20	N			94
A 48	1		45A8J7- 1	20	N			75	45A8J7- 7	20	N			79
A 49	1		45A8J7- 3	20	N			76	45A8J1- 1	08	N		2	89
A 50	1		45A8J7- 5	20	N			77	45A8J1- 2	08	N		2	90
A 51	1		45A8J7- 7	20	N			78	45A8J10-13	20	N			96
A 52	1		45A8J7-10	20	N			80	45A8J1-11	08	N		2	91
A 53	1		45A8J7-11	20	N			81	45A8J10- 1	20	N			100
A 54	1		45A8J7-12	20	N			82	45A8J1-10	08	N		2	92

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A 1008611
SCALE-NONE REV LTR + SHEET 7 OF 9

MIL 2085 - 4-63 WIR

GVF WIRING HARNESS A + 1008611

CONDUCTOR			FROM						TO					
NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
A 55	1		45A8J7-15	20	N			83	45A8J1-23	08	N		2	93
A 56	1		45A8J7-17	20	N			84	45A8J1- 9	08	N		2	88

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

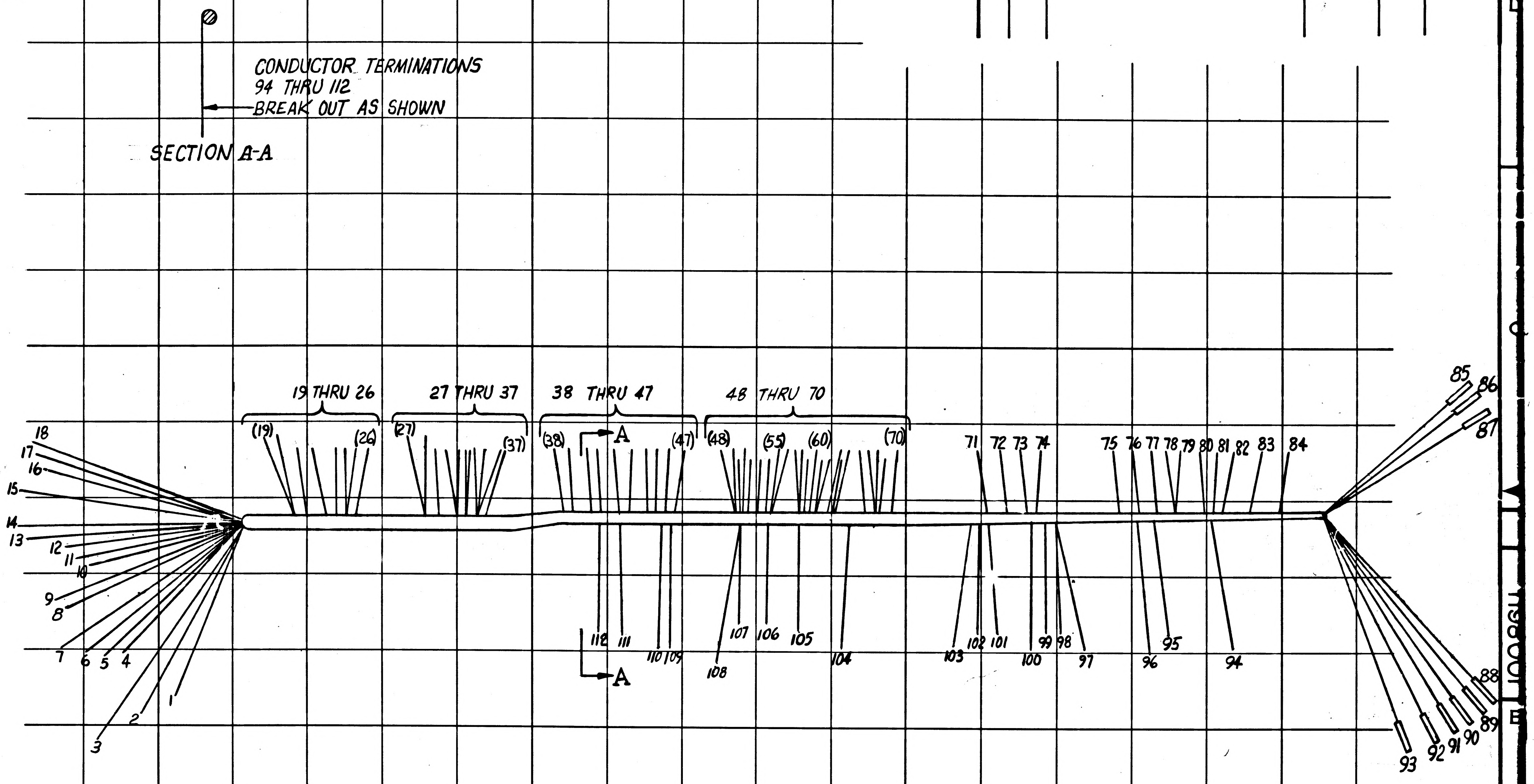
MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A 1008611
SCALE-NONE REV LTR + SHEET 8 OF 9

MIL 2085 - 4-63 WIR

1198001

REVISIONS 15116

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


CONDUCTOR TERMINATIONS
94 THRU 112
BREAK OUT AS SHOWN
SECTION A-A
19 THRU 26
27 THRU 37
38 THRU 47
48 THRU 70
(19)
(26)
(27)
(37)
(38)
A
(47)
(48)
(55)
(60)
(70)
71 72 73 74
75 76 77 78 79 80 81 82 83 84
85 86 87
88 89 90 91 92 93
18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
112 111 110 109
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108 107 106 105 104
103 102 101 100 99 98 97
96 95 94

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Krotek DATE 6 NOV 64
CHECKED Zuna 24 NOV 64
APPROVAL R Osberg 30 Nov 64
APPROVAL

NASA APPROVAL W J Rhine 12-23-64

MIT APPROVAL W Kupfer 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS "A"
(TRAY 8)

CODE IDENT NO.
SIZE C
1008611

SCALE FULL
SHEET 9 OF 9

MIL 1077C—P

15116

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15952	[illegible] 65	KHG W.L. WK

APPLICATION	
NEXT ASSY	USED ON

REV									
SHEET									
REV STATUS OF SHEETS — REV	/	+	+	+	A	A	A	A	A
REV STATUS OF SHEETS — SHEET	1	2	3	4	5	6	7	8	9

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Kutch — DATE 11 NOV 64
CHECKED — 24 NOV 64
APPROVAL — 30 NOV 64
APPROVAL — 2 DEC 64
NASA APPROVAL — 12-23-64
MIT APPROVAL — 23 Dec 64
CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "B"
(TRAY 8)

SIZE — CODE IDENT NO. — 1008612 — REV A

SCALE — SHEET 1 OF 9

PENNANT NOTE — GENERAL NOTES

1 SEE CONDUCTOR CHART. PENNANT NOTE 1.

2 SEE CONDUCTOR CHART. PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 4.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER ND1002019

9 SOLDER PER ND1002071 USING ITEMS 5 AND 6.

10 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

11 GRID IS SHOWN FOR DIMENSIONING PURPOSES.

12 GRID MODULE IS 1 INCH BASIC.

13 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

14 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

15 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

PENNANT NOTE — GENERAL NOTES

16 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

17 ASSEMBLE HARNESS PER ND1002032.

18 ASSEMBLE ITEM 3 PER ND1002206.

TOLERANCE CHART. UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE. STRIP JACKET. CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
15	1	1	1010848- 2	WIRE. 50 FEET TOTAL LENGTH
15	2	1	1010847- 2	WIRE. 15 INCHES TOTAL LENGTH
15	3	10	1010738- 2	CONTACT. CRIMP TYPE SOCKET
16	4	AR	1012507-002	TAPE. LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR(ES-2175. TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

GVD WIRING HARNESS B + 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	FROM TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TO TERMINATION SPEC 1 ITEM NO.	NO.
B 1	1		45A8P1-K6	20	N		21	45A8J3- 3	20	N		48
B 2	1		45A8P1-K5	20	N		22	45A8J3- 5	20	N		49
B 3	1		45A8P1-K4	20	N		23	45A8J2- 3	20	N		44
B 4	1		45A8P1-K3	20	N		24	45A8J2- 5	20	N		45
B 5	1		45A8P1-K1	20	N		25	45A8J5-28	20	N		123
B 6	1		45A8P1-L6	20	N		15	45A8J7-37	20	N		74
B 7	1		45A8P1-L5	20	N		16	45A8J7-[redacted] 33	20	N		79 [redacted]
B 8	1		45A8P1-L4	20	N		17	45A8J7-26	20	N		87
B 9	1		45A8P1-L3	20	N		18	45A8J7-15	20	N		60
B 10	1		45A8P1-L2	20	N		19	45A8J7-10	20	N		58
B 11	1		45A8P1-L1	20	N		20	45A8J7- 3	20	N		54
B 12	1		45A8P1-M6	20	N		9	45A8J7-35	20	N		77
B 13	1		45A8P1-M5	20	N		10	45A8J7-[redacted] 31	20	N		82 [redacted]
B 14	1		45A8P1-M4	20	N		11	45A8J7-24	20	N		90
B 15	1		45A8P1-M3	20	N		12	45A8J7-17	20	N		61
B 16	1		45A8P1-M2	20	N		13	45A8J7-12	20	N		59
B 17	1		45A8P1-M1	20	N		14	45A8J7- 5	20	N		56
B 18	1		45A8P1-A9	20	N		42	45A8J5-54	20	N		105

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE-NONE
REV LTR A [redacted]
SHEET 5 OF 9

MIL 2085 - 4-63 WIR

GVD WIRING HARNESS B + 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	FROM TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TO TERMINATION SPEC 1 ITEM NO.	NO.
B 19	1		45A8P1-A5	20	N		40	45A8J8-[redacted] 1	20	N		143
B 20	1		45A8P1-C5	20	N		37	45A8J8- 9	20	N		140
B 21	1		45A8P1-F3	20	N		27	45A8J4-21	20	N		133
B 22	1		45A8P1-F2	20	N		28	45A8J4-17	20	N		136
B 23	1		45A8P1-F1	20	N		29	45A8J4-25	20	N		131
B 24	1		45A8P1-P3	20	N		7	45A8J5-53	20	N		107
B 25	1		45A8P1-P1	20	N		8	45A8J5- 2	20	N		50
B 26	1		45A8P1-B5	20	N		38	45A8J8-13	20	N		139
B 27	1		45A8P1-D9	20	N		36	45A8J1-15	08	N	3	64
B 28	1		45A8P1-D8	20	N		35	45A8J1-14	08	N	3	65
B 29	1		45A8P1-D7	20	N		34	45A8J1-13	08	N	3	66
B 30	1		45A8P1-D5	20	N		33	45A8J8- 5	20	N		142
B 31	1		45A8P1-D4	20	N		32	45A8J4-19	20	N		135
B 32	1		45A8P1-D3	20	N		31	45A8J4-20	20	N		134
B 33	1		45A8P1-D1	20	N		30	45A8J4-26	20	N		130
B 34	1		45A8P1-R1	20	N		6	45A8J5-37	20	N		110
B 35	1		45A8P1-S3	20	N		4	45A8J7- 6	20	N		57
B 36	1		45A8P1-S1	20	N		5	45A8J2- 7	20	N		47

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE-NONE
REV LTR A [redacted]
SHEET 6 OF 9

MIL 2085 - 4-63 WIR

GVD WIRING HARNESS B + 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	FROM TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TO TERMINATION SPEC 1 ITEM NO.	NO.
B 37	1		45A8P1-T3	20	N		1	45A8J2- 1	20	N		43
B 38	2		45A8P1-T2	25	Y		2	45A8J4-27	25	Y		128
B 39	1		45A8P1-T1	20	N		3	45A8J2- 6	20	N		46
B 40	2		45A8J4-27	25	Y		129	45A8J5-29	25	Y		120
B 41	1		45A8J4-24	20	N		132	45A8J4-29	20	N		127
B 42	1		45A8J5-29	20	N		121	45A8J7-28	20	N		86
B 43	1		45A8J5-42	20	N		119	45A8J5-52	20	N		109
B 44	1		45A8J5-30	20	N		118	45A8J5-32	20	N		116
B 45	1		45A8J5-34	20	N		115	45A8J10- 9	20	N		93
B 46	1		45A8J5-48	20	N		114	45A8J5-50	20	N		111
B 47	1		45A8J5-38	20	N		108	45A8J10- 7	20	N		95
B 48	1		45A8J5-39	20	N		106	45A8J10- 2	20	N		99
B 49	1		45A8J6- [redacted] 5	20	N		53 [redacted]	45A8J9- 5	20	N		125
B 50	1		45A8J6- [redacted] 13	20	N		104 [redacted]	45A8J6-[redacted] 16	20	N		103 [redacted]
B 51	1		45A8J6-[redacted] 18	20	N		101 [redacted]	45A8J10- 6	20	N		96
B 52	1		45A8J7-24	20	N		91	45A8J1-17	08	N	3	67
B 53	1		45A8J7-26	20	N		88	45A8J1-24	08	N	3	69
B 54	1		45A8J7-30	20	N		84	45A8J8-17	20	N		138

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE-NONE
REV LTR A [redacted]
SHEET 7 OF 9

MIL 2085 - 4-63 WIR

GVD WIRING HARNESS B + 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	FROM TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TO TERMINATION SPEC 1 ITEM NO.	NO.
B 55	1		45A8J7-30	20	N		85	45A8J7-39	20	N		73
B 56	1		45A8J7-[redacted] 33	20	N		80 [redacted]	45A8J1-12	08	N	3	68
B 57	1		45A8J7-32	20	N		81	45A8J8- 9	20	N		141
B 58	1		45A8J7-[redacted] 31	20	N		83 [redacted]	45A8J1- 3	08	N	3	72
B 59	1		45A8J7-35	20	N		78	45A8J1-18	08	N	3	70
B 60	1		45A8J7-36	20	N		76	45A8J8- [illegible]	20	N		144
B 61	1		45A8J7-37	20	N		75	45A8J1-19	08	N	3	71
B 62	1		45A8J8-18	20	N		137	45A8J1-36	08	N	3	63
B 63	1		45A8J5-41	20	N		122	45A8J5-49	20	N		112
B 64	1		45A8J6- [redacted] 17	20	N		102 [redacted]	45A8J9- 6	20	N		124
B 65	1		45A8J6- [redacted] 19	20	N		100 [redacted]	45A8J10- 5	20	N		97
B 66	1		45A8J5-23	20	N		51	45A8J6-[redacted] 23	20	N		98
B 67	1		45A8P1-G1	20	N		26	45A8J5-44	20	N		127
B 68	1		45A8J5-35	20	N		113	45A8J6-[redacted] 2	20	N		52 [redacted]
B 69	1		45A8J7-22	20	N		92	45A8J7-19	20	N		62
B 70	1		45A8P1-B9	20	N		39	45A8J10-13	20	N		89
B 71	1		45A8J7- 4	20	N		55	45A8J10- 9	20	N		94
B 72	1		45A8P1-A7	20	N		41	45A8J9- 1	20	N		126

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

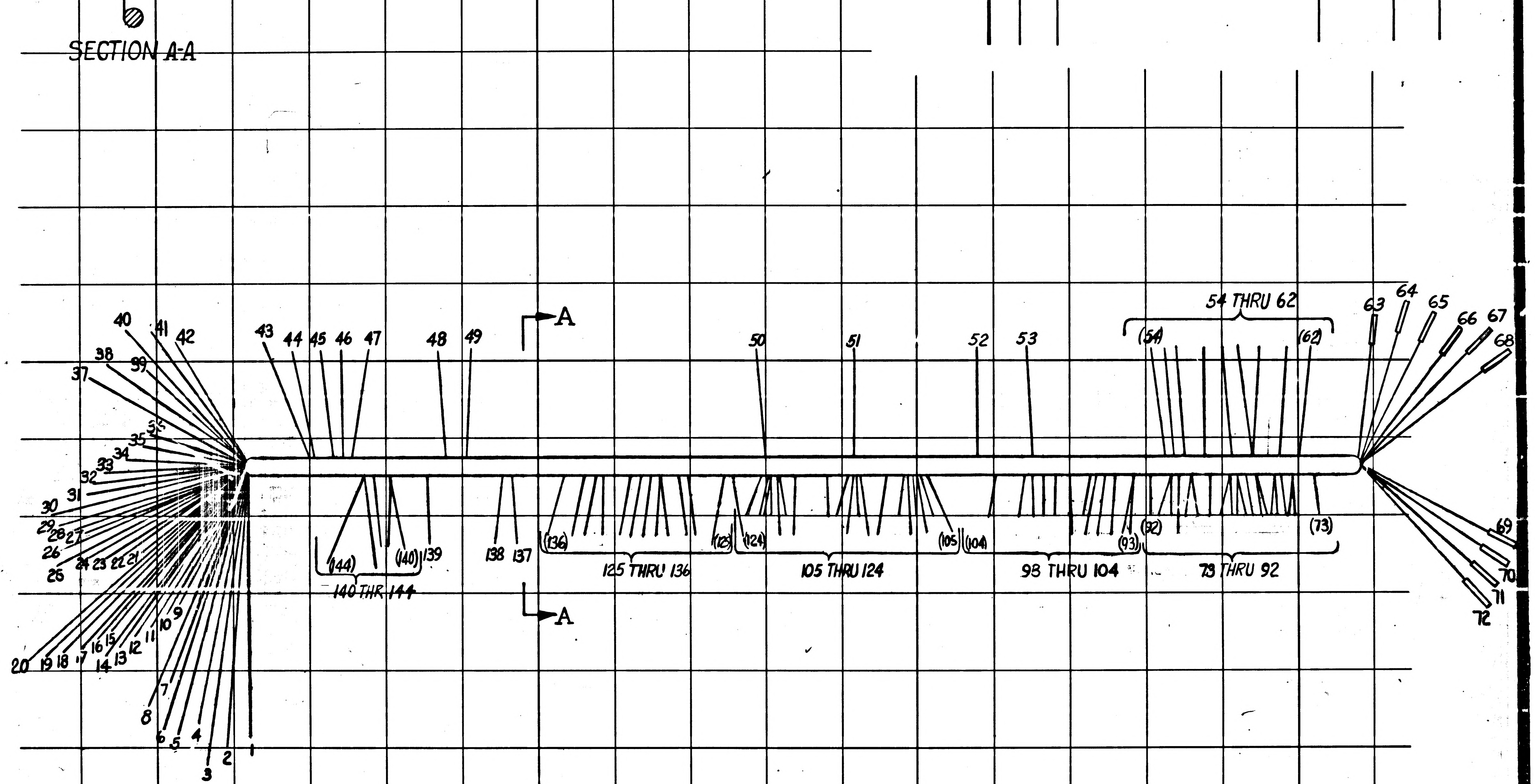
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE-NONE
REV LTR A [redacted]
SHEET 8 OF 9

MIL 2085 - 4-63 WIR

1008612

REVISIONS 15116					
SYM	ZONE	DESCRIPTION		DATE	APPD.
A		REVISED PER TDRR 15952	CHG NO.	8 Feb 65	KH 2.20.? W

CONDUCTOR TERMINATIONS 43 THRU 62 BREAK OUT AS SHOWN.


SECTION A-A
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73 THRU 92
(92)
(93)
98 THRU 104
(104)
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105 THRU 124
(124)
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125 THRU 136
(136)
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(140)
(144)
140 THR 144

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
		FRACTIONS ± DECIMALS ± ANGLES ±	ACSP PN	WIRE HARNESS "B" (TRAY 8)		
			DRAWN C. Knotek DATE 11 Nov 64			
			CHECKED J. Lima 24 Nov 64			
			APPROVAL R. Osburg 30 Nov 64			
		DO NOT SCALE THIS DRAWING	APPROVAL			
1007538		MATERIAL	NASA APPROVAL W. J. Rhine 12-23-64	CODE IDENT NO.	SIZE C	1008612
NEXT ASSY	USED ON					
APPLICATION		CONTRACT NAS 9497	MIT APPROVAL W. Cuyler 23 Dec 64	SCALE FULL		SHEET 9 OF 9

MIL 1077C—F

15116

APPLICATION		REVISIONS			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
		A	REVISED PER TDRR 15952	8 Feb 65	KH a.w.L. WK
		B	REVISED PER TDRR 17974	6 APR 65	JJJ C7P

REV										
SHEET										
REV STATUS	REV	B	+	+	B	A	A	A	A	A
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN C. Krotek DATE 11 Nov 64
CHECKED 24 Nov 64
APPROVAL 30 Nov 64
APPROVAL 2 DEC 64

WIRE HARNESS "B"
(TRAY 8)

NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64

CODE IDENT NO.
SIZE
1008612
REV B

CONTRACT NAS 9-497
SCALE —
SHEET 1 OF 9

PENNANT GENERAL NOTES

NOTE

1 SEE CONDUCTOR CHART. PENNANT NOTE 1.

2 SEE CONDUCTOR CHART. PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 4.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER ND1002019

9 SOLDER PER ND1002071 USING ITEMS 5 AND 6.

10 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

11 GRID IS SHOWN FOR DIMENSIONING PURPOSES.

12 GRID MODULE IS 1 INCH BASIC.

13 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

14 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

15 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

MANNED
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1008612
SCALE-NONE REV LTR + SHEET 2 OF 9

MIL 2084 4 63

PENNANT GENERAL NOTES

NOTE

16 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

17 ASSEMBLE HARNESS PER ND1002032.

18 ASSEMBLE ITEM 3 PER ND1002206.

TOLERANCE CHART. UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE. STRIP JACKET. CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED
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CENTER
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SIZE A
1008612
SCALE-NONE REV LTR + SHEET 3 OF 9

MIL 2084 4 63

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
15	1	1	1010848- 2	WIRE. 50 FEET TOTAL LENGTH
15	2	1	1010847- 2	WIRE. 15 INCHES TOTAL LENGTH
15	3	10	1010738-6 *	CONTACT. CRIMP TYPE SOCKET
16	4	AR	1012507-002	TAPE. LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR(ES-2175. TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED
SPACECRAFT
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SIZE A
1008612
SCALE-NONE REV LTR * B SHEET 4 OF 9

MIL 2084 4 63

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT 2	FROM STRIP WIRE OR JACKET	FROM TIN	FROM CUT WIRE OR SHIELD 2	FROM TERMINATION SPEC. 1 ITEM NO.	FROM NO.	TO CIRCUIT POINT 2	TO STRIP WIRE OR JACKET	TO TIN	TO CUT WIRE OR SHIELD 2	TO TERMINATION SPEC 1 ITEM NO.	TO NO.
B 1	1		45A8P1-K6	20	N			21	45A8J3- 3	20	N			48
B 2	1		45A8P1-K5	20	N			22	45A8J3- 5	20	N			49
B 3	1		45A8P1-K4	20	N			23	45A8J2- 3	20	N			44
B 4	1		45A8P1-K3	20	N			24	45A8J2- 5	20	N			45
B 5	1		45A8P1-K1	20	N			25	45A8J5-28	20	N			123
B 6	1		45A8P1-L6	20	N			15	45A8J7-37	20	N			74
B 7	1		45A8P1-L5	20	N			16	45A8J7-[illegible] 33	20	N			79 [illegible]
B 8	1		45A8P1-L4	20	N			17	45A8J7-26	20	N			87
B 9	1		45A8P1-L3	20	N			18	45A8J7-15	20	N			60
B 10	1		45A8P1-L2	20	N			19	45A8J7-10	20	N			58
B 11	1		45A8P1-L1	20	N			20	45A8J7- 3	20	N			54
B 12	1		45A8P1-M6	20	N			9	45A8J7-35	20	N			77
B 13	1		45A8P1-M5	20	N			10	45A8J7-[illegible] 31	20	N			82 [illegible]
B 14	1		45A8P1-M4	20	N			11	45A8J7-24	20	N			90
B 15	1		45A8P1-M3	20	N			12	45A8J7-17	20	N			61
B 16	1		45A8P1-M2	20	N			13	45A8J7-12	20	N			59
B 17	1		45A8P1-M1	20	N			14	45A8J7- 5	20	N			56
B 18	1		45A8P1-A9	20	N			42	45A8J5-54	20	N			105

1 > THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 > DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE-NONE REV LTR A [illegible] SHEET 5 OF 9

MIL 2085 4-63 WIR

GVD WIRING HARNESS B ✦ 1008612

CONDUCTOR NUMBER	ITEM NO.	FROM CIRCUIT POINT	2	FROM TERMINATION SPEC ITEM NO.	NO.	TO CIRCUIT POINT	2	TO TERMINATION SPEC ITEM NO.	NO.
B 19	1	45A8P1-A5	20N		40	45A8J8- 1	20N		143
B 20	1	45A8P1-C5	20N		37	45A8J8- 9	20N		140
B 21	1	45A8P1-F3	20N		27	45A8J4-21	20N		133
B 22	1	45A8P1-F2	20N		28	45A8J4-17	20N		136
B 23	1	45A8P1-F1	20N		29	45A8J4-25	20N		131
B 24	1	45A8P1-P3	20N		7	45A8J5-53	20N		107
B 25	1	45A8P1-P1	20N		8	45A8J5- 2	20N		50
B 26	1	45A8P1-B5	20N		38	45A8J8-13	20N		139
B 27	1	45A8P1-D9	20N		36	45A8J1-15	08N	3	64
B 28	1	45A8P1-D8	20N		35	45A8J1-14	08N	3	65
B 29	1	45A8P1-D7	20N		34	45A8J1-13	08N	3	66
B 30	1	45A8P1-D5	20N		33	45A8J8- 5	20N		142
B 31	1	45A8P1-D4	20N		32	45A8J4-19	20N		135
B 32	1	45A8P1-D3	20N		31	45A8J4-20	20N		134
B 33	1	45A8P1-D1	20N		30	45A8J4-26	20N		130
B 34	1	45A8P1-R1	20N		6	45A8J5-37	20N		110
B 35	1	45A8P1-S3	20N		4	45A8J7- 6	20N		57
B 36	1	45A8P1-S1	20N		5	45A8J2- 7	20N		47

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008612

SCALE - NONE | REV LTR A | SHEET 6 OF 9

MIL 2085 · 4-63 WIR

GVD WIRING HARNESS B ✦ 1008612

CONDUCTOR NUMBER	ITEM NO.	FROM CIRCUIT POINT	2	FROM TERMINATION SPEC ITEM NO.	NO.	TO CIRCUIT POINT	2	TO TERMINATION SPEC ITEM NO.	NO.
B 37	1	45A8P1-T3	20N		1	45A8J2- 1	20N		43
B 38	2	45A8P1-T2	25Y		2	45A8J4-27	25Y		128
B 39	1	45A8P1-T1	20N		3	45A8J2- 6	20N		46
B 40	2	45A8J4-27	25Y		129	45A8J5-29	25Y		120
B 41	1	45A8J4-24	20N		132	45A8J4-29	20N		127
B 42	1	45A8J5-29	20N		121	45A8J7-28	20N		86
B 43	1	45A8J5-42	20N		119	45A8J5-52	20N		109
B 44	1	45A8J5-30	20N		118	45A8J5-32	20N		116
B 45	1	45A8J5-34	20N		115	45A8J10- 9	20N		93
B 46	1	45A8J5-48	20N		114	45A8J5-50	20N		111
B 47	1	45A8J5-38	20N		108	45A8J10- 7	20N		95
B 48	1	45A8J5-39	20N		106	45A8J10- 2	20N		99
B 49	1	45A8J6- 5	20N		53	45A8J9- 5	20N		125
B 50	1	45A8J6- 13	20N		104	45A8J6- 16	20N		103
B 51	1	45A8J6- 18	20N		101	45A8J10- 6	20N		96
B 52	1	45A8J7-24	20N		91	45A8J1-17	08N	3	67
B 53	1	45A8J7-26	20N		88	45A8J1-24	08N	3	69
B 54	1	45A8J7-30	20N		84	45A8J8-17	20N		138

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008612

SCALE - NONE | REV LTR A | SHEET 7 OF 9

MIL 2085 · 4-63 WIR

GVD WIRING HARNESS B ✦ 1008612

CONDUCTOR NUMBER	ITEM NO.	FROM CIRCUIT POINT	2	FROM TERMINATION SPEC ITEM NO.	NO.	TO CIRCUIT POINT	2	TO TERMINATION SPEC ITEM NO.	NO.
B 55	1	45A8J7-30	20N		85	45A8J7-39	20N		73
B 56	1	45A8J7- 33	20N		80	45A8J1-12	08N	3	68
B 57	1	45A8J7-32	20N		81	45A8J8- 9	20N		141
B 58	1	45A8J7- 31	20N		83	45A8J1- 3	08N	3	72
B 59	1	45A8J7-35	20N		78	45A8J1-18	08N	3	70
B 60	1	45A8J7-36	20N		76	45A8J8- [illegible]	20N		144
B 61	1	45A8J7-37	20N		75	45A8J1-19	08N	3	71
B 62	1	45A8J8-18	20N		137	45A8J1-36	08N	3	63
B 63	1	45A8J5-41	20N		122	45A8J5-49	20N		112
B 64	1	45A8J6- 17	20N		102	45A8J9- 6	20N		124
B 65	1	45A8J6- 19	20N		100	45A8J10- 5	20N		97
B 66	1	45A8J5-23	20N		51	45A8J6- 23	20N		98
B 67	1	45A8P1-G1	20N		26	45A8J5-44	20N		117
B 68	1	45A8J5-35	20N		113	45A8J6- 2	20N		52
B 69	1	45A8J7-22	20N		92	45A8J7-19	20N		62
B 70	1	45A8P1-B9	20N		39	45A8J10-13	20N		89
B 71	1	45A8J7- 4	20N		55	45A8J10- 9	20N		94
B 72	1	45A8P1-A7	20N		41	45A8J9- 1	20N		126

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

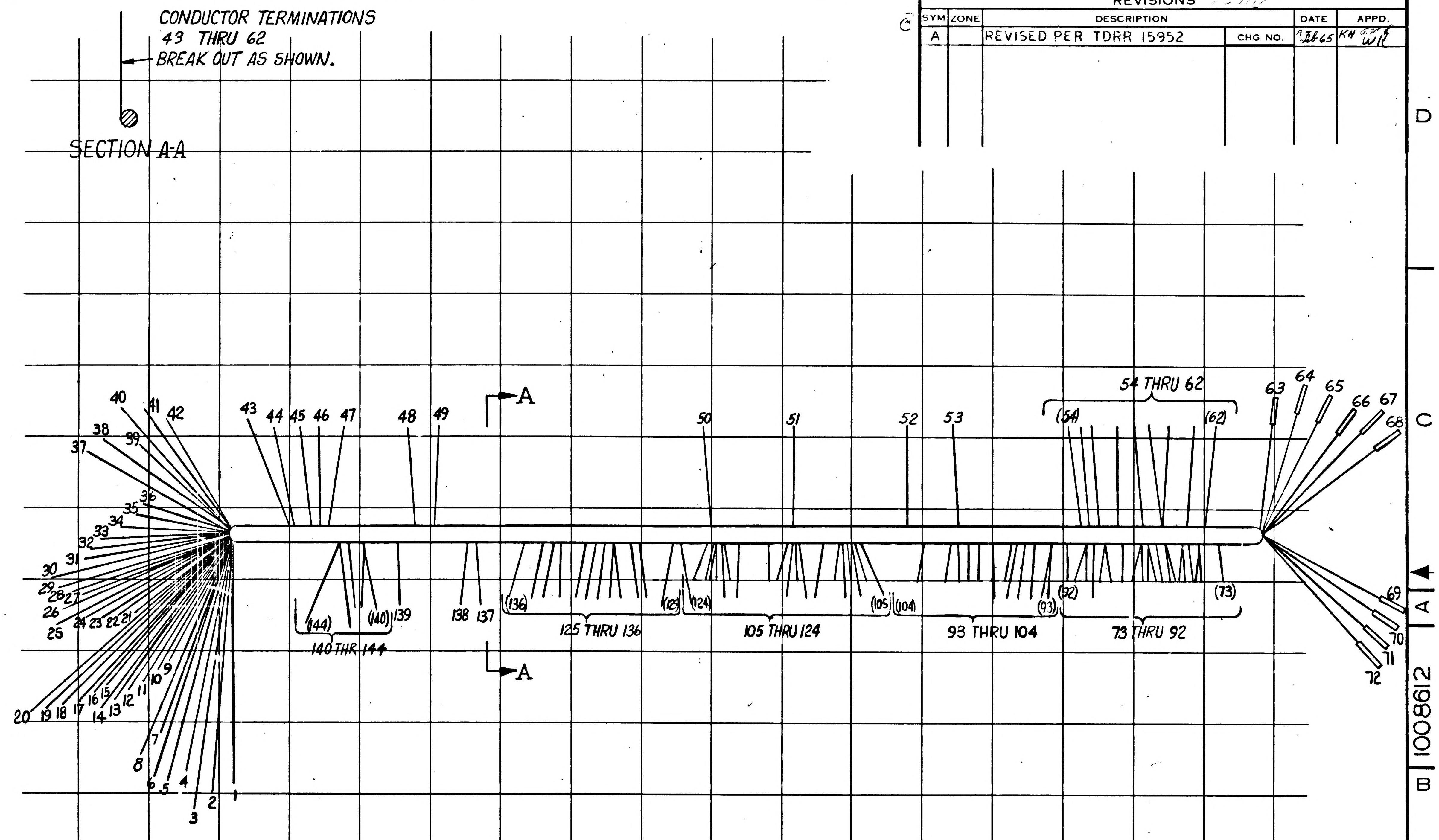
2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008612

SCALE - NONE | REV LTR A | SHEET 8 OF 9

MIL 2085 · 4-63 WIR

REVISIONS					
SYM	ZONE	DESCRIPTION		DATE	APPD.
A		REVISED PER TDRR 15952	CHG NO.	8 Feb 65	KH WR


CONDUCTOR TERMINATIONS
43 THRU 62
BREAK OUT AS SHOWN.
SECTION A-A
A
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
43 44 45 46 47 48 49 50 51 52 53
54 THRU 62
(54) (62)
63 64 65 66 67 68 69 70 71 72
(73) (92) 73 THRU 92
(93) (104) 93 THRU 104
(105) (124) 105 THRU 124
(125) (136) 125 THRU 136
137 138 139
(140) (144) 140 THR 144

1007538	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C. Knotek DATE 11 Nov 64
CHECKED Lima 24 Nov 64
APPROVAL R Osing 30 Nov 64
APPROVAL
NASA APPROVAL W J Kline 12-23-64
MIT APPROVAL W Kupfer 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "B"
(TRAY 8)

CODE IDENT NO.
SIZE C
1008612
SCALE FULL
SHEET 9 OF 9

MIL 1077C—P

15716

APPLICATION	
NEXT ASSY	USED ON

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REV									
SHEET									
REV STATUS REV	+	+	+	+	+	+	+	+	+
OF SHEETS SHEET	1	2	3	4	5	6	7	8	9

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Krotek 11 Nov 64
DATE
CHECKED 24 Nov 64
APPROVAL R Oeberg 30 Nov 64
APPROVAL 2 DEC 64
NASA APPROVAL 12-2-64
MIT APPROVAL
CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "B"
(TRAY 8)

CODE IDENT NO. SIZE 1008612 REV

SCALE — SHEET 1 OF 9

GVD WIRING HARNESS B + 1008612

PENNANT NOTE GENERAL NOTES

1 SEE CONDUCTOR CHART. PENNANT NOTE 1.

2 SEE CONDUCTOR CHART. PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 4.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER ND1002019

9 SOLDER PER ND1002071 USING ITEMS 5 AND 6.

10 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

11 GRID IS SHOWN FOR DIMENSIONING PURPOSES.

12 GRID MODULE IS 1 INCH BASIC.

13 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

14 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

15 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008612
SCALE-NONE | REV LTR + | SHEET 2 OF 9

MIL 2084 4-63

GVD WIRING HARNESS B + 1008612

PENNANT NOTE GENERAL NOTES

16 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

17 ASSEMBLE HARNESS PER ND1002032.

18 ASSEMBLE ITEM 3 PER ND1002206.

TOLERANCE CHART. UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE. STRIP JACKET. CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008612
SCALE-NONE | REV LTR + | SHEET 3 OF 9

MIL 2084 4-63

GVD WIRING HARNESS B + 1008612

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
15	1	1	1010848- 2	WIRE. 50 FEET TOTAL LENGTH
15	2	1	1010847- 2	WIRE. 15 INCHES TOTAL LENGTH
15	3	10	1010738- 2	CONTACT. CRIMP TYPE SOCKET
16	4	AR	1012507-002	TAPE. LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR(ES-2175. TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008612
SCALE-NONE | REV LTR + | SHEET 4 OF 9

MIL 2084 4-63

GVD

WIRING HARNESS B

+ 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
B 1	1		45A8P1-K6	20	N		21	45A8J3- [illegible]	20	N		48
B 2	1		45A8P1-K5	20	N		22	45A8J3- 5	20	N		49
B 3	1		45A8P1-K4	20	N		23	45A8J2- 3	20	N		44
B 4	1		45A8P1-K3	20	N		24	45A8J2- 5	20	N		45
B 5	1		45A8P1-K1	20	N		25	45A8J5-28	20	N		123
B 6	1		45A8P1-L6	20	N		15	45A8J7-37	20	N		74
B 7	1		45A8P1-L5	20	N		16	45A8J7-31	20	N		82
B 8	1		45A8P1-L4	20	N		17	45A8J7-26	20	N		87
B 9	1		45A8P1-L3	20	N		18	45A8J7-15	20	N		60
B 10	1		45A8P1-L2	20	N		19	45A8J7-10	20	N		58
B 11	1		45A8P1-L1	20	N		20	45A8J7- 3	20	N		54
B 12	1		45A8P1-M6	20	N		9	45A8J7-35	20	N		77
B 13	1		45A8P1-M5	20	N		10	45A8J7-33	20	N		79
B 14	1		45A8P1-M4	20	N		11	45A8J7-24	20	N		90
B 15	1		45A8P1-M3	20	N		12	45A8J7-17	20	N		61
B 16	1		45A8P1-M2	20	N		13	45A8J7-12	20	N		59
B 17	1		45A8P1-M1	20	N		14	45A8J7- 5	20	N		56
B 18	1		45A8P1-A9	20	N		42	45A8J5-54	20	N		105

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE - NONE
REV LTR +
SHEET 5 OF 9

MIL 2085 - 4-63 WIR

GVD

WIRING HARNESS B

+ 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
B 19	1		45A8P1-A5	20	N		40	45A8J8- 3	20	N		143
B 20	1		45A8P1-C5	20	N		37	45A8J8- 9	20	N		140
B 21	1		45A8P1-F3	20	N		27	45A8J4-21	20	N		133
B 22	1		45A8P1-F2	20	N		28	45A8J4-17	20	N		136
B 23	1		45A8P1-F1	20	N		29	45A8J4-25	20	N		131
B 24	1		45A8P1-P3	20	N		7	45A8J5-53	20	N		107
B 25	1		45A8P1-P1	20	N		8	45A8J5- 2	20	N		50
B 26	1		45A8P1-B5	20	N		38	45A8J8-13	20	N		139
B 27	1		45A8P1-D9	20	N		36	45A8J1-15	08	N	3	64
B 28	1		45A8P1-D8	20	N		35	45A8J1-14	08	N	3	65
B 29	1		45A8P1-D7	20	N		34	45A8J1-13	08	N	3	66
B 30	1		45A8P1-D5	20	N		33	45A8J8- 5	20	N		142
B 31	1		45A8P1-D4	20	N		32	45A8J4-19	20	N		135
B 32	1		45A8P1-D3	20	N		31	45A8J4-20	20	N		134
B 33	1		45A8P1-D1	20	N		30	45A8J4-26	20	N		130
B 34	1		45A8P1-R1	20	N		6	45A8J5-37	20	N		110
B 35	1		45A8P1-S3	20	N		4	45A8J7- 6	20	N		57
B 36	1		45A8P1-S1	20	N		5	45A8J2- 7	20	N		47

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE - NONE
REV LTR +
SHEET 6 OF 9

MIL 2085 - 4-63 WIR

GVD

WIRING HARNESS B

+ 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
B 37	1		45A8P1-T3	20	N		1	45A8J2- 1	20	N		43
B 38	2		45A8P1-T2	25	Y		2	45A8J4-27	25	Y		128
B 39	1		45A8P1-T1	20	N		3	45A8J2- 6	20	N		46
B 40	2		45A8J4-27	25	Y		129	45A8J5-29	25	Y		120
B 41	1		45A8J4-24	20	N		132	45A8J4-29	20	N		127
B 42	1		45A8J5-29	20	N		121	45A8J7-28	20	N		86
B 43	1		45A8J5-42	20	N		119	45A8J5-52	20	N		109
B 44	1		45A8J5-30	20	N		118	45A8J5-32	20	N		116
B 45	1		45A8J5-34	20	N		115	45A8J10- 9	20	N		93
B 46	1		45A8J5-48	20	N		114	45A8J5-50	20	N		111
B 47	1		45A8J5-38	20	N		108	45A8J10- 7	20	N		95
B 48	1		45A8J5-39	20	N		106	45A8J10- 2	20	N		99
B 49	1		45A8J6- 8	20	N		104	45A8J9- 5	20	N		125
B 50	1		45A8J6- 9	20	N		103	45A8J6-12	20	N		102
B 51	1		45A8J6-16	20	N		100	45A8J10- 6	20	N		96
B 52	1		45A8J7-24	20	N		91	45A8J1-17	08	N	3	67
B 53	1		45A8J7-26	20	N		88	45A8J1-24	08	N	3	69
B 54	1		45A8J7-30	20	N		84	45A8J8-17	20	N		138

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE - NONE
REV LTR +
SHEET 7 OF 9

MIL 2085 - 4-63 WIR

GVD

WIRING HARNESS B

+ 1008612

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
B 55	1		45A8J7-30	20	N		85	45A8J7-39	20	N		73
B 56	1		45A8J7-31	20	N		83	45A8J1-12	08	N	3	68
B 57	1		45A8J7-32	20	N		81	45A8J8- 9	20	N		141
B 58	1		45A8J7-33	20	N		80	45A8J1- 3	08	N	3	72
B 59	1		45A8J7-35	20	N		78	45A8J1-18	08	N	3	70
B 60	1		45A8J7-36	20	N		76	45A8J8- [illegible]	20	N		144
B 61	1		45A8J7-37	20	N		75	45A8J1-19	08	N	3	71
B 62	1		45A8J8-18	20	N		137	45A8J1-36	08	N	3	63
B 63	1		45A8J5-41	20	N		122	45A8J5-49	20	N		112
B 64	1		45A8J6- 2	20	N		52	45A8J9- 6	20	N		124
B 65	1		45A8J6- 4	20	N		53	45A8J10- 5	20	N		97
B 66	1		45A8J5-23	20	N		51	45A8J6-19	20	N		98
B 67	1		45A8P1-G1	20	N		26	45A8J5-44	20	N		117
B 68	1		45A8J5-35	20	N		113	45A8J6-13	20	N		101
B 69	1		45A8J7-22	20	N		92	45A8J7-19	20	N		62
B 70	1		45A8P1-B9	20	N		39	45A8J10-13	20	N		89
B 71	1		45A8J7- 4	20	N		55	45A8J10- 9	20	N		94
B 72	1		45A8P1-A7	20	N		41	45A8J9- 1	20	N		126

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

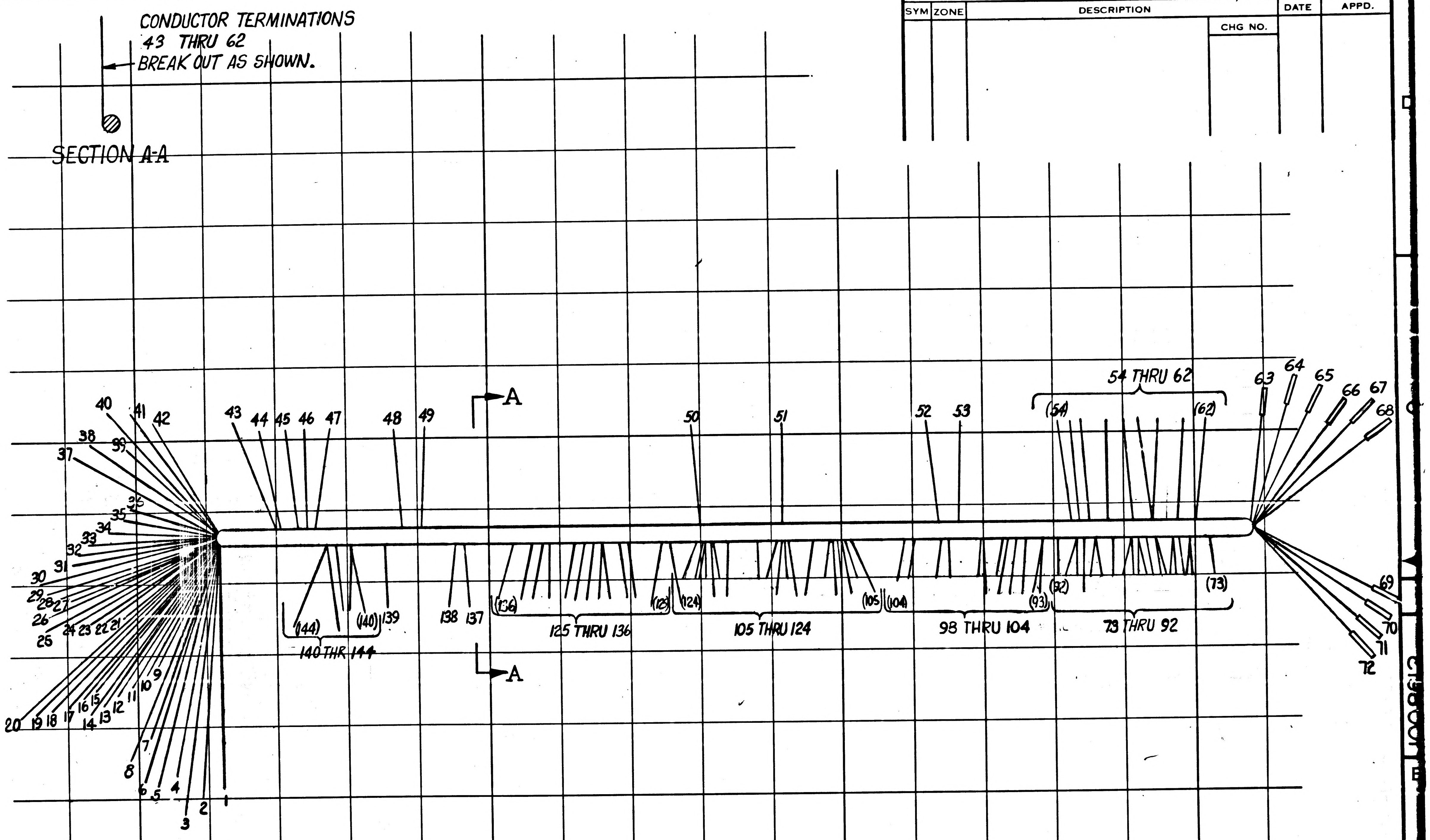
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008612
SCALE - NONE
REV LTR +
SHEET 8 OF 9

MIL 2085 - 4-63 WIR

REVISIONS 15116

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.



CONDUCTOR TERMINATIONS 43 THRU 62 BREAK OUT AS SHOWN.
SECTION A-A
A
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
43 44 45 46 47 48 49
50 51 52 53
54 THRU 62
(54) (62)
63 64 65 66 67 68 69 70 71 72
(73) 73 THRU 92 (92)
(93) 98 THRU 104 (104) (105)
105 THRU 124 (124) (125)
125 THRU 136 (136) 137 138 139
(140) (144) 140 THR 144

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C Knotek DATE 11 Nov 64
CHECKED Lima 24 Nov 64
APPROVAL L Osberg 30 Nov 64
APPROVAL
NASA APPROVAL W J Rhine 12-3-64
MIT APPROVAL 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "B"
(TRAY 8)

CODE IDENT NO.
SIZE C
1008612
SCALE FULL
SHEET 9 OF 9

MIL 1077C—P

APPLICATION	
NEXT ASSY	USED ON

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17970	6 APR 65	J J J W.D.

REV STATUS OF SHEETS					
REV	A	+	+	+	A
SHEET	1	2	3	4	5

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. Knotek DATE 11 Nov. 64
CHECKED 23 Nov 64
APPROVAL 30 Nov 64
APPROVAL 2 Dec 64

NASA APPROVAL 12-3-64
MIT APPROVAL 23 Dec 64

CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE LIST A-A
(TRAY 8)

CODE IDENT NO.	SIZE		REV
		1008614	A

SCALE —

SHEET 1 OF 5

GVC WIRE LIST AA + 1008614

PENNANT NOTE — GENERAL NOTES

1 SEE CONDUCTOR CHART. PENNANT NOTE 1.

2 SEE CONDUCTOR CHART. PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

8 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

9 ASSEMBLE ITEM 2 PER ND1002206.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008614
SCALE-NONE | REV LTR + | SHEET 2 OF 5

GVC WIRE LIST AA + 1008614

PENNANT NOTE — GENERAL NOTES

TOLERANCE CHART. UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR WIRE OR CABLE. STRIP WIRE. STRIP JACKET. CUT WIRE OR CUT SHIELD.	TOLERANCE WIRE OR CABLE	STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+ .06-.00	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+ .50-.00	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET	+1.00-.00		+.50-.50	+.50-.50	+.50-.50
OVER 6 FEET	+2.00-.00				

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008614
SCALE-NONE | REV LTR + | SHEET 3 OF 5

GVC WIRE LIST AA + 1008614

PENNANT — LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
8	1	AR	1010848- 2	WIRE. 16.0 INCHES TOTAL LENGTH
	2	AR	1006757- 8	WIRE. 3.0 INCHES TOTAL LENGTH
	3	1	MS25036- 44	TERMINAL LUG

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008614
SCALE-NONE | REV LTR + | SHEET 4 OF 5

GVC WIRE LIST AA A 1008614

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	FROM TERMINATION SPEC. 1 ITEM NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TO TERMINATION SPEC 1 ITEM NO.
AA 1	2	4	45A8P1-H6		N		45A8P1-H5		N	
AA 2	2	40	45A8P1-H4		N		45A8P1-H3		N	
AA 3	1	150	45A8P1-P4	20	N		45A8E1	20	N	3
AA 4	1	250	45A8J4-18	20	N		45A8J4- 4	20	N	
AA 5	1	250	45A8J4-22	20	N		45A8J4- 7	20	N	
AA 6	1	250	45A8J4-26	20	N		45A8J4-10	20	N	
AA 7	1	250	45A8J4-30	20	N		45A8J4-16	20	N	
AA 8	1	50	45A8J5-46	20	N		45A8J9- 9	20	N	
AA 9	1	100	45A8J5-35	20	N		45A8J9-17	20	N	
AA 10	1	250	45A8J5-50	20	N		45A8J5-11	20	N	
AA 11	2	2	45A8J8- 5		N		45A8J8- 6		N	
AA 12	2	20	45A8J8-11		N		45A8J8-12		N	
AA 13	2	20	45A8J9-11		N		45A8J9-12		N	
AA 14	2	2	45A8J10-11		N		45A8J10-12		N	
AA 15	1	250	45A8J5-24	20	N		45A8J5-37	20	N	

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008614
SCALE-NONE | REV LTR A | SHEET 5 OF 5

APPLICATION		REVISIONS 15116			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
	Ⓜ	A	REVISED PER TDRR 17970	6 APR 65	JJJ W.D.
		B	REPLACED WITH CHANGE BY REV C PER TDRR 22305	16 SEP 65	B DXH

REPLACED WITH CHANGE BY REV C

REV STATUS OF SHEETS					
REV	B	+	+	+	B
SHEET	1	2	3	4	5

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN C. Knoth DATE 11 Nov. 64
CHECKED 23 Nov 64
APPROVAL R. Cs 30 Nov 64
APPROVAL 2 DEC 64

WIRE LIST A-A
(TRAY 8)

NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64

CODE IDENT NO.	SIZE		REV
		1008614	B

CONTRACT NAS 9-497

SCALE —

SHEET 1 OF 5

REVISIONS 5116			
SYM	DESCRIPTION	DATE	APPROVAL

APPLICATION	
NEXT ASSY	USED ON

REV					
SHEET					
REV STATUS OF SHEETS REV	+	+	+	+	+
SHEET	1	2	3	4	5

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN C. Kretek DATE 11 Nov. 64
CHECKED 23 Nov 64
APPROVAL 30 Nov 64
APPROVAL 2 DEC 64
NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64
CONTRACT NAS 9-497

WIRE LIST A-A (TRAY 8)

CODE IDENT NO. | SIZE | 1008614 | REV
SCALE — | SHEET 1 OF 5

GVC WIRE LIST AA + 1008614

PENNANT GENERAL NOTES

NOTE	
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
8	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
9	ASSEMBLE ITEM 2 PER ND1002206.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008614
SCALE-NONE | REV LTR + | SHEET 2 OF 5

MIL 2084 4-63

GVC WIRE LIST AA + 1008614

PENNANT GENERAL NOTES

NOTE

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR WIRE OR CABLE, STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE				
	WIRE OR CABLE	STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+ .06-.00	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+ .50-.00	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET	+1.00-.00		+.50-.50	+.50-.50	+.50-.50
OVER 6 FEET	+2.00-.00				

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008614
SCALE-NONE | REV LTR + | SHEET 3 OF 5

MIL 2084 4-63

GVC WIRE LIST AA + 1008614

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
8	1	AR	1010848- 2	WIRE, 16.0 INCHES TOTAL LENGTH
	2	AR	1006757- 8	WIRE, 3.0 INCHES TOTAL LENGTH
	3	1	MS25036- 44	TERMINAL LUG

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008614
SCALE-NONE | REV LTR + | SHEET 4 OF 5

MIL 2084 4-63

GVC

WIRE LIST AA

+ 1008614

CONDUCTOR			FROM					TO				
INDIVIDUAL LENGTH			CUT WIRE OR SHIELD			TERMINATION SPEC. 1		CUT WIRE OR SHIELD			TERMINATION SPEC 1	
NUMBER	ITEM NO.	2	STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN 2	ITEM NO.	NO.	STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN 2	ITEM NO.	NO.
AA 1	2	40	45A8P1-H6		N			45A8P1-H5		N		
AA 2	2	40	45A8P1-H4		N			45A8P1-H3		N		
AA 3	1	150	45A8P1-P4	20	N			45A8E1	20	N	3	
AA 4	1	250	45A8J4-18	20	N			45A8J4- 4	20	N		
AA 5	1	250	45A8J4-22	20	N			45A8J4- 7	20	N		
AA 6	1	250	45A8J4-26	20	N			45A8J4-10	20	N		
AA 7	1	250	45A8J4-30	20	N			45A8J4-16	20	N		
AA 8	1	50	45A8J5-46	20	N			45A8J9- 9	20	N		
AA 9	1	100	45A8J5-35	20	N			45A8J9-17	20	N		
AA 10	1	250	45A8J5-50	20	N			45A8J5-11	20	N		
AA 11	2	20	45A8J8- 5		N			45A8J8- 6		N		
AA 12	2	20	45A8J8-11		N			45A8J8-12		N		
AA 13	2	20	45A8J9-11		N			45A8J9-12		N		
AA 14	2	20	45A8J10-11		N			45A8J10-12		N		

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008614
SCALE - NONE	REV LTR +	SHEET 5 OF 5

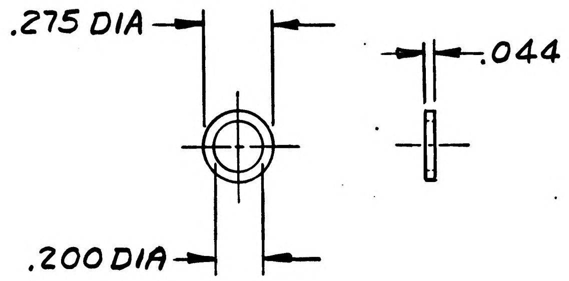
MIL 2085 - 4-65 WIR

REVISIONS 21270

SYM	DESCRIPTION	CHG NO.	DATE	APPD.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: MIL-P-22242 TYPE I POLYTETRAFLUOROETHYLENE PLASTIC.
3. SURFACE ROUGHNESS MUST NOT EXCEED $\overset{125}{\surd}$.
4. MUST BE FREE FROM BURRS



NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ —	±.005	+ —
— —	—	— —

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2

CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN DATE 22 JUN 65
CHECKED J. Stelma 24 JUN 65
APPROVAL L A Plummer 24 JUN 65
APPROVAL 7/27/65
NASA APPROVAL
MIT APPROVAL 27

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SPACER, TEFLON

CODE IDENT NO. 80230

SIZE B

1008615

SCALE 2:1

SHEET 1 OF 1

MIL 10778-P

APPLICATION

NEXT ASSY	USED ON
1007534-011	1007574-011

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL

Chenlustone 20 Nov. 64

REV STATUS	REV	+	+	+	+	+	+	+	+	+	+	+	+	+
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN DATE 30 Oct 64
CHECKED 20 NOV 64
APPROVAL 20 Nov 64
APPROVAL 20 Nov 64
NASA APPROVAL 12-23-64
MIT APPROVAL 11/23/64
CONTRACT NAS 9-497

WIRING HARNESS A (TRAY 4)

CODE IDENT NO. SIZE A 1008626 REV

SCALE NONE SHEET 1 OF 13

PENNANT GENERAL NOTES

NOTE

1 SEE CONDUCTOR CHART. PENNANT NOTE 1.

2 SEE CONDUCTOR CHART. PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 3

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 SOLDER PER ND 1002071 USING ITEMS 5 AND 6.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS SIZE A 1008626
SCALE-NONE REV LTR + SHEET 2 OF 13

PENNANT GENERAL NOTES

NOTE

16 IN CONDUCTOR CHART CONDUCTOR [illegible] E FOR REFERENCE ONLY

17 INSTALL ITEM 4 PER ND1002206.

18 ASSEMBLE PER ND1002032.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS SIZE A 1008626
SCALE-NONE REV LTR + SHEET 3 OF 13

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE 75 FEET 7.3 INCHES TOTAL LENGTH
13	2	1	1010847- 4	WIRE 8 FEET 3.1 INCHES TOTAL LENGTH
14	3	AR	1012507-002	TAPE, LACING
13	4	22	1010738- 6	CONTACT, CRIMP TYPE SOCKET
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR (ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)
	7	AR	1010847-2	WIRE 2 FEET TOTAL LENGTH

MANNED SPACECRAFT CENTER HOUSTON, TEXAS SIZE A 1008626
SCALE-NONE REV LTR + SHEET 4 OF 13

GVA WIRING HARNESS A + 1008626

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	INDIVIDUAL LENGTH 2▷	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	FROM TERMINATION SPEC. 1▷ ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	TO TERMINATION SPEC 1▷ ITEM NO.	TO NO.	
A 1	1	340	45A4P1-D6	20N		109	45A4J7- 1	20N		95	C
A 2	~~1~~	~~420~~	DELETED ~~45A4P1-F3~~	~~20N~~	DELETED	~~218~~	~~45A4J7- 4~~	~~20N~~		~~92~~	~~C~~
A 3	1	200	45A4P1-D5	20N		217	45A4J7- 6	20N		90	C
A 6	~~1~~	~~520~~	~~45A4P1-G3~~	~~20N~~	DELETED	~~222~~	~~45A4J7-13~~	~~20N~~		~~82~~	~~C~~
A 7	1	430	45A4P1-K4	20N		228	45A4J7- 2	20N		94	C
A 8	2	560	45A4P1-R2	25Y		235	45A4J7- 7	25Y		88	B
A 9	1	870	45A4P1-D4	20N		216	45A4J5- 1	20N		57	C
A 10	~~1~~	~~780~~	~~45A4P1-F4~~	~~20N~~	DELETED	~~219~~	~~45A4J5- 4~~	~~20N~~		~~54~~	~~C~~
A 11	1	880	45A4P1-D3	20N		107	45A4J5- 6	20N		52	C
A 14	~~1~~	~~900~~	~~45A4P1-G4~~	~~20N~~	DELETED	~~223~~	~~45A4J5-13~~	~~20N~~		~~44~~	~~C~~
A 15	~~1~~	~~600~~	~~45A4P1-S6~~	~~20N~~	DELETED	~~127~~	~~45A4J7-14~~	~~20N~~		~~81~~	~~A~~
A 16	~~1~~	~~660~~	~~45A4P1-H4~~	~~20N~~	DELETED	~~112~~	~~45A4J7-15~~	~~20N~~		~~78~~	~~C~~
A 17	~~1~~	~~600~~	~~45A4P1-R6~~	~~20N~~	DELETED	~~237~~	~~45A4J7-16~~	~~20N~~		~~77~~	~~B~~
A 18	1	720	45A4P1-S3	20N		124	45A4J7-18	20N		73	A
A 19	1	660	45A4P1-S2	20N		123	45A4J7-19	20N		72	A
A 20	7 ~~1~~	740	45A4P1-S5	20N		126	45A4J6- 3	20N		66	A
A 21	1	1150	45A4P1-A1	20N		104	45A4J4- 1	20N		32	D
A 22	1	1110	45A4P1-A2	20N		103	45A4J4- 2	20N		31	D

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE - NONE | REV LTR + | SHEET 5 OF 13

MIL 2085 - 4-63 WIR

GVA WIRING HARNESS A + 1008626

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	INDIVIDUAL LENGTH 2▷	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	FROM TERMINATION SPEC. 1▷ ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	TO TERMINATION SPEC 1▷ ITEM NO.	TO NO.	
A 23	1	1300	45A4P1-P6	20N		121	45A4J4-12	20N		25	B
A 24	1	1200	45A4P1-H6	20N		116	45A4J4- 9	20N		28	C
A 25	1	1420	45A4P1-K3	20N		227	45A4J3- 3	20N		19	C
A 26	1	1420	45A4P1-H3	20N		113	45A4J3- 5	20N		18	C
A 27	7 ~~1~~	1780	45A4P1-S4	20N		125	45A4J2- 3	20N		8	A
A 28	2	350	45A4J12- 6	25Y		155	45A4J6- 2	25Y		68	A
A 30	1	1670	45A4P1-P3	20N		117	45A4J8- 7	20N		208	B
A 31	2	1550	45A4P1-R1	25Y		234	45A4J9- 7	25Y		189	B
A 32	1	1660	45A4P1-P2	20N		119	45A4J8- 4	20N		206	B
A 33	1	1700	45A4P1-P1	20N		118	45A4J8- 1	20N		203	B
A 34	1	1650	45A4P1-S1	20N		122	45A4J9-19	20N		201	A
A 35	1	1500	45A4P1-G6	20N		225	45A4J9-11	20N		194	C
A 36	1	1350	45A4P1-F6	20N		220	45A4J9- 4	20N		186	C
A 37	1	1270	45A4P1-M3	20N		231	45A4J10- 9	20N		182	C
A 38	1	1180	45A4P1-M2	20N		115	45A4J10- 2	20N		174	C
A 39	1	1200	45A4P1-M1	20N		230	45A4J10- 1	20N		173	C
A 40	1	800	45A4P1-N6	20N		233	45A4J12- 9	20N		159	C
A 41	1	700	45A4P1-M6	20N		232	45A4J12- 2	20N		151	C

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE - NONE | REV LTR + | SHEET 6 OF 13

MIL 2085 - 4-63 WIR

GVA WIRING HARNESS A + 1008626

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	INDIVIDUAL LENGTH 2▷	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	FROM TERMINATION SPEC. 1▷ ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	TO TERMINATION SPEC 1▷ ITEM NO.	TO NO.	
A 42	1	800	45A4P1-L6	20N		229	45A4J12- 1	20N		150	C
A 43	1	400	45A4P1-A6	20N		102	45A4J13-20	20N		149	D
A 44	1	800	45A4P1-G1	20N		221	45A4J13-17	20N		146	C
A 45	~~1~~	~~640~~	~~45A4P1-G5~~	~~20N~~	DELETED	~~224~~	~~45A4J13-13~~	~~20N~~		~~140~~	~~C~~
A 46	1	700	45A4P1-KI	20N		226	45A4J13-12	20N		139	C
A 49	1	700	45A4P1-H1	20N		114	45A4J13- 9	20N		136	C
A 50	1	560	45A4P1-D1	20N		105A	45A4J13- 6	20N		133	C
A 51	~~1~~	~~490~~	~~45A4P1-F5~~	~~20N~~	DELETED	~~108~~	~~45A4J13- 4~~	~~20N~~		~~131~~	~~C~~
A 52	1	600	45A4P1-D2	20N		106	45A4J13- 1	20N		128	C
A 53	2	2090	45A4P1-R2	25Y		120	45A4J13- 7	25Y		134A	B
A 54	1	300	45A4J7- 3	20N		93	45A4J13- 2	20N		129	E
A 55	2	590	45A4J7- 7	25Y		88A	45A4J12- 5	25Y		154	A
A 56	2	500	45A4J5- 7	25Y		51	45A4J11-10	25Y		171	A
A 57	2	620	45A4J5- 7	25Y		51A	45A4J10- 5	25Y		177	E
A 58	2	500	45A4J6-10	25Y		58	45A4J7- 7	25Y		89	E
A 59	1	650	45A4J5- 2	20N		56	45A4J7- 3	20N		93A	E
A 60	2	850	45A4P1-R2	25Y		120A	45A4J5- 7	25Y		50	B
A 61	1	1450	45A4J1- 1	12N	4	214	45A4J13- 7	20N		134	B

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE - NONE | REV LTR + | SHEET 7 OF 13

MIL 2085 - 4-63 WIR

GVA WIRING HARNESS A + 1008626

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	INDIVIDUAL LENGTH 2▷	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	FROM TERMINATION SPEC. 1▷ ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT 2▷	T I N 2▷	TO TERMINATION SPEC 1▷ ITEM NO.	TO NO.	
A 62	~~1~~	~~275~~	~~45A4J7-14~~	~~20N~~	DELETED	~~80~~	~~45A4J13-14~~	~~20N~~		~~142~~	~~A~~
A 63	1	1500	45A4P1-S6	20N		127A	45A4J9-14	20N		196	A
A 64	1	475	45A4J9-14	20N		197	45A4J4-15	20N		21	A
A 65	~~1~~	~~620~~	~~45A4J7-14~~	~~20N~~	DELETED	~~80A~~	~~45A4J9-14~~	~~20N~~		~~43~~	~~E~~
A 66	~~1~~	~~600~~	~~45A4J7-15~~	~~20N~~	DELETED	~~79~~	~~45A4J13-15~~	~~20N~~		~~143A~~	~~E~~
A 67	~~1~~	~~625~~	~~45A4J5-15~~	~~20N~~	DELETED	~~42~~	~~45A4J13-15~~	~~20N~~		~~145~~	~~E~~
A 68	~~1~~	~~275~~	~~45A4J7-16~~	~~20N~~	DELETED	~~76~~	~~45A4J13-16~~	~~20N~~		~~144~~	~~A~~
A 69	1	1375	45A4P1-R6	20N		121A	45A4J4-13	20N		24	B
A 70	1	500	45A4J4-13	20N		23	45A4J9-16	20N		198	A
A 71	1	275	45A4J9-16	20N		199	45A4J3-14	20N		13	E
A 72	1	175	45A4J3-14	20N		14	45A4J3-18	20N		11	E
A 73	~~1~~	~~620~~	~~45A4J5-16~~	~~20N~~	DELETED	~~39~~	~~45A4J7-16~~	~~20N~~		~~76A~~	~~E~~
A 74	1	475	45A4J7-17	20N		75	45A4J12-10	20N		160	E
A 75	1	575	45A4J7-18	20N		74	45A4J5-18	20N		37	E
A 76	1	300	45A4J7-18	20N		74A	45A4J13-18	20N		147	A
A 77	1	275	45A4J7-19	20N		71	45A4J6- 9	20N		59	E
A 78	1	350	45A4J7-19	20N		71A	45A4J13-19	20N		148A	A
A 79	1	225	45A4J5-19	20N		35	45A4J11- 9	20N		169	A

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE - NONE | REV LTR + | SHEET 8 OF 13

MIL 2085 - 4-63 WIR

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	FROM TERMINATION SPEC. 1 ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TO TERMINATION SPEC 1 ITEM NO.	TO NO.	
A 80	1	525	45A4J11- 9	20	N		170	45A4J13-19	20	N		148	A
A 81	1	500	45A4J7- 9	20	N		86	45A4J12- 3	20	N		152	A
A 82	1	475	45A4J7-12	20	N		83	45A4J12- 4	20	N		153	A
A 83	1	250	45A4J7-20	20	N		70	45A4J6- 7	20	N		62	E
A 84	7 ~~2~~	425	45A4J6- 3	20	N		67	45A4J11- 3	20	N		163	E
A 85	2	125	45A4J10- 6	25	Y		165A	45A4J11- 2	25	Y		162	A
A 86	2	300	45A4J6- 5	25	Y		64	45A4J12- 6	25	Y		156	A
A 87	1	300	45A4J6- 8	20	N		61	45A4J12- 8	20	N		158	E
A 88	1	225	45A4J5-20	20	N		33	45A4J11- 7	20	N		167	C
A 89	1	450	45A4J5- 9	20	N		48	45A4J10- 3	20	N		175	A
A 90	1	425	45A4J5-12	20	N		45	45A4J10- 4	20	N		176	A
A 91	1	425	45A4J5-17	20	N		38	45A4J10-10	20	N		183	E
A 92	2	325	45A4J11- 5	25	Y		165	45A4J10- 6	25	Y		179	A
A 93	1	300	45A4J11- 8	20	N		168	45A4J10- 8	20	N		181	A
A 94	1	325	45A4J4- 8	20	N		29	45A4J3- 7	20	N		17	E
A 95	1	475	45A4J4-11	20	N		26	45A4J3-20	20	N		10	E
A 96	1	400	45A4J4-10	20	N		27	45A4J3-17	20	N		12	E
A 97	1	250	45A4J3- 2	20	N		20	45A4J9- 1	20	N		185	A

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE-NONE | REV LTR + | SHEET 9 OF 13

MIL 2085 - 4-63 WIR

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	FROM TERMINATION SPEC. 1 ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TO TERMINATION SPEC 1 ITEM NO.	TO NO.	
A 98	1	225	45A4J3- 8	20	N		16	45A4J9- 6	20	N		188	C
A 99	1	300	45A4J3- 9	20	N		15	45A4J9-13	20	N		195	A
A 100	2	300	45A4J2- 5	25	Y		6	45A4J8-10	25	Y		211	A
A 101	1	300	45A4J2- 7	20	N		4	45A4J9-20	20	N		202	A
A 102	1	275	45A4J2- 8	20	N		3	45A4J8- 9	20	N		210	A
A 103	1	325	45A4J9- 9	20	N		192	45A4J8- 2	20	N		204	A
A 104	1	325	45A4J9-10	20	N		193	45A4J8- 3	20	N		205	A
A 105	1	325	45A4J9-19	20	N		200	45A4J2- 9	20	N		2	A
A 106	2	450	45A4J9- 7	25	Y		190	45A4J8-11	25	Y		212	A
A 108	1	650	45A4J1-21	12	N	4	214	45A4J2- 6	20	N		5	E
A 109	1	650	45A4J1-20	12	N	4	214	45A4J2- 4	20	N		7	E
A 110	1	1200	45A4J1- 2	12	N	4	214	45A4J4- 7	20	N		30	E
A 112	~~1~~	~~1550~~	~~45A4J1-25~~	~~12~~	~~N~~	~~4~~ DELETED	~~214~~	~~45A4J5- 8~~	~~20~~	~~N~~		~~49~~	~~C~~
A 113	~~1~~	~~1650~~	~~45A4J1-39~~	~~12~~	~~N~~	~~4~~ DELETED	~~214~~	~~45A4J5- 5~~	~~20~~	~~N~~		~~53~~	~~C~~
A 114	1	1650	45A4J1-36	12	N	4	214	45A4J6- 6	20	N		63	C
A 115	1	1600	45A4J1-35	12	N	4	214	45A4J6- 4	20	N		65	C
A 116	~~1~~	~~1950~~	~~45A4J1-26~~	~~12~~	~~N~~	~~4~~ DELETED	~~214~~	~~45A4J7- 8~~	~~20~~	~~N~~		~~87~~	~~E~~
A 117	~~1~~	~~2000~~	~~45A4J1-34~~	~~12~~	~~N~~	~~4~~ DELETED	~~214~~	~~45A4J7- 5~~	~~20~~	~~N~~		~~91~~	~~E~~

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE-NONE | REV LTR + | SHEET 10 OF 13

MIL 2085 - 4-63 WIR

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	FROM TERMINATION SPEC. 1 ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET 2	TIN	TO TERMINATION SPEC 1 ITEM NO.	TO NO.	
A 118	~~1~~	~~1900~~	~~45A4J1-22~~	~~12~~	~~N~~	~~4~~ DELETED	~~214~~	~~45A4J13- 5~~	~~20~~	~~N~~		~~132~~	~~A~~
A 119	~~1~~	~~1850~~	~~45A4J1-24~~	~~12~~	~~N~~	~~4~~ DELETED	~~214~~	~~45A4J13- 8~~	~~20~~	~~N~~		~~135~~	~~A~~
A 120	1	1550	45A4J1-19	12	N	4	214	45A4J12- 7	20	N		157	B
A 121	1	1550	45A4J1-11	12	N	4	214	45A4J12-11	20	N		161	B
A 122	1	1350	45A4J1-27	12	N	4	214	45A4J11- 4	20	N		164	C
A 123	1	1350	45A4J1-28	12	N	4	214	45A4J11- 6	20	N		166	C
A 124	1	1050	45A4J1-31	12	N	4	214	45A4J9- 5	20	N		187	B
A 125	1	1200	45A4J1-18	12	N	4	214	45A4J10- 7	20	N		180	C
A 126	1	1200	45A4J1-10	12	N	4	214	45A4J10-11	20	N		184	C
A 127	1	1050	45A4J1-23	12	N	4	214	45A4J9- 8	20	N		191	B
A 128	1	700	45A4J1- 9	12	N	4	214	45A4J8- 5	20	N		207	B
A 129	1	650	45A4J1-17	12	N	4	214	45A4J8- 8	20	N		209	B
A 132	2	525	45A4J9- 7	25	Y		189A	45A4J2-10	25	Y		1	A
A 133	2	275	45A4J2- 2	25	Y		9	45A4J8-10	25	Y		211	AE
A 134	1	1760	45A4P1-B1	20	N		95A	45A4R1- 1	20	N		184	AE
A 135	1	1760	45A4P1-B2	20	N		95B	45A4R1- 2	20	N		184	BE

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE-NONE | REV LTR + | SHEET 11 OF 13

MIL 2085 - 4-63 WIR

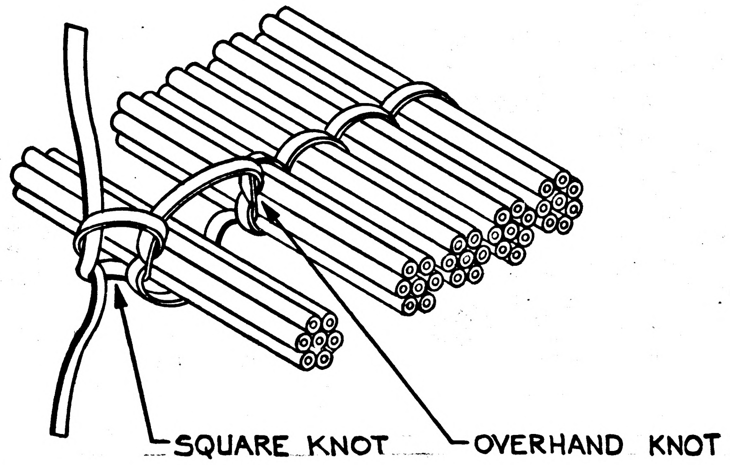


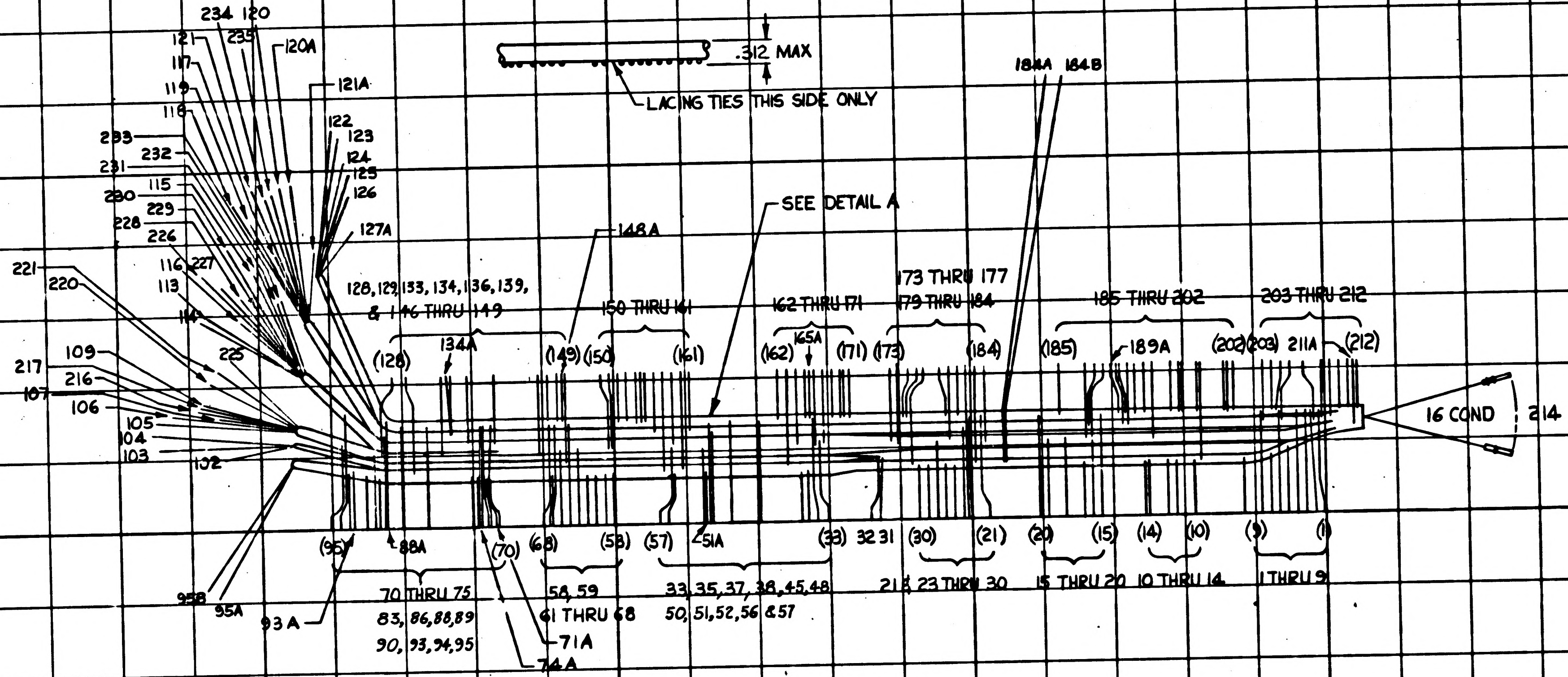
FIGURE 1
MULTIPLE SPOT TIE

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008626
SCALE-NONE | REV LTR + | SHEET 12 OF 13

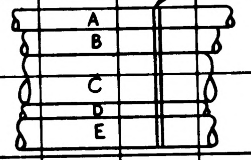
MIL 2084 4-63

9298001 2

SYM	ZONE	REVISIONS /5116 DESCRIPTION	CHG NO.	DATE	APPD.


234 120
121
235
120A
117
119
121A
118
233
232
231
115
230
229
228
226
116
227
113
114
221
220
122
123
124
125
126
127A
.312 MAX
LACING TIES THIS SIDE ONLY
184A 184B
SEE DETAIL A
148A
128, 129, 133, 134, 136, 139, & 146 THRU 149
134A
(128)
(149)
150 THRU 161
(150)
(161)
162 THRU 171
165A
(162)
(171)
173 THRU 177
179 THRU 184
(173)
(184)
185 THRU 202
(185)
189A
(202)
203 THRU 212
(203)
211A
(212)
16 COND
214
109
217
216
107
106
105
104
103
102
225
(95)
88A
(70)
(68)
(58)
(57)
51A
(33)
32 31
(30)
(21)
(20)
(15)
(14)
(10)
(9)
(1)
95B
95A
93A
70 THRU 75
83, 86, 88, 89
90, 93, 94, 95
58, 59
61 THRU 68
71A
74A
33, 35, 37, 38, 45, 48
50, 51, 52, 56 & 57
21 & 23 THRU 30
15 THRU 20
10 THRU 14
1 THRU 9

SPOT TIE CONFIGURATION AS REQUIRED PER FIG I SHEET 13



CHANNELS
DETAIL A
SCALE 2:1

1007534-011	1007574-011	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	DO NOT SCALE THIS DRAWING	ACSP PN	WIRING HARNESS A (TRAY 4)
APPLICATION		MATERIAL	DRAWN A Kauffman DATE 30 OCT 64	
		CONTRACT NAS9-497	CHECKED Zeeler 20 NOV 64	CODE IDENT NO.
			APPROVAL R Clodius 20 NOV 64	SIZE D 1008626
			APPROVAL	SCALE FULL
			NASA APPROVAL 12-23-64	SHEET 13 OF 13
			MIT APPROVAL 23 Dec 64	

D0 58634

APPLICATION	
NEXT ASSY	USED ON
1007572-011	1007570-011

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15964	25 FEB 65	WP

Charleston
3 DEC 64

REV STATUS OF SHEETS													
REV	A	+	+	+	+	A	+	+	+	+	+	+
SHEET	1	2	3	4	5	6	7	8	9	10	11	12

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN John A. Krasnowski DATE 12 Nov 64
CHECKED A. Udovich 3 DEC 64
APPROVAL K. C 7 Dec 64
APPROVAL 3 Dec 64

NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64
CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS A
(TRAY 2)

CODE IDENT NO.	SIZE		REV
	A	1008627	A

SCALE —

SHEET 1 OF 12

PENNANT GENERAL NOTES

NOTE

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 6.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 ASSEMBLE ITEM 3 PER ND1002206.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008627
SCALE - NONE REV LTR + SHEET 2 OF 12

PENNANT GENERAL NOTES

NOTE

16 ASSEMBLE PER ND1002032.

17 SOLDER PER ND1002071.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	JACKET	CUT WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008627
SCALE - NONE REV LTR + SHEET 3 OF 12

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE, 63 FEET 6 INCHES TOTAL LENGTH
13	2	AR	1010848- 4	WIRE 20 FEET 5.8 INCHES TOTAL LENGTH
13	3	AR	1010847- 2	WIRE, ELECTRICAL
13	4	AR	1010847- 4	WIRE, ELECTRICAL
13	5	13	1010738- 6	CONTACT, ELECTRICAL SOCKET
14	6	AR	1012507- 2	TAPE LACING AND TYING
	7	AR	QQ-S-571	SOLDER SN60 WRAP 2 (ES-2175, ALLOY 1)
	8	AR	MIL-F-14256	FLUX (ES-2798)

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008627
SCALE - NONE REV LTR + SHEET 4 OF 12

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2>	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2>	TIN	TERMINATION SPEC. 1> ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2>	TIN	TERMINATION SPEC 1> ITEM NO.	NO.
A 1	3 ~~1~~		45A2P1-S 1	25	Y		69	45A2J9- 6	25	Y		64
A 3	1		45A2J8-10	20	N		59	45A2J3- 3	20	N		173
A 4	1		45A2J3- 3	20	N		174	45A2J7- 5	20	N		45
A 5	1		45A2P1-S 6	20	N		71	45A2J4- 3	20	N		161
A 6	3 ~~1~~		45A2P1-R 4	25	Y		73	45A2J9-14	25	Y		68
A 8	2		45A2J8- 4	20	N		52	45A2J3-11	20	N		165
A 9	2		45A2J3-11	20	N		166	45A2J7- 4	20	N		42
A 10	4 ~~2~~		45A2P1-R 2	25	Y		72	45A2J2- 9	25	Y		183
A 11	1		45A2P1-R 6	20	N		75	45A2J4-11	20	N		153
A 12	3 ~~1~~		45A2P1-M 5	20	N		80	45A2J2- 3	20	N		193
A 14	1		45A2P1-M 6	20	N		81	45A2J2-20	20	N		181
A 15	2		45A2P1-L 6	20	N		82	45A2J2- 1	20	N		195 ~~[illegible]~~
A 16	4 ~~2~~		45A2P1-K 6	25	Y		83	45A2J2- 6	25	Y		190
A 17	1		45A2J5- 9	20	N		141	45A2J3- 2	20	N		175
A 18	1		45A2J5- 7	20	N		144	45A2J3- 1	20	N		176
A 19	1		45A2P1-N 3	20	N		79	45A2J9-10	20	N		66
A 20	2		45A2J5- 5	20	N		146	45A2J7- 1	20	N		40
A 21	1		45A2P1-P 3	20	N		77	45A2J9-12	20	N		67

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008627
SCALE - NONE REV LTR + SHEET 5 OF 12

GVZ WIRING HARNESS A + 1008627

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC ITEM NO.	NO.
A 22	2	45A2J5- 8	20N		142	45A2J7- 3	20N		41
A 23	2	45A2J5-10	20N		138	45A2J9- 1	20N		61
A 24	2	45A2J9- 4	20N		63	45A2J5- 1	20N		152
A 25	1	45A2J4- 5	20N		159	45A2J3- 5	20N		171
A 26	1	45A2J4- 9	20N		157	45A2J3- 9	20N		170
A 27	1	45A2J4-10	20N		155	45A2J3-10	20N		168
A 28	1	45A2J2- 7	20N		187	45A2J2-24	20N		179
A 29	1	45A2J8- 3	20N		51	45A2J7- 7	20N		47
A 30	1	45A2J8- 5	20N		59	45A2J7- 9	20N		49
A 31	1	45A2J8-11	20N		60	45A2J7- 8	20N		48
A 32	4 ~~2~~	45A2P1-S 3	25Y		70	45A2J2-14	25Y		182
A 33	1	45A2P1-M 4	20N		99	45A2J6-37	20N		17
A 34	1	45A2P1-S 5	20N		85	45A2J6-14	20N		20
A 35	3 ~~1~~	45A2J2- ~~X~~9	25Y		186	45A2J1- 1	08N		197
A 36	1	45A2P1-R 5	20N		87	45A2J6-26	20N		36
A 37	~~1~~	~~45A2J2- 2~~	~~20N~~	DELETED	~~195~~	~~45A2J1-21~~	~~08N~~	~~3~~	~~197~~
A 38	1	45A2J2- 6	20N		188	45A2E 2	20N		198
A 39	1	45A2P1-P 6	20N		92	45A2J4- 2	20N		162

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008627
SCALE - NONE	REV LTR A	SHEET 6 OF 12

MIL 2085 · 4-63 WIR

GVZ WIRING HARNESS A + 1008627

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC ITEM NO.	NO.
A 40	1	45A2P1-N 6	20N		97	45A2J4- 1	20N		163
A 41	1	45A2J4- 1	20N		164	45A2J1-27	08N	3	197
A 42	1	45A2P1-N 5	20N		96	45A2J5- 9	20N		140
A 43	1	45A2P1-P 5	20N		91	45A2J5- 7	20N		145
A 44	1	45A2J6-42	20N		28	45A2J1-35	08N	3	197
A 45	1	45A2P1-N 4	20N		95	45A2J6-43	20N		30
A 46	1	45A2P1-P 4	20N		90	45A2J2-22	20N		180
A 47	2	45A2P1-P 1	20N		88	45A2J5- 2	20N		150
A 48	1	45A2J5- 2	20N		151	45A2E 6	20N		198
A 49	2	45A2P1-P 2	20N		89	45A2J5-10	20N		139
A 50	2	45A2P1-R 1	20N		86	45A2J9- 3	20N		62
A 51	1	45A2P1-N 1	20N		93	45A2J6-25	20N		34
A 52	1	45A2P1-N 2	20N		94	45A2J6-24	20N		32
A 53	1	45A2P1-M 1	20N		98	45A2J6- 9	20N		14
A 54	1	45A2P1-L 1	20N		100	45A2J6- 1	20N		1
A 55	1	45A2P1-H 2	20N		103	45A2J6-28	20N		39
A 56	1	45A2P1-K 2	20N		101	45A2J6-27	20N		38
A 57	1	45A2P1-G 5	20N		107	45A2J6-20	20N		25

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008627
SCALE - NONE	REV LTR +	SHEET 7 OF 12

MIL 2085 · 4-63 WIR

GVZ WIRING HARNESS A + 1008627

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC ITEM NO.	NO.
A 58	1	45A2P1-G 6	20N		108	45A2J6-19	20N		24
A 59	1	45A2P1-H 5	20N		105	45A2J6-22	20N		29
A 60	1	45A2P1-H 6	20N		106	45A2J6-41	20N		26
A 61	1	45A2P1-H 4	20N		104	45A2J5- 4	20N		148
A 62	1	45A2P1-K 4	20N		102	45A2J5- 3	20N		149
A 63	1	45A2P1-D 1	20N		111	45A2J8- 7	20N		54
A 64	1	45A2J8- 7	20N		55	45A2E 8	20N		198
A 65	1	45A2P1-D 2	20N		110	45A2J8- 9	20N		57
A 66	1	45A2J8- 9	20N		58	45A2E 7	20N		198
A 67	1	45A2P1-F 1	20N		109	45A2J8- 8	20N		56
A 68	1	45A2J3- 9	20N		169	45A2E 5	20N		198
A 69	1	45A2J3-10	20N		167	45A2E 4	20N		198
A 70	1	45A2J4- 4	20N		160	45A2J1-28	08N	3	197
A 71	1	45A2J3- 4	20N		172	45A2J1-36	08N	3	197
A 72	1	45A2J2- 4	20N		192	45A2J1-15	08N	3	197
A 73	1	45A2J2- 5	20N		191	45A2E 3	20N		198
A 74	1	45A2J2-26	20N		178	45A2J1-14	08N	3	197
A 75	1	45A2J9- 7	20N		65	45A2J1-17	08N	3	197

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008627
SCALE - NONE	REV LTR +	SHEET 8 OF 12

MIL 2085 · 4-63 WIR

GVZ WIRING HARNESS A + 1008627

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TERMINATION SPEC ITEM NO.	NO.
A 76	1	45A2J7- 6	20N		46	45A2J1-10	08N	3	197
A 77	1	45A2J8- 2	20N		50	45A2J1- 9	08N	3	197
A 81	1	45A2J3- 1	20N		177	45A2J6-42	20N		27
A 82	1	45A2P1-M 3	20N		112	45A2J6-34	20N		12
A 83	1	45A2P1-L 2	20N		113	45A2J6-32	20N		8
A 84	1	45A2P1-L 3	20N		114	45A2J6-33	20N		10
A 85	1	45A2P1-L 4	20N		115	45A2J6-10	20N		16
A 87	1	45A2P1-F 3	20N		123	45A2J6- 4	20N		6
A 88	1	45A2P1-G 3	20N		121	45A2J6- 2	20N		2
A 89	1	45A2P1-H 3	20N		118	45A2J6- 3	20N		4
A 90	1	45A2P1-F 2	20N		122	45A2J4- 5	20N		158
A 91	1	45A2P1-G 1	20N		119	45A2J4- 9	20N		156
A 92	1	45A2P1-G 2	20N		120	45A2J4-10	20N		154
A 93	1	45A2P1-H 1	20N		117	45A2J6-36	20N		15
A 94	1	45A2P1-K 1	20N		116	45A2J6-38	20N		18
A 95	1	45A2P1-D 4	20N		127	45A2J6-31	20N		7
A 96	1	45A2P1-F 4	20N		124	45A2J6- 6	20N		9
A 97	1	45A2P1-D 5	20N		128	45A2J6- 7	20N		11

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008627
SCALE - NONE	REV LTR +	SHEET 9 OF 12

MIL 2085 · 4-63 WIR

GVZ WIRING HARNESS A + 1008627

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2	TIN 2	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2	TIN 2	TERMINATION SPEC 1 ITEM NO.	NO.
A 98	1		45A2P1-F 5	20N			125	45A2J6-35	20N			13
A 99	1		45A2P1-D 6	20N			129	45A2J6-29	20N			3
A 100	1		45A2P1-F 6	20N			126	45A2J6-30	20N			5
A 101	1		45A2P1-A 1	20N			134	45A2J6-47	20N			37
A 102	1		45A2P1-A 2	20N			135	45A2J6-46	20N			35
A 103	1		45A2P1-B 1	20N			130	45A2J6-44	20N			31
A 104	1		45A2P1-B 2	20N			131	45A2J6-45	20N			33
A 105	1		45A2P1-A 5	20N			136	45A2J6-17	20N			23
A 106	1		45A2P1-A 6	20N			137	45A2J6-16	20N			22
A 107	1		45A2P1-B 6	20N			133	45A2J6-39	20N			21
A 108	1		45A2P1-B 5	20N			132	45A2J6-12	20N			19
A 109	2		45A2P1-G 4	20N			84	45A2J7- 5	20N			44
A 110	2		45A2P1-N 3	20N			78	45A2J5- 5	20N			147
A 111	2		45A2P1-P 3	20N			76	45A2J5- 8	20N			143
A 112	2		45A2P1-R 3	20N			74	45A2J7- 4	20N			43
A 113	4		45A2J2- 2	25Y			194	45A2J2- 8	25Y			185
A 114	4		45A2J2- 8	25Y			184	45A2J2- 6	25Y			189

1 > THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 > DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A

1008627

SCALE - NONE

REV LTR +

SHEET 10 OF 12

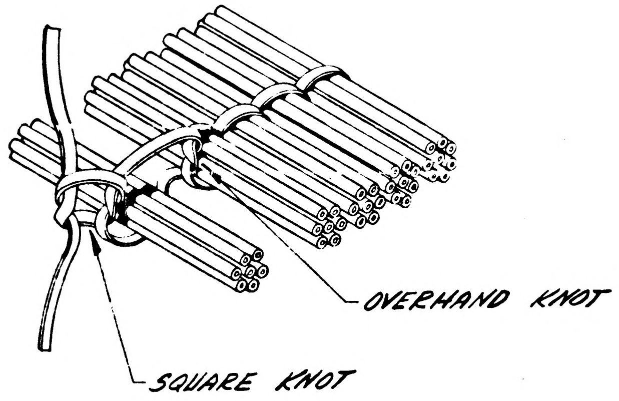
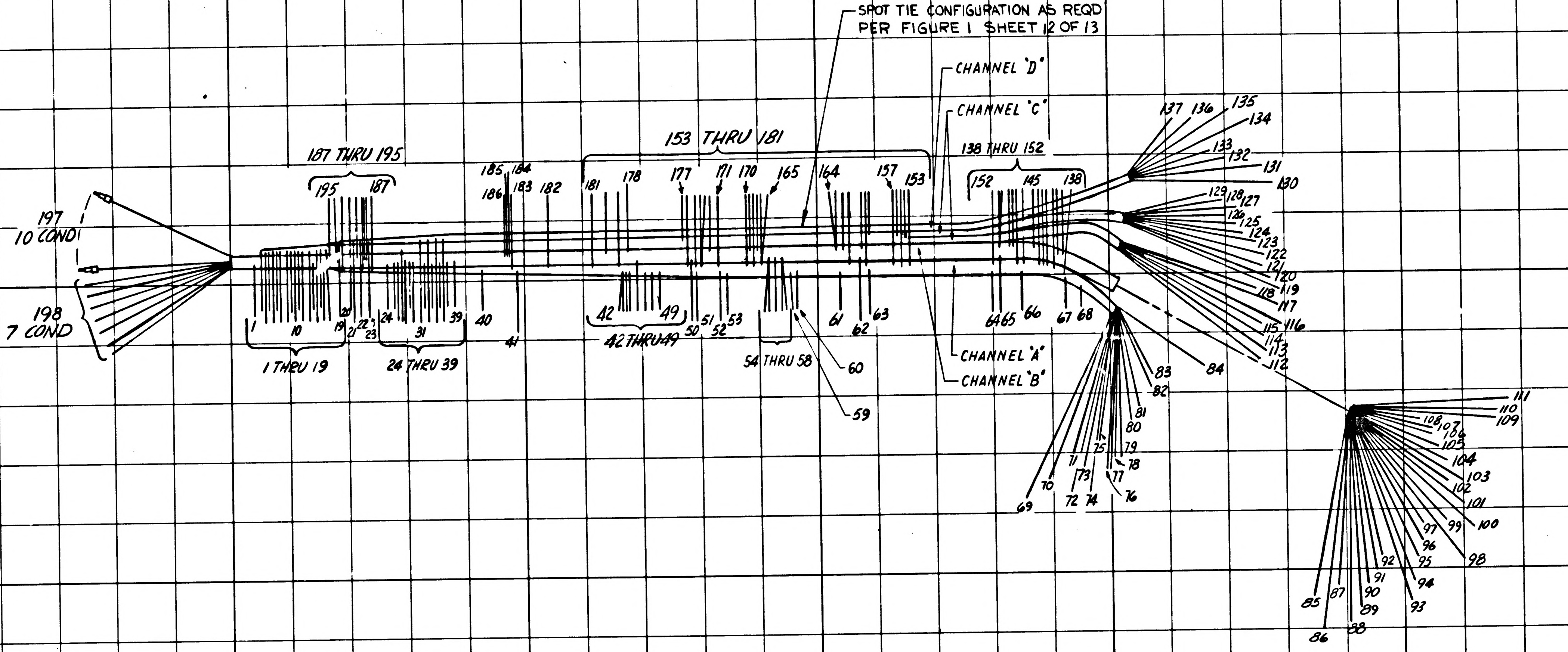

OVERHAND KNOT
SQUARE KNOT

FIGURE 1
MULTIPLE SPOT TIE

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008627
SCALE - NONE	REV LTR +	SHEET 11 OF 12

1008627 | 2

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPD


SPOT TIE CONFIGURATION AS REQD PER FIGURE 1 SHEET 12 OF 13
197
10 COND
198
7 COND
187 THRU 195
195
187
1 THRU 19
24 THRU 39
185
184
186
183
182
40
41
153 THRU 181
181
178
177
171
170
165
164
157
153
42
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42 THRU 49
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51
52
53
54 THRU 58
59
60
61
62
63
CHANNEL "D"
CHANNEL "C"
CHANNEL "A"
CHANNEL "B"
138 THRU 152
152
145
138
64
65
66
67
68
137
136
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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ——— ± ——— ± ———
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

NEXT ASSY | USED ON
APPLICATION

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN John A. Gondowski DATE 12 Nov 64
CHECKED D. Udovich 7 DEC 64
APPROVAL 7 DEC 64
APPROVAL
NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS "A"
(TRAY 2)

CODE IDENT NO.
SIZE D
1008627
SCALE FULL
SHEET 12 OF 12

D0 58634

APPLICATION	
NEXT ASSY	USED ON
1007572-011	1007570-011

REVISIONS 15116

SYM	DESCRIPTION	DATE	APPROVAL

REV												
SHEET												
REV STATUS REV	+	+	+	+	+	+	+	+	+	+	+	+
OF SHEETS SHEET	1	2	3	4	5	6	7	8	9	10	11	12

Charleston
3 DEC 64

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN 12 Nov 64
DATE
CHECKED 3 DEC 64
APPROVAL 7 DEC 64
APPROVAL 8 DEC 64
NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec
CONTRACT NAS 9-497

WIRING HARNESS A
(TRAY 2)

CODE IDENT NO. | SIZE A | 1008627 | REV

SCALE — | SHEET 1 OF 12

GVZ WIRING HARNESS A + 1008627

PENNANT GENERAL NOTES

NOTE

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 6.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 ASSEMBLE ITEM 3 PER ND1002206.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008627
SCALE-NONE | REV LTR + | SHEET 2 OF 12

MIL 2084 4-63

GVZ WIRING HARNESS A + 1008627

PENNANT GENERAL NOTES

NOTE

16 ASSEMBLE PER ND1002032.

17 SOLDER PER ND1002071.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008627
SCALE-NONE | REV LTR + | SHEET 3 OF 12

MIL 2084 4-63

GVZ WIRING HARNESS A + 1008627

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE, 63 FEET 6 INCHES TOTAL LENGTH
13	2	AR	1010848- 4	WIRE 20 FEET 5.8 INCHES TOTAL LENGTH
13	3	AR	1010847- 2	WIRE, ELECTRICAL
13	4	AR	1010847- 4	WIRE, ELECTRICAL
13	5	13	1010738- 6	CONTACT, ELECTRICAL SOCKET
14	6	AR	1012507- 2	TAPE LACING AND TYING
	7	AR	QQ-S-571	SOLDER SN60 WRAP 2 (ES-2175, ALLOY 1)
	8	AR	MIL-F-14256	FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008627
SCALE-NONE | REV LTR + | SHEET 4 OF 12

MIL 2084 4-63

GVZ WIRING HARNESS A + 1008627

CONDUCTOR NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC ITEM NO.	FROM NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 1	3 ~~1~~	45A2P1-S 1	25	Y		69	45A2J9- 6	25	Y		64
A 3	1	45A2J8-10	20	N		59	45A2J3- 3	20	N		173
A 4	1	45A2J3- 3	20	N		174	45A2J7- 5	20	N		45
A 5	1	45A2P1-S 6	20	N		71	45A2J4- 3	20	N		161
A 6	3 ~~1~~	45A2P1-R 4	25	Y		73	45A2J9-14	25	Y		68
A 8	2	45A2J8- 4	20	N		52	45A2J3-11	20	N		165
A 9	2	45A2J3-11	20	N		166	45A2J7- 4	20	N		42
A 10	4 ~~2~~	45A2P1-R 2	25	Y		72	45A2J2- 9	25	Y		183
A 11	1	45A2P1-R 6	20	N		75	45A2J4-11	20	N		153
→ A 12	3 ~~1~~	45A2P1-M 5	20	N		80	45A2J2- 3	20	N		193
A 14	1	45A2P1-M 6	20	N		81	45A2J2-20	20	N		181
A 15	2	45A2P1-L 6	20	N		82	45A2J2- 1	20	N		125 ~~[illegible]~~
A 16	4 ~~2~~	45A2P1-K 6	25	Y		83	45A2J2- 6	25	Y		190
A 17	1	45A2J5- 9	20	N		141	45A2J3- 2	20	N		175
A 18	1	45A2J5- 7	20	N		144	45A2J3- 1	20	N		176
A 19	1	45A2P1-N 3	20	N		79	45A2J9-10	20	N		66
A 20	2	45A2J5- 5	20	N		146	45A2J7- 1	20	N		40
A 21	1	45A2P1-P 3	20	N		77	45A2J9-12	20	N		67

1. THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2. DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008627
SCALE - NONE | REV LTR + | SHEET 5 OF 12

MIL 2085 - 4-63 WIR

GVZ WIRING HARNESS A + 1008627

CONDUCTOR NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC ITEM NO.	FROM NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 22	2	45A2J5- 8	20	N		142	45A2J7- 3	20	N		41
A 23	2	45A2J5-10	20	N		138	45A2J9- 1	20	N		61
A 24	2	45A2J9- 4	20	N		63	45A2J5- 1	20	N		152
A 25	1	45A2J4- 5	20	N		159	45A2J3- 5	20	N		171
A 26	1	45A2J4- 9	20	N		157	45A2J3- 9	20	N		170
A 27	1	45A2J4-10	20	N		155	45A2J3-10	20	N		168
A 28	1	45A2J2- 7	20	N		187	45A2J2-24	20	N		179
A 29	1	45A2J8- 3	20	N		51	45A2J7- 7	20	N		47
A 30	1	45A2J8- 5	20	N		53	45A2J7- 9	20	N		49
→ A 31	1	45A2J8-11	20	N		60	45A2J7- 8	20	N		48
A 32	4 ~~2~~	45A2P1-S 3	25	Y		70	45A2J2-14	25	Y		182
A 33	1	45A2P1-M 4	20	N		99	45A2J6-37	20	N		17
A 34	1	45A2P1-S 5	20	N		85	45A2J6-14	20	N		20
A 35	3 ~~1~~	45A2J2- 8	25	Y		186	45A2J1- 1	08	N		197
A 36	1	45A2P1-R 5	20	N		87	45A2J6-26	20	N		36
A 37	~~1~~	~~45A2J2- 2~~	~~20~~	~~N~~	DELETED	~~195~~	~~45A2J1-21~~	~~08~~	~~N~~	~~3~~	~~197~~
A 38	1	45A2J2- 6	20	N		188	45A2E 2	20	N		198
A 39	1	45A2P1-P 6	20	N		92	45A2J4- 2	20	N		162

1. THE STD CONDUCTOR TERMINATION FIGURES ARE PER
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MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008627
SCALE - NONE | REV LTR + | SHEET 6 OF 12

MIL 2085 - 4-63 WIR

GVZ WIRING HARNESS A + 1008627

CONDUCTOR NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC ITEM NO.	FROM NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 40	1	45A2P1-N 6	20	N		97	45A2J4- 1	20	N		163
A 41	1	45A2J4- 1	20	N		164	45A2J1-27	08	N	3	197
A 42	1	45A2P1-N 5	20	N		96	45A2J5- 9	20	N		140
A 43	1	45A2P1-P 5	20	N		91	45A2J5- 7	20	N		145
A 44	1	45A2J6-42	20	N		28	45A2J1-35	08	N	3	197
A 45	1	45A2P1-N 4	20	N		95	45A2J6-43	20	N		30
A 46	1	45A2P1-P 4	20	N		90	45A2J2-22	20	N		180
A 47	2	45A2P1-P 1	20	N		88	45A2J5- 2	20	N		150
A 48	1	45A2J5- 2	20	N		151	45A2E 6	20	N		198
→ A 49	2	45A2P1-P 2	20	N		89	45A2J5-10	20	N		139
A 50	2	45A2P1-R 1	20	N		86	45A2J9- 3	20	N		62
A 51	1	45A2P1-N 1	20	N		93	45A2J6-25	20	N		34
A 52	1	45A2P1-N 2	20	N		94	45A2J6-24	20	N		32
A 53	1	45A2P1-M 1	20	N		98	45A2J6- 9	20	N		14
A 54	1	45A2P1-L 1	20	N		100	45A2J6- 1	20	N		1
A 55	1	45A2P1-H 2	20	N		103	45A2J6-28	20	N		39
A 56	1	45A2P1-K 2	20	N		101	45A2J6-27	20	N		38
A 57	1	45A2P1-G 5	20	N		107	45A2J6-20	20	N		25

1. THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2. DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008627
SCALE - NONE | REV LTR + | SHEET 7 OF 12

MIL 2085 - 4-63 WIR

GVZ WIRING HARNESS A + 1008627

CONDUCTOR NUMBER	ITEM NO.	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	FROM TERMINATION SPEC ITEM NO.	FROM NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TO TERMINATION SPEC ITEM NO.	TO NO.
A 58	1	45A2P1-G 6	20	N		108	45A2J6-19	20	N		24
A 59	1	45A2P1-H 5	20	N		105	45A2J6-22	20	N		29
A 60	1	45A2P1-H 6	20	N		106	45A2J6-41	20	N		26
A 61	1	45A2P1-H 4	20	N		104	45A2J5- 4	20	N		148
A 62	1	45A2P1-K 4	20	N		102	45A2J5- 3	20	N		149
A 63	1	45A2P1-D 1	20	N		111	45A2J8- 7	20	N		54
A 64	1	45A2J8- 7	20	N		55	45A2E 8	20	N		198
A 65	1	45A2P1-D 2	20	N		110	45A2J8- 9	20	N		57
A 66	1	45A2J8- 9	20	N		58	45A2E 7	20	N		198
→ A 67	1	45A2P1-F 1	20	N		109	45A2J8- 8	20	N		56
A 68	1	45A2J3- 9	20	N		169	45A2E 5	20	N		198
A 69	1	45A2J3-10	20	N		167	45A2E 4	20	N		198
A 70	1	45A2J4- 4	20	N		160	45A2J1-28	08	N	3	197
A 71	1	45A2J3- 4	20	N		172	45A2J1-36	08	N	3	197
A 72	1	45A2J2- 4	20	N		192	45A2J1-15	08	N	3	197
A 73	1	45A2J2- 5	20	N		191	45A2E 3	20	N		198
A 74	1	45A2J2-26	20	N		178	45A2J1-14	08	N	3	197
A 75	1	45A2J9- 7	20	N		65	45A2J1-17	08	N	3	197

1. THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2. DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008627
SCALE - NONE | REV LTR + | SHEET 8 OF 12

MIL 2085 - 4-63 WIR

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	FROM TERMINATION SPEC. 1 ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TO TERMINATION SPEC 1 ITEM NO.	TO NO.
A 76	1		45A2J7- 6	20N		46	45A2J1-10	08N	3	197
A 77	1		45A2J8- 2	20N		50	45A2J1- 9	08N	3	197
A 81	1		45A2J3- 1	20N		177	45A2J6-42	20N		27
A 82	1		45A2P1-M 3	20N		112	45A2J6-34	20N		12
A 83	1		45A2P1-L 2	20N		113	45A2J6-32	20N		8
A 84	1		45A2P1-L 3	20N		114	45A2J6-33	20N		10
A 85	1		45A2P1-L 4	20N		115	45A2J6-10	20N		16
A 87	1		45A2P1-F 3	20N		123	45A2J6- 4	20N		6
A 88	1		45A2P1-G 3	20N		121	45A2J6- 2	20N		2
A 89	1		45A2P1-H 3	20N		118	45A2J6- 3	20N		4
A 90	1		45A2P1-F 2	20N		122	45A2J4- 5	20N		158
A 91	1		45A2P1-G 1	20N		119	45A2J4- 9	20N		156
A 92	1		45A2P1-G 2	20N		120	45A2J4-10	20N		154
A 93	1		45A2P1-H 1	20N		117	45A2J6-36	20N		15
A 94	1		45A2P1-K 1	20N		116	45A2J6-38	20N		18
A 95	1		45A2P1-D 4	20N		127	45A2J6-31	20N		7
A 96	1		45A2P1-F 4	20N		124	45A2J6- 6	20N		9
A 97	1		45A2P1-D 5	20N		128	45A2J6- 7	20N		11

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A 1008627

SCALE-NONE REV LTR + SHEET 9 OF 12

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	FROM TERMINATION SPEC. 1 ITEM NO.	FROM NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TO TERMINATION SPEC 1 ITEM NO.	TO NO.
A 98	1		45A2P1-F 5	20N		125	45A2J6-35	20N		13
A 99	1		45A2P1-D 6	20N		129	45A2J6-29	20N		3
A 100	1		45A2P1-F 6	20N		126	45A2J6-30	20N		5
A 101	1		45A2P1-A 1	20N		134	45A2J6-47	20N		37
A 102	1		45A2P1-A 2	20N		135	45A2J6-46	20N		35
A 103	1		45A2P1-B 1	20N		130	45A2J6-44	20N		31
A 104	1		45A2P1-B 2	20N		131	45A2J6-45	20N		33
A 105	1		45A2P1-A 5	20N		136	45A2J6-17	20N		23
A 106	1		45A2P1-A 6	20N		137	45A2J6-16	20N		22
A 107	1		45A2P1-B 6	20N		133	45A2J6-39	20N		21
A 108	1		45A2P1-B 5	20N		132	45A2J6-12	20N		19
A 109	2		45A2P1-G 4	20N		84	45A2J7- 5	20N		44
A 110	2		45A2P1-N 3	20N		78	45A2J5- 5	20N		147
A 111	2		45A2P1-P 3	20N		76	45A2J5- 8	20N		143
A 112	2		45A2P1-R 3	20N		74	45A2J7- 4	20N		43
A 113	4		45A2J2- 2	25Y		194	45A2J2- 8	25Y		185
A 114	4		45A2J2- 8	25Y		184	45A2J2- 6	25Y		189

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A 1008627

SCALE-NONE REV LTR + SHEET 10 OF 12

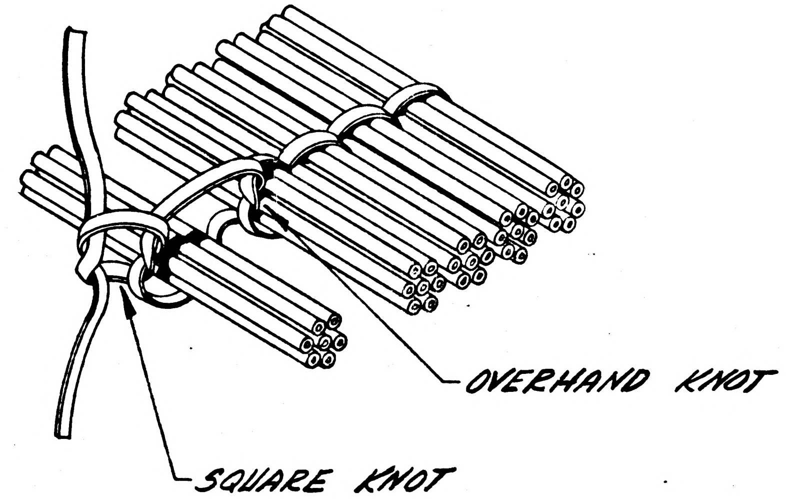


FIGURE 1
MULTIPLE SPOT TIE

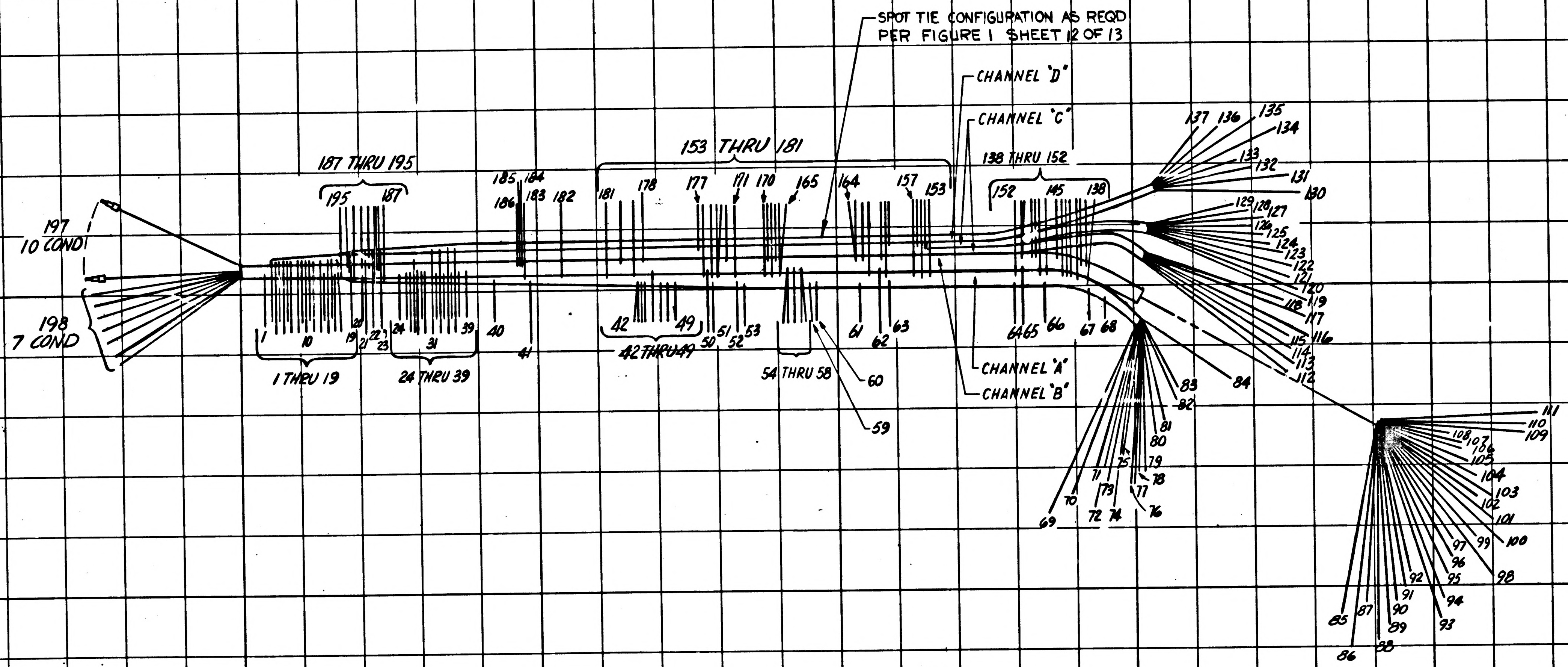
MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A 1008627

SCALE-NONE REV LTR SHEET 11 OF 12

REVISIONS 15116

SYM	ZONE	DESCRIPTION	DATE	APPD.


SPOT TIE CONFIGURATION AS REQD PER FIGURE 1 SHEET 12 OF 13
197
10 COND
198
7 COND
187 THRU 195
195
187
1 THRU 19
24 THRU 39
40
41
185
184
186
183
182
153 THRU 181
42 THRU 49
54 THRU 58
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60
61
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63
64
65
66
67
68
CHANNEL "D"
CHANNEL "C"
CHANNEL "A"
CHANNEL "B"
138 THRU 152
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MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN John A. Spudowski DATE 12 Nov 64
CHECKED A. Udovich 7 DEC 64
APPROVAL L. Osbers 7 DEC 64
APPROVAL
NASA APPROVAL 12-23-64
MIT APPROVAL 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS "A"
(TRAY 2)

CODE IDENT NO.
SIZE D
1008627
SCALE FULL
SHEET 12 OF 12

PENNANT NOTE — GENERAL NOTES

PENNANT NOTE	GENERAL NOTES
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 3
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10	GRID MODULE IS 1 INCH BASIC.
11	UNLESS OTHERWISE SPECIFIED --- FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .12 INCH. END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .06 INCH.
12	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14	ASSEMBLE PER ND1002032
15	INSTALL ITEM 2 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008629
SCALE-NONE | REV LTR + | SHEET 2 OF 8

MIL 2084 4-63

PENNANT NOTE	GENERAL NOTES
16	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008629
SCALE-NONE | REV LTR + | SHEET 3 OF 8

MIL 2084 4-63

APPLICATION		REVISIONS 14793			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
1007537-011	1007577-011		-		

Charleston
18 Nov 64

REV								
SHEET								
REV STATUS OF SHEETS — REV	+	+	+	+	+	+	+	+
REV STATUS OF SHEETS — SHEET	1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN RW Kesial DATE 3 NOV 64
CHECKED W. Diehl 16 Nov. '64
APPROVAL 18 Nov 64
APPROVAL 18 Nov 64
12/14/64
NASA APPROVAL 12-15-64
MIT APPROVAL 15 Dec 64
CONTRACT NAS9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS A
(TRAY 7)

CODE IDENT NO. | SIZE A | 1008629 | REV
SCALE — | SHEET 1 OF 8

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE, 45 FEET 3.5 INCHES TOTAL LENGTH
13	2	14	1010738- 6	CONTACT, ELECTRICAL SOCKET
16	3	AR	1012507-002	TAPE, LACING AND TYING

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008629
SCALE-NONE | REV LTR + | SHEET 4 OF 8

MIL 2084 4-63

GUP WIRING HARNESS A + 1008629

CONDUCTOR INDIVIDUAL LENGTH			FROM						TO					
NUMBER	ITEM NO.	2	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
A 37	1		45A7P1-G 4	20	N			12	45A7J3-14	20	N			72
A 38	1		45A7P1-K 4	20	N			8	45A7J3-15	20	N			73
A 39	1		45A7P1-H 4	20	N			10	45A7J3-19	20	N			74
A 40	1		45A7P1-F 9	20	N			17	45A7J3-27	20	N			76
A 41	1		45A7J2-13	08	N		2	6	45A7J6-12	20	N			38
A 42	1		45A7J2- 7	08	N		2	7	45A7J6-10	20	N			39
A 43	1		45A7J4- 4	20	N			62	45A7J1- 5	08	N		2	77
A 44	1		45A7J4-26	20	N			69	45A7J1- 6	08	N		2	77
A 45	1		45A7J3- 4	20	N			71	45A7J1- 3	08	N		2	77
A 46	1		45A7J3-26	20	N			75	45A7J1- 4	08	N		2	77
A 47	1		45A7J6-19	20	N			42	45A7J1-31	08	N		2	77
A 48	1		45A7J6-20	20	N			41	45A7J1-23	08	N		2	77
A 49	1		45A7J6- 4	20	N			44	45A7J1-24	08	N		2	77

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008629
SCALE-NONE REV LTR + SHEET 7 OF 8

MIL 2085 - 4-63 WIR

GUP WIRING HARNESS A + - 1008629

CONDUCTOR INDIVIDUAL LENGTH			FROM						TO					
NUMBER	ITEM NO.	2	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
A 19	1		45A7P1-D 1	20	N			37	45A7J5- 7	20	N			52
A 20	1		45A7J5- 7	20	N			52	45A7-E 4	20	N			3
A 21	1		45A7P1-A 3	20	N			25	45A7J5- 2	20	N			59
A 22	1		45A7J5- 2	20	N			59	45A7-E 5	20	N			4
A 23	1		45A7P1-B 3	20	N			26	45A7J5- 3	20	N			58
A 24	1		45A7J5- 3	20	N			58	45A7J1-28	08	N		2	77
A 25	1		45A7P1-C 3	20	N			27	45A7J5-10	20	N			47
A 26	1		45A7J5-10	20	N			47	45A7-E 6	20	N			5
A 27	1		45A7P1-F 3	20	N			29	45A7J6-20	20	N			40
A 28	1		45A7P1-F 6	20	N			20	45A7J6- 4	20	N			43
A 29	1		45A7P1-A 6	20	N			19	45A7J4- 2	20	N			61
A 30	1		45A7P1-G 6	20	N			13	45A7J4-14	20	N			65
A 31	1		45A7P1-K 6	20	N			9	45A7J4-15	20	N			66
A 32	1		45A7P1-H 6	20	N			11	45A7J4-19	20	N			67
A 33	1		45A7P1-A 8	20	N			18	45A7J4-27	20	N			68
A 34	1		45A7P1-A 9	20	N			14	45A7J4- 8	20	N			63
A 35	1		45A7P1-B 9	20	N			15	45A7J4- 9	20	N			64
A 36	1		45A7P1-C 9	20	N			16	45A7J3- 2	20	N			70

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008629
SCALE-NONE REV LTR + SHEET 6 OF 8

MIL 2085 - 4-63 WIR

GUP WIRING HARNESS A + 1008629

CONDUCTOR INDIVIDUAL LENGTH			FROM						TO					
NUMBER	ITEM NO.	2	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
A 1	1		45A7P1-A 1	20	N			34	45A7J5- 1	20	N			60
A 2	1		45A7P1-B 1	20	N			35	45A7J5-12	20	N			45
A 3	1		45A7P1-D 2	20	N			33	45A7J5-11	20	N			46
A 4	1		45A7P1-D 3	20	N			28	45A7J5- 9	20	N			48
A 5	1		45A7J5- 9	20	N			48	45A7J1-36	08	N		2	77
A 6	1		45A7P1-C 2	20	N			32	45A7J5- 6	20	N			54
A 7	1		45A7P1-C 1	20	N			36	45A7J5-13	20	N			55
A 8	1		45A7J5-13	20	N			55	45A7J1-21	08	N		2	77
A 9	1		45A7P1-A 2	20	N			30	45A7J5- 5	20	N			56
A 10	1		45A7P1-B 2	20	N			31	45A7J5- 4	20	N			57
A 11	1		45A7P1-A 4	20	N			21	45A7J5- 8	20	N			50
A 12	1		45A7J5- 8	20	N			50	45A7-E 2	20	N			1
A 13	1		45A7P1-B 4	20	N			22	45A7J5-14	20	N			53
A 14	1		45A7J5-14	20	N			53	45A7J1-15	08	N		2	77
A 15	1		45A7P1-C 4	20	N			23	45A7J5-16	20	N			49
A 16	1		45A7J5-16	20	N			49	45A7-E 3	20	N			2
A 17	1		45A7P1-D 4	20	N			24	45A7J5-15	20	N			51
A 18	1		45A7J5-15	20	N			51	45A7J1- 8	08	N		2	77

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

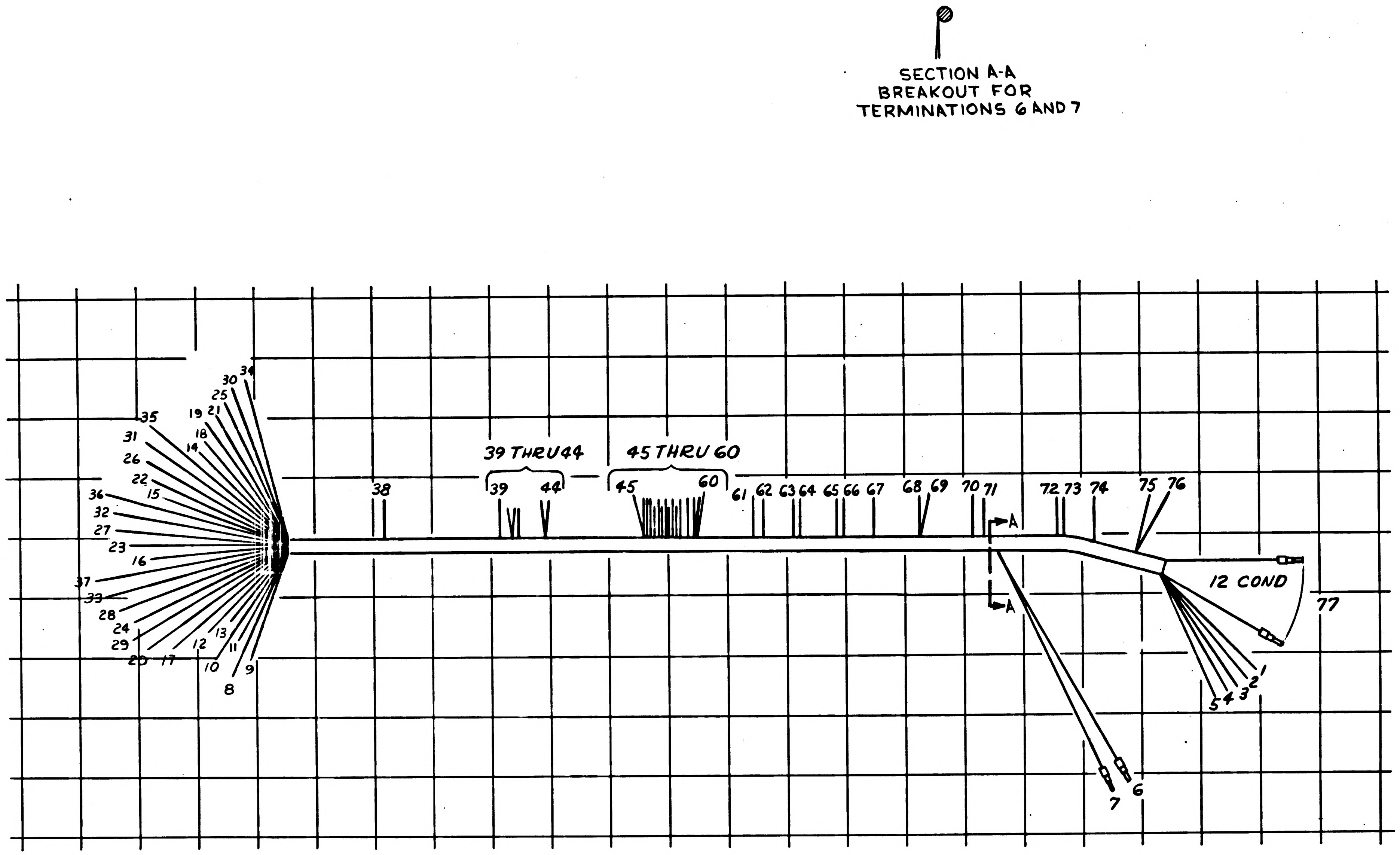
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008629
SCALE-NONE REV LTR + SHEET 5 OF 8

MIL 2085 - 4-63 WIR

1008629 | 2

REVISIONS 14793

SYM	ZONE	DESCRIPTION	DATE	APPD.
		CHG NO.		



SECTION A-A
BREAKOUT FOR
TERMINATIONS 6 AND 7
39 THRU 44
45 THRU 60
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73
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1007537-011	1007577-011	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
NEXT ASSY	USED ON	DO NOT SCALE THIS DRAWING	DRAWN R W Kiral DATE 3 NOV 64 CHECKED W. Dick 16 Nov. 64 APPROVAL R Capra 18 Nov 64 APPROVAL 18 NOV 64	WIRING HARNESS A (TRAY 7)
APPLICATION		MATERIAL —	NASA APPROVAL W J Rhine 12-1-64	CODE IDENT NO.	SIZE D	1008629
		CONTRACT NAS 9-497	MIT APPROVAL 15 Dec 64	SCALE 1/1	SHEET 8 OF 8

APPLICATION	
NEXT ASSY	USED ON
1007537-011	1007577-011

REVISIONS 14793

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15957	8 Feb 65	KH [illegible] WK

Charleston 18 Nov 64

REV								
SHEET								
REV STATUS REV	A	+	+	+	A	+	+	A
OF SHEETS SHEET	1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

		DATE
DRAWN	R.W. Leisel	3 Nov 64
CHECKED	W. Siell	16 Nov 64
APPROVAL	R. Oberg	18 Nov 64
APPROVAL	[illegible]	18 Nov 64 12/14/64
NASA APPROVAL	W.J. Rhine	12-15-64
MIT APPROVAL	[illegible]	15 Dec 64
CONTRACT	NAS9-497	

WIRING HARNESS B
(TRAY 7)

CODE IDENT NO.
SIZE A
1008630
REV A
SCALE —
SHEET 1 OF 8

PENNANT NOTE | GENERAL NOTES

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 6

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED ---
FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .12 INCH.
END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .06 INCH.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 5 PER ND1002206

PENNANT NOTE | GENERAL NOTES

16 ASSEMBLE PER ND1002032

17 SOLDER PER ND1002071 USING ITEMS 7 AND 8.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE 28 FEET 2 INCHES TOTAL LENGTH
13	2	1	1010848- 4	WIRE 30 INCHES TOTAL LENGTH.
	3	AR	1010847- 2	WIRE
	4	AR	1010847- 4	WIRE
13	5	11	1010738- 6	CONTACT ELECTRICAL SOCKET
14	6	AR	1012507-002	TAPE, LACING AND TYING.
	7	AR	QQ-S-571	SOLDER SN60(ES-2175 ALLOY 1)
	8	AR	QQ-S-571	FLUX TYPE AR (ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

GUQ

WIRING HARNESS B + 1008630

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH NUMBER	ITEM NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC. ITEM NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC ITEM NO.	NO.
B 1	1	45A7P1-N 3	20	N		27	45A7J4-20	20	N		54
B 2	1	45A7J4-20	20	N		55	45A7J3-20	20	N		61
B 4	2	45A7P1-R 1	20	N		69	45A7J6-18	20	N		48
B 5	1	45A7P1-T 6	20	N		20	45A7J4-21	20	N		56
B 6	1	45A7J4-21	20	N		57	45A7J3-21	20	N		62
B 7	1	45A7J4-23	20	N		58A	45A7J1-13	08	N	5	67
B 8	1	45A7P1-A 7	20	N		37	45A7J4-23	20	N		58
B 9	1	45A7J3-23	20	N		63A	45A7J1-12	08	N	5	67
B 10	1	45A7P1-D 9	20	N		38	45A7J3-23	20	N		63
B 11	1	45A7J7- 6	20	N		7	45A7-E 7	20	N		65
~~B 12~~	~~1~~	~~45A7J7- 2~~	~~20~~	~~N~~	DELETED	~~4~~	~~45A7J1- 9~~	~~08~~	~~N~~	~~5~~	~~67~~
B 13	1	45A7P1-N 2	20	N		26	45A7J8-28	20	N		18
B 14	1	45A7J8-28	20	N		19	45A7J6- 7	20	N		47
B 15	1	45A7J8-35	20	N		17	45A7J6-11	20	N		44
B 16	2	45A7P1-R 4	20	N		22	45A7J6- 3	20	N		51
B 17	2	45A7P1-P 4	20	N		25	45A7J6- 1	20	N		53
B 18	1	45A7P1-P 3	20	N		24	45A7J4-24	20	N		59
B 19	1	45A7J4-24	20	N		60	45A7J3-24	20	N		64

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008630	
SCALE - NONE	REV LTR A		SHEET 5 OF 8

MIL 2085 - 4-63 WIR

GUQ

WIRING HARNESS B + 1008630

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH NUMBER	ITEM NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC. ITEM NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC ITEM NO.	NO.
B 20	3	45A7J6- 6	25	Y		49	45A7J2-35	08	N	5	1
B 21	3	45A7J6-13	25	Y		43	45A7J2-31	08	N	5	2
B 22	3	45A7J6- 5	25	Y		50	45A7J2-23	08	N	5	3
B 23	3	45A7P1-N 6	25	Y		29	45A7J6-16	25	Y		39
B 24	3	45A7P1-M 5	25	Y		32	45A7J8- 2	25	Y		8
B 25	3	45A7P1-N 5	25	Y		28	45A7J8- 6	25	Y		11
B 26	2	45A7P1-L 1	20	N		34	45A7J8- 9	20	N		13
B 27	4	45A7P1-M 1	25	Y		30	45A7J6-15	25	Y		40B
B 28	3	45A7J8- 7	25	Y		12	45A7J6- 9	25	Y		45
B 29	3	45A7P1-M 6	25	Y		33	45A7J6- 8	25	Y		46
B 30	1	45A7J7- 5	20	N		6	45A7-E 8	20	N		66
B 31	1	45A7J7- 4	20	N		5	45A7J1-10	08	N	5	67
B 32	1	45A7J6-15	20	N		40	45A7J1-17	08	N	5	67
B 33	1	45A7J6- 2	20	N		52	45A7J1-18	08	N	5	67
B 34	1	45A7P1-L 2	20	N		35	45A7J8- 3	20	N		9
B 35	1	45A7P1-L 3	20	N		36	45A7J8-10	20	N		14
B 36	1	45A7P1-M 3	20	N		31	45A7J8- 4	20	N		10
B 37	1	45A7P1-S 6	20	N		21	45A7J3-23	20	N		63B

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008630	
SCALE - NONE	REV LTR +		SHEET 6 OF 8

MIL 2085 - 4-63 WIR

GUQ

WIRING HARNESS B + 1008630

CONDUCTOR		FROM					TO				
INDIVIDUAL LENGTH NUMBER	ITEM NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC. ITEM NO.	NO.	CUT WIRE OR SHIELD CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC ITEM NO.	NO.
B 38	1	45A7P1-R 6	20	N		23	45A7J4-23	20	N		58B
B 39	3	45A7J6-18	25	Y		70	45A7J2-33	08	N	5	68
B 40	4	45A7J6-15	25	Y		40A	45A7J8-17	25	Y		71
B 41	2	45A7J6-14	20	N		41	45A7J8-30	20	N		72
B 42	3	45A7J6-14	25	Y		41A	45A7J1-34	08	N	5	67
B 43	3	45A7P1-F 2	25	Y		74	45A7J2-10	08	N	5	73
B 44	1	45A7J3- 9	20	N		75	45A7J3-21	20	N		62A

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

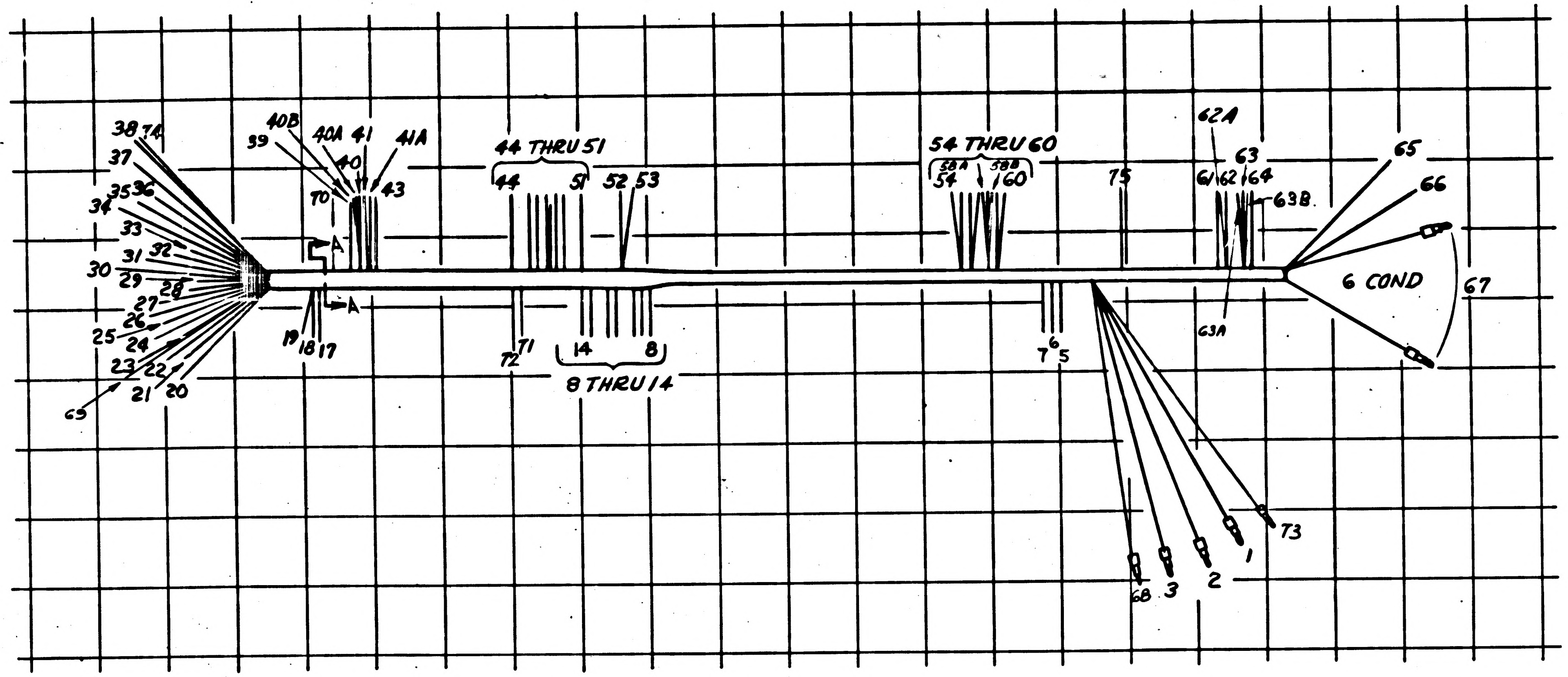
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008630	
SCALE - NONE	REV LTR +		SHEET 7 OF 8

MIL 2085 - 4-63 WIR

1008630 A

REVISIONS 14793				
SYM	ZONE	DESCRIPTION	DATE	APPD.
A		REVISED PER TDRR 15957 CHG NO.	3-8-65	

SECTION A-A
TYPICAL BREAKOUTS FOR
TERMINATIONS 39 THRU
64, 70 AND 75



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1007537-011	1007577-011
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN R.W. Kuisel DATE 3 NOV 64
CHECKED W. Diehl 16 Nov. '64
APPROVAL R Ogberg 18 Nov 64
APPROVAL 18 NOV 64
12-15-64
NASA APPROVAL
MIT APPROVAL 15 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS B
(TRAY 7)

CODE IDENT NO.
SIZE D
1008630
SCALE 1/1
SHEET 8 OF 8

APPLICATION		REVISIONS 14793			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
1007537-011	1007577-011	A	REVISED PER TDRR 15957	8 Feb 65	KH WL
		B	REPLACED WITH CHANGE BY REV. (C) PER TDRR 21515	13 AUG 65	RLP / AU

Ⓑ **REPLACED WITH CHANGE BY REV**Ⓒ

Charleston 18 Nov 64

REV									
SHEET									
REV STATUS OF SHEETS	REV	B	+	+	+	A	+	+	A
	SHEET	1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN K W Kessel DATE 3 NOV 64
CHECKED W. Diehl 16 Nov. 64
APPROVAL 18 Nov 64
APPROVAL 18 Nov 64 12/14/64

WIRING HARNESS B
(TRAY 7)

NASA APPROVAL 12-11
MIT APPROVAL 15

CODE IDENT NO. | SIZE A | 1008630 | REV B

CONTRACT NAS9-497

SCALE —

SHEET 1 OF 8

PENNANT NOTE

GENERAL NOTES

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 6

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED ---
FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .12 INCH.
END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .06 INCH.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 5 PER ND1002206

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008630
SCALE-NONE REV LTR + SHEET 2 OF 8

MIL 2084 4-63

PENNANT NOTE

GENERAL NOTES

16 ASSEMBLE PER ND1002032

17 SOLDER PER ND1002071 USING ITEMS 7 AND 8.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008630
SCALE-NONE REV LTR + SHEET 3 OF 8

MIL 2084 4-63

REVISIONS 14793

SYM	DESCRIPTION	DATE	APPROVAL

APPLICATION

NEXT ASSY	USED ON
1007537-011	1007577-011

Charleston
18 Nov 64

REV															
SHEET															
REV STATUS REV											+	+	+	+	+	+	+	+
OF SHEETS SHEET											1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN R.W. [illegible] DATE 3 NOV 64
CHECKED W. Siebel 16 Nov. 64
APPROVAL [illegible] 18 Nov 64
APPROVAL [illegible] 18 Nov 64
NASA APPROVAL W.J. [illegible] 12-15-64
MIT APPROVAL [illegible] 15 Dec 64
CONTRACT NAS9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS B
(TRAY 7)

CODE IDENT NO.
SIZE A
1008630
REV
SCALE —
SHEET 1 OF 8

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE 28 FEET 2 INCHES TOTAL LENGTH
13	2	1	1010848- 4	WIRE 30 INCHES TOTAL LENGTH.
	3	AR	1010847- 2	WIRE
	4	AR	1010847- 4	WIRE
13	5	11	1010738- 6	CONTACT ELECTRICAL SOCKET
14	6	AR	1012507-002	TAPE, LACING AND TYING.
	7	AR	QQ-S-571	SOLDER SN60(ES-2175 ALLOY 1)
	8	AR	QQ-S-571	FLUX TYPE AR (ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008630
SCALE-NONE REV LTR + SHEET 4 OF 8

MIL 2084 4-63

GUQ WIRING HARNESS B + 1008630

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2▷	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2▷	T I N	2▷	TERMINATION SPEC. 1▷ ITEM NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2▷	T I N	2▷	TERMINATION SPEC 1▷ ITEM NO.	NO.
B 1	1		45A7P1-N 3	20	N			27	45A7J4-20	20	N			54
B 2	1		45A7J4-20	20	N			55	45A7J3-20	20	N			61
B 4	2		45A7P1-R 1	20	N			69	45A7J6-18	20	N			48
B 5	1		45A7P1-T 6	20	N			20	45A7J4-21	20	N			56
B 6	1		45A7J4-21	20	N			57	45A7J3-21	20	N			62
B 7	1		45A7J4-23	20	N			58A	45A7J1-13	08	N		5	67
B 8	1		45A7P1-A 7	20	N			37	45A7J4-23	20	N			58
B 9	1		45A7J3-23	20	N			63A	45A7J1-12	08	N		5	67
B 10	1		45A7P1-D 9	20	N			38	45A7J3-23	20	N			63
B 11	1		45A7J7- 6	20	N			7	45A7-E 7	20	N			65
B 12	1		45A7J7- 2	20	N			4	45A7J1- 9	08	N		5	67
B 13	1		45A7P1-N 2	20	N			26	45A7J8-28	20	N			18
B 14	1		45A7J8-28	20	N			19	45A7J6- 7	20	N			47
B 15	1		45A7J8-35	20	N			17	45A7J6-11	20	N			44
B 16	2		45A7P1-R 4	20	N			22	45A7J6- 3	20	N			51
B 17	2		45A7P1-P 4	20	N			25	45A7J6- 1	20	N			53
B 18	1		45A7P1-P 3	20	N			24	45A7J4-24	20	N			59
B 19	1		45A7J4-24	20	N			60	45A7J3-24	20	N			64

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008630
SCALE - NONE
REV LTR +
SHEET 5 OF 8

MIL 2085 - 4-63 WIR

GUQ WIRING HARNESS B + 1008630

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2▷	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2▷	T I N	2▷	TERMINATION SPEC. 1▷ ITEM NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2▷	T I N	2▷	TERMINATION SPEC 1▷ ITEM NO.	NO.
B 20	3		45A7J6- 6	25	Y			49	45A7J2-35	08	N		5	1
B 21	3		45A7J6-13	25	Y			43	45A7J2-31	08	N		5	2
B 22	3		45A7J6- 5	25	Y			50	45A7J2-23	08	N		5	3
B 23	3		45A7P1-N 6	25	Y			29	45A7J6-16	25	Y			39
B 24	3		45A7P1-M 5	25	Y			32	45A7J8- 2	25	Y			8
B 25	3		45A7P1-N 5	25	Y			28	45A7J8- 6	25	Y			11
B 26	2		45A7P1-L 1	20	N			34	45A7J8- 9	20	N			13
B 27	4		45A7P1-M 1	25	Y			30	45A7J6-15	25	Y			40B
B 28	3		45A7J8- 7	25	Y			12	45A7J6- 9	25	Y			45
B 29	3		45A7P1-M 6	25	Y			33	45A7J6- 8	25	Y			46
B 30	1		45A7J7- 5	20	N			6	45A7-E 8	20	N			66
B 31	1		45A7J7- 4	20	N			5	45A7J1-10	08	N		5	67
B 32	1		45A7J6-15	20	N			40	45A7J1-17	08	N		5	67
B 33	1		45A7J6- 2	20	N			52	45A7J1-18	08	N		5	67
B 34	1		45A7P1-L 2	20	N			35	45A7J8- 3	20	N			9
B 35	1		45A7P1-L 3	20	N			36	45A7J8-10	20	N			14
B 36	1		45A7P1-M 3	20	N			31	45A7J8- 4	20	N			10
B 37	1		45A7P1-S 6	20	N			21	45A7J3-23	20	N			63B

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008630
SCALE - NONE
REV LTR +
SHEET 6 OF 8

MIL 2085 - 4-63 WIR

GUQ WIRING HARNESS B + 1008630

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2▷	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2▷	T I N	2▷	TERMINATION SPEC. 1▷ ITEM NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2▷	T I N	2▷	TERMINATION SPEC 1▷ ITEM NO.	NO.
B 38	1		45A7P1-R 6	20	N			23	45A7J4-23	20	N			58B
B 39	3		45A7J6-18	25	Y			70	45A7J2-33	08	N		5	68
B 40	4		45A7J6-15	25	Y			40A	45A7J8-17	25	Y			71
B 41	2		45A7J6-14	20	N			41	45A7J8-30	20	N			72
B 42	3		45A7J6-14	25	Y			41A	45A7J1-34	08	N		5	67
B 43	3		45A7P1-F 2	25	Y			74	45A7J2-10	08	N		5	73
B 44	1		45A7J3- 9	20	N			75	45A7J3-21	20	N			62A

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008630
SCALE - NONE
REV LTR +
SHEET 7 OF 8

MIL 2085 - 4-63 WIR

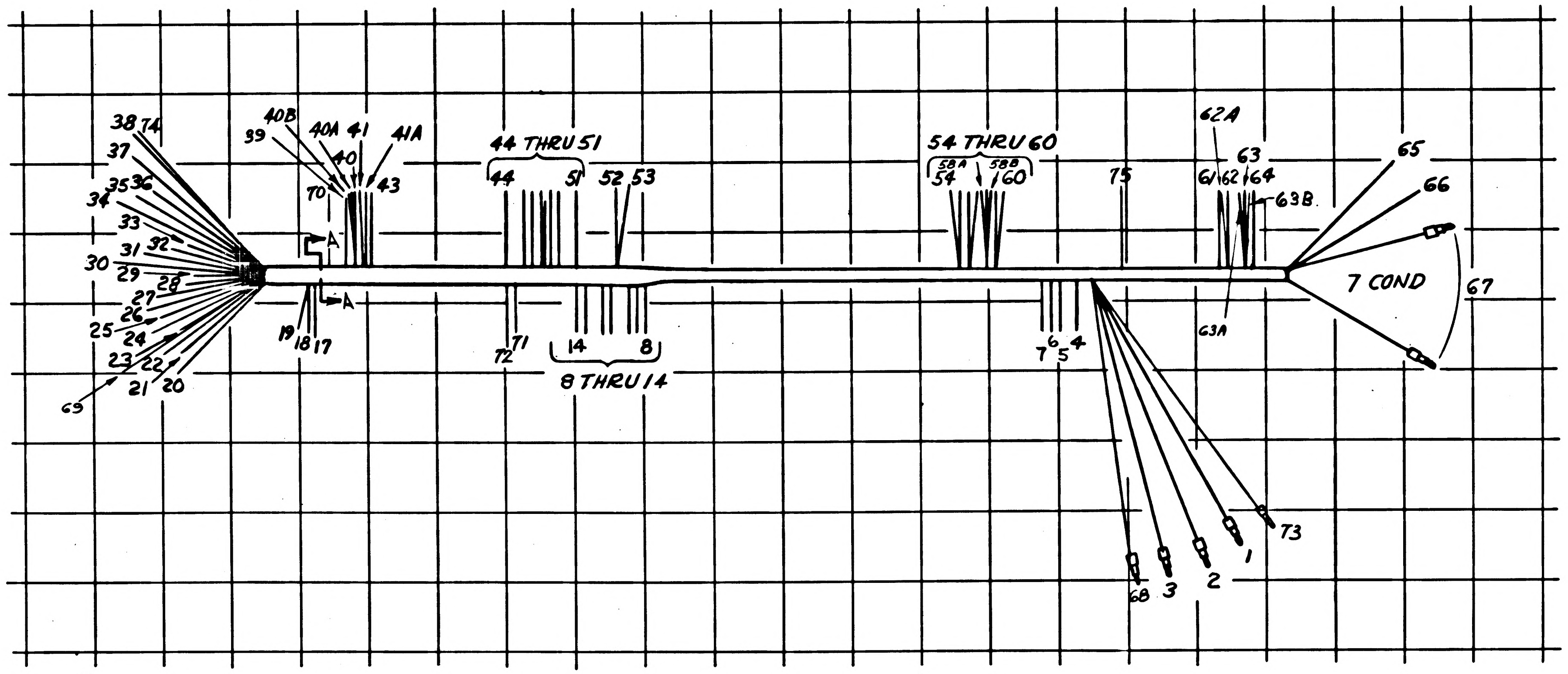
1008630

8	7	6	5	4	3	2	1

REVISIONS 14793

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

SECTION A-A
TYPICAL BREAKOUTS FOR
TERMINATIONS 39 THRU
64, 70 AND 75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		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + — DECIMALS + — ANGLES + —	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		DO NOT SCALE THIS DRAWING	DRAWN R.W. [illegible] DATE 3 NOV 64 CHECKED W. Diehl 16 Nov. '64 APPROVAL R. Ojeng 18 Nov 64 APPROVAL [illegible] 18 Nov 64 [illegible] 12/18/64	WIRING HARNESS B (TRAY 7)
1007537-011	1007577-011	MATERIAL ———	12-15-64 NASA APPROVAL W. J. [illegible]	CODE IDENT NO. — SIZE D — 1008630
NEXT ASSY	USED ON		MIT APPROVAL [illegible] 15 Dec 64	SCALE 1/1 — SHEET 8 OF 8
APPLICATION		CONTRACT NAS 9-497		

8	7	6	5	4	3	2	1

GUO WIRING HARNESS C + 1008631

PENNANT NOTE — GENERAL NOTES

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 3.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED ---
FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .25 INCH.
END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .12 INCH.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OF CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 2 PER ND1002206

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008631
SCALE-NONE REV LTR + SHEET 2 OF 7

MIL 2084 4-63

GUO WIRING HARNESS C + 1008631

PENNANT NOTE — GENERAL NOTES

16 ASSEMBLE PER ND1002032

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008631
SCALE-NONE REV LTR + SHEET 3 OF 7

MIL 2084 4-63

REVISIONS 1Y793

SYM	DESCRIPTION	DATE	APPROVAL

APPLICATION

NEXT ASSY	USED ON
1007537-011	1007577-011

Charleston 13 Nov 64

REV							
SHEET							
REV STATUS REV	+	+	+	+	+	+	+
OF SHEETS SHEET	1	2	3	4	5	6	7

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN RW Liedl 3 NOV 64 DATE
CHECKED W. Diehl 16 Nov. '64
APPROVAL 18 Nov 64
APPROVAL 18 Nov 64 12-15-64
NASA APPROVAL W. J. Klein
MIT APPROVAL 15 Dec 64
CONTRACT NAS9-497

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS C
(TRAY 7)

CODE IDENT NO. SIZE A 1008631 REV
SCALE — SHEET 1 OF 7

GUO WIRING HARNESS C + 1008631

PENNANT — LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE 26 FEET 11 INCHES TOTAL LENGTH
13	2	12	1010738- 6	CONTACT ELECTRICAL SOCKET
14	3	AR	1012507-002	TAPE LACING AND TYING

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008631
SCALE-NONE REV LTR + SHEET 4 OF 7

MIL 2084 4-63

GUO WIRING HARNESS C + 1008631

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	T I N	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	T I N	TERMINATION SPEC 1 ITEM NO.	NO.
C 1	1	45A7P1-B 6	20	N		11	45A7J2- 5	08	N	2	42
C 2	1	45A7P1-B 5	20	N		15	45A7J2- 6	08	N	2	42
C 3	1	45A7P1-C 6	20	N		12	45A7J2-21	08	N	2	42
C 4	1	45A7P1-C 8	20	N		6	45A7J2-20	08	N	2	42
C 5	1	45A7P1-C 5	20	N		16	45A7J2-15	08	N	2	42
C 6	1	45A7J8-34	20	N		21	45A7J2-14	08	N	2	42
C 7	1	45A7P1-H 2	20	N		2	45A7J8-14	20	N		39
C 8	1	45A7P1-G 1	20	N		4	45A7J8-16	20	N		37
C 9	1	45A7P1-G 2	20	N		3	45A7J8-15	20	N		38
C 10	1	45A7P1-F 4	20	N		19	45A7J8-29	20	N		35
C 11	1	45A7P1-H 1	20	N		1	45A7J8-18	20	N		34
C 12	1	45A7P1-F 5	20	N		18	45A7J8-31	20	N		32
C 13	1	45A7P1-D 6	20	N		13	45A7J8-22	20	N		27
C 14	1	45A7P1-D 5	20	N		17	45A7J8-23	20	N		26
C 15	1	45A7P1-D 7	20	N		9	45A7J8-24	20	N		25
C 16	1	45A7P1-B 8	20	N		5	45A7J8-25	20	N		24
C 17	1	45A7P1-F 7	20	N		10	45A7J8-33	20	N		23
C 18	1	45A7P1-B 7	20	N		7	45A7J8-26	20	N		22

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008631

SCALE - NONE | REV LTR + | SHEET 5 OF 7

MIL 2085 - 4-63 WIR

GUO WIRING HARNESS C + 1008631

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	T I N	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	T I N	TERMINATION SPEC 1 ITEM NO.	NO.
C 19	1	45A7P1-C 7	20	N		8	45A7J8-27	20	N		20
C 20	1	45A7J8-19	20	N		31	45A7J1-25	08	N	2	41
C 21	1	45A7J8-20	20	N		29	45A7J1-32	08	N	2	41
C 22	1	45A7J8-21	20	N		28	45A7J1-26	08	N	2	41
C 23	1	45A7J8-29	20	N		36	45A7J1-19	08	N	2	41
C 24	1	45A7J8-31	20	N		33	45A7J1-11	08	N	2	41
C 25	1	45A7J8-32	20	N		30	45A7J1-33	08	N	2	41

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008631

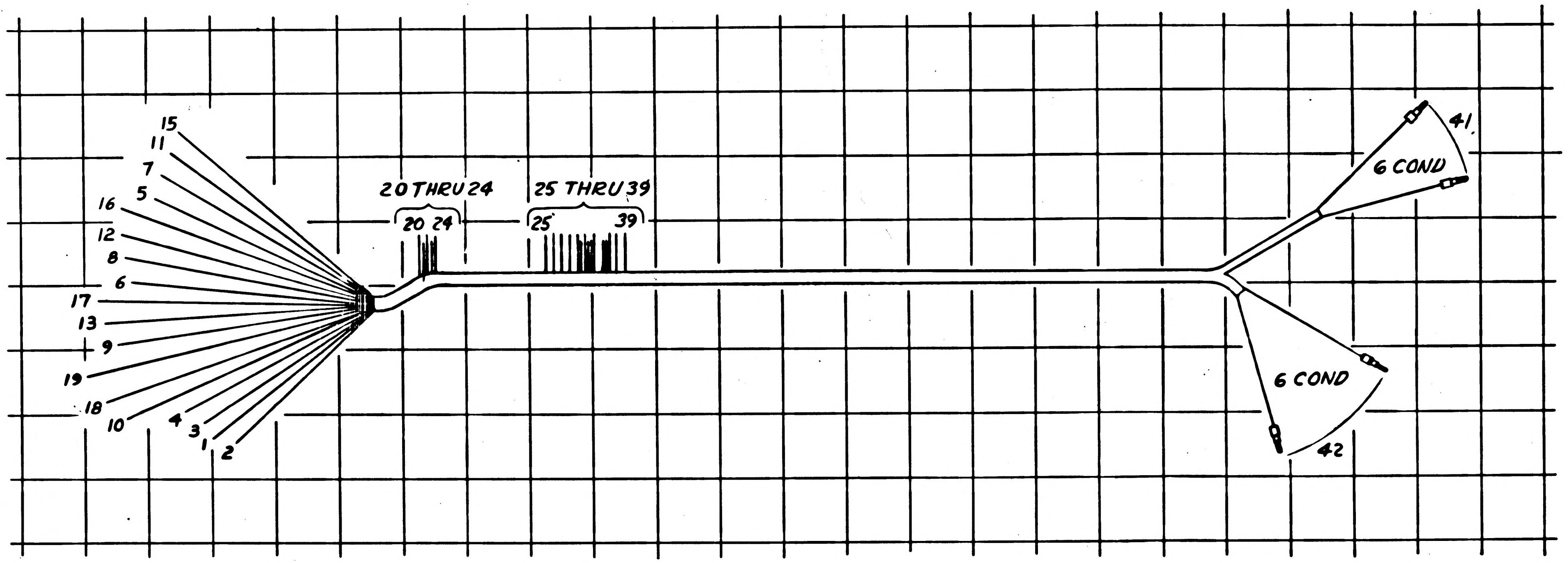
SCALE - NONE | REV LTR + | SHEET 6 OF 7

MIL 2085 - 4-63 WIR

1008631

REVISIONS 14793

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.



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20 24
25 THRU 39
25 39
6 COND
41
6 COND
42

1007537-011	1007577-011
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN W. Kosul DATE 3 Nov 64
CHECKED Sickel 16 Nov. '64
APPROVAL Osberg 18 Nov 64
APPROVAL [illegible] 18 Nov 64
NASA APPROVAL 12-15-64
MIT APPROVAL W. Kupfer 15 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS C
(TRAY 7)

CODE IDENT NO.
SIZE D
1008631
SCALE 1/1
SHEET 7 OF 7

APPLICATION	
NEXT ASSY	USED ON
1007537-011	1007577-011

REVISIONS 14793

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15958	8 Feb 65	KH WK

Charleston
18 Nov 64

REV									
SHEET									
REV STATUS	REV	A	+	+	+	A	+	A
OF SHEETS	SHEET	1	2	3	4	5	6	7

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN R.W. Harvil 3 NOV 64 DATE
CHECKED W. Diehl 16 NOV. 64
APPROVAL K. Dykerg 18 Nov 64
APPROVAL 18 NOV 64
12/18/64
NASA APPROVAL W J Rhine 12-15-64
MIT APPROVAL 15 Dec 64
CONTRACT NAS9-497

WIRING HARNESS D (TRAY 7)

CODE IDENT NO. | SIZE A | 1008632 | REV A
SCALE — | SHEET 1 OF 7

PENNANT NOTE	GENERAL NOTES
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 8.
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10	GRID MODULE IS 1 INCH BASIC.
11	UNLESS OTHERWISE SPECIFIED --- FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .12 INCH. END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .06 INCH.
12	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
15	INSTALL ITEM 5 PER ND1002206.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008632
SCALE-NONE | REV LTR + | SHEET 2 OF 7

PENNANT NOTE	GENERAL NOTES
16	ASSEMBLE PER ND1002032.
17	SOLDER PER ND1002071 USING ITEMS 9 AND 10.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008632
SCALE-NONE | REV LTR + | SHEET 3 OF 7

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE 24 FEET 1 INCHES TOTAL LENGTH
13	2	AR	1010848- 4	WIRE 23.0 INCHES TOTAL LENGTH
	3	AR	1010847- 2	WIRE
	4	AR	1010847- 4	WIRE
13	5	12	1010738- 6	CONTACT, ELECTRICAL SOCKET
	6	2	1010711- 2	SPLICE REDUCER
13	7	2	1010476-168	INSULATION, SLEEVING ELECTRICAL
14	8	AR	1012507-002	TAPE, LACING AND TYING
	9	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	10	AR	QQ-S-571	FLUX TYPE AR(ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008632
SCALE-NONE | REV LTR + | SHEET 4 OF 7

GUN WIRING HARNESS D + 1008632

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
D 1	4		45A7P1-S 2	25	Y		5	45A7E17	25	N		36
D 2	4		45A7J8-17	25	Y		40	45A7E16	25	N		35
D 3	1		45A7P1-M 2	20	N		18	45A7J2-17	08	N	5	37
D 4	4		45A7P1-S 4	25	Y		6	45A7J7- 9	25	Y		31
D 5	3		45A7P1-T 2	25	Y		2	45A7J2-27	08	N	5	37
D 6	3		45A7P1-T 1	25	Y		1	45A7J2-34	08	N	5	37
D 7	3		45A7P1-P 1	25	Y		13	45A7J2-28	08	N	5	37
D 9	2		45A7P1-R 1	20	N		9	45A7J8-11	20	N		26
D 10	3		45A7P1-T 5	20	N		4	45A7J7- 3	20	N		32
→ D 11	4		45A7P1-T 4	25	Y		3	45A7J7-13	25	Y		30
D 12	4		45A7P1-L 4	20	N		20	45A7J7- 6	20	N		31C
~~D 13~~	~~1~~		~~45A7P1-G 5~~	~~20~~	~~N~~	DELETED	~~7~~	~~45A7J7- 2~~	~~20~~	~~N~~		~~33~~
D 14	2		45A7P1-L 5	20	N		21	45A7J7- 1	20	N		34
D 15	1		45A7P1-R 2	20	N		10	45A7J8-35	20	N		22
D 16	1		45A7P1-R 5	20	N		12	45A7J8-12	20	N		25
D 17	1		45A7P1-P 5	20	N		14	45A7J8- 5	20	N		27
D 18	3		45A7P1-N 1	25	Y		16	45A7J2-36	08	N	5	37
D 19	3		45A7P1-N 4	25	Y		17	45A7J2-32	08		5	37

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008632	
SCALE-NONE	REV LTR A		SHEET 5 OF 7

MIL 2085 - 4-63 WIR

GUN WIRING HARNESS D + 1008632

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
D 20	3		45A7P1-M 4	25	Y		19	45A7J2-24	08		5	37
D 21	1		45A7P1-P 6	20	N		15	45A7J8-13	20			24
D 22	1		45A7P1-R 3	20	N		11	45A7J7-22	20			29
D 23	3		45A7E17	25	N		36	45A7J2-18	08		5	37
D 24	3		45A7E17	25	N		36	45A7J2-19	08		5	37
D 25	3		45A7E16	25	N		35	45A7J2-25	08		5	37
D 26	3		45A7E16	25	N		35	45A7J2-26	08		5	37
D 27	4		45A7P1-S1	25	Y		5A	45A7E17	25	N		36
D 28	3		45A7J8-30	25	Y		23	45A7J2- 9	08	N	5	37
→ D 29	4		45A7J7- 2	25	Y		33A	45A7J7- 8	25	Y		31A
D 30	4		45A7J7- 8	25	Y		31B	45A7J7- 6	25	Y		31C

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

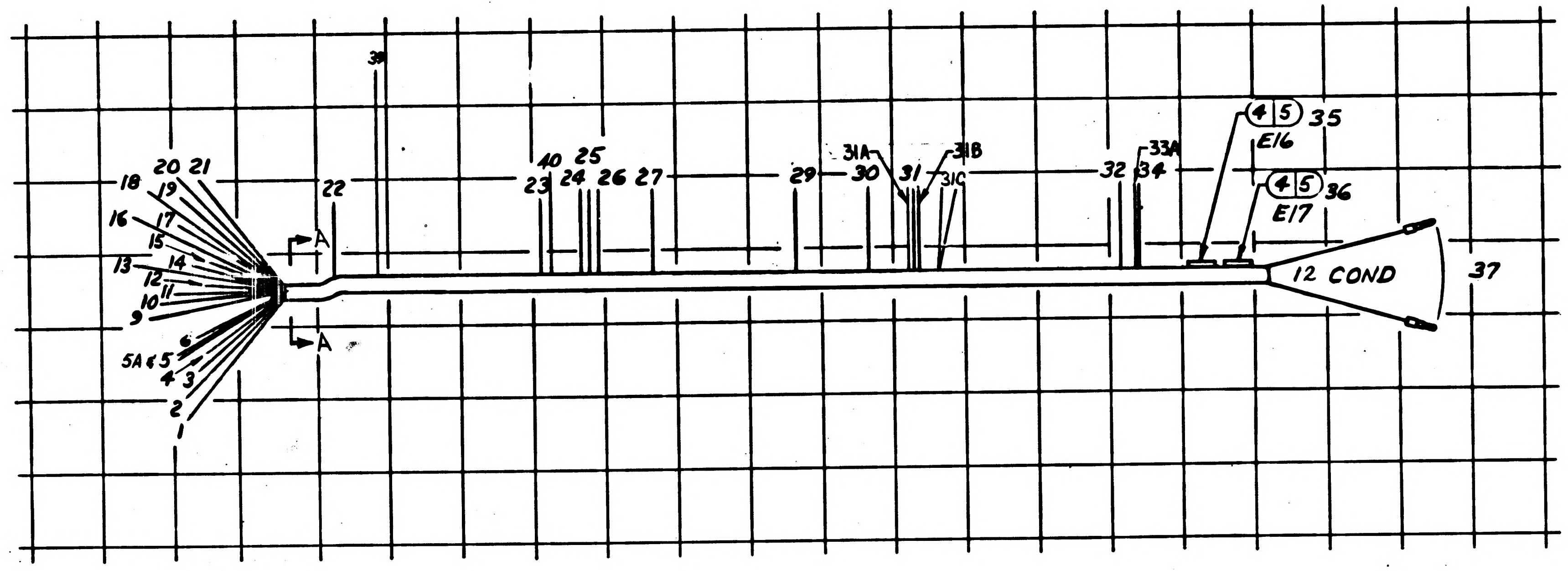
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008632	
SCALE-NONE	REV LTR +		SHEET 6 OF 7

MIL 2085 - 4-63 WIR

A 1008632

REVISIONS 14793				
SYM	ZONE	DESCRIPTION	DATE	APPD.
A		REVISED PER TDRR 15958 CHG NO.	8-26-65	KN W.R.

SECTION A-A
TYPICAL LEAD BREAKOUT



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		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ±	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		DO NOT SCALE THIS DRAWING	ACSP PN DRAWN R.W. Kneil DATE 3 NOV 64 CHECKED W. Dickel 16 Nov. 64 APPROVAL R Osberg 18 Nov 64 APPROVAL 18 Nov 64	WIRING HARNESS D (TRAY 7)
1007537-011	1007577-011	MATERIAL —	NASA APPROVAL W J Rhine 12-15-64	CODE IDENT NO. SIZE D 1008632
NEXT ASSY	USED ON		MIT APPROVAL W Kupfer 15 Dec 64	SCALE 1/1 SHEET 7 OF 7
APPLICATION		CONTRACT NAS 9-497		

MASTER

APPLICATION	
NEXT ASSY	USED ON
1007537-011	1007577-011

REVISIONS 14793

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15958	8 Feb 65	KH 8 Feb 65 WK
B	REVISED PER TDRR 17971	6 APR 65	JJJ AU

Charleston
18 Nov 64

REV STATUS OF SHEETS	REV	B	+	+	+	B	+	A	
	SHEET	1	2	3	4	5	6	7	

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN DATE 3 NOV 64
CHECKED W. Piehl 16 Nov. 64
APPROVAL 18 Nov 64
APPROVAL 18 Nov 64
12/18/64

NASA APPROVAL 12-15-64
MIT APPROVAL 15 Dec 64

CONTRACT NAS9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS D
(TRAY 7)

CODE IDENT NO.

SIZE A

1008632

REV B

SCALE —

SHEET 1 OF 7

GUN WIRING HARNESS D + 1008632

PENNANT GENERAL NOTES

NOTE

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 8.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED ---
FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .12 INCH.
END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .06 INCH.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 5 PER ND1002206.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS
SIZE A
1008632
SCALE - NONE REV LTR + SHEET 2 OF 7

MIL 2084 4 63

GUN WIRING HARNESS D + 1008632

PENNANT GENERAL NOTES

NOTE

16 ASSEMBLE PER ND1002032

17 SOLDER PER ND1002071 USING ITEMS 9 AND 10.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS
SIZE A
1008632
SCALE - NONE REV LTR + SHEET 3 OF 7

GUN WIRING HARNESS D + 1008632

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE 24 FEET 1 INCHES TOTAL LENGTH
13	2	AR	1010848- 4	WIRE 23.0 INCHES TOTAL LENGTH
	3	AR	1010847- 2	WIRE
	4	AR	1010847- 4	WIRE
13	5	12	1010738- 6	CONTACT, ELECTRICAL SOCKET
	6	2	1010711- 2	SPLICE REDUCER
13	7	2	1010476-168	INSULATION, SLEEVING ELECTRICAL
14	8	AR	1012507-002	TAPE, LACING AND TYING
	9	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	10	AR	QQ-S-571	FLUX TYPE AR(ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS
SIZE A
1008632
SCALE - NONE REV LTR + SHEET 4 OF 7

GUN WIRING HARNESS D + B 1008632

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2>	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2>	TIN	2>	TERMINATION SPEC 1> ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2>	TIN	2>	TERMINATION SPEC 1> ITEM NO.	NO.
D 1	4		45A7P1-S 2	25	Y			5	45A7E17	25	N			36
D 2	4		45A7J8-17	25	Y			40	45A7E16	25	N			35
D 3	3		45A7P1-M 2	20	N			18	45A7J2-17	08	N		5	37
D 4	4		45A7P1-S 4	25	Y			6	45A7J7- 9	25	Y			31
D 5	3		45A7P1-T 2	25	Y			2	45A7J2-27	08	N		5	37
D 6	3		45A7P1-T 1	25	Y			1	45A7J2-34	08	N		5	37
D 7	3		45A7P1-P 1	25	Y			13	45A7J2-28	08	N		5	37
D 9	2		45A7P1-R 1	20	N			9	45A7J8-11	20	N			26
D 10	3		45A7P1-T 5	20	N			4	45A7J7- 3	20	N			32
D 11	4		45A7P1-T 4	25	Y			3	45A7J7-13	25	Y			30
D 12	4		45A7P1-L 4	20	N			20	45A7J7- 6	20	N			31
~~D 13~~	~~1~~		~~45A7P1-G 5~~	~~20~~	~~N~~		DELETED	~~7~~	~~45A7J7- 2~~	~~20~~	~~N~~			~~35~~
D 14	2		45A7P1-L 5	20	N			21	45A7J7- 1	20	N			34
D 15	1		45A7P1-R 2	20	N			10	45A7J8-35	20	N			22
D 16	1		45A7P1-R 5	20	N			12	45A7J8-12	20	N			25
D 17	1		45A7P1-P 5	20	N			14	45A7J8- 5	20	N			27
D 18	3		45A7P1-N 1	25	Y			16	45A7J2-36	08	N		5	37
D 19	3		45A7P1-N 4	25	Y			17	45A7J2-32	08			5	37

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS
SIZE A
1008632
SCALE - NONE REV LTR B SHEET 5 OF 7

MIL 2085 4-63 WIR

GUN WIRING HARNESS D + 1008632

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	T I N	2	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	T I N	2	TERMINATION SPEC 1 ITEM NO.	NO.
D 20	3		45A7P1-M 4	25	Y			19	45A7J2-24	08			5	37
D 21	1		45A7P1-P 6	20	N			15	45A7J8-13	20				24
D 22	1		45A7P1-R 3	20	N			11	45A7J7-22	20				29
D 23	3		45A7E17	25	N			36	45A7J2-18	08			5	37
D 24	3		45A7E17	25	N			36	45A7J2-19	08			5	37
D 25	3		45A7E16	25	N			35	45A7J2-25	08			5	37
D 26	3		45A7E16	25	N			35	45A7J2-26	08			5	37
D 27	4		45A7P1-S1	25	Y			5A	45A7E17	25	N			36
D 28	3		45A7J8-30	25	Y			23	45A7J2- 9	08	N		5	37
D 29	4		45A7J7- 2	25	Y			33A	45A7J7- 8	25	Y			31A
D 30	4		45A7J7- 8	25	Y			31B	45A7J7- 6	25	Y			31C

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENS'ONS ARE IN INCHES AND TWO PLACE DECIMALS.

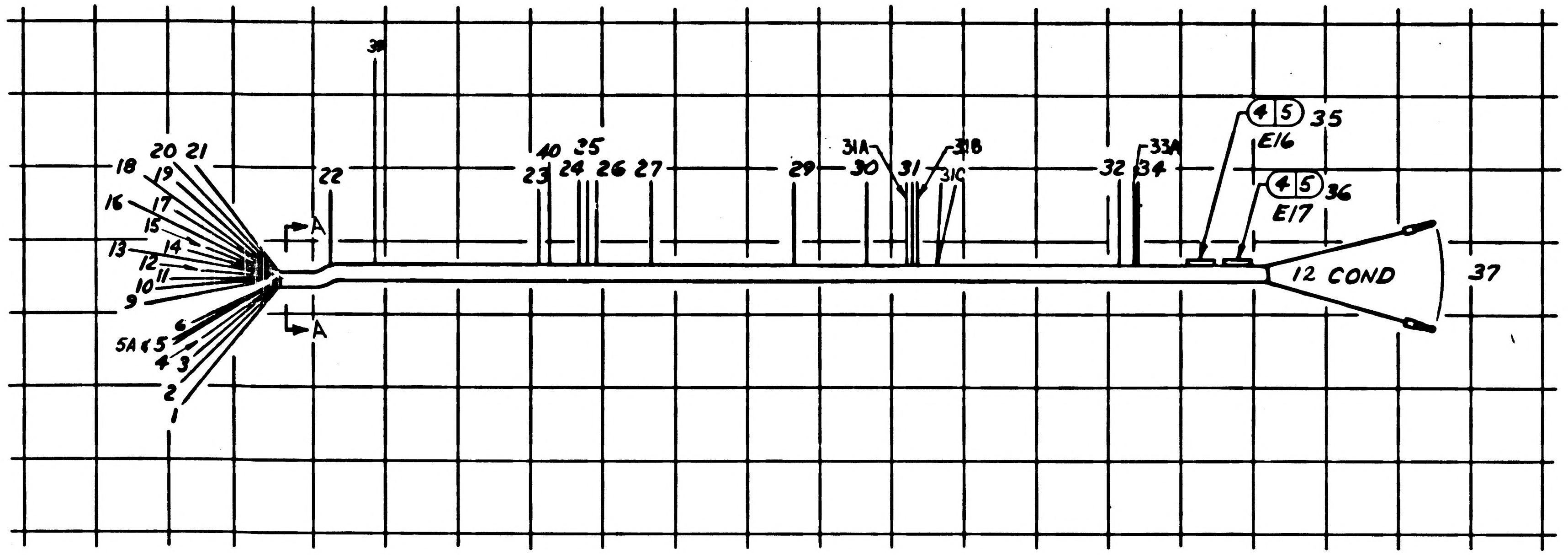
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008632
SCALE - NONE	REV LTR +	SHEET 6 OF 7

MIL 2085 - 4-63 WIR

1008632 A

REVISIONS 4793				
SYM	ZONE	DESCRIPTION	DATE	APPD.
A		REVISED PER TDRR 15958 CHG NO.	6-26-65	W.R.

SECTION A-A
TYPICAL LEAD BREAKOUT



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E17
12 COND
37

1007537-011	1007577-011
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + — — — DECIMALS + — — — ANGLES + — — —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN R W Haird DATE 3 Nov 64
CHECKED W. Diehl 16 Nov. 64
APPROVAL R Opbing 11 Nov 64
APPROVAL 18 Nov 64
NASA APPROVAL 12-15-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS D
(TRAY 7)

CODE IDENT NO.
SIZE D
1008632
SCALE 1/1
SHEET 7 OF 7

GUN WIRING HARNESS D + 1008632

PENNANT NOTE GENERAL NOTES

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 8.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED ---
FEATURE CENTERLINES ARE LOCATED WITHIN + OR - .12 INCH.
END OF HOOKUP WIRES OR ACCESSORIES ARE LOCATED WITHIN + OR - .06 INCH.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 5 PER ND1002206.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A 1008632
SCALE-NONE REV LTR + SHEET 2 OF 7

MIL 2084 4-63

GUN WIRING HARNESS D + 1008632

PENNANT NOTE GENERAL NOTES

16 ASSEMBLE PER ND1002032

17 SOLDER PER ND1002071 USING ITEMS 9 AND 10.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET	-	+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A 1008632
SCALE-NONE REV LTR + SHEET 3 OF 7

MIL 2084 4-63

APPLICATION	
NEXT ASSY	USED ON
10Q7531-011	10Q7577-011

REVISIONS '4793

SYM	DESCRIPTION	DATE	APPROVAL

Charleston
18 Nov 64

REV							
SHEET							
REV STATUS REV	+	+	+	+	+	+	+
OF SHEETS SHEET	1	2	3	4	5	6	7

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN 3 NOV 64 DATE
CHECKED 16 NOV 64
APPROVAL 18 Nov 64
APPROVAL 18 NOV 64
NASA APPROVAL 12-15-64
MIT APPROVAL 15 Dec 64
CONTRACT NAS9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS D
(TRAY 7)

CODE IDENT NO. SIZE A 1008632 REV
SCALE — SHEET 1 OF 7

GUN WIRING HARNESS D + 1008632

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	AR	1010848- 2	WIRE 24 FEET 1 INCHES TOTAL LENGTH
13	2	AR	1010848- 4	WIRE 23.0 INCHES TOTAL LENGTH
	3	AR	1010847- 2	WIRE
	4	AR	1010847- 4	WIRE
13	5	12	1010738- 6	CONTACT, ELECTRICAL SOCKET
	6	2	1010711- 2	SPLICE REDUCER
13	7	2	1010476-168	INSULATION, SLEEVING ELECTRICAL
14	8	AR	1012507-002	TAPE, LACING AND TYING
	9	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	10	AR	QQ-S-571	FLUX TYPE AR(ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A 1008632
SCALE-NONE REV LTR + SHEET 4 OF 7

MIL 2084 4-63

GUN

WIRING HARNESS D ✦ 1008632

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
D 1	4		45A7P1-S 2	25	Y		5	45A7E17	25	N		36
D 2	4		45A7J8-17	25	Y		40	45A7E16	25	N		35
D 3	1		45A7P1-M 2	20	N		18	45A7J2-17	08	N	5	37
D 4	4		45A7P1-S 4	25	Y		6	45A7J7- 9	25	Y		31
D 5	3		45A7P1-T 2	25	Y		2	45A7J2-27	08	N	5	37
D 6	3		45A7P1-T 1	25	Y		1	45A7J2-34	08	N	5	37
D 7	3		45A7P1-P 1	25	Y		13	45A7J2-28	08	N	5	37
D 9	2		45A7P1-R 1	20	N		9	45A7J8-11	20	N		26
D 10	1		45A7P1-T 5	20	N		4	45A7J7- 3	20	N		32
D 11	4		45A7P1-T 4	25	Y		3	45A7J7-13	25	Y		30
D 12	4		45A7P1-L 4	20	N		20	45A7J7- 6	20	N		31C
D 13	1		45A7P1-S 5	20	N		7	45A7J7- 2	20	N		33
D 14	2		45A7P1-L 5	20	N		21	45A7J7- 1	20	N		34
D 15	1		45A7P1-R 2	20	N		10	45A7J8-35	20	N		22
D 16	1		45A7P1-R 5	20	N		12	45A7J8-12	20	N		25
D 17	1		45A7P1-P 5	20	N		14	45A7J8- 5	20	N		27
D 18	3		45A7P1-N 1	25	Y		16	45A7J2-36	08	N	5	37
D 19	3		45A7P1-N 4	25	Y		17	45A7J2-32	08		5	37

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008632	
SCALE - NONE	REV LTR ✦		SHEET 5 OF 7

MIL 2085 - 4-63 WIR

GUN

WIRING HARNESS D ✦ 1008632

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO: CUT WIRE OR SHIELD / STRIP WIRE OR JACKET / CIRCUIT POINT	2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
D 20	3		45A7P1-M 4	25	Y		19	45A7J2-24	08		5	37
D 21	1		45A7P1-P 6	20	N		15	45A7J8-13	20			24
D 22	1		45A7P1-R 3	20	N		11	45A7J7-22	20			29
D 23	3		45A7E17	25	N		36	45A7J2-18	08		5	37
D 24	3		45A7E17	25	N		36	45A7J2-19	08		5	37
D 25	3		45A7E16	25	N		35	45A7J2-25	08		5	37
D 26	3		45A7E16	25	N		35	45A7J2-26	08		5	37
D 27	4		45A7P1-S1	25	Y		5A	45A7E17	25	N		36
D 28	3		45A7J8-30	25	Y		23	45A7J2- 9	08	N	5	37
D 29	4		45A7J7- 2	25	Y		33A	45A7J7- 8	25	Y		31A
D 30	4		45A7J7- 8	25	Y		31B	45A7J7- 6	25	Y		31C

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008632	
SCALE - NONE	REV LTR ✦		SHEET 6 OF 7

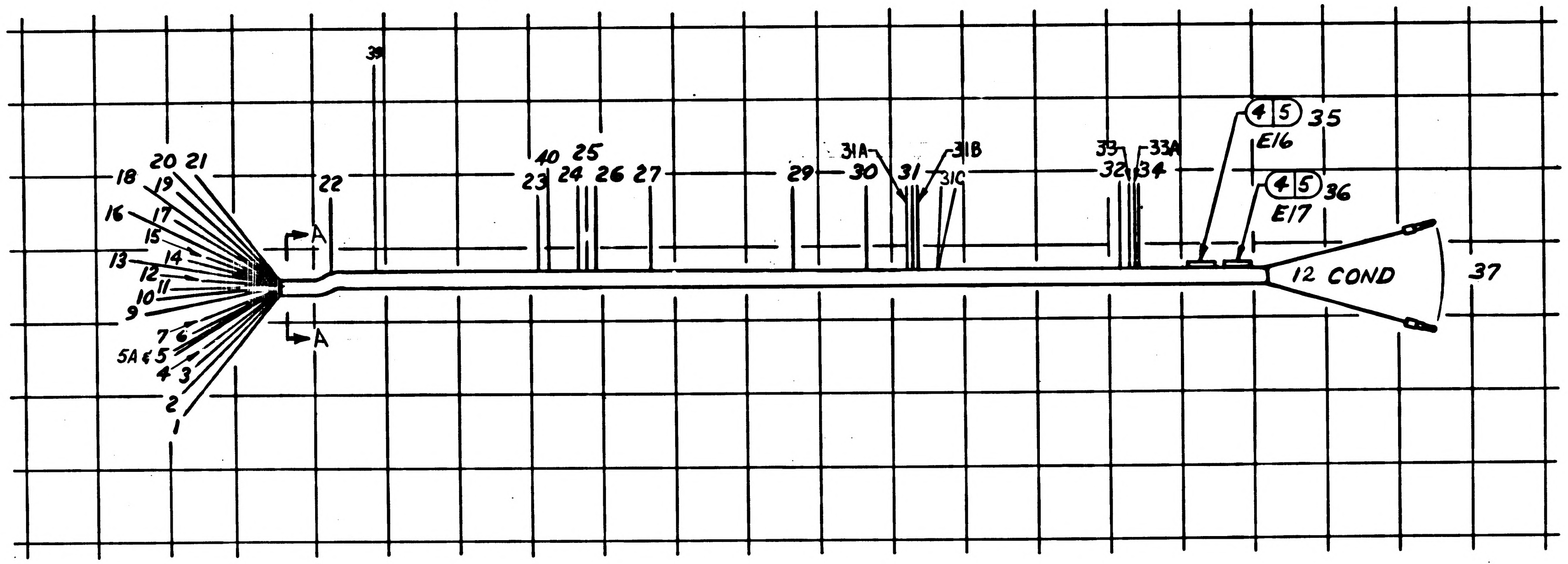
MIL 2085 - 4-63 WIR

8 7 6 5 4 3 2 1

1008632

REVISIONS 14793				
SYM	ZONE	DESCRIPTION	DATE	APPD.
		CHG NO.		

SECTION A-A
TYPICAL LEAD BREAKOUT



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		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
		FRACTIONS ± — DECIMALS ± — ANGLES ± —	ACSP PN		
			DRAWN RW Harvel DATE 3 NOV 64	WIRING HARNESS D (TRAY 7)	
			CHECKED W. Diehl 16 Nov. 64		
			APPROVAL R Osberg 18 Nov 64		
		DO NOT SCALE THIS DRAWING	APPROVAL 18 Nov 64		
1007537-011	1007577-011	MATERIAL —	NASA APPROVAL W J Rhine 12-15-64	CODE IDENT NO.	SIZE D · 1008632
NEXT ASSY	USED ON				
APPLICATION		CONTRACT NAS 9-497	MIT APPROVAL	SCALE 1/1	SHEET 7 OF 7

MASTER

8 7 6 5 4 3 2 1

APPLICATION		REVISIONS 15561			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
1007530		A	REPLACED WITH CHANGE BY REV B PER TDRR 22202	7 SEP 65	AU

Ⓐ **REPLACED WITH CHANGE BY REV B**

REV STATUS OF SHEETS									
REV	A	+	+	+	+	+	+	+
SHEET	1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN DATE 5 NOV 64
CHECKED 27 NOV 64
APPROVAL 30 NOV 64
APPROVAL 30 NOV 64 1/12/65

NASA APPROVAL 1-19-65
MIT APPROVAL 19 Jan 65

CONTRACT NAS9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS B
(TRAY 10)

CODE IDENT NO.
SIZE
1008635
REV A

SCALE NONE
SHEET 1 OF 8

PENNANT GENERAL NOTES

NOTE

1 SEE CONDUCTOR CHART. PENNANT NOTE 1.

2 SEE CONDUCTOR CHART. PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 5

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 5 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008635

SCALE-NONE | REV LTR + | SHEET 2 OF 8

MIL 2084 4-63

PENNANT GENERAL NOTES

NOTE

16 ALL LEADS SHOWN AT TERMINATION NOS. LISTED MUST BREAK OUT AT BOTTOM OF HARNESS 51.52.59 THRU 62. 78 THRU 85.

17 SOLDER PER ND 1002071 USING ITEMS 7 AND 8.

18 ASSEMBLE PER ND 1002032

TOLERANCE CHART. UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE. STRIP JACKET. CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008635

SCALE-NONE | REV LTR + | SHEET 3 OF 8

MIL 2084 4-63

APPLICATION		REVISIONS 15561			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
1007530					

REV									
SHEET									
REV STATUS OF SHEETS	REV	+	+	+	+	+	+	+	+
	SHEET	1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN DATE 5 NOV 64
CHECKED 25 NOV64
APPROVAL 30NOV64
APPROVAL 30NOV64 1/12/65

NASA APPROVAL 1-19-65
MIT APPROVAL 19 Jan 65

CONTRACT NAS9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS B
(TRAY 10)

CODE IDENT NO. | SIZE | 1008635 | REV

SCALE NONE | SHEET 1 OF 8

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
	1	AR	1010848- 2	WIRE 23.00 FEET TOTAL LENGTH
	2	AR	1010848- 4	WIRE 24 INCHES TOTAL LENGTH
	3	AR	1010847- 2	WIRE 60 INCHES TOTAL LENGTH
	4	AR	1010847- 4	WIRE 51.00 FEET TOTAL LENGTH
13	5	5	1010738- 6	CONTACT. CRIMP TYPE SOCKET
14	6	AR	1012507-002	TAPE. LACING
	7	AR	QQ-S-571	SOLDER SN 60 (ES-2175 ALLOY 1)
	8	AR	QQ-S-571	FLUX TYPE AR (ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008635

SCALE-NONE | REV LTR + | SHEET 4 OF 8

MIL 2084 4-63

GVE WIRING HARNESS B + 1008635

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TERMINATION SPEC 1 ITEM NO.	NO.	
B 19	4		45A10P1-N2	25	Y		18	45A10J4-26	25	Y		54	
B 20	1		45A10P1-N3	25	N		17	45A10J9-14	25	N		26	
B 21	1		45A10P1-N4	25	N		16	45A10J7- 8	25	N		70	
B 22	4		45A10P1-N6	25	Y		15	45A10J3-20	25	Y		75	CHAN A
B 23	4		45A10P1-P1	25	Y		14	45A10J4- 2	25	Y		62	
B 24	4		45A10P1-P2	25	Y		13	45A10J4- 9	25	Y		60	
B 25	1		45A10P1-P3	25	N		12	45A10J7-12	25	N		64	
B 26	4		45A10P1-P4	25	Y		11	45A10J3-19	25	Y		76	CHAN A
B 27	4		45A10P1-P6	25	Y		10	43A10J3-26	25	Y		77	CHAN A
B 28	4		45A10P1-R4	25	Y		9	45A10J5-26	25	Y		39	
B 29	4		45A10P1-R5	25	Y		8	45A10J3- 2	25	Y		81	CHAN A
B 30	4		45A10P1-R6	25	Y		7	45A10J3- 9	25	Y		79	CHAN A
B 31	4		45A10P1-T1	25	Y		6	45A10J4- 6	25	Y		61	
B 32	4		45A10P1-T2	25	Y		5	45A10J4-13	25	Y		59	
B 33	4		45A10P1-T3	25	Y		4	45A10J5- 4	25	Y		52	
B 34	4		45A10P1-T4	25	Y		3	45A10J5-11	25	Y		51	
B 35	4		45A10P1-T5	25	Y		2	45A10J3- 6	25	Y		80	CHAN A
B 36	4		45A10P1-T6	25	Y		1	45A10J3-13	25	Y		78	CHAN A

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SIZE A 1008635

SCALE - NONE | REV LTR + | SHEET 6 OF 8

MIL 2085 - 4-63 WIR

GVE WIRING HARNESS B + 1008635

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TERMINATION SPEC 1 ITEM NO.	NO.	
B 37	1		45A10J9-10	25	N		29	45A10J1- 8	25	N	5	86	
B 38	1		45A10J9- 8	25	N		31	45A10J1-13	25	N	5	86	
B 39	1		45A10J9- 7	25	N		32	45A10J1- 6	25	N	5	86	
B 40	1		45A10J9-12	25	N		27	45A10J1-14	25	N	5	86	
B 41	1		45A10J9-11	25	N		28	45A10J1- 7	25	N	5	86	
B 42	1		45A10J9- 2	25	N		35	45A10J4-25	25	N		55	
B 43	1		45A10J4-21	25	N		56	E3	25	N		87	
B 44	1		45A10J7-12	25	N		65	45A10J7- 4	25	N		73	
B 45	1		45A10J7-10	25	N		67	45A10J2- 8	25	N		84	
B 46	1		45A10J7- 9	25	N		69	45A10J2- 7	25	N		85	
B 47	1		45A10J7- 8	25	N		71	45A10J2-14	25	N		83	
B 48	1		45A10J7- 4	25	N		74	45A10J2-19	25	N		82	

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SIZE A 1008635

SCALE - NONE | REV LTR + | SHEET 7 OF 8

MIL 2085 - 4-63 WIR

GVE WIRING HARNESS B + 1008635

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2	T I N	TERMINATION SPEC 1 ITEM NO.	NO.	
B 1	1		45A10P1-A6	25	N		50	45A10J9- 6	25	N		33	
B 2	1		45A10P1-B6	25	N		49	45A10J9- 9	25	N		30	
B 3	1		45A10P1-C7	25	N		48	45A10J7- 5	25	N		72	
B 4	1		45A10P1-D1	25	N		47	45A10J9- 5	25	N		34	
B 5	1		45A10P1-D6	25	N		46	45A10J7-16	25	N		63	
B 6	1		45A10P1-G4	25	N		45	45A10J7- 9	25	N		68	
B 7	4		45A10P1-H1	25	Y		44	45A10J5-19	25	Y		38	
B 8	2		45A10P1-H2	25	N		43	45A10J5-16	25	N		37	
B 9	1		45A10P1-H4	25	N		42	45A10J7-10	25	N		66	
B 10	3		45A10P1-H5	25	Y		41	45A10J8- 1	25	Y		58	
B 11	3		45A10P1-H6	25	Y		40	45A10J8- 6	25	Y		53	
B 12	4		45A10P1-K2	25	Y		25	45A10J6-14	25	Y		92	CHAN A
B 13	4		45A10P1-L1	25	Y		24	45A10J4-20	25	Y		57	
B 14	3		45A10P1-L5	25	Y		23	45A10J6- 4	25	Y		89	CHAN A
B 15	3		45A10P1-L6	25	Y		22	45A10J6- 2	25	Y		88	CHAN A
B 16	1		45A10P1-M4	25	N		21	45A10J2-25	25	N		90	CHAN A
B 17	2		45A10P1-M5	25	N		20	45A10J5-15	25	N		36	
B 18	4		45A10P1-M6	25	Y		19	45A10J6- 6	25	Y		91	CHAN A

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

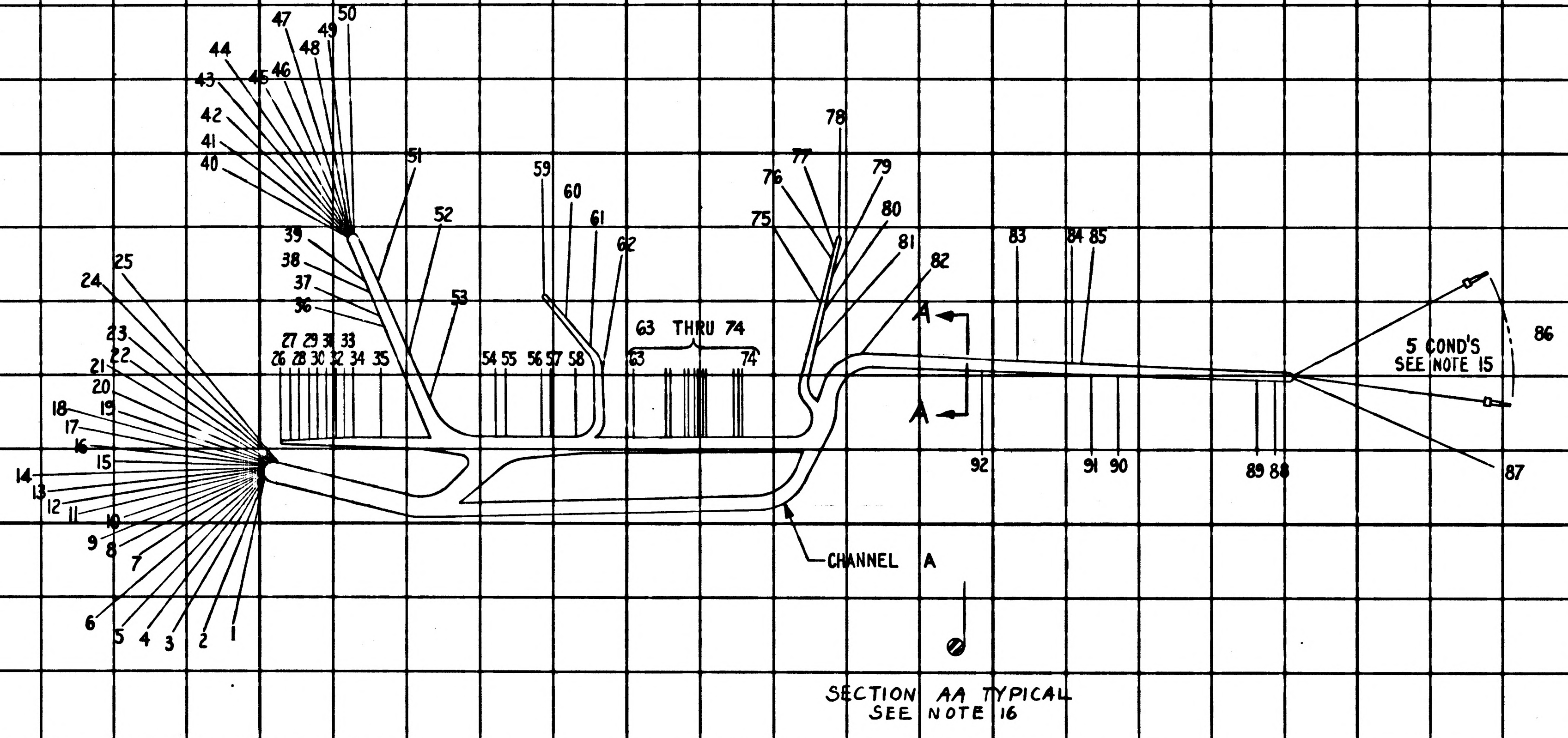
SIZE A 1008635

SCALE - NONE | REV LTR + | SHEET 5 OF 8

MIL 2085 - 4-63 WIR

1008635

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD
REVISIONS 1556/					



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SEE NOTE 15
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CHANNEL A
SECTION AA TYPICAL
SEE NOTE 16

1007530	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ——— ± ——— ± ———
DO NOT SCALE THIS DRAWING
MATERIAL
———
CONTRACT NAS 9 - 497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN E. Lenik Jr. DATE 6 NOV 64
CHECKED V. Molye 25 NOV 64
APPROVAL R. Osberg 30 Nov 64
APPROVAL 30 NOV 64
NASA APPROVAL 1-19-65 W. J. Rhine
MIT APPROVAL 19 Jan 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING HARNESS B
(TRAY 10)

CODE IDENT NO.
SIZE D
1008635
SCALE FULL
SHEET 8 OF 8

PENNANT NOTE	GENERAL NOTES
1	SEE CONDUCTOR CHART. PENNANT NOTE 1.
2	SEE CONDUCTOR CHART. PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
8	LENGTHS SPECIFIED ARE FOR CONDUCTORS BEFORE ATTACHING TO AN ACCESSORY.
9	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
10	INSTALL ITEM 6 PER ND1002206.
11	SOLDER PER ND1002071 USING ITEMS 7 AND 8.
12	ASSEMBLE PER ND1002032.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008637
SCALE-NONE | REV LTR + | SHEET 2 OF 10

MIL 2084 4-63

PENNANT NOTE | GENERAL NOTES

TOLERANCE CHART. UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR WIRE OR CABLE. STRIP WIRE. STRIP JACKET. CUT WIRE OR CUT SHIELD.	TOLERANCE WIRE OR CABLE	STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+ .06-.00	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+ .50-.00	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET	+1.00-.00		+.50-.50	+.50-.50	+.50-.50
OVER 6 FEET	+2.00-.00				

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008637
SCALE-NONE | REV LTR + | SHEET 3 OF 10

MIL 2084 4-63

APPLICATION
NEXT ASSY: 1007530
USED ON

REVISIONS 15561
SYM | DESCRIPTION | DATE | APPROVAL

REV										
SHEET										
REV STATUS OF SHEETS REV	+	+	+	+	+	+	+	+	+	+
SHEET	1	2	3	4	5	6	7	8	9	10

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN J. Patuk DATE 4 NOV 64
CHECKED T. Moleje 25 NOV 64
APPROVAL 30 NOV 64
APPROVAL 30 NOV 64 1/21/65
NASA APPROVAL 1-14-65
MIT APPROVAL 15 Jan 65
CONTRACT NAS9-497

WIRE LIST AA
(TRAY 10)

CODE IDENT NO. | SIZE A | 1008637 | REV
SCALE NONE | SHEET 1 OF 10

PENNANT | LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
9	1	AR	1006757- 9	WIRE 12.44 INCHES TOTAL LENGTH
9	2	~~AR~~	~~1010847- 4~~	~~WIRE .50 INCHES TOTAL LENGTH~~ DELETED
9	3	~~AR~~	~~1010847- 2~~	~~WIRE .50 INCHES TOTAL LENGTH~~ DELETED
9	4	AR	1010848- 2	WIRE 4.50 INCHES TOTAL LENGTH
9	5	AR	1010848- 4	WIRE 3.62 INCHES TOTAL LENGTH
	6	1	MS-25036- 44	TERMINAL. LUG
	7	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY)
	8	AR	QQ-S-571	FLUX TYPE AR (ES-2175 TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008637
SCALE-NONE | REV LTR + | SHEET 4 OF 10

MIL 2084 4-63

GVI

WIRE LIST AA

+ 1008637

CONDUCTOR			FROM					TO				
NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	CIRCUIT POINT	2	T IN	TERMINATION SPEC. 1 ITEM NO.	NO.	CIRCUIT POINT	2	T IN	TERMINATION SPEC 1 ITEM NO.	NO.
			45A10J3-24					45A10J3-25				
			45A10J3-25					45A10J3-26				
AA 5	1	87	45A10J4- 1					45A10J4- 2				
			45A10J4- 2					45A10J4- 3				
			45A10J4- 3					45A10J4- 4				
			45A10J4- 4					45A10J4- 5				
			45A10J4- 5					45A10J4- 6				
			45A10J4- 6					45A10J4- 7				
AA 6	1	87	45A10J4- 8					45A10J4- 9				
			45A10J4- 9					45A10J4-10				
			45A10J4-10					45A10J4-11				
			45A10J4-11					45A10J4-12				
			45A10J4-12					45A10J4-13				
			45A10J4-13					45A10J4-14				
AA 7	1	31	45A10J4-17					45A10J4-18				
			45A10J4-18					45A10J4-19				
AA 8	1	87	45A10J4-20					45A10J4-21				
			45A10J4-21					45A10J4-22				

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A

1008637

SCALE-NONE | REV LTR + | SHEET 6 OF 10

MIL 2085 - 4-63 WIR

GVI

WIRE LIST AA

+ 1008637

CONDUCTOR			FROM					TO				
NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	CIRCUIT POINT	2	T IN	TERMINATION SPEC. 1 ITEM NO.	NO.	CIRCUIT POINT	2	T IN	TERMINATION SPEC 1 ITEM NO.	NO.
			45A10J4-22					45A10J4-23				
			45A10J4-23					45A10J4-24				
			45A10J4-24					45A10J4-25				
			45A10J4-25					45A10J4-26				
AA 9	1	87	45A10J5- 1					45A10J5- 2				
			45A10J5- 2					45A10J5- 3				
			45A10J5- 3					45A10J5- 4				
			45A10J5- 4					45A10J5- 5				
			45A10J5- 5					45A10J5- 6				
			45A10J5- 6					45A10J5- 7				
AA 10	1	87	45A10J5- 8					45A10J5- 9				
			45A10J5- 9					45A10J5-10				
			45A10J5-10					45A10J5-11				
			45A10J5-11					45A10J5-12				
			45A10J5-12					45A10J5-13				
			45A10J5-13					45A10J5-14				
AA 11	1	31	45A10J5-17					45A10J5-18				
			45A10J5-18					45A10J5-19				

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A

1008637

SCALE-NONE | REV LTR + | SHEET 7 OF 10

MIL 2085 - 4-63 WIR

GVI

WIRE LIST AA

+ 1008637

CONDUCTOR			FROM					TO				
NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	CIRCUIT POINT	2	T IN	TERMINATION SPEC. 1 ITEM NO.	NO.	CIRCUIT POINT	2	T IN	TERMINATION SPEC 1 ITEM NO.	NO.
AA 1	1	87	45A10J3- 1					45A10J3- 2				
			45A10J3- 2					45A10J3- 3				
			45A10J3- 3					45A10J3- 4				
			45A10J3- 4					45A10J3- 5				
			45A10J3- 5					45A10J3- 6				
			45A10J3- 6					45A10J3- 7				
AA 2	1	87	45A10J3- 8					45A10J3- 9				
			45A10J3- 9					45A10J3-10				
			45A10J3-10					45A10J3-11				
			45A10J3-11					45A10J3-12				
			45A10J3-12					45A10J3-13				
			45A10J3-13					45A10J3-14				
AA 3	1	31	45A10J3-17					45A10J3-18				
			45A10J3-18					45A10J3-19				
AA 4	1	87	45A10J3-20					45A10J3-21				
			45A10J3-21					45A10J3-22				
			45A10J3-22					45A10J3-23				
			45A10J3-23					45A10J3-24				

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A

1008637

SCALE-NONE | REV LTR + | SHEET 5 OF 10

MIL 2085 - 4-63 WIR

GVI

WIRE LIST AA

+ 1008637

CONDUCTOR			FROM					TO				
NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	CIRCUIT POINT	2	T IN	TERMINATION SPEC. 1 ITEM NO.	NO.	CIRCUIT POINT	2	T IN	TERMINATION SPEC 1 ITEM NO.	NO.
AA 12	1	87	45A10J5-20					45A10J5-21				
			45A10J5-21					45A10J5-22				
			45A10J5-22					45A10J5-23				
			45A10J5-23					45A10J5-24				
			45A10J5-24					45A10J5-25				
			45A10J5-25					45A10J5-26				
AA 13	1 ~~5~~	25	45A10J6- 1	20	Y			45A10J6- 2	20	Y		
AA 14	1 ~~5~~	25	45A10J6- 3	20	Y			45A10J6- 4	20	Y		
AA 15	1 ~~5~~	25	45A10J6- 5	20	Y			45A10J6- 6	20	Y		
AA 16	1 ~~5~~	25	45A10J6-13	20	Y			45A10J6-14	20	Y		
AA 17	4	250	45A10J9-15	20	N			45A10P1-M3	20	N		
AA 18	4	200	45A10P1-M4	20	N			45A10E-1	20	N	6	
AA 19	1	25	45A10P1-G1					45A10P1-H1				
			45A10P1-H1					45A10P1-K1				
			45A10P1-K1					45A10P1-K2				
AA 20	1	50	45A10P1-L1					45A10P1-M1				
			45A10P1-M1					45A10P1-N1				
AA 21	1	25	45A10P1-M1					45A10P1-M2				

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED
SPACECRAFT
CENTER
HOUSTON, TEXAS

SIZE A

1008637

SCALE-NONE | REV LTR + | SHEET 8 OF 10

MIL 2085 - 4-63 WIR

GVI

WIRE LIST AA

+ 1008637

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC ITEM NO.	NO.
AA 35	5	25	45A10P1-S6	25	N			45A10P1-T6	25	N		
AA 36	5	87	45A10P1-K5	25	N			45A10P1-L5	25	N		
AA 37	5	87	45A10P1-K6	25	N			45A10P1-L6	25	N		

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008637
SCALE - NONE
REV LTR +
SHEET 10 OF 10

MIL 2085 - 4-63 WIR

GVI

WIRE LIST AA

+ 1008637

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH	FROM CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET	TIN	TERMINATION SPEC ITEM NO.	NO.
AA 22	1	50	45A10P1-L2					45A10P1-[illegible]				
			45A10P1-M2					45A10P1-N2				
AA 23	1	68	45A10P1-P1					45A10P1-R1				
			45A10P1-R1					45A10P1-S1				
			45A10P1-S1					45A10P1-T1				
AA 24	1	50	45A10P1-P2					45A10P1-R2				
			45A10P1-R2					45A10P1-S2				
			45A10P1-S2					45A10P1-T2				
AA 25	1	25	45A10P1-S3					45A10P1-T3				
AA 26	1	25	45A10P1-P3					45A10P1-P4				
AA 27	1	25	45A10P1-R3					45A10P1-R4				
AA 28	5 ~~1~~	100 ~~25~~	45A10P1-P5	25	N			45A10P1-P6	25	N		
~~AA 29~~	~~3~~	37	45A10P1-~~[illegible]~~ P6	25 ~~37~~	N			45A10P1-~~[illegible]~~ N6	25 ~~37~~	N		
AA 30	5	25	45A10P1-M5	25	N			45A10P1-N5	25	N		
AA 31	5	25	45A10P1-R5	25	N			45A10P1-S5	25	N		
AA 32	5	25	45A10P1-R6	25	N			45A10P1-S6	25	N		
AA 33	5	25	45A10P1-S4	25	N			45A10P1-T4	25	N		
AA 34	5	25	45A10P1-S5	25	N			45A10P1-T5	25	N		

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008637
SCALE - NONE
REV LTR +
SHEET 9 OF 10

MIL 2085 - 4-63 WIR

APPLICATION	
NEXT ASSY	USED ON
1007539	

REVISIONS 1556

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15956	8/26/65	KH WL

REV STATUS	REV	A	+	+	+	A	A	A	A
OF SHEETS	SHEET	1	2	3	4	5	6	7	8

10 DEC 64

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN D.J. Linder DATE 13-NOV-64
CHECKED V. Mobye 27 NOV 64
APPROVAL Dalberg 10 DEC 64
APPROVAL Slundby 10 DEC 64
APPROVAL 1/12/65
NASA APPROVAL 1-19-65
MIT APPROVAL 1/4/65
CONTRACT NAS 9-497

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "A"
(TRAY 9)

SIZE | CODE IDENT NO. | 1008638 | REV A
SCALE — | SHEET 1 OF 8

GVS WIRE HARNESS A + 1008638

PENNANT GENERAL NOTES

PENNANT NOTE	
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 4.
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10	GRID MODULE IS 1 INCH BASIC.
11	UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.
12	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
15	INSTALL ITEM 3 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008638
SCALE-NONE | REV LTR + | SHEET 2 OF 8

MIL 2084 4-63

GVS WIRE HARNESS A + 1008638

PENNANT GENERAL NOTES

PENNANT NOTE	
16	ASSEMBLE PER ND1002032
17	SOLDER PER ND1002071 USING ITEMS 5 AND 6.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008638
SCALE-NONE | REV LTR + | SHEET 3 OF 8

MIL 2084 4-63

GVS WIRE HARNESS A + 1008638

PENNANT LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE, 23 FEET 0 INCHES TOTAL LENGTH
13	2	1	1010847- 2	WIRE, 8 INCHES TOTAL LENGTH
13	3	8	1010738- 6	CONTACT, CRIMP TYPE
14	4	AR	1012507-002	TAPE, LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR (ES-2175, TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008638
SCALE-NONE | REV LTR + | SHEET 4 OF 8

MIL 2084 4-63

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2▷	TIN	TERMINATION SPEC. 1▷ ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2▷	TIN	TERMINATION SPEC 1▷ ITEM NO.	NO.
A 1	1	45A9P1-A6	20	N		14	45A9J9- 1	20	N		78
A 2	1	45A9P1-A1	20	N		15	45A9J3-20	20	N		23
A 3	1	45A9J3-20	20	N		22	45A9J4- 3	20	N		36
A 4	1	45A9P1-B9	20	N		10	45A9J8-13	20	N		82
A 5	1	45A9P1-B8	20	N		11	45A9J2- [redacted] 16	20	N		89
A 6	1	45A9J2- [redacted] 16	20	N		88	45A9J5-16	20	N		65
A 7	1	45A9P1-B5	20	N		13	45A9J2- [redacted] 8	20	N		18 [redacted]
A 8	1	45A9J2- [redacted] 8	20	N		17 [redacted]	45A9J5-32	20	N		75
A 9	1	45A9P1-B1	20	N		12	45A9J4-13	20	N		45
A 10	1	45A9P1-C9	20	N		4	45A9J2- [redacted] 14	20	N		90
A 11	1	45A9P1-C8	20	N		5	45A9J2- [redacted] 9	20	N		19 [redacted]
A 12	1	45A9P1-C6	20	N		6	45A9J2- [redacted] 22	20	N		87
A 13	1	45A9P1-C5	20	N		7	45A9J2- [redacted] 1	20	N		16 [redacted]
A 14	1	45A9P1-C2	20	N		8	45A9J4- 6	20	N		41
A 15	1	45A9J4- 6	20	N		40	45A9J4- 9	20	N		43
A 16	1	45A9J4- 9	20	N		44	45A9J4-17	20	N		48
A 17	1	45A9J4-17	20	N		49	45A9J5- 1	20	N		55
A 18	1	45A9J5- 1	20	N		56	45A9J5- 7	20	N		60

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008638
SCALE - NONE
REV LTR A [redacted]
SHEET 5 OF 8

MIL 2085 - 4-63 WIR

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2▷	TIN	TERMINATION SPEC. 1▷ ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2▷	TIN	TERMINATION SPEC 1▷ ITEM NO.	NO.
A 19	1	45A9P1-C1	20	N		9	45A9J3-23	20	N		28
A 20	1	45A9P1-D8	20	N		1	45A9J7-12	20	N		84
A 21	1	45A9P1-D7	20	N		2	45A9J3-46	20	N		83
A 22	1	45A9P1-D3	20	N		3	45A9J3-10	20	N		27
A 23	1	45A9J2- [redacted] 19	20	N		94 [redacted]	45A9J9- 5	20	N		77
A 24	1	45A9J3- 6	20	N		21	45A9J4- 2	20	N		34
A 25	1	45A9J3- 7	20	N		24	45A9J4- 5	20	N		38
A 26	1	45A9J4- 5	20	N		39	45A9J5- 4	20	N		58
A 27	1	45A9J3-21	20	N		25	45A9J3-24	20	N		29
A 28	1	45A9J3- 9	20	N		26	45A9J4- 7	20	N		42
A 29	2	45A9J3-25	25	Y		30	45A9J3-29	25	Y		86
A 30	1	45A9J3-25	20	N		31	45A9J5-28	20	N		76
A 31	1	45A9J3-14	20	N		32	45A9J7-11	20	N		85
A 32	~~1~~	~~45A9J4- 1~~	~~20~~	~~N~~	DELETED	~~33~~	~~45A9J4- 4~~	~~20~~	~~N~~		~~37~~
A 33	1	45A9J4- 3	20	N		35	45A9J5-11	20	N		62
A 34	1	45A9J4-14	20	N		46	45A9J8-14	20	N		81
A 35	1	45A9J4-15	20	N		47	45A9J8-15	20	N		80
A 36	1	45A9J4-18	20	N		50	45A9J1-~~26~~ 14	08	N	3	74

1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008638
SCALE - NONE
REV LTR A [redacted]
SHEET 6 OF 8

MIL 2085 - 4-63 WIR

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2▷	TIN	TERMINATION SPEC. 1▷ ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2▷	TIN	TERMINATION SPEC 1▷ ITEM NO.	NO.
A 37	1	45A9J4-20	20	N		51	45A9J4-23	20	N		52
A 38	1	45A9J4-25	20	N		53	45A9J1-~~35~~ 13	08	N	3	73
A 39	2	45A9J4-26	25	Y		54	45A9J8-26	25	Y		79
A 40	1	45A9J5- 3	20	N		57	45A9J1-~~12~~ 23	08	N	3	69
A 41	1	45A9J5- 5	20	N		59	45A9J1- ~~5~~ 9	08	N	3	67
A 42	1	45A9J5-10	20	N		61	45A9J1-~~23~~ 12	08	N	3	71
A 43	1	45A9J5-12	20	N		63	45A9J1-~~18~~ 3	08	N	3	70
A 44	1	45A9J5-15	20	N		64	45A9J1-~~25~~ 19	08	N	3	72
A 45	1	45A9J5-17	20	N		66	45A9J1- ~~5~~ 18	09	N	3	68
A 46	1	45A9J3-31	20	N		91	45A9J1-7	08	N	3	92
A 47	1	45A9J2-10	20	N		20	45A9J2 - 20	20	N		93

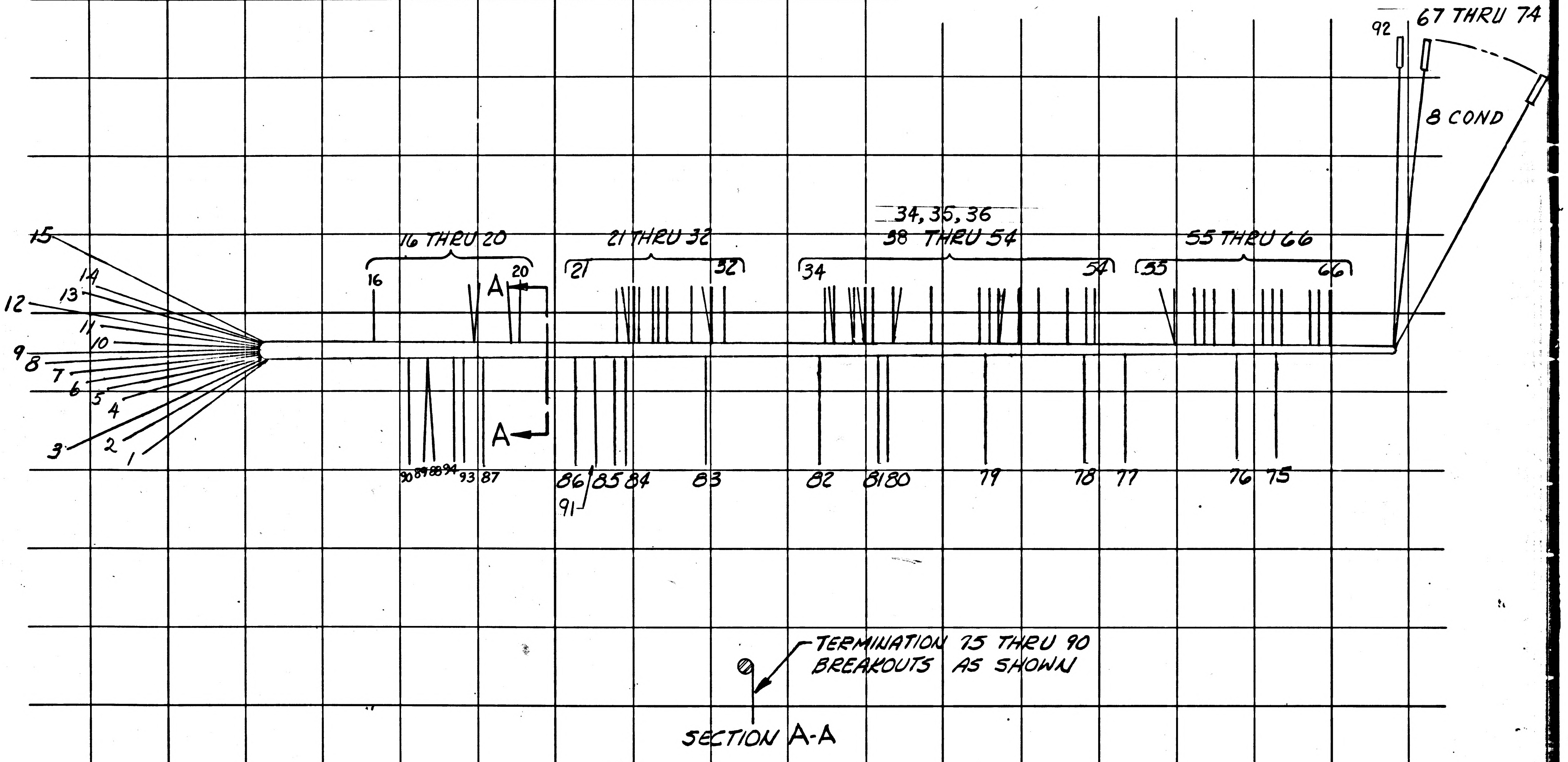
1▷ THE STD CONDUCTOR TERMINATION FIGURES ARE PER
2▷ DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008638
SCALE - NONE
REV LTR A [redacted]
SHEET 7 OF 8

MIL 2085 - 4-63 WIR

REVISIONS 15561

SYM	ZONE	DESCRIPTION		DATE	APPD.
A		REVISED PER TDRR 15956	CHG NO.	8 Feb 65	



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67 THRU 74
8 COND
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16 THRU 20
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21 THRU 32
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38 THRU 54
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55 THRU 66
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90 89 88 94 93 87
86
91
85 84
83
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81 80
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78
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76
75

TERMINATION 75 THRU 90
BREAKOUTS AS SHOWN

SECTION A-A

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ___ ± ___ ±___
DO NOT SCALE THIS DRAWING
MATERIAL ———
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN A.J. Fluder DATE 13-NOV-64
CHECKED V. Molye 27 NOV 64
APPROVAL R Osberg 10 DEC 64
APPROVAL 10 DEC 64 1/12/65
NASA APPROVAL W J Rhine 1-19-65
MIT APPROVAL 19 Jan 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "A"
(TRAY 9)

CODE IDENT NO.
SIZE C
1008638
SCALE 1:1
SHEET 8 OF 8

APPLICATION		REVISIONS 15561			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
1007539		A	REVISED PER TDRR 15956	8 Feb 65	KH
		B	REVISED PER TDRR 17975	6 APR 65	JJJ

Charleston
10 DEC 64

REV STATUS OF SHEETS	REV	B	+	+	B	A	A	A	A
	SHEET	1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN DATE 13-NOV-64
CHECKED 27 NOV 64
APPROVAL 10 DEC 64
APPROVAL 10 DEC 64

WIRE HARNESS "A"
(TRAY 9)

NASA APPROVAL 1-19-65
MIT APPROVAL

CODE IDENT NO.
SIZE
1008638
REV B

CONTRACT NAS 9-497
SCALE —
SHEET 1 OF 8

GVS WIRE HARNESS A + 1008638

PENNANT NOTE — GENERAL NOTES

PENNANT NOTE	GENERAL NOTES
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 4.
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10	GRID MODULE IS 1 INCH BASIC.
11	UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.
12	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
15	INSTALL ITEM 3 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE-NONE	REV LTR +	SHEET 2 OF 8

GVS WIRE HARNESS A + 1008638

PENNANT NOTE	GENERAL NOTES
16	ASSEMBLE PER ND1002032
17	SOLDER PER ND1002071 USING ITEMS 5 AND 6.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE-NONE	REV LTR +	SHEET 3 OF 8

GVS WIRE HARNESS A B 1008638

PENNANT — LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE, 23 FEET 0 INCHES TOTAL LENGTH
13	2	1	1010847- 2	WIRE, 8 INCHES TOTAL LENGTH
13	3	9	1010738- 6	CONTACT, CRIMP TYPE
14	4	AR	1012507-002	TAPE, LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR (ES-2175, TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE-NONE	REV LTR B	SHEET 4 OF 8

GVS WIRE HARNESS A + 1008638

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2>	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2>	TIN	2>	TERMINATION SPEC. 1> ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2>	TIN	2>	TERMINATION SPEC 1> ITEM NO.	NO.
A 1	1		45A9P1-A6	20	N			14	45A9J9- 1	20	N			78
A 2	1		45A9P1-A1	20	N			15	45A9J3-20	20	N			23
A 3	1		45A9J3-20	20	N			22	45A9J4- 3	20	N			36
A 4	1		45A9P1-B9	20	N			10	45A9J8-13	20	N			82
A 5	1		45A9P1-B8	20	N			11	45A9J2- [redacted] 16	20	N			89
A 6	1		45A9J2- [redacted] 16	20	N			88	45A9J5-16	20	N			65
A 7	1		45A9P1-B5	20	N			13	45A9J2- [redacted] 8	20	N			18 [redacted]
A 8	1		45A9J2- [redacted] 8	20	N			17 [redacted]	45A9J5-32	20	N			75
A 9	1		45A9P1-B1	20	N			12	45A9J4-13	20	N			45
A 10	1		45A9P1-C9	20	N			4	45A9J2- [redacted] 14	20	N			90
A 11	1		45A9P1-C8	20	N			5	45A9J2- [redacted] 9	20	N			19 [redacted]
A 12	1		45A9P1-C6	20	N			6	45A9J2- [redacted] 22	20	N			87
A 13	1		45A9P1-C5	20	N			7	45A9J2- [redacted] 1	20	N			16 [redacted]
A 14	1		45A9P1-C2	20	N			8	45A9J4- 6	20	N			41
A 15	1		45A9J4- 6	20	N			40	45A9J4- 9	20	N			43
A 16	1		45A9J4- 9	20	N			44	45A9J4-17	20	N			48
A 17	1		45A9J4-17	20	N			49	45A9J5- 1	20	N			55
A 18	1		45A9J5- 1	20	N			56	45A9J5- 7	20	N			60

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE-NONE	REV LTR A [redacted]	SHEET 5 OF 8

MIL 2085 4-63 WIR

GVS

WIRE HARNESS A

◆ 1008638

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2>	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2>	TIN	TERMINATION SPEC. 1> ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2>	TIN	TERMINATION SPEC 1> ITEM NO.	NO.
A 19	1		45A9P1-C1	20	N		9	45A9J3-23	20	N		28
A 20	1		45A9P1-D8	20	N		1	45A9J7-12	20	N		84
A 21	1		45A9P1-D7	20	N		2	45A9J3-46	20	N		83
A 22	1		45A9P1-D3	20	N		3	45A9J3-10	20	N		27
A 23	1		45A9J2- 19	20	N		94	45A9J9- 5	20	N		77
A 24	1		45A9J3- 6	20	N		21	45A9J4- 2	20	N		34
A 25	1		45A9J3- 7	20	N		24	45A9J4- 5	20	N		38
A 26	1		45A9J4- 5	20	N		39	45A9J5- 4	20	N		58
A 27	1		45A9J3-21	20	N		25	45A9J3-24	20	N		29
A 28	1		45A9J3- 9	20	N		26	45A9J4- 7	20	N		42
A 29	2		45A9J3-25	25	Y		30	45A9J3-29	25	Y		86
A 30	1		45A9J3-25	20	N		31	45A9J5-28	20	N		76
A 31	1		45A9J3-14	20	N		32	45A9J7-11	20	N		85
A 32	~~1~~		~~45A9J4- 1~~	~~20~~	~~N~~	DELETED	~~33~~	~~45A9J4- 4~~	~~20~~	~~N~~		~~37~~
A 33	1		45A9J4- 3	20	N		35	45A9J5-11	20	N		62
A 34	1		45A9J4-14	20	N		46	45A9J8-14	20	N		81
A 35	1		45A9J4-15	20	N		47	45A9J8-15	20	N		80
A 36	1		45A9J4-18	20	N		50	45A9J1-14	08	N	3	74

1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE - NONE	REV LTR A	SHEET 6 OF 8

MIL 2085 · 4-63 WIR

GVS

WIRE HARNESS A

◆ 1008638

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2>	FROM CIRCUIT POINT	STRIP WIRE OR JACKET 2>	TIN	TERMINATION SPEC. 1> ITEM NO.	NO.	TO CIRCUIT POINT	STRIP WIRE OR JACKET 2>	TIN	TERMINATION SPEC 1> ITEM NO.	NO.
A 37	1		45A9J4-20	20	N		51	45A9J4-23	20	N		52
A 38	1		45A9J4-25	20	N		53	45A9J1-13	08	N	3	73
A 39	2		45A9J4-26	25	Y		54	45A9J8-26	25	Y		74
A 40	1		45A9J5- 3	20	N		57	45A9J1-23	08	N	3	69
A 41	1		45A9J5- 5	20	N		59	45A9J1-9	08	N	3	67
A 42	1		45A9J5-10	20	N		61	45A9J1-12	08	N	3	71
A 43	1		45A9J5-12	20	N		63	45A9J1-3	08	N	3	70
A 44	1		45A9J5-15	20	N		64	45A9J1-19	08	N	3	72
A 45	1		45A9J5-17	20	N		66	45A9J1-18	08	N	3	68
A 46	1		45A9J3-31	20	N		91	45A9J1-7	08	N	3	92
A 47	1		45A9J2-10	20	N		20	45A9J2-20	20	N		93

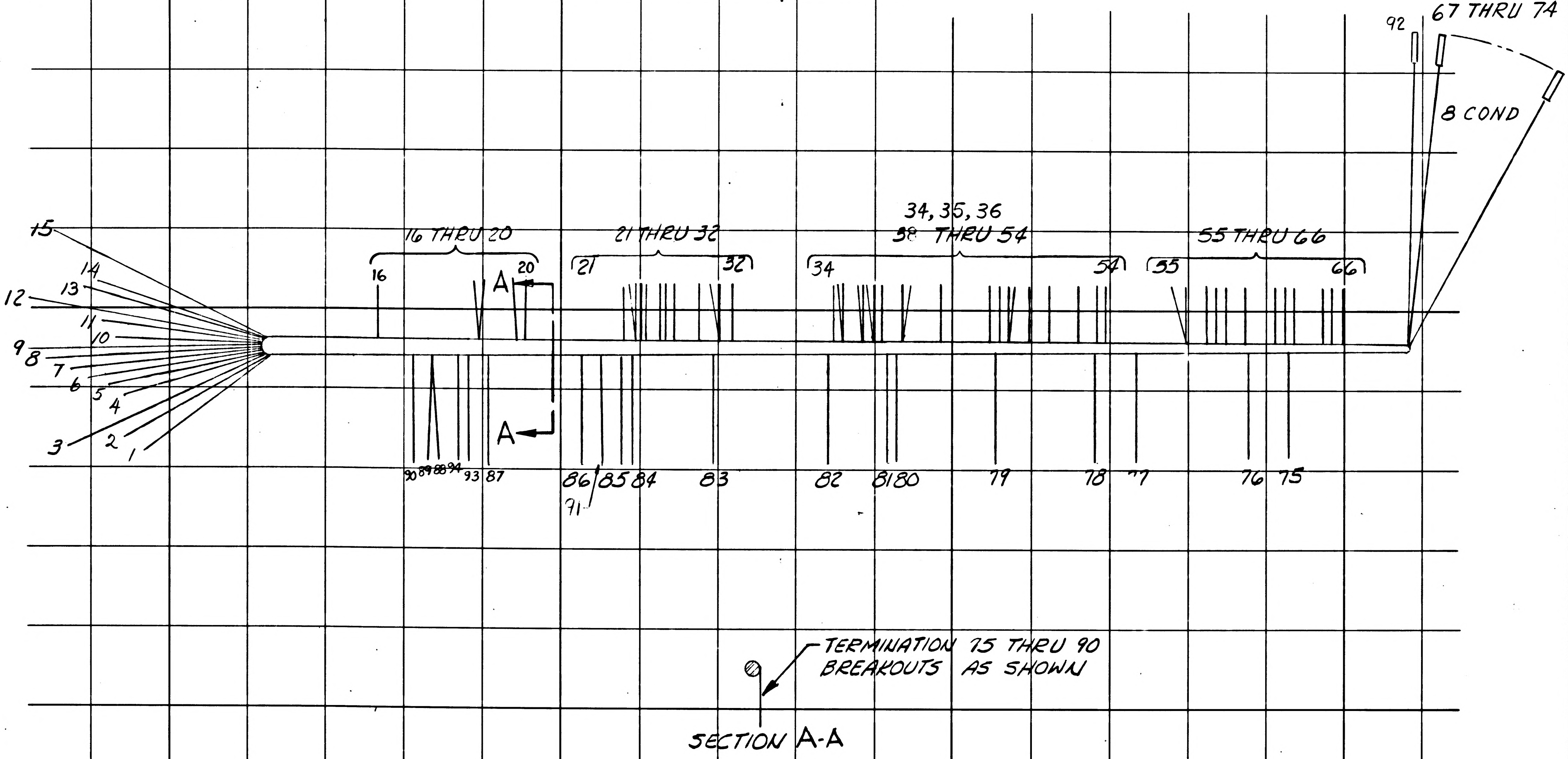
1> THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2> DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE - NONE	REV LTR A	SHEET 7 OF 8

MIL 2085 · 4-63 WIR

SYM	ZONE	DESCRIPTION		DATE	APPD.
A		REVISED PER TDRR 15956	CHG NO.	8 Feb 65	KH a.w.f. WR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16 THRU 20
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38 THRU 54
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55 THRU 66
55
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92
67 THRU 74
8 COND
90 89 88 94 93 87
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85 84
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81 80
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76 75
TERMINATION 75 THRU 90
BREAKOUTS AS SHOWN
SECTION A-A

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ __ \+ __ \+ __
− − −
DO NOT SCALE THIS DRAWING
MATERIAL
—
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN A.J. Fluder DATE 13-NOV-64
CHECKED V Molyé 27 NOV 64
APPROVAL R Dalberg 10 DEC 64
APPROVAL 10 DEC 64 1/12/65
NASA APPROVAL W J Rhine 1-19-65
MIT APPROVAL W Kupfer 19 Jan 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "A"
(TRAY 9)

CODE IDENT NO.
SIZE C
1008638
SCALE 1:1
SHEET 8 OF 8

MIL 1077C—P

PENNANT NOTE — GENERAL NOTES

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 4.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 3 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE-NONE	REV LTR +	SHEET 2 OF 8

PENNANT NOTE — GENERAL NOTES

16 ASSEMBLE PER ND1002032

17 SOLDER PER ND1002071 USING ITEMS 5 AND 6.

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE-NONE	REV LTR +	SHEET 3 OF 8

APPLICATION NEXT ASSY	APPLICATION USED ON
1007539	

REVISIONS 1556

SYM	DESCRIPTION	DATE	APPROVAL

Charleston 10 DEC. 64

REV																					
SHEET																					
REV STATUS REV						+	+	+	+	+	+	+									
OF SHEETS SHEET						1	2	3	4	5	6	7									

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

WIRE HARNESS "A"
(TRAY 9)

DRAWN D. J. Fluder DATE 13 NOV. 64
CHECKED L. Mohye 27 NOV 64
APPROVAL 10 DEC 64
APPROVAL 10 DEC 64
1/12/65
NASA APPROVAL 1-19-65
MIT APPROVAL
CONTRACT NAS 9-497

CODE IDENT NO. | SIZE | 1008638 | REV
SCALE — | SHEET 1 OF 8

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE, 23 FEET 0 INCHES TOTAL LENGTH
13	2	1	1010847- 2	WIRE, 8 INCHES TOTAL LENGTH
13	3	8	1010738- 6	CONTACT, CRIMP TYPE
14	4	AR	1012507-002	TAPE, LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR (ES-2175, TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008638
SCALE-NONE	REV LTR +	SHEET 4 OF 8

GVS WIRE HARNESS A + 1008638

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	FROM CIRCUIT POINT	2	T I N	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	2	T I N	TERMINATION SPEC ITEM NO.	NO.
A 19	1	45A9P1-C1	20	N		9	45A9J3-23	20	N		28
A 20	1	45A9P1-D8	20	N		1	45A9J7-12	20	N		84
A 21	1	45A9P1-D7	20	N		2	45A9J3-46	20	N		83
A 22	1	45A9P1-D3	20	N		3	45A9J3-10	20	N		27
A 23	1	45A9J2- 4	20	N		18	45A9J9- 5	20	N		77
A 24	1	45A9J3- 6	20	N		21	45A9J4- 2	20	N		34
A 25	1	45A9J3- 7	20	N		24	45A9J4- 5	20	N		38
A 26	1	45A9J4- 5	20	N		39	45A9J5- 4	20	N		58
A 27	1	45A9J3-21	20	N		25	45A9J3-24	20	N		29
→ A 28	1	45A9J3- 9	20	N		26	45A9J4- 7	20	N		42
A 29	2	45A9J3-25	25	Y		30	45A9J3-29	25	Y		86
A 30	1	45A9J3-25	20	N		31	45A9J5-28	20	N		76
A 31	1	45A9J3-14	20	N		32	45A9J7-11	20	N		85
A 32	~~1~~	~~45A9J4- 1~~	~~20~~	~~N~~	DELETED	~~33~~	~~45A9J4- 4~~	~~20~~	~~N~~		~~37~~
A 33	1	45A9J4- 3	20	N		35	45A9J5-11	20	N		62
A 34	1	45A9J4-14	20	N		46	45A9J8-14	20	N		81
A 35	1	45A9J4-15	20	N		47	45A9J8-15	20	N		80
A 36	1	45A9J4-18	20	N		50	45A9J1-~~26~~ 14	08	N	3	74

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SIZE A

1008638

SCALE-NONE | REV LTR + | SHEET 6 OF 8

MIL 2085 - 4-63 WIR

GVS WIRE HARNESS A + 1008638

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	FROM CIRCUIT POINT	2	T I N	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	2	T I N	TERMINATION SPEC ITEM NO.	NO.
A 37	1	45A9J4-20	20	N		51	45A9J4-23	20	N		52
A 38	1	45A9J4-25	20	N		53	45A9J1-~~36~~ 13	08	N	3	73
A 39	2	45A9J4-26	25	Y		54	45A9J8-26	25	Y		79
A 40	1	45A9J5- 3	20	N		57	45A9J1-~~12~~ 23	08	N	3	69
A 41	1	45A9J5- 5	20	N		59	45A9J1-~~5~~ 9	08	N	3	67
A 42	1	45A9J5-10	20	N		61	45A9J1-~~27~~ 12	08	N	3	71
A 43	1	45A9J5-12	20	N		63	45A9J1-~~18~~ 3	08	N	3	70
A 44	1	45A9J5-15	20	N		64	45A9J1-~~25~~ 19	08	N	3	72
A 45	1	45A9J5-17	20	N		66	45A9J1-~~5~~ 18	08	N	3	68
A 46	1	45A9J3-31	20	N		91	45A9J1-7	08	N	3	92

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SIZE A

1008638

SCALE-NONE | REV LTR + | SHEET 7 OF 8

MIL 2085 - 4-63 WIR

GVS WIRE HARNESS A + 1008638

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	FROM CIRCUIT POINT	2	T I N	TERMINATION SPEC. ITEM NO.	NO.	TO CIRCUIT POINT	2	T I N	TERMINATION SPEC ITEM NO.	NO.
A 1	1	45A9P1-A6	20	N		14	45A9J9- 1	20	N		78
A 2	1	45A9P1-A1	20	N		15	45A9J3-20	20	N		23
A 3	1	45A9J3-20	20	N		22	45A9J4- 3	20	N		36
A 4	1	45A9P1-B9	20	N		10	45A9J8-13	20	N		82
A 5	1	45A9P1-B8	20	N		11	45A9J2- 9	20	N		89
A 6	1	45A9J2- 9	20	N		88	45A9J5-16	20	N		65
A 7	1	45A9P1-B5	20	N		13	45A9J2- 5	20	N		19
A 8	1	45A9J2- 5	20	N		20	45A9J5-32	20	N		75
A 9	1	45A9P1-B1	20	N		12	45A9J4-13	20	N		45
→ A 10	1	45A9P1-C9	20	N		4	45A9J2- 7	20	N		90
A 11	1	45A9P1-C8	20	N		5	45A9J2- 1	20	N		16
A 12	1	45A9P1-C6	20	N		6	45A9J2-17	20	N		87
A 13	1	45A9P1-C5	20	N		7	45A9J2- 3	20	N		17
A 14	1	45A9P1-C2	20	N		8	45A9J4- 6	20	N		41
A 15	1	45A9J4- 6	20	N		40	45A9J4- 9	20	N		43
A 16	1	45A9J4- 9	20	N		44	45A9J4-17	20	N		48
A 17	1	45A9J4-17	20	N		49	45A9J5- 1	20	N		55
A 18	1	45A9J5- 1	20	N		56	45A9J5- 7	20	N		60

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SIZE A

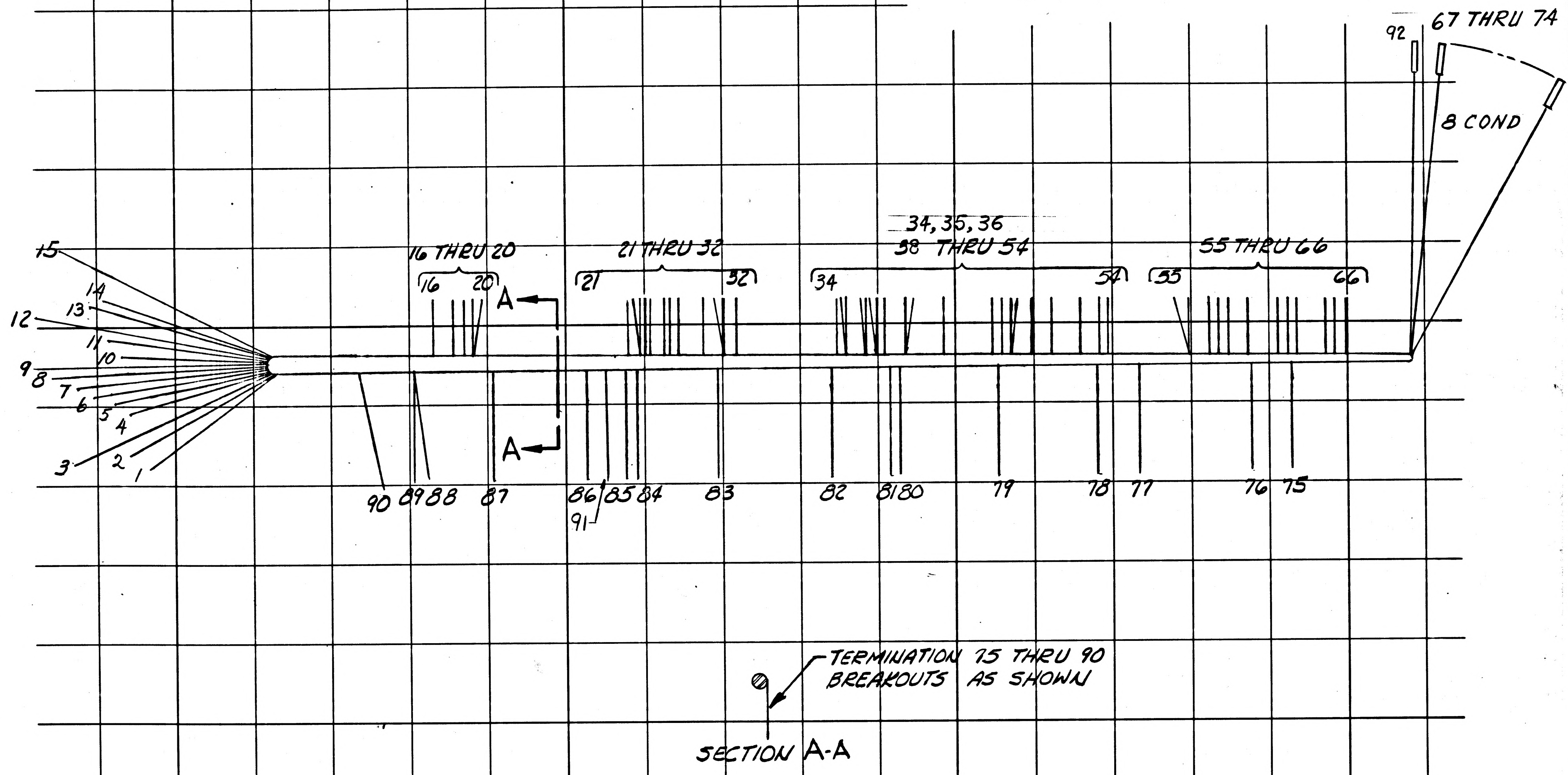
1008638

SCALE-NONE | REV LTR + | SHEET 5 OF 8

MIL 2085 - 4-63 WIR

REVISIONS 15561

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


92
67 THRU 74
8 COND
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
16 THRU 20
16
20
A
A
21 THRU 32
21
32
34, 35, 36
38 THRU 54
34
54
55 THRU 66
55
66
90
89
88
87
86
91
85
84
83
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81
80
79
78
77
76
75
TERMINATION 75 THRU 90
BREAKOUTS AS SHOWN
SECTION A-A

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ——
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN DATE 13-NOV-64
CHECKED V. Molye 27 NOV 64
APPROVAL R Osberg 10 DEC 64
APPROVAL 10 DEC 64 1/12/65
NASA APPROVAL 1-19-65
MIT APPROVAL 19 Jan 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "A"
(TRAY 9)

CODE IDENT NO.
SIZE C
1008638
SCALE 1:1
SHEET 8 OF 8

MIL 1077C—P

APPLICATION	
NEXT ASSY	USED ON
1007539	

REVISIONS /5561

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15955	8-26-65	KH WK

REV								
SHEET								
REV STATUS REV	A	+	+	+	+	A	+	A
OF SHEETS SHEET	1	2	3	4	5	6	7	8

Chamberlain
10 DEC 64

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN A. J. [illegible] DATE 11-NOV-64
CHECKED T. Moyes 10 DEC 64
APPROVAL [illegible] 10 DEC 64
APPROVAL [illegible] 10 DEC 64 11-17-65
NASA APPROVAL [illegible] 1-19-65
MIT APPROVAL [illegible] Jan 19 65
CONTRACT NAS 9-497

WIRE HARNESS "B"
(TRAY 9)

CODE IDENT NO. | SIZE A | 1008639 | REV A

SCALE — | SHEET 1 OF 8

PENNANT NOTE | GENERAL NOTES

1 SEE CONDUCTOR CHART, PENNANT NOTE 1.

2 SEE CONDUCTOR CHART, PENNANT NOTE 2.

3 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

4 MARK CONDUCTOR IDENTIFICATION PER ND1002019.

5 SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.

6 SPIRALLING OF THE MARKING IS ALLOWED.

7 LACE HARNESS USING ITEM 4.

8 IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).

9 Y OR N IN TINNED COLUMN INDICATES YES OR NO.

10 GRID MODULE IS 1 INCH BASIC.

11 UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.

12 BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.

13 VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.

14 VENDOR ITEM - SEE SOURCE CONTROL DRAWING.

15 INSTALL ITEM 3 PER ND 1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639
SCALE-NONE | REV LTR + | SHEET 2 OF 8

MIL 2084 4-63

PENNANT NOTE | GENERAL NOTES

16 ASSEMBLE PER ND 1002032

17 SOLDER PER ND 1002071 USING ITEMS 5 AND 6

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639
SCALE-NONE | REV LTR + | SHEET 3 OF 8

MIL 2084 4-63

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE 26 FEET 6 INCHES TOTAL LENGTH
13	2	1	1010847- 2	WIRE 13 INCHES TOTAL LENGTH
13	3	8	1010738- 6	CONTACT, CRIMP TYPE
14	4	AR	1012507-002	TAPE, LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR (ES-2175, TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639
SCALE-NONE | REV LTR + | SHEET 4 OF 8

MIL 2084 4-63

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	2	TIN	FROM TERMINATION SPEC 1 ITEM NO.	NO.	TO CIRCUIT POINT	2	TIN	TO TERMINATION SPEC 1 ITEM NO.	NO.
B 1	1		45A9P1-L6	20	N		6	45A9J5-10	20	N		29
B 2	1		45A9P1-L5	20	N		7	45A9J5- 3	20	N		27
B 3	1		45A9P1-L3	20	N		8	45A9J5-15	20	N		31
B 4	1		45A9P1-L2	20	N		9	45A9J5-37	20	N		43
B 5	1		45A9J5-37	20	N		44	45A9J1-11	08	N	3	39
B 6	1		45A9P1-L1	20	N		10	45A9J5-~~32~~ 33	20	N		47
B 7	1		45A9J5-~~32~~ 33	20	N		~~50~~ 48	45A9J1-~~1~~ 24	08	N	3	34
B 8	1		45A9P1-M6	20	N		1	45A9J5-12	20	N		30
B 9	1		45A9P1-M5	20	N		2	45A9J5- 5	20	N		28
B 10	1		45A9P1-M4	20	N		3	45A9J5-24	20	N		55
B 11	1		45A9J5-24	20	N		56	45A9J1-~~27~~ 2	08	N	3	35
B 12	1		45A9P1-M3	20	N		4	45A9J5-17	20	N		32
B 13	1		45A9P1-M1	20	N		5	45A9J5-~~53~~ 31	20	N		49
B 14	1		45A9J5-~~23~~ 31	20	N		~~48~~ 50	45A9J1- ~~4~~ 17	08	N	3	36
B 15	1		45A9P1-F9	20	N		20	45A9J7- 1	20	N		90
B 16	1		45A9J7- 1	20	N		91	45A9J3-52	20	N		71
B 17	1		45A9P1-F8	20	N		21	45A9J3-34	20	N		77
B 18	1		45A9P1-G6	20	N		17	45A9J3-38	20	N		70

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639

SCALE-NONE | REV LTR + | SHEET 5 OF 8

MIL 2085 - 4-63 WIR

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	2	TIN	FROM TERMINATION SPEC 1 ITEM NO.	NO.	TO CIRCUIT POINT	2	TIN	TO TERMINATION SPEC 1 ITEM NO.	NO.
B 19	1		45A9P1-~~G6~~ G4	20	N		18	45A9J6- 1	20	N		100
B 20	1		45A9P1-G3	20	N		19	45A9J3-44	20	N		82
B 21	1		45A9P1-H6	20	N		13	45A9J3-32	20	N		78
B 22	1		45A9P1-H5	20	N		14	45A9J3-40	20	N		88
B 23	1		45A9P1-H4	20	N		15	45A9J3-31	20	N		83
B 24	1		45A9P1-H1	20	N		16	45A9J6- 2	20	N		99
B 25	1		45A9P1-K6	20	N		11	45A9J3-53	20	N		69
B 26	1		45A9P1-K4	20	N		12	45A9J3-28	20	N		87
B 27	1		45A9J2- 17	20	N		94	45A9J8- 6	20	N		65
B 28	1		45A9J2- 10	20	N		23	45A9J9- 9	20	N		58
B 29	1		45A9J2- 14	20	N		97	45A9J5-19	20	N		53
B 30	1		45A9J2- 5	20	N		22	45A9J8- 5	20	N		66
B 31	1		45A9J2- 2	20	N		96	45A9J8- 9	20	N		64
B 32	1		45A9J2- 18	20	N		93	45A9J9- 6	20	N		59
B 33	1		45A9J2- 22	20	N		92	45A9J5-30	20	N		52
B 34	1		45A9J6- 3	20	N		98	45A9J3-41	20	N		86
B 35	1		45A9J6-11	20	N		95	45A9J3-39	20	N		68
B 36	1		45A9J3-42	20	N		85	45A9J3-37	20	N		72

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639

SCALE-NONE | REV LTR A | SHEET 6 OF 8

MIL 2085 - 4-63 WIR

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	2	TIN	FROM TERMINATION SPEC 1 ITEM NO.	NO.	TO CIRCUIT POINT	2	TIN	TO TERMINATION SPEC 1 ITEM NO.	NO.
B 37	1		45A9J3-30	20	N		84	45A9J3-36	20	N		73
B 38	1		45A9J3-45	20	N		79	45A9J7- 3	20	N		89
B 39	1		45A9J3-48	20	N		76	45A9J3-50	20	N		74
B 40	1		45A9J3-35	20	N		75	45A9J7-10	20	N		81
B 41	1		45A9J3-54	20	N		67	45A9J7-12	20	N		80
B 42	1		45A9J4-14	20	N		24	45A9J9-14	20	N		53
B 43	1		45A9J4-15	20	N		25	45A9J9-15	20	N		51
B 44	2		45A9J4-26	25	Y		26	45A9J9-26	25	Y		42
B 45	1		45A9J8-13	20	N		63	45A9J5-22	20	N		57
B 46	1		45A9J8-18	20	N		62	45A9J1-28	08	N	3	40
B 47	1		45A9J8-25	20	N		61	45A9J1-27	08	N	3	41
B 48	1		45A9J9- 1	20	N		60	45A9J5-36	20	N		45
B 49	1		45A9J5-26	20	N		54	45A9J1-~~24~~ 1	08	N	3	38
B 50	1		45A9J5-35	20	N		46	45A9J1-10	08	N	3	37
B 51	2		45A9P1-T5	25	Y		1A	45A9J3-29	25	Y		85A

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

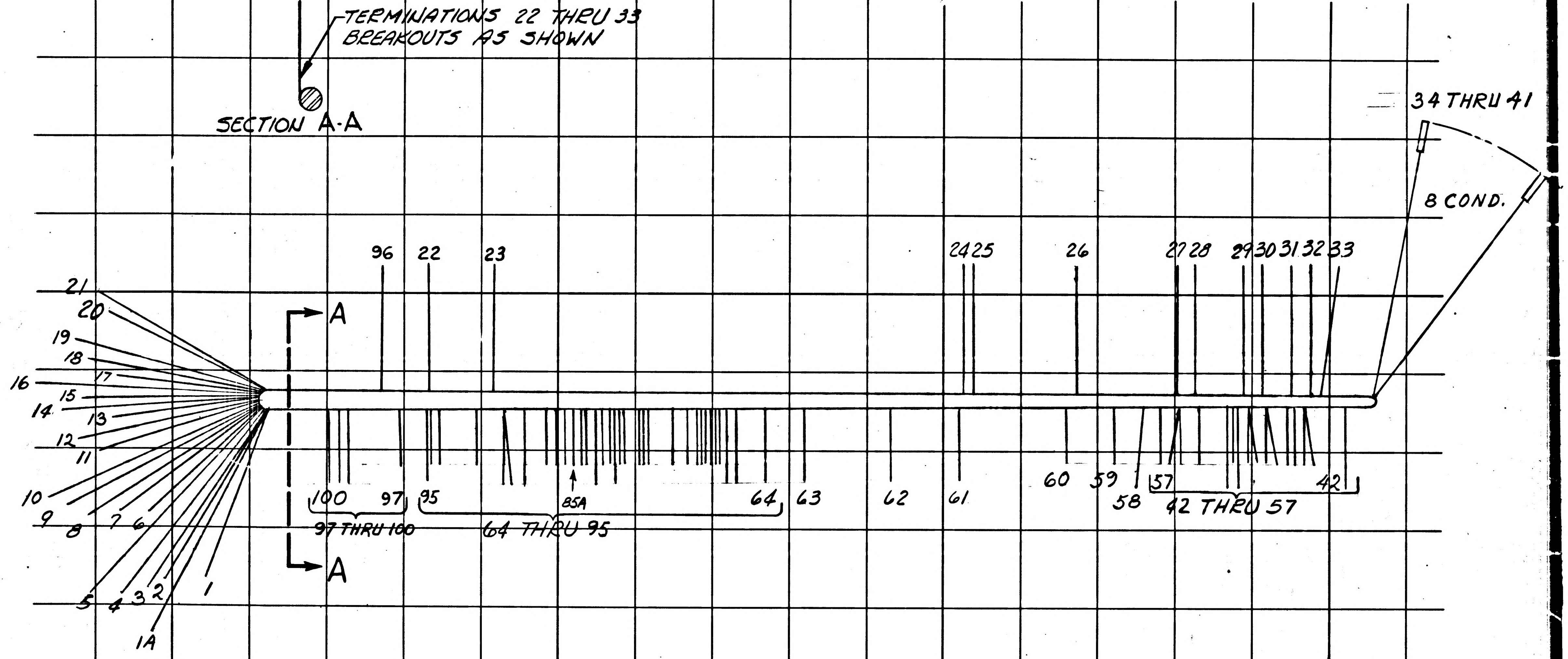
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639

SCALE-NONE | REV LTR + | SHEET 7 OF 8

MIL 2085 - 4-63 WIR

REVISIONS 15561					
SYM	ZONE	DESCRIPTION		DATE	APPD.
A		REVISED PER TDRR 15955	CHG NO.	8 Feb 65	KHG. WR


TERMINATIONS 22 THRU 33
BREAKOUTS AS SHOWN
SECTION A-A
34 THRU 41
8 COND.
96
22
23
24 25
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27 28
29 30 31 32 33
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2
1
1A
A
A
100
97
95
85A
64
63
62
61
60
59
58
57
42
97 THRU 100
64 THRU 95
42 THRU 57

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ___
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN A. J. Fleder DATE 11-NOV-64
CHECKED V. Molye 8 DEC 64
APPROVAL R. Doering 10 DEC 64
APPROVAL [illegible] 10 DEC 64
NASA APPROVAL W. J. Rhine 1-19-65
MIT APPROVAL W. Kupfer 19 Jan 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "B"
(TRAY 9)

CODE IDENT NO.
SIZE C
1008639
SCALE 1:1
SHEET 8 OF 8

MIL 1077C—P

PENNANT NOTE	GENERAL NOTES
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 4.
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10	GRID MODULE IS 1 INCH BASIC.
11	UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.
12	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
15	INSTALL ITEM 3 PER ND 1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639
SCALE-NONE | REV LTR + | SHEET 2 OF 8

MIL 2084 4-63

PENNANT NOTE	GENERAL NOTES
16	ASSEMBLE PER ND 1002032
17	SOLDER PER ND 1002071 USING ITEMS 5 AND 6

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639
SCALE-NONE | REV LTR + | SHEET 3 OF 8

MIL 2084 4-63

APPLICATION	
NEXT ASSY	USED ON
1007539	

REVISIONS /5561

SYM	DESCRIPTION	DATE	APPROVAL

Chamberlain
10 DEC 64

REV								
SHEET								
REV STATUS	+	+	+	+	+	+	+	+
OF SHEETS	1	2	3	4	5	6	7	8

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN

DRAWN A. J. Fluck DATE 11-NOV-64
CHECKED J. Molye 10 DEC 64
APPROVAL [illegible] 10 DEC 64
APPROVAL [illegible] 10 DEC 64 [illegible] 1/12/65
NASA APPROVAL [illegible] 1-19-65
MIT APPROVAL [illegible] 19 Jan 65
CONTRACT NAS 9-497

WIRE HARNESS 'B'
(TRAY 9)

CODE IDENT NO. | SIZE A | 1008639 | REV
SCALE — | SHEET 1 OF 8

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE 26 FEET 6 INCHES TOTAL LENGTH
13	2	1	1010847- 2	WIRE 13 INCHES TOTAL LENGTH
13	3	8	1010738- 6	CONTACT, CRIMP TYPE
14	4	AR	1012507-002	TAPE, LACING AND TYING
	5	AR	QQ-S-571	SOLDER SN60 (ES-2175 ALLOY 1)
	6	AR	QQ-S-571	FLUX TYPE AR (ES-2175, TYPE 1 OR 2) OR MIL-F-14256 FLUX (ES-2798)

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008639
SCALE-NONE | REV LTR + | SHEET 4 OF 8

MIL 2084 4-63

GVU WIRING HARNESS B + 1008639

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CIRCUIT POINT	2	T IN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	2	T IN	TERMINATION SPEC 1 ITEM NO.	NO.
B 19	1		45A9P1-~~G6~~ G4	20	N		18	45A9J6- 1	20	N		100
B 20	1		45A9P1-G3	20	N		19	45A9J3-44	20	N		82
B 21	1		45A9P1-H6	20	N		13	45A9J3-32	20	N		78
B 22	1		45A9P1-H5	20	N		14	45A9J3-40	20	N		88
B 23	1		45A9P1-H4	20	N		15	45A9J3-31	20	N		83
B 24	1		45A9P1-H1	20	N		16	45A9J6- 2	20	N		99
B 25	1		45A9P1-K6	20	N		11	45A9J3-53	20	N		69
B 26	1		45A9P1-K4	20	N		12	45A9J3-28	20	N		87
B 27	1		45A9J2- 2	20	N		22	45A9J8- 6	20	N		65
B 28	1		45A9J2- 6	20	N		23	45A9J9- 9	20	N		58
B 29	1		45A9J2- 7	20	N		97	45A9J5-19	20	N		33
B 30	1		45A9J2- 8	20	N		96	45A9J8- 5	20	N		66
B 31	1		45A9J2-13	20	N		94	45A9J8- 9	20	N		64
B 32	1		45A9J2-16	20	N		93	45A9J9- 6	20	N		59
B 33	1		45A9J2-17	20	N		92	45A9J5-30	20	N		52
B 34	1		45A9J6- 3	20	N		98	45A9J3-41	20	N		86
B 35	1		45A9J6-11	20	N		95	45A9J3-39	20	N		68
B 36	1		45A9J3-42	20	N		85	45A9J3-37	20	N		72

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008639
SCALE - NONE | REV LTR + | SHEET 6 OF 8

MIL 2085 - 4-63 WIR

GVU WIRING HARNESS B + 1008639

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CIRCUIT POINT	2	T IN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	2	T IN	TERMINATION SPEC 1 ITEM NO.	NO.
B 37	1		45A9J3-30	20	N		84	45A9J3-36	20	N		73
B 38	1		45A9J3-45	20	N		79	45A9J7- 3	20	N		89
B 39	1		45A9J3-48	20	N		76	45A9J3-50	20	N		74
B 40	1		45A9J3-35	20	N		75	45A9J7-10	20	N		81
B 41	1		45A9J3-54	20	N		67	45A9J7-12	20	N		80
B 42	1		45A9J4-14	20	N		24	45A9J9-14	20	N		53
B 43	1		45A9J4-15	20	N		25	45A9J9-15	20	N		51
B 44	2		45A9J4-26	25	Y		26	45A9J9-26	25	Y		42
B 45	1		45A9J8-13	20	N		63	45A9J5-22	20	N		57
B 46	1		45A9J8-18	20	N		62	45A9J1-28	08	N	3	40
B 47	1		45A9J8-25	20	N		61	45A9J1-27	08	N	3	41
B 48	1		45A9J9- 1	20	N		60	45A9J5-36	20	N		45
B 49	1		45A9J5-26	20	N		54	45A9J1-~~24~~ 1	08	N	3	38
B 50	1		45A9J5-35	20	N		46	45A9J1-10	08	N	3	37
B 51	2		45A9P1-T5	25	Y		1A	45A9J3-29	25	Y		85A

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008639
SCALE - NONE | REV LTR + | SHEET 7 OF 8

MIL 2085 - 4-63 WIR

GVU WIRING HARNESS B + 1008639

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CIRCUIT POINT	2	T IN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	2	T IN	TERMINATION SPEC 1 ITEM NO.	NO.
B 1	1		45A9P1-L6	20	N		6	45A9J5-10	20	N		29
B 2	1		45A9P1-L5	20	N		7	45A9J5- 3	20	N		27
B 3	1		45A9P1-L3	20	N		8	45A9J5-15	20	N		31
B 4	1		45A9P1-L2	20	N		9	45A9J5-37	20	N		43
B 5	1		45A9J5-37	20	N		44	45A9J1-11	08	N	3	39
B 6	1		45A9P1-L1	20	N		10	45A9J5-~~32~~ 33	20	N		~~46~~ 47
B 7	1		45A9J5-~~32~~ 33	20	N		~~50~~ 48	45A9J1-~~1~~ 24	08	N	3	34
B 8	1		45A9P1-M6	20	N		1	45A9J5-12	20	N		30
B 9	1		45A9P1-M5	20	N		2	45A9J5- 5	20	N		28
B 10	1		45A9P1-M4	20	N		3	45A9J5-24	20	N		55
B 11	1		45A9J5-24	20	N		56	45A9J1-~~27~~ 2	08	N	3	35
B 12	1		45A9P1-M3	20	N		4	45A9J5-17	20	N		32
B 13	1		45A9P1-M1	20	N		5	45A9J5-~~33~~ 31	20	N		~~47~~ 49
B 14	1		45A9J5-~~33~~ 31	20	N		~~48~~ 50	45A9J1-~~4~~ 17	08	N	3	36
B 15	1		45A9P1-F9	20	N		20	45A9J7- 1	20	N		90
B 16	1		45A9J7- 1	20	N		91	45A9J3-52	20	N		71
B 17	1		45A9P1-F8	20	N		21	45A9J3-34	20	N		77
B 18	1		45A9P1-G6	20	N		17	45A9J3-38	20	N		70

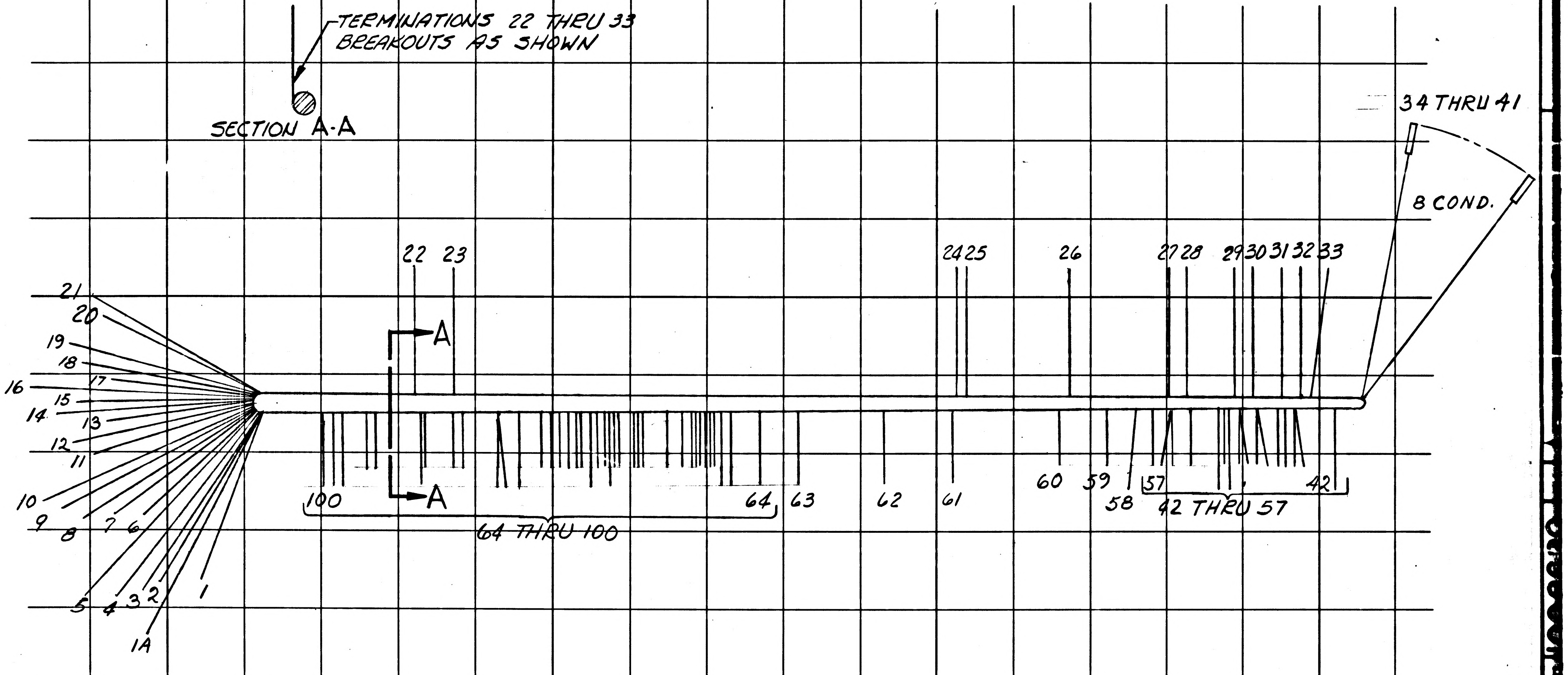
1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS
SIZE A
1008639
SCALE - NONE | REV LTR + | SHEET 5 OF 8

MIL 2085 - 4-63 WIR

REVISIONS 15561					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


TERMINATIONS 22 THRU 33
BREAKOUTS AS SHOWN
SECTION A-A
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34 THRU 41
8 COND.
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57
42
64 THRU 100
42 THRU 57

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ ___ –	+ ___ –	+ ___ –

DO NOT SCALE THIS DRAWING

MATERIAL ________

CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN A. J. Fluder DATE 11-NOV-64
CHECKED V. Molye 8 DEC 64
APPROVAL R Osowz 10 DEC 64
APPROVAL 10 DEC 64 1/12/65
NASA APPROVAL W. J. Rhine 1-19-65
MIT APPROVAL 19 Jan 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "B"
(TRAY 9)

CODE IDENT NO.
SIZE C
1008639
SCALE 1:1
SHEET 8 OF 8

MIL 1077C–F

APPLICATION		REVISIONS 15561			
NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVAL
1007539		A	REVISED PER TDRR 17761	29 MAR 65	RS/J.E.G.

Charleston
10 DEC 64

REV STATUS OF SHEETS	REV	A	+	+	+	+	A	A
	SHEET	1	2	3	4	5	6	7

AC SPARK PLUG DIVISION , GMC
MILWAUKEE, WISCONSIN

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ACSP PN
DRAWN DATE 10-NOV-64
CHECKED Y. Molye 10 DEC 64
APPROVAL 10 DEC 64
APPROVAL 10 DEC 64 1/13/65
NASA APPROVAL 1-14-65
MIT APPROVAL
CONTRACT NAS 9-497

WIRE HARNESS "C"
(TRAY 9)

CODE IDENT NO.
SIZE A
1008640
REV A
SCALE —
SHEET 1 OF 7

PENNANT NOTE	GENERAL NOTES
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 3
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10	GRID MODULE IS 1 INCH BASIC.
11	UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.
12	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14	VENDOR ITEM - SEE SOURCE CONTROL DRAWING.
15	INSTALL ITEM 2 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A
1008640
SCALE-NONE REV LTR + SHEET 2 OF 7

PENNANT NOTE	GENERAL NOTES
16	ASSEMBLE PER ND1002032

TOLERANCE CHART. UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE. STRIP JACKET. CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	STRIP JACKET	CUT WIRE	CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A
1008640
SCALE-NONE REV LTR + SHEET 3 OF 7

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE 26 FEET 6 INCHES TOTAL LENGTH
13	2	2	1010738- 6	CONTACT. CRIMP TYPE
14	3	AR	1012507-002	TAPE. LACING AND TYING

MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A
1008640
SCALE-NONE REV LTR + SHEET 4 OF 7

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2	TIN	TERMINATION SPEC 1 ITEM NO.	NO.
C 1	1	45A9P1-A9	20	N		18	45A9J8- 1	20	N		38
C 2	1	45A9J8- 1	20	N		39	45A9J5-25	20	N		55
C 3	1	45A9P1-B6	20	N		17	45A9J9-13	20	N		52
C 4	1	45A9J9-13	20	N		53	45A9J9- 3	20	N		49
C 5	1	45A9J9-13	20	N		54	45A9J5-39	20	N		61
C 6	1	45A9P1-L4	20	N		12	45A9J5-26	20	N		56
C 7	1	45A9P1-M2	20	N		11	45A9J5-35	20	N		60
C 8	1	45A9P1-G5	20	N		16	45A9J6- 9	20	N		24
C 9	1	45A9J6- 9	20	N		25	45A9J3-49	20	N		36
C 10	1	45A9P1-G1	20	N		15	45A9J6- 6	20	N		21
C 11	1	45A9P1-K2	20	N		13	45A9J6-10	20	N		26
C 12	1	45A9P1-K1	20	N		14	45A9J6- 8	20	N		25
C 13	1	45A9P1-P6	20	N		5	45A9J3-48	20	N		35
C 14	1	45A9P1-P5	20	N		6	45A9J7- 4	20	N		29
C 15	1	45A9P1-P4	20	N		7	45A9J7-~~[illegible]~~ 2	20	N		28 ~~[illegible]~~
C 16	~~1~~	DELETED ~~45A9J7-11~~	~~20~~	~~N~~		~~34~~	~~45A9J7- 2~~	~~20~~	~~N~~		~~28~~
C 17	1	45A9J7- ~~8~~ 11	20	N		33 ~~27~~	45A9J6- 5	20	N		20
C 18	1	45A9P1-P3	20	N		8	45A9J7- 9	20	N		32

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS
SIZE A
1008640
SCALE-NONE REV LTR + SHEET 5 OF 7

MIL 2085 - 4-63 WIR

GWG WIRING HARNESS C ~~-~~ A 1008640

CONDUCTOR INDIVIDUAL LENGTH NUMBER	ITEM NO.	2	FROM CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD STRIP WIRE OR JACKET CIRCUIT POINT	2 / TIN	TERMINATION SPEC 1 ITEM NO.	NO.
C 19	1		45A9P1-P2	20N		9	45A9J6- 7	20N		22
C 20	1		45A9P1-P1	20N		10	45A9J6- 4	20N		19
C 21	1		45A9P1-R6	20N		1	45A9J3-42	20N		31
C 22	1		45A9P1-R3	20N		2	45A9J4-18	20N		47
C 23	1		45A9P1-R2	20N		3	45A9J8-18	20N		46
C 24	1		45A9P1-R1	20N		4	45A9J9-18	20N		58
C 25	1		45A9J9-18	20N		59	45A9J1-21	08N	3	64
C 26	1		45A9J3-12	20N		37	45A9J7- 7	20N		30
C 27	1		45A9J8- 2	20N		40	45A9J8- 7	20N		42
C 28	1		45A9J8- 3	20N		41	45A9J8-13	20N		44
C 29	1		45A9J8- 9	20N		43	45A9J8-17	20N		45
C 30	1		45A9J9- 2	20N		48	45A9J9- 7	20N		50
C 31	1		45A9J9- 9	20N		51	45A9J9-17	20N		57
C 32	1		45A9J9-25	20N		62	45A9J1-20	08N	3	63
C 33	1		45A9J3-40	20N		69	45A9J1-5	08N	3	65
C 34	1		45A9J3-32	20N		70	45A9J1-6	08N	3	66
C 35	1		45A9J6- 1	20N		68	45A9J1-8	08N	3	67
C 36	1		45A9J8-20	20N		71	45A9~~J8-25~~ P1-N2	20N		75 ~~72~~
C 37	1		45A9J9-20	20N		73	45A9~~J9-25~~ P1-N1	20N		76 ~~74~~

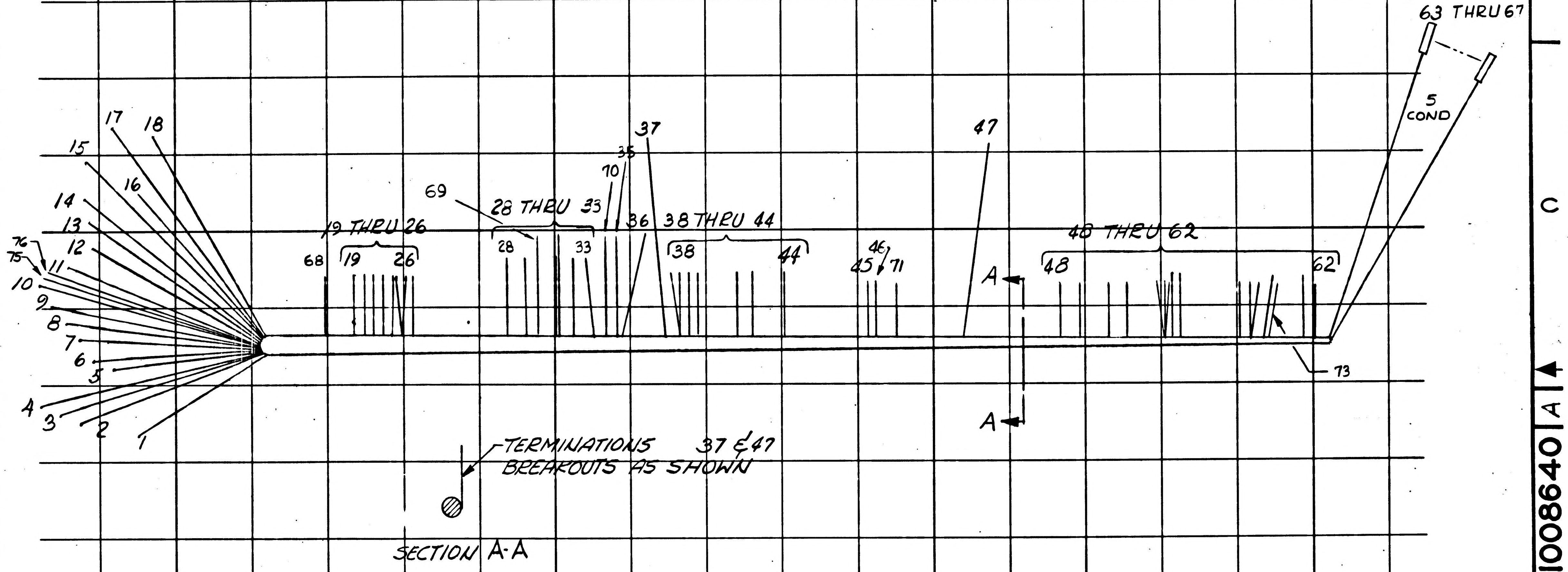
1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008640
SCALE - NONE	REV LTR ~~-~~ A	SHEET 6 OF 7

MIL 2085 - 4-63 WIR

REVISIONS 15561					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD.
		SEE SHEET 1 FOR REVISION RECORD			



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38 THRU 44
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48 THRU 62
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63 THRU 67
5 COND
73
TERMINATIONS 37 & 47 BREAKOUTS AS SHOWN
SECTION A-A

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+ ___	+ ___	+ ___
−	−	−

DO NOT SCALE THIS DRAWING

MATERIAL ______

CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN	A. J. Fluder	DATE 10-NOV-64
CHECKED	V. Molye	7 DEC 64
APPROVAL	R Oaberg	10 DEC 64
APPROVAL	J. Henley	10 DEC 64
NASA APPROVAL	W J Klein	1-19-65
MIT APPROVAL		

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "C"
(TRAY 9)

CODE IDENT NO.	SIZE	
	C	1008640
SCALE 1:1		SHEET 7 OF 7

MIL 1077C—P

GWG WIRING HARNESS C + 1008640

PENNANT GENERAL NOTES

NOTE	
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	LACE HARNESS USING ITEM 3
8	IDENTIFY USING DRAWING NO. AND REVISION LETTER PER MIL-STD-130 (ES-267).
9	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
10	GRID MODULE IS 1 INCH BASIC.
11	UNLESS OTHERWISE SPECIFIED - FEATURE CENTERLINES AT TRUE POSITION WITHIN + OR - .12 INCH RELATIVE TO GRID. ENDS OF CONDUCTORS OR ACCESSORIES AT TRUE POSITION WITHIN + OR - .06 INCH RELATIVE TO GRID. TRUE POSITION DIMENSIONS ARE REGARDLESS OF FEATURE SIZE.
12	BREAKOUTS OF INDIVIDUAL OR GROUPS OR CONDUCTORS ARE MINIMUM CONFIGURATION.
13	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
14	VENDOR ITEM SEE SOURCE CONTROL DRAWING.
15	INSTALL ITEM 2 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008640
SCALE-NONE | REV LTR + | SHEET 2 OF 7

MIL 2084 4-63

GWG WIRING HARNESS C + 1008640

PENNANT GENERAL NOTES

NOTE

16 ASSEMBLE PER ND1002032

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE STRIP WIRE	TOLERANCE STRIP JACKET	TOLERANCE CUT WIRE	TOLERANCE CUT SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008640
SCALE-NONE | REV LTR + | SHEET 3 OF 7

MIL 2084 4-63

REVISIONS / 5361

SYM	DESCRIPTION	DATE	APPROVAL

APPLICATION

NEXT ASSY	USED ON
1007539	

Charleston
10 DEC 64

REV STATUS	REV	+	+	+	+	+	+	+
OF SHEETS	SHEET	1	2	3	4	5	6	7

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN A. J. Fludu DATE 10-NOV-64
CHECKED Y. Molyee 10 DEC 64
APPROVAL [illegible] 10 DEC 64
APPROVAL [illegible] 16 DEC 64 [illegible] 1/11/65
NASA APPROVAL [illegible] 1-14-65
MIT APPROVAL [illegible] 15 Jan 65
CONTRACT NAS 9-497

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "C"
(TRAY 9)

CODE IDENT NO. | SIZE A | 1008640 | REV
SCALE — | SHEET 1 OF 7

GWG WIRING HARNESS C + 1008640

PENNANT LIST OF MATERIALS

NOTE	ITEM	QTY	PART NO	DESCRIPTION
13	1	1	1010848- 2	WIRE 26 FEET 6 INCHES TOTAL LENGTH
13	2	2	1010738- 6	CONTACT, CRIMP TYPE
14	3	AR	1012507-002	TAPE, LACING AND TYING

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008640
SCALE-NONE | REV LTR + | SHEET 4 OF 7

MIL 2084 4-63

GWG

WIRING HARNESS C

+ 1008640

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT 2	T I N 2	FROM TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT 2	T I N 2	TO TERMINATION SPEC 1 ITEM NO.	NO.
C 19	1		45A9P1-P2	20N		9	45A9J6- 7	20N		22
C 20	1		45A9P1-P1	20N		10	45A9J6- 4	20N		19
C 21	1		45A9P1-R6	20N		1	45A9J3-42	20N		31
C 22	1		45A9P1-R3	20N		2	45A9J4-18	20N		47
C 23	1		45A9P1-R2	20N		3	45A9J8-18	20N		46
C 24	1		45A9P1-R1	20N		4	45A9J9-18	20N		58
C 25	1		45A9J9-18	20N		59	45A9J1-21	08N	3	64
C 26	1		45A9J3-12	20N		37	45A9J7- 7	20N		30
C 27	1		45A9J8- 2	20N		40	45A9J8- 7	20N		42
C 28	1		45A9J8- 3	20N		41	45A9J8-13	20N		44
C 29	1		45A9J8- 9	20N		43	45A9J8-17	20N		45
C 30	1		45A9J9- 2	20N		48	45A9J9- 7	20N		50
C 31	1		45A9J9- 9	20N		51	45A9J9-17	20N		57
C 32	1		45A9J9-25	20N		62	45A9J1-20	08N	3	63
C 33	1		45A9J3-40	20N		69	45A9J1-5	08N	3	65
C 34	1		45A9J3-32	20N		70	45A9J1-6	08N	3	66
C 35	1		45A9J6- 1	20N		68	45A9J1-8	08N	3	67
C 36	1		45A9J8-20	20N		71	45A9J8-23	20N		72
C 37	1		45A9J9-20	20N		73	45A9J9-23	20N		74

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008640
SCALE - NONE	REV LTR +	SHEET 6 OF 7

MIL 2085 - 4-63 WIR

GWG

WIRING HARNESS C

+ 1008640

CONDUCTOR NUMBER	INDIVIDUAL LENGTH ITEM NO.	2	FROM CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT 2	T I N 2	FROM TERMINATION SPEC. 1 ITEM NO.	NO.	TO CUT WIRE OR SHIELD / STRIP WIRE OR JACKET CIRCUIT POINT 2	T I N 2	TO TERMINATION SPEC 1 ITEM NO.	NO.
C 1	1		45A9P1-A9	20N		18	45A9J8- 1	20N		38
C 2	1		45A9J8- 1	20N		39	45A9J5-25	20N		55
C 3	1		45A9P1-B6	20N		17	45A9J9-13	20N		52
C 4	1		45A9J9-13	20N		53	45A9J9- 3	20N		49
C 5	1		45A9J9-13	20N		54	45A9J5-39	20N		61
C 6	1		45A9P1-L4	20N		12	45A9J5-26	20N		56
C 7	1		45A9P1-M2	20N		11	45A9J5-35	20N		60
C 8	1		45A9P1-G5	20N		16	45A9J6- 9	20N		24
C 9	1		45A9J6- 9	20N		25	45A9J3-49	20N		36
C 10	1		45A9P1-G1	20N		15	45A9J6- 6	20N		21
C 11	1		45A9P1-K2	20N		13	45A9J6-10	20N		26
C 12	1		45A9P1-K1	20N		14	45A9J6- 8	20N		23
C 13	1		45A9P1-P6	20N		5	45A9J3-48	20N		35
C 14	1		45A9P1-P5	20N		6	45A9J7- 4	20N		29
C 15	1		45A9P1-P4	20N		7	45A9J7-~~[illegible]~~ 2	20N		28 ~~22~~
C 16	~~1~~		DELETED ~~45A9J7-11~~	~~20N~~		~~34~~	~~45A9J7- 2~~	~~20N~~		~~28~~
C 17	1		45A9J7- ~~4~~ 11	20N		33 ~~27~~	45A9J6- 5	20N		20
C 18	1		45A9P1-P3	20N		8	45A9J7- 9	20N		32

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

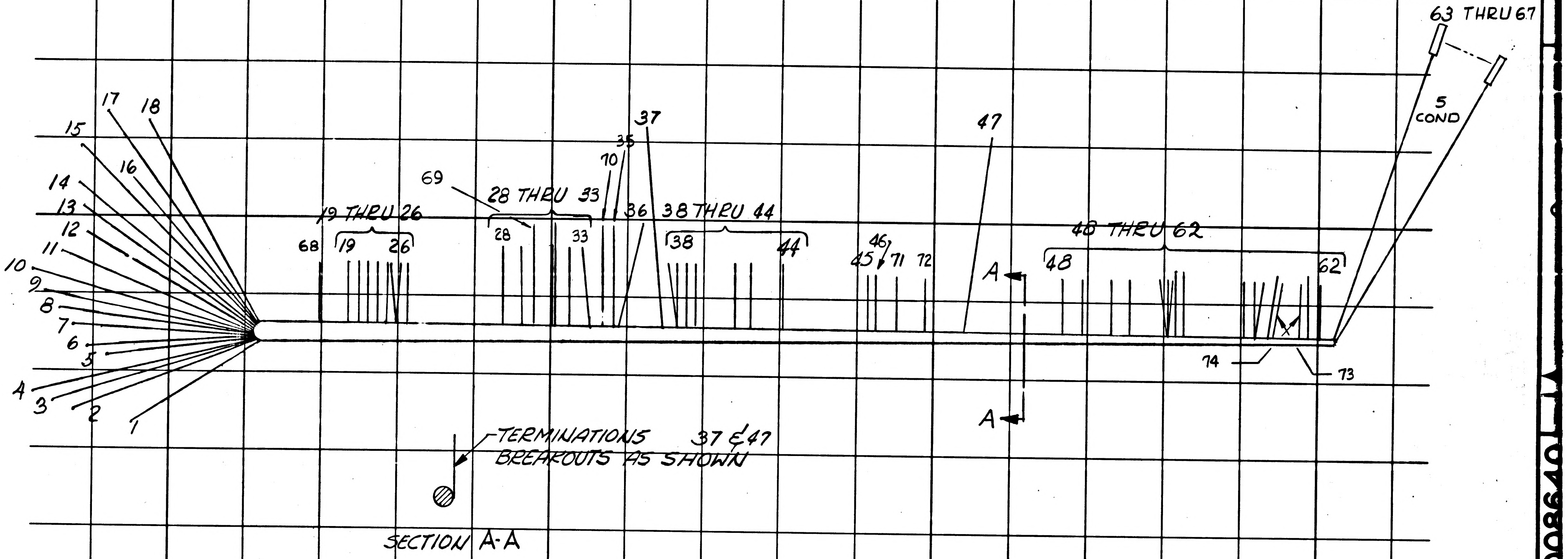
2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008640
SCALE - NONE	REV LTR +	SHEET 5 OF 7

MIL 2085 - 4-63 WIR

1008640

REVISIONS 15561					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.



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47
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A
48 THRU 62
48
62
63 THRU 67
5 COND
74
73
TERMINATIONS 37 & 47
BREAKOUTS AS SHOWN
SECTION A-A

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ___
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN DATE 10-NOV-64
CHECKED 7 DEC 64
APPROVAL 10 DEC 64
APPROVAL 10 DEC 64 1/12/65 9-19-65
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE HARNESS "C"
(TRAY 9)

CODE IDENT NO.
SIZE C
1008640
SCALE 1:1
SHEET 7 OF 7

MIL 1077C-P

PENNANT NOTE	GENERAL NOTES
1	SEE CONDUCTOR CHART, PENNANT NOTE 1.
2	SEE CONDUCTOR CHART, PENNANT NOTE 2.
3	INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
4	MARK CONDUCTOR IDENTIFICATION PER ND1002019.
5	SPACING OF CONDUCTOR IDENTIFICATION SHALL BE EVERY 1.2 INCHES.
6	SPIRALLING OF THE MARKING IS ALLOWED.
7	Y OR N IN TINNED COLUMN INDICATES YES OR NO.
8	LENGTHS SPECIFIED ARE FOR CONDUCTORS BEFORE ATTACHING TO AN ACCESSORY.
9	VENDOR ITEM - SEE SPECIFICATION CONTROL DRAWING.
10	ASSEMBLE ITEM 3 PER ND1002206

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008642
SCALE - NONE | REV LTR + | SHEET 2 OF 5

PENNANT NOTE — GENERAL NOTES

TOLERANCE CHART, UNLESS OTHERWISE SPECIFIED ---

APPLICABLE LENGTH FOR STRIP WIRE, STRIP JACKET, CUT WIRE OR CUT SHIELD.	TOLERANCE			
	STRIP		CUT	
	WIRE	JACKET	WIRE	SHIELD
UNDER 1 INCH	+.03-.00	+.06-.06	+.06-.06	+.06-.06
1 INCH TO 6 INCHES	+.06-.00	+.25-.25	+.25-.25	+.25-.25
6 INCHES TO 6 FEET		+.50-.50	+.50-.50	+.50-.50

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008642
SCALE - NONE | REV LTR + | SHEET 3 OF 5

APPLICATION	
NEXT ASSY	USED ON
1007539	

REVISIONS /536/

SYM	DESCRIPTION	DATE	APPROVAL

REV								
SHEET								
REV STATUS REV	+	+	+	+	+			
OF SHEETS SHEET	1	2	3	4	5			

Charleston 10DEC64

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN 12-NOV-64 DATE
CHECKED 10 DEC 64
APPROVAL 10 DEC 64
APPROVAL 10 DEC 64
NASA APPROVAL 1-14-65
MIT APPROVAL
CONTRACT NAS 9-497

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRE LIST 'A-A' (TRAY 9)

CODE IDENT NO. | SIZE A | 1008642 | REV
SCALE — | SHEET 1 OF 5

LIST OF MATERIALS

PENNANT NOTE	ITEM	QTY	PART NO	DESCRIPTION
9	1	1	1010848- 2	WIRE - 5.5 INCHES TOTAL LENGTH
9	2	1	1006757- 8	WIRE - .75 INCHES TOTAL LENGTH
	3	1	MS25036-44	TERMINAL LUG

MANNED SPACECRAFT CENTER HOUSTON, TEXAS | SIZE A | 1008642
SCALE - NONE | REV LTR + | SHEET 4 OF 5

GWI WIRE LIST AA + 1008642

CONDUCTOR NUMBER	ITEM NO.	INDIVIDUAL LENGTH 2	FROM CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET 2	TIN	2	TERMINATION SPEC. 1 ITEM NO.	NO.	TO CIRCUIT POINT	CUT WIRE OR SHIELD / STRIP WIRE OR JACKET 2	TIN	2	TERMINATION SPEC 1 ITEM NO.	NO.
AA 1	1	50	45A9P1-B7	20	N				45A9P1-C9	20	N			
AA 2	1	50	45A9P1-B4	20	N				45A9P1-C6	20	N			
AA 3	2	25	45A9P1-C2	20	N				45A9P1-D2	20	N			
AA 4	1	50	45A9P1-H6	20	N				45A9P1-K5	20	N			
AA 5	1	100	45A9P1-R4	20	N				E1	20	N		3	
AA 6	1	150	45A9J3-11	20	N				45A9J3-50	20	N			
AA 7	1	150	45A9J3-24	20	N				45A9J3-37	20	N			
AA 8	2	25	45A9J7- 6	20	N				45A9J7- 7	20	N			
AA 9	2	25	45A9J4-11	20	N				45A9J4-12	20	N			

1 THE STD CONDUCTOR TERMINATION FIGURES ARE PER

2 DIMENSIONS ARE IN INCHES AND TWO PLACE DECIMALS.

MANNED SPACECRAFT CENTER HOUSTON, TEXAS	SIZE A	1008642
SCALE - NONE	REV LTR +	SHEET 5 OF 5

MIL 2085 - 4-63 WIR

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008643 | 2

REVISIONS 24645					
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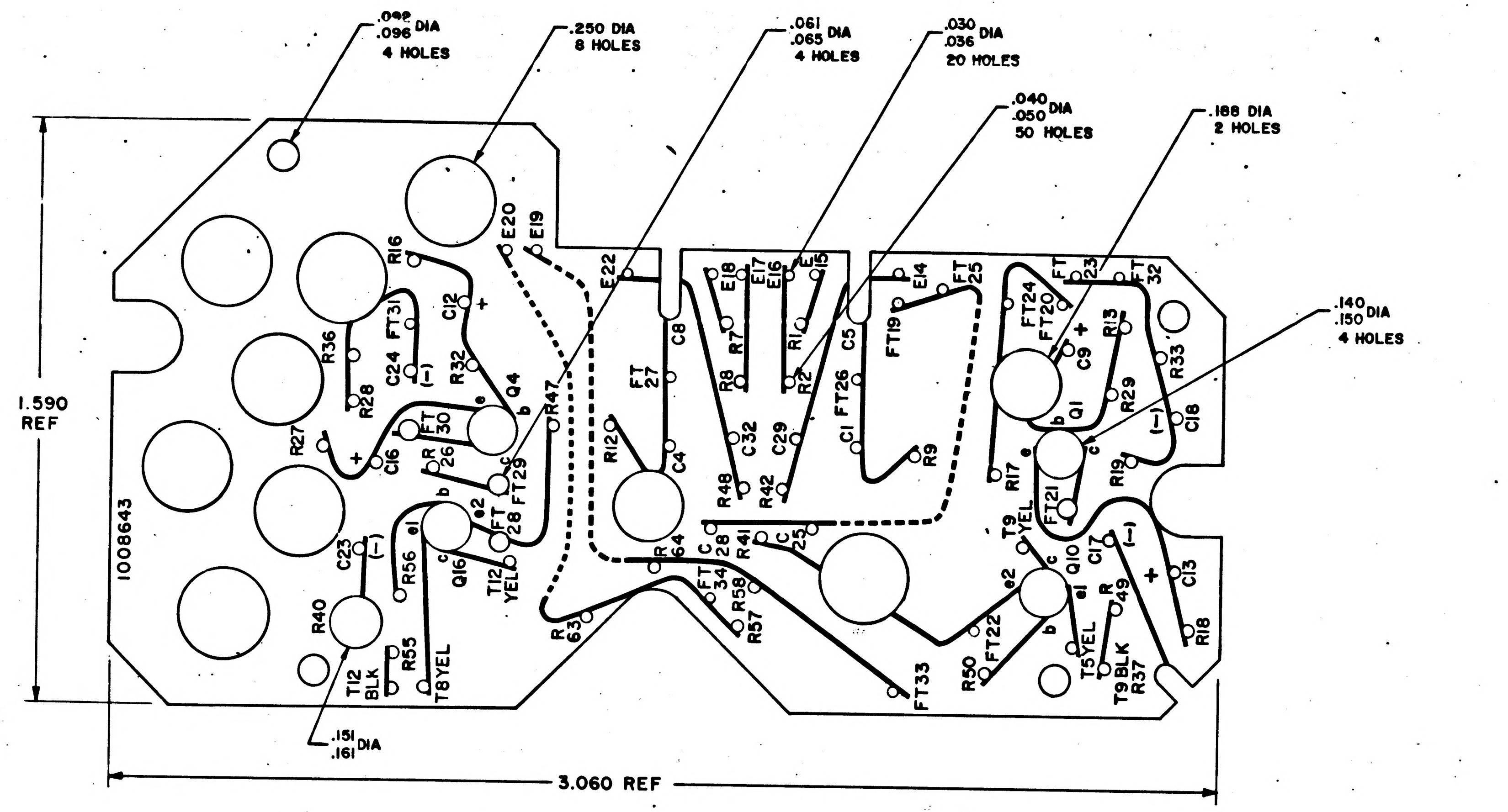

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.096 DIA
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3.060 REF
1008643
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R37
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REF:
DRAWING NO. 1008647 FOR PHOTOGRAPHIC MASTER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133
4. MARK BLACK CHARACTERS PER ND 1002019

1007660	1007700
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± .010 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN M.T. Yamasaki DATE 28 OCT 65
CHECKED J. Stelma 1 NOV 65
APPROVAL 1 NOV 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

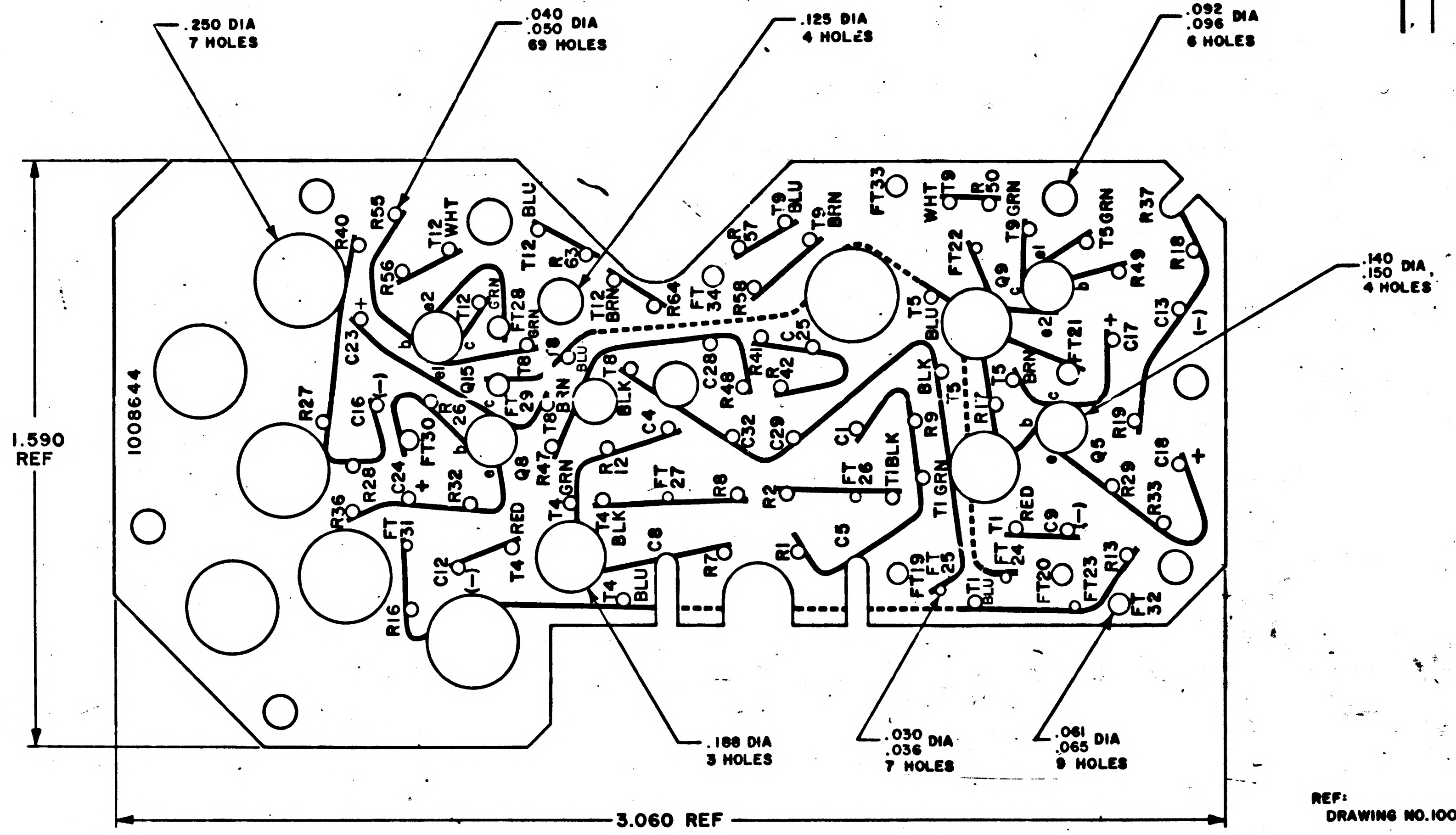
WIRING BOARD A
SIGNAL CONDITIONER
CDU RESOLVER

CODE IDENT NO 80230 SIZE D 1008643
SCALE 5/1 SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008644 | 2 | REVISIONS 24045

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD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T5 GRN

REF:
DRAWING NO.1008648 FOR PHOTOGRAPHIC MASTER.

NOTES.
1. INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE.
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133.
4. MARK BLACK CHARACTERS PER ND1002019.

NEXT ASSY	USED ON
1007660	1007700
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± .010 ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN H. Nikure DATE 20 OCT 65
CHECKED J. Holland 1 Nov 65
APPROVAL E J Sidle 1 Nov 65
APPROVAL G. Dahl 4/30
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD B
SIGNAL CONDITIONER
CDU RESOLVER

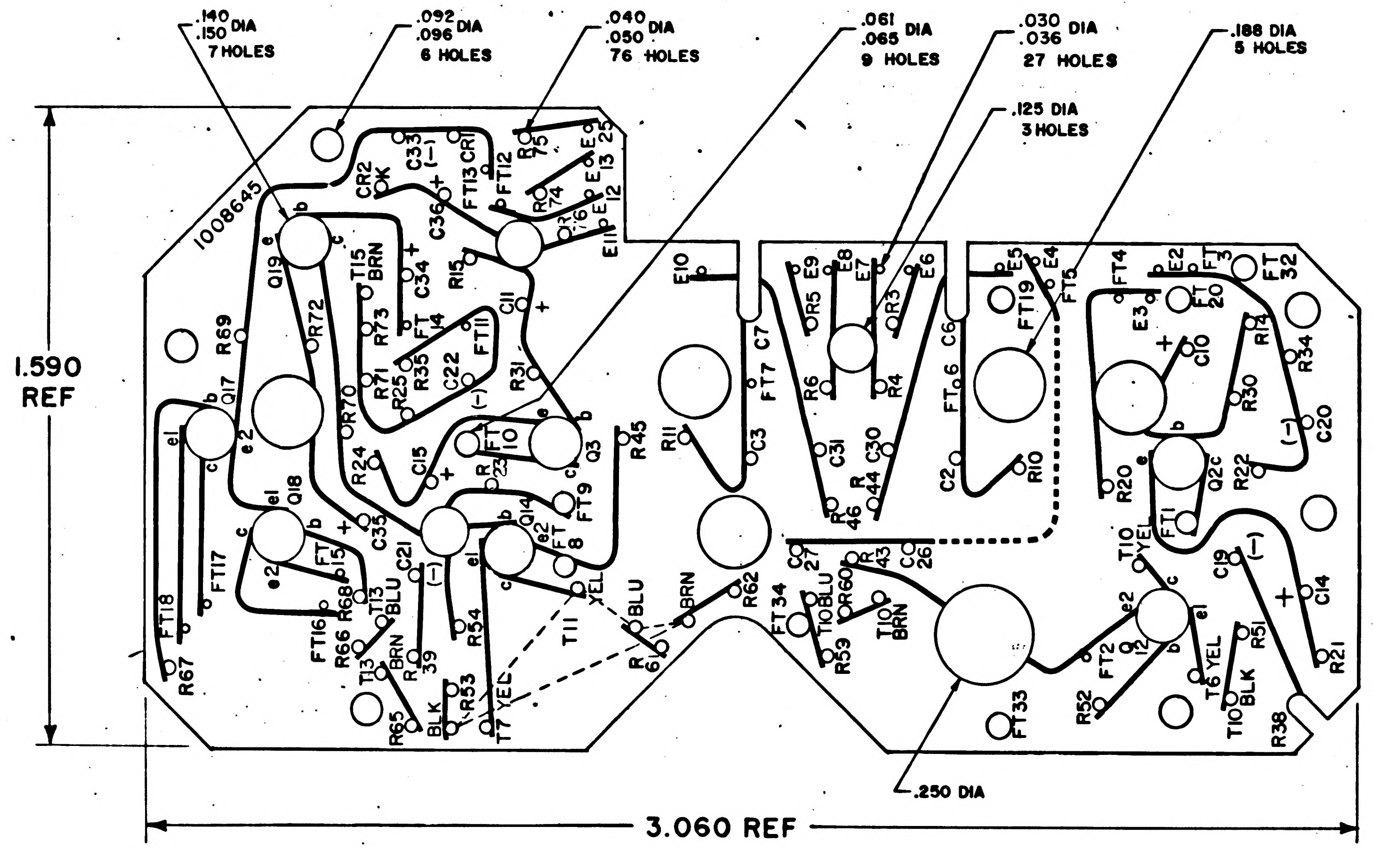
CODE IDENT NO. 80230 SIZE D 1008644
SCALE 5/1 SHEET 1 OF 1

MIL 10770-P

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008645 | 2

REVISIONS 24045				
SYM	ZONE	DESCRIPTION	DATE	APPD
		CHG NO		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REF
DRAWING NO. 1008649 FOR PHOTOGRAPHIC MASTER.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL: .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE.
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND 1002133.
4. MARK BLACK CHARACTERS PER ND 1002019.

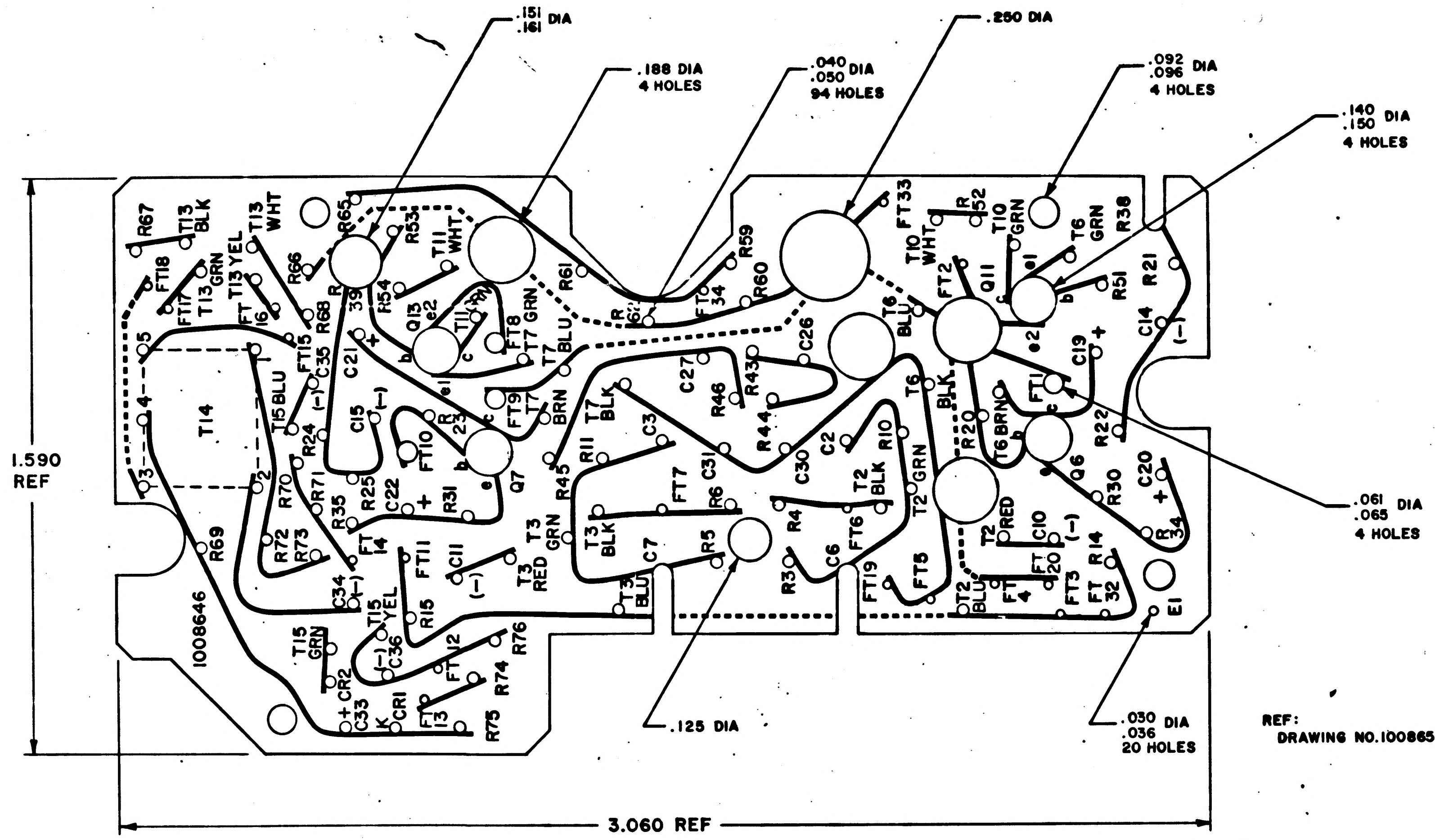
1007665 1007660	1007700 1007700	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± .010 ANGLES ± — DO NOT SCALE THIS DRAWING	M I T INSTRUMENTATION LAB CAMBRIDGE MASS DRAWN M. Yamasaki DATE 25 OCT 65 CHECKED J. Stillman 1 NOV 65 APPROVAL E. J. Sodek 1 NOV 65 APPROVAL J. Ives LTB	MANNED SPACECRAFT CENTER HOUSTON, TEXAS WIRING BOARD C SIGNAL CONDITIONER CDU RESOLVER
NEXT ASSY	USED ON	MATERIAL SEE NOTE 2	NASA APPROVAL A. C. METZGER	CODE IDENT NO 80230 SIZE D 1008645
APPLICATION		CONTRACT NAS 9-497	MIT APPROVAL	SCALE 5/1 SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008646

REVISIONS 246 45

SYM	ZONE	DESCRIPTION	CHG NO	DATE	& APPD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C31
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C6
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FT5
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FT1
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C14
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Q6
R30
C20
R34
T2 RED
C10
FT20
R14
FT32
FT3
FT4
T2 BLU
E1
T15 GRN
CR2
C33
C36
CR1
FT12
FT13
R74
R75
R76
T5 BLU

REF:
DRAWING NO.1008650 FOR PHOTOGRAPHIC MASTER.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. MATERIAL. .031 THICK PLASTIC SHEET PER MIL-P-18177 TYPE GEE.
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133.
4. MARK BLACK CHARACTERS PER ND1002019.

NEXT ASSY	USED ON
1007665	1007700
1007660	1007700

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ±.010 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2

CONTRACT NAS 9-497

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN M GRABNER DATE 16 OCT 65
CHECKED J. Stelma 1 NOV 65
APPROVAL E.J. [illegible] 1 NOV 65
APPROVAL [illegible]
NASA APPROVAL A. C. METZGER
MIT APPROVAL [illegible]

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING BOARD D
SIGNAL CONDITIONER
CDU RESOLVER

CODE IDENT NO	SIZE	
80230	D	1008646

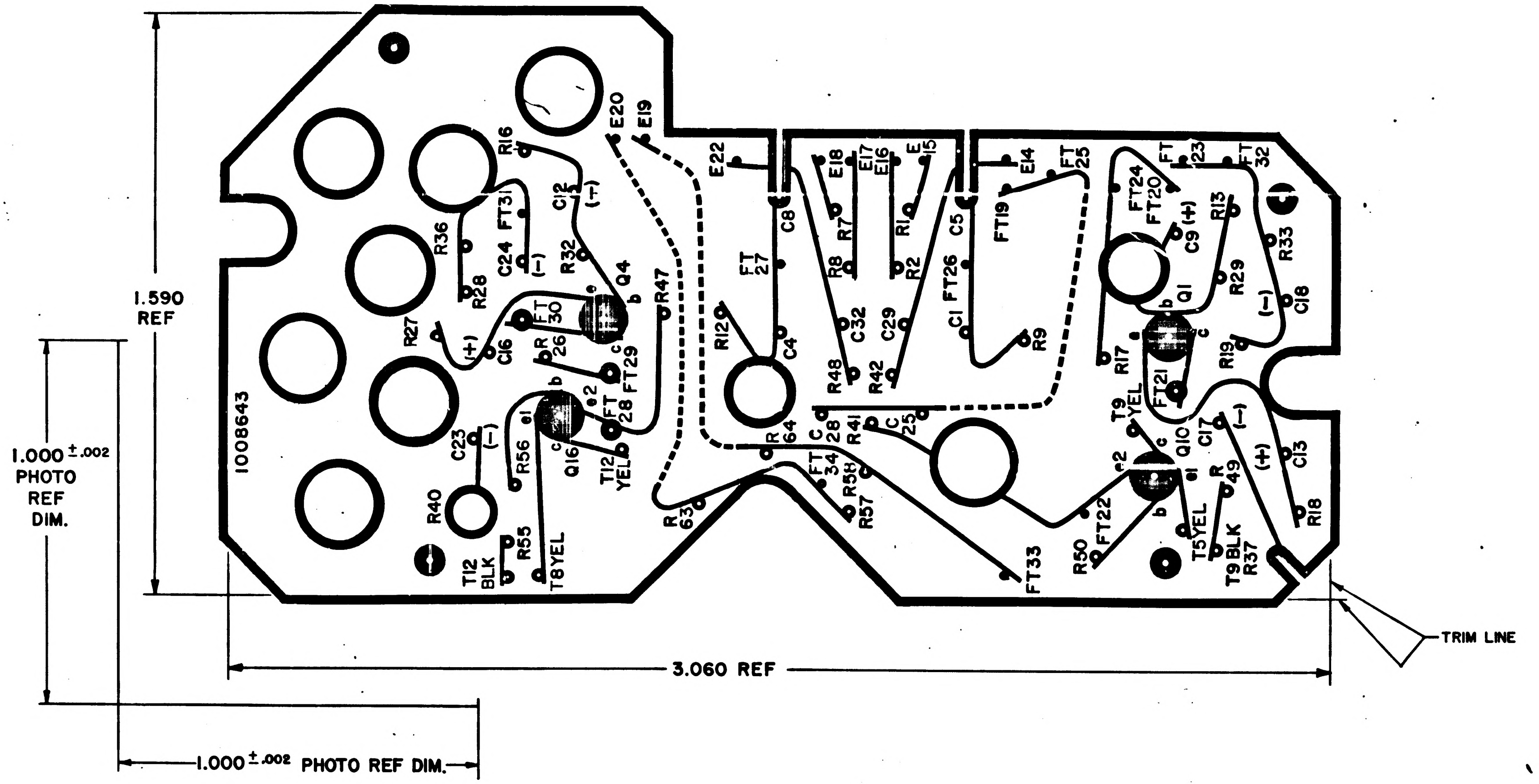
SCALE 5/1 SHEET 1 OF 1

1008647

REVISIONS 24045

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO


1.590
REF
1.000 ±.002
PHOTO
REF
DIM.
3.060 REF
1.000 ±.002 PHOTO REF DIM.
TRIM LINE
1008643
R16
E20
E19
E22
E18
E17
E16
E15
E14
FT 25
FT 23
FT 32
FT31
C12
(+)
R36
C24
(−)
R32
Q4
e
b
c
R47
R28
FT 30
R27
(+)
C16
R 26
FT29
e2
FT 28
e1
Q16
T12 YEL
C23
(−)
R56
R40
R55
T12 BLK
T8YEL
R 63
C8
FT 27
R8
R7
R1
R2
C5
FT26
FT19
C1
R12
C4
R48
C32
R42
C29
R9
R 64
C 28
FT 34
R41
C 25
R58
R57
FT33
FT24
FT20
C9 (+)
R13
R33
Q1
R29
C18
(−)
R17
FT21
R19
T9 YEL
Q10
C17
(−)
(+)
C13
R 49
R18
FT22
R50
T5YEL
T9BLK
R37

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN M. Yamasaki DATE 21 OCT 65
CHECKED F. Stelma 1 NOV 65
APPROVAL E. Ekrosfeld 1 Nov 65
APPROVAL D. Hoag LSD
NASA APPROVAL A. C. METZGER
MIT APPROVAL W. Kupfer 16 Nov 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD A SIGNAL CONDITIONER
CDU RESOLVER

CODE IDENT NO. 80230
SIZE D
1008647
SCALE 5/1
SHEET 1 OF 1

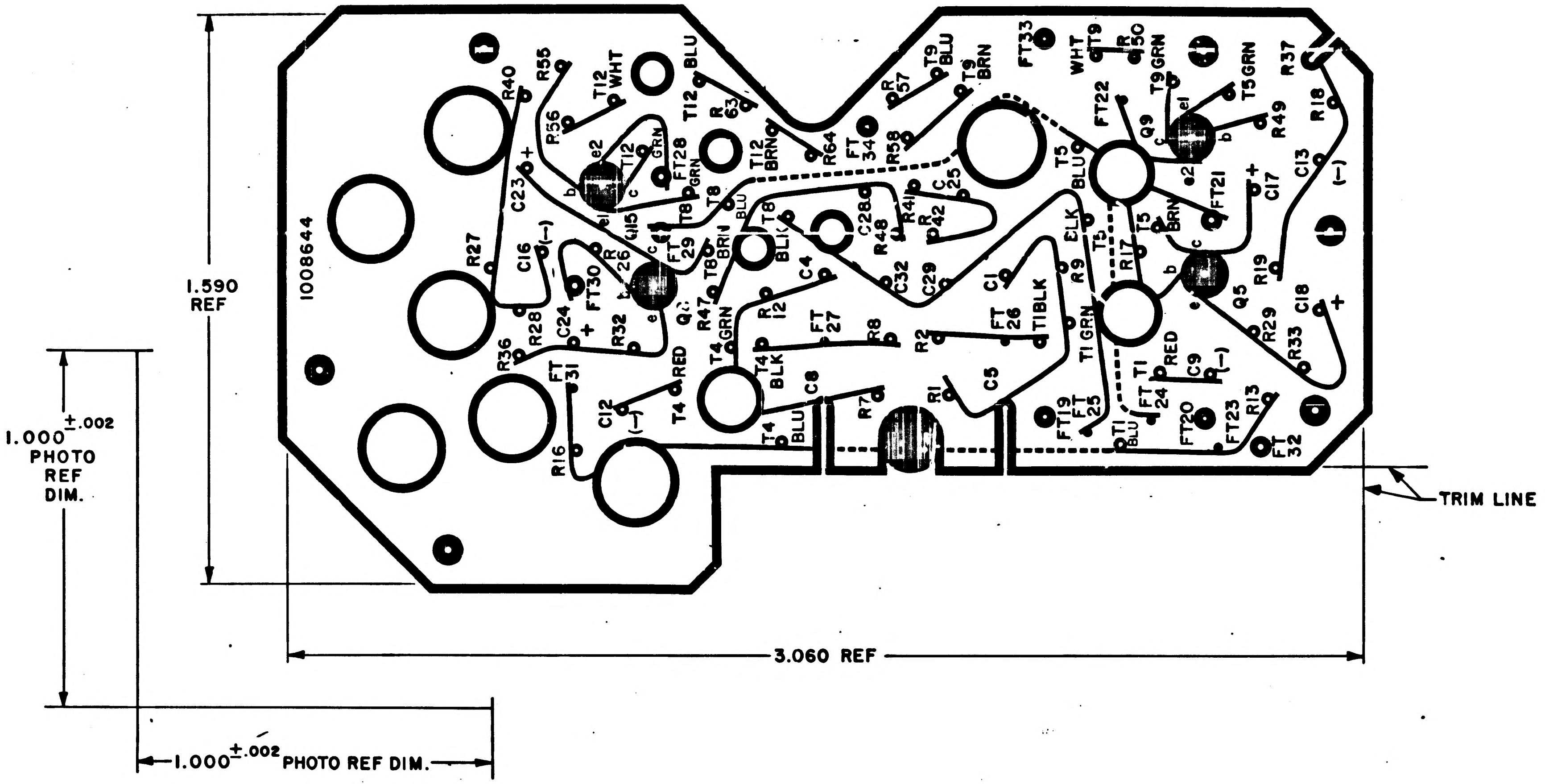
MIL 10770-P

NOTICE -- WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008648 2

REVISIONS 24045

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.



1008644
R40
R55
T12 WHT
T12 BLU
R63
R56
e2
T12 GRN
FT28 GRN
T12 BRN
R64
FT 34
R58
R57
T9 BLU
T9 BRN
FT33
WHT T9
R50
T9 GRN
T5 GRN
R37
R18
FT22
Q9
e1
c
b
e2
R49
C13
(−)
C17
+
FT21
T5 BLU
BRN
T5
R17
C23
+
b
e1
Q15
c
T8
T8 BLU
T8 BLK
T8 BRN
FT 29
C28
R48
R41
R42
C25
R27
C16
(−)
R26
FT30
+
C24
R28
R36
R32
e
Q2
R47
T4 GRN
R12
C4
FT 27
C32
C29
C1
ELK
R9
T1BLK
FT 26
R8
R2
T1 GRN
Q5
b
c
e
R19
C18
+
R29
R33
FT 31
C12
(−)
T4 RED
T4
T4 BLK
C8
T4 BLU
R7
R1
C5
FT19
FT 25
T1 BLU
FT 24
T1 RED
C9
(−)
FT20
FT23
R13
FT 32
R16
1.590 REF
1.000 ±.002 PHOTO REF DIM.
3.060 REF
TRIM LINE
1.000 ±.002 PHOTO REF DIM.

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH.
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN.
4. CUT TO WITHIN .010 OF TRIM LINE.

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DRAWN Art. Nikurs DATE 20 OCT 65 CHECKED F. Stelma 1 NOV 65 APPROVAL E. Sholak 1 NOV 65 APPROVAL G. Ives 458	MANNED SPACECRAFT CENTER HOUSTON, TEXAS PHOTOGRAPHIC MASTER WIRING BOARD B SIGNAL CONDITIONER CDU RESOLVER
APPLICATION		MATERIAL —	NASA APPROVAL A. C. Metzger	CODE IDENT NO. 80230 · SIZE D · 1008648
		CONTRACT NAS 9-497	MIT APPROVAL W. Kupfer 16 Nov 65	SCALE 5/1 · SHEET 1 OF 1

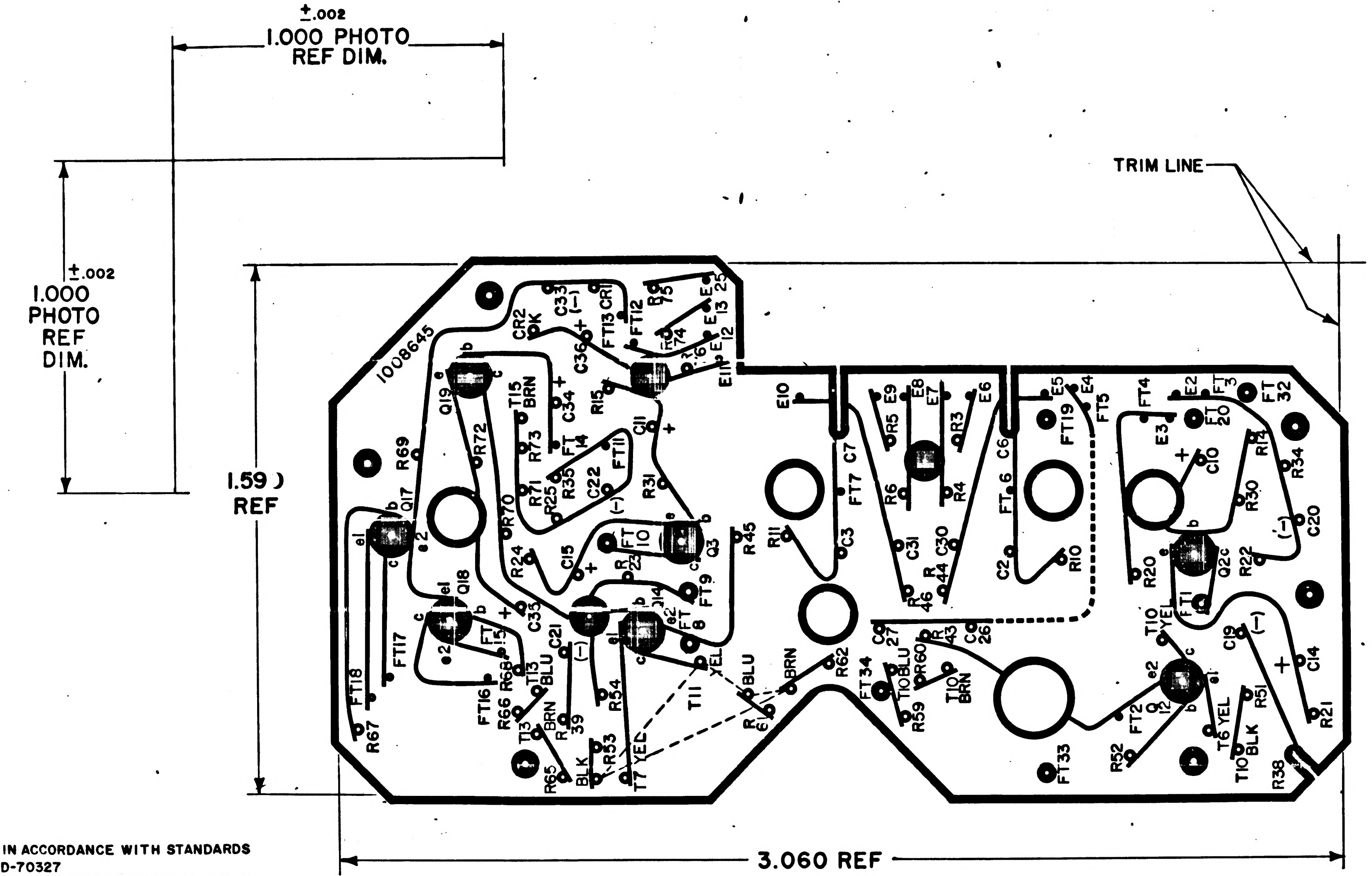
MIL 10770-P

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008649 | 2

REVISIONS 24045

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


±.002
1.000 PHOTO
REF DIM.
±.002
1.000
PHOTO
REF
DIM.
1.590
REF
3.060 REF
TRIM LINE
1008645
CR2
K
C33
(-)
+
C36
FT13
CR1
FT12
R75
R74
E13
E12
E11
E10
Q19
T15
BRN
C34
R15
C11
R72
R73
R71
R35
FT14
FT11
R69
R70
R25
C22
R31
Q17
Q3
FT10
R23
R45
R11
FT7
C7
C3
R5
E9
E8
E7
R3
E6
R6
R4
C31
C30
R44
R46
C6
FT6
C2
R10
E5
FT19
E4
FT5
FT4
E3
E2
FT20
FT3
FT32
C10
R14
R34
R30
C20
Q2
R20
R22
FT1
C14
C19
R21
R51
YEL
BLK
T10
T6
R38
FT2
R52
FT33
Q12
Q18
FT15
C35
C21
R54
FT9
FT8
Q14
C15
R24
FT17
FT18
R67
FT16
R66
R68
T13
BLU
BRN
R39
R53
R65
BLK
T7
YEL
T11
YEL
BLU
BRN
R62
FT34
T10
BLU
R60
R59
C27
R43
C26
T10
BRN

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN J. KOSS DATE 16 OCT 65
CHECKED J. Stelons 1 NOV 65
APPROVAL E.J. Smith 1 NOV 65
APPROVAL G. Ives 4 B
NASA APPROVAL A. C. METZGER
MIT APPROVAL W. Snyder 16 Nov 65

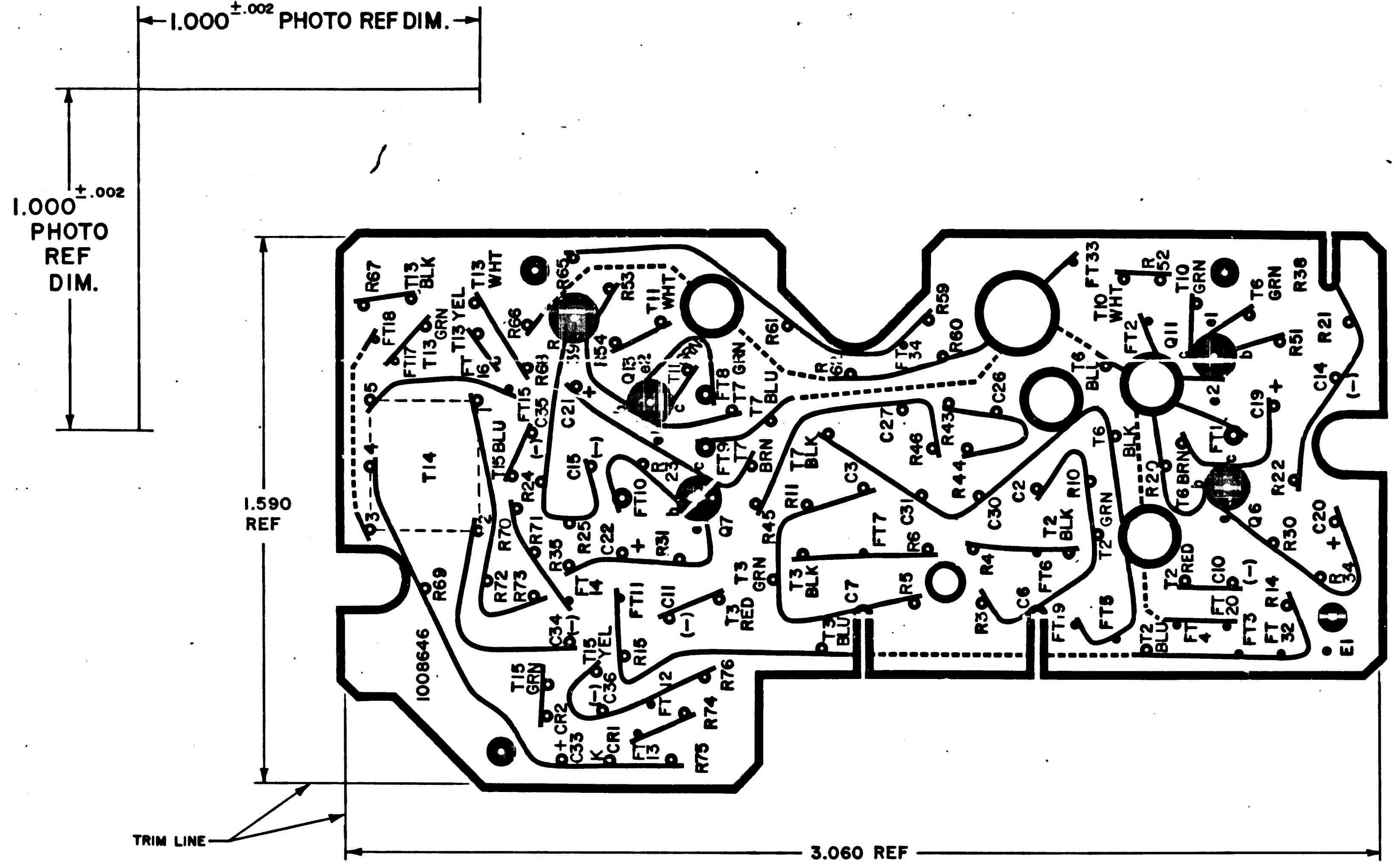
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD C SIGNAL CONDITIONER
CDU RESOLVER

CODE IDENT NO. 80230
SIZE D
1008649
SCALE 5/1
SHEET 1 OF 1

1008650

SYM	ZONE	REVISIONS 24045 DESCRIPTION	CHG NO	DATE	APPD



NOTES:

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2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH.
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN.
4. CUT TO WITHIN .010 OF TRIM LINE.

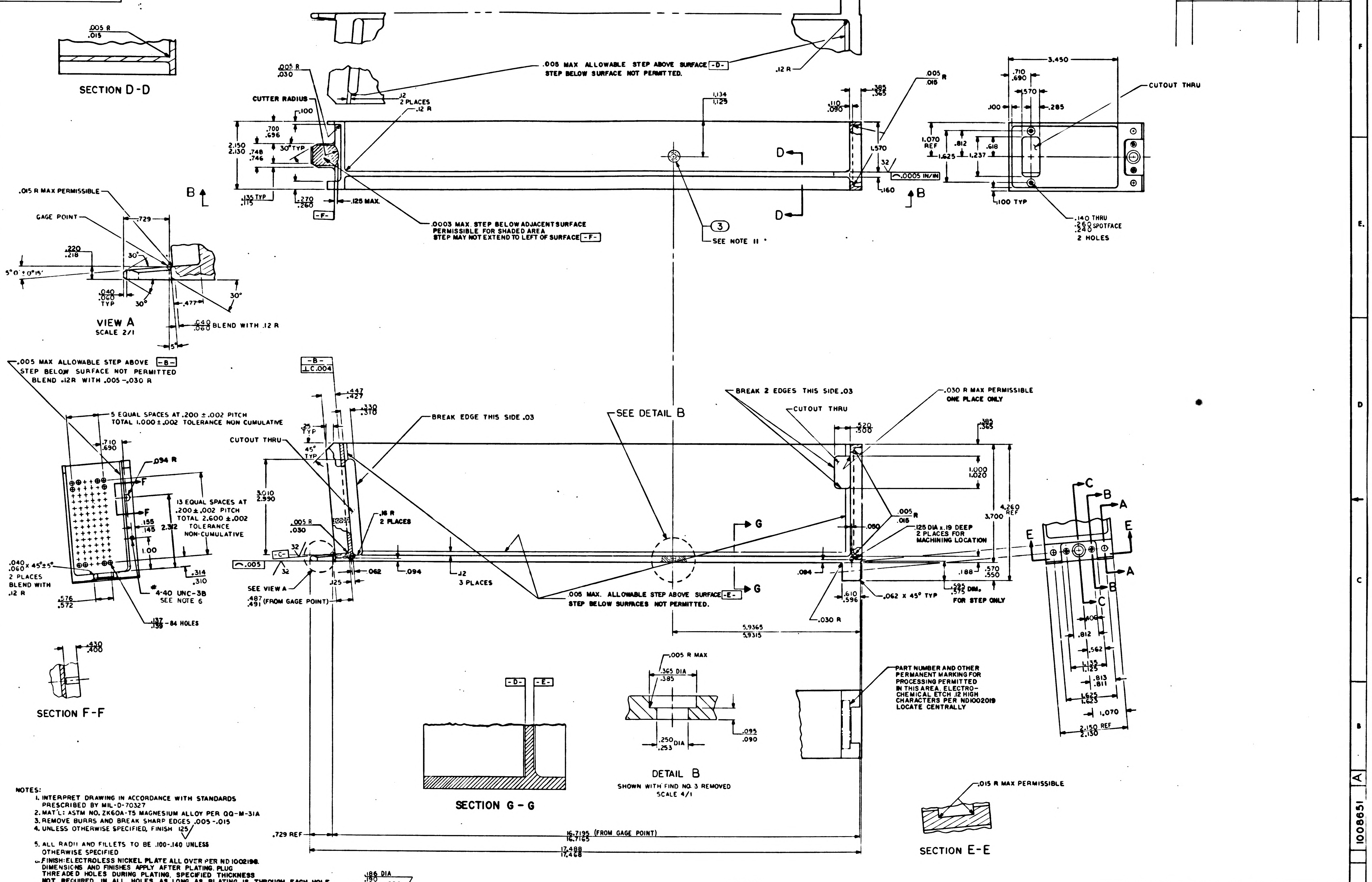
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN M. GRABNER DATE 16 OCT 65 CHECKED J. Holmes 1 NOV 65 APPROVAL E. Zukowski APPROVAL [illegible]	MANNED SPACECRAFT CENTER HOUSTON, TEXAS PHOTOGRAPHIC MASTER WIRING BOARD D SIGNAL CONDITIONER CDU RESOLVER
APPLICATION		DO NOT SCALE THIS DRAWING MATERIAL — CONTRACT NAS 9-497	NASA APPROVAL A. C. METZGER MIT APPROVAL	CODE IDENT NO. 80230 SIZE D 1008650 SCALE 5/1 SHEET 1 OF 1

MIL 10270-P

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

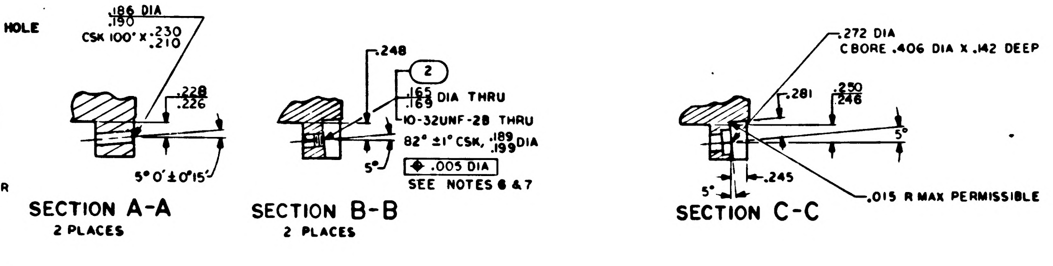
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ



SECTION D-D
.005 R
.015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.005 R
.030
CUTTER RADIUS
.12
2 PLACES
.12 R
.100
.700
.696
2.150
2.130
30° TYP
.748
.746
.135 TYP
.115
.270
.260
-F-
.125 MAX.
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
1.134
1.129
③
SEE NOTE 11
.12 R
.110
.090
.385
.365
.005 R
.015
1.570
.32
.0005 IN/IN
.160
B
D
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 THRU
.260
.240 SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5°0' ± 0°15'
.040
.060 TYP
30°
.477
30°
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .005-.030 R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710
.690
.094 R
F
F
13 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 2.600 ± .002
TOLERANCE NON-CUMULATIVE
.155
.145
2.312
1.00
.040
.060 X 45° ± 5°
2 PLACES
BLEND WITH .12 R
.314
.310
4-40 UNC-3B
SEE NOTE 6
.576
.572
.137
.139 - 84 HOLES
-B-
⊥ C .004
.447
.427
.330
.310
.25 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
3.010
2.990
.005 R
.030
.16 R
2 PLACES
-C-
.005
.32
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125
.062
.094
.12
3 PLACES
SEE DETAIL B
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520
.500
.385
.365
1.000
1.020
3.700
4.260 REF
.005 R
.015
.080
.125 DIA x .19 DEEP
2 PLACES FOR MACHINING LOCATION
G
G
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
.084
.610
.596
.062 X 45° TYP
.188
.570
.550
.595
.575 DIM.
FOR STEP ONLY
.030 R
5.9365
5.9315
C
B
A
E
E
A
B
C
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150 REF
2.130
.430
.400
SECTION F-F
.005 R MAX
.365 DIA
.385
.095
.090
.250 DIA
.253
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
-D-
-E-
SECTION G - G
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 (FROM GAGE POINT)
16.7165
17.488
17.468

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE .100-.140 UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND 1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 AND FIND NO.2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002128 USING CURING METHOD III.



.186 DIA
.190
CSK 100° X .230
.210
.228
.226
5°0' ± 0°15'
SECTION A-A
2 PLACES
.248
②
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189
.199 DIA
⊕ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

FIND NO	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	QTY REQD
3	1010861-24	NUT, SELF-CLINCHING	1
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008651-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ± .02, XXX ± .005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN Weniant DATE 2-FEB-65
CHECKED 4 FEB
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
8/65
NASA APPROVAL 2-4-65
MIT APPROVAL 4 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO
SIZE E
NASA DRAWING NO 1008651
SCALE 1/1
WT
SHEET 1 OF 3

1008651 A

4 FEB 65

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
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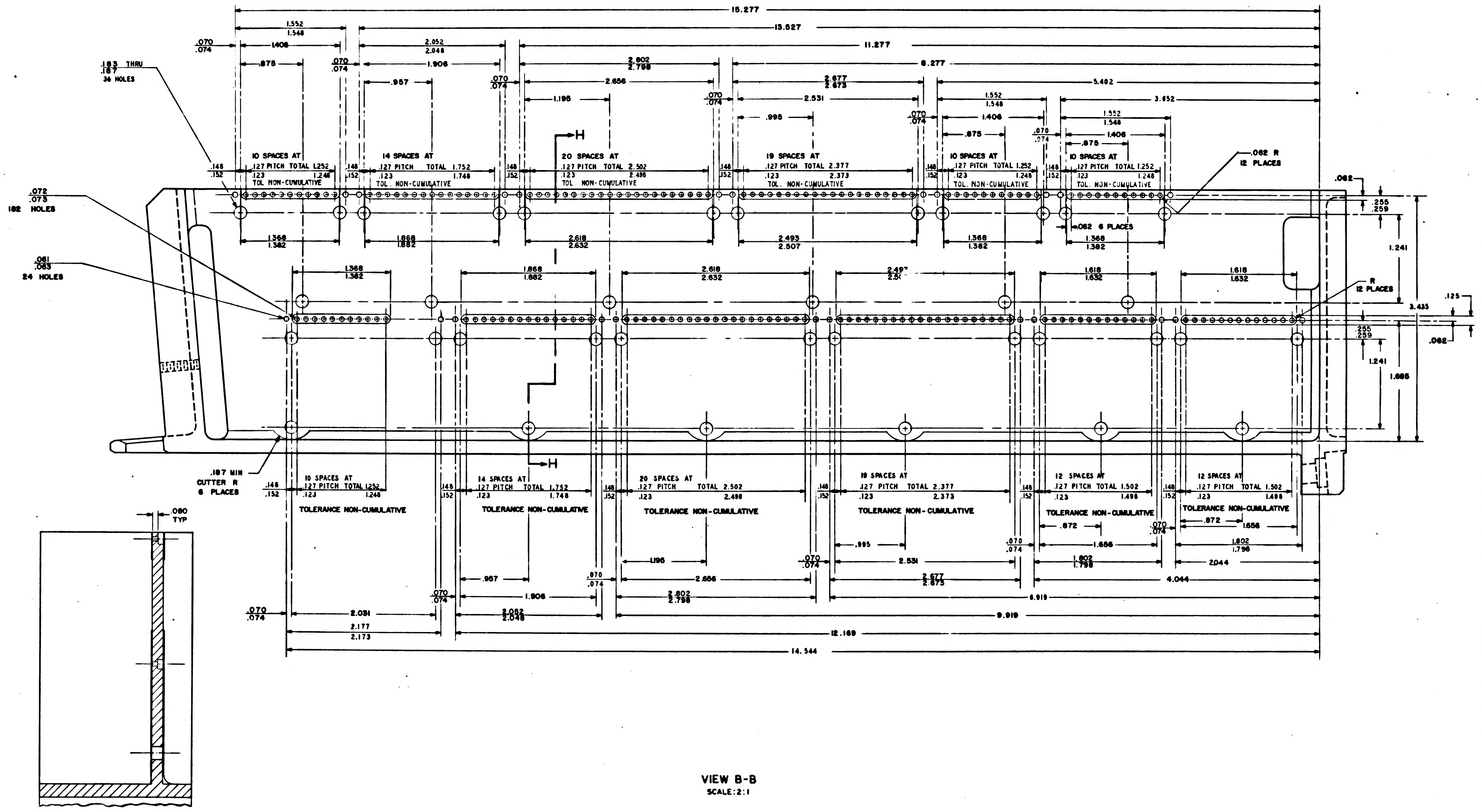

15.277
13.527
11.277
8.277
5.402
3.652
1.552
1.548
1.406
.875
.070
.074
2.052
2.048
1.906
.957
2.802
2.798
2.656
1.195
2.677
2.673
2.531
.995
.183 THRU
.187
36 HOLES
.072
.073
182 HOLES
.061
.063
24 HOLES
10 SPACES AT
.127 PITCH TOTAL 1.252
.123 1.248
TOL. NON-CUMULATIVE
14 SPACES AT
.127 PITCH TOTAL 1.752
.123 1.748
20 SPACES AT
.127 PITCH TOTAL 2.502
.123 2.498
19 SPACES AT
.127 PITCH TOTAL 2.377
.123 2.373
.148
.152
H
1.368
1.382
1.868
1.882
2.618
2.632
2.493
2.507
2.497
1.618
1.632
.062 R
12 PLACES
.062 6 PLACES
R
12 PLACES
.062
.255
.259
1.241
3.435
.125
1.685
.187 MIN
CUTTER R
6 PLACES
12 SPACES AT
.127 PITCH TOTAL 1.502
.123 1.498
TOLERANCE NON-CUMULATIVE
.872
1.656
1.802
1.798
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177
2.173
.080
TYP

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN M. Graham DATE 2-FEB 65
CHECKED 4 FEB 65
APPROVAL 4 Feb 65
APPROVAL 4 FEB 65
NASA APPROVAL 2-9-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

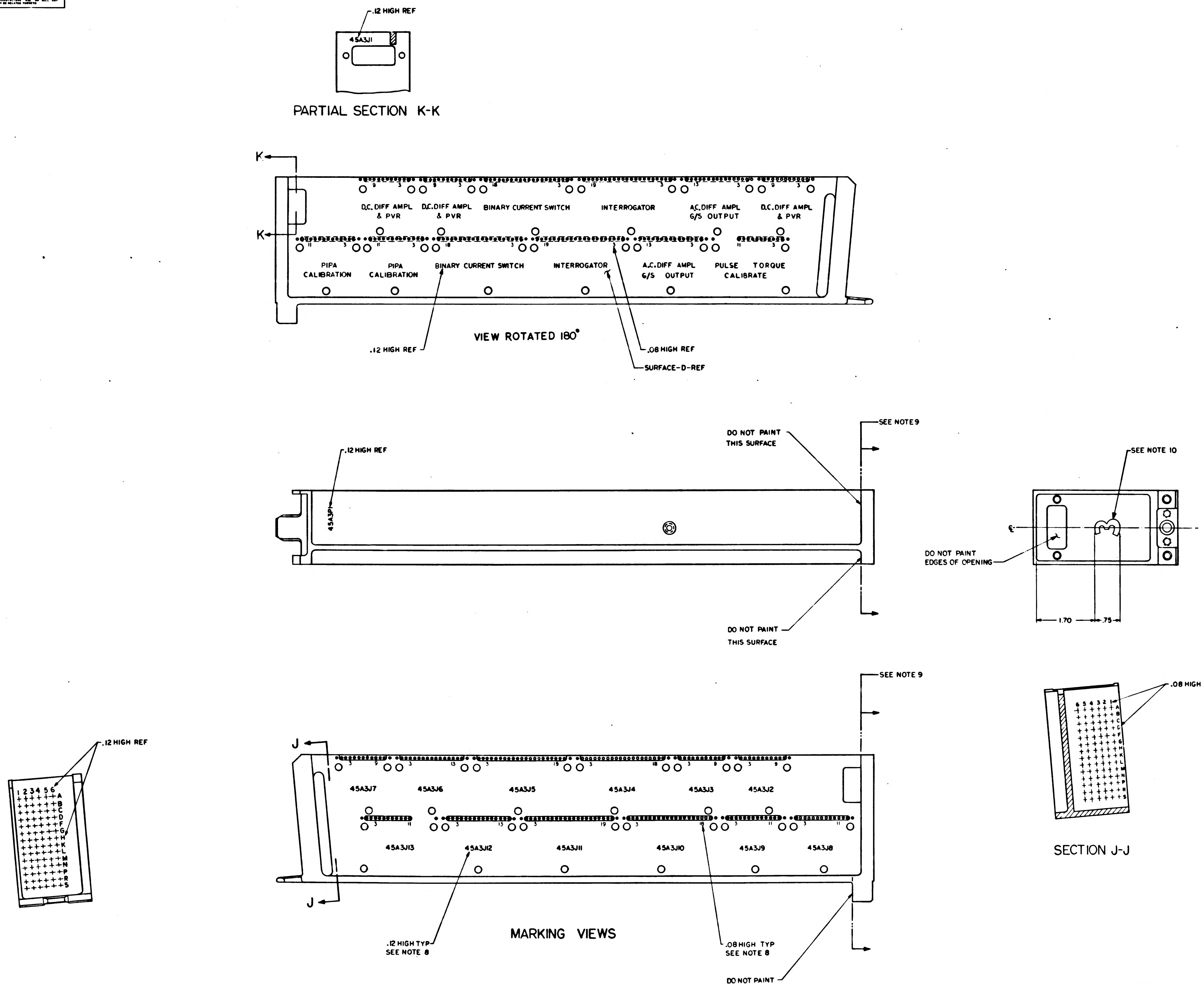
CODE IDENT NO. | SIZE E | NASA DRAWING NO 1008651
SCALE 2/1 | WT | SHEET 2 OF 3

1008651 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ


.12 HIGH REF
45A3J1
PARTIAL SECTION K-K
K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
PIPA CALIBRATION
PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE TORQUE CALIBRATE
VIEW ROTATED 180°
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF
SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE
SEE NOTE 10
DO NOT PAINT EDGES OF OPENING
1.70
.75
SEE NOTE 9
.12 HIGH REF
1 2 3 4 5 6
A B C D F G H K L M N P R S
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
J
MARKING VIEWS
.12 HIGH TYP SEE NOTE 8
.08 HIGH TYP SEE NOTE 8
DO NOT PAINT THIS SURFACE
.08 HIGH REF
6 5 4 3 2 1
A B C D F G H K L M N P R S
SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

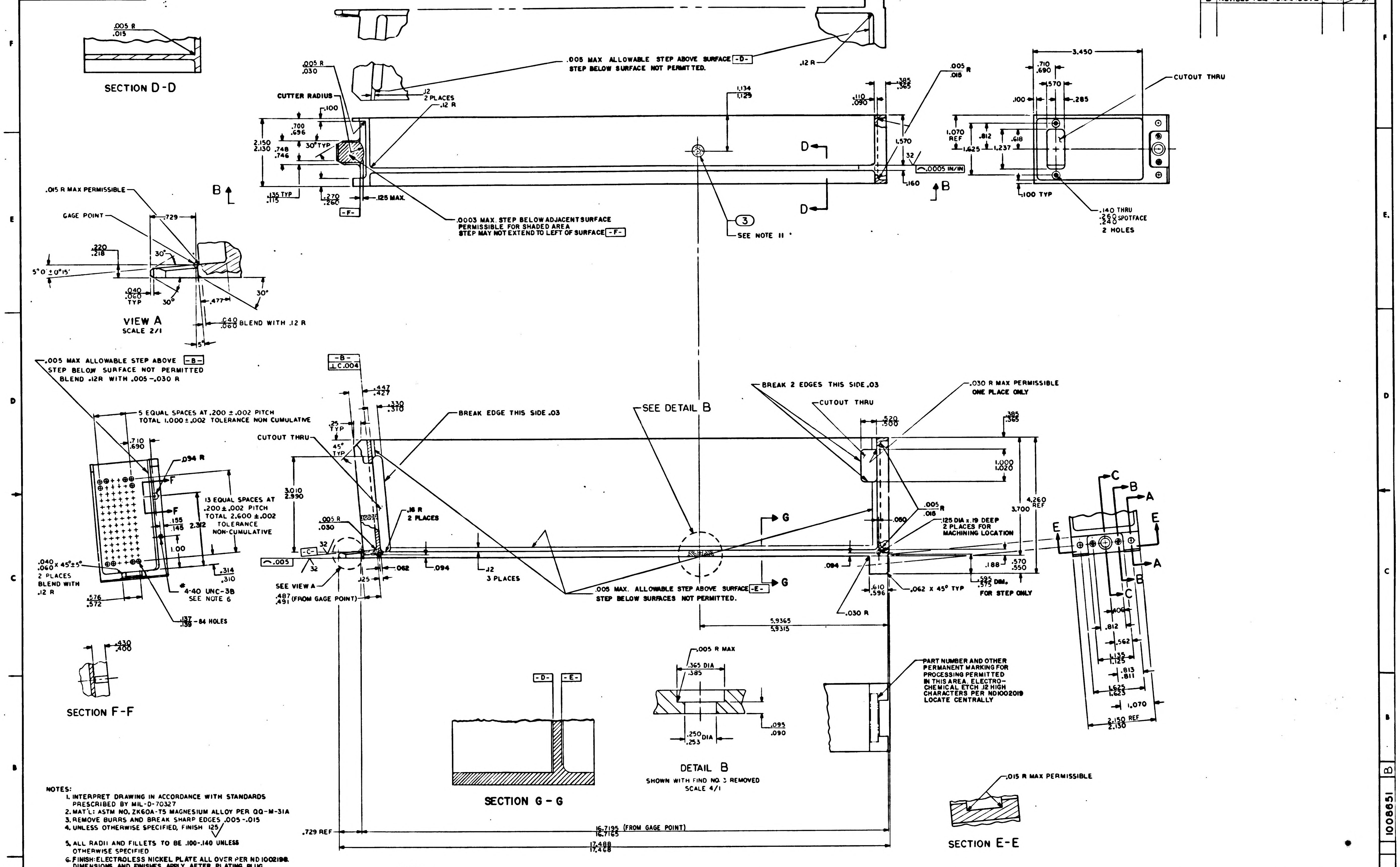
DRAWN M. Graham DATE 2 FEB 65
CHECKED 4 FEB 65
APPROVAL P.C. Quinn 4 FEB 65
APPROVAL 4 FEB 65
-18/65
NASA APPROVAL 2-4-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

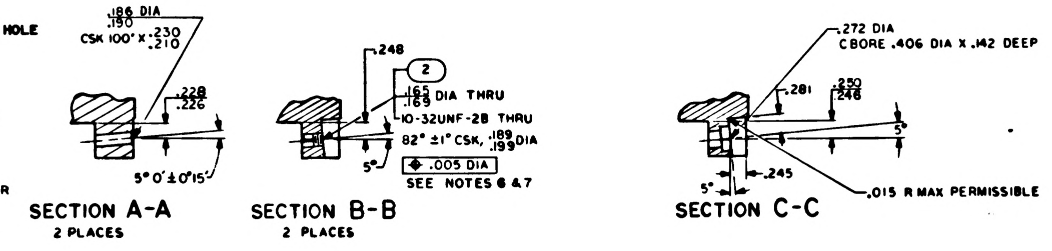
FRAME,
TRAY 3

CODE IDENT NO. | SIZE E | NASA DRAWING NO 1008651
SCALE 1/1 | WT | SHEET 3 OF 3

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ
B	REVISED PER TDRR 18692	6 MAY 65	JRS



SECTION D-D
.005 R
.015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
CUTTER RADIUS
.12 2 PLACES
.12 R
CUTOUT THRU
3.450
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.125 MAX.
SEE NOTE 11
.140 THRU .260 .240 SPOTFACE 2 HOLES
.100 TYP
.015 R MAX PERMISSIBLE
GAGE POINT
VIEW A
SCALE 2/1
BLEND WITH .12 R
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .005-.030 R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
13 EQUAL SPACES AT .200 ± .002 PITCH TOTAL 2.600 ± .002 TOLERANCE NON-CUMULATIVE
4-40 UNC-3B SEE NOTE 6
.137 .139 - 84 HOLES
CUTOUT THRU
BREAK EDGE THIS SIDE .03
SEE DETAIL B
BREAK 2 EDGES THIS SIDE .03
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.125 DIA x .19 DEEP 2 PLACES FOR MACHINING LOCATION
.062 x 45° TYP
FOR STEP ONLY
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
SEE VIEW A
.487 .491 (FROM GAGE POINT)
5.9365 5.9315
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
.729 REF
SECTION F-F
SECTION G-G
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION E-E
.015 R MAX PERMISSIBLE



.186 DIA .190 CSK 100° x .230 .210
SECTION A-A
2 PLACES
.162 .165 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
C'BORE .406 DIA x .142 DEEP
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125✓
5. ALL RADII AND FILLETS TO BE .100-.140 UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATED SURFACE MUST BE CONTINUOUS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008651-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

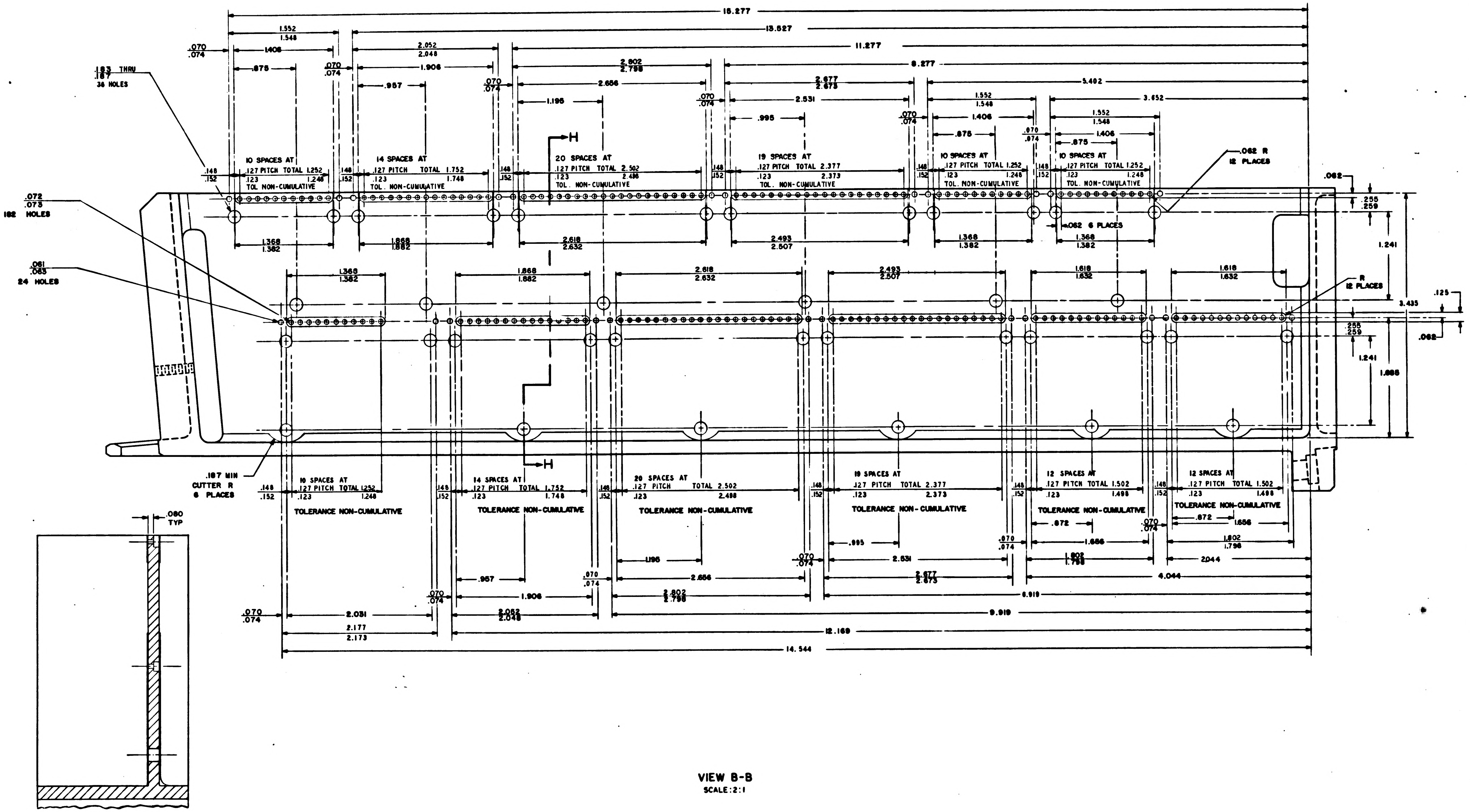
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Wenisch DATE 2-FEB-65
CHECKED 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 FEB 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008651
SCALE 1/1
WT
SHEET 1 OF 3

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ
B	REVISED PER TDRR 18692	MAY 65	JES MEM


15.277
13.527
11.277
8.277
5.402
3.652
1.552
1.548
1.406
.875
.070
.074
2.052
2.048
1.906
.957
2.802
2.798
2.656
1.195
2.677
2.673
2.531
.995
.183 THRU
.187
36 HOLES
10 SPACES AT
.127 PITCH TOTAL 1.252
.123 1.248
TOL NON-CUMULATIVE
14 SPACES AT
.127 PITCH TOTAL 1.752
.123 1.748
TOL. NON-CUMULATIVE
20 SPACES AT
.127 PITCH TOTAL 2.502
.123 2.498
TOL. NON-CUMULATIVE
19 SPACES AT
.127 PITCH TOTAL 2.377
.123 2.373
TOL. NON-CUMULATIVE
.148
.152
H
.062 R
12 PLACES
.062
.255
.259
.072
.073
182 HOLES
1.368
1.382
1.868
1.882
2.618
2.632
2.493
2.507
.062 6 PLACES
1.241
.061
.063
24 HOLES
1.618
1.632
R
12 PLACES
3.435
.125
.062
1.241
1.885
.187 MIN
CUTTER R
6 PLACES
10 SPACES AT
.127 PITCH TOTAL 1.252
.123 1.248
TOLERANCE NON-CUMULATIVE
14 SPACES AT
.127 PITCH TOTAL 1.752
.123 1.748
TOLERANCE NON-CUMULATIVE
20 SPACES AT
.127 PITCH TOTAL 2.502
.123 2.498
TOLERANCE NON-CUMULATIVE
19 SPACES AT
.127 PITCH TOTAL 2.377
.123 2.373
TOLERANCE NON-CUMULATIVE
12 SPACES AT
.127 PITCH TOTAL 1.502
.123 1.498
TOLERANCE NON-CUMULATIVE
.872
1.656
1.802
1.798
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177
2.173
.080
TYP

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN M. Graham DATE 2-FEB 65
CHECKED 4 FEB 65
APPROVAL 4 Feb 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL (1) 2-4-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO. 80230 SIZE E NASA DRAWING NO 1008651
SCALE 2/1 WT SHEET 2 OF 3

1008651 B

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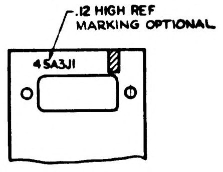
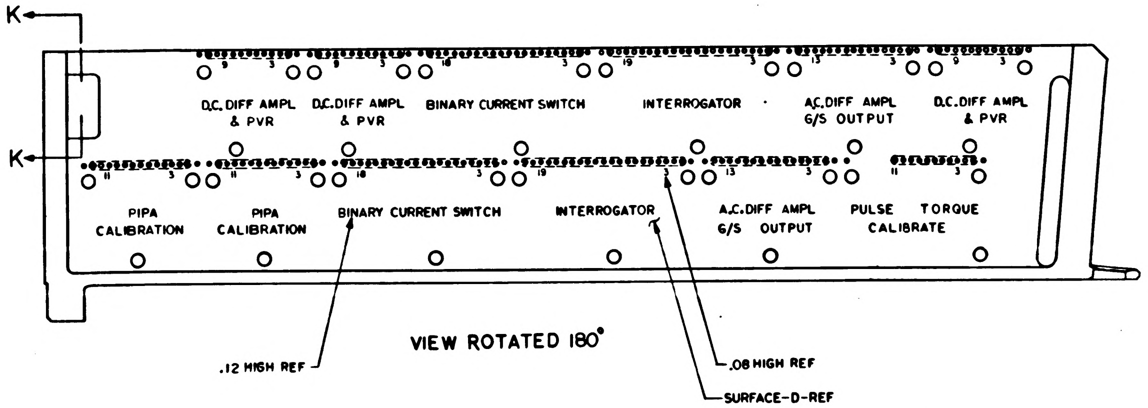
REVISIONS

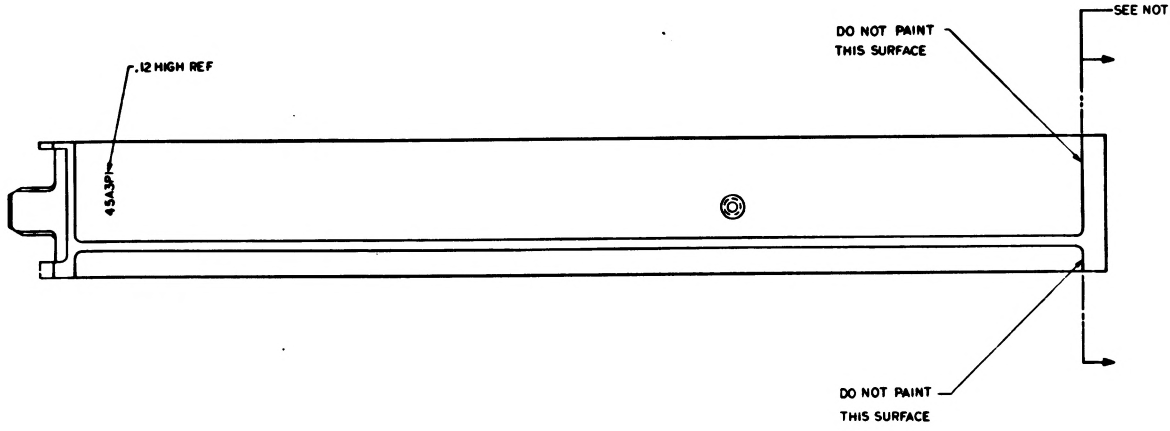
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ
B	REVISED PER TDRR 18692	10 MAY 65	JRS MEN

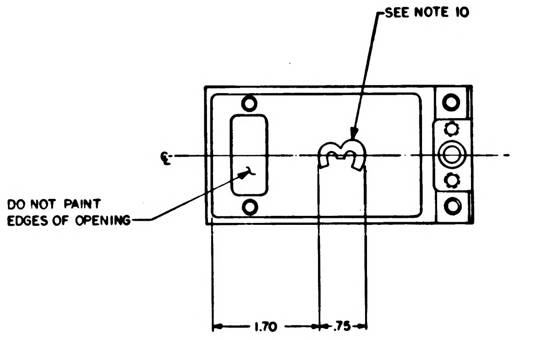

.12 HIGH REF
MARKING OPTIONAL
45A3J1

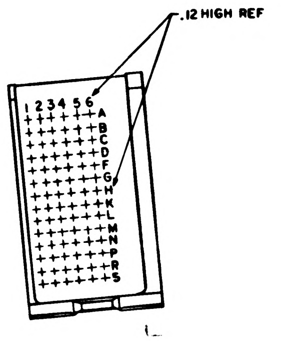
PARTIAL SECTION K-K

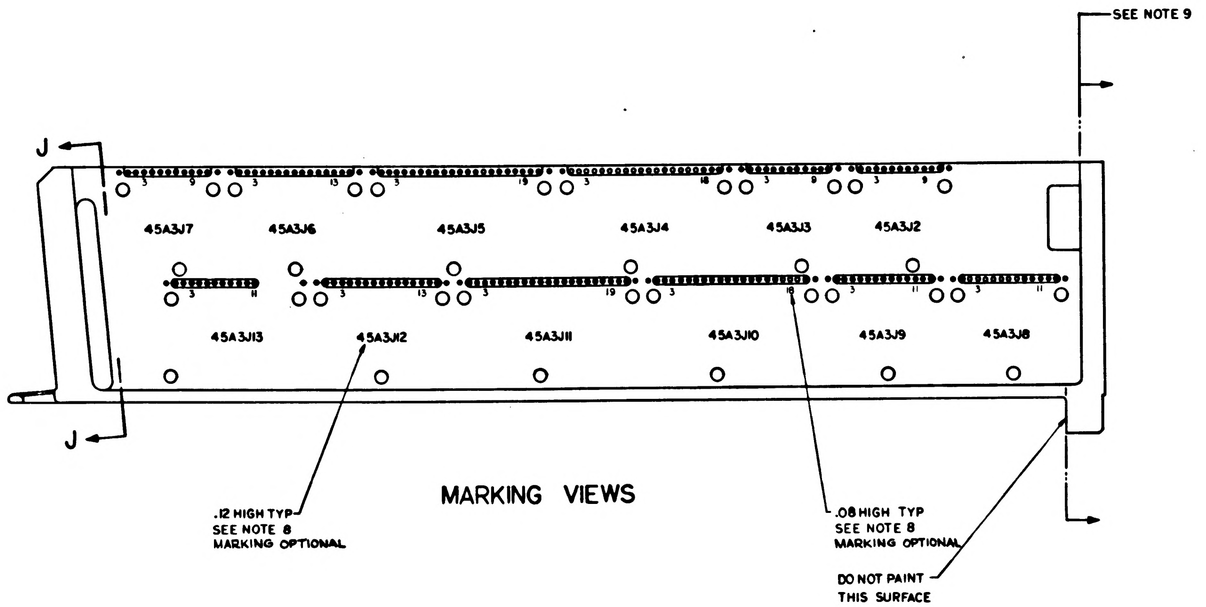

K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
PIPA CALIBRATION
PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE TORQUE CALIBRATE
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF

VIEW ROTATED 180°

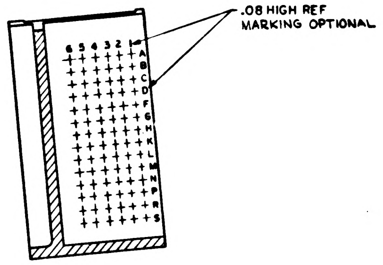

SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE


SEE NOTE 10
℄
DO NOT PAINT EDGES OF OPENING
1.70
.75


.12 HIGH REF
1 2 3 4 5 6
A B C D F G H K L M N P R S


SEE NOTE 9
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
MARKING OPTIONAL
6 5 4 3 2 1
A B C D F G H K L M N P R S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN M. Graham DATE 3 FEB 65
CHECKED 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

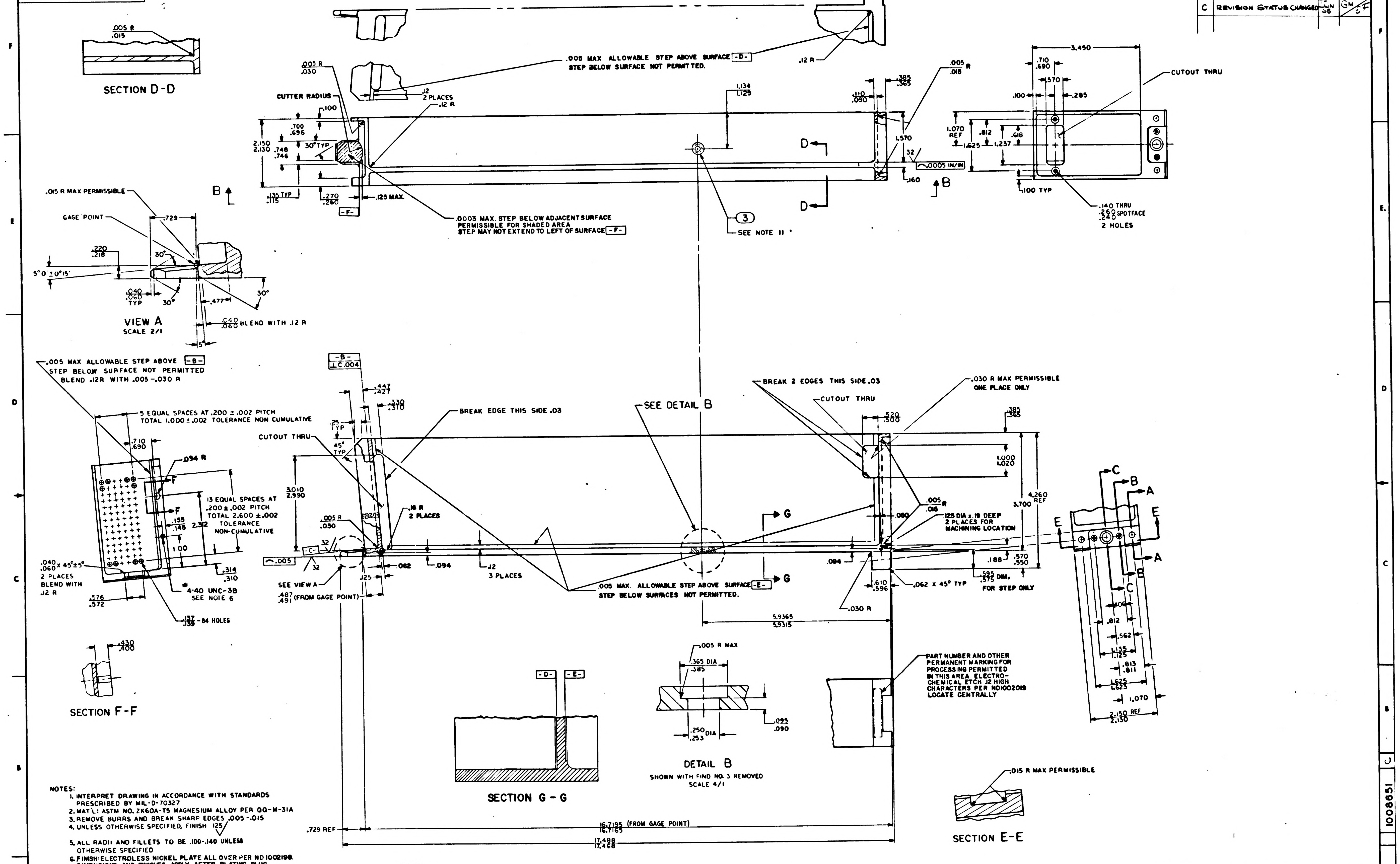
FRAME,
TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008651
SCALE 1/1
WT
SHEET 3 OF 3

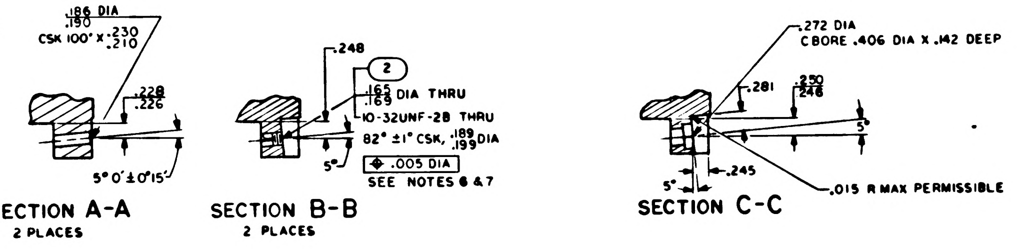
1008651 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ
B	REVISED PER TDRR 18692	6 MAY 65	JRS
C	REVISION STATUS CHANGED	JUN 65	GM


SECTION D-D
.005 R
.015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED
.12 R
.005 R
.030
CUTTER RADIUS
.12
2 PLACES
.12 R
.100
.700
.696
30° TYP
2.150
2.130
.748
.746
.135 TYP
.115
.270
.260
.125 MAX.
-F-
1.134
1.129
.110
.090
.385
.365
.005 R
.015
1.570
32
.0005 IN/IN
.160
D
B
.0003 MAX STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
3
SEE NOTE 11
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 THRU
.260
.240 SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5° 0' ± 0° 15'
.040
.060 TYP
30°
.477
30°
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .005-.030 R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.710
.690
.094 R
F
13 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 2.600 ± .002
TOLERANCE
NON-CUMULATIVE
.155
.145
2.312
1.00
.040
.060 X 45° ± 5°
2 PLACES
BLEND WITH
.12 R
.576
.572
.314
.310
4-40 UNC-3B
SEE NOTE 6
.137
.139 -84 HOLES
-B-
⊥ C .004
.447
.427
.330
.310
.25 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
3.010
2.990
.005 R
.030
.16 R
2 PLACES
.005
-C-
32
SEE VIEW A
.125
.062
.094
.12
3 PLACES
.487
.491 (FROM GAGE POINT)
SEE DETAIL B
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.520
.500
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.385
.365
1.000
1.020
3.700
4.260 REF
.005 R
.015
.080
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
G
.094
.188
.570
.550
.595
.575 DIM.
FOR STEP ONLY
.610
.596
.062 X 45° TYP
.005 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
.030 R
5.9365
5.9315
C
B
A
E
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150 REF
2.130
.430
.400
SECTION F-F
-D-
-E-
SECTION G-G
.005 R MAX
.365 DIA
.385
.250
.253 DIA
.095
.090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 (FROM GAGE POINT)
16.7165
17.488
17.468

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE .100-.140 UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 AND FIND NO.2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002128 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATED SURFACE MUST BE CONTINUOUS.


.186 DIA
.190
CSK 100° x .230
.210
.228
.226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165
.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189
.199 DIA
.005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.248
5°
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008651-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007533	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
Contract NAS 9-497

DRAWN Weissert DATE 2-FEB-65
CHECKED 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
4/8/65
NASA APPROVAL 2-4-65
MIT APPROVAL 4 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

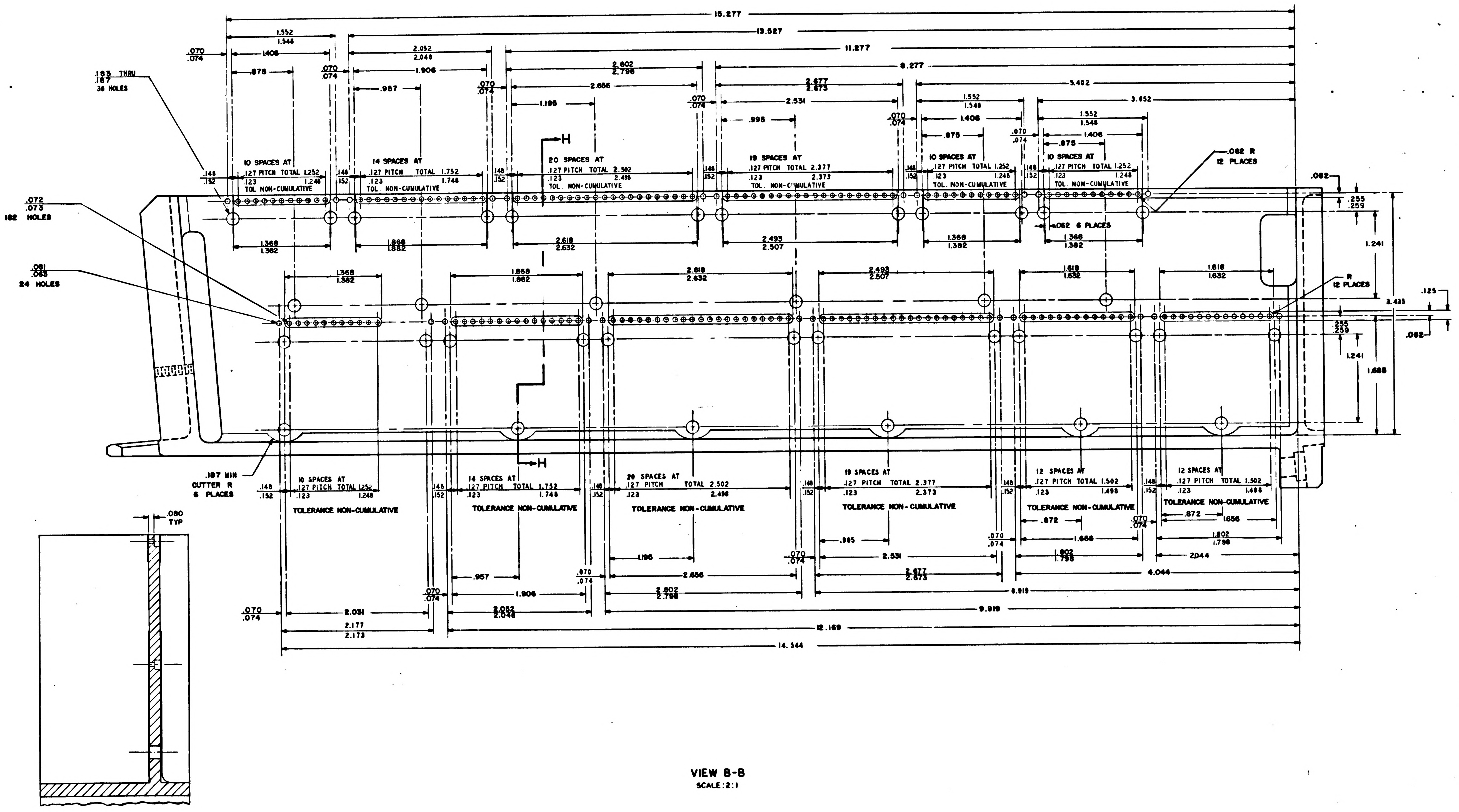
CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008651
SCALE 1/1
WT
SHEET 1 OF 3

1008651

4 FEB 65

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ
B	REVISED PER TDRR 18692	MAY 65	JRS MEM
C	REVISION STATUS CHANGED	7 JUN 65	GM


15.277
13.527
11.277
9.277
5.492
3.652
1.552
1.548
2.052
2.048
2.802
2.798
2.677
2.673
.070
.074
1.406
.875
1.906
.957
2.656
1.195
2.531
.995
.183 THRU
.187
36 HOLES
.072
.075
182 HOLES
.081
.063
24 HOLES
.148
.152
10 SPACES AT
.127 PITCH TOTAL 1.252
.123
1.248
TOL NON-CUMULATIVE
14 SPACES AT
.127 PITCH TOTAL 1.752
1.748
20 SPACES AT
.127 PITCH TOTAL 2.502
2.498
19 SPACES AT
.127 PITCH TOTAL 2.377
2.373
12 SPACES AT
.127 PITCH TOTAL 1.502
1.498
TOLERANCE NON-CUMULATIVE
.062 R
12 PLACES
.062 6 PLACES
R
12 PLACES
.062
.255
.259
1.241
3.435
1.685
.125
1.368
1.382
1.868
1.882
2.618
2.632
2.493
2.507
1.618
1.632
.187 MIN
CUTTER R
6 PLACES
H
.080
TYP
.872
1.656
1.802
1.798
2.044
4.044
6.919
9.919
12.169
14.544
2.031
2.177
2.173

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN M. Graham DATE 2 FEB 65
CHECKED 4 FEB 65
APPROVAL R. Ceria 4 FEB 65
APPROVAL 4 FEB 65
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

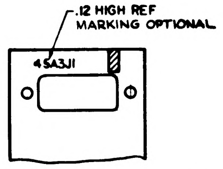
FRAME,
TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008651
SCALE 2/1
WT
SHEET 2 OF 3

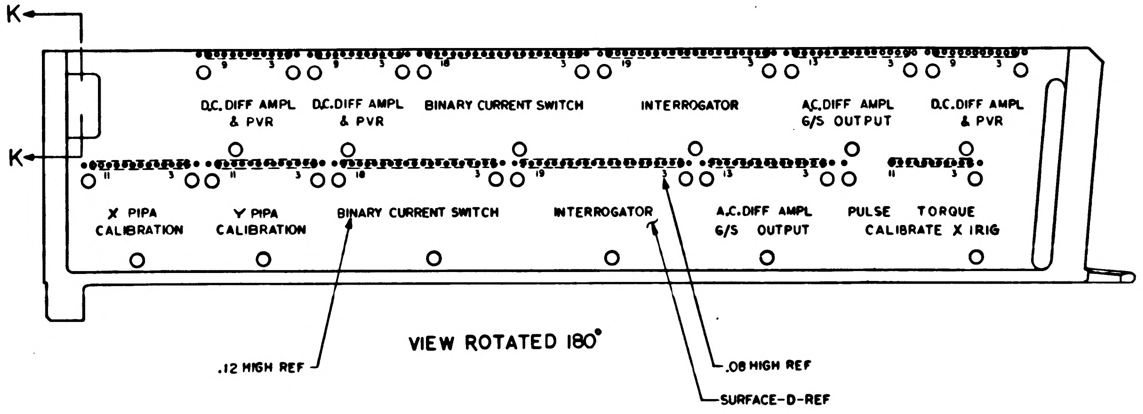
1008651 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

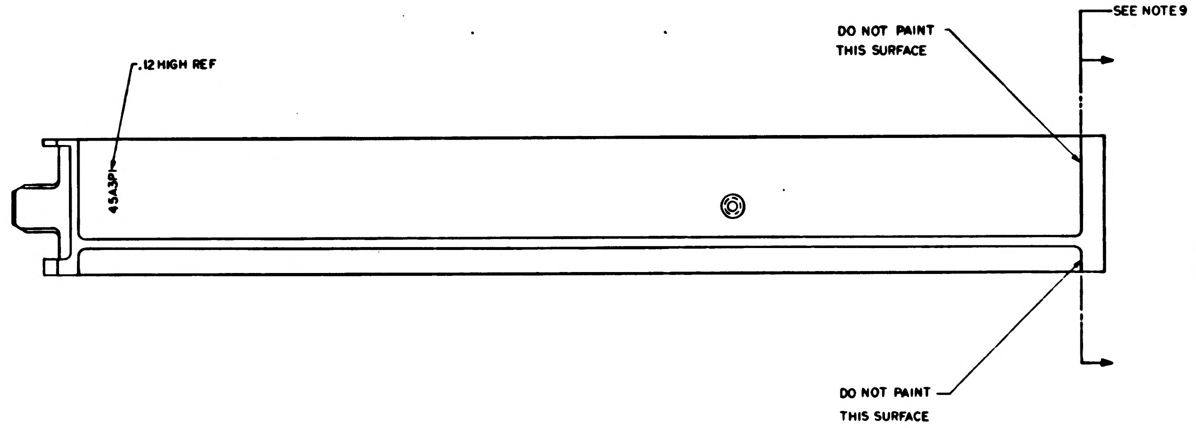
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18534	26 APR 65	RJJ
B	REVISED PER TDRR 18692	MAY 65	JRS
C	REVISED PER TDRR 19797	7 JUN 65	GM

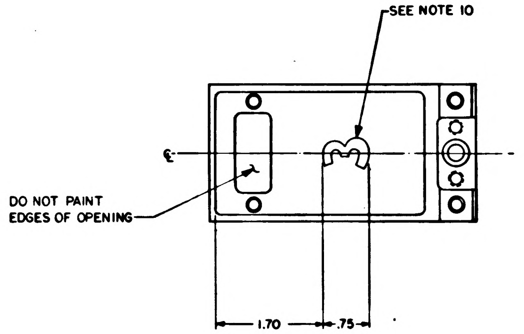

.12 HIGH REF
MARKING OPTIONAL
45A3J1

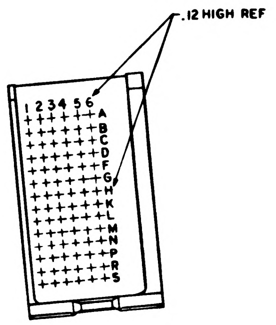
PARTIAL SECTION K-K

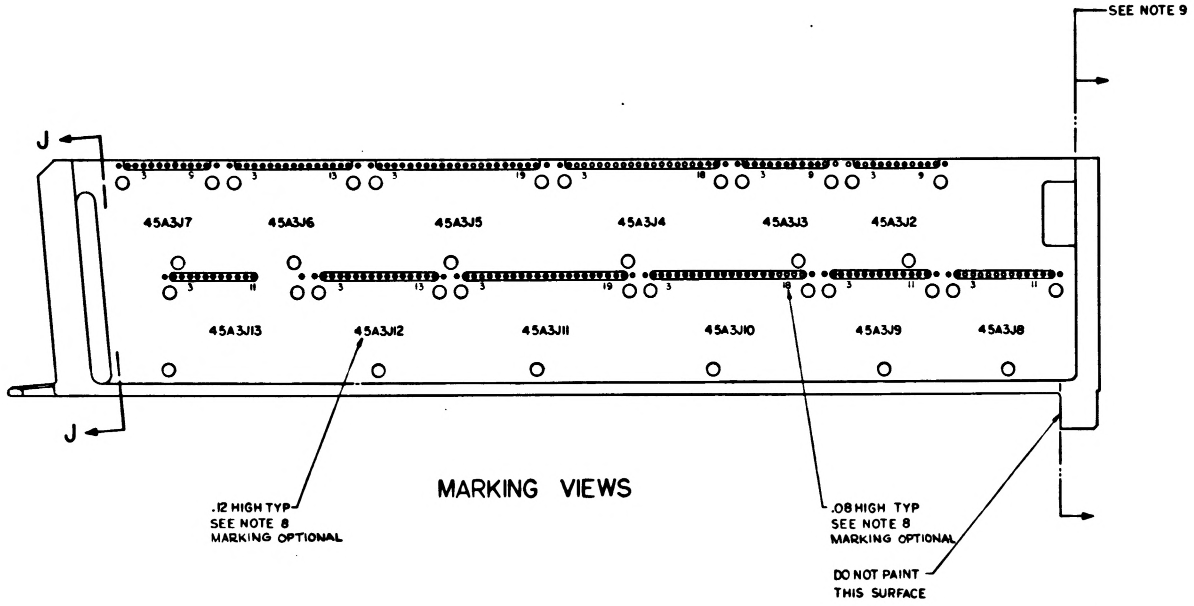

K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
X PIPA CALIBRATION
Y PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE CALIBRATE
TORQUE X IRIG
9
3
18
19
13
11
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF

VIEW ROTATED 180°

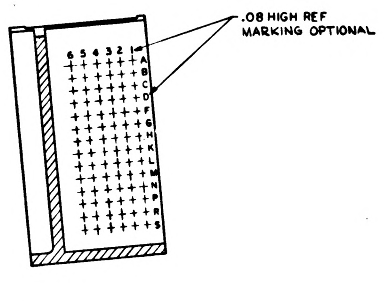

SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE


SEE NOTE 10
℄
DO NOT PAINT EDGES OF OPENING
1.70
.75


.12 HIGH REF
1 2 3 4 5 6
A
B
C
D
E
F
G
H
K
L
M
N
P
R
S


SEE NOTE 9
J
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
.12 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
.08 HIGH TYP
SEE NOTE 8
MARKING OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS


.08 HIGH REF
MARKING OPTIONAL
6 5 4 3 2 1
A
B
C
D
E
F
G
H
K
L
M
N
P
R
S

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN M. Graham DATE 3 FEB 65
CHECKED 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
-/8/65
NASA APPROVAL 2-4-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

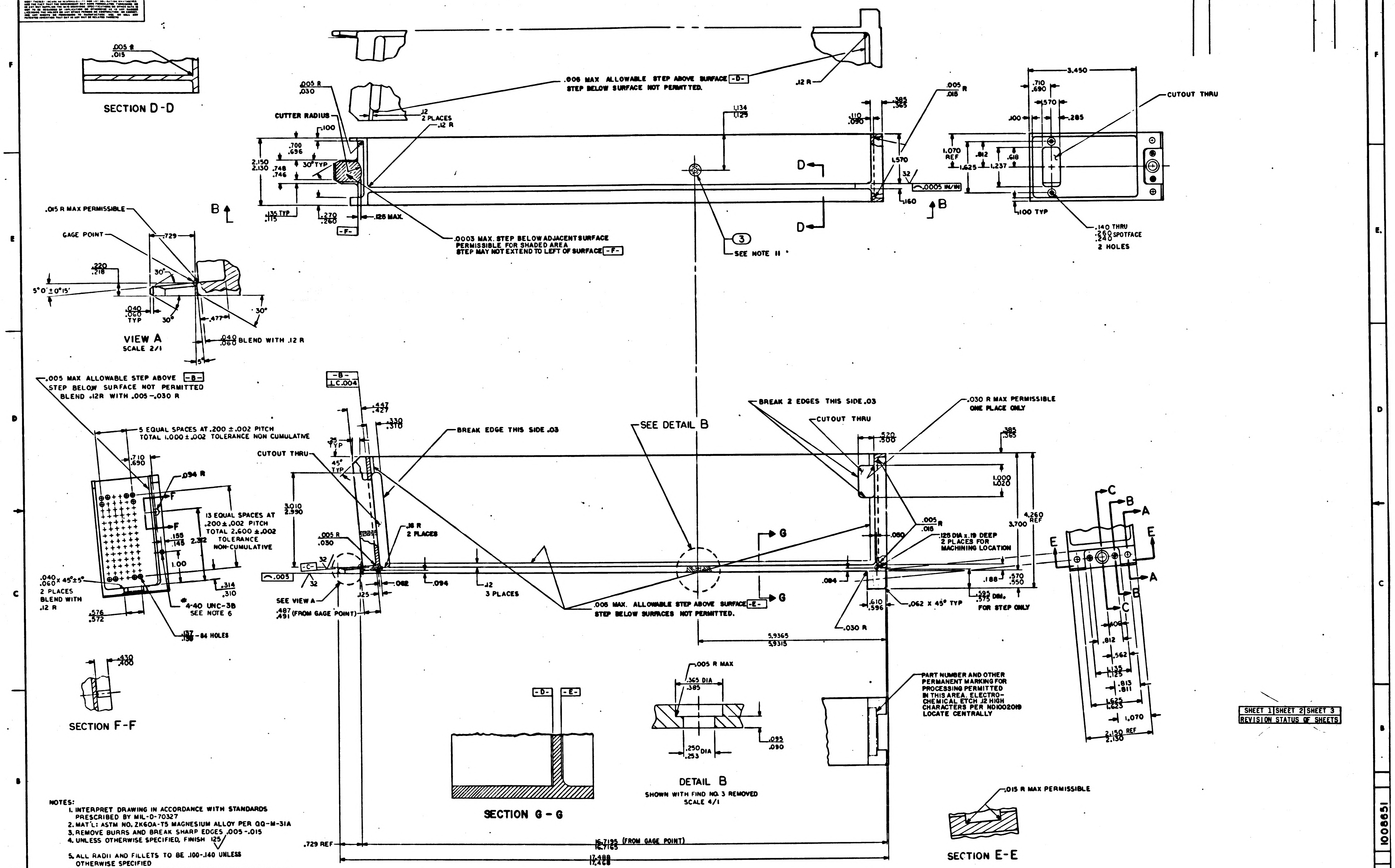
FRAME,
TRAY 3

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008651
SCALE 1/1
WT
SHEET 3 OF 3

1008651
C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

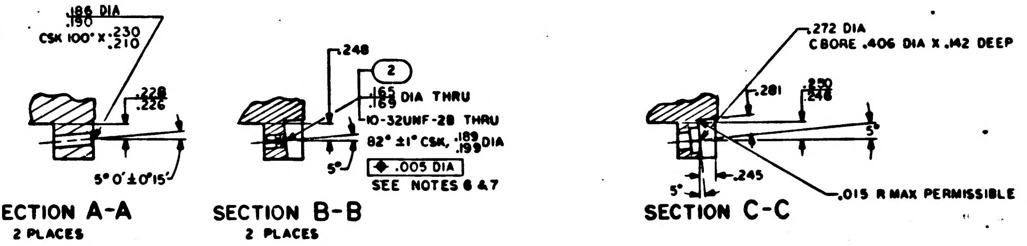
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



SECTION D-D
.005 R
.015
VIEW A
SCALE 2/1
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
5° 0' ± 0° 15'
.040
.060
TYP
30°
.477
.040
.060 BLEND WITH .12 R
.005 R
.030
CUTTER RADIUS
.100
.700
.696
2.150
2.130
.748
.746
30° TYP
.135 TYP
.115
.270
.260
-F-
.125 MAX.
.12
2 PLACES
.12 R
.006 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
1.134
1.129
.0003 MAX. STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
3
SEE NOTE 11
.12 R
.110
.090
.385
.365
.005
.015 R
1.570
32
.0005 IN/IN
.160
B
D
3.450
.710
.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.100 TYP
.140 THRU
.260
.240 SPOTFACE
2 HOLES
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12R WITH .005-.030 R
5 EQUAL SPACES AT .200 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON CUMULATIVE
.094 R
13 EQUAL SPACES AT
.200 ± .002 PITCH
TOTAL 2.600 ± .002
TOLERANCE
NON-CUMULATIVE
.155
.145
2.312
1.00
.314
.310
.040
.060 x 45° ± 5°
2 PLACES
BLEND WITH
.12 R
.576
.572
4-40 UNC-3B
SEE NOTE 6
.137
.138 - 84 HOLES
SECTION F-F
.430
.400
-B-
⊥ C .004
.447
.427
.330
.310
.25 TYP
45° TYP
CUTOUT THRU
BREAK EDGE THIS SIDE .03
3.010
2.990
.005 R
.030
.16 R
2 PLACES
-C-
.003
32
SEE VIEW A
.487
.491 (FROM GAGE POINT)
.125
.062
.094
.12
3 PLACES
SEE DETAIL B
.006 MAX. ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACES NOT PERMITTED.
G
BREAK 2 EDGES THIS SIDE .03
CUTOUT THRU
.520
.500
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.385
.365
1.000
1.020
3.700
4.260 REF
.005
.015
.080
.125 DIA x .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.084
.610
.596
.062 x 45° TYP
.188
.570
.550
.595
.575 DIM.
FOR STEP ONLY
.030 R
5.9365
5.9315
C
B
A
E
.400
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150 REF
2.130
.005 R MAX
.365 DIA
.385
.250 DIA
.253
.095
.090
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
-D-
-E-
SECTION G-G
PART NUMBER AND OTHER
PERMANENT MARKING FOR
PROCESSING PERMITTED
IN THIS AREA. ELECTRO-
CHEMICAL ETCH .12 HIGH
CHARACTERS PER ND1002019
LOCATE CENTRALLY
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 (FROM GAGE POINT)
16.7165
17.488
17.468

SHEET 1	SHEET 2	SHEET 3
REVISION STATUS OF SHEETS		

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE .100-.140 UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 AND FIND NO. 2 WITH MIL-P-8585 ZINC CHROMATE PRIMER.
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002128 USING CURING METHOD III.



.186 DIA
.190
CSK 100° x .230
.210
.228
.226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.162
.165 DIA THRU
10-32UNF-2B THRU
82° ± 1° CSK, .189
.199 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
5°
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA x .142 DEEP
.281
.250
.248
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008851-001	FRAME, TRAY	1
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007835	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02, XXX ±.005 — ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN Weissert DATE 2-FEB-65
CHECKED Zapler 4 FEB 65
APPROVAL R. Ostberg 4 FEB 65
APPROVAL 4 FEB 65
A. R. Test 2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 FEB 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

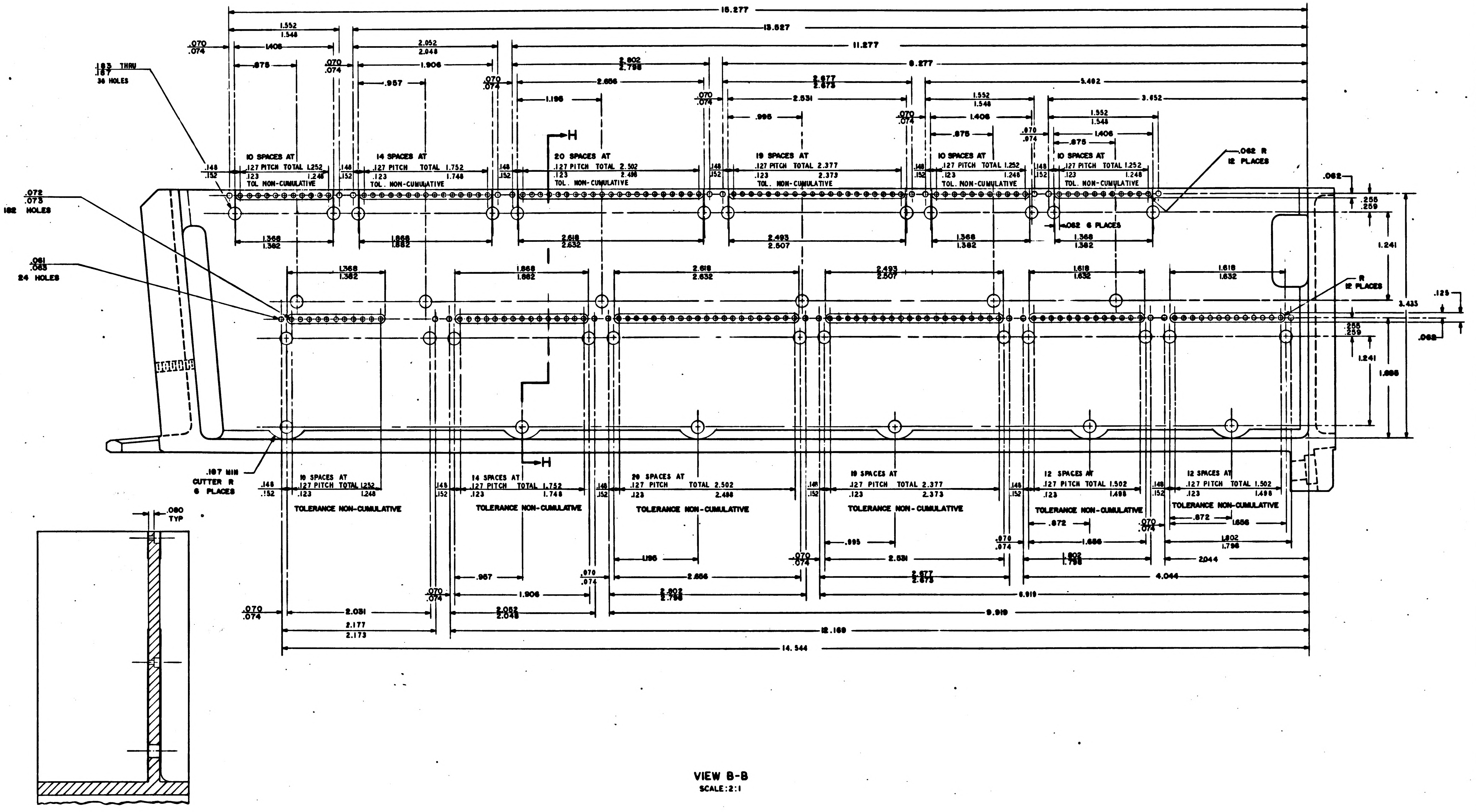
CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008651
SCALE 1/1 | WT | SHEET 1 OF 3

1008651

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL


.183 THRU
.187
36 HOLES
.072
.075
182 HOLES
.061
.063
24 HOLES
.062 R
12 PLACES
R
12 PLACES
.062 6 PLACES
.167 MIN
CUTTER R
6 PLACES
15.277
13.527
11.277
9.277
5.402
3.652
14.544
12.169
9.919
6.919
4.044
2.044
10 SPACES AT .127 PITCH TOTAL 1.252 1.248
14 SPACES AT .127 PITCH TOTAL 1.752 1.748
20 SPACES AT .127 PITCH TOTAL 2.502 2.498
19 SPACES AT .127 PITCH TOTAL 2.377 2.373
12 SPACES AT .127 PITCH TOTAL 1.502 1.498
TOL. NON-CUMULATIVE
TOLERANCE NON-CUMULATIVE
H
H
.080
TYP

VIEW B-B
SCALE: 2:1

SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ⧣ DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL ⧣
HEAT TREATMENT ⧣
FINAL FINISH ⧣

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO Contract NAS 9-497
DRAWN M. Gerber DATE 2-4-65
CHECKED Zaber 4 FEB 65
APPROVAL R. Dionne 4 Feb 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL W J Rhine 2-9-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

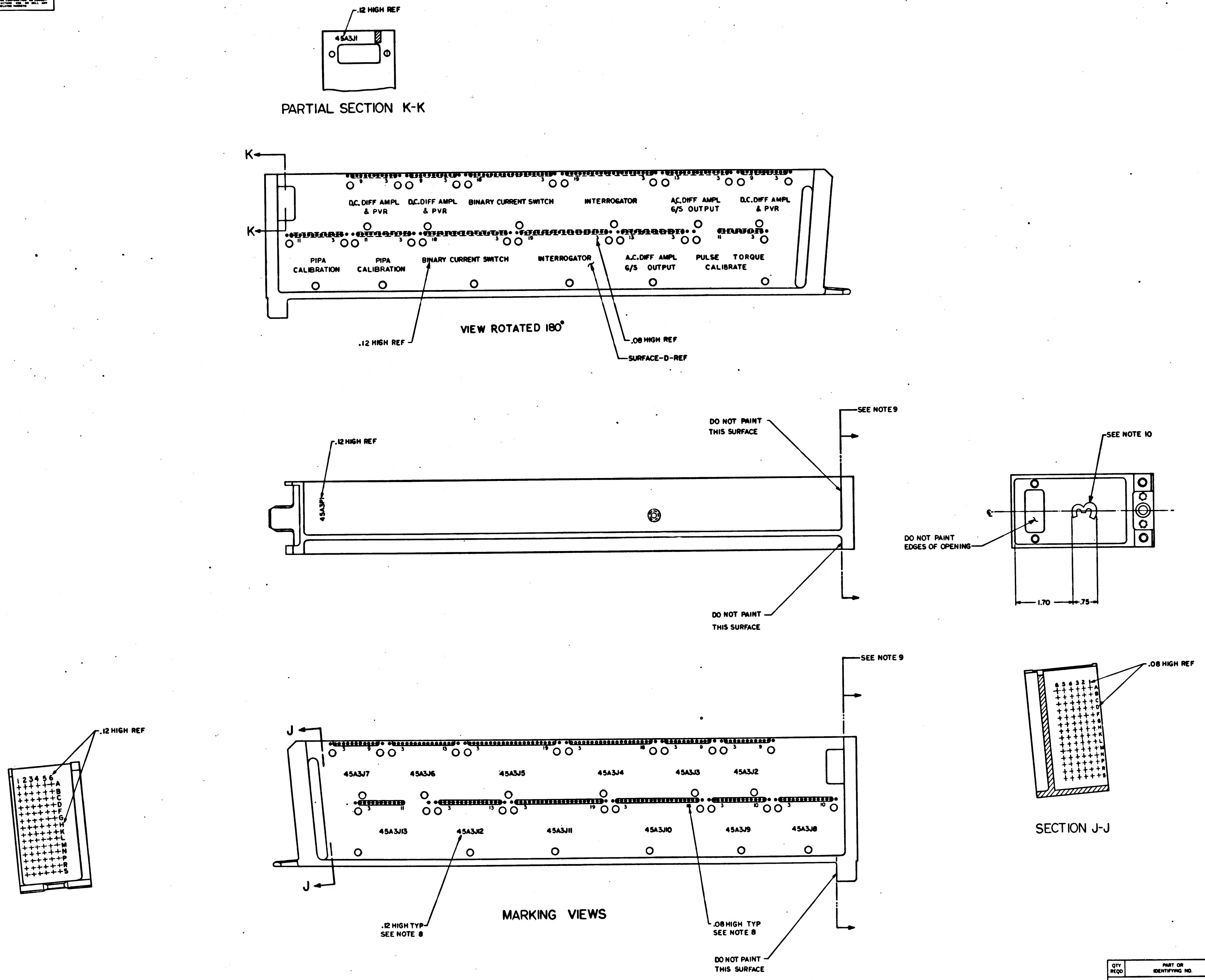
FRAME,
TRAY 3

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008651
SCALE 2/1
WT
SHEET 2 OF 3

1008651

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


.12 HIGH REF
45A3J1
PARTIAL SECTION K-K
K
K
D.C. DIFF AMPL & PVR
D.C. DIFF AMPL & PVR
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
D.C. DIFF AMPL & PVR
PIPA CALIBRATION
PIPA CALIBRATION
BINARY CURRENT SWITCH
INTERROGATOR
A.C. DIFF AMPL G/S OUTPUT
PULSE TORQUE CALIBRATE
VIEW ROTATED 180°
.12 HIGH REF
.08 HIGH REF
SURFACE-D-REF
SEE NOTE 9
DO NOT PAINT THIS SURFACE
.12 HIGH REF
45A3P1
DO NOT PAINT THIS SURFACE
SEE NOTE 10
DO NOT PAINT EDGES OF OPENING
1.70
.75
SEE NOTE 9
.08 HIGH REF
.12 HIGH REF
J
45A3J7
45A3J6
45A3J5
45A3J4
45A3J3
45A3J2
45A3J13
45A3J12
45A3J11
45A3J10
45A3J9
45A3J8
J
SECTION J-J
MARKING VIEWS
.12 HIGH TYP SEE NOTE 8
.08 HIGH TYP SEE NOTE 8
DO NOT PAINT THIS SURFACE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN M. Graham DATE 2-1-65
CHECKED Fesler 4 FEB 65
APPROVAL R Osburg 4 FEB 65
APPROVAL D Hanley 4 FEB 65
D. R. Test 2/8/65
NASA APPROVAL W. J. Rhine 12-4-65
MIT APPROVAL 5 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 3

CODE IDENT NO. | SIZE E | NASA DRAWING NO 1008651
SCALE 1/1 | WT | SHEET 3 OF 3

1008651

SYM	ZONE	DESCRIPTION	DATE	APPD
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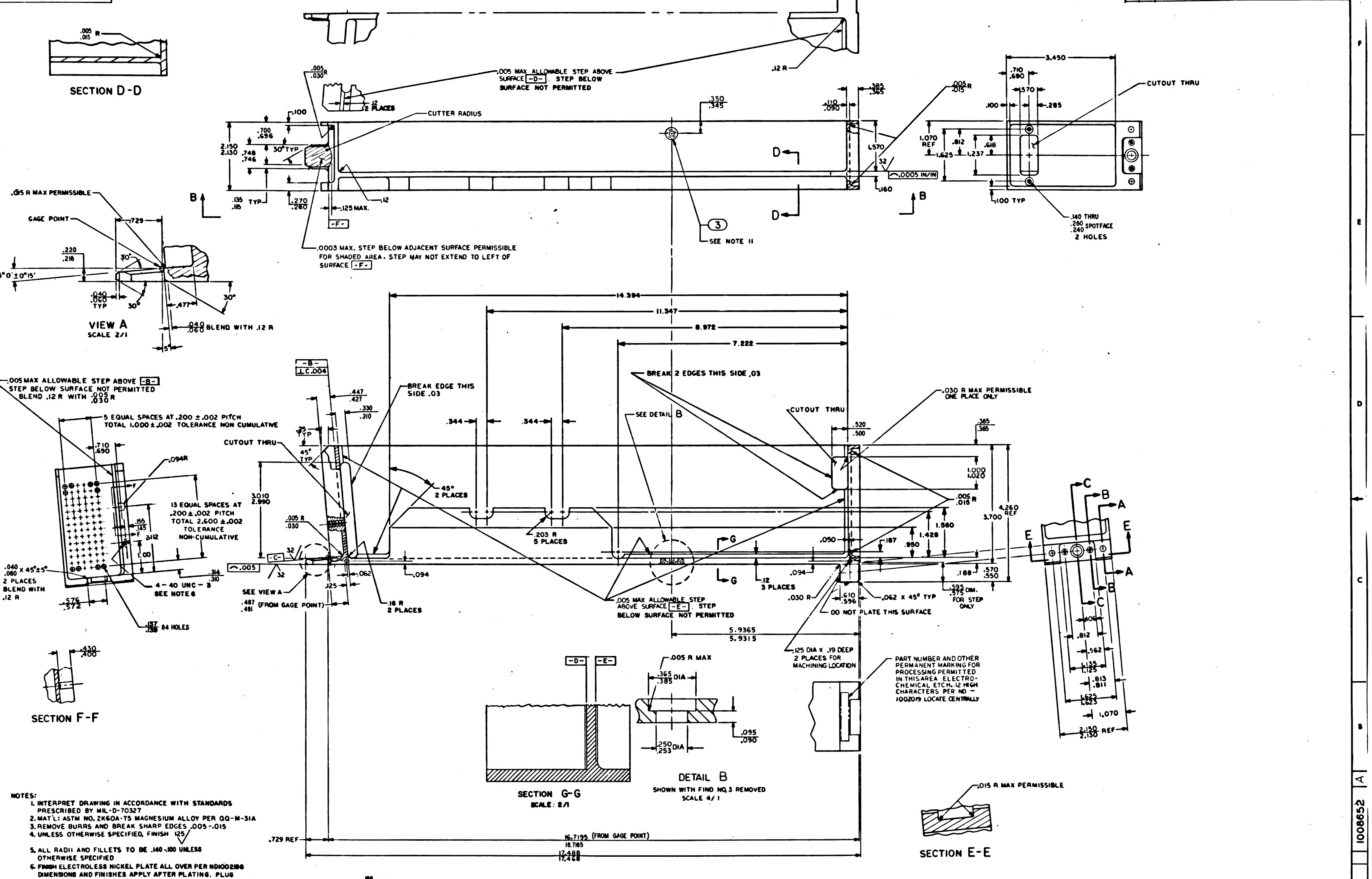
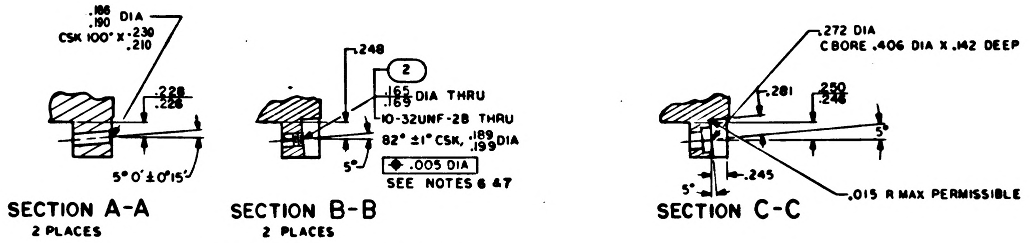

SECTION D-D
.005/.015 R
.12 R
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-. STEP BELOW SURFACE NOT PERMITTED
.005/.030
12 PLACES
CUTTER RADIUS
.350/.345
.385/.365
.110/.090
.005/.015 R
3.450
.710/.690
.570
.100
.285
CUTOUT THRU
1.070 REF
.812
.618
1.625
1.237
.140 THRU
.260/.240 SPOTFACE
2 HOLES
.100 TYP
2.150/2.130
.700/.696
30° TYP
.748/.746
.135/.115 TYP
.270/.260
.125 MAX.
-F-
1.570
32
.0005 IN/IN
.160
B
D
3
SEE NOTE 11
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220/.218
30°
5° 0' ±0° 15'
.040/.060 TYP
.477
.040/.060 BLEND WITH .12 R
VIEW A
SCALE 2/1
14.394
11.347
8.972
7.222
BREAK 2 EDGES THIS SIDE .03
-B-
⊥ C .004
.005 MAX ALLOWABLE STEP ABOVE -B-
STEP BELOW SURFACE NOT PERMITTED
BLEND .12 R WITH .005/.030 R
5 EQUAL SPACES AT .200 ±.002 PITCH
TOTAL 1.000 ±.002 TOLERANCE NON CUMULATIVE
.094R
13 EQUAL SPACES AT .200 ±.002 PITCH
TOTAL 2.600 ±.002 TOLERANCE NON-CUMULATIVE
.155/.145
2.12
1.00
.040/.060 x 45° ±5°
2 PLACES
BLEND WITH .12 R
.576/.572
4 - 40 UNC - 3
SEE NOTE 6
.137/.139 84 HOLES
.447/.427
.330/.310
BREAK EDGE THIS SIDE .03
.25 TYP
45° TYP
CUTOUT THRU
3.010/2.990
.005 R/.030
-C-
.005
32
SEE VIEW A
.487/.491 (FROM GAGE POINT)
.125
.062
.094
.16 R
2 PLACES
45°
2 PLACES
.344
SEE DETAIL B
.203 R
5 PLACES
G
.12
3 PLACES
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
CUTOUT THRU
.520/.500
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.385/.365
1.000/1.020
4.260 REF
3.700
.005/.015 R
1.560
1.428
.950
.187
.050
.094
.188
.570/.550
.585/.575 DIM. FOR STEP ONLY
.030 R
.610/.596
.062 x 45° TYP
DO NOT PLATE THIS SURFACE
5.9365/5.9315
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND 1002019 LOCATE CENTRALLY
C
B
A
E
.400
.812
.562
1.135/1.125
1.813/1.811
1.625/1.623
1.070
2.150/2.130 REF
.430/.400
SECTION F-F
-D-
-E-
SECTION G-G
SCALE: 2/1
.005 R MAX
.365/.385 DIA
.250/.253 DIA
.095/.090
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195/16.7165 (FROM GAGE POINT)
17.488/17.468


.198/.190 DIA
CSK 100° x .230/.210
.228/.226
5° 0' ±0° 15'
.248
2
.165/.169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189/.199 DIA
5°
◆ .005 DIA
SEE NOTES 6 & 7
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250/.248
5°
.245
.015 R MAX PERMISSIBLE

SECTION A-A
2 PLACES

SECTION B-B
2 PLACES

SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE .140-.100 UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLAN AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002126 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTIN'JOUS.

A	A	A
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007534		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS XX ±.02 XXX ±.005 ANGLES 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008652-001	FRAME, TRAY	1

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN Splane DATE 3FEB65
CHECKED [illegible] 4FEB65
APPROVAL [illegible] 4FEB65
APPROVAL [illegible] 4FEB65
[illegible] 2/8/65
NASA APPROVAL [illegible] 2-5-65
MIT APPROVAL [illegible]
4FEB65

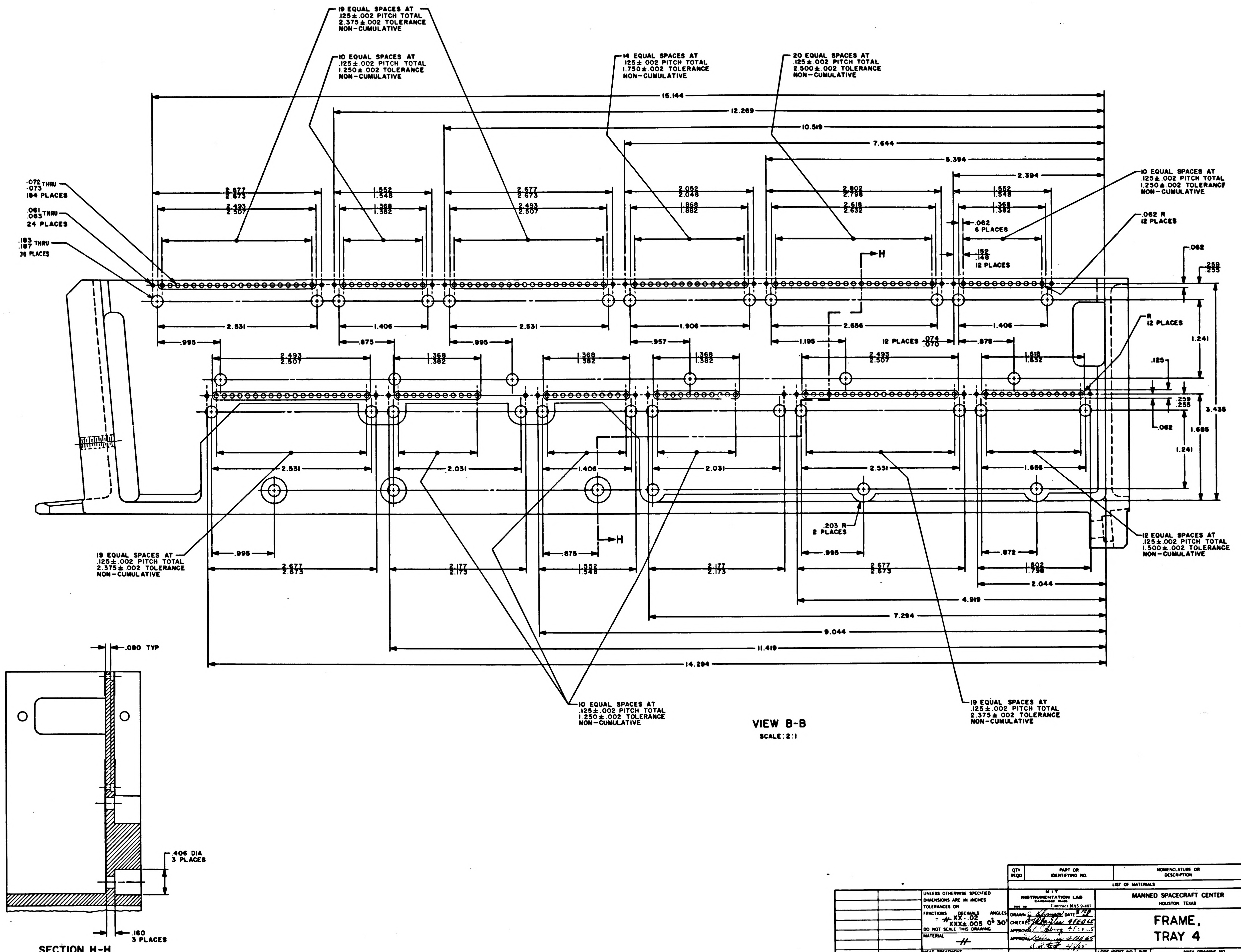
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 4

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1008652
SCALE 1/1
WT
SHEET 1 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	3 MAY 65	A.N.



19 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.375 ± .002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.250 ± .002 TOLERANCE NON-CUMULATIVE
14 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.750 ± .002 TOLERANCE NON-CUMULATIVE
20 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.500 ± .002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.250 ± .002 TOLERANCE NON-CUMULATIVE
15.144
12.269
10.519
7.644
5.394
2.394
.072 .073 THRU 184 PLACES
.061 .063 THRU 24 PLACES
.183 .187 THRU 36 PLACES
2.677 2.673
2.493 2.507
1.552 1.548
1.368 1.382
2.052 2.048
1.868 1.882
2.802 2.798
2.618 2.632
.062 6 PLACES
.062 R 12 PLACES
.152 .148 12 PLACES
H
.062
.259 .255
2.531
1.406
1.906
2.656
.995
.875
.957
1.195
12 PLACES .074 .070
R 12 PLACES
1.241
.125
1.618 1.632
3.435
1.685
2.031
1.656
.203 R 2 PLACES
.872
2.177 2.173
1.802 1.798
2.044
4.919
7.294
9.044
11.419
14.294
19 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.375 ± .002 TOLERANCE NON-CUMULATIVE
12 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.500 ± .002 TOLERANCE NON-CUMULATIVE
10 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 1.250 ± .002 TOLERANCE NON-CUMULATIVE
19 EQUAL SPACES AT .125 ± .002 PITCH TOTAL 2.375 ± .002 TOLERANCE NON-CUMULATIVE
.080 TYP
.406 DIA 3 PLACES
.160 3 PLACES

VIEW B-B
SCALE: 2:1

SECTION H-H
SCALE: 2:1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ± .02 XXX ± .005 ANGLES 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN O. Klausner DATE 3 FEB
CHECKED Schaefer 4 FEB 65
APPROVAL L. Alberg 4 FEB 65
APPROVAL Henning 4 FEB 65
D.R. Ford 4/5/65
NASA APPROVAL 4-65
MIT APPROVAL W. [illegible] 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008652
SCALE 2:1
WT
SHEET 2 OF 3

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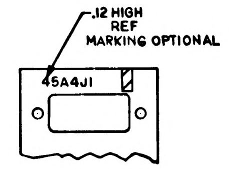
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	3 MAY 65	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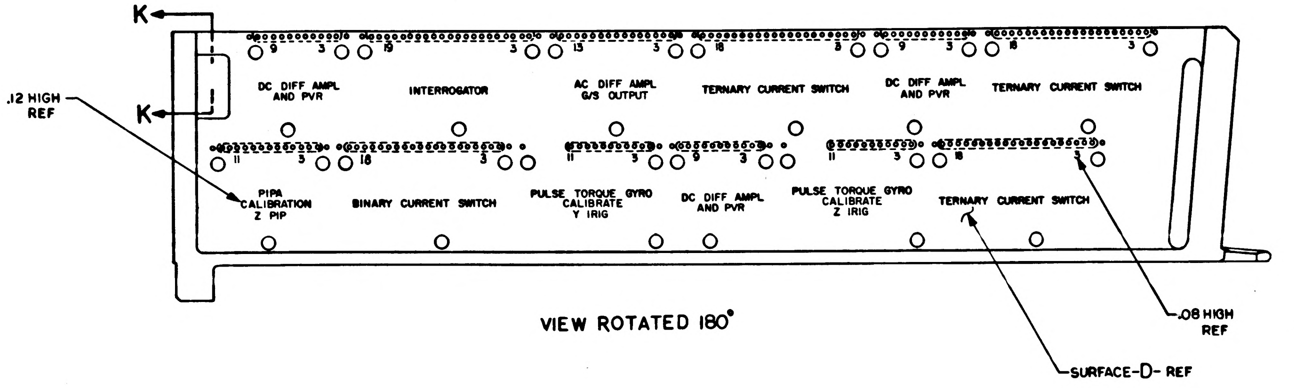
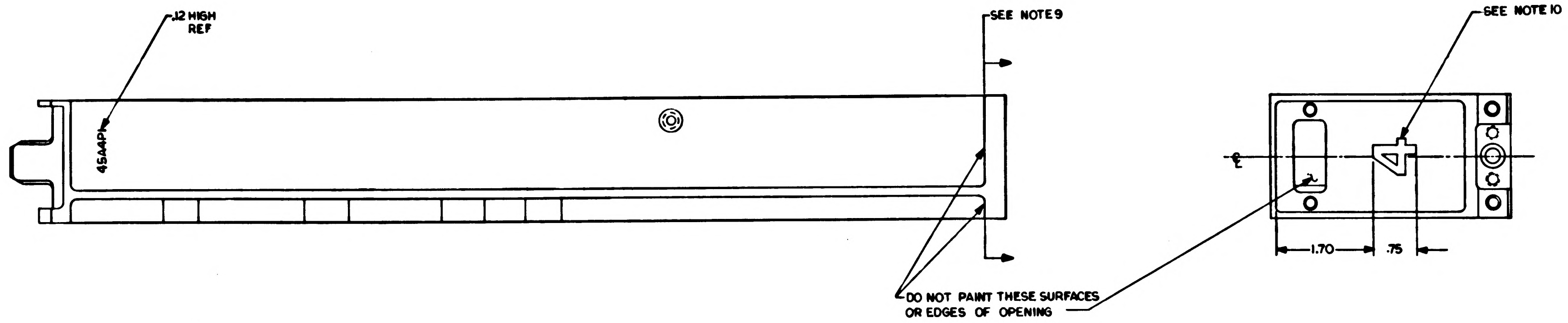
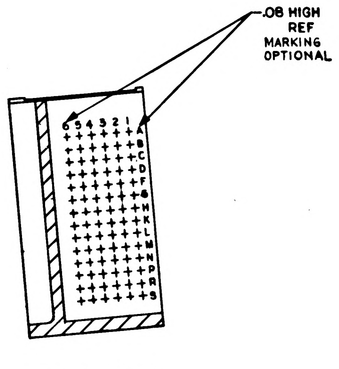
REF
MARKING OPTIONAL
45A4J1

PARTIAL SECTION K-K

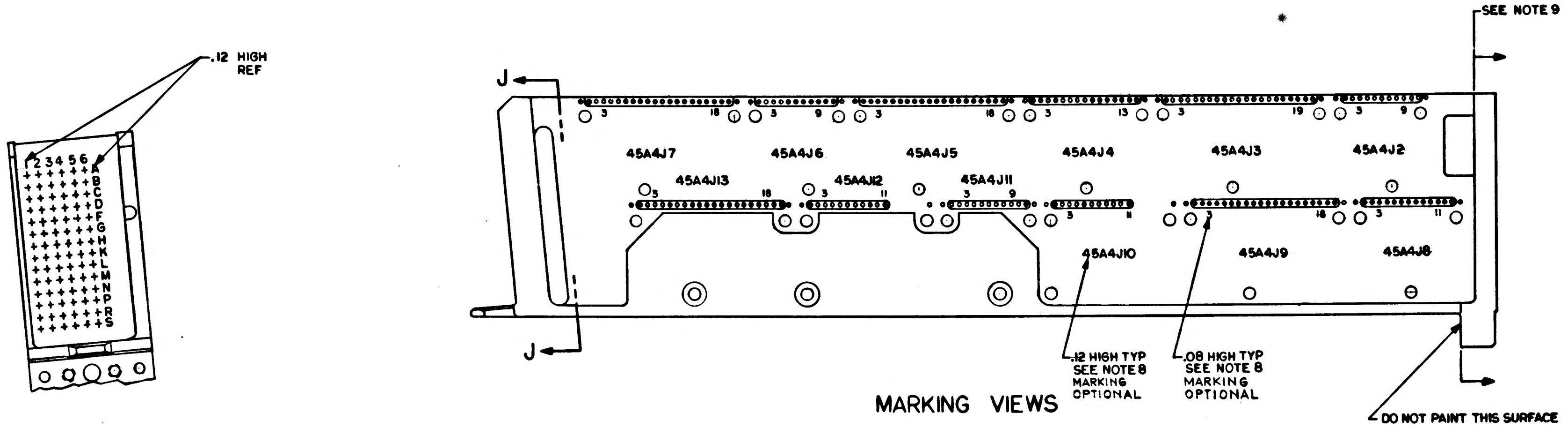

K
K
.12 HIGH
REF
DC DIFF AMPL AND PVR
INTERROGATOR
AC DIFF AMPL G/S OUTPUT
TERNARY CURRENT SWITCH
DC DIFF AMPL AND PVR
TERNARY CURRENT SWITCH
PIPA CALIBRATION Z PIP
BINARY CURRENT SWITCH
PULSE TORQUE GYRO CALIBRATE Y IRIG
DC DIFF AMPL AND PVR
PULSE TORQUE GYRO CALIBRATE Z IRIG
TERNARY CURRENT SWITCH
9
3
19
13
18
11
.08 HIGH
REF
SURFACE-D- REF

VIEW ROTATED 180°


.12 HIGH
REF
45A4P1
SEE NOTE 9
SEE NOTE 10
4
℄
1.70
.75
DO NOT PAINT THESE SURFACES
OR EDGES OF OPENING


.08 HIGH
REF
MARKING
OPTIONAL
6 5 4 3 2 1
A B C D E F G H K L M N P R S

SECTION J-J


.12 HIGH
REF
2 3 4 5 6
A B C D E F G H K L M N P R S
SEE NOTE 9
J
J
45A4J7
45A4J6
45A4J5
45A4J4
45A4J3
45A4J2
45A4J13
45A4J12
45A4J11
45A4J10
45A4J9
45A4J8
3
18
9
13
19
11
.12 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
.08 HIGH TYP
SEE NOTE 8
MARKING
OPTIONAL
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

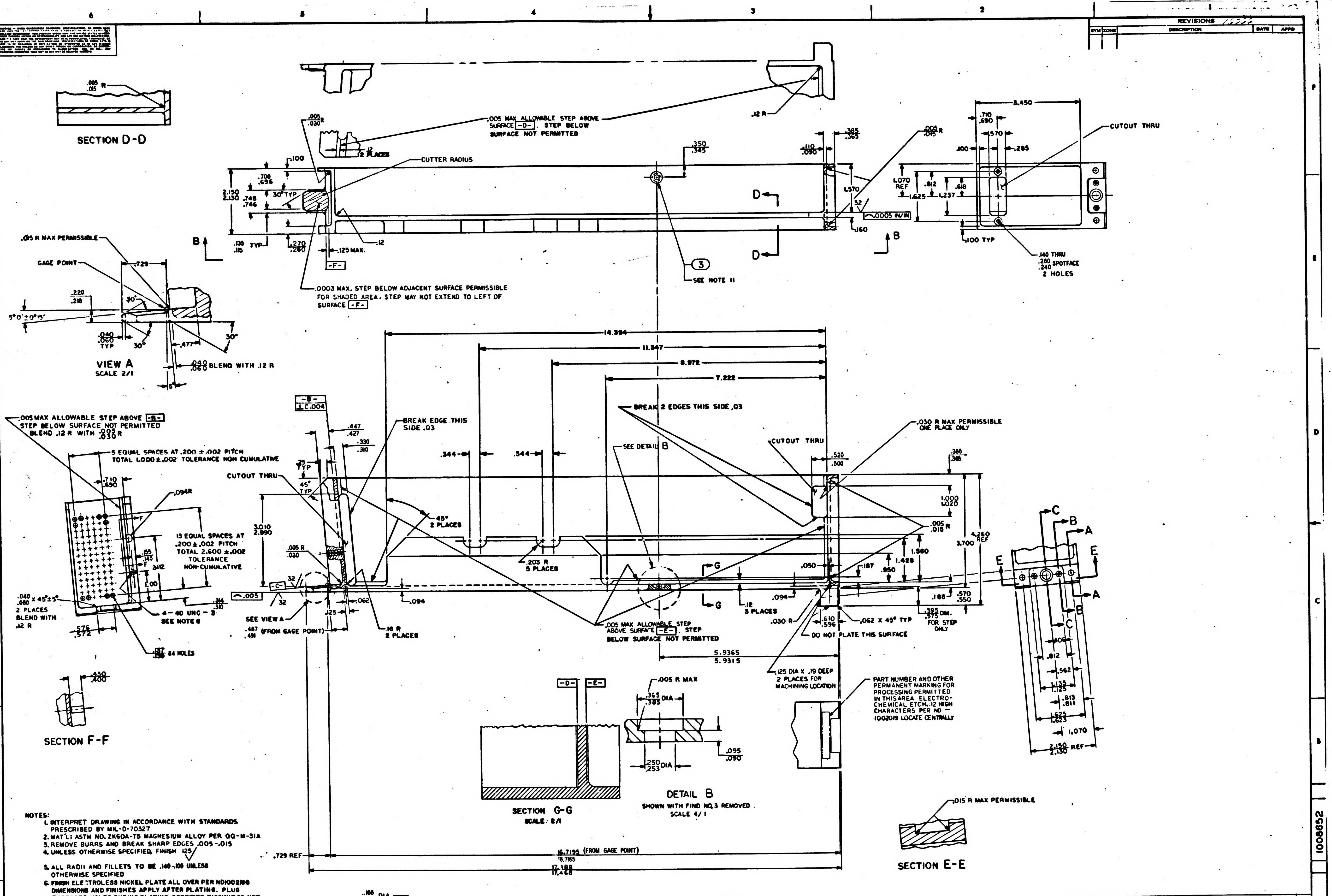
MIT
INSTRUMENTATION LAB
Cambridge Mass
Contract NAS 9-497
DRAWN Bender DATE 3-FEB-65
CHECKED Sayler 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
2/9/65
NASA APPROVAL 2-4-65
MIT APPROVAL 9 Feb 66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

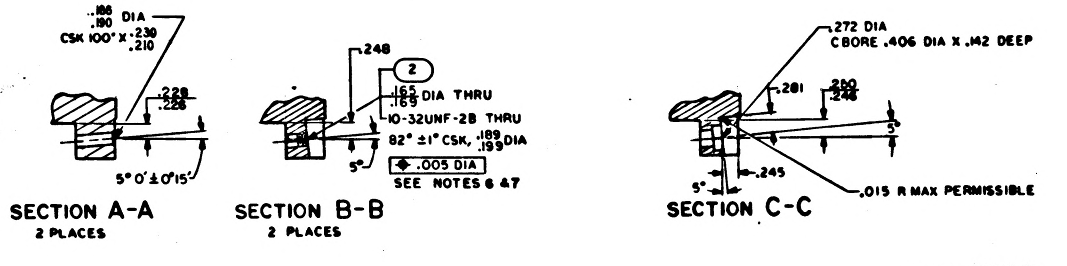
CODE IDENT NO.	SIZE	NASA DRAWING NO
80230	E	1008652
SCALE	WT	SHEET 3 OF 3

1008652 A


SECTION D-D
.005 R .015
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-. STEP BELOW SURFACE NOT PERMITTED
.12 R
12 2 PLACES
CUTTER RADIUS
.350 .345
.385 .365
.110 .090
.002 R .015
3.450
.710 .690
.570
.100
.285
CUTOUT THRU
2.150 2.130
.700 .696
30° TYP
.748 .746
1.570
1.070 REF
.812
.618
1.625
1.237
.0005 IN/IN
.160
.135 .115 TYP
.270 .260
.125 MAX.
-F-
.100 TYP
.140 THRU .260 .240 SPOTFACE 2 HOLES
SEE NOTE 11
.0003 MAX. STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA. STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220 .218
5°0'±0°15'
.040 .060 TYP
30°
.477
VIEW A SCALE 2/1
.040 .060 BLEND WITH .12 R
14.394
11.347
8.972
7.222
BREAK 2 EDGES THIS SIDE .03
.030 R MAX PERMISSIBLE ONE PLACE ONLY
.005 MAX ALLOWABLE STEP ABOVE -B- STEP BELOW SURFACE NOT PERMITTED BLEND .12 R WITH .005 .030 R
-B- ⊥ C .004
.447 .427
.330 .310
BREAK EDGE THIS SIDE .03
SEE DETAIL B
CUTOUT THRU
.520 .500
.385 .365
5 EQUAL SPACES AT .200 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON CUMULATIVE
.344
.344
CUTOUT THRU
45° TYP
.094R
13 EQUAL SPACES AT .200±.002 PITCH TOTAL 2.600±.002 TOLERANCE NON-CUMULATIVE
3.010 2.990
45° 2 PLACES
1.000 1.020
4.260 REF
3.700
.005 R .015
1.560
1.428
.950
.187
.050
.005 R .030
.203 R 5 PLACES
G
.040 .060 X 45°±5° 2 PLACES BLEND WITH .12 R
4-40 UNC-3 SEE NOTE 6
.576 .572
.316 .310
.137 .136 84 HOLES
-C- .005
SEE VIEW A
.125
.062
.094
.16 R 2 PLACES
.12 3 PLACES
.094
.030 R
.610 .596
.062 X 45° TYP
.188
.570 .550
.392 .375 DIM. FOR STEP ONLY
.487 .491 (FROM GAGE POINT)
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-. STEP BELOW SURFACE NOT PERMITTED
DO NOT PLATE THIS SURFACE
5.9365 5.9315
.125 DIA X .19 DEEP 2 PLACES FOR MACHINING LOCATION
PART NUMBER AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND-1002019 LOCATE CENTRALLY
C B A E
.406
.812
.562
1.135 1.125
.813 .811
1.625 1.623
1.070
2.150 2.130 REF
.430 .400
SECTION F-F
-D- -E-
SECTION G-G SCALE: 2/1
.005 R MAX
.365 .385 DIA
.095 .050
.250 .253 DIA
DETAIL B SHOWN WITH FIND NO.3 REMOVED SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
16.7195 16.7165 (FROM GAGE POINT)
17.488 17.468
B
D
3

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE .140-.100 UNLESS OTHERWISE SPECIFIED
6. FINISH ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198 DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO.1 & FIND NO 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND 1002019 EXCEPT SURFACE D AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND 1002019 ALL CHARACTERS ON SURFACE D CENTRALIZE AS SHOWN.
9. PAINT PER ND1002110 TYPE II USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLAN AND END OF FRAME UNLESS OTHERWISE SPECIFIED ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND1002110 TYPE II USING 1010729-3 CHARACTER TO BE TYPE I PER ND1002122 CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO.3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (365/.385 DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO.3 SHALL BE ASSEMBLED TO FIND NO.1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND1002128 USING CURING METHOD II.


.186 .190 DIA
CSK 100° X .230 .210
.228 .226
5°0'±0°15'
SECTION A-A 2 PLACES
.248
2
.165 .169 DIA THRU
10-32UNF-2B THRU
82° ±1° CSK, .189 .193 DIA
⌖ .005 DIA
SEE NOTES 6 & 7
SECTION B-B 2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008852-001	FRAME, THAY	1

LIST OF MATERIALS

SHEET 1	SHEET 2	SHEET 3
REVISION STATUS OF SHEETS		

NEXT ASSY	USED ON	APPLICABLE DASH NO.
1007534		

APPLICATION

THE ASSEMBLY PART NUMBER IS THE DRAWING NUMBER AND THE DASH NUMBER THAT APPLIES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS XX ±.02 XXX ±.005
ANGLES ±0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Splane DATE 3FEB65
CHECKED Taylor 4FEB65
APPROVAL 4FEB65
APPROVAL 4FEB65
2/8/65
NASA APPROVAL 2-4-65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 4

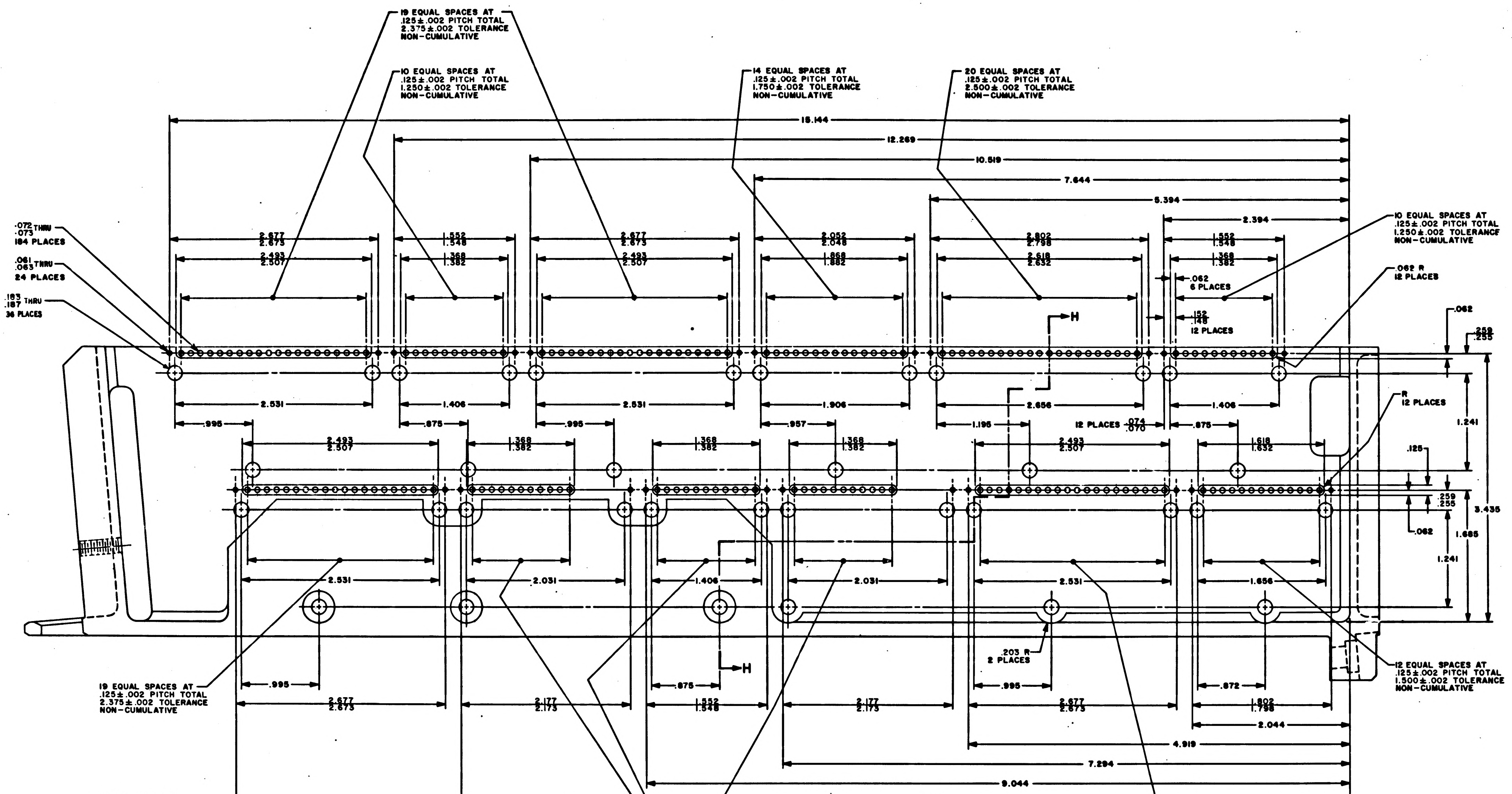
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008652
SCALE 1/1
WT
SHEET 1 OF 3

REVISIONS
SYM	ZONE	DESCRIPTION	DATE	APPD

1008652

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


15.144
12.269
10.519
7.644
5.394
2.394
2.677
2.673
2.493
2.507
1.552
1.548
1.368
1.382
2.052
2.048
1.868
1.882
2.802
2.798
2.618
2.632
2.531
1.406
1.906
2.656
.995
.875
.957
1.195
.062
.259
.255
1.241
3.435
1.685
.125
2.031
1.618
1.632
1.656
.872
2.177
2.173
1.802
1.798
2.044
4.919
7.294
9.044
11.419
14.294
H

19 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.375±.002 TOLERANCE NON-CUMULATIVE

10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE

14 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.750±.002 TOLERANCE NON-CUMULATIVE

20 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.500±.002 TOLERANCE NON-CUMULATIVE

10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE

.072 .073 THRU 184 PLACES

.061 .063 THRU 24 PLACES

.183 .187 THRU 36 PLACES

.062 6 PLACES

.152 .148 12 PLACES

.062 R 12 PLACES

R 12 PLACES

12 PLACES .074 .070

.203 R 2 PLACES

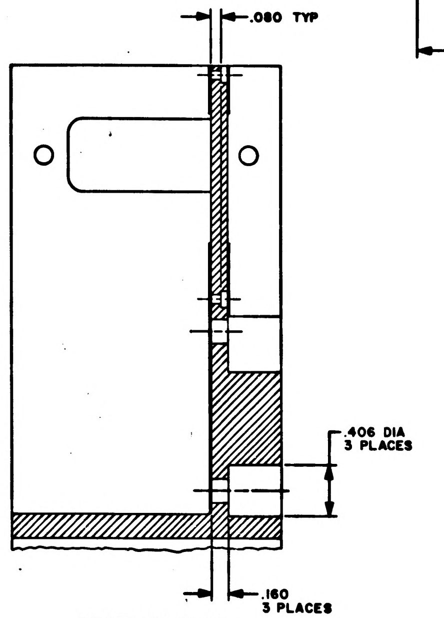
19 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.375±.002 TOLERANCE NON-CUMULATIVE

12 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.500±.002 TOLERANCE NON-CUMULATIVE

10 EQUAL SPACES AT .125±.002 PITCH TOTAL 1.250±.002 TOLERANCE NON-CUMULATIVE

19 EQUAL SPACES AT .125±.002 PITCH TOTAL 2.375±.002 TOLERANCE NON-CUMULATIVE

VIEW B-B
SCALE: 2:1


.080 TYP
.406 DIA
3 PLACES
.160
3 PLACES

SECTION H-H
SCALE: 2:1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS .XX ± .02 .XXX ± .005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN DATE
CHECKED 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

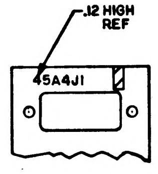
FRAME,
TRAY 4

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008652
SCALE 2:1 | WT | SHEET 2 OF 3

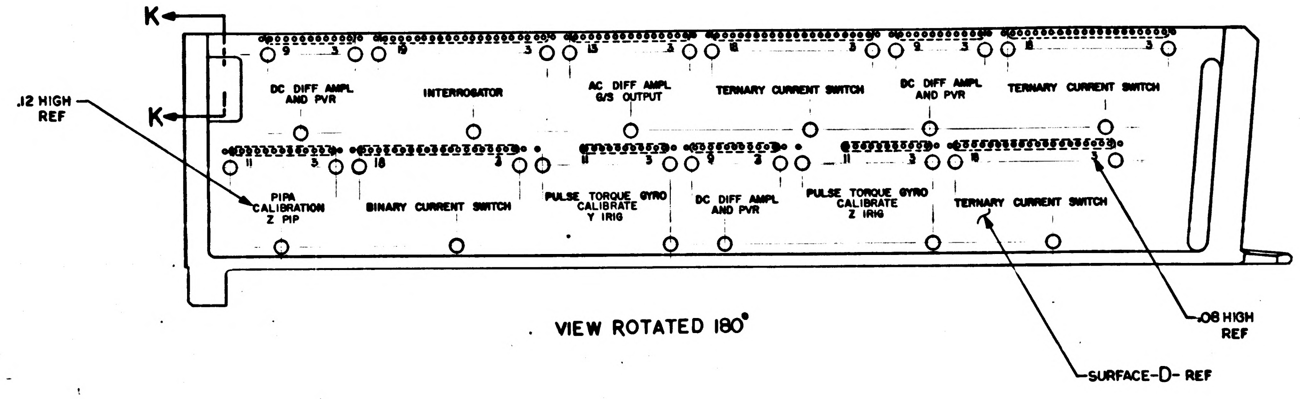
1008652

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

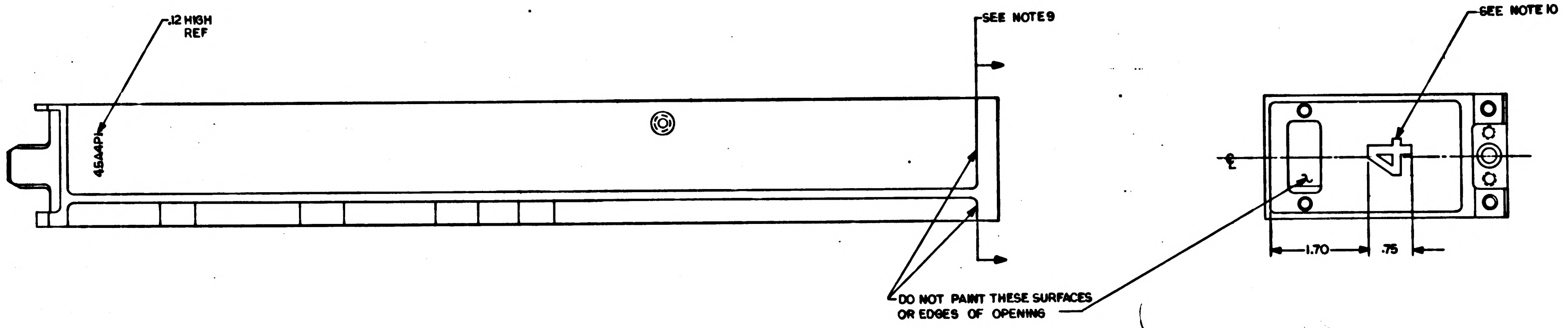
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

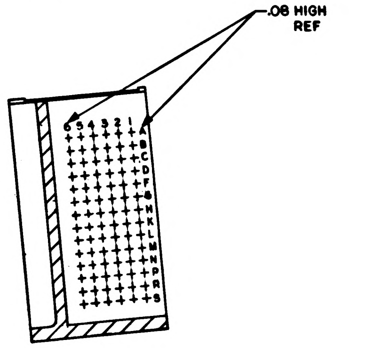

.12 HIGH
REF
45A4J1

PARTIAL SECTION K-K

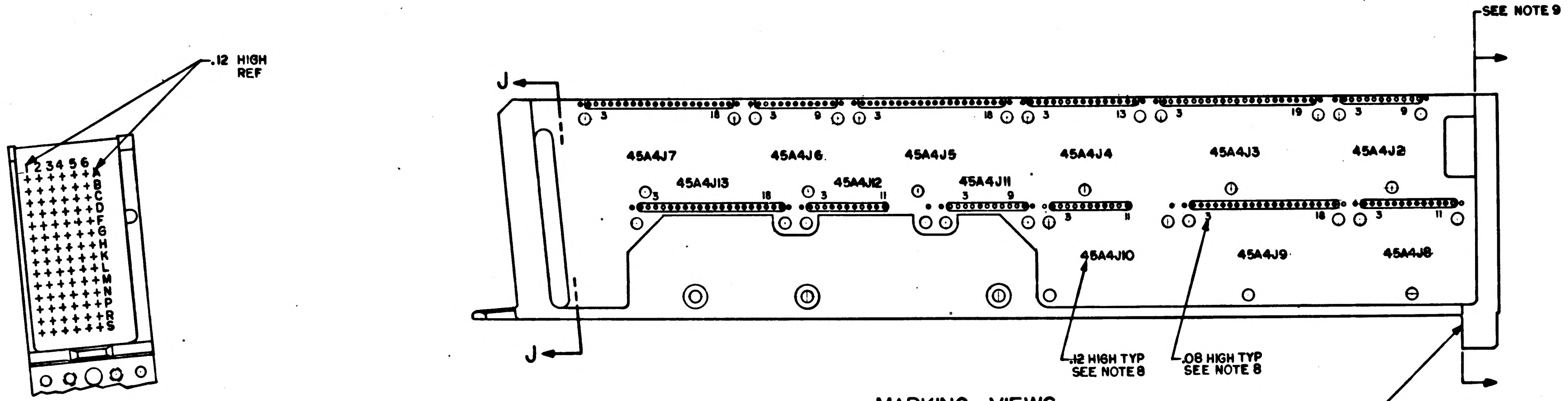

K
K
.12 HIGH
REF
DC DIFF AMPL
AND PVR
INTERROGATOR
AC DIFF AMPL
G/S OUTPUT
TERNARY CURRENT SWITCH
DC DIFF AMPL
AND PVR
TERNARY CURRENT SWITCH
PIPA
CALIBRATION
Z PIP
BINARY CURRENT SWITCH
PULSE TORQUE GYRO
CALIBRATE
Y IRIG
DC DIFF AMPL
AND PVR
PULSE TORQUE GYRO
CALIBRATE
Z IRIG
TERNARY CURRENT SWITCH
.08 HIGH
REF
SURFACE-D- REF

VIEW ROTATED 180°


.12 HIGH
REF
45A4P1
SEE NOTE 9
SEE NOTE 10
℄
1.70
.75
DO NOT PAINT THESE SURFACES
OR EDGES OF OPENING



SECTION J-J


.12 HIGH
REF
SEE NOTE 9
J
J
45A4J7
45A4J6
45A4J5
45A4J4
45A4J3
45A4J2
45A4J13
45A4J12
45A4J11
45A4J10
45A4J9
45A4J8
.12 HIGH TYP
SEE NOTE 8
.08 HIGH TYP
SEE NOTE 8
DO NOT PAINT THIS SURFACE

MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

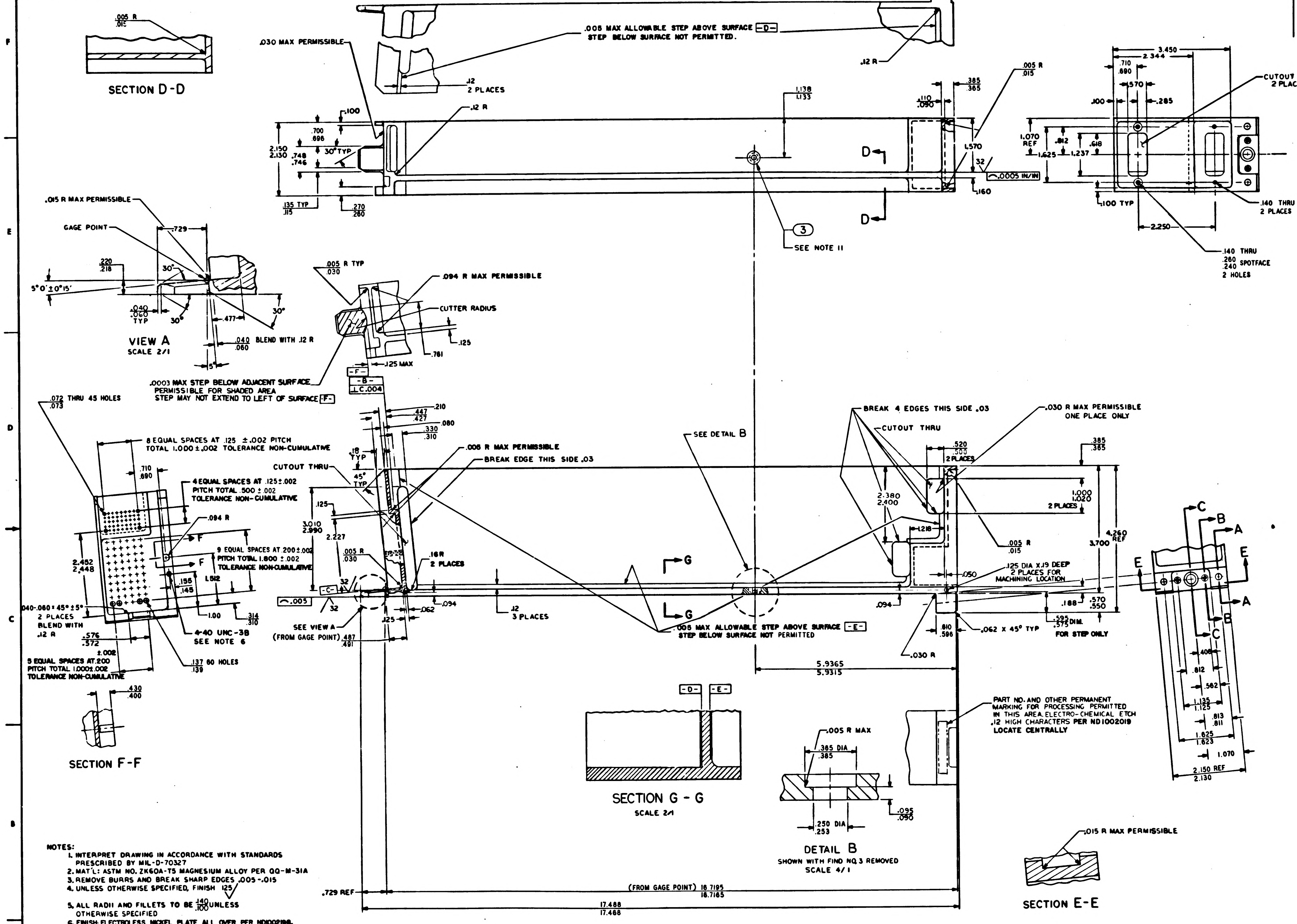
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Bender DATE 3-FEB-65
CHECKED 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL 2-4-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 4

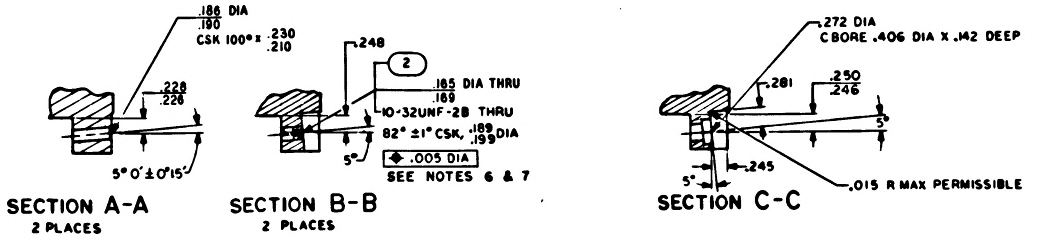
CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1008652
SCALE | WT | SHEET 3 OF 3

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAR 66	


SECTION D-D
.005 R / .015
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D- STEP BELOW SURFACE NOT PERMITTED.
.12 R
.12 2 PLACES
3.450
2.344
CUTOUT THRU 2 PLACES
.140 THRU 2 PLACES
.140 THRU .260 .240 SPOTFACE 2 HOLES
.100 TYP
2.250
SEE NOTE 11
.0005 IN/IN
.015 R MAX PERMISSIBLE
GAGE POINT
VIEW A
SCALE 2/1
BLEND WITH .12 R
.005 R TYP
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE PERMISSIBLE FOR SHADED AREA STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
.072 THRU 45 HOLES .073
8 EQUAL SPACES AT .125 ±.002 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .125±.002 PITCH TOTAL .500±.002 TOLERANCE NON-CUMULATIVE
9 EQUAL SPACES AT .200±.002 PITCH TOTAL 1.800±.002 TOLERANCE NON-CUMULATIVE
.040-.060 × 45°±5° 2 PLACES BLEND WITH .12 R
4-40 UNC-3B SEE NOTE 6
.137 60 HOLES .139
5 EQUAL SPACES AT .200 PITCH TOTAL 1.000±.002 TOLERANCE NON-CUMULATIVE
SECTION F-F
CUTOUT THRU
.005 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
.16R 2 PLACES
SEE VIEW A (FROM GAGE POINT)
.12 3 PLACES
SEE DETAIL B
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE ONE PLACE ONLY
2 PLACES
.125 DIA X.19 DEEP 2 PLACES FOR MACHINING LOCATION
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E- STEP BELOW SURFACE NOT PERMITTED
.062 X 45° TYP
.030 R
FOR STEP ONLY
5.9365 5.9315
PART NO. AND OTHER PERMANENT MARKING FOR PROCESSING PERMITTED IN THIS AREA. ELECTRO-CHEMICAL ETCH .12 HIGH CHARACTERS PER ND1002019 LOCATE CENTRALLY
SECTION G-G
SCALE 2/1
.005 R MAX
.385 DIA .385
.250 DIA .253
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
2.150 REF 2.130
.729 REF
(FROM GAGE POINT) 18.7195 18.7165
17.488 17.488

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385-DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND 1002128 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS


.186 DIA .190
CSK 100° × .230 .210
5°0'±0°15'
SECTION A-A
2 PLACES
.248
.165 DIA THRU .169
10-32UNF-2B THRU
82° ±1° CSK, .189 .199 DIA
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250 .246
.245
.015 R MAX PERMISSIBLE
SECTION C-C

A	—	A
SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008653-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007537	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES 0° 30'
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTE 2
HEAT TREATMENT —
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Bender DATE 3-FEB-65
CHECKED 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

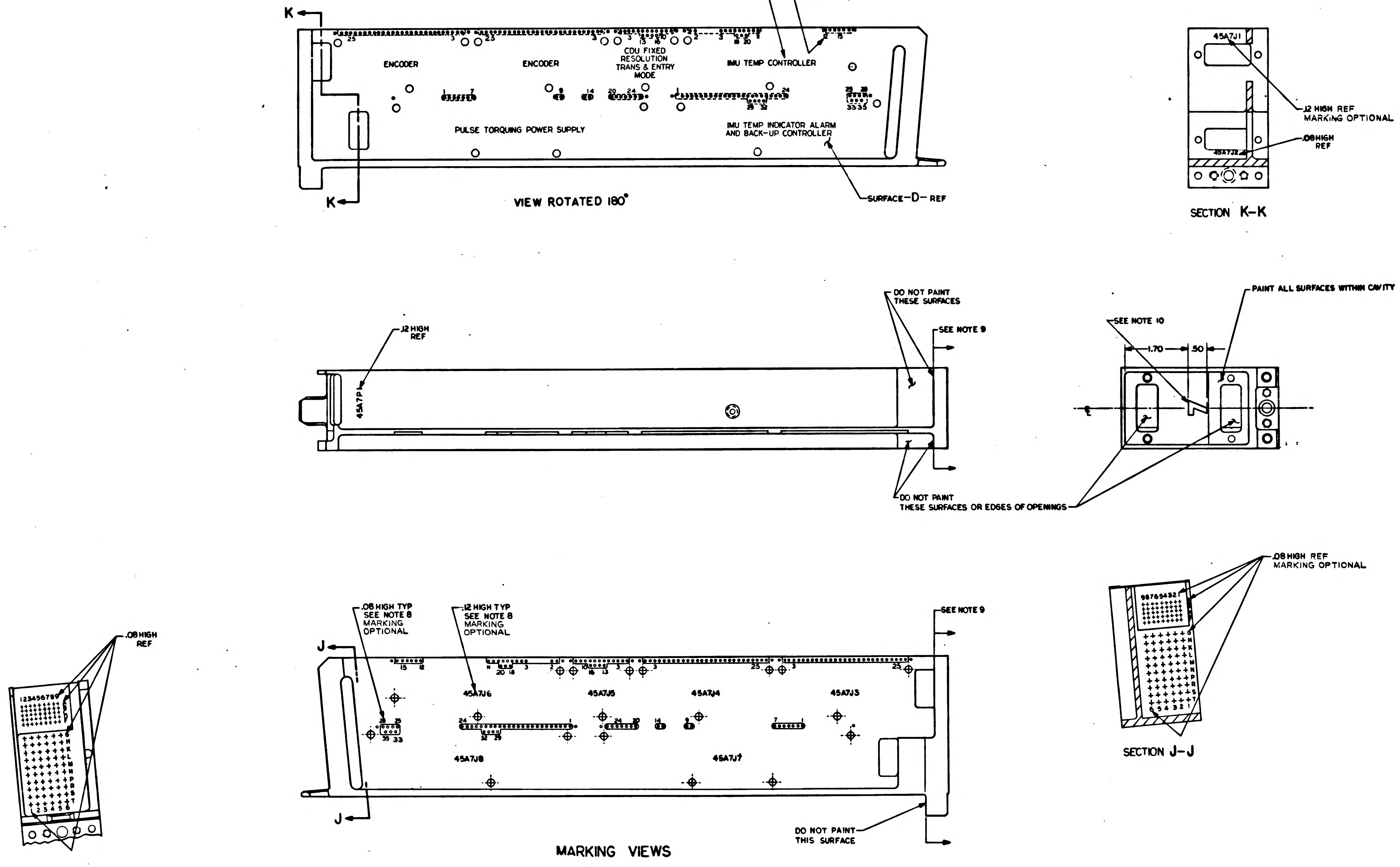
FRAME,
TRAY 7

CODE IDENT NO. 80230 SIZE E NASA DRAWING NO 1008653
SCALE 1/1 WT SHEET 1 OF 3

4 FEB 64

[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	6 MAR 65	


K
K
.12 HIGH REF.
.08 HIGH REF
25
3
23
3
13
16
10
2
18
20
12
15
ENCODER
ENCODER
CDU FIXED RESOLUTION TRANS & ENTRY MODE
IMU TEMP CONTROLLER
1
7
9
14
20
24
24
29
32
33
35
PULSE TORQUING POWER SUPPLY
IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
SURFACE -D- REF
VIEW ROTATED 180°
45A7J1
.12 HIGH REF MARKING OPTIONAL
.08 HIGH REF
45A7J2
SECTION K-K
DO NOT PAINT THESE SURFACES
SEE NOTE 9
.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS
PAINT ALL SURFACES WITHIN CAVITY
SEE NOTE 10
1.70
.50
℄
.08 HIGH REF MARKING OPTIONAL
987654321
SECTION J-J
.08 HIGH REF
123456789
.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
J
J
SEE NOTE 9
45A7J6
45A7J5
45A7J4
45A7J3
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE
MARKING VIEWS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±# DECIMALS XX ±.02 XXX .005 ANGLES ±0°30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
Cambridge Mass
Contract NAS 9-497
DRAWN Weisert DATE 2-FEB-65
CHECKED A. Ottoman 4 FEB 65
APPROVAL W. Plumbing 4 Feb 65
APPROVAL 4 Feb 65
4/16/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 Feb 65

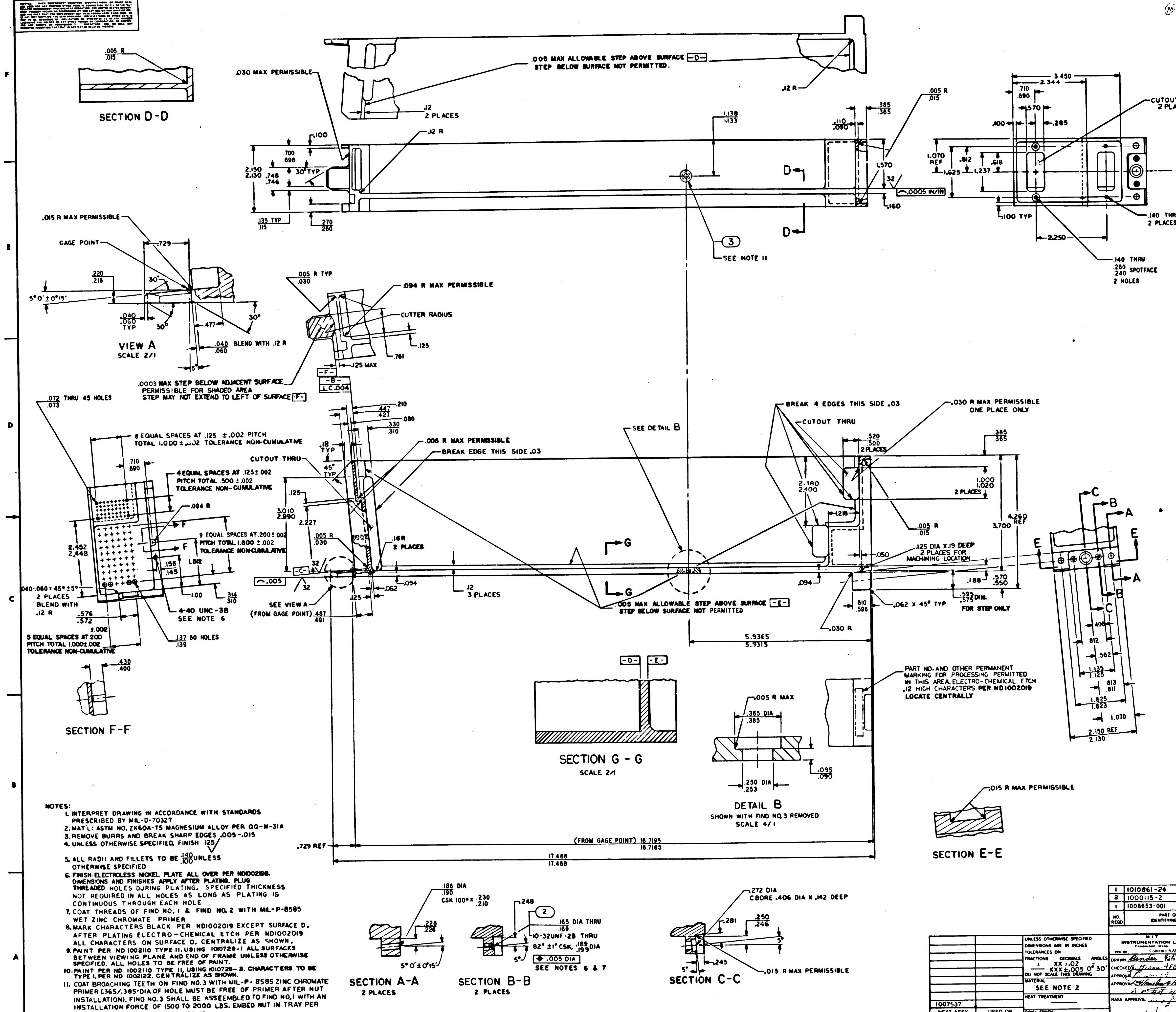
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1008653
SCALE 1/1
WT
SHEET 3 OF 3

1008653 A

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	65	
B	REVISED PER TDRR 21515	3 AUG 65	


SECTION D-D
.005 R
.015
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12
2 PLACES
.12 R
.100
.700
.696
2.150
2.130
.748
.746
30° TYP
.135 TYP
.115
.270
.260
1.138
1.133
.110
.090
.385
.365
1.570
32
.0005 IN/IN
.160
D
3
SEE NOTE 11
3.450
2.344
.710
.690
.570
.100
.285
CUTOUT THRU
2 PLACES
1.070
REF
.812
.618
1.625
1.237
.100 TYP
.140 THRU
2 PLACES
2.250
.140 THRU
.260
.240 SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
30°
5° 0' ± 0° 15'
.040
.060
TYP
.477
VIEW A
SCALE 2/1
.040
.060 BLEND WITH .12 R
5°
.005 R TYP
.030
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125
.761
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥ C .004
.072 THRU 45 HOLES
.073
8 EQUAL SPACES AT .125 ±.002 PITCH
TOTAL 1.000 ±.002 TOLERANCE NON-CUMULATIVE
4 EQUAL SPACES AT .125 ±.002
PITCH TOTAL .500 ±.002
TOLERANCE NON-CUMULATIVE
.094 R
F
9 EQUAL SPACES AT .200 ±.002
PITCH TOTAL 1.800 ±.002
TOLERANCE NON-CUMULATIVE
2.452
2.448
.155
.145
1.512
1.00
.314
.310
.040-.060 × 45° ± 5°
2 PLACES
BLEND WITH
.12 R
.576
.572
±.002
5 EQUAL SPACES AT .200
PITCH TOTAL 1.000 ±.002
TOLERANCE NON-CUMULATIVE
4-40 UNC-3B
SEE NOTE 6
.137 60 HOLES
.139
.430
.400
SECTION F-F
.210
.447
.427
.080
.330
.310
.18
TYP
45°
TYP
CUTOUT THRU
.005 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
3.010
2.990
2.227
.005 R
.030
.16 R
2 PLACES
-C-
.005
32
SEE VIEW A
(FROM GAGE POINT) .487
.491
.125
.062
.094
.12
3 PLACES
SEE DETAIL B
G
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520
.500
2 PLACES
.385
.365
2.380
2.400
1.000
1.020
2 PLACES
1.218
.005 R
.015
3.700
4.260
REF
.125 DIA X .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.050
.188
.570
.550
.595
.575 DIM.
FOR STEP ONLY
.610
.596
.062 X 45° TYP
.030 R
5.9365
5.9315
C
B
A
E
.406
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150 REF
2.130
PART NO. AND OTHER PERMANENT
MARKING FOR PROCESSING PERMITTED
IN THIS AREA. ELECTRO-CHEMICAL ETCH
.12 HIGH CHARACTERS PER ND1002019
LOCATE CENTRALLY
-D-
-E-
SECTION G - G
SCALE 2/1
.005 R MAX
.365 DIA
.385
.095
.090
.250 DIA
.253
DETAIL B
SHOWN WITH FIND NO. 3 REMOVED
SCALE 4/1
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
(FROM GAGE POINT) 18.7195
18.7165
17.488
17.468
.186 DIA
.190
CSK 100° × .230
.210
.228
.226
5° 0' ± 0° 15'
SECTION A-A
2 PLACES
.248
2
.165 DIA THRU
.169
10-32UNF-2B THRU
82° ±1° CSK, .189
.199 DIA
5°
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385-DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND 1002128 USING CURING METHOD III.
12. AFTER PLATING, ROUGHENING OF THE SURFACES TO BE ENCAPSULATED IS PERMITTED. PLATING SURFACE MUST BE CONTINUOUS

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008653-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007537	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
———

FINAL FINISH
SEE NOTE 6

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN Bender DATE 2 FEB 65
CHECKED 4 FEB 65
APPROVAL 4
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL
MIT APPROVAL

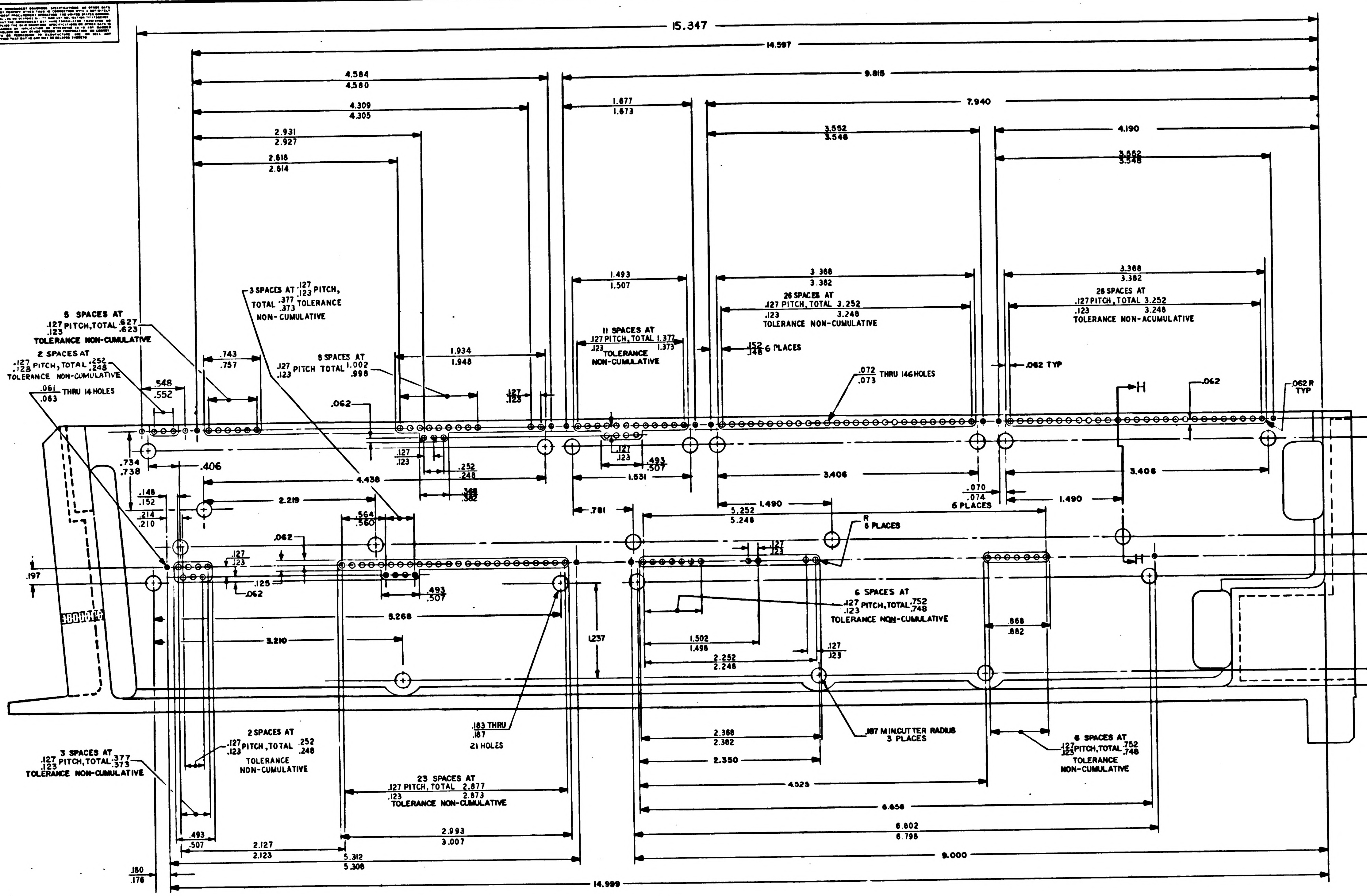
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008653
SCALE 1/1
WT
SHEET 1 OF 3

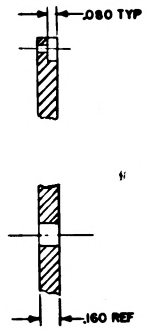
1008653 B

REVISIONS 16266			
SYM	DESCRIPTION	DATE	APPROVAL
B	REVISED PER TDRR 2.5.5	6 A 6 65	



15.347
14.597
4.584 4.580
9.815
4.309 4.305
1.677 1.673
7.940
2.931 2.927
3.552 3.548
4.190
2.618 2.614
3.552 3.548
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
1.493 1.507
3.388 3.382
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-CUMULATIVE
3.388 3.382
26 SPACES AT .127 .123 PITCH, TOTAL 3.252 3.248 TOLERANCE NON-ACUMULATIVE
5 SPACES AT .127 .123 PITCH, TOTAL .627 .623 TOLERANCE NON-CUMULATIVE
11 SPACES AT .127 .123 PITCH, TOTAL 1.377 1.373 TOLERANCE NON-CUMULATIVE
.743 .757
1.934 1.948
.152 .148 6 PLACES
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
8 SPACES AT .127 .123 PITCH TOTAL 1.002 .998
.072 .073 THRU 146 HOLES
.062 TYP
.548 .552
.061 .063 THRU 14 HOLES
H
.062
.062 R TYP
.062
.127 .123
.259 .255
.734 .738
.406
.127 .123
.252 .248
.127 .123
.493 .507
3.406
3.406
1.241
.148 .152
4.438
.388 .382
1.531
.070 .074 6 PLACES
1.490
1.490
3.435
.214 .210
2.219
.564 .560
.781
5.252 5.248
R 8 PLACES
.062
.127 .123
.127 .123
.259 .255
.197
.127 .123
.125
.062
.493 .507
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
1.685
1.241
5.268
.888 .882
3.210
1.237
1.502 1.498
.127 .123
2.252 2.248
.183 THRU .187 21 HOLES
2.388 2.382
.187 MIN CUTTER RADIUS 3 PLACES
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
2.350
23 SPACES AT .127 .123 PITCH, TOTAL 2.877 2.873 TOLERANCE NON-CUMULATIVE
4.525
6.656
6.802 6.798
2.993 3.007
.493 .507
2.127 2.123
8.000
5.312 5.308
.180 .176
14.999

VIEW B-B



.080 TYP
.160 REF

PARTIAL SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497

DRAWN J. Janowiak DATE 2 FEB 65
CHECKED J. Stelma 4 FEB 65
APPROVAL 4 FEB 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL
MIT APPROVAL

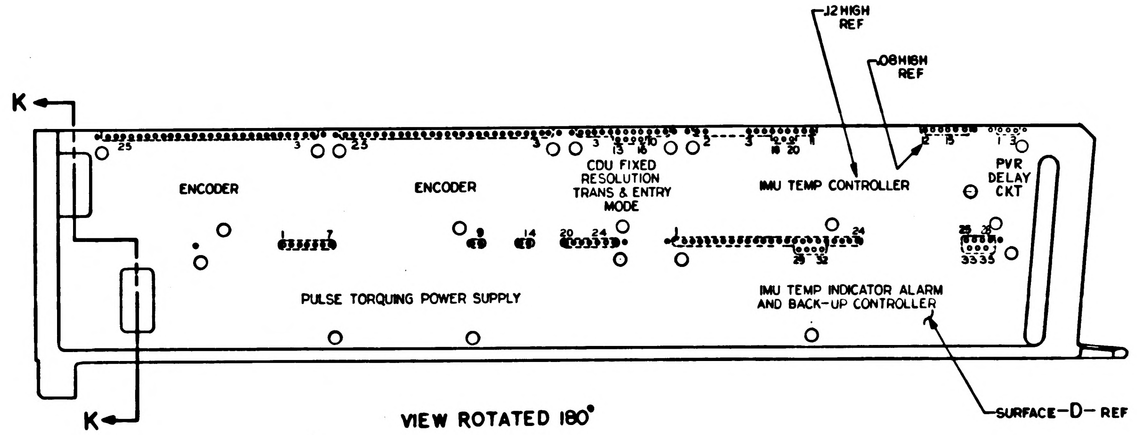
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME,
TRAY 7

CODE IDENT NO. | SIZE E | NASA DRAWING NO 1008653

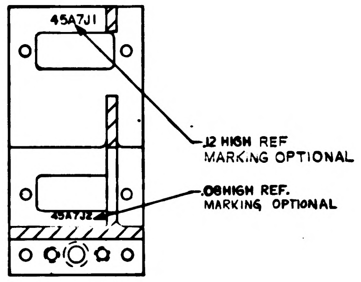
SCALE 2/1 | WT | SHEET 2 OF 3

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18692	3 MAR 65	
B	REVISED PER TDRR 21515	16 AUG 65	



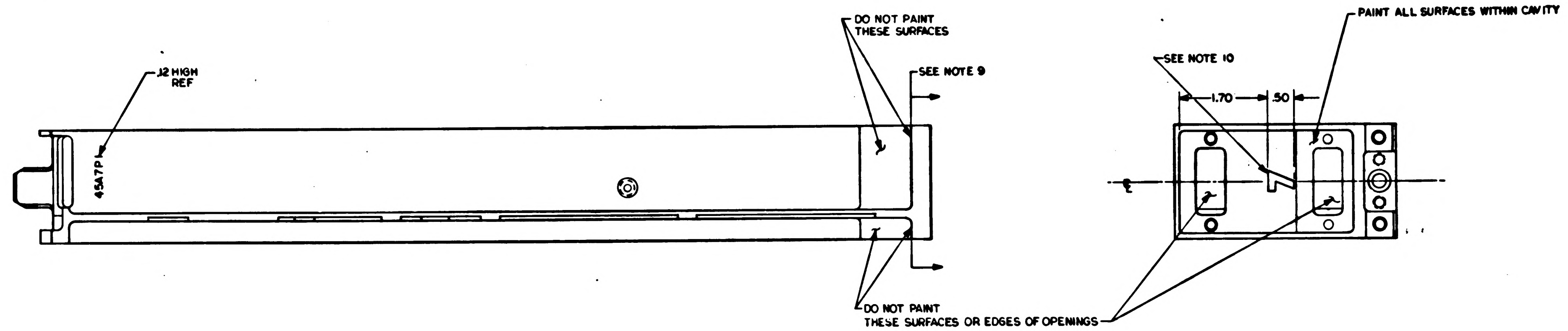
K
K
.12 HIGH REF
.08 HIGH REF
ENCODER
ENCODER
CDU FIXED RESOLUTION TRANS & ENTRY MODE
IMU TEMP CONTROLLER
PVR DELAY CKT
PULSE TORQUING POWER SUPPLY
IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
SURFACE -D- REF

VIEW ROTATED 180°

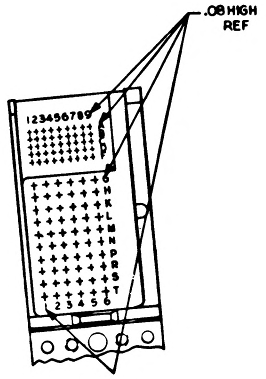


45A7J1
45A7J2
.12 HIGH REF MARKING OPTIONAL
.08 HIGH REF. MARKING OPTIONAL

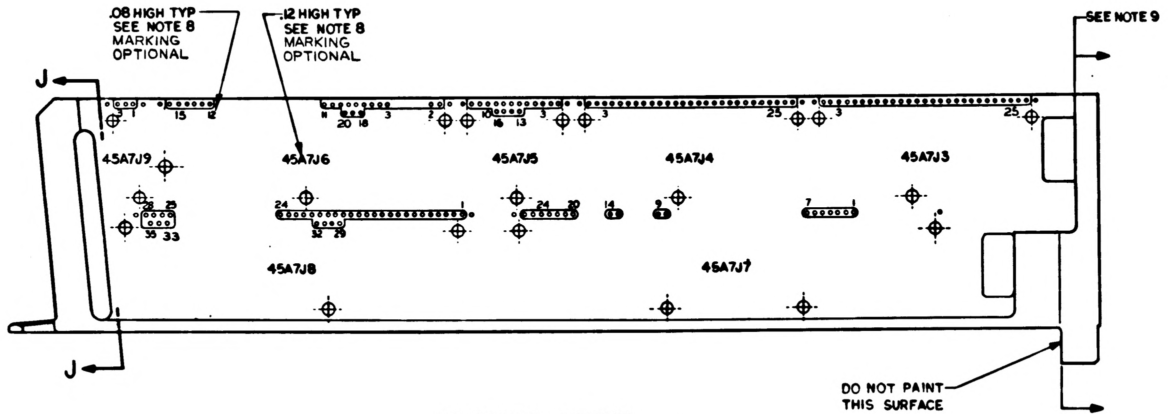
SECTION K-K



.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES
SEE NOTE 9
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS
SEE NOTE 10
1.70
.50
PAINT ALL SURFACES WITHIN CAVITY

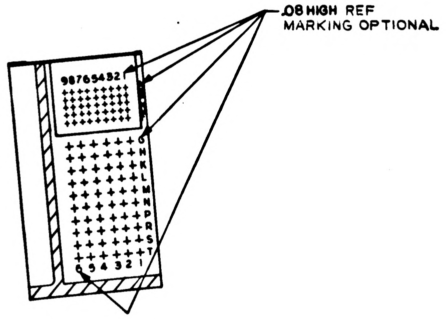


.08 HIGH REF
123456789



.08 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
.12 HIGH TYP SEE NOTE 8 MARKING OPTIONAL
SEE NOTE 9
J
J
45A7J9
45A7J6
45A7J5
45A7J4
45A7J3
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE

MARKING VIEWS



.08 HIGH REF MARKING OPTIONAL
987654321

SECTION J-J

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS XX ± .02 XXX .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

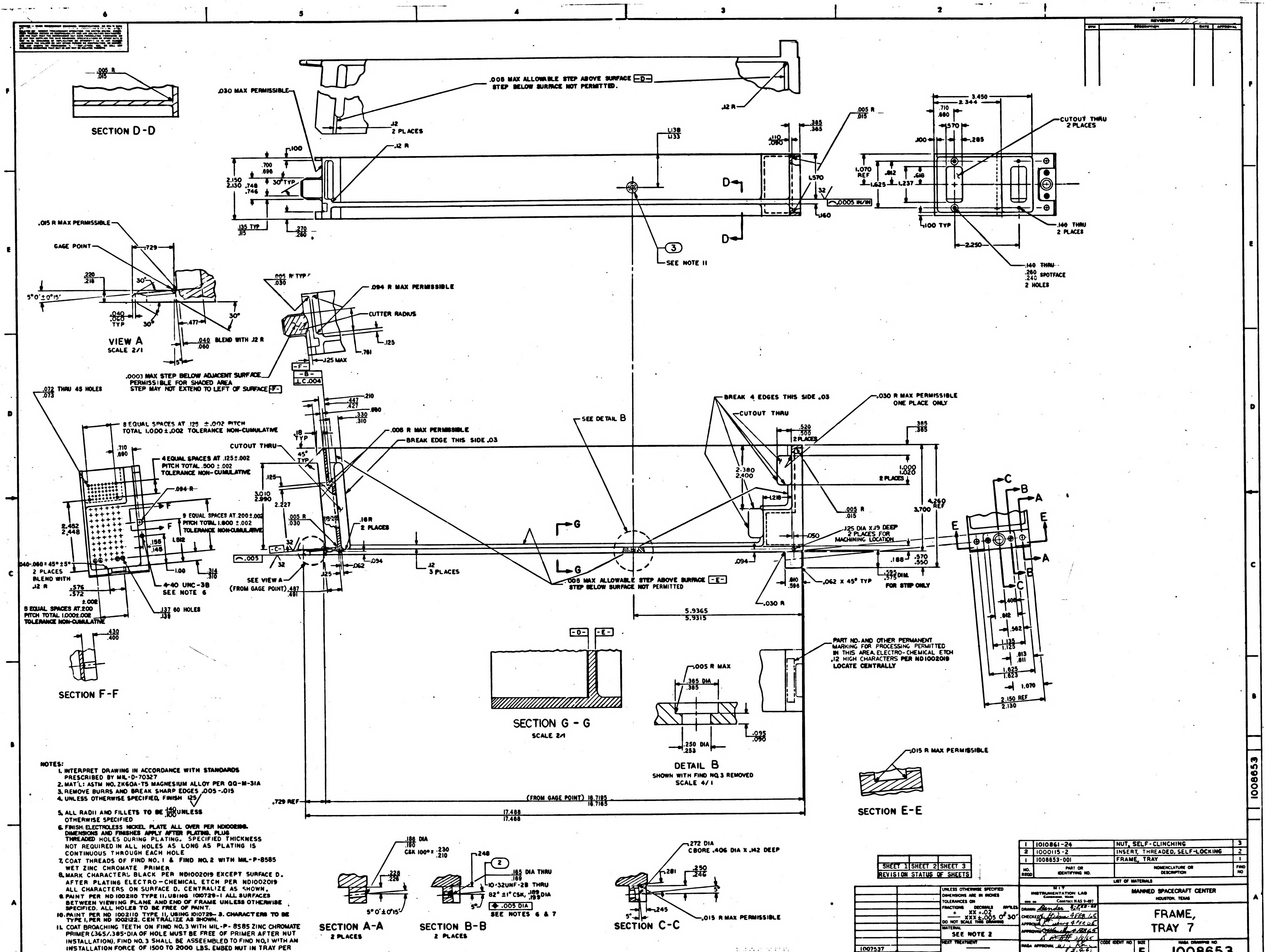
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Weissert DATE 2-FEB-65
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FRAME,
TRAY 7

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1008653
SCALE 1/1
WT
SHEET 3 OF 3

1008653 B


SECTION D-D
.005 R
.015
.030 MAX PERMISSIBLE
.005 MAX ALLOWABLE STEP ABOVE SURFACE -D-
STEP BELOW SURFACE NOT PERMITTED.
.12 R
.12
2 PLACES
.100
2.150
2.130
.700
.696
.748
.746
30° TYP
.135 TYP
.115
.270
.260
1.138
1.133
.110
.090
.385
.365
.005 R
.015
1.570
.32
.0005 IN/IN
.160
D
3
SEE NOTE 11
3.450
2.344
.710
.690
.570
.100
.285
1.070 REF
.812
.618
1.625
1.237
CUTOUT THRU
2 PLACES
.100 TYP
2.250
.140 THRU
2 PLACES
.140 THRU
.260
.240 SPOTFACE
2 HOLES
.015 R MAX PERMISSIBLE
GAGE POINT
.729
.220
.218
5°0' ± 0°15'
30°
.040
.060 TYP
.477
.040
.060
BLEND WITH .12 R
VIEW A
SCALE 2/1
.005 R TYP
.030
.094 R MAX PERMISSIBLE
CUTTER RADIUS
.125
.781
.125 MAX
.0003 MAX STEP BELOW ADJACENT SURFACE
PERMISSIBLE FOR SHADED AREA
STEP MAY NOT EXTEND TO LEFT OF SURFACE -F-
-F-
-B-
⊥ C .004
.072 THRU 45 HOLES
.073
8 EQUAL SPACES AT .125 ± .002 PITCH
TOTAL 1.000 ± .002 TOLERANCE NON-CUMULATIVE
.710
.690
4 EQUAL SPACES AT .125 ± .002
PITCH TOTAL .500 ± .002
TOLERANCE NON-CUMULATIVE
.094 R
9 EQUAL SPACES AT .200 ± .002
PITCH TOTAL 1.800 ± .002
TOLERANCE NON-CUMULATIVE
2.452
2.448
.156
.146
1.612
1.00
.314
.310
.040-.060 × 45° ± 5°
2 PLACES
BLEND WITH .12 R
.576
.572
±.002
4-40 UNC-3B
SEE NOTE 6
5 EQUAL SPACES AT .200
PITCH TOTAL 1.000 ± .002
TOLERANCE NON-CUMULATIVE
.137 60 HOLES
.139
.430
.400
SECTION F-F
.447
.427
.210
.330
.310
.680
.18 TYP
45° TYP
CUTOUT THRU
.006 R MAX PERMISSIBLE
BREAK EDGE THIS SIDE .03
3.010
2.990
2.227
.005 R
.030
.16 R
2 PLACES
-C-
.005
.32
.094
.062
.125
.12
3 PLACES
SEE VIEW A
(FROM GAGE POINT) .487
.491
G
SEE DETAIL B
.005 MAX ALLOWABLE STEP ABOVE SURFACE -E-
STEP BELOW SURFACE NOT PERMITTED
BREAK 4 EDGES THIS SIDE .03
CUTOUT THRU
.030 R MAX PERMISSIBLE
ONE PLACE ONLY
.520
.500
2 PLACES
.385
.365
2.380
2.400
1.000
1.020
2 PLACES
3.700
4.260 REF
1.218
.005 R
.015
.125 DIA X .19 DEEP
2 PLACES FOR
MACHINING LOCATION
.050
.188
.570
.550
.595
.575 DIM.
FOR STEP ONLY
.610
.598
.062 × 45° TYP
.030 R
5.9365
5.9315
-D-
-E-
SECTION G-G
SCALE 2/1
.005 R MAX
.385 DIA
.365
.095
.050
.250 DIA
.253
DETAIL B
SHOWN WITH FIND NO.3 REMOVED
SCALE 4/1
PART NO. AND OTHER PERMANENT
MARKING FOR PROCESSING PERMITTED
IN THIS AREA. ELECTRO-CHEMICAL ETCH
.12 HIGH CHARACTERS PER ND1002019
LOCATE CENTRALLY
C
B
A
E
.400
.812
.562
1.135
1.125
.813
.811
1.625
1.623
1.070
2.150 REF
2.130
.015 R MAX PERMISSIBLE
SECTION E-E
.729 REF
(FROM GAGE POINT) 16.7195
16.7165
17.488
17.488
.186 DIA
.180
CSK 100° × .230
.210
.228
.226
5°0' ± 0°15'
SECTION A-A
2 PLACES
.248
2
.165 DIA THRU
.169
10-32UNF-2B THRU
82° ± 1° CSK, .189
.199 DIA
5°
.005 DIA
SEE NOTES 6 & 7
SECTION B-B
2 PLACES
.272 DIA
CBORE .406 DIA X .142 DEEP
.281
.250
.246
5°
.245
.015 R MAX PERMISSIBLE
SECTION C-C

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MAT'L: ASTM NO. ZK60A-T5 MAGNESIUM ALLOY PER QQ-M-31A
3. REMOVE BURRS AND BREAK SHARP EDGES .005-.015
4. UNLESS OTHERWISE SPECIFIED, FINISH 125√
5. ALL RADII AND FILLETS TO BE $\frac{.140}{.100}$ UNLESS OTHERWISE SPECIFIED
6. FINISH: ELECTROLESS NICKEL PLATE ALL OVER PER ND1002198. DIMENSIONS AND FINISHES APPLY AFTER PLATING. PLUG THREADED HOLES DURING PLATING. SPECIFIED THICKNESS NOT REQUIRED IN ALL HOLES AS LONG AS PLATING IS CONTINUOUS THROUGH EACH HOLE
7. COAT THREADS OF FIND NO. 1 & FIND NO. 2 WITH MIL-P-8585 WET ZINC CHROMATE PRIMER
8. MARK CHARACTERS BLACK PER ND1002019 EXCEPT SURFACE D. AFTER PLATING ELECTRO-CHEMICAL ETCH PER ND1002019 ALL CHARACTERS ON SURFACE D. CENTRALIZE AS SHOWN.
9. PAINT PER ND 1002110 TYPE II, USING 1010729-1 ALL SURFACES BETWEEN VIEWING PLANE AND END OF FRAME UNLESS OTHERWISE SPECIFIED. ALL HOLES TO BE FREE OF PAINT.
10. PAINT PER ND 1002110 TYPE II, USING 1010729-3. CHARACTERS TO BE TYPE I, PER ND 1002122. CENTRALIZE AS SHOWN.
11. COAT BROACHING TEETH ON FIND NO. 3 WITH MIL-P-8585 ZINC CHROMATE PRIMER (.365/.385-DIA OF HOLE MUST BE FREE OF PRIMER AFTER NUT INSTALLATION). FIND NO. 3 SHALL BE ASSEEMBLED TO FIND NO. 1 WITH AN INSTALLATION FORCE OF 1500 TO 2000 LBS. EMBED NUT IN TRAY PER ND 1002128 USING CURING METHOD III.

SHEET 1	SHEET 2	SHEET 3

REVISION STATUS OF SHEETS

NO. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
1	1010861-24	NUT, SELF-CLINCHING	3
2	1000115-2	INSERT, THREADED, SELF-LOCKING	2
1	1008653-001	FRAME, TRAY	1

LIST OF MATERIALS

NEXT ASSY	USED ON
1007537	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0° 30'
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

HEAT TREATMENT
—

FINAL FINISH
SEE NOTE 6

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497

DRAWN Bender DATE 2-FEB-65
CHECKED J. Hildreth 4 FEB 65
APPROVAL R. Cushing 4 FEB 65
APPROVAL 4 FEB 65
2/8/65
NASA APPROVAL 3-9-65
MIT APPROVAL 9 FEB 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

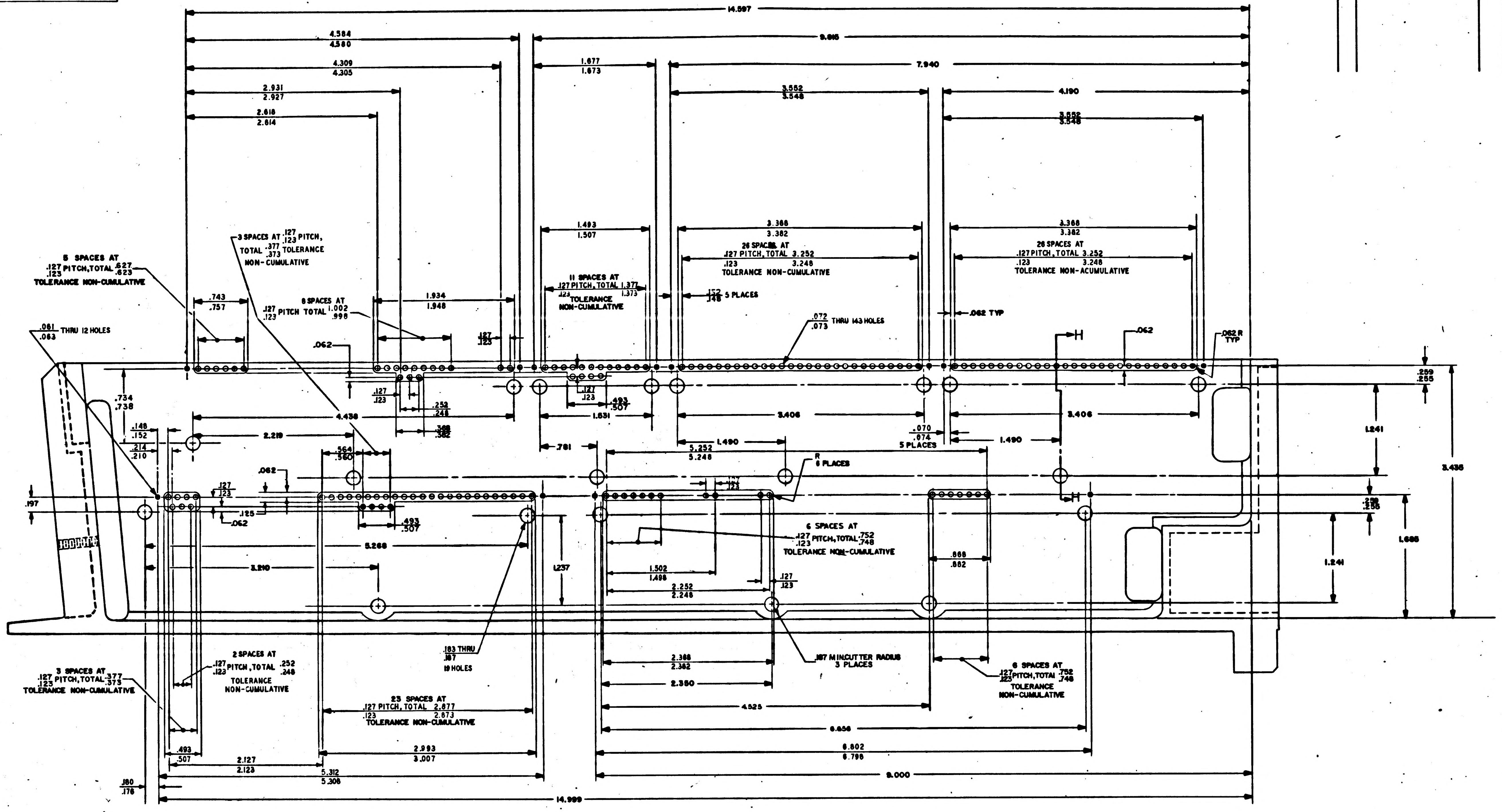
FRAME,
TRAY 7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008653
SCALE 1/1
WT
SHEET 1 OF 3

SHEET 1 OF 3
1008653

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 16266			
SYM	DESCRIPTION	DATE	APPROVAL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4.580
9.816
4.309
4.305
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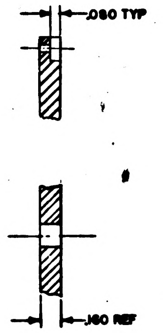
1.673
7.940
2.931
2.927
3.552
3.548
4.190
2.618
2.614
3.552
3.548
1.493
1.507
3.388
3.382
3.388
3.382
3 SPACES AT .127 .123 PITCH, TOTAL .377 .373 TOLERANCE NON-CUMULATIVE
26 SPACES AT .127 PITCH, TOTAL 3.252 .123 3.248 TOLERANCE NON-CUMULATIVE
26 SPACES AT .127 PITCH, TOTAL 3.252 .123 3.248 TOLERANCE NON-ACUMULATIVE
5 SPACES AT .127 .123 PITCH, TOTAL .627 .623 TOLERANCE NON-CUMULATIVE
11 SPACES AT .127 PITCH, TOTAL 1.377 .123 1.373 TOLERANCE NON-CUMULATIVE
.743
.757
8 SPACES AT .127 .123 PITCH TOTAL 1.002 .998
1.934
1.948
.127
.123
.152 .148 5 PLACES
.062 TYP
.072 .073 THRU 143 HOLES
.061 .063 THRU 12 HOLES
.062
H
.062
.062 R TYP
.259
.255
.734
.738
.127
.123
.121
.123
.493
.507
.252
.248
1.831
3.406
3.406
4.438
.148
.152
.214
.210
2.219
.348
.352
.564
.560
.781
.070
.074
5 PLACES
1.241
1.490
1.490
5.252
5.248
R 6 PLACES
3.438
.062
.127
.123
.197
.125
.062
.493
.507
.127
.123
.259
.255
1.686
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
5.268
1.237
1.241
3.210
1.502
1.498
.127
.123
.868
.862
2.252
2.248
.183 THRU .187 19 HOLES
2.388
2.382
.187 MIN CUTTER RADIUS 3 PLACES
6 SPACES AT .127 .123 PITCH, TOTAL .752 .748 TOLERANCE NON-CUMULATIVE
3 SPACES AT .127 PITCH, TOTAL .377 .123 .373 TOLERANCE NON-CUMULATIVE
2 SPACES AT .127 .123 PITCH, TOTAL .252 .248 TOLERANCE NON-CUMULATIVE
2.350
23 SPACES AT .127 PITCH, TOTAL 2.877 .123 2.873 TOLERANCE NON-CUMULATIVE
4.525
6.856
2.993
3.007
6.802
6.798
.493
.507
2.127
2.123
5.312
5.308
8.000
.180
.176
14.999

VIEW B-B


.080 TYP
.160 REF

PARTIAL SECTION H-H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± 1/64 DECIMALS XX ±.02 XXX ±.005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

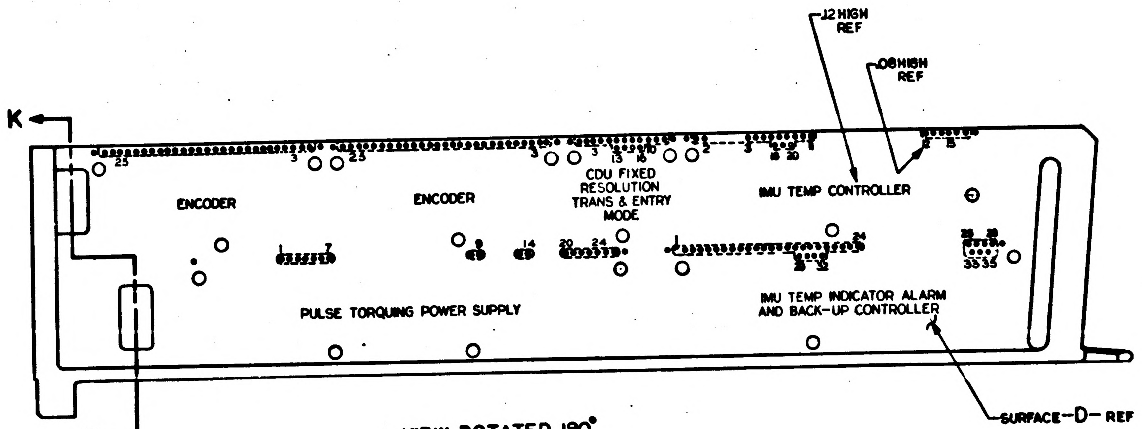
MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN J. Janowicz DATE 3 FEB 65
CHECKED C. Stelma 4 FEB 65
APPROVAL R Osburg 4 FEB 65
APPROVAL 4 FEB 65
2/9/65
NASA APPROVAL 2-9-65
MIT APPROVAL 9 Feb 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

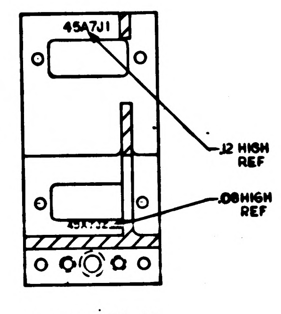
FRAME, TRAY 7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008653
SCALE 2/1
WT
SHEET 2 OF 3

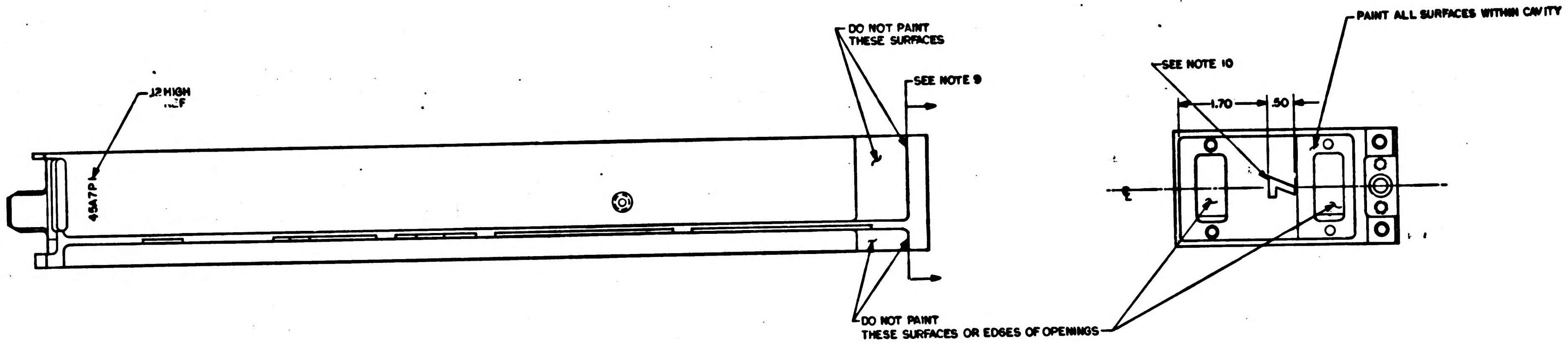
1008653

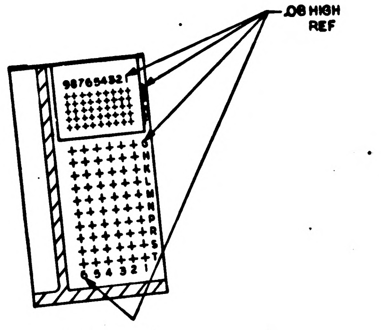

K
.12 HIGH REF
.08 HIGH REF
25
3
23
13
16
10
2
18 20
12
15
CDU FIXED RESOLUTION TRANS & ENTRY MODE
ENCODER
ENCODER
IMU TEMP CONTROLLER
1
7
9
14
20
24
28
32
33 35
PULSE TORQUING POWER SUPPLY
IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
SURFACE -D- REF
K

VIEW ROTATED 180°

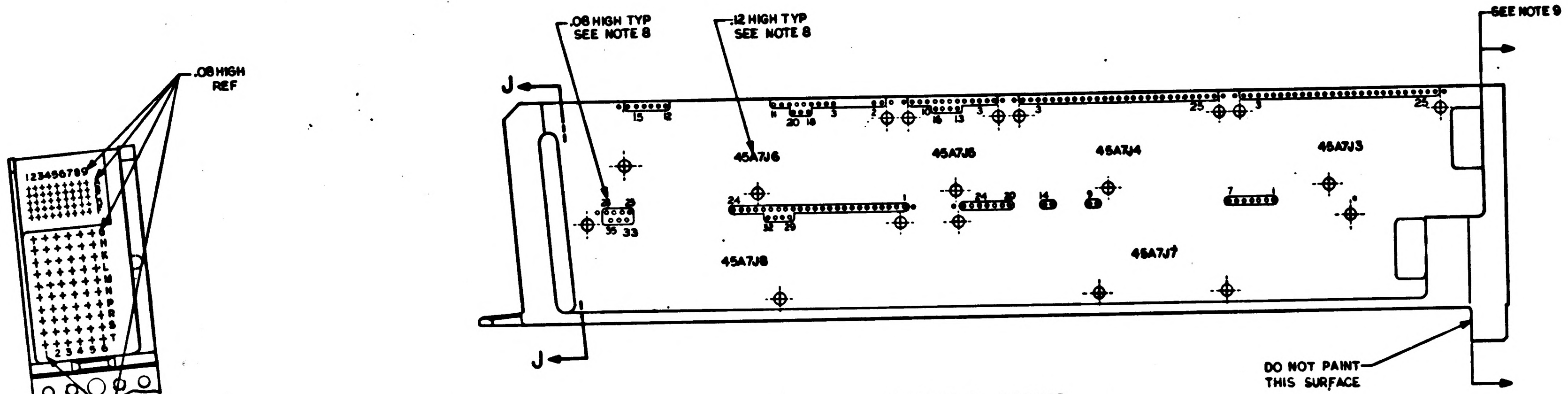

45A7J1
.12 HIGH REF
.08 HIGH REF
45A7J2

SECTION K-K


.12 HIGH REF
45A7P1
DO NOT PAINT THESE SURFACES
SEE NOTE 9
SEE NOTE 10
PAINT ALL SURFACES WITHIN CAVITY
1.70
.50
℄
DO NOT PAINT THESE SURFACES OR EDGES OF OPENINGS


.08 HIGH REF
987654321

SECTION J-J


.08 HIGH REF
123456789
.08 HIGH TYP SEE NOTE 8
.12 HIGH TYP SEE NOTE 8
SEE NOTE 9
J
15
12
20 16
3
13
25
45A7J6
45A7J5
45A7J4
45A7J3
24
1
14
9
7
28
32 29
35 33
45A7J8
45A7J7
DO NOT PAINT THIS SURFACE
J

MARKING VIEWS

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS XX ±.02 XXX .005 ANGLES ± 0°30'
DO NOT SCALE THIS DRAWING

MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Weisset DATE 2-FEB-65
CHECKED Stolms 4 FEB 65
APPROVAL Pardberg 4 FEB 65
APPROVAL 5 FEB 65
D.B. 2/8/65
NASA APPROVAL 2-9-65
MIT APPROVAL 4 FEB 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FRAME, TRAY 7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1008653
SCALE 1/1
WT
SHEET 3 OF 3

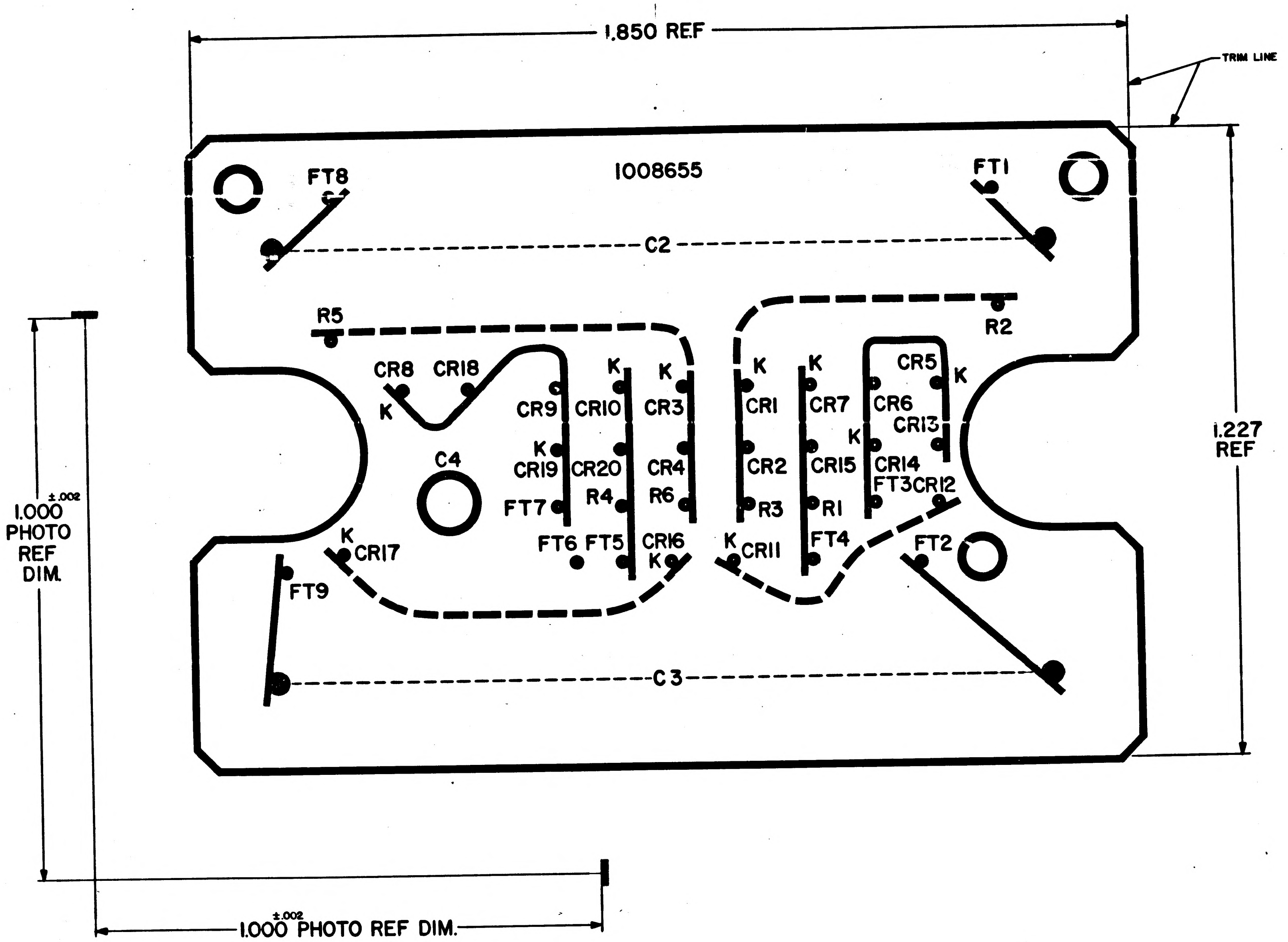
MASTER

1008653

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1633

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



1.850 REF
TRIM LINE
1008655
FT8
FT1
C2
R5
R2
CR8
CR18
K
CR9
CR10
CR3
CR1
CR7
CR6
CR5
CR13
C4
CR19
CR20
CR4
CR2
CR15
CR14
FT3
CR12
R4
R6
R3
R1
FT7
FT6
FT5
CR16
CR11
FT4
FT2
CR17
FT9
C3
1.227 REF
1.000 ±.002 PHOTO REF DIM.
1.000 ±.002 PHOTO REF DIM.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODUCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L. Krahn 5 FEB 65
CHECKED R.L. Kampshaug 8 Feb 65
APPROVED 7 FEB 65
APPROVED E. Tast LAB 4/9/65
APPROVED MIT 5 Feb 65
APPROVED MSC W. J. R 2-8-65
DATE

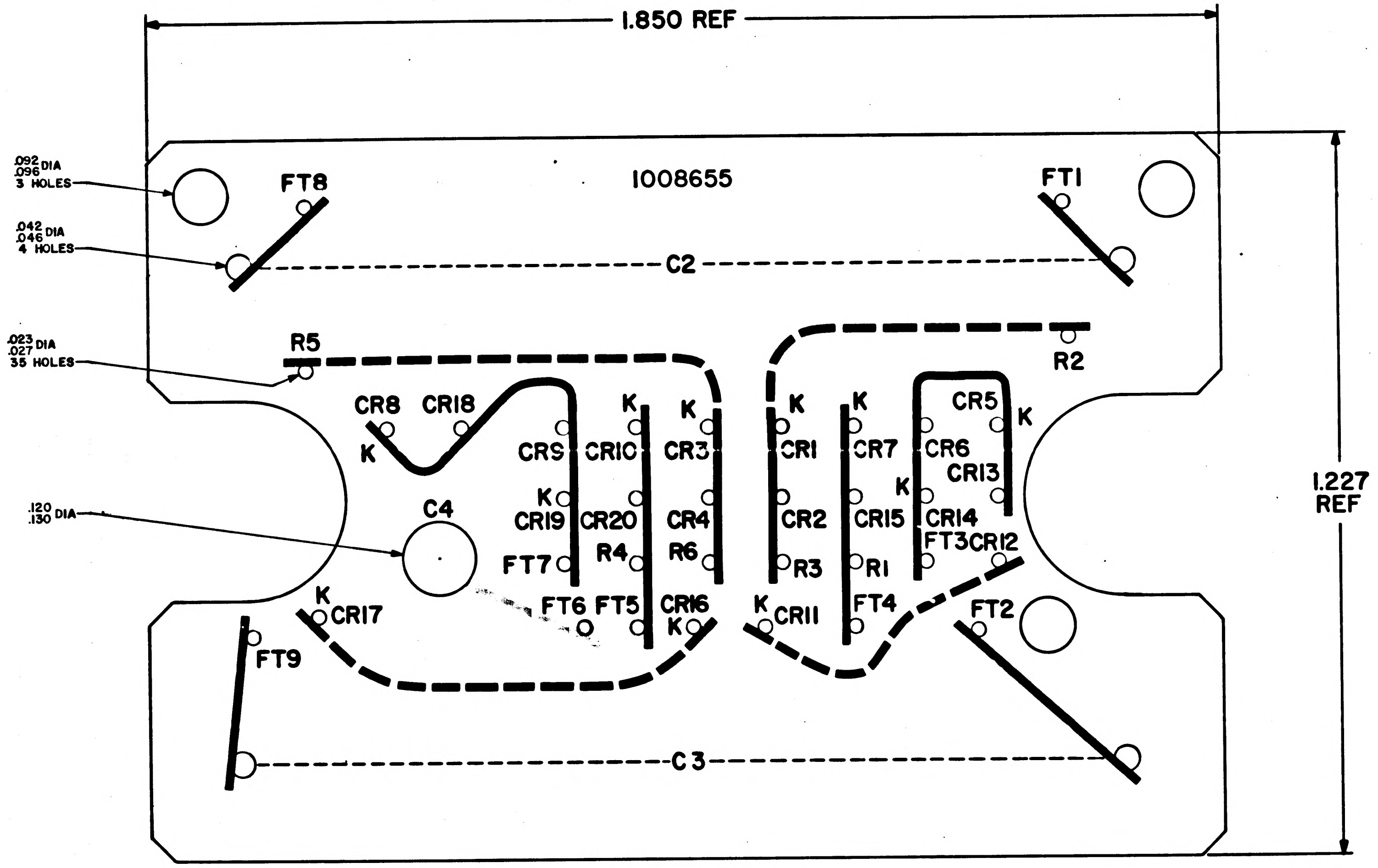
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD (BOTTOM)
TWO SPEED SWITCH

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008654
SCALE 10/1
SHEET 1 OF 1

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 1623/						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


1.850 REF
.092 .096 DIA 3 HOLES
.042 .046 DIA 4 HOLES
.023 .027 DIA 35 HOLES
.120 .130 DIA
1008655
FT8
FT1
C2
R5
R2
CR8
CR18
K
CR9
CR10
CR3
CR1
CR7
CR6
CR5
CR13
CR19
CR20
CR4
CR2
CR15
CR14
FT3
CR12
C4
R4
R6
R3
R1
FT7
FT6
FT5
CR16
CR11
FT4
FT2
CR17
FT9
C3
1.227 REF

REF DRAWING:
1008654 PHOTOGRAPHIC MASTER

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. MATERIAL: PLASTIC SHEET .031 THICK PER MIL-P-18177 TYPE GEE
3. PREPARE BOARD FOR PHOTOGRAPHY PER ND1002133
4. MARK BLACK CHARACTERS PER ND1002019

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007522	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTE 2

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN L. Krahn 5 FEB 65
CHECKED 8 Feb 65
APPROVED 8 FEB 65
APPROVED 4/8/65
APPROVED MIT 9 Feb 65
APPROVED MSC W J Rhine 2-6-65
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

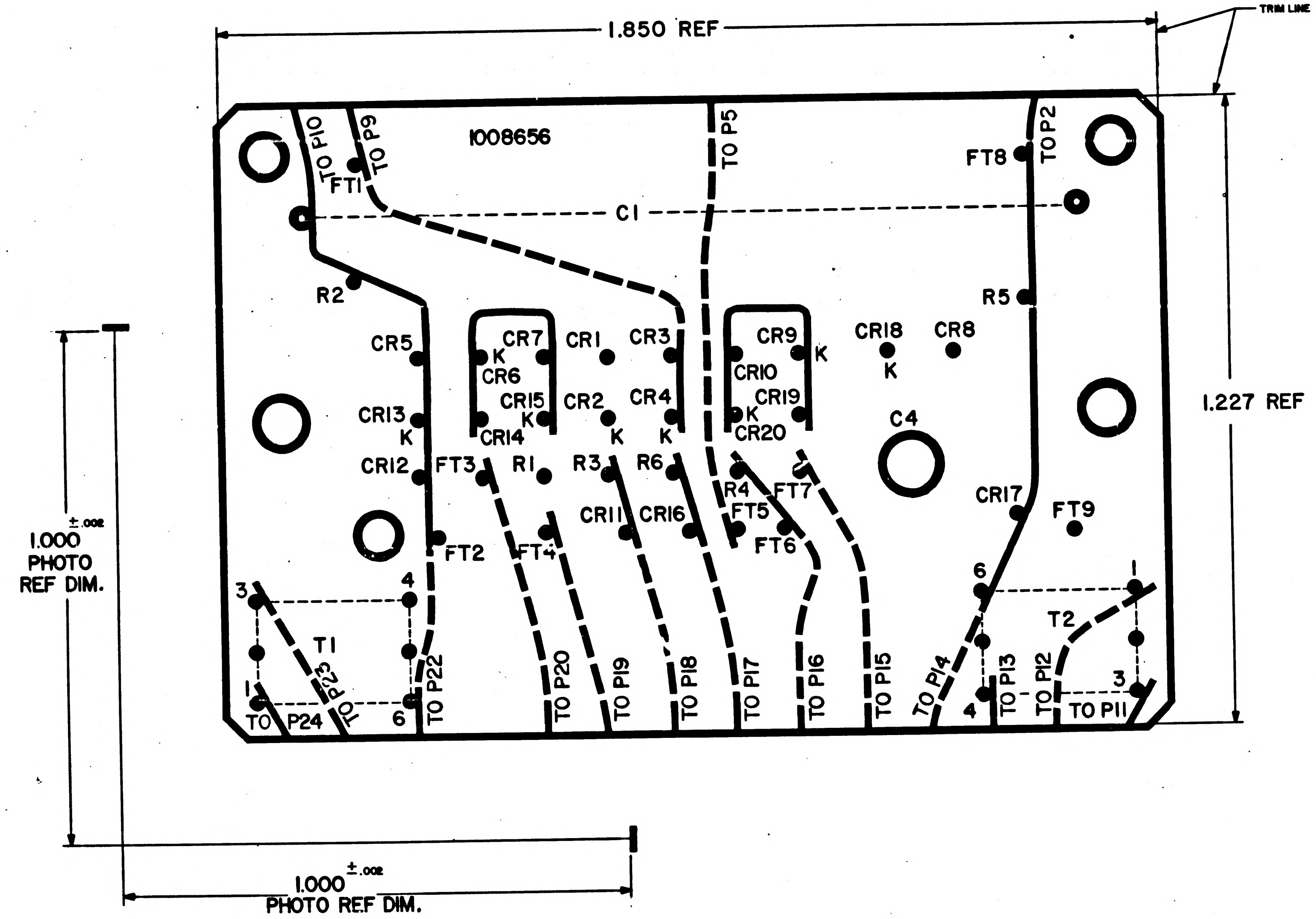
WIRING BOARD (BOTTOM)
TWO SPEED SWITCH

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008655
SCALE 10/1
SHEET 1 OF 1

1008655

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 16331						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


1.850 REF
TRIM LINE
1008656
TO P10
TO P9
FT1
TO P5
FT8
TO P2
C1
R2
R5
CR5
CR7
K
CR6
CR1
CR3
CR9
K
CR10
CR18
K
CR8
CR13
K
CR15
K
CR2
CR4
K
K
CR19
K
CR14
CR20
C4
1.227 REF
CR12
FT3
R1
R3
R6
R4
FT7
FT5
CR11
CR16
CR17
FT9
FT2
FT4
FT6
1.000 ±.002 PHOTO REF DIM.
3
4
T1
6
T2
1
TO P24
TO P23
6
TO P22
TO P20
TO P19
TO P18
TO P17
TO P16
TO P15
TO P14
4
TO P13
TO P12
3
TO P11
1.000 ±.002 PHOTO REF DIM.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ORIGINAL OF THIS DRAWING OR REPRODCTION MADE BY A PROCESS OR METHOD SHALL INSURE DIMENSIONAL STABILITY. DIMENSIONAL STABILITY SHALL NOT EXCEED .001 INCH PER INCH
3. MAKE MASTER PATTERN POSITIVE FILM TO DIMENSIONS SHOWN
4. CUT TO WITHIN .010 OF TRIM LINE

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J. Brady
CHECKED
APPROVED
APPROVED FEB 3 65
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PHOTOGRAPHIC MASTER
WIRING BOARD TOP
TWO SPEED SWITCH

CODE IDENT NO. —
SIZE E
DRAWING NO. 1008656
SCALE 10/1
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22622	9-21-65	WK.
A	REVISED PER TDRR 24705	12/21/65	RTS WK

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.
   - C. PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN ACCORDANCE WITH THE MANUFACTURER'S NORMAL COMMERCIAL PRACTICE.
   - D. MARKING: CLAMPS SHALL BE MARKED PER ND 1002019 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL AND NASA PART NUMBER. METAL RAISING DUE TO STAMPING PERMITTED.

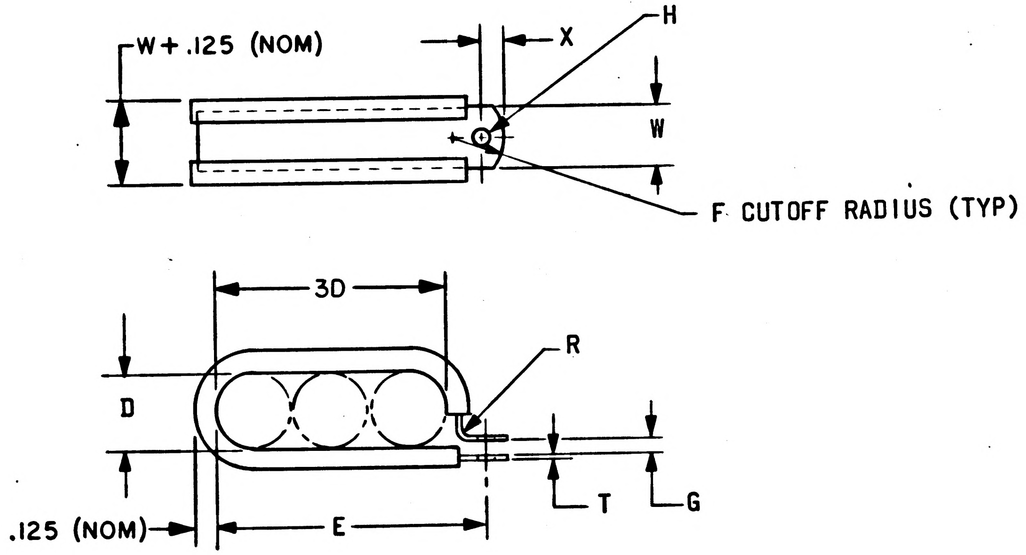
2. ACCEPTANCE AND INSPECTION:
   - A. MECHANICAL: PER TABLE I AND DRAWING.

3. DESIGN:
   - A. METAL: CORROSION RESISTANT STEEL PER MIL-S-6721, ANNEALED, BALL BURNISHED AND PASSIVATED.

TABLE I

DASH NUMBER	D DIA	E	F CUTOFF RADIUS (TYP)	G GAP	H DIA (TO CLEAR 8-32 SCREW REF)	R RADIUS	T METAL THICKNESS	X	W WIDTH
-001	.327 .297	1.355 1.325	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-002	.390 .360	1.542 1.512	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-003	.452 .422	1.730 1.700	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-004	.515 .485	1.917 1.887	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497
DRAWN S. Amyx DATE 10 AUG 65
CHECKED W. Diehl 12 AUG. '65
APPROVAL J. Kerr 9/20/65
APPROVAL
NASA APPROVAL
MIT APPROVAL 21 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLAMP, LOOP - CUSHIONED,
MULTIPLE TYPE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008807
SCALE NONE
WT
SHEET 1 OF 1

W.D.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008807 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22622	4-21-65	WK.
A	REVISED PER TDRR 24722	12/21/65	RTS WK
B	REVISED PER TDRR 25943	2/8/66	WK.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.
   - C. PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN ACCORDANCE WITH THE MANUFACTURER'S NORMAL COMMERCIAL PRACTICE.
   - D. MARKING: CLAMPS SHALL BE MARKED PER ND 1002019 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL AND NASA PART NUMBER. METAL RAISING DUE TO STAMPING PERMITTED.

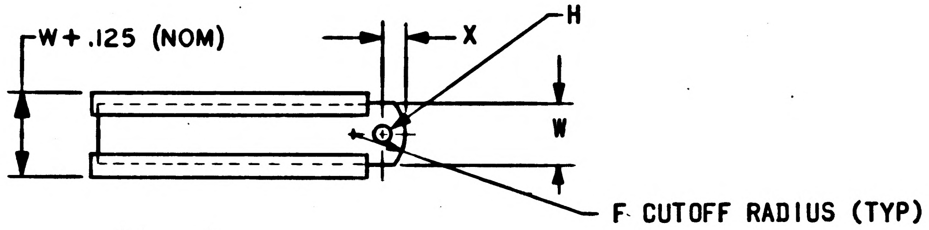
2. ACCEPTANCE AND INSPECTION:
   - A. MECHANICAL: PER TABLE I AND DRAWING.

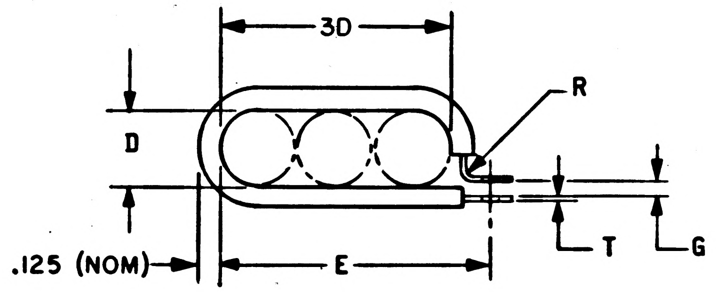
3. DESIGN:
   - A. METAL: CORROSION RESISTANT STEEL PER MIL-S-6721, ANNEALED, BALL BURNISHED AND PASSIVATED.

TABLE I

DASH NUMBER	D DIA	E	F CUTOFF RADIUS (TYP)	G GAP	H DIA (TO CLEAR 8-32 SCREW REF)	R RADIUS	T METAL THICKNESS	X	W WIDTH
-001	.327 .297	1.355 1.325	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-002	.390 .360	1.542 1.512	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-003	.452 .422	1.730 1.700	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-004	.515 .485	1.917 1.887	.40 .34	.09 .03	.178 .168	.09 .03	.042 .022	.198 .178	.53 .47

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.





PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT NAS 9-497
DRAWN S. Amyx DATE 10 AUG 65
CHECKED W. Diehl 12 AUG. '65
APPROVAL J. J. Kerri 9/20/65
APPROVAL
NASA APPROVAL Arthur C. Metzger
MIT APPROVAL W Kupfer 2/4/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLAMP, LOOP - CUSHIONED, MULTIPLE TYPE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008807
SCALE NONE
WT
SHEET 1 OF 1

W.D.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008807 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22622	4-21-65	WH.
A	REVISED PER TDRR 24722	12/24/65	RTS WK
B	REVISED PER TDRR 25943	2/8/66	WK.
C	REVISED PER TDRR 27109	3/22/66	WK

REQUIREMENTS:

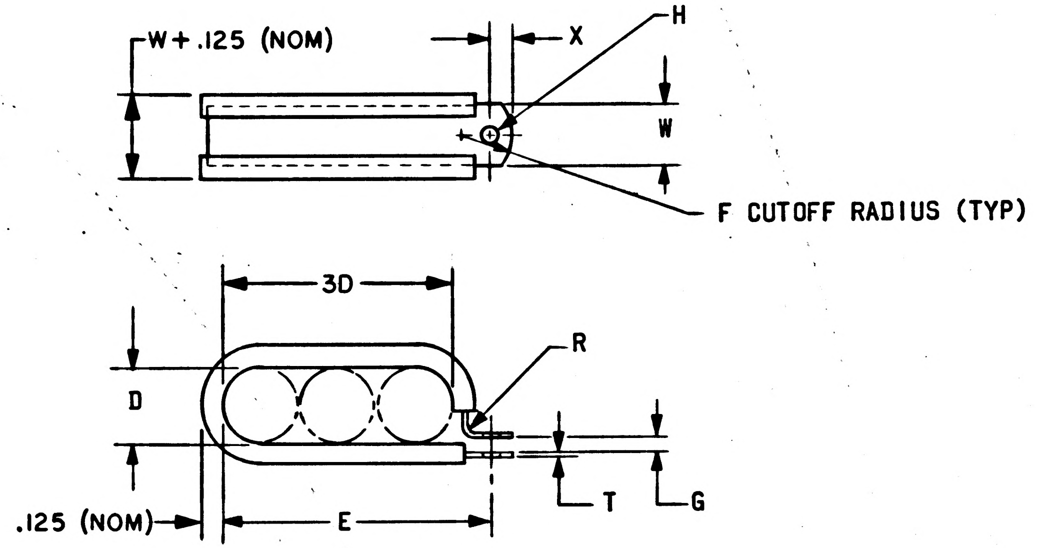
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.
   - C. PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN ACCORDANCE WITH THE MANUFACTURER'S NORMAL COMMERCIAL PRACTICE.
   - D. MARKING: CLAMPS SHALL BE MARKED PER ND 1002019 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL AND NASA PART NUMBER. METAL RAISING DUE TO STAMPING PERMITTED.

2. ACCEPTANCE AND INSPECTION:
   - A. MECHANICAL: PER TABLE I AND DRAWING.

3. DESIGN:
   - A. METAL: CORROSION RESISTANT STEEL PER MIL-S-6721, ANNEALED, BALL BURNISHED AND PASSIVATED.

TABLE I

DASH NUMBER	D DIA (TO BE MET WHEN GAP "G" IS .060)	E	F CUTOFF RADIUS (TYP)		H DIA (TO CLEAR 8-32 SCREW REF)	R RADIUS	T METAL THICKNESS	X	W WIDTH
-001	.327 .297	1.355 1.325	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-002	.390 .360	1.542 1.512	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-003	.452 .422	1.730 1.700	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-004	.515 .485	1.917 1.887	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-005	.578 .548	2.103 2.073	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-006	.640 .610	2.292 2.262	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-007	.703 .673	2.481 2.451	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47
-008	.765 .735	2.667 2.637	.40 .34		.178 .168	.09 .03	.042 .022	.198 .178	.53 .47



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO
NAS 9-497 CONTRACT
DRAWN S. Amyx DATE 10 AUG 65
CHECKED W. Diehl 12 AUG. '65
APPROVAL J Kerr 9/20/65
APPROVAL
NASA APPROVAL Arthur C. Metzger
MIT APPROVAL W Kupfer 21 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLAMP, LOOP - CUSHIONED, MULTIPLE TYPE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008807
SCALE NONE
WT
SHEET 1 OF 1

W.D.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008807

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22622	9-21-65	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.
   - C. PACKAGING AND PACKING: UNITS SHALL BE PACKAGED IN ACCORDANCE WITH THE MANUFACTURER'S NORMAL COMMERCIAL PRACTICE.
   - D. MARKING: CLAMPS SHALL BE MARKED PER ND 1002019 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL AND NASA PART NUMBER. METAL RAISING DUE TO STAMPING PERMITTED.

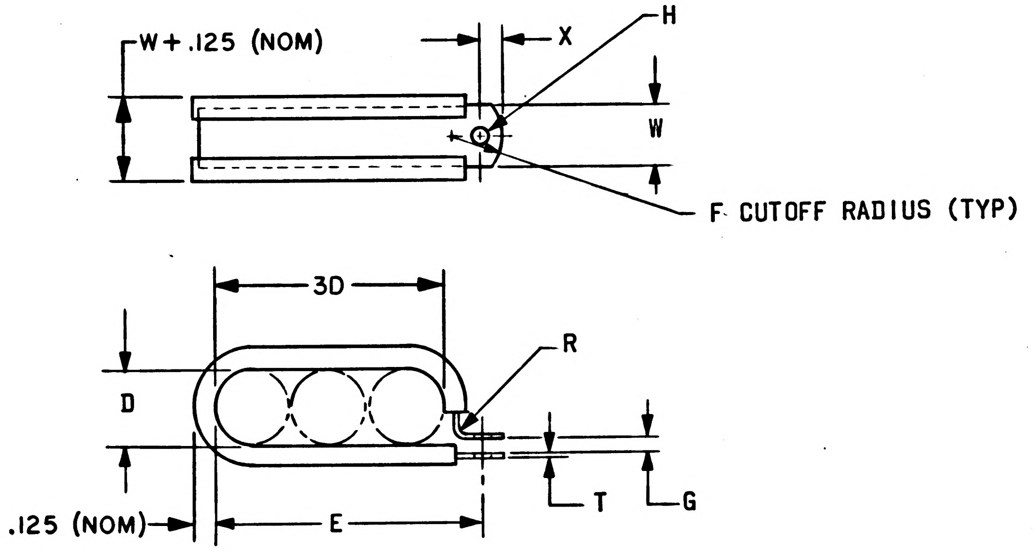
2. ACCEPTANCE AND INSPECTION:
   - A. MECHANICAL: PER TABLE I AND DRAWING.

3. DESIGN:
   - A. METAL: 2024-T4 ALUMINUM ALLOY PER QQ-A-362 COND. T.
   - B. CUSHION MATERIAL: SILICATE RUBBER (RED) PER AMS 3303.

TABLE I

DASH NUMBER	D DIA	E	F CUTOFF RADIUS (TYP)	G GAP	H DIA (TO CLEAR 6-32 SCREW REF)	R RADIUS	T METAL THICKNESS	X	W WIDTH
-001	.452 .422	1.728 1.698	.40 .34	.09 .03	.152 .142	.09 .03	.042 .022	.198 .178	.53 .47
-002	.515 .485	1.917 1.887	.40 .34	.09 .03	.152 .142	.09 .03	.042 .022	.198 .178	.53 .47
-003	.577 .547	2.103 2.073	.40 .34	.09 .03	.152 .142	.09 .03	.042 .022	.198 .178	.53 .47
-004	.640 .610	2.292 2.262	.40 .34	.09 .03	.152 .142	.09 .03	.042 .022	.198 .178	.53 .47

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO.
CONTRACT NAS 9-497
DRAWN S. Amyx DATE 10 AUG 65
CHECKED W. Diehl 12 AUG. '65
APPROVAL J. J. Kerr 9/20/65
APPROVAL
NASA APPROVAL Milton C. Metzger
MIT APPROVAL 21 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CLAMP, LOOP - CUSHIONED,
MULTIPLE TYPE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008807

SCALE NONE
WT
SHEET 1 OF 1

1008807

W. D.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 8088001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23184	10-13-65	
A	REVISED PER TDRR 26262	16 FEB 66	WK

REQUIREMENTS:

1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

2. INSPECTION AND ACCEPTANCE:
   A. MARKING:
      (1) PIECEMARKING - PART SHALL BE MARKED PER ND 1002019 WITH THE NASA PART NUMBER AND MANUFACTURER'S NAME AND/OR SYMBOL.
      (2) MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
   B. PACKAGING:
      (1) PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING SHALL BE PER ND 1002215, CLASS I, CODE 3.

3. DESIGN:
   A. MATERIAL:
      (1) CAP - ALUMINUM ALLOY, GOLD IRIDITE FINISH PER MIL-C-5541.
      (2) CHAIN - CORROSION RESISTANT STEEL
      (3) RIVET - CORROSION RESISTANT STEEL OR ANODIZED ALUMINUM.
      (4) GASKET - RESILIENT RUBBER. (SILICONE)
   B. SHALL CONFORM TO MIL-C-26482 EXCEPT FOR RUBBER.
   C. TO BE USED ON CONNECTORS P/N's 1010937, 1010930, 1010936, AND 100636
   D. NO CADMIUM OR ZINC SHALL BE USED

FIG II

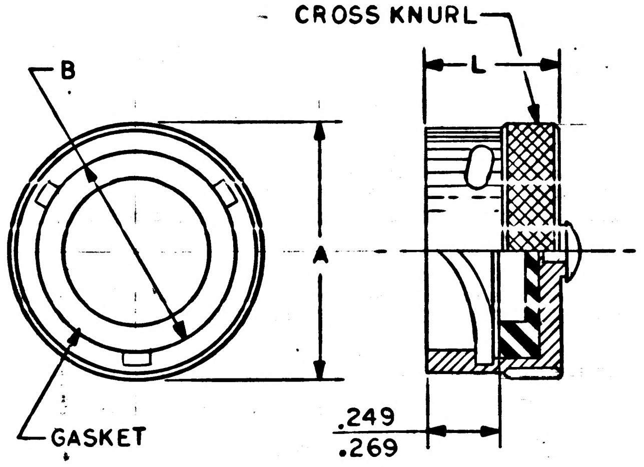
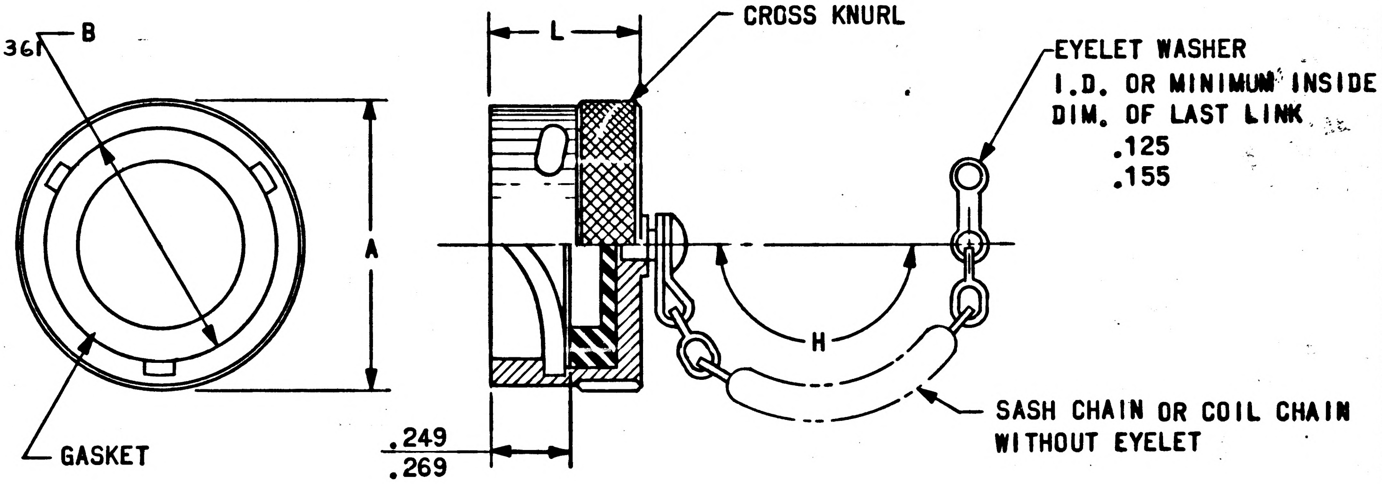


FIG I


B
L
CROSS KNURL
EYELET WASHER
I.D. OR MINIMUM INSIDE DIM. OF LAST LINK
.125
.155
A
H
SASH CHAIN OR COIL CHAIN WITHOUT EYELET
GASKET
.249
.269

DASH NUMBER (FIG I)	SHELL SIZE	A MAX	B	L MAX	H (FIG I)	DASH NUMBER (FIG II)
-001	8	.719	.486 .480	.562	3.25 2.75	-011
-002	10	.812	.607 .601	.562	3.25 2.75	-012
-003	12	1.000	.766 .760	.562	3.75 3.25	-013
-004	14	1.125	.890 .884	.562	3.75 3.25	-014
-005	16	1.250	1.015 1.009	.562	3.75 3.25	-015
-006	18	1.375	1.141 1.135	.562	3.75 3.25	-016
-007	20	1.500	1.265 1.259	.562	4.25 3.75	-017
-008	22	1.625	1.390 1.384	.562	4.25 3.75	-018

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT NAS 9-497
DRAWN S. Amyx DATE 18 AUG 65
CHECKED Ed Foster 19 Aug 65
APPROVAL 6 Oct 65
APPROVAL
~~NASA APPROVAL~~ NOT REQUIRED PER LETTER NASA PP7-65-612
MIT APPROVAL M G Munley 10-13-65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAP, PROTECTIVE, DUST AND MOISTURE SEAL
BAYONNET COUPLING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008808
SCALE NONE
WT
SHEET 1 OF 1

8088001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23184	10-13-65	

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.

2. INSPECTION AND ACCEPTANCE:
   - A. MARKING:
     - (1) PIECEMARKING - PART SHALL BE MARKED PER ND 1002019 WITH THE NASA PART NUMBER AND MANUFACTURER'S NAME AND/OR SYMBOL.
     - (2) MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.
   - B. PACKAGING:
     - (1) PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING SHALL BE PER ND 1002215, CLASS I, CODE 3.

3. DESIGN:
   - A. MATERIAL:
     - (1) CAP - ALUMINUM ALLOY, GOLD IRIDITE FINISH PER MIL-C-5541.
     - (2) CHAIN - CORROSION RESISTANT STEEL
     - (3) RIVET - CORROSION RESISTANT STEEL OR ANODIZED ALUMINUM.
     - (4) GASKET - RESILIENT RUBBER. (SILICONE)
   - B. SHALL CONFORM TO MIL-C-26482 EXCEPT FOR RUBBER.
   - C. TO BE USED ON CONNECTORS P/N's 1010937, 1010930, 1010936, AND 100636
   - D. NO CADMIUM OR ZINC SHALL BE USED

DASH NUMBER	SHELL SIZE	A MAX	B	L MAX	H
-001	8	.719	.486 .480	.562	3.25 2.75
-002	10	.812	.607 .601	.562	3.25 2.75
-003	12	1.000	.766 .760	.562	3.75 3.25
-004	14	1.125	.890 .884	.562	3.75 3.25
-005	16	1.250	1.015 1.009	.562	3.75 3.25
-006	18	1.375	1.141 1.135	.562	3.75 3.25
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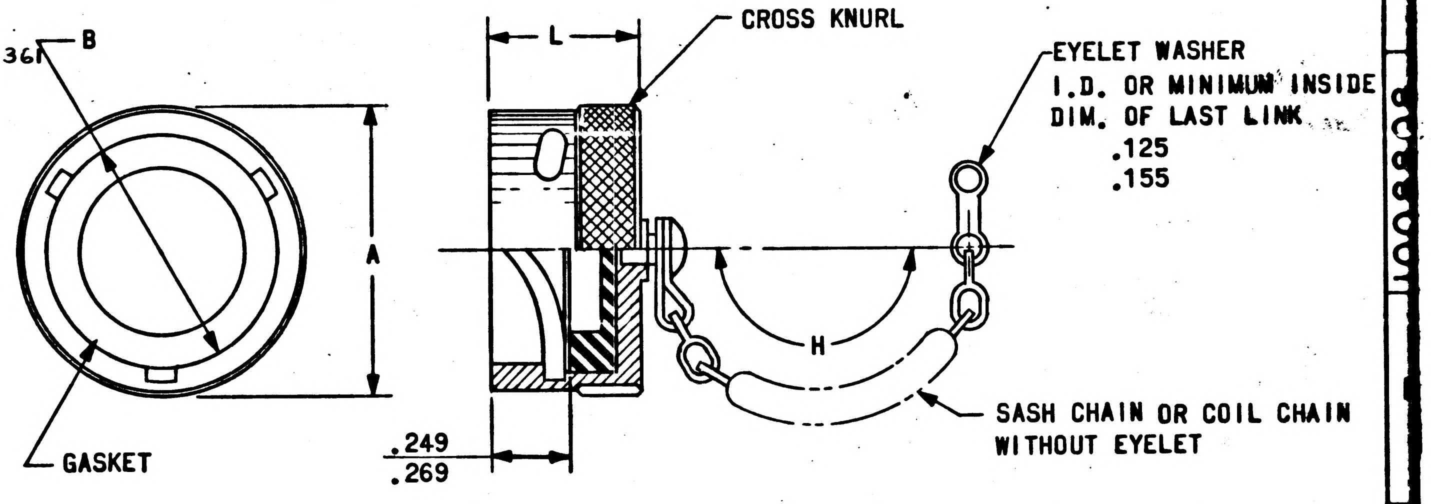


MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT
NONE
FINAL FINISH
NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS 9-497
DRAWN S. Amyx DATE 18 AUG 65
CHECKED Ed Foster 19 Aug 65
APPROVAL 6 Oct '65
APPROVAL
~~NASA APPROVAL~~ NOT REQUIRED PER LETTER NASA PP7-65-612
MIT APPROVAL 10-13-65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAP, PROTECTIVE, DUST AND MOISTURE SEAL
BAYONNET COUPLING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008808

SCALE NONE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

6088001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 22037	8-31-65	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. EACH SHIPPING AND UNIT CONTAINER SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, ITEM NAME, NASA DRAWING NUMBER, NET CONTENTS, LOT NUMBER AND DATE OF MANUFACTURE. INDIVIDUAL CONTAINERS SHALL ALSO BE MARKED PART A (EPOXY RESIN COMPONENT) OR PART B (CATALYST COMPONENT) WHICHEVER IS APPLICABLE, AND INSTRUCTIONS FOR USE IN ACCORDANCE WITH MIL-P-22808.

2. ACCEPTANCE AND INSPECTION:
   - A. MATERIAL: THE MATERIAL COVERED BY THIS SPECIFICATION SHALL BE A TWO COMPONENT EPOXY PAINT MEETING THE QUANTITATIVE AND QUALITATIVE REQUIREMENTS OF MIL-P-22808 EXCEPT AS REQUIRED TO MEET THE REQUIREMENTS SPECIFIED HEREIN.
     - (1) PART A
       - (a) EPOXY RESIN COMPONENT: THE EPOXY RESIN COMPONENT SHALL CONSIST OF A BISPHENOL TYPE EPOXY RESIN COMBINED WITH THE AMOUNTS OF FLOW CONTROL AGENTS AND VOLATILE SOLVENTS NECESSARY TO MEET THE REQUIREMENTS OF THIS SPECIFICATION.
       - (b) PIGMENT: PIGMENTATION SHALL BE AS SPECIFIED IN MIL-P-22808 EXCEPT FOR THOSE COLORS NOT SPECIFIED THEREIN.
     - (2) PART B
       - (a) CATALYST COMPONENT: THE CATALYST COMPONENT SHALL CONSIST OF A POLYAMIDE RESIN COMBINED WITH THE AMOUNTS OF VOLATILE SOLVENTS NECESSARY TO MEET THE REQUIREMENTS OF THIS SPECIFICATION.
   - B. COLOR: WHEN MIXED IN A RATIO OF TWO PARTS BY VOLUME, PART A, TO ONE PART BY VOLUME, PART B, THE MATERIAL SHALL CURE TO THE COLOR AND SPECULAR GLOSS SPECIFIED IN TABLE I. TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH FEDERAL TEST METHOD STANDARD NO. 141, METHODS 4250 AND 6101, RESPECTIVELY.
   - C. MIXED PAINT: THE MIXED PAINT SHALL CONFORM TO THE QUANTITATIVE REQUIREMENTS SPECIFIED IN MIL-P-22808 EXCEPT THAT THE HIDING POWER SHALL BE 0.98 MINIMUM FOR THE COLORS SPECIFIED HEREIN AND THE SPECULAR GLOSS SHALL BE AS SPECIFIED IN TABLE I.
   - D. CURED FILM: TESTS SPECIFIED IN MIL-P-22808 FOR QUALITATIVE REQUIREMENTS OF THE CURED FILM SHALL NOT CONSTITUTE PART OF THE ACCEPTANCE AND INSPECTION REQUIREMENTS.
   - E. PACKAGING: THE MATERIAL SHALL BE FURNISHED IN KIT FORM SUCH THAT THE VOLUMN RATIO IS TWO PARTS EPOXY RESIN COMPONENT (PART A) TO ONE PART CATALYST COMPONENT (PART B).
     CONTAINER SIZE MAY BE 1 QUART MULTIPLE FRICTION TOP FOR PART A, AND 1 PINT MULTIPLE FRICTION TOP FOR PART B, AS OPPOSED TO THOSE SIZES SPECIFIED IN MIL-P-22808, AT THE OPTION OF THE PURCHASER.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

HEAT TREATMENT
NONE

FINAL FINISH
NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT NAS 9-497

DRAWN DATE 22 JUL 65
CHECKED W. Diehl 26 JUL 65
APPROVAL 8/30/65
APPROVAL
NASA APPROVAL 8/3/65
MIT APPROVAL 3 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PAINT, EPOXY

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008809

SCALE NONE WT SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

6088001

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 22037	8-31-65	

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. SHELF LIFE: TWELVE MONTHS MINIMUM FROM THE DATE OF MANUFACTURE. THE MATERIAL SHALL HAVE A MINIMUM OF 10 MONTHS SHELF LIFE WHEN RECEIVED BY THE PURCHASER AND STORED IN THE UNOPENED CONTAINERS AT A TEMPERATURE OF 80°F MAX.
   - B. PROPERTIES: THE MATERIAL SHALL COMPLY WITH REQUIREMENTS OF MIL-P-22808 INCLUDING THE DRY FILM PROPERTIES EXCEPT THAT COLOR, GLOSS, PIGMENTATION, ACCEPTANCE INSPECTION, AND PACKAGING SHALL BE AS SPECIFIED IN SECTION 2.
   - C. INTENDED USE: THIS MATERIAL IS INTENDED TO BE USED AS A TWO PART EPOXY PAINT SYSTEM TO PROVIDE AN ADHERENT, ABRASION AND MAR RESISTANT FINISH OVER METALLIC AND NON-METALLIC SUBSTRATES.

TABLE I

NASA DASH NUMBER (SEE NOTE 1)	COLOR	COLOR NUMBER FED-STD-595	SPECULAR GLOSS
-1	DARK GRAY	36231	2 TO 5
-2	LIGHT GRAY	26440	30 TO 70
-3	WHITE	37886	2 TO 5
-4	BLACK	27038	30 TO 70

NOTES:
1. SEE SECTION 2.E.

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —— DECIMALS ± —— ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
NAS 9-497
CONTRACT
DRAWN DATE 22 JUL 65
CHECKED W Diehl 26 Jul 65
APPROVAL 8/30/65
APPROVAL
NASA APPROVAL 8/31/
MIT APPROVAL 31 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PAINT, EPOXY

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008809
SCALE ——
WT
SHEET 2 OF 2

wΣ

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1188001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TORR 23265	10-19-65	

REQUIREMENTS:

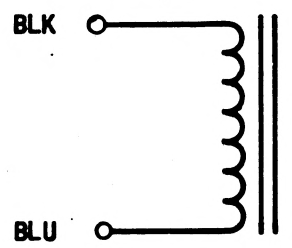
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   - D. UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.
   - E. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I, CODE 1.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEADS: LEAD MATERIAL SHALL BE DUMET ALLOY PER ND 1015401 EXCEPT NICKEL STRIKE MAY BE 100 MICROINCHES MAXIMUM AND LEAD DIAMETER SHALL BE 0.016 ± .001 DIAMETER. A CERTIFICATION OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT. LEADS SHALL BE NYLON INSULATED, COLOR CODED PER SCHEMATIC DIAGRAM AND ENDS SHALL BE STRIPPED AS SHOWN.
     - (2) MARKING: MARK PERMANENTLY AND LEGIBLY WITH THE NASA DRAWING NUMBER, MANUFACTURER'S SERIAL NUMBER AND CONNECTION DATA. MARK PER ND 1002019, EXCEPT ACRYLIC LACQUER SHALL NOT BE USED AS A PROTECTIVE COATING.
     - (3) FINISH: BLACK, COLOR NO. 37038 PER FED-STD-595.
   - B. ELECTRICAL REQUIREMENTS: UNIT SHALL MEET ALL REQUIREMENTS OF TABLE I.

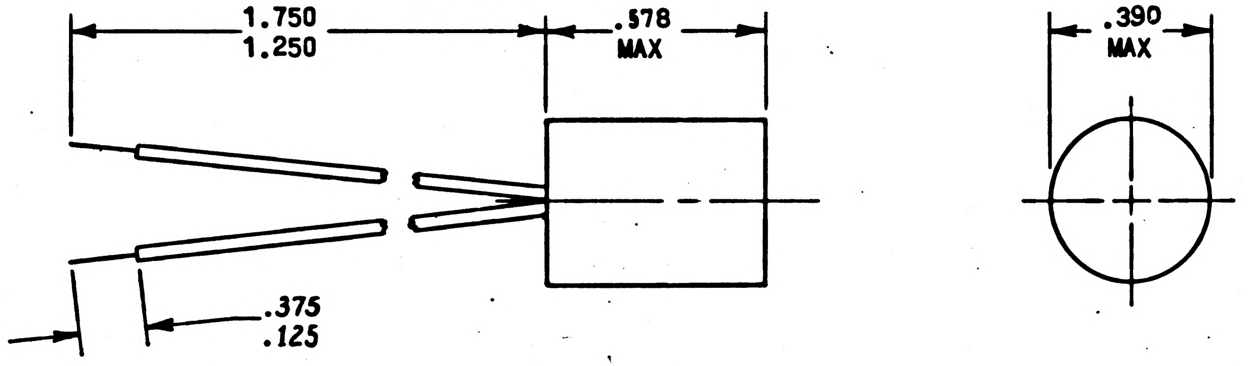
3. DESIGN:
   - A. THE UNIT SHALL MEET ALL REQUIREMENTS OF MIL-T-27 FOR GRADE 4, CLASS R, LIFE EXPECTANCY X, FAMILY 20 IN AN AMBIENT TEMPERATURE OF 85°C.
   - B. THE UNIT SHALL MEET ALL ELECTRICAL REQUIREMENTS EXCEPT WHERE NOTED, BEFORE, DURING AND AFTER THE FOLLOWING EXPOSURES:
     - (1) HIGH TEMPERATURE: 71°C OPERATING.
     - (2) LOW TEMPERATURE: -18°C OPERATING.
     - (3) VIBRATION: 10 TO 2000 CPS, 20 G (PER MIL-STD-202, METHOD 204A, CONDITION D).
     - (4) ALTITUDE (REDUCED PRESSURE): 96 HOURS AT A PRESSURE OF 10^{-4} MM OF MERCURY.
     - (5) SHOCK: PER MIL-STD-810 PROCEDURE 1, EXCEPT USE 100 G.
   - C. MAXIMUM WORKING VOLTAGE: 50 VOLTS. (BETWEEN WINDING AND CASE)
   - D. MAXIMUM RATINGS: CURRENT, 100MA; VOLTAGE ACROSS COIL, 20VRMS.

4. SPECIAL CONDITIONING BY MANUFACTURER (100%):
   - A. REACTOR SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202 METHOD 102 EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE UNIT SHALL PASS NORMAL PRODUCTION TESTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



SCHEMATIC DIAGRAM



MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —	
DO NOT SCALE THIS DRAWING	
MATERIAL	SEE REQUIREMENTS
HEAT TREATMENT	NONE
FINAL FINISH	NONE
NEXT ASSY	
USED ON	
APPLICATION	
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	DWG. NO. CONTRACT NAS9 497
DRAWN	J. Rotherson DATE 5 Aug 65
CHECKED	Ed Foster 6 Aug 65
APPROVAL	Z. Cushman 13 Oct 65
APPROVAL	
~~NASA APPROVAL~~	~~NOT REQUIRED PER LETTER~~ NASA PP7-65-612
MIT APPROVAL	15 Oct 65
MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
REACTOR	
SPECIFICATION CONTROL DRAWING	
CODE IDENT NO.	80230
SIZE	C
NASA DRAWING NO.	1008811
SCALE	—
WT	
SHEET	1 OF 2

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1188001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23265	10-19-66	

TABLE I

INSPECTION TESTS	
TITLES IN PARAGRAPH COLUMN REFER TO PARAGRAPH TITLES IN SPECIFICATION MIL-T-27	
PARAGRAPH	
SEALING	IMMERSE IN LIQUID AS INDICATED
DIELECTRIC STRENGTH	APPLY 100 VOLTS (RMS) BETWEEN WINDING AND CASE.
INSULATION RESISTANCE	10,000 MEGOHMS MINIMUM AT 20°C. (USE 100 VDC)
DC RESISTANCE (AT 20°C)	R(BLACK-BLUE) = 25 OHMS ± 25%.
INDUCTANCE	SHALL BE 0.24 HENRYS MINIMUM AT 1.0 VOLT, 60 CPS, AND 4 MA DC. SHALL BE 0.1 HENRYS MINIMUM AT 1.0 VOLT, 60 CPS, AND 20 MA DC.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

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CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS9 497

DRAWN J. Patterson DATE 3 AUG 65
CHECKED Ed Foster 6 AUG 65
APPROVAL O. Cushman 13 OCT '65
APPROVAL

NOT REQUIRED PER LETTER
NASA PP7-65-612
MIT APPROVAL W Kupfer 19 Oct 65

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REACTOR

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008811
SCALE
WT
SHEET 2 OF 2

S. Amyx 9K6247

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A 1008812

REVISIONS	21445		
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	MGM

REQUIREMENTS:

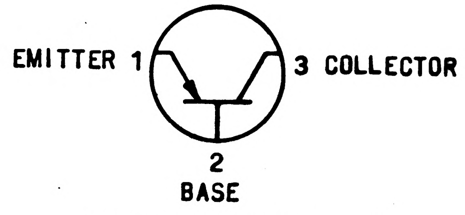
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS AND THE SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT I_{CBO} AT 100°C.
     - (2) SWITCHBACK VOLTAGE, LV_{CEO}.
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}, h_{FE_2}, h_{FE_3} WHEN APPLICABLE.
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$.
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.

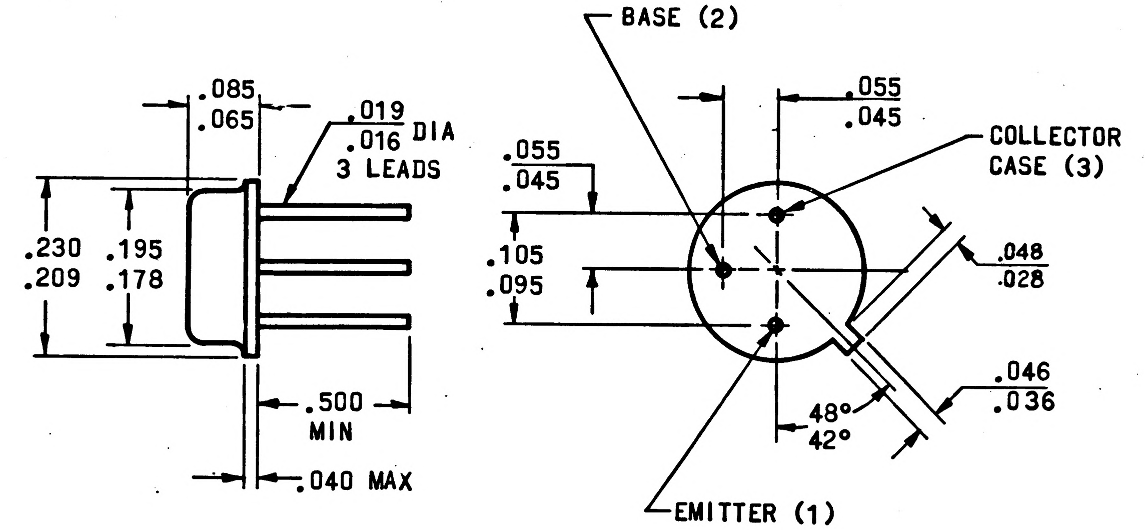
3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): 200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 2.0 WATTS. THERMAL RESISTANCE (θ_{JC}): 87°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 360 MILLIWATTS. THERMAL RESISTANCE (θ_{JA}): 486°C/WATT.

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. X-RAY ALL PARTS FOR .003 INCH MINIMUM CLEARANCE BETWEEN CAP AND INTERNAL LEADS INCLUDING POSTS.
   - B. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD 750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8}CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS9-497
DRAWN J. Kormetta DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL 8/14
MIT APPROVAL 10 Aug 65

MANNED SPACECRAFT CENTER
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TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008812
SCALE
WT
SHEET 1 OF 4

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1008812 A

REVISIONS 21445			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	MGM

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
   (1) AMBIENT TEMPERATURE = +175°C.
   (2) V_{CE} = 80% OF MAX PART RATING.
   (3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 10 NA.

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
   (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
   (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
   (3) POWER DISSIPATION: 190 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
   (1) SWITCHBACK VOLTAGE, LV_{CEO}
   (2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
   (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
   (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATE SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT NAS 9-497
DRAWN J. Kramer DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL 8/12/65
MIT APPROVAL

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TRANSISTOR - SILICONE, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812

SCALE — WT SHEET 2 OF 4

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REVISIONS 2(445			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	MGM

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W	
-1	-60	-60	-5	-60	2.0	
-2	-60	-60	-5	-60	2.0	
-3	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -1 MA, V_{CE} = -10 VOLTS.					
-4	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -5 MA, V_{CE} = -10 V. h_{FE_1} AND h_{FE_3} REQUIREMENTS SHALL NOT APPLY TO THIS DASH NUMBER.					

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=100°C	I_{CBO_2}	—	8	μA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=+150°C	I_{CBO_3}	—	10	μA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V(NOTE 1)	h_{FE_3}	75	200	—
		I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	75	—	—
		I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_1}	40	150	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 μSEC, DUTY CYCLE ≤ 2%.

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

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LIST OF MATERIALS

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DO NOT SCALE THIS DRAWING
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DRAWN T. Kosmatka DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL 8/1/65
MIT APPROVAL

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CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812
SCALE —	WT	SHEET 3 OF 4

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1008812 A

REVISIONS 21445			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	MCM

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	µA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	µA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10µA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V, I_C=0	I_{EBO}	—	0.1	µA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10µA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V, R_{BE}=100K	I_{CER}	—	10	µA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA, V_{CE}=-10V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA, V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA, V_{CE}=-10V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA, I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V, I_E=0, F=0.14mc	C_{ob}	—	8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

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MIT APPROVAL 10 Aug 65

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HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008812
SCALE —
WT
SHEET 4 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008812 B

REVISIONS 21445			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	916M
B	REVISED PER TDRR 23183	10/26/65	wK

REQUIREMENTS:

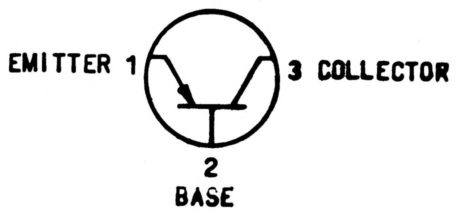
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS AND THE SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT I_{CBO} AT 100°C.
     - (2) SWITCHBACK VOLTAGE, LV_{CEO}.
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}, h_{FE_2}, h_{FE_3} WHEN APPLICABLE.
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$.
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.

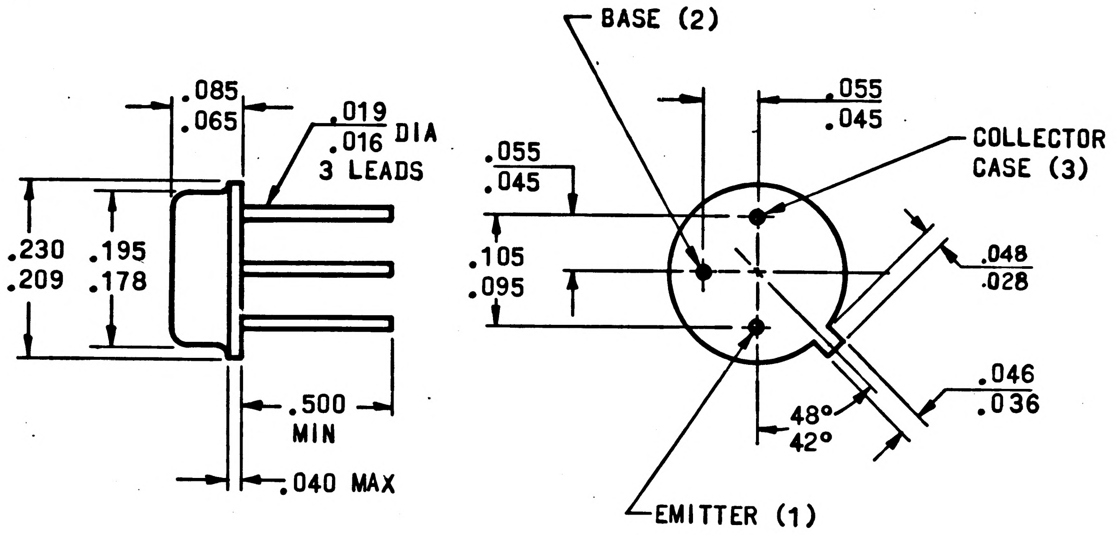
3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): 200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 2.0 WATTS. THERMAL RESISTANCE (θ_{JC}): 87°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 360 MILLIWATTS. THERMAL RESISTANCE (θ_{JA}): 486°C/WATT.

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. X-RAY ALL PARTS FOR .003 INCH MINIMUM CLEARANCE BETWEEN CAP AND INTERNAL LEADS INCLUDING POSTS.
   - B. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD 750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8}CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

ROCURE ONLY FROM APPROVED SOURCES LISTED ON
1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FI N
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___ DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG. NO. CONTRACT NAS9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL SEE REQUIREMENTS	DRAWN F. Kornacki DATE 4 AUG 65 CHECKED Ed Foster 5 AUG 65 APPROVAL Robert Bolingfield 8/10/65 APPROVAL ___	TRANSISTOR - SILICON, PNP SPECIFICATION CONTROL DRAWING
HEAT TREATMENT ___	NASA APPROVAL B Michael 8/16/65	CODE IDENT NO. 80230 · SIZE C · NASA DRAWING NO. 1008812
FINAL FINISH ___	MIT APPROVAL W Kupfer 10 Aug 65	SCALE ___ · WT · SHEET 1 OF 4

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REVISIONS 21445

SYM	DESCRIPTION	DATE	APPROVAL
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B	REVISED PER TDRR 23183	10/26/65	WK

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
   (1) AMBIENT TEMPERATURE = +175°C.
   (2) V_{CE} = 80% OF MAX PART RATING.
   (3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100%, OR 10 NANOAMPS, WHICHEVER IS GREATER

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
   (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
   (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
   (3) POWER DISSIPATION: 190 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
   (1) SWITCHBACK VOLTAGE, LV_{CEO}
   (2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
   (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
   (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

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DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT NAS 9-4971
DRAWN J. Kramer DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL B Whitaker 8/12/65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812

SCALE — WT SHEET 2 OF 4

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REVISIONS 21445

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B	REVISED PER TDRR 23183	10/26/65	WK

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W	
-1	-60	-60	-5	-60	2.0	
-2	-60	-60	-5	-60	2.0	
-3	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -1 MA, V_{CE} = -10 VOLTS.					
-4	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -5 MA, V_{CE} = -10 V. h_{FE_1} AND h_{FE_3} REQUIREMENTS SHALL NOT APPLY TO THIS DASH NUMBER.					

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=100°C	I_{CBO_2}	—	8	µA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=+150°C	I_{CBO_3}	—	10	µA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V(NOTE 1)	h_{FE_3}	75	200	—
		I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	75	—	—
		I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_1}	40	150	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 2%.

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

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LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS 9-497

DRAWN L. Kosmatka DATE 4 Aug 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL [illegible] 8/1/65
MIT APPROVAL [illegible] 10 Aug 65

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TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
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NASA DRAWING NO. 1008812
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SHEET 3 OF 4

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1008812 B

REVISIONS 21445			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	MCM
B	REVISED PER TDRR 23183	10/26/65	WR

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	μA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	μA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10μA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V, I_C=0	I_{EBO}	—	0.1	μA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10μA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V, R_{BE}=100K	I_{CER}	—	10	μA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA, V_{CE}=-10V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA, V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA, V_{CE}=-10V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA, I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V, I_E=0, F=0.14mc	C_{ob}	—	8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

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DWG. NO.
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DRAWN T. Kozmatka DATE 4 Aug 65
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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

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80230	C	1008812
SCALE —	WT	SHEET 4 OF 4

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A	REVISED PER TDRR 22133	9/14	[illegible]
B	REVISED PER TDRR 23183	[illegible]/65	WK
C	REVISED PER TDRR 24701	12/21/65	WK

REQUIREMENTS:

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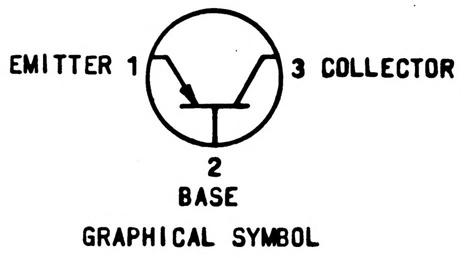
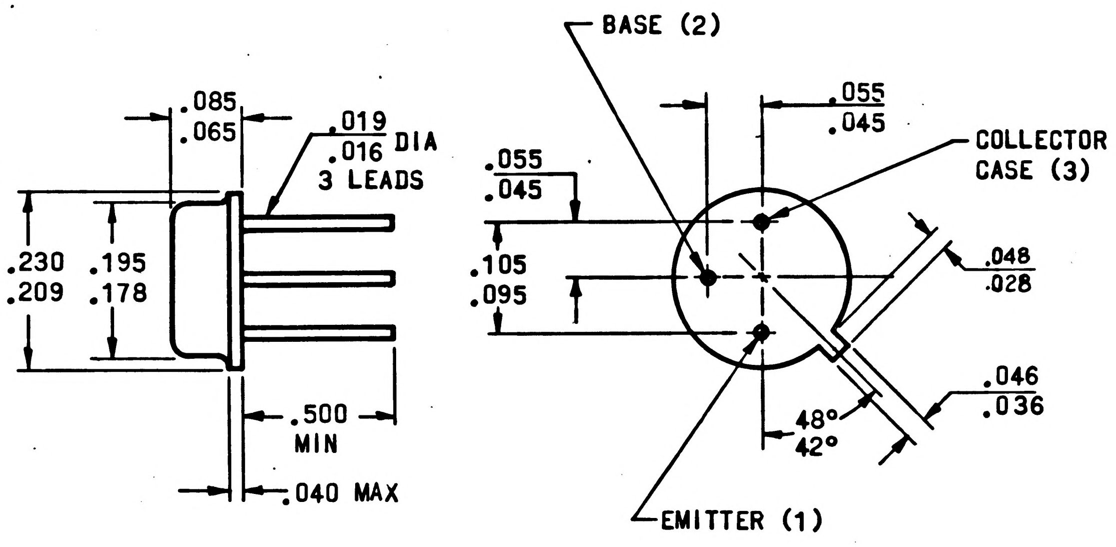


GRAPHICAL SYMBOL



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CAMBRIDGE, MASS
DWG NO.
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DRAWN T. Kurumoto DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
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APPROVAL
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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

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SHEET 1 OF 4

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1008812 C

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A	REVISED PER TDRR 22133	9/1/65	MGM
B	REVISED PER TDRR 23183	10/26/65	WK
C	REVISED PER TDRR 24701	12/21/65	WK

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
(1) AMBIENT TEMPERATURE = +175°C.
(2) V_{CE} = 80% OF MAX PART RATING.
(3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100%, OR 10 NANOAMPS, WHICHEVER IS GREATER

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
(1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
(2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
(3) POWER DISSIPATION: 190 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
(1) SWITCHBACK VOLTAGE, LV_{CEO}
(2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
(3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
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MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT NAS 9-497
DRAWN J. Kramer DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bolingfield 8/10/65
APPROVAL
NASA APPROVAL B. Whitaker 8/10/65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON , PNP
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812

SCALE — WT SHEET 2 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 21445

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	MGM
B	REVISED PER TDRR 23183	10/26/65	WK
C	REVISED PER TDRR 24701	12/21/65	WK

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W	
-1	-60	-60	-5	-60	2.0	
-2	-60	-60	-5	-60	2.0	
-3	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -1 MA, V_{CE} = -10 VOLTS.					
-4	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -5 MA, V_{CE} = -10 V. h_{FE1} AND h_{FE3} REQUIREMENTS SHALL NOT APPLY TO THIS DASH NUMBER.					

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V	I_{CBO1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=100°C	I_{CBO2}	—	8	µA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=+150°C	I_{CBO3}	—	10	µA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE3}	75	200	—
		I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE2}	75	—	—
		I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE1}	40	150	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:
1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 2%.

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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CAMBRIDGE, MASS.
DWG. NO
CONTRACT NAS 9-497

DRAWN DATE 4 Aug 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008812
SCALE —
WT
SHEET 3 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS		21445	
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 22133	9/14	mcm
B	REVISED PER TDRR 23183	10/26/65	WR
C	REVISED PER TDRR 24701	12/10/65	WR

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	μA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	μA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10μA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V, I_C=0	I_{EBO}	—	0.1	μA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10μA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V, R_{BE}=100K	I_{CER}	—	10	μA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA, V_{CE}=-10V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA, V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA, V_{CE}=-10V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA, I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V, I_E=0, F=0.14mc	C_{ob}	—	8	PF
	TURN ON TIME	$I_{B1}=I_{B2}$=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	$I_{B1}=I_{B2}$=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
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UNLESS OTHERWISE SPECIFIED
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FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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DWG. NO.
CONTRACT NAS 9-497

DRAWN T. Kosmatka DATE 4 Aug 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bolingfield 8/10/65
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 10 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812
SCALE —	WT	SHEET 4 OF 4

1008812

SYM	REVISIONS 21445 DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER: AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

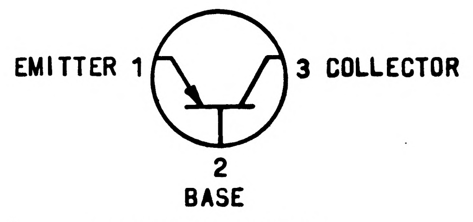
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS AND THE SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT I_{CBO} AT 100°C.
     - (2) SWITCHBACK VOLTAGE, LV_{CEO}.
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}, h_{FE_2}, h_{FE_3} WHEN APPLICABLE.
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$.
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT $I_C = -150$ MA.

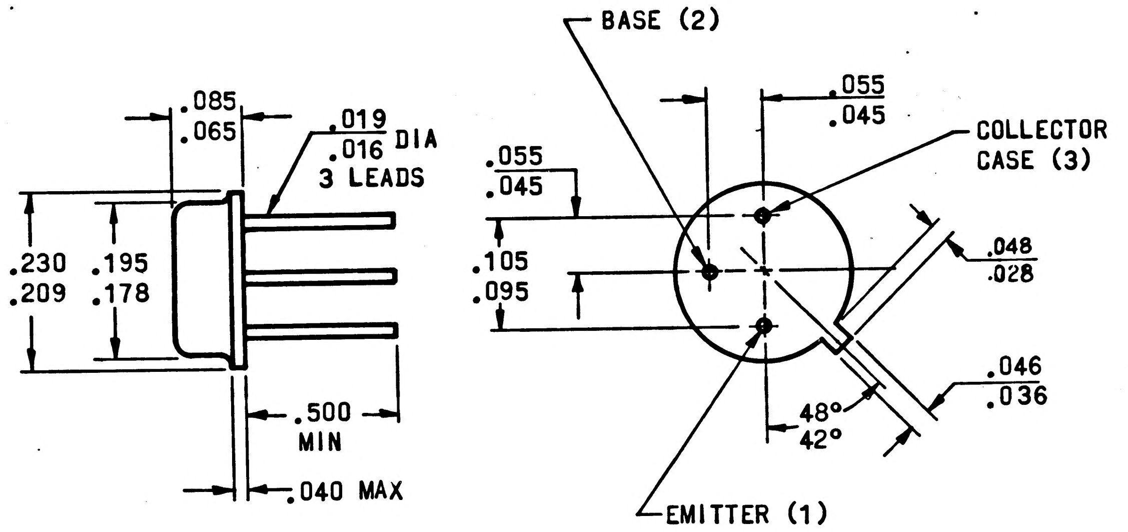
3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): 200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 2.0 WATTS. THERMAL RESISTANCE (θ_{JC}): 87°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 360 MILLIWATTS. THERMAL RESISTANCE (θ_{JA}): 486°C/WATT.

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. X-RAY ALL PARTS FOR .003 INCH MINIMUM CLEARANCE BETWEEN CAP AND INTERNAL LEADS INCLUDING POSTS.
   - B. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD 750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8}CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT —
FINAL FINISH —

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CAMBRIDGE, MASS
DWG. NO. CONTRACT NAS 9-497
DRAWN J. Kornowski DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812
SCALE —	WT	SHEET 1 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008812

REVISIONS 2145			
SYM	DESCRIPTION	DATE	APPROVAL

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
   (1) AMBIENT TEMPERATURE = +175°C.
   (2) V_{CE} = 80% OF MAX PART RATING.
   (3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 10 NA.

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
   (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
   (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
   (3) POWER DISSIPATION: 190 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
   (1) SWITCHBACK VOLTAGE, LV_{CEO}
   (2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
   (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
   (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATE SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

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DWG. NO.
CONTRACT NAS 9-497
DRAWN J. Kramer DATE 4 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL 8/1/
MIT APPROVAL

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008812
SCALE —
WT
SHEET 2 OF 4

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1008812

REVISIONS 21445			
SYM	DESCRIPTION	DATE	APPROVAL

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W	
-1	-50	-50	-5	-35	2.0	2N2303 (TO-46)
-2	-60	-60	-5	-60	2.0	2N3505 (TO-46)
-3	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -1 MA, V_{CE} = -10 VOLTS.					2N2303 (TO-46)
-4	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT AT I_C = -5 MA, V_{CE} = -10 V. h_{FE_1} AND h_{FE_3} REQUIREMENTS SHALL NOT APPLY TO THIS DASH NUMBER.					2N2303 (TO-46)

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V, T_C=100°C	I_{CBO_2}	—	8	μA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V, T_C=+150°C	I_{CBO_3}	—	10	μA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	-35	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-50	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V(NOTE 1)	h_{FE_3}	75	200	—
		I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	75	—	—
		I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_1}	40	150	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 μSEC, DUTY CYCLE ≤ 1%.

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

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CONTRACT NAS 9-497
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CHECKED Ed Foster 5 AUG 65
APPROVAL Robert Bedingfield 8/10/65
APPROVAL
NASA APPROVAL 8/1/65
MIT APPROVAL 10 Aug 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812

SCALE — WT SHEET 3 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 2(445			
SYM	DESCRIPTION	DATE	APPROVAL

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	μA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	μA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10μA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V, I_C=0	I_{EBO}	—	0.1	μA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10μA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V, R_{BE}=100K	I_{CER}	—	10	μA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA, V_{CE}=-10V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA, V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA, V_{CE}=-10V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA, I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA, I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V, I_E=0, F=0.14mc	C_{ob}	—	8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30mA, I_C=300mA tw > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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MIT APPROVAL 10 Aug 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008812

SCALE — WT SHEET 4 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008813 A

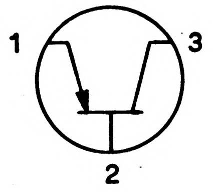
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	

REQUIREMENTS:

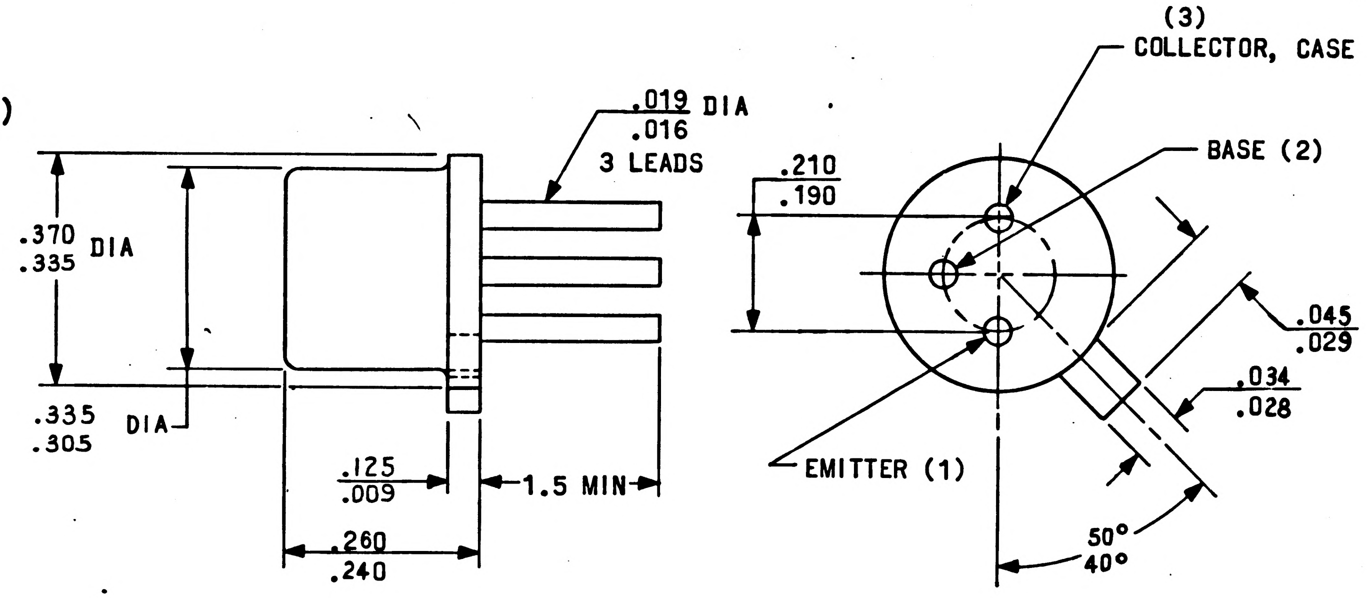
1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   A. MECHANICAL REQUIREMENTS:
      (1) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED) DASH NUMBER AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE, DATE CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
      (2) LEAD DATA: KOVAR, GOLD PLATED PER ND 1015402. A CERTIFICATE OF COMPLIANCE FOR THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   B. ELECTRICAL REQUIREMENTS: PER TABLE II.
      (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT 100°C
      (2) SWITCHBACK VOLTAGE, (LV_{CEO})
      (3) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE_2}, h_{FE_3}, h_{FE_4}) WHEN APPLICABLE.
      (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$
      (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.

3. DESIGN:
   A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   B. JUNCTION OPERATING TEMPERATURE (T_J): +200°C MAXIMUM.
   C. ELECTRICAL RATINGS: PER TABLE I.
   D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   E. POWER DISSIPATION:
      (1) AT +25°C CASE TEMPERATURE: 3.0 WATTS.
         (a) THERMAL RESISTANCE (θ_{JC}): 58.3°C/WATT.
      (2) AT +25°C AMBIENT TEMPERATURE: 700 MILLIWATTS.
         (a) THERMAL RESISTANCE (θ_{JA}): 250°C/WATT.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

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LIST OF MATERIALS

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SPECIFICATION CONTROL DRAWING

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80230	C	1008813
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SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	MCM

REQUIREMENTS: (CONTINUED)

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1×10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE = +175°C.
     - (2) V_{CE} = 80% OF MAX PART RATING.
     - (3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 10 NA.
   - C. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE, $T_A = +25° \pm 5°C$.
     - (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
     - (3) POWER DISSIPATION: 400 MILLIWATTS ± 10 PERCENT.
   - D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) SWITCHBACK VOLTAGE, LV_{CEO}
     - (2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C=25°C.
     - (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}
   - E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-60	-5	-60	2.0	
-2	-60	-5	-60	2.0	
-3	SHALL BE MATCHED PAIR OF 1008813-1 WITH THE ADDITION THAT BETA(h_{FE}) SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER BETA UNIT AT I_C = -150 mA. V_{CE} = -10 VOLTS.				

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008813
SCALE —
WT
SHEET 2 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

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SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED F R TDRR 22134	9/14	

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=+150°C	I_{CBO_2}	—	10	μA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=100°C	I_{CBO_3}	—	8	μA
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE}\leq 10\Omega$ (NOTE 1)	BV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_1}	75	200	—
	(PULSE CONDITIONS)	I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	75	—	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20 V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300μSEC, DUTY CYCLE ≤ 2%.

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1008813 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	MGM

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	µA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	µA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10µA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	VDC
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3 V, I_C=0	I_{EBO}	—	0.1	µA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10 µA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	VDC
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	VDC
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20 V, R_{BE}=100K	I_{CER}	—	10	µA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50 V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10 mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	VDC
	COLLECTOR CAPACITANCE	V_{CB}=-10 V, I_E=0, F=0.14 mc	C_{ob}	—	8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA tw > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA tw > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

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MIT APPROVAL 17 Aug 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008813
SCALE —
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SHEET 4 OF 4

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1008813 B

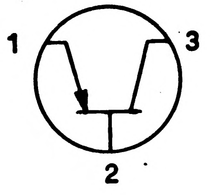
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	MCM
B	REVISED PER TDRR 23174	10/26/65	WK

REQUIREMENTS:

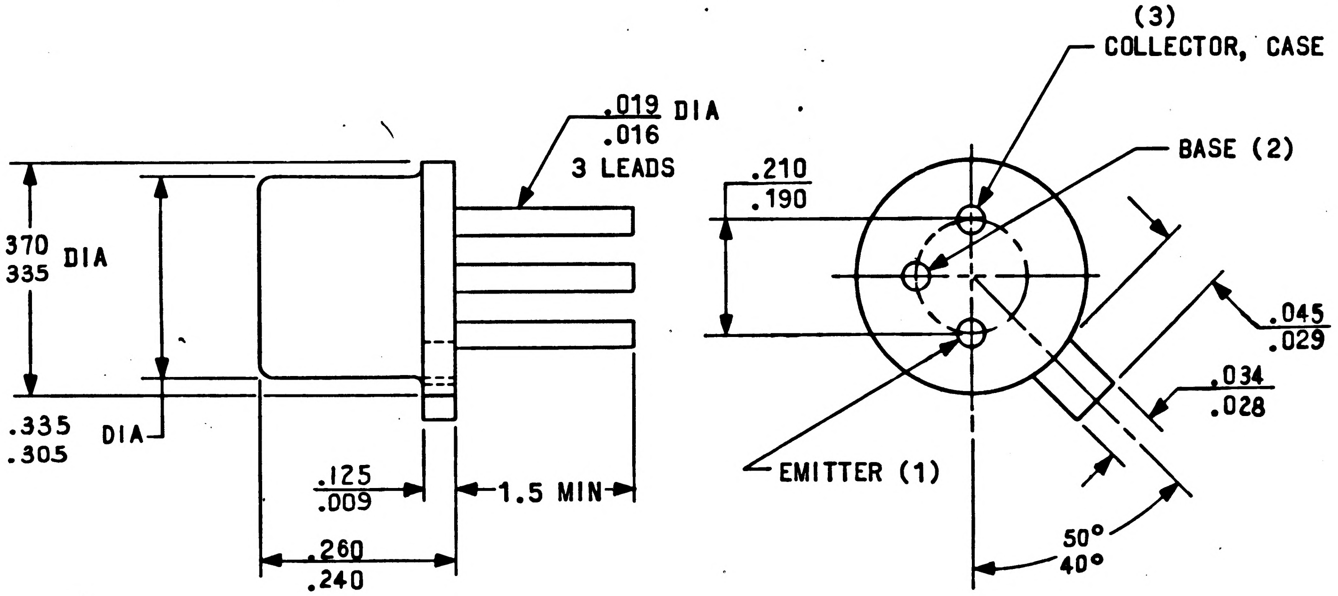
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED) DASH NUMBER AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE, DATE CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, GOLD PLATED PER ND 1015402. A CERTIFICATE OF COMPLIANCE FOR THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT 100°C
     - (2) SWITCHBACK VOLTAGE, (LV_{CEO})
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE_2}, h_{FE_3}, h_{FE_4}) WHEN APPLICABLE.
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT $I_C = -150$ MA.

3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): +200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 3.0 WATTS.
       - (a) THERMAL RESISTANCE (θ_{JC}): 58.3°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 700 MILLIWATTS.
       - (a) THERMAL RESISTANCE (θ_{JA}): 250°C/WATT.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: SEE REQUIREMENTS
HEAT TREATMENT: NONE
FINAL FINISH: NONE

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DWG. NO.
CONTRACT NAS 9-497
DRAWN J. Patterson DATE 2 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL C Bedingfield 8/9/65
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 17 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008813

SCALE NONE WT SHEET 1 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	mcM
B	REVISED PER TDRR 23174	11/22/65	wk

REQUIREMENTS: (CONTINUED)

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE = +175°C.
     - (2) V_{CE} = 80% OF MAX PART RATING.
     - (3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10 NANOAMP WHICHEVER IS GREATER
   - C. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE, $T_A = +25° \pm 5°C$.
     - (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
     - (3) POWER DISSIPATION: 400 MILLIWATTS ± 10 PERCENT.
   - D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) SWITCHBACK VOLTAGE, LV_{CEO}
     - (2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C=25°C.
     - (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}
   - E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = +25°C					
DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-60	-5	-60	2.0	
-2	-60	-5	-60	2.0	
-3	SHALL BE MATCHED PAIR OF 1008813-1 WITH THE ADDITION THAT BETA(h_{FE}) SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER BETA UNIT AT I_C = -150 mA. V_{CE} = -10 VOLTS.				

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
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DO NOT SCALE THIS DRAWING
MATERIAL
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APPROVAL
NASA APPROVAL 8/17/65
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TRANSISTOR - SILICON, PNP
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008813
SCALE —
WT
SHEET 2 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008813 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	[illegible]
B	REVISED PER TDRR 23174	10/26/65	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=+150°C	I_{CBO_2}	—	10	μA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50 V, T_C=100°C	I_{CBO_3}	—	8	μA
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR BREAKDOWN VOLTAGE	I_C=-10 mA, R_{BE}≤10Ω (NOTE 1)	BV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE1}	75	200	—
	(PULSE CONDITIONS)	I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE2}	75	—	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20 V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300μSEC, DUTY CYCLE ≤ 2%.

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DRAWN J. Patterson DATE 2 AUG 65
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APPROVAL R Bedingfield 8/17/65
APPROVAL
NASA APPROVAL [illegible] 8/17/65
MIT APPROVAL W Kupfer 17 Aug 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008813
SCALE —
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SHEET 3 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	MGM
B	REVISED PER TDRR 23174	10/65	WK.

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	µA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	µA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10µA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	VDC
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3 V, I_C=0	I_{EBO}	—	0.1	µA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10 µA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	VDC
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	VDC
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20 V, R_{BE}=100K	I_{CER}	—	10	µA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50 V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10 mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	VDC
	COLLECTOR CAPACITANCE	V_{CB}=-10 V, I_E=0, F=0.14 mc	C_{ob}	—	8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA tw > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA tw > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

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CONTRACT NAS9 497
DRAWN J Petterson DATE 2 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL Bedingfield 8/17/65
APPROVAL
NASA APPROVAL 8/17/65
MIT APPROVAL W Kupfer 17 Aug 65

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HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008813
SCALE —
WT
SHEET 4 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008813 C

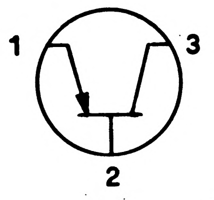
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	mcm
B	REVISED PER TDRR 23174	10/26/65	WK
C	REVISED PER TDRR 24702	12/ /65	wk

REQUIREMENTS:

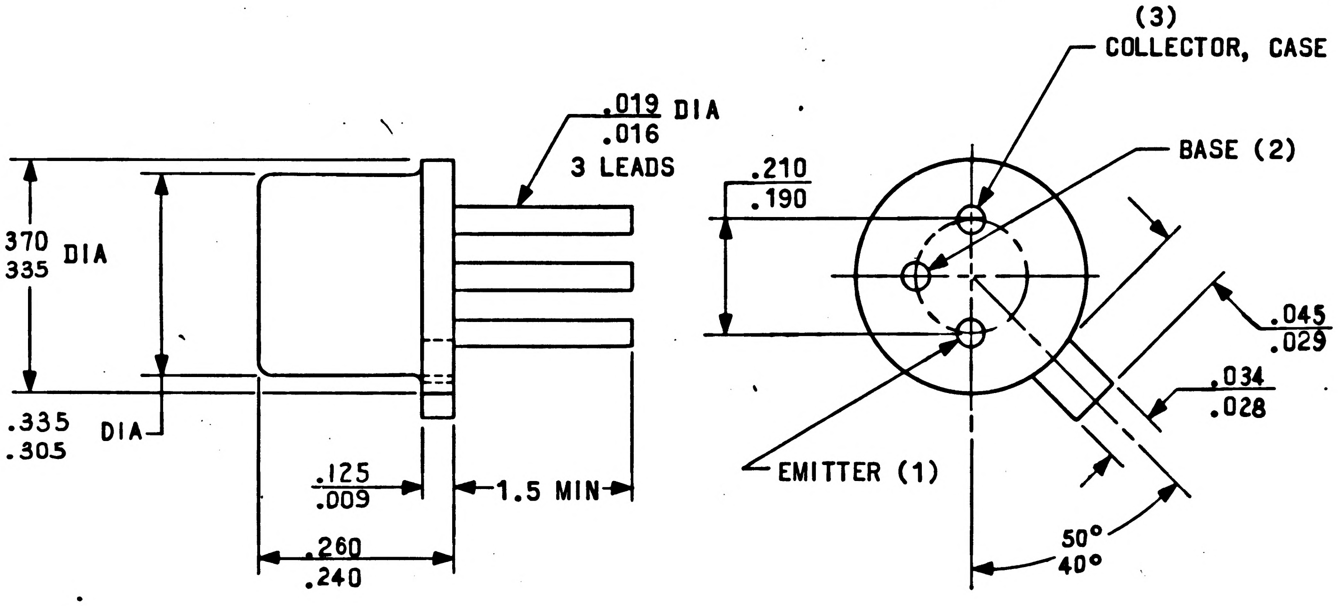
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED) DASH NUMBER AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE, DATE CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, GOLD PLATED PER ND 1015402. A CERTIFICATE OF COMPLIANCE FOR THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT 100°C
     - (2) SWITCHBACK VOLTAGE, (LV_{CEO})
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE2}, h_{FE3}, h_{FE4}) WHEN APPLICABLE.
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.

3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): +200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 3.0 WATTS.
       - (a) THERMAL RESISTANCE (θ_{JC}): 58.3°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 700 MILLIWATTS.
       - (a) THERMAL RESISTANCE (θ_{JA}): 250°C/WATT.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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DO NOT SCALE THIS DRAWING

MATERIAL: SEE REQUIREMENTS
HEAT TREATMENT: NONE
FINAL FINISH: NONE

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DWG NO
CONTRACT NAS 9-497

DRAWN J. Patterson DATE 2 AUG 65
CHECKED Ed Foster 5 AUG 65
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NASA APPROVAL ______
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008813

SCALE NONE
WT
SHEET 1 OF 4

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	[illegible]
B	REVISED PER TDRR 23174	[illegible]	[illegible]
C	REVISED PER TDRR 24702	12/21/65	[illegible]

REQUIREMENTS: (CONTINUED)

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE = +175°C.
     - (2) V_{CE} = 80% OF MAX PART RATING.
     - (3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10 NANOAMP WHICHEVER IS GREATER
   - C. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
     - (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
     - (3) POWER DISSIPATION: 400 MILLIWATTS ± 10 PERCENT.
   - D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) SWITCHBACK VOLTAGE, LV_{CEO}
     - (2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C=25°C.
     - (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}
   - E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-60	-5	-60	2.0	
-2	-60	-5	-60	2.0	
-3	SHALL BE MATCHED PAIR OF 1008813-1 WITH THE ADDITION THAT BETA(h_{FE}) SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER BETA UNIT AT I_C = -150 mA. V_{CE} = -10 VOLTS.				

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
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CONTRACT NAS9-497
DRAWN J Patterson DATE 2 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL C Bedingfield 8/17/65
APPROVAL
NASA APPROVAL Hilderbrit 8/17/65
MIT APPROVAL [illegible]

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 | SIZE C | NASA DRAWING NO. 1008813

SCALE — | WT | SHEET 2 OF 4

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1008813 C

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	MGM
B	REVISED PER TDRR 23174	10/26/65	WK
C	REVISED PER TDRR 24702	12/21/65	wK

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-50$ V	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-50$ V, $T_C=+150°C$	I_{CBO_2}	—	10	μA
	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-50$ V, $T_C=100°C$	I_{CBO_3}	—	8	μA
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	$I_C=-10$mA, $I_B=0$ (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR BREAKDOWN VOLTAGE	$I_C=-10$ mA, $R_{BE}\leq 10\Omega$ (NOTE 1)	BV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	$I_C=-150$ mA, $V_{CE}=-10$ V (NOTE 1)	h_{FE_1}	75	200	—
	(PULSE CONDITIONS)	$I_C=-5$ mA, $V_{CE}=-10$ V (NOTE 1)	h_{FE_2}	75	—	—
	BASE SATURATION VOLTAGE	$I_C=-150$ mA, $I_B=-15$ mA (NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	$I_C=-150$ mA, $I_B=-15$ mA (NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	$I_C=-50$ mA, $V_{CE}=-20$ V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	$I_E=0$, $V_{CB}=-10$ V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300μSEC, DUTY CYCLE ≤ 2%.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DRAWN J. Patterson DATE 2 AUG 65
CHECKED Ed Foster 5 AUG 65
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APPROVAL

NASA APPROVAL 8/17/65
MIT APPROVAL W Kupfer 17 Aug 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008813

SCALE —
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SHEET 3 OF 4

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 22134	9/14	MGM
B	REVISED PER TDRR 23174	10/65	WK
C	REVISED PER TDRR 24702	12/21/65	WK

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	µA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	µA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10µA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	VDC
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3 V, I_C=0	I_{EBO}	—	0.1	µA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10 µA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	VDC
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	VDC
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20 V, R_{BE}=100K	I_{CER}	—	10	µA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50 V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10 mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	VDC
	COLLECTOR CAPACITANCE	V_{CB}=-10 V, I_E=0, F=0.14 mc	C_{ob}	—	8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA tw > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA tw > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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DWG. NO.
CONTRACT NAS9 497
DRAWN J Patterson DATE 2 AUG 65
CHECKED Ed Foster 5 AUG 65
APPROVAL A Bedingfield 8/17/65
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Aug 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008813
SCALE —	WT	SHEET 4 OF 4

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1008813

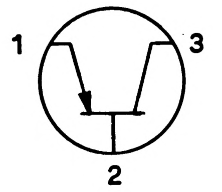
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	

REQUIREMENTS:

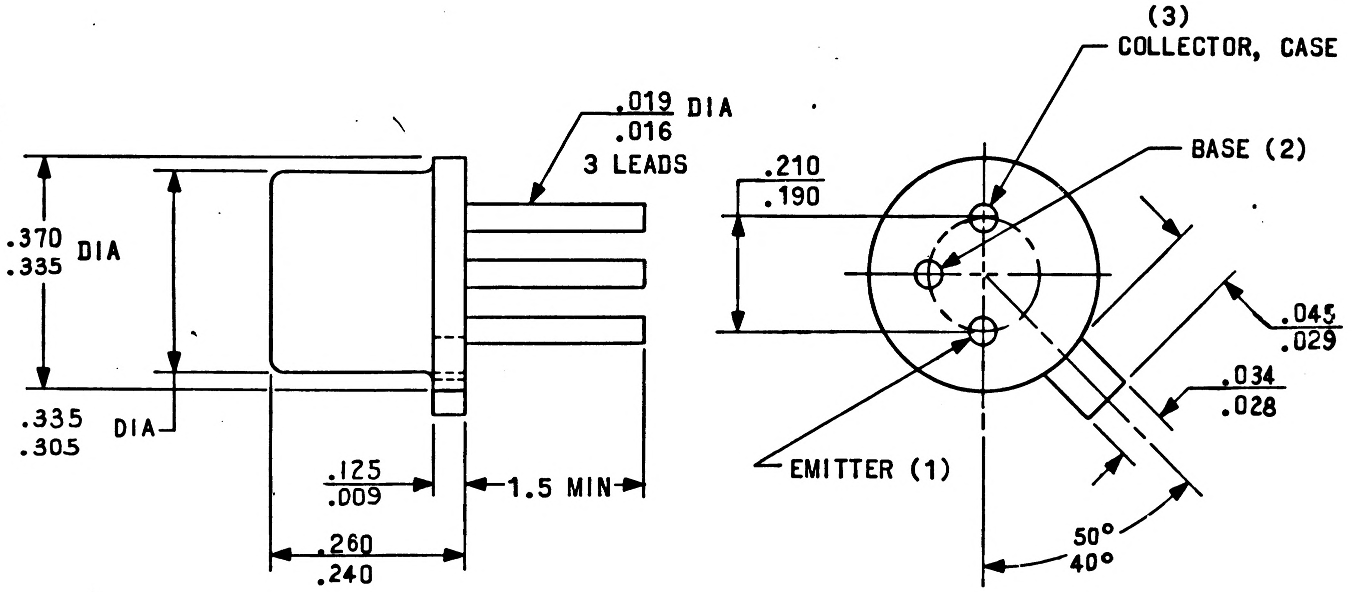
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED) DASH NUMBER AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE, DATE CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, GOLD PLATED PER ND 1015402. A CERTIFICATE OF COMPLIANCE FOR THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT 100°C
     - (2) SWITCHBACK VOLTAGE, (LV_{CEO})
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE_2}, h_{FE_3}, h_{FE_4}) WHEN APPLICABLE.
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT $I_C = -150$ MA.

3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): +200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 3.0 WATTS.
       - (a) THERMAL RESISTANCE (θ_{JC}): 58.3°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 700 MILLIWATTS.
       - (a) THERMAL RESISTANCE (θ_{JA}): 250°C/WATT.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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SEE REQUIREMENTS

HEAT TREATMENT
NONE

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NONE

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DRAWN J Patterson DATE 2 AUG 65
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SPECIFICATION CONTROL DRAWING

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80230	C	1008813

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NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	

REQUIREMENTS: (CONTINUED)

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE = +175°C.
     - (2) V_{CE} = 80% OF MAX PART RATING.
     - (3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 10 NA.
   - C. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
     - (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
     - (3) POWER DISSIPATION: 400 MILLIWATTS ± 10 PERCENT.
   - D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) SWITCHBACK VOLTAGE, LV_{CEO}
     - (2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C=25°C.
     - (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE1}
   - E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = +25°C					
DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-50	-5	-35	2.0	
-2	-60	-5	-60	2.0	
-3	SHALL BE MATCHED PAIR OF 1008813-1 WITH THE ADDITION THAT BETA(h_{FE}) SHALL BE MATCHED INITIALLY (AS RECEIVED BY USER) TO WITHIN 10% OF THE LOWER BETA UNIT AT I_C = -150 mA. V_{CE} = -10 VOLTS.				

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

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1008813

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V, T_C=+150°C	I_{CBO_2}	—	10	μA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V, T_C=100°C	I_{CBO_3}	—	8	μA
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA, I_B=0 (NOTE 1)	LV_{CEO}	-35	—	VDC
	COLLECTOR BREAKDOWN VOLTAGE	I_C=-10 mA, R_{BE}≤10Ω (NOTE 1)	BV_{CER}	-50	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE1}	75	200	—
	(PULSE CONDITIONS)	I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE2}	75	—	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20 V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300μSEC, DUTY CYCLE ≤ 1%.

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DRAWN J. Patterson DATE 2 AUG 65
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APPROVAL

NASA APPROVAL 8/17/65
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REVISIONS			
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	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	

TABLE II (CONTINUED)

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0	I_{CBO_1}	—	10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=150°C	I_{CBO_2}	—	10	µA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50 V, I_E=0, T_C=100°C	I_{CBO_3}	—	8	µA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10µA, I_E=0 (NOTE 1)	BV_{CBO}	60	—	VDC
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3 V, I_C=0	I_{EBO}	—	0.1	µA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10 µA, I_C=0 (NOTE 1)	BV_{EBO}	5	—	VDC
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	60	—	VDC
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20 V, R_{BE}=100K	I_{CER}	—	10	µA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0, V_{CE}=-50 V	I_{CES}	—	10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10 mA, V_{CE}=-10V (NOTE 1)	h_{FE_1}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_2}	100	—	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_3}	100	300	—
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500 mA, V_{CE}=-10 V (NOTE 1)	h_{FE_4}	30	—	—
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50 mA, I_B=-2.5 mA (NOTE 1)	$V_{CE(SAT)_1}$	—	-0.25	VDC
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA (NOTE 1)	$V_{CE(SAT)_2}$	—	-0.4	VDC
	COLLECTOR CAPACITANCE	V_{CB}=-10 V, I_E=0, F=0.14 mc	C_{ob}	—	8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA t_w > 400nsec, 2% DUTY CYCLE	ton	—	40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30 mA, I_C=300 mA t_w > 400nsec, 2% DUTY CYCLE	toff	—	100	NSEC

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT NAS9 497
DRAWN J. Patterson DATE 2 AUG 65
CHECKED Ed Foster 5AUG 65
APPROVAL R Bedingfield 8/17/65
APPROVAL
NASA APPROVAL 8/17/65
MIT APPROVAL 17 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008813
SCALE —
WT
SHEET 4 OF 4

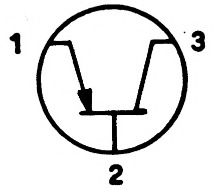
NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008814 A

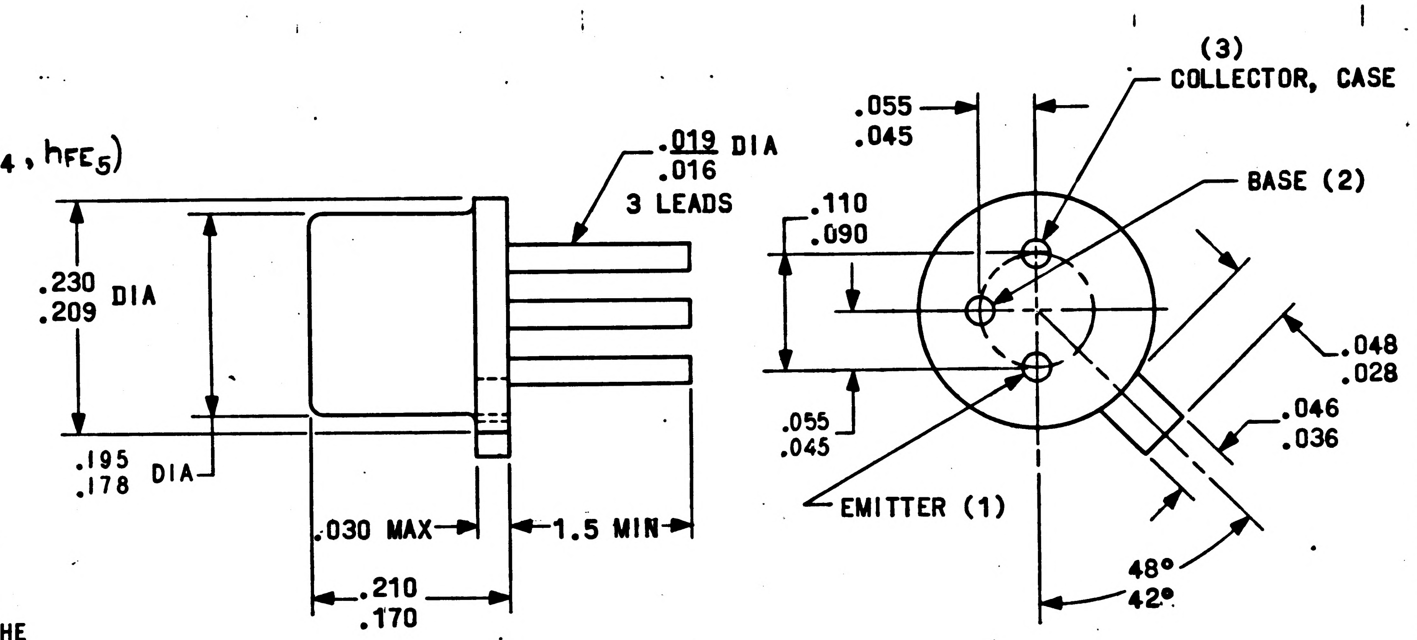
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WR

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS ONLY), DASH NUMBER, AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE; DATE CODE; LOT CODE, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT =100°C
     - (2) SWITCHBACK VOLTAGE, (LV_{CEO})
     - (3) COLLECTOR SATURATION VOLTAGE, ($V_{CE(SAT)}$) AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE_2}, h_{FE_3}, h_{FE_4}, h_{FE_5}) WHEN APPLICABLE.
     - (5) BASE SATURATION VOLTAGE ($V_{BE(SAT)}$)
3. DESIGN:
   - A. ELECTRICAL RATINGS: PER TABLE I.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - C. JUNCTION TEMPERATURE: -65°C TO +200°C.
   - D. POWER DISSIPATION:
     - (1) AT 25°C AMBIENT TEMP = 400 MILLIWATTS, THERMAL RESISTANCE (θ_{JA}) = 437.5°C/WATT.
     - (2) AT 25°C CASE TEMP = 1.5 WATTS, THERMAL RESISTANCE (θ_{JC}) = 116.7°C/WATT.
4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006, OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.



GRAPHICAL SYMBOL
(NUMBERS ARE FOR REFERENCE ONLY)



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DWG. NO. CONTRACT NAS9-497 DRAWN J. Patterson DATE 30 Jul 65 CHECKED Ed Foster, 4 Aug 65 APPROVAL C Bedingfield 8/17/65 APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS TRANSISTOR - SILICON, PNP SPECIFICATION CONTROL DRAWING
MATERIAL SEE NOTES		
HEAT TREATMENT NONE	NASA APPROVAL 8/17/65	CODE IDENT NO. 80230 · SIZE C · NASA DRAWING NO. 1008814
FINAL FINISH NONE	MIT APPROVAL	SCALE — · WT · SHEET 1 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008814 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WK

REQUIREMENTS: (CONTINUED)

B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
(1) V_{CE} = 80% OF MAX PART RATING.
(2) AMBIENT TEMPERATURE = +175°C.
(3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10NANOAMPS, WHICHEVER IS GREATER

C. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
(1) AMBIENT TEMPERATURE 25° ± 5°C.
(2) COLLECTOR VOLTAGE V_{CE}-20 VOLTS ±5%.
(3) POWER DISSIPATION 220 ± 10 MILLIWATTS.

D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO, AND FOLLOWING BURN-IN.
(1) SWITCHBACK VOLTAGE, L_{VCEO}
(2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C = 25°C.
(3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}.

E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READINGS, THE FINAL TEST READINGS AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET THE INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = 25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REFERENCE)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-50	-5	-35	1.5	
-2	-60	-5	-60	1.5	

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPLICATION

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CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS9-497
DRAWN J. Patterson DATE 30 JUL 65
CHECKED Ed Foster 4 AUG 65
APPROVAL C Bedingfield 8/17/65
APPROVAL
NASA APPROVAL 8/17/65
MIT APPROVAL W K 8/17/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008814
SCALE —
WT
SHEET 2 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	$I_E = 0$, $V_{CB} = -30V$	I_{CBO_1}		20	NA
	COLLECTOR CUTOFF CURRENT	$V_{CB} = -30VDC$, $T_C = 100°C$	I_{CBO_2}		8	µA
	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-30V$, $T_C=150°C$	I_{CBO_3}		10	µA
	COLLECTOR BREAKDOWN VOLTAGE (PULSED - SEE NOTE 1)	$I_C=-10$ mA, $R_{BE} \leq 10\Omega$	BV_{CER}	-50		VOLTS
	SWITCHBACK VOLTAGE (PULSED - SEE NOTE 1)	$I_C=-10$ mA, $I_B=0$	LV_{CEO}	-35		VOLTS
	STATIC FORWARD CURRENT TRANSFER RATIO (PULSED - SEE NOTE 1)	$I_C=-150$ mA, $V_{CE}=-10V$	h_{FE_1}	30	90	
	STATIC FORWARD CURRENT TRANSFER RATIO (NOTE 1)	$I_C=-5$ mA, $V_{CE}=-10V$	h_{FE_2}	25		
	COLLECTOR SATURATION VOLTAGE (NOTE 1)	$I_C=-150$ mA, $I_B=-15$ mA	V_{CE} (sat)		-.4	VOLTS
	BASE SATURATION VOLTAGE (NOTE 1)	$I_C=-150$ mA, $I_B=-15$ mA	V_{BE} (sat)		-1.3	VOLTS
	SMALL SIGNAL, SHORT-CIRCUIT FORWARD CURRENT TRANSFER RATIO	$I_C=-50$ mA, $V_{CE}=-20V$, f=100 mc	h_{FE}	2.0		
	OUTPUT CAPACITANCE	$V_{CB}=-10V$, $I_E=0$, f=140KC	C_{ob}		8	PF

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 1%.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008814
SCALE —	WT	SHEET 3 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008814 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	WK
A	REVISED PER TDRR 23176	10/26/65	WK

TABLE III

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0	I_{CBO_1}		10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=150°C	I_{CBO_2}		10	μA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=100°C	I_{CBO_3}		8	μA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10μA; I_E=0 (NOTE 1)	BV_{CBO}	60		V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V; I_C=0	I_{EBO}		0.1	μA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10μA; I_C=0 (NOTE 1)	BV_{EBO}	5		V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA PULSED; I_B=0 (NOTE 1)	LV_{CEO}	60		V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V; R_{BE}=100K (NOTE 1)	I_{CER}		10	μA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0; V_{CE}=-50V	I_{CES}		10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA; V_{CE}=-10V (NOTE 1)	h_{FE_1}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA; V_{CE}=-10V (NOTE 1)	h_{FE_2}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA; V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA; V_{CE}=-10V (NOTE 1)	h_{FE_4}	30		
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$		-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA; I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$		-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V; I_E=0; F=0.14mc	C_{ob}		8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30mA; I_C=300mA tw> 400nsec; 2% DUTY CYCLE	ton		40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30mA; I_C=300mA tw > 400nsec; 2% DUTY CYCLE	toff		100	NSEC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C =-100μA, V_{CE} =-10V (NOTE 1)	h_{FE5}	75		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO
CONTRACT NAS 9-497
DRAWN J. Patterson DATE 30 JUL 65
CHECKED Ed Foster 4 AUG 65
APPROVAL R Bedingfield 8/11/65
APPROVAL
NASA APPROVAL 8/17/65
MIT APPROVAL 17 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008814
SCALE —	WT	SHEET 4 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008814 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/66	WR
B	REVISED PER TDRR 24185		WR

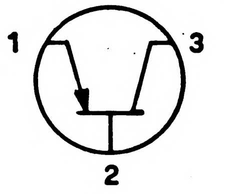
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS ONLY), DASH NUMBER, AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE; DATE CODE; LOT CODE, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II, III OR IV AS APPLICABLE.
     - (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT =100°C
     - (2) SWITCHBACK VOLTAGE, (LV_{CEO})
     - (3) COLLECTOR SATURATION VOLTAGE, ($V_{CE(SAT)}$) AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE_2}, h_{FE_3}, h_{FE_4}, h_{FE_5}) WHEN APPLICABLE.
     - (5) BASE SATURATION VOLTAGE ($V_{BE(SAT)}$)

3. DESIGN:
   - A. ELECTRICAL RATINGS: PER TABLE I.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE II, III OR IV AS APPLICABLE.
   - C. JUNCTION TEMPERATURE: -65°C TO +200°C.
   - D. POWER DISSIPATION:
     - (1) AT 25°C AMBIENT TEMP = 400 MILLIWATTS, THERMAL RESISTANCE (θ_{JA}) = 437.5°C/WATT.
     - (2) AT 25°C CASE TEMP = 1.5 WATTS, THERMAL RESISTANCE (θ_{JC}) = 116.7°C/WATT.

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006, OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.



GRAPHICAL SYMBOL
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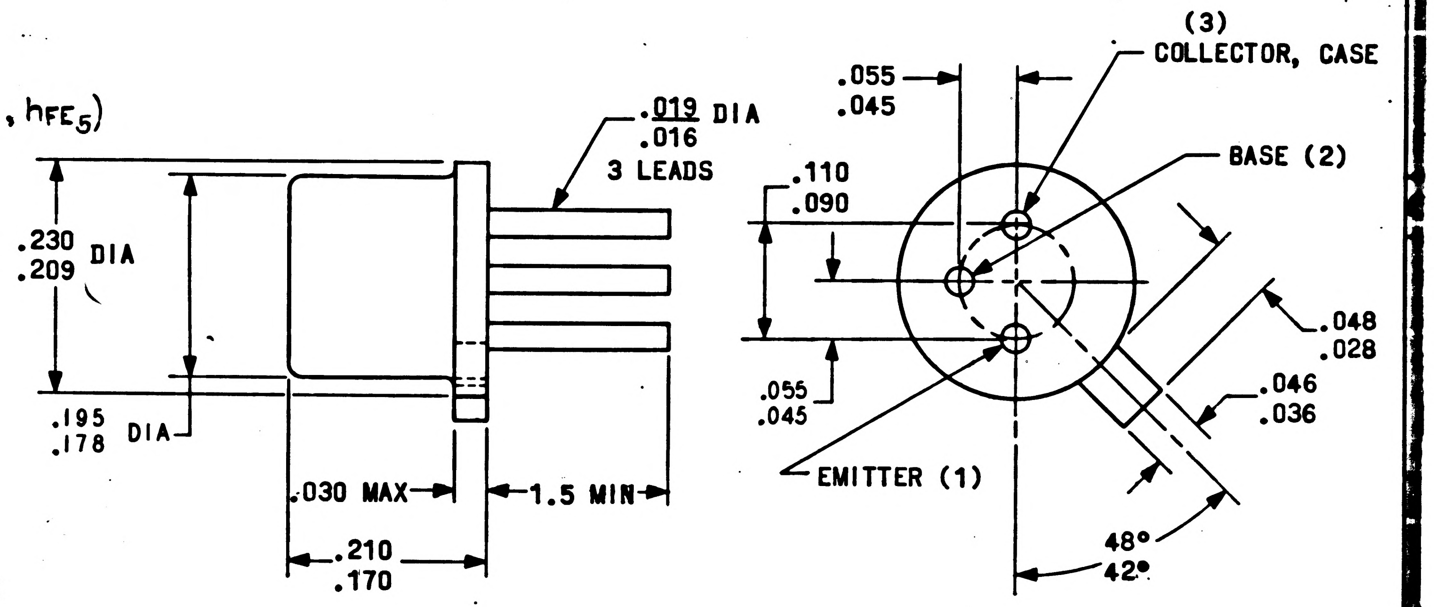

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

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DWG NO
CONTRACT NAS9-497
DRAWN J. Patterson DATE 30 JUL 65
CHECKED Ed Foster 4 Aug 65
APPROVAL C Bedingfield 8/17/65
APPROVAL
NASA APPROVAL 8/17/65
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008814
SCALE —
WT
SHEET 1 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WK
B	REVISED PER TDRR 24185		WK

REQUIREMENTS: (CONTINUED)

B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
(1) V_{CE} = 80% OF MAX PART RATING.
(2) AMBIENT TEMPERATURE = +175°C.
(3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10 NANOAMPS, WHICHEVER IS GREATER

C. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
(1) AMBIENT TEMPERATURE 25° ± 5°C.
(2) COLLECTOR VOLTAGE V_{CE}-20 VOLTS ±5%.
(3) POWER DISSIPATION 220 ± 10 MILLIWATTS.

D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO, AND FOLLOWING BURN-IN.
(1) SWITCHBACK VOLTAGE, L_{VCEO}
(2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C = 25°C.
(3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}.

E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READINGS, THE FINAL TEST READINGS AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET THE INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = 25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REFERENCE)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-50	-5	-35	1.5	
-2	-60	-5	-60	1.5	2N2907A
-3	-60	-5	-60	1.5	2N2906A

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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DRAWN J. Patterson DATE 30 JUL 65
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008814

SCALE — WT SHEET 2 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B 1008814

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WK
B	REVISED PER TDRR 24185		WK

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	$I_E = 0$, $V_{CB} = -30V$	I_{CBO_1}		20	NA
	COLLECTOR CUTOFF CURRENT	$V_{CB} = -30VDC$, $T_C = 100°C$	I_{CBO_2}		8	µA
	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-30V$, $T_C=150°C$	I_{CBO_3}		10	µA
	COLLECTOR BREAKDOWN VOLTAGE (PULSED - SEE NOTE 1)	$I_C=-10$ mA, $R_{BE} \leq 10\Omega$	BV_{CER}	-50		VOLTS
	SWITCHBACK VOLTAGE (PULSED - SEE NOTE 1)	$I_C=-10$ mA, $I_B=0$	LV_{CEO}	-35		VOLTS
	STATIC FORWARD CURRENT TRANSFER RATIO (PULSED - SEE NOTE 1)	$I_C=-150$ mA, $V_{CE}=-10V$	h_{FE_1}	30	90	
	STATIC FORWARD CURRENT TRANSFER RATIO (NOTE 1)	$I_C=-5$ mA, $V_{CE}=-10V$	h_{FE2}	25		
	COLLECTOR SATURATION VOLTAGE (NOTE 1)	$I_C=-150$ mA, $I_B=-15$ mA	V_{CE} (sat)		-.4	VOLTS
	BASE SATURATION VOLTAGE (NOTE 1)	$I_C=-150$ mA, $I_B=-15$ mA	V_{BE} (sat)		-1.3	VOLTS
	SMALL SIGNAL, SHORT-CIRCUIT FORWARD CURRENT TRANSFER RATIO	$I_C=-50$ mA, $V_{CE}=-20V$, f=100 mc	h_{FE}	2.0		
	OUTPUT CAPACITANCE	$V_{CB}=-10V$, $I_E=0$, f=140KC	C_{ob}		8	PF

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 1%.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
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CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008814
SCALE —	WT	SHEET 3 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	WK
A	REVISED PER TDRR 23176	10/26/65	WK
B	REVISED PER TDRR 24185		WK

TABLE III

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0	I_{CBO_1}		10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=150°C	I_{CBO_2}		10	µA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=100°C	I_{CBO_3}		8	µA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10µA; I_E=0 (NOTE 1)	BV_{CBO}	60		V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V; I_C=0	I_{EBO}		0.1	µA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10µA; I_C=0 (NOTE 1)	BV_{EBO}	5		V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA PULSED; I_B=0 (NOTE 1)	LV_{CEO}	60		V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V; R_{BE}=100K (NOTE 1)	I_{CER}		10	µA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0; V_{CE}=-50V	I_{CES}		10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA; V_{CE}=-10V (NOTE 1)	h_{FE_1}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA; V_{CE}=-10V (NOTE 1)	h_{FE_2}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA; V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA; V_{CE}=-10V (NOTE 1)	h_{FE_4}	30		
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$		-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA; I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$		-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V; I_E=0; F=0.14mc	C_{ob}		8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30mA; I_C=300mA tw> 400nsec; 2% DUTY CYCLE	ton		40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30mA; I_C=300mA tw > 400nsec; 2% DUTY CYCLE	toff		100	NSEC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C =-100µA, V_{CE} =-10V (NOTE 1)	h_{FE5}	75		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

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DRAWN J. Patterson DATE 30 JUL 65
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APPROVAL R Bedingfield 8/17/65
APPROVAL
NASA APPROVAL 8/17/65
MIT APPROVAL 17 Aug 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008814
SCALE —	WT	SHEET 4 OF 5

4 3 2 1

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REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
B		THIS SHEET ADDED PER TDRR 24185			12/7/65	WK

TABLE IV

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NO.	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN.	MAX.	UNITS
-3	COLLECTOR CUTOFF CURRENT	V_{CB} = -50V; I_E = 0	1_{CBO_1}		10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB} =-50V; I_E = 0; T_C = 150°C	1_{CBO_2}		10	uA
	COLLECTOR CUTOFF CURRENT	V_{CB} = -50V; I_E = 0; T_C = 100°C	1_{CBO_3}		8	uA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C = -10 uA; I_E =0 (NOTE 1)	BV_{CBO}	60		V
	EMITTER-BASE REVERSE CURRENT	V_{EB} =-3V; I_C = 0	1_{EBO}		0.1	uA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E = -10uA; I_C = 0 (NOTE 1)	BV_{EBO}			V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C = -10 mA PULSED; I_B = 0 (NOTE 1)	LV_{CEO}	60		V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE} = -20V; R_{BE} = 100K (NOTE 1)	1_{CER}		10	uA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE} = -0; V_{CE} = -50V	1_{CES}		10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -10 mA; V_{CE} = -10V (NOTE 1)	h_{FE_1}	40		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -1 mA; V_{CE} = -10V (NOTE 1)	h_{FE_2}	40		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -150mA; V_{CE} = -10V (NOTE 1)	h_{FE_3}	40	120	
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -500 mA; V_{CE} = -10V (NOTE 1)	h_{FE_4}	40		
	BASE-EMITTER SATURATION VOLTAGE	I_C = -50 mA; I_B = -2.5 mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C = -50 mA: I_B = -2.5 mA (NOTE 1)	$V_{CE(SAT)_1}$		-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C = -150 mA; I_B = -15 mA (NOTE 1)	$V_{CE(SAT)_2}$		-0.4	V
	COLLECTOR CAPACITANCE	V_{CB} = -10V; I_E = 0; F = 0.14 mc	C_{ob}		8	PF
	TURN ON TIME	I_{B_1} = $-I_{B_2}$ = 30 mA; I_C = 300 mA tw> 400 NSEC: 2% DUTY CYCLE	ton		40	NSEC
	TURN OFF TIME	I_{B_1} = $-I_{B_2}$ = 30 mA: I_C = 300 mA tw> 400 NSEC: 2% DUTY CYCLE	toff		100	NSEC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -100 uA, V_{CE} = 10V(NOTE 1)	h_{FES}		40	

(B) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS				

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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
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APPROVED 12/6/65
APPROVED
APPROVED MIT 7 Dec 65
APPROVED MSC A C METZGER
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008814
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4 3 2 1

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1008814 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WK
B	REVISED PER TDRR 24185		WK
C	REVISED PER TDRR 24700	12/2/65	WK

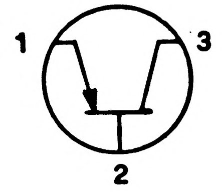
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS ONLY), DASH NUMBER, AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE; DATE CODE; LOT CODE, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II, III OR IV AS APPLICABLE.
     - (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT =100°C
     - (2) SWITCHBACK VOLTAGE, (LV_{CEO})
     - (3) COLLECTOR SATURATION VOLTAGE, ($V_{CE(SAT)}$) AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE_2}, h_{FE_3}, h_{FE_4}, h_{FE_5}) WHEN APPLICABLE.
     - (5) BASE SATURATION VOLTAGE ($V_{BE(SAT)}$)

3. DESIGN:
   - A. ELECTRICAL RATINGS: PER TABLE I.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE II, III OR IV AS APPLICABLE.
   - C. JUNCTION TEMPERATURE: -65°C TO +200°C.
   - D. POWER DISSIPATION:
     - (1) AT 25°C AMBIENT TEMP = 400 MILLIWATTS, THERMAL RESISTANCE (θ_{JA}) = 437.5°C/WATT.
     - (2) AT 25°C CASE TEMP = 1.5 WATTS, THERMAL RESISTANCE (θ_{JC}) = 116.7°C/WATT.

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006, OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.



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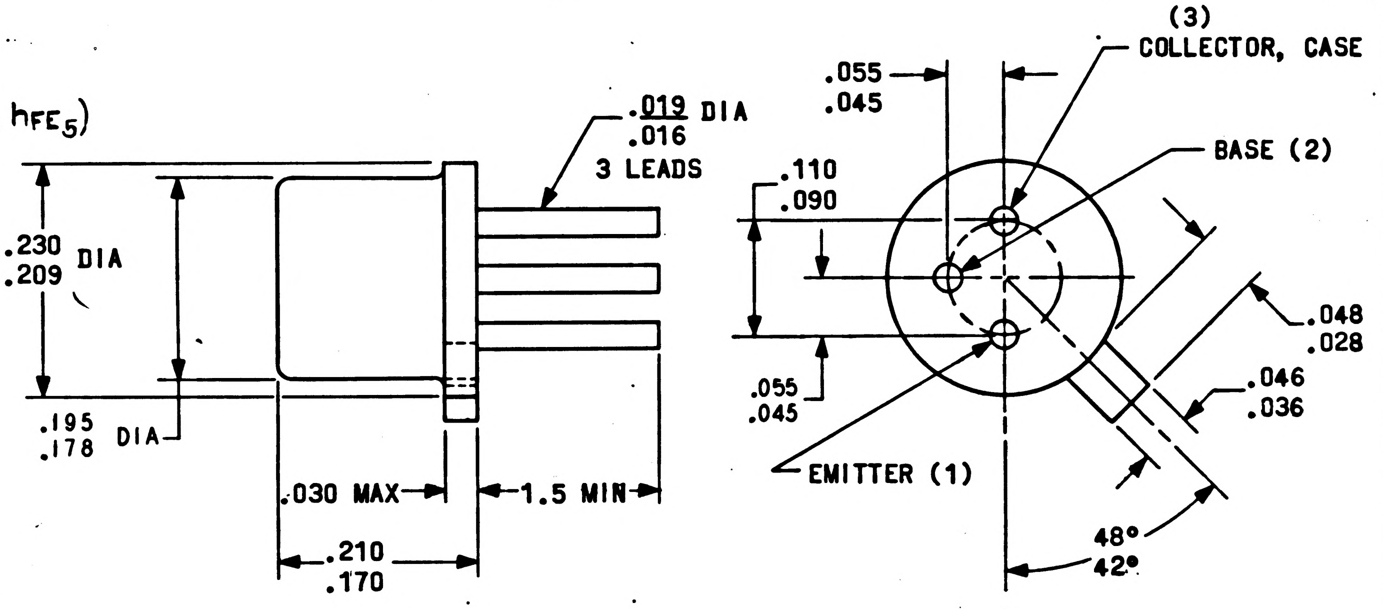

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LIST OF MATERIALS

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DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

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DRAWN J. Patterson DATE 30 JUL 65
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APPROVAL
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HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008814
SCALE —
WT
SHEET 1 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WK
B	REVISED PER TDRR 24185		WK
C	REVISED PER TDRR 24700	12/29/65	WK

REQUIREMENTS: (CONTINUED)

B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
   (1) V_{CE} = 80% OF MAX PART RATING.
   (2) AMBIENT TEMPERATURE = +175°C.
   (3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10 NANOAMPS, WHICHEVER IS GREATER.

C. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
   (1) AMBIENT TEMPERATURE 25° ± 5°C.
   (2) COLLECTOR VOLTAGE V_{CE}-20 VOLTS ±5%.
   (3) POWER DISSIPATION 220 ± 10 MILLIWATTS.

D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO, AND FOLLOWING BURN-IN.
   (1) SWITCHBACK VOLTAGE, L_{VCEO}
   (2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C = 25°C.
   (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
   (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}.

E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READINGS, THE FINAL TEST READINGS AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET THE INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = 25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REFERENCE)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-50	-5	-35	1.5	
-2	-60	-5	-60	1.5	2N2907A
-3	-60	-5	-60	1.5	2N2906A

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS9-497
DRAWN J. Patterson DATE 30 JUL 65
CHECKED Ed Foster 4 AUG 65
APPROVAL C Bedingfield 8/17/65
APPROVAL
NASA APPROVAL [illegible] 8/17/65
MIT APPROVAL W[illegible] 17 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008814
SCALE —
WT
SHEET 2 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008814 C

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	
A	REVISED PER TDRR 23176	10/26/65	WK
B	REVISED PER TDRR 24185	11/	WK
C	REVISED PER TDRR 24700	12/21/65	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E = 0, V_{CB} = -30V	I_{CBO_1}		20	NA
	COLLECTOR CUTOFF CURRENT	V_{CB} = -30VDC, T_C = 100°C	I_{CBO_2}		8	µA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30V, T_C=150°C	I_{CBO_3}		10	µA
	COLLECTOR BREAKDOWN VOLTAGE (PULSED - SEE NOTE 1)	I_C=-10 mA, $R_{BE} \leq 10\Omega$	BV_{CER}	-50		VOLTS
	SWITCHBACK VOLTAGE (PULSED - SEE NOTE 1)	I_C=-10 mA, I_B=0	LV_{CEO}	-35		VOLTS
	STATIC FORWARD CURRENT TRANSFER RATIO (PULSED - SEE NOTE 1)	I_C=-150 mA, V_{CE}=-10V	h_{FE_1}	30	90	
	STATIC FORWARD CURRENT TRANSFER RATIO (NOTE 1)	I_C=-5 mA, V_{CE}=-10V	h_{FE_2}	25		
	COLLECTOR SATURATION VOLTAGE (NOTE 1)	I_C=-150 mA, I_B=-15 mA	V_{CE} (sat)		-.4	VOLTS
	BASE SATURATION VOLTAGE (NOTE 1)	I_C=-150 mA, I_B=-15 mA	V_{BE} (sat)		-1.3	VOLTS
	SMALL SIGNAL, SHORT-CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 mc	h_{FE}	2.0		
	OUTPUT CAPACITANCE	V_{CB}=-10V, I_E=0, f=140KC	C_{ob}		8	PF

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 1%.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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FRACTIONS ± — DECIMALS ± — ANGLES ± —
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DRAWN J. Patterson DATE 30 JUL 65
CHECKED Ed Foster 4 AUG 65
APPROVAL R Bedingfield 8/17/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
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SCALE —
WT
SHEET 3 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	WK
A	REVISED PER TDRR 23176	10/26/65	WK
B	REVISED PER TDRR 24185		WK
C	REVISED PER TDRR 24700	12/2 65	WK

TABLE III

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0	I_{CBO_1}		10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=150°C	I_{CBO_2}		10	μA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=100°C	I_{CBO_3}		8	μA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10μA; I_E=0 (NOTE 1)	BV_{CBO}	60		V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V; I_C=0	I_{EBO}		0.1	μA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10μA; I_C=0 (NOTE 1)	BV_{EBO}	5		V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA PULSED; I_B=0 (NOTE 1)	LV_{CEO}	60		V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V; R_{BE}=100K (NOTE 1)	I_{CER}		10	μA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0; V_{CE}=-50V	I_{CES}		10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA; V_{CE}=-10V (NOTE 1)	h_{FE_1}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA; V_{CE}=-10V (NOTE 1)	h_{FE_2}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA; V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA; V_{CE}=-10V (NOTE 1)	h_{FE_4}	30		
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$		-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA; I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$		-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V; I_E=0; F=0.14mc	C_{ob}		8	PF
	TURN ON TIME	I_{B1}=I_{B2}=30mA; I_C=300mA tw> 400nsec; 2% DUTY CYCLE	ton		40	NSEC
	TURN OFF TIME	I_{B1}=I_{B2}=30mA; I_C=300mA tw > 400nsec; 2% DUTY CYCLE	toff		100	NSEC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C =-100μA, V_{CE} =-10V (NOTE 1)	h_{FE5}	75		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DO NOT SCALE THIS DRAWING
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CONTRACT NAS 9-497
DRAWN J. Patterson DATE 30 JUL 65
CHECKED Ed Foster 4 AUG 65
APPROVAL R Bedingfield 8/17/65
APPROVAL
NASA APPROVAL 8/17/65
MIT APPROVAL 17 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008814
SCALE —
WT
SHEET 4 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
Ⓦ B		THIS SHEET ADDED PER TDRR 24185			12/7/65	WK
C		REVISED PER TDRR 24700	ets		12/24/65	WK

TABLE IV

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NO.	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN.	MAX.	UNITS
-3	COLLECTOR CUTOFF CURRENT	V_{CB} = -50V; I_E = 0	1_{CBO_1}		10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB} =-50V; I_E = 0; T_C = 150°C	1_{CBO_2}		10	uA
	COLLECTOR CUTOFF CURRENT	V_{CB} = -50V; I_E = 0; T_C = 100°C	1_{CBO_3}		8	uA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C = -10 uA; I_E =0 (NOTE 1)	BV_{CBO}	60		V
	EMITTER-BASE REVERSE CURRENT	V_{EB} =-3V; I_C = 0	1_{EBO}		0.1	uA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E = -10uA; I_C = 0 (NOTE 1)	BV_{EBO}	5		V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C = -10 mA PULSED; I_B = 0 (NOTE 1)	LV_{CEO}	60		V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE} = -20V; R_{BE} = 100K (NOTE 1)	1_{CER}		10	uA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE} = -0; V_{CE} = -50V	1_{CES}		10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -10 mA; V_{CE} = -10V (NOTE 1)	h_{FE_1}	40		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -1 mA; V_{CE} = -10V (NOTE 1)	h_{FE_2}	40		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -150mA; V_{CE} = -10V (NOTE 1)	h_{FE_3}	40	120	
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -500 mA; V_{CE} = -10V (NOTE 1)	h_{FE_4}	40		
	BASE-EMITTER SATURATION VOLTAGE	I_C = -50 mA; I_B = -2.5 mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C = -50 mA: I_B = -2.5 mA (NOTE 1)	$V_{CE(SAT)_1}$		-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C = -150 mA; I_B = -15 mA (NOTE 1)	$V_{CE(SAT)_2}$		-0.4	V
	COLLECTOR CAPACITANCE	V_{CB} = -10V; I_E = 0; F = 0.14 mc	C_{ob}		8	PF
	TURN ON TIME	I_{B_1} = $-I_{B_2}$ = 30 mA; I_C = 300 mA tw> 400 NSEC: 2% DUTY CYCLE	ton		40	NSEC
	TURN OFF TIME	I_{B_1} = $-I_{B_2}$ = 30 mA: I_C = 300 mA tw> 400 NSEC: 2% DUTY CYCLE	toff		100	NSEC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C = -100 uA, V_{CE} = 10V(NOTE 1)	h_{FES}		40	

(B) THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL

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DRAWN A. Addario Jr. 2DEC 65
CHECKED A. Marto 12-2-65
APPROVED Robert Badingfield 12/6/65
APPROVED
APPROVED MIT W Kupfer 7 Dec 65
APPROVED MSC A C METZGER
DATE

TRANSISTOR-SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008814

SCALE NONE

SHEET 5 OF 5

1008814 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	

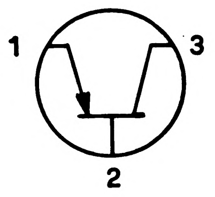
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

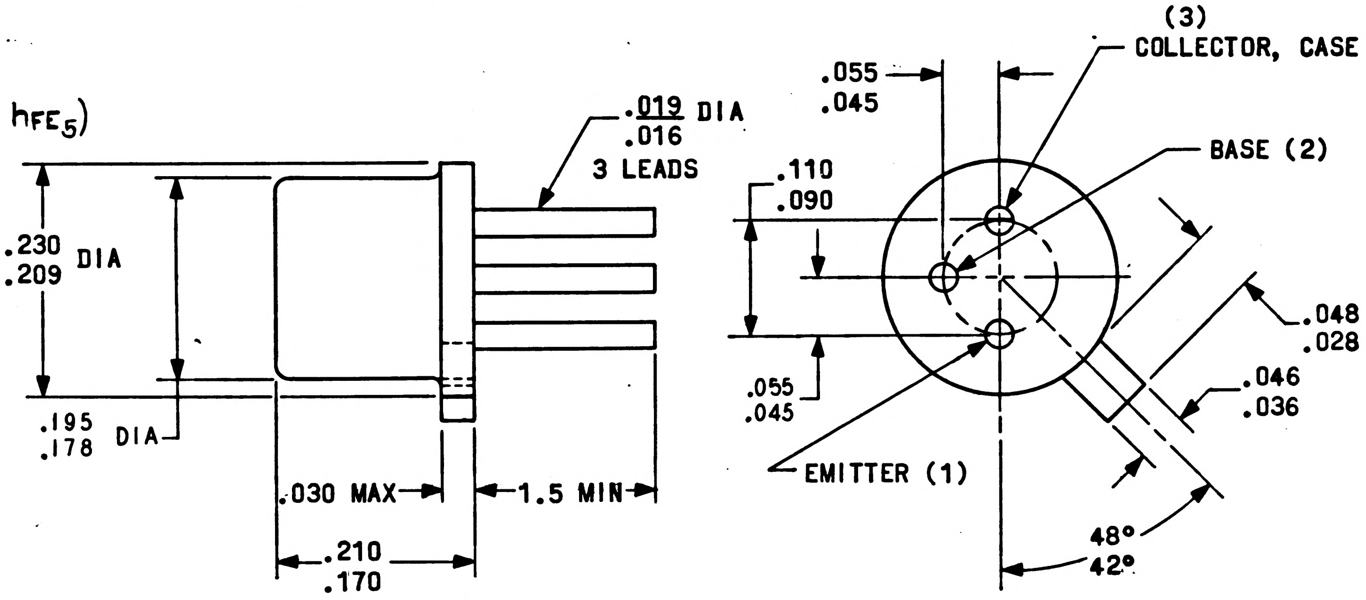
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS ONLY), DASH NUMBER, AND THE MANUFACTURER'S NAME, TRADEMARK OR CODE; DATE CODE; LOT CODE, AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT, (I_{CBO}) AT =100°C
     - (2) SWITCHBACK VOLTAGE, (LV_{CEO})
     - (3) COLLECTOR SATURATION VOLTAGE, ($V_{CE(SAT)}$) AT I_C = 150 MA.
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, (h_{FE_1}, h_{FE_2}, h_{FE_3}, h_{FE_4}, h_{FE_5}) WHEN APPLICABLE.
     - (5) BASE SATURATION VOLTAGE ($V_{BE(SAT)}$)

3. DESIGN:
   - A. ELECTRICAL RATINGS: PER TABLE I.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - C. JUNCTION TEMPERATURE: -65°C TO +200°C.
   - D. POWER DISSIPATION:
     - (1) AT 25°C AMBIENT TEMP = 400 MILLIWATTS, THERMAL RESISTANCE (θ_{JA}) = 437.5°C/WATT.
     - (2) AT 25°C CASE TEMP = 1.5 WATTS, THERMAL RESISTANCE (θ_{JC}) = 116.7°C/WATT.

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750 METHOD 2006, OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.



GRAPHICAL SYMBOL
(NUMBERS ARE FOR REFERENCE ONLY)



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES

HEAT TREATMENT: NONE

FINAL FINISH: NONE

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CONTRACT NAS9-497

DRAWN J. Patterson DATE 30 JUL 65
CHECKED Ed Foster 4 AUG 65
APPROVAL C Bedingfield 8/17/65
APPROVAL
NASA APPROVAL 8/17/65
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008814

SCALE — WT SHEET 1 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	

REQUIREMENTS: (CONTINUED)

B. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
(1) V_{CE} = 80% OF MAX PART RATING.
(2) AMBIENT TEMPERATURE = +175°C.
(3) I_{CES} AT -40 V AND I_{EBO} AT -4 V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 10 NA.

C. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
(1) AMBIENT TEMPERATURE 25° ± 5°C.
(2) COLLECTOR VOLTAGE V_{CE}-20 VOLTS ±5%.
(3) POWER DISSIPATION 220 ± 10 MILLIWATTS.

D. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO, AND FOLLOWING BURN-IN.
(1) SWITCHBACK VOLTAGE, L_{VCEO}
(2) COLLECTOR CUTOFF CURRENT, I_{CBO} AT T_C = 25°C.
(3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}.

E. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READINGS, THE FINAL TEST READINGS AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET THE INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

TABLE I

MAXIMUM RATINGS T_C = 25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REFERENCE)
	V_{DC}	V_{DC}	V_{DC}	W	
-1	-50	-5	-35	1.5	
-2	-60	-5	-60	1.5	

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
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80230	C	1008814

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SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 21620	8-17-65	

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	$I_E = 0$, $V_{CB} = -30V$	I_{CBO_1}		20	NA
	COLLECTOR CUTOFF CURRENT	$V_{CB} = -30VDC$, $T_C = 100°C$	I_{CBO_2}		8	µA
	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-30V$, $T_C=150°C$	I_{CBO_3}		10	µA
	COLLECTOR BREAKDOWN VOLTAGE (PULSED - SEE NOTE 1)	$I_C=-10$ mA, $R_{BE} \leq 10\Omega$	BV_{CER}	-50		VOLTS
	SWITCHBACK VOLTAGE (PULSED - SEE NOTE 1)	$I_C=-10$ mA, $I_B=0$	LV_{CEO}	-35		VOLTS
	STATIC FORWARD CURRENT TRANSFER RATIO (PULSED - SEE NOTE 1)	$I_C=-150$ mA, $V_{CE}=-10V$	h_{FE_1}	30	90	
	STATIC FORWARD CURRENT TRANSFER RATIO (NOTE 1)	$I_C=-5$ mA, $V_{CE}=-10V$	h_{FE2}	25		
	COLLECTOR SATURATION VOLTAGE (NOTE 1)	$I_C=-150$ mA, $I_B=-15$ mA	V_{CE} (sat)		-.4	VOLTS
	BASE SATURATION VOLTAGE (NOTE 1)	$I_C=-150$ mA, $I_B=-15$ mA	V_{BE} (sat)		-1.3	VOLTS
	SMALL SIGNAL, SHORT-CIRCUIT FORWARD CURRENT TRANSFER RATIO	$I_C=-50$ mA, $V_{CE}=-20V$, f=100 mc	h_{FE}	2.0		
	OUTPUT CAPACITANCE	$V_{CB}=-10V$, $I_E=0$, f=140KC	C_{ob}		8	PF

NOTES:
1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 1%.

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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TABLE III

ELECTRICAL CHARACTERISTICS AT T_C = 25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
-2	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0	I_{CBO_1}		10	NA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=150°C	I_{CBO_2}		10	μA
	COLLECTOR CUTOFF CURRENT	V_{CB}=-50V; I_E=0; T_C=100°C	I_{CBO_3}		8	μA
	COLLECTOR-BASE BREAKDOWN VOLTAGE	I_C=-10μA; I_E=0 (NOTE 1)	BV_{CBO}	60		V
	EMITTER-BASE REVERSE CURRENT	V_{EB}=-3V; I_C=0	I_{EBO}		0.1	μA
	EMITTER-BASE BREAKDOWN VOLTAGE	I_E=-10μA; I_C=0 (NOTE 1)	BV_{EBO}	5		V
	COLLECTOR-EMITTER SWITCHBACK VOLTAGE	I_C=-10mA PULSED; I_B=0 (NOTE 1)	LV_{CEO}	60		V
	COLLECTOR-EMITTER CURRENT RES. RETURN	V_{CE}=-20V; R_{BE}=100K (NOTE 1)	I_{CER}		10	μA
	COLLECTOR-EMITTER THRESHOLD CURRENT	V_{BE}=-0; V_{CE}=-50V	I_{CES}		10	NA
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-10mA; V_{CE}=-10V (NOTE 1)	h_{FE_1}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-1mA; V_{CE}=-10V (NOTE 1)	h_{FE_2}	100		
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-150mA; V_{CE}=-10V (NOTE 1)	h_{FE_3}	100	300	
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-500mA; V_{CE}=-10V (NOTE 1)	h_{FE_4}	30		
	BASE-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{BE(SAT)}$	-0.7	-1.0	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-50mA; I_B=-2.5mA (NOTE 1)	$V_{CE(SAT)_1}$		-0.25	V
	COLLECTOR-EMITTER SATURATION VOLTAGE	I_C=-150mA; I_B=-15mA (NOTE 1)	$V_{CE(SAT)_2}$		-0.4	V
	COLLECTOR CAPACITANCE	V_{CB}=-10V; I_E=0; F=0.14mc	C_{ob}		8	PF
	TURN ON TIME	$I_{B1}=I_{B2}$=30mA; I_C=300mA tw> 400nsec; 2% DUTY CYCLE	ton		40	NSEC
	TURN OFF TIME	$I_{B1}=I_{B2}$=30mA; I_C=300mA tw > 400nsec; 2% DUTY CYCLE	toff		100	NSEC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C =-100μA, V_{CE} =-10V (NOTE 1)	h_{FE5}	75		

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SCALE —
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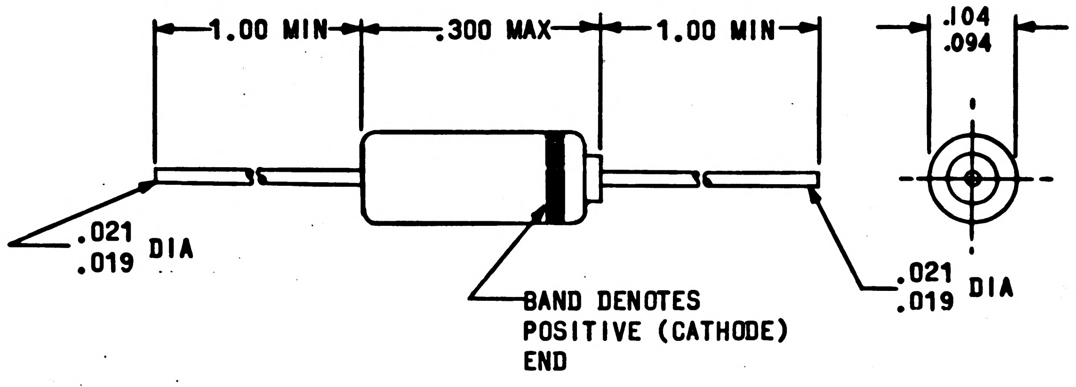
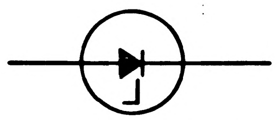
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	wJC

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
   - C. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: TO BE IN ACCORDANCE WITH ND 1002215, CLASS I CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA:
       - (a) ANODE: DUMET PER ND 1015401
       - (b) CATHODE: DUMET PER ND 1015401
       - (c) THE LEADS SHALL NOT CONTAIN KINKS AND BENDS WHOSE AMPLITUDES EXCEED 1/2 OF THE RADIUS OF THE LEAD OVER A NODE TO NODE DISTANCE OF 1/8 INCH OR LESS. THE LEADS SHALL FALL FREELY IN A TUBE WITH AN ID EQUAL TO 1-1/2 TIMES THE LEAD DIAMETER AND A MINIMUM TUBE LENGTH EQUAL TO THE LEAD LENGTH. SEE FIG. A.
       - (d) THE FINISH OF THE LEADS SHALL BE FREE OF FOREIGN MATERIAL IN THE AREA 1/16 INCH MAX FROM THE DEVICE BODY TO WITHIN 1/8 INCH OF THE LEAD END. FOREIGN MATERIAL SHALL MEAN ANY MATERIAL NOT COMMON TO THE LEAD FINISH WHICH WOULD REDUCE WELDABILITY AND SOLDERABILITY. THE END OF THE DEVICE BODY IS DEFINED AS THE END OF THE SLUG ON THE CATHODE END AND THE END OF THE GLASS BODY ON THE ANODE END.
       - (e) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, THE NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, AND DATE CODE SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. THE CATHODE END OF THE PART SHALL BE IDENTIFIED WITH A COLOR BAND. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL SPECIFICATION: PER TABLE II
     - (1) ZENER VOLTAGE (V_Z AT I_{ZT})
     - (2) ZENER IMPEDANCE (Z_{ZT})
     - (3) REVERSE CURRENT (IR) AT 25°C





GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

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SIZE C
NASA DRAWING NO. 1008815
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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - B. MAXIMUM RATINGS: PER TABLE I.
   - C. STORAGE TEMPERATURE: -65°C TO +175°C.
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3M SEC DURATION SUPERIMPOSED ON I_{ZT} (TABLE II).
   - E. THERMAL RESISTANCE (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR): .375°C/MW MAX.
   - F. POWER DISSIPATION: 400 MILLIWATTS MAX, DERATE 2.67 MW/°C ABOVE 25°C AMBIENT.
   - G. PARTS MUST BE CAPABLE OF MEETING A MINIMUM OF 100 MEGOHMS RESISTANCE FROM LEADS TO BODY.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) MONITORED VARIABLE FREQUENCY VIBRATION AT A CONSTANT PEAK ACCELERATION OF 20 G MINIMUM OVER 100-2,000 CPS PER MIL-STD-750, METHOD 2056 WITH FORCE APPLIED PERPENDICULAR TO THE MAIN AXIS. MONITOR DURING TESTING FOR OPENS AND SHORTS USING A MINIMUM INTERMITTENCY CAPABILITY OF 5 μ SECONDS. ALSO MONITOR FOR SIGNIFICANT ELECTRICAL PARAMETER CHANGES.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.
     - (1) AMBIENT TEMPERATURE: 100°C ± 5°C.
     - (2) POWER DISSIPATION: 100 ± 10 MILLIWATTS (DIODE IN VOLTAGE BREAKDOWN CONDITION)
     - (3) MOUNTING: BY CLIPS 1/2 ± 1/16 INCH FROM DIODE BODY.
   - C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) ZENER VOLTAGE AT I_{ZT}.
     - (2) ZENER IMPEDANCE AT I_{ZT}.
     - (3) REVERSE LEAKAGE CURRENT AT 25°C.
   - D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
     - (1) PARAMETRIC CHANGE LIMITS:
       - (a) ZENER VOLTAGE: ±3% OF INITIAL VALUE.
       - (b) ZENER IMPEDANCE: ±15% OF INITIAL VALUE.
       - (c) REVERSE LEAKAGE CURRENT: 5 X INITIAL VALUE OR 1 μA WHICHEVER IS GREATER.
   - E. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.
   - F. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED FOR EACH SHIPMENT.

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AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815

SCALE — WT SHEET 2 OF 5.

E.F.

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A	1008815

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SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK

TABLE I

DASH NUMBER	MAXIMUM RATINGS AT AMBIENT TEMPERATURE 25°C			
	ZENER CURRENT (I_{ZM}) MA_{DC}	POWER DISSIPATION (P) MW	JUNCTION TEMPERATURE (T_J) °C	EIA TYPE DESIGNATION (FOR REF ONLY)
-1	58	400	175	1N957B
-2	53			1N958B
-3	48			1N959B
-4	44			1N960B
-5	40			1N961B
-6	35			1N962B
-7	32			1N963B
-8	30			1N964B
-9	26			1N965B
-10	25			1N966B
-11	21			1N967B
-12	19			1N968B
-13	17			1N969B
-14	16			1N970B
-15	14			1N971B
-16	13			1N972B
-17	12			1N973B
-18	11			1N974B
-19	9.1			1N975B
-20	8.8			1N976B
-21	7.9			1N977B
-22	7.4			1N978B
-23	6.9			1N979B
-24	6.0			1N980B
-25	26			.4M11.5Z2
-26	16			
-27	15	400	175	
-28	14	400	175	1N971
-29	75	400	175	1N751
-30	5.5	400	175	1N981B
-31	5.1	400	175	1N982B
-32	4.6	400	175	1N983B
-33	4.2	400	175	1N984B
-34	3.7	400	175	1N985B
-35	3.3	400	175	1N986B
-36	3.1	400	175	1N987B
-37	2.7	400	175	1N988B
-38	2.4	400	175	1N989B
-39	2.2	400	175	1N990B
-40	2.0	400	175	1N991B
-41	1.8	400	175	1N992B
-42	120	400	175	1N746A
-43	110	400	175	1N747A
-44	100	400	175	1N748A
-45	90	400	175	1N749A
-46	85	400	175	1N750A
-47	75	400	175	1N751A
-48	70	400	175	1N752A
-49	65	400	175	1N753A

NOTES:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL. $(Z_Z = \frac{E(AC)}{I(AC)})$
3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC (MINIMUM) AT 10% I_{ZM}, THEN INCREASING CURRENT TO 50% I_{ZM} AND NOTING VALUE OF BREAKDOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN A STILL AIR AMBIENT OF 25°C.
4. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM) AT 10% I_{ZT}, THEN INCREASING CURRENT TO 100% I_{ZT} AND NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST, THE DIODE SHALL BE MOUNTED AS SPECIFIED IN NOTE 3.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
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MIT APPROVAL 5 Oct 65

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815

SCALE — WT SHEET 3 OF 5

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1008815 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

DASH NUMBER	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT		MAXIMUM ZENER IMPEDANCE (SEE NOTE 2)		MAXIMUM REVERSE CURRENT			VOLTAGE REGULATION (SEE NOTE 3)		MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
		(I_{ZT}) MADC	(I_{ZK}) MADC	(Z_{ZT}) AT I_{ZT} OHMS	(Z_{ZK}) AT I_{ZK} OHMS	(I_R) AT 25°C UA DC	(I_R) AT 100°C UA DC	AT VOLTS DC	10% I_{ZM} TO 50% I_{ZM} (MA_{DC})	MAX ΔV_Z VDC			
-1	6.8±5%	18.5	1.0	4.5	700	150	300	5.2	5.8 -29	.25	1.5	6.2	.057
-2	7.5±5%	16.5	0.5	5.5	↓	75	150	5.7	5.3 -26.5	.30	↓	7.1	.061
-3	8.2±5%	15.0	0.5	6.5	↓	50	120	6.2	4.8 -24.0	.35	↓	7.6	.065
-4	9.1±5%	14.0	0.5	7.5	↓	25	75	6.9	4.4 -22.0	.40	↓	8.7	.068
-5	10 ±5%	12.5	0.25	8.5	↓	2	30	7.6	4.0 -20.0	.45	↓	9.0	.071
-6	11 ±5%	11.5	↓	9.5	↓	↓	↓	8.4	3.5 -17.5	.50	↓	10.0	.073
-7	12 ±5%	10.5	↓	11.5	↓	↓	↓	9.1	3.2 -16.0	.55	↓	10.5	.076
-8	13 ±5%	9.5	↓	13.0	↓	↓	↓	9.9	3.0 -15.0	.60	↓	11.5	.079
-9	15 ±5%	8.5	↓	16.0	↓	↓	↓	11.0	2.6 -13.0	.70	↓	13.0	.082
-10	16 ±5%	7.8	↓	17.0	700	↓	↓	12.0	2.5 -12.5	.75	↓	14.0	.083
-11	18 ±5%	7.0	↓	21	750	↓	↓	14.0	2.1 -10.5	.85	↓	16.0	.085
-12	20 ±5%	6.2	↓	25	750	↓	↓	15.0	1.9 - 9.5	.95	↓	18.0	.086
-13	22 ±5%	5.6	↓	29	750	↓	↓	17.0	1.7 - 8.5	1.05	↓	19.0	.087
-14	24 ±5%	5.2	↓	33	750	↓	↓	18.0	1.6 - 8.0	1.15	↓	21.0	.088
-15	27 ±5%	4.6	↓	41	750	↓	↓	21.0	1.4 - 7.0	1.30	↓	24.0	.090
-16	30 ±5%	4.2	↓	49	1000	↓	↓	23.0	1.3 - 6.5	1.45	↓	27.0	.091
-17	33 ±5%	3.8	↓	58	1000	↓	↓	25.0	1.2 - 6.0	1.60	↓	30.0	.092
-18	36 ±5%	3.4	↓	70	1000	↓	↓	27.0	1.1 - 5.5	1.75	↓	32.5	.093
-19	39 ±5%	3.2	↓	80	1000	↓	↓	30.0	.91- 4.55	1.90	↓	35.0	.094
-20	43 ±5%	3.0	↓	93	1500	↓	↓	33.0	.88- 4.4	2.10	↓	39.0	.095
-21	47 ±5%	2.7	↓	105	1500	↓	↓	36.0	.79- 3.95	2.25	↓	43.0	.095
-22	51 ±5%	2.5	↓	125	1500	↓	↓	39.0	.74- 3.70	2.50	↓	47.0	.096
-23	56 ±5%	2.2	↓	150	2000	↓	↓	43.0	.69- 3.45	2.70	↓	52.5	.096
-24	62 ±5%	2.0	↓	185	2000	↓	↓	47.0	.60- 3.0	2.90	↓	57.5	.097
-25	11.5±2%	10.5	↓	10.5	700	↓	↓	8.7	3.5 -17.5	.50	↓	10.25	.076
-26	24 ±2%	5.1	↓	33	750	↓	↓	18.0	1.6 - 8.0	1.15	↓	21.0	.088
-27	26 ±2%	4.7	0.25	41	750	2	30	20.0	1.4 - 7.0	1.30	1.5		
-28	27 ±2%	4.6	0.25	41	750	2	30	21.0	1.4 - 7.0	1.30	1.5	24.0	.090
-29	5.1 ±5%	20	0.25	14	1200	5	50	2.0	7.5 -37.5	.80	1.5	3.4	±.030

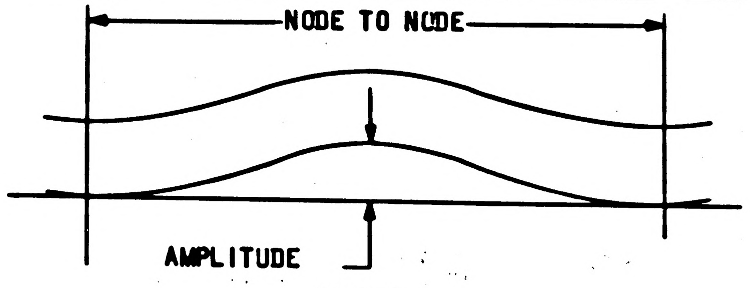

FIGURE A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008815
SCALE —— WT
SHEET 4 OF 5

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	THIS SHEET ADDED PER TDRR 24188	12/7/65	WK.

TABLE II (CONT'D)

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

~~NASA~~ DASH NO.	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT		MAXIMUM ZENER IMPEDANCE (SEE NOTE 2)		MAXIMUM REVERSE CURRENT			VOLTAGE REGULATION (SEE NOTE 3)		MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
		(I_{ZT}) MADC	(I_{ZK}) MADC	(Z_{ZT}) AT I_{ZT} OHMS	(Z_{ZK}) AT I_{ZK} OHMS	(I_R) AT 25°C UA DC	(I_R) AT 100°C UA DC	AT VOLTS DC	10% I_{ZM} TO 50% I_{ZM} (MADC)	MAX ΔV_Z VDC			
-30	68± 5%	1.8	0.25	230	2000	5	--	52	0.55-2.75	3.2	1.5	--	+0.097
-31	75 ↑	1.7	↑	270	2000	↑	--	56	0.51-2.55	3.4	↑	--	+0.098
-32	82	1.5		330	3000		--	62	0.46-2.30	3.8		--	+0.098
-33	91	1.4		400	3000		--	69	0.42-2.10	4.2		--	+0.099
-34	100	1.3		500	3000		--	76	0.37-1.85	4.4		--	+1.000
-35	110	1.1		750	4000		--	84	0.33-1.65	4.8		--	↑
-36	120	1.0		900	4500		--	91	0.31-1.55	5.2		--	
-37	130	0.95		1100	5000		--	99	0.27-1.35	5.6		--	
-38	150	0.85		1500	6000		--	114	0.24-1.20	7.0		--	
-39	160	0.80		1700	6500		--	122	0.22-1.10	7.5		--	
-40	180	0.68		2200	7100		--	137	0.20-1.00	9.0		--	↓
-41	200	0.65		2500	8000		--	152	0.18-0.90	12.0		--	+1.000
									10% I_{ZT} TO 100% I_{ZT} (MADC) (SEE NOTE 4)				
-42	3.3	20.0		24	--		30	1.0	2.0-20.0	1.0		1.5	-0.070
-43	3.6	↑		22	--		30	↑	↑	↑		1.8	-0.065
-44	3.9			20	--	↓	30	↓				2.0	-0.060
-45	4.3			18	--	5	50	1.0		↓		2.4	-0.055
-46	4.7			16	--	10	↑	2.0		1.0		2.8	-0.043
-47	5.1			14	--	↑		2.0		0.8		3.3	±0.030
-48	5.6 ↓	↓	↓	8	--	↓	↓	3.0	↓	0.8	↓	4.3	±0.028
-49	6.2±5%	20.0	0.25	3	--	10	50	4.0	2.0-20.0	0.6	1.5	5.2	+0.045

Ⓐ THIS SHEET ADDED

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LIST OF MATERIALS

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CHECKED	W. Simpson	6 Dec. 65
APPROVED	R. Bedingfield	7 Dec. 65
APPROVED		
APPROVED MIT		7 Dec. 65
APPROVED MSC	A. C. METZGER	
		DATE

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008815
SCALE —		SHEET 5 OF 5

B 1008815

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	RES WK

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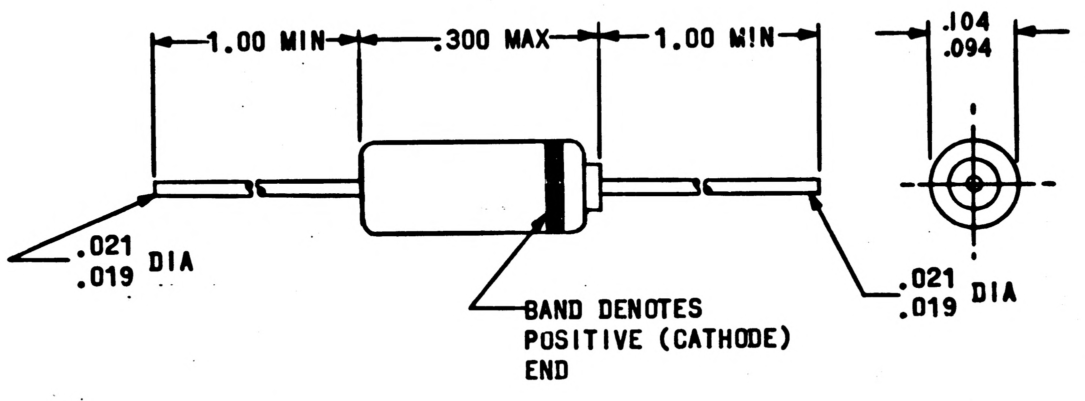
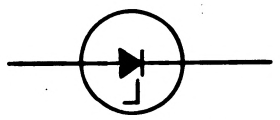
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
   - C. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: TO BE IN ACCORDANCE WITH ND 1002215, CLASS I CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA:
       - (a) ANODE: DUMET PER ND 1015401
       - (b) CATHODE: DUMET PER ND 1015401
       - (c) THE LEADS SHALL NOT CONTAIN KINKS AND BENDS WHOSE AMPLITUDES EXCEED 1/2 OF THE RADIUS OF THE LEAD OVER A NODE TO NODE DISTANCE OF 1/8 INCH OR LESS. THE LEADS SHALL FALL FREELY IN A TUBE WITH AN ID EQUAL TO 1-1/2 TIMES THE LEAD DIAMETER AND A MINIMUM TUBE LENGTH EQUAL TO THE LEAD LENGTH. SEE FIG. A.
       - (d) THE FINISH OF THE LEADS SHALL BE FREE OF FOREIGN MATERIAL IN THE AREA 1/16 INCH MAX FROM THE DEVICE BODY TO WITHIN 1/8 INCH OF THE LEAD END. FOREIGN MATERIAL SHALL MEAN ANY MATERIAL NOT COMMON TO THE LEAD FINISH WHICH WOULD REDUCE WELDABILITY AND SOLDERABILITY. THE END OF THE DEVICE BODY IS DEFINED AS THE END OF THE SLUG ON THE CATHODE END AND THE END OF THE GLASS BODY ON THE ANODE END.
       - (e) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, THE NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, AND DATE CODE SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. THE CATHODE END OF THE PART SHALL BE IDENTIFIED WITH A COLOR BAND. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL SPECIFICATION: PER TABLE II
     - (1) ZENER VOLTAGE (V_Z AT I_{ZT})
     - (2) ZENER IMPEDANCE (Z_{ZT})
     - (3) REVERSE CURRENT (I_R) AT 25°C




GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

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HEAT TREATMENT NONE
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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A	REVISED PER TDRR 24188	12/7/65	
B	REVISED PER TDRR 24271	12/21/65	

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - B. MAXIMUM RATINGS: PER TABLE I.
   - C. STORAGE TEMPERATURE: -65°C TO +175°C.
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3M SEC DURATION SUPERIMPOSED ON I_{ZT} (TABLE II).
   - E. THERMAL RESISTANCE (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR): .375°C/MW MAX.
   - F. POWER DISSIPATION: 400 MILLIWATTS MAX, DERATE 2.67 MW/°C ABOVE 25°C AMBIENT.
   - G. PARTS MUST BE CAPABLE OF MEETING A MINIMUM OF 100 MEGOHMS RESISTANCE FROM LEADS TO BODY.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) MONITORED VARIABLE FREQUENCY VIBRATION AT A CONSTANT PEAK ACCELERATION OF 20 G MINIMUM OVER 100-2,000 CPS PER MIL-STD-750, METHOD 2056 WITH FORCE APPLIED PERPENDICULAR TO THE MAIN AXIS. OR MONITORED SHOCK PER MIL-STD-750, METHOD 2021.1 WITH A MINIMUM OF 5 BLOWS IN A DIRECTION PERPENDICULAR TO THE MAJOR AXIS AT A MINIMUM OF 3KG PEAK ACCELERATION. MONITOR DURING TESTING FOR OPENS AND SHORTS USING A MINIMUM INTERMITTENCY CAPABILITY OF 5 μ SECONDS. ALSO MONITOR FOR SIGNIFICANT ELECTRICAL PARAMETER CHANGES.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.
     - (1) AMBIENT TEMPERATURE: 100°C ± 5°C.
     - (2) POWER DISSIPATION: 100 ± 10 MILLIWATTS (DIODE IN VOLTAGE BREAKDOWN CONDITION)
     - (3) MOUNTING: BY CLIPS 7/16 ± 3/32 INCH FROM DIODE BODY.
   - C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) ZENER VOLTAGE AT I_{ZT}.
     - (2) ZENER IMPEDANCE AT I_{ZT}.
     - (3) REVERSE LEAKAGE CURRENT AT 25°C.
   - D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
     - (1) PARAMETRIC CHANGE LIMITS:
       - (a) ZENER VOLTAGE: ±3% OF INITIAL VALUE.
       - (b) ZENER IMPEDANCE: ±15% OF INITIAL VALUE, OR 1 OHM, WHICHEVER IS GREATER.
       - (c) REVERSE LEAKAGE CURRENT: 5 X INITIAL VALUE OR 1μA WHICHEVER IS GREATER.
   - E. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.
   - F. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED FOR EACH SHIPMENT.

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APPROVAL R Bodingfield 10-4-65
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MIT APPROVAL 5 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008815
SCALE —
WT
SHEET 2 OF 5.

E.F.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008815 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	RTS WK

TABLE I

DASH NUMBER	MAXIMUM RATINGS AT AMBIENT TEMPERATURE 25°C			
	ZENER CURRENT (I_{ZM}) MA_{DC}	POWER DISSIPATION (P) MW	JUNCTION TEMPERATURE (T_J) °C	EIA TYPE DESIGNATION (FOR REF ONLY)
-1	58	400	175	1N957B
-2	53	↑	↑	1N958B
-3	48			1N959B
-4	44			1N960B
-5	40			1N961B
-6	35			1N962B
-7	32			1N963B
-8	30			1N964B
-9	26			1N965B
-10	25			1N966B
-11	21			1N967B
-12	19			1N968B
-13	17			1N969B
-14	16			1N970B
-15	14			1N971B
-16	13			1N972B
-17	12			1N973B
-18	11			1N974B
-19	9.1			1N975B
-20	8.8			1N976B
-21	7.9			1N977B
-22	7.4			1N978B
-23	6.9			1N979B
-24	6.0			1N980B
-25	26			.4M11.5Z2
-26	16	↓	↓	.4M24Z2
-27	15	400	175	.4M26Z2
-28	14	400	175	.4M27Z2
-29	75	400	175	1N751
-30	5.5	400	175	1N981B
-31	5.1	400	175	1N982B
-32	4.6	400	175	1N983B
-33	4.2	400	175	1N984B
-34	3.7	400	175	1N985B
-35	3.3	400	175	1N986B
-36	3.1	400	175	1N987B
-37	2.7	400	175	1N988B
-38	2.4	400	175	1N989B
-39	2.2	400	175	1N990B
-40	2.0	400	175	1N991B
-41	1.8	400	175	1N992B
-42	120	400	175	1N746A
-43	110	400	175	1N747A
-44	100	400	175	1N748A
-45	90	400	175	1N749A
-46	85	400	175	1N750A
-47	75	400	175	1N751A
-48	70	400	175	1N752A
-49	65	400	175	1N753A

NOTES:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL.
   $(Z_Z = \frac{E(AC)}{I(AC)})$
3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC (MINIMUM) AT 10% I_{ZM}, THEN INCREASING CURRENT TO 50% I_{ZM} AND NOTING VALUE OF BREAKDOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN AN AMBIENT OF 25°C.
4. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM) AT 10% I_{ZT}, THEN INCREASING CURRENT TO 100% I_{ZT} AND NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST, THE DIODE SHALL BE MOUNTED AS SPECIFIED IN NOTE 3.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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DWG. NO. Contract NAS 9-497
DRAWN L. Amy DATE 3 AUG 65
CHECKED Ed Foster 4 AUG 65
APPROVAL
APPROVAL R Bedingfield 10/4/65
NOT REQUIRED PER LETTER
NASA APPROVAL
NASA PP7 65-612
MIT APPROVAL 5 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008815
SCALE
WT
SHEET 3 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B 1008815

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

DASH NUMBER	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT (I_{ZT}) MADC	ZENER TEST CURRENT (I_{ZK}) MADC	MAXIMUM ZENER IMPEDANCE (SEE NOTE 2) (Z_{ZT}) AT I_{ZT} OHMS	MAXIMUM ZENER IMPEDANCE (SEE NOTE 2) (Z_{ZK}) AT I_{ZK} OHMS	MAXIMUM REVERSE CURRENT (I_R) AT 25°C UA DC	MAXIMUM REVERSE CURRENT (I_R) AT 100°C UA DC	MAXIMUM REVERSE CURRENT AT VOLTS DC	VOLTAGE REGULATION (SEE NOTE 3) 10% I_{ZM} TO 50% I_{ZM} (MADC)	VOLTAGE REGULATION (SEE NOTE 3) MAX ΔV_Z VDC	MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
-1	6.8±5%	18.5	1.0	4.5	700	150	300	5.2	5.8 -29	.25	1.5	6.2	.057
-2	7.5±5%	16.5	0.5	5.5		75	150	5.7	5.3 -26.5	.30		7.1	.061
-3	8.2±5%	15.0	0.5	6.5		50	120	6.2	4.8 -24.0	.35		7.6	.065
-4	9.1±5%	14.0	0.5	7.5		25	75	6.9	4.4 -22.0	.40		8.7	.068
-5	10 ±5%	12.5	0.25	8.5		2	30	7.6	4.0 -20.0	.45		9.0	.071
-6	11 ±5%	11.5		9.5				8.4	3.5 -17.5	.50		10.0	.073
-7	12 ±5%	10.5		11.5				9.1	3.2 -16.0	.55		10.5	.076
-8	13 ±5%	9.5		13.0				9.9	3.0 -15.0	.60		11.5	.079
-9	15 ±5%	8.5		16.0				11.0	2.6 -13.0	.70		13.0	.082
-10	16 ±5%	7.8		17.0	700			12.0	2.5 -12.5	.75		14.0	.083
-11	18 ±5%	7.0		21	750			14.0	2.1 -10.5	.85		16.0	.085
-12	20 ±5%	6.2		25	750			15.0	1.9 - 9.5	.95		18.0	.086
-13	22 ±5%	5.6		29	750			17.0	1.7 - 8.5	1.05		19.0	.087
-14	24 ±5%	5.2		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-15	27 ±5%	4.6		41	750			21.0	1.4 - 7.0	1.30		24.0	.090
-16	30 ±5%	4.2		49	1000			23.0	1.3 - 6.5	1.45		27.0	.091
-17	33 ±5%	3.8		58	1000			25.0	1.2 - 6.0	1.60		30.0	.092
-18	36 ±5%	3.4		70	1000			27.0	1.1 - 5.5	1.75		32.5	.093
-19	39 ±5%	3.2		80	1000			30.0	.91- 4.55	1.90		35.0	.094
-20	43 ±5%	3.0		93	1500			33.0	.88- 4.4	2.10		39.0	.095
-21	47 ±5%	2.7		105	1500			36.0	.79- 3.95	2.25		43.0	.095
-22	51 ±5%	2.5		125	1500			39.0	.74- 3.70	2.50		47.0	.096
-23	56 ±5%	2.2		150	2000			43.0	.69- 3.45	2.70		52.5	.096
-24	62 ±5%	2.0		185	2000			47.0	.60- 3.0	2.90		57.5	.097
-25	11.5±2%	10.5		10.5	700			8.7	3.5 -17.5	.50		10.25	.076
-26	24 ±2%	5.1		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-27	26 ±2%	4.7	0.25	41	750	2	30	20.0	1.4 - 7.0	1.30	1.5	23.0	.090
-28	27 ±2%	4.6	0.25	41	750	2	30	21.0	1.4 - 7.0	1.30	1.5	24.0	.090
-29	5.1 ±5%	20	0.25	14	1200	5	50	2.0	7.5 -37.5	.80	1.5	3.4	±.030

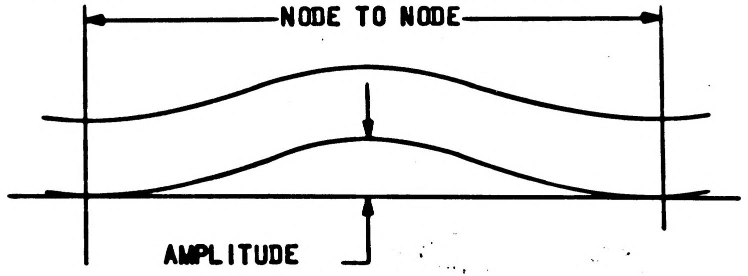

FIGURE A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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Contract NAS 9-497

DRAWN S. Amyx DATE 3 AUG 65
CHECKED Ed Foster 4 AUG 65
APPROVAL
APPROVAL C Bedingfield 10/4/65
NASA APPROVAL
NASA TT 7-65-612
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815

SCALE — WT SHEET 4 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
A	THIS SHEET ADDED PER TDRR 24188	12/7/65	WK.
B	REVISED PER TDRR 24271	12/21/65	RTS WK

TABLE II (CONT'D)

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

~~NASA~~ DASH NO.	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT		MAXIMUM ZENER IMPEDANCE (SEE NOTE 2)		MAXIMUM REVERSE CURRENT			VOLTAGE REGULATION (SEE NOTE 3)		MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
		(I_{ZT}) MADC	(I_{ZK}) MADC	(Z_{ZT}) AT I_{ZT} OHMS	(Z_{ZK}) AT I_{ZK} OHMS	(I_R) AT 25°C UA DC	(I_R) AT 100°C UA DC	AT VOLTS DC	10% I_{ZM} TO 50% I_{ZM} (MADC)	MAX Δ V_Z VDC			
-30	68± 5%	1.8	0.25	230	2000	5	--	52	0.55-2.75	3.2	1.5	--	+0.097
-31	75 ↑	1.7	↑	270	2000	↑	--	56	0.51-2.55	3.4	↑	--	+0.098
-32	82	1.5		330	3000		--	62	0.46-2.30	3.8		--	+0.098
-33	91	1.4		400	3000		--	69	0.42-2.10	4.2		--	+0.099
-34	100	1.3		500	3000		--	76	0.37-1.85	4.4		--	+1.000
-35	110	1.1		750	4000		--	84	0.33-1.65	4.8		--	↑
-36	120	1.0		900	4500		--	91	0.31-1.55	5.2		--	
-37	130	0.95		1100	5000		--	99	0.27-1.35	5.6		--	
-38	150	0.85		1500	6000		--	114	0.24-1.20	7.0		--	
-39	160	0.80		1700	6500		--	122	0.22-1.10	7.5		--	
-40	180	0.68		2200	7100		--	137	0.20-1.00	9.0		--	↓
-41	200	0.65		2500	8000		--	152	0.18-0.90	12.0		--	+1.000
									10% I_{ZT} TO 100% I_{ZT} (MADC) (SEE NOTE 4)				
-42	3.3	20.0		24	--		30	1.0	2.0-20.0	1.0		1.5	-0.070
-43	3.6	↑		22	--		30	↑	↑	↑		1.8	-0.065
-44	3.9			20	--	↓	30	↓				2.0	-0.060
-45	4.3			18	--	5	50	1.0		↓		2.4	-0.055
-46	4.7			16	--	10	↑	2.0		1.0		2.8	-0.043
-47	5.1			14	--	↑		2.0		0.8		3.3	±0.030
-48	5.6 ↓	↓	↓	8	--	↓	↓	3.0	↓	0.8	↓	4.3	±0.028
-49	6.2±5%	20.0	0.25	3	--	10	50	4.0	2.0-20.0	0.6	1.5	5.2	+0.045

Ⓐ THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

		DATE
DRAWN	Louis A Lowe	23 Nov, 65
CHECKED	W. Simpson	6 Dec, 65
APPROVED	C Bedingfield	7 Dec 65
APPROVED		
APPROVED MIT	W Kupfer	7 Dec 65
APPROVED MSC	A. C. METZGER	

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008815

SCALE —

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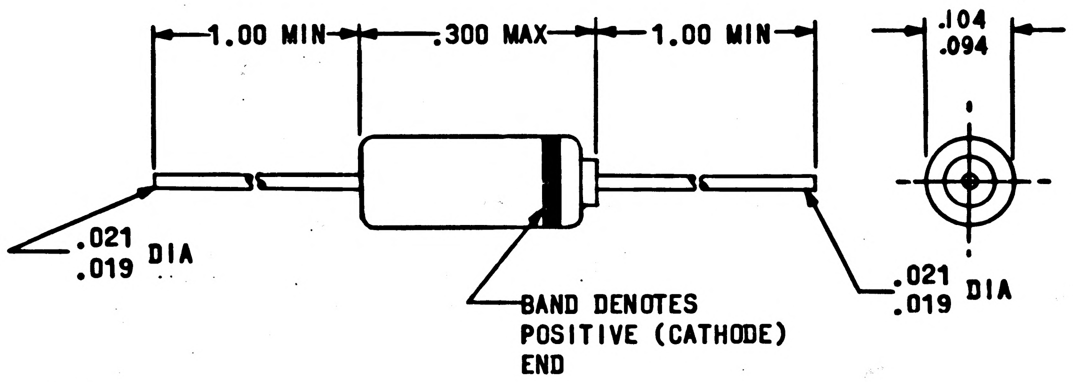
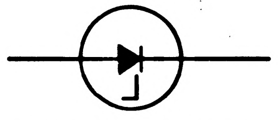
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/2/65	WK
C	REVISED PER TDRR 24936	4/ /66	WK

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
   - C. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: TO BE IN ACCORDANCE WITH ND 1002215, CLASS I CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA:
       - (a) ANODE: DUMET PER ND 1015401
       - (b) CATHODE: DUMET PER ND 1015401
       - (c) THE LEADS SHALL NOT CONTAIN KINKS AND BENDS WHOSE AMPLITUDES EXCEED 1/2 OF THE RADIUS OF THE LEAD OVER A NODE TO NODE DISTANCE OF 1/8 INCH OR LESS. THE LEADS SHALL FALL FREELY IN A TUBE WITH AN ID EQUAL TO 1-1/2 TIMES THE LEAD DIAMETER AND A MINIMUM TUBE LENGTH EQUAL TO THE LEAD LENGTH. SEE FIG. A.
       - (d) THE FINISH OF THE LEADS SHALL BE FREE OF FOREIGN MATERIAL IN THE AREA 1/16 INCH MAX FROM THE DEVICE BODY TO WITHIN 1/8 INCH OF THE LEAD END. FOREIGN MATERIAL SHALL MEAN ANY MATERIAL NOT COMMON TO THE LEAD FINISH WHICH WOULD REDUCE WELDABILITY AND SOLDERABILITY. THE END OF THE DEVICE BODY IS DEFINED AS THE END OF THE SLUG ON THE CATHODE END AND THE END OF THE GLASS BODY ON THE ANODE END.
       - (e) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, THE NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, DATE CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. THE CATHODE END OF THE PART SHALL BE IDENTIFIED WITH A COLOR BAND. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL SPECIFICATION: PER TABLE II
     - (1) ZENER VOLTAGE (V_Z AT I_{ZT})
     - (2) ZENER IMPEDANCE (Z_{ZT})
     - (3) REVERSE CURRENT (IR) AT 25°C





GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL: SEE REQUIREMENTS
HEAT TREATMENT: NONE
FINAL FINISH: SEE REQUIREMENTS

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DWG. NO. Contract NAS 9-497

DRAWN S. Amyx DATE 3 AUG 65
CHECKED Ed Foster 4 Aug 65
APPROVAL
APPROVAL E Bolingfield 10-4-65
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 SIZE C NASA DRAWING NO. 1008815
SCALE NONE WT SHEET 1 OF 5

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B	REVISED PER TDRR 24271	12/21/65	wk
C	REVISED PER TDRR 24936	4/[illegible]	wk

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - B. MAXIMUM RATINGS: PER TABLE I.
   - C. STORAGE TEMPERATURE: -65°C TO +175°C.
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3M SEC DURATION SUPERIMPOSED ON I_{ZT} (TABLE II).
   - E. THERMAL RESISTANCE (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR): .375°C/MW MAX.
   - F. POWER DISSIPATION: 400 MILLIWATTS MAX, DERATE 2.67 MW/°C ABOVE 25°C AMBIENT.
   - G. PARTS MUST BE CAPABLE OF MEETING A MINIMUM OF 100 MEGOHMS RESISTANCE FROM LEADS TO BODY.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) MONITORED VARIABLE FREQUENCY VIBRATION AT A CONSTANT PEAK ACCELERATION OF 20 G MINIMUM OVER 100-2,000 CPS PER MIL-STD-750, METHOD 2056 WITH FORCE APPLIED PERPENDICULAR TO THE MAIN AXIS. OR MONITORED SHOCK PER MIL-STD-750, METHOD 2021.1 WITH A MINIMUM OF 5 BLOWS IN A DIRECTION PERPENDICULAR TO THE MAJOR AXIS AT A MINIMUM OF 3KG PEAK ACCELERATION. MONITOR DURING TESTING FOR OPENS AND SHORTS USING A MINIMUM INTERMITTENCY CAPABILITY OF 5 µ SECONDS. ALSO MONITOR FOR SIGNIFICANT ELECTRICAL PARAMETER CHANGES.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.
     - (1) AMBIENT TEMPERATURE: 100°C ± 5°C.
     - (2) POWER DISSIPATION: 100 ± 10 MILLIWATTS (DIODE IN VOLTAGE BREAKDOWN CONDITION)
     - (3) MOUNTING: BY CLIPS 7/16 ± 3/32 INCH FROM DIODE BODY.
   - C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) ZENER VOLTAGE AT I_{ZT}.
     - (2) ZENER IMPEDANCE AT I_{ZT}.
     - (3) REVERSE LEAKAGE CURRENT AT 25°C.
   - D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
     - (1) PARAMETRIC CHANGE LIMITS:
       - (a) ZENER VOLTAGE: ±3% OF INITIAL VALUE.
       - (b) ZENER IMPEDANCE: ±15% OF INITIAL VALUE, OR 1 OHM, WHICHEVER IS GREATER.
       - (c) REVERSE LEAKAGE CURRENT: 5 X INITIAL VALUE OR 1µA WHICHEVER IS GREATER.
   - E. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.
   - F. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED FOR EACH SHIPMENT.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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DRAWN S. Amyx DATE 3 AUG 65
CHECKED Ed Foster 4 AUG 65
APPROVAL
APPROVAL R Bodenfield 10-4-65
NASA APPROVAL NOT REQUIRED PER LETTER NASA PP7-65-612
MIT APPROVAL W[illegible] 5 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE (VOLTAGE REGULATOR, SILICON, AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815

SCALE — WT SHEET 2 OF 5

E. F.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	RTS WK
C	REVISED PER TDRR 24936	4 Jan 66	WK

TABLE I

DASH NUMBER	MAXIMUM RATINGS AT AMBIENT TEMPERATURE 25°C			
	ZENER CURRENT (I_{ZM}) MA_{DC}	POWER DISSIPATION (P) MW	JUNCTION TEMPERATURE (T_J) °C	EIA TYPE DESIGNATION (FOR REF ONLY)
-1	58	400	175	1N957B
-2	53			1N958B
-3	48			1N959B
-4	44			1N960B
-5	40			1N961B
-6	35			1N962B
-7	32			1N963B
-8	30			1N964B
-9	26			1N965B
-10	25			1N966B
-11	21			1N967B
-12	19			1N968B
-13	17			1N969B
-14	16			1N970B
-15	14			1N971B
-16	13			1N972B
-17	12			1N973B
-18	11			1N974B
-19	9.1			1N975B
-20	8.8			1N976B
-21	7.9			1N977B
-22	7.4			1N978B
-23	6.9			1N979B
-24	6.0			1N980B
-25	26			.4M11.5Z2
-26	16			.4M24Z2
-27	15	400	175	.4M26Z2
-28	14	400	175	.4M27Z2
-29	75	400	175	1N751
-30	5.5	400	175	1N981B
-31	5.1	400	175	1N982B
-32	4.6	400	175	1N983B
-33	4.2	400	175	1N984B
-34	3.7	400	175	1N985B
-35	3.3	400	175	1N986B
-36	3.1	400	175	1N987B
-37	2.7	400	175	1N988B
-38	2.4	400	175	1N989B
-39	2.2	400	175	1N990B
-40	2.0	400	175	1N991B
-41	1.8	400	175	1N992B
-42	120	400	175	1N746A
-43	110	400	175	1N747A
-44	100	400	175	1N748A
-45	90	400	175	1N749A
-46	85	400	175	1N750A
-47	75	400	175	1N751A
-48	70	400	175	1N752A
-49	65	400	175	1N753A

NOTES:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL.

   $(Z_Z = \frac{E(AC)}{I(AC)})$
3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC (MINIMUM) AT 10% I_{ZM}, THEN INCREASING CURRENT TO 50% I_{ZM} AND NOTING VALUE OF BREAKDOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN AN AMBIENT OF 25°C.
4. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM) AT 10% I_{ZT}, THEN INCREASING CURRENT TO 100% I_{ZT} AND NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST, THE DIODE SHALL BE MOUNTED AS SPECIFIED IN NOTE 3.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

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DIMENSIONS ARE IN INCHES
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MIT APPROVAL 5 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008815
SCALE —
WT
SHEET 3 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	RTT WK
C	REVISED PER TDRR 24936	4 Jan 66	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

DASH NUMBER	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT		MAXIMUM ZENER IMPEDANCE (SEE NOTE 2)		MAXIMUM REVERSE CURRENT			VOLTAGE REGULATION (SEE NOTE 3)		MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
		(I_{ZT}) MADC	(I_{ZK}) MADC	(Z_{ZT}) AT I_{ZT} OHMS	(Z_{ZK}) AT I_{ZK} OHMS	(I_R) AT 25°C UA DC	(I_R) AT 100°C UA DC	AT VOLTS DC	10% I_{ZM} TO 50% I_{ZM} (MADC)	MAX ΔV_Z VDC			
-1	6.8±5%	18.5	1.0	4.5	700	150	300	5.2	5.8 -29	.25	1.5	6.2	.057
-2	7.5±5%	16.5	0.5	5.5		75	150	5.7	5.3 -26.5	.30		7.1	.061
-3	8.2±5%	15.0	0.5	6.5		50	120	6.2	4.8 -24.0	.35		7.6	.065
-4	9.1±5%	14.0	0.5	7.5		25	75	6.9	4.4 -22.0	.40		8.7	.068
-5	10 ±5%	12.5	0.25	8.5		2	30	7.6	4.0 -20.0	.45		9.0	.071
-6	11 ±5%	11.5		9.5				8.4	3.5 -17.5	.50		10.0	.073
-7	12 ±5%	10.5		11.5				9.1	3.2 -16.0	.55		10.5	.076
-8	13 ±5%	9.5		13.0				9.9	3.0 -15.0	.60		11.5	.079
-9	15 ±5%	8.5		16.0				11.0	2.6 -13.0	.70		13.0	.082
-10	16 ±5%	7.8		17.0	700			12.0	2.5 -12.5	.75		14.0	.083
-11	18 ±5%	7.0		21	750			14.0	2.1 -10.5	.85		16.0	.085
-12	20 ±5%	6.2		25	750			15.0	1.9 - 9.5	.95		18.0	.086
-13	22 ±5%	5.6		29	750			17.0	1.7 - 8.5	1.05		19.0	.087
-14	24 ±5%	5.2		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-15	27 ±5%	4.6		41	750			21.0	1.4 - 7.0	1.30		24.0	.090
-16	30 ±5%	4.2		49	1000			23.0	1.3 - 6.5	1.45		27.0	.091
-17	33 ±5%	3.8		58	1000			25.0	1.2 - 6.0	1.60		30.0	.092
-18	36 ±5%	3.4		70	1000			27.0	1.1 - 5.5	1.75		32.5	.093
-19	39 ±5%	3.2		80	1000			30.0	.91- 4.55	1.90		35.0	.094
-20	43 ±5%	3.0		93	1500			33.0	.88- 4.4	2.10		39.0	.095
-21	47 ±5%	2.7		105	1500			36.0	.79- 3.95	2.25		43.0	.095
-22	51 ±5%	2.5		125	1500			39.0	.74- 3.70	2.50		47.0	.096
-23	56 ±5%	2.2		150	2000			43.0	.69- 3.45	2.70		52.5	.096
-24	62 ±5%	2.0		185	2000			47.0	.60- 3.0	2.90		57.5	.097
-25	11.5±2%	10.5		10.5	700			8.7	3.5 -17.5	.50		10.25	.076
-26	24 ±2%	5.1		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-27	26 ±2%	4.7	0.25	41	750	2	30	20.0	1.4 - 7.0	1.30	1.5	23.0	.090
-28	27 ±2%	4.6	0.25	41	750	2	30	21.0	1.4 - 7.0	1.30	1.5	24.0	.090
-29	5.1 ±5%	20	0.25	14	1200	5	50	2.0	7.5 -37.5	.80	1.5	3.4	±.030

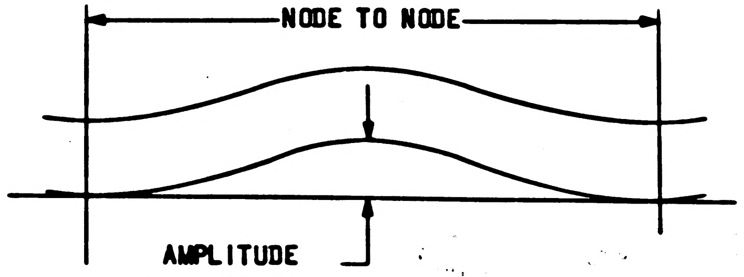

FIGURE A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
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MIT APPROVAL

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008815
SCALE ——
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SHEET 4 OF 5

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
Ⓜ A	THIS SHEET ADDED PER TDRR 24188	12/7/65	WK.
B	REVISED PER TDRR 24271	12/21/65	RTS WK
C	REVISED PER TDRR 24936	4 Jan 66	WK

TABLE II (CONT'D)

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

~~NASA~~ DASH NO.	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT		MAXIMUM ZENER IMPEDANCE (SEE NOTE 2)		MAXIMUM REVERSE CURRENT			VOLTAGE REGULATION (SEE NOTE 3)		MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
		(I_{ZT}) MADC	(I_{ZK}) MADC	(Z_{ZT}) AT I_{ZT} OHMS	(Z_{ZK}) AT I_{ZK} OHMS	(I_R) AT 25°C UA DC	(I_R) AT 100°C UA DC	AT VOLTS DC	10% I_{ZM} TO 50% I_{ZM} (MADC)	MAX ΔV_Z VDC			
-30	68± 5%	1.8	0.25	230	2000	5	--	52	0.55-2.75	3.2	1.5	--	+0.097
-31	75	1.7	↕	270	2000	↕	--	56	0.51-2.55	3.4	↕	--	+0.098
-32	82	1.5	↕	330	3000	↕	--	62	0.46-2.30	3.8	↕	--	+0.098
-33	91	1.4	↕	400	3000	↕	--	69	0.42-2.10	4.2	↕	--	+0.099
-34	100	1.3	↕	500	3000	↕	--	76	0.37-1.85	4.4	↕	--	+1.000
-35	110	1.1	↕	750	4000	↕	--	84	0.33-1.65	4.8	↕	--	↕
-36	120	1.0	↕	900	4500	↕	--	91	0.31-1.55	5.2	↕	--	↕
-37	130	0.95	↕	1100	5000	↕	--	99	0.27-1.35	5.6	↕	--	↕
-38	150	0.85	↕	1500	6000	↕	--	114	0.24-1.20	7.0	↕	--	↕
-39	160	0.80	↕	1700	6500	↕	--	122	0.22-1.10	7.5	↕	--	↕
-40	180	0.68	↕	2200	7100	↕	--	137	0.20-1.00	9.0	↕	--	↕
-41	200	0.65	↕	2500	8000	↕	--	152	0.18-0.90	12.0	↕	--	+1.000
	↕		↕			↕			10% I_{ZT} TO 100% I_{ZT} (MADC) (SEE NOTE 4)		↕		
-42	3.3	20.0	↕	24	--	↕	30	1.0	2.0-20.0	1.0	↕	1.5	-0.070
-43	3.6	↕	↕	22	--	↕	30	↕	↕	↕	↕	1.8	-0.065
-44	3.9	↕	↕	20	--	↕	30	↕	↕	↕	↕	2.0	-0.060
-45	4.3	↕	↕	18	--	5	50	1.0	↕	↕	↕	2.4	-0.055
-46	4.7	↕	↕	16	--	10	↕	2.0	↕	1.0	↕	2.8	-0.043
-47	5.1	↕	↕	14	--	↕	↕	2.0	↕	0.8	↕	3.3	±0.030
-48	5.6	↕	↕	8	--	↕	↕	3.0	↕	0.8	↕	4.3	±0.028
-49	6.2±5%	20.0	0.25	3	--	10	50	4.0	2.0-20.0	0.6	1.5	5.2	+0.045

Ⓐ THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Louis A'Lowe 23 Nov 65
CHECKED W. Simpson 6 Dec 65
APPROVED P. Bedingfield 7 Dec 65
APPROVED
APPROVED MIT 7 Dec 65
APPROVED MSC A. C. METZGER
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008815
SCALE —/—		SHEET 5 OF 5

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D	1008815

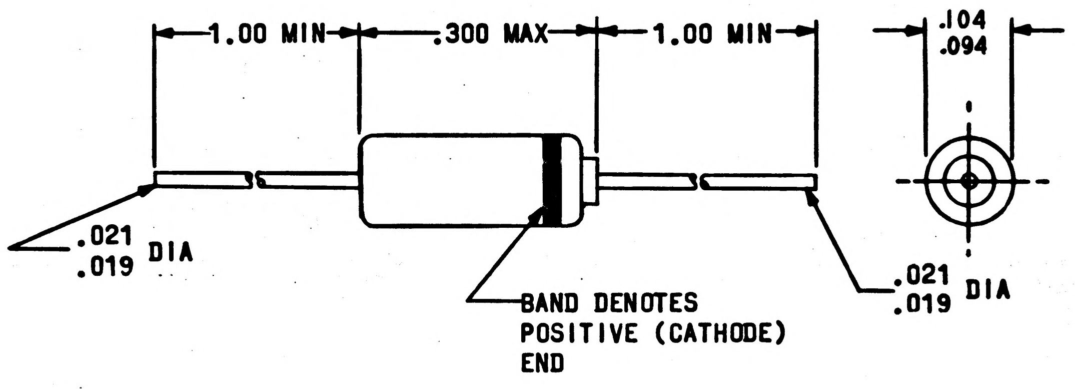
REVISIONS

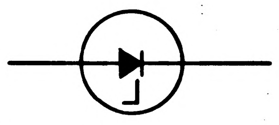
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	RES WK
C	REVISED PER TDRR 24936	[illegible]	WK.
D	REVISED RER TDRR 28327	8/3/66	WK.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
   - C. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: TO BE IN ACCORDANCE WITH ND 1002215, CLASS I CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA:
       - (a) ANODE: DUMET PER ND 1015401
       - (b) CATHODE: DUMET PER ND 1015401
       - (c) THE LEADS SHALL NOT CONTAIN KINKS AND BENDS WHOSE AMPLITUDES EXCEED 1/2 OF THE RADIUS OF THE LEAD OVER A NODE TO NODE DISTANCE OF 1/8 INCH OR LESS. THE LEADS SHALL FALL FREELY IN A TUBE WITH AN ID EQUAL TO 1-1/2 TIMES THE LEAD DIAMETER AND A MINIMUM TUBE LENGTH EQUAL TO THE LEAD LENGTH. SEE FIG. A.
       - (d) THE FINISH OF THE LEADS SHALL BE FREE OF FOREIGN MATERIAL IN THE AREA 1/16 INCH MAX FROM THE DEVICE BODY TO WITHIN 1/8 INCH OF THE LEAD END. FOREIGN MATERIAL SHALL MEAN ANY MATERIAL NOT COMMON TO THE LEAD FINISH WHICH WOULD REDUCE WELDABILITY AND SOLDERABILITY. THE END OF THE DEVICE BODY IS DEFINED AS THE END OF THE SLUG ON THE CATHODE END AND THE END OF THE GLASS BODY ON THE ANODE END.
       - (e) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, THE NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, DATE CODE: AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. THE CATHODE END OF THE PART SHALL BE IDENTIFIED WITH A COLOR BAND. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL SPECIFICATION: PER TABLE II
     - (1) ZENER VOLTAGE (V_Z AT I_{ZT})
     - (2) ZENER IMPEDANCE (Z_{ZT})
     - (3) REVERSE CURRENT (IR) AT 25°C





GRAPHICAL SYMBOL

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PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815

SCALE NONE | WT | SHEET 1 OF 5

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1008815 D

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	wK
B	REVISED PER TDRR 24271	12/21/65	wK
C	REVISED PER TDRR 24936	4/6/66	wK
D	REVISED PER TDRR 28327	5/3/66	wK

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - B. MAXIMUM RATINGS: PER TABLE I.
   - C. STORAGE TEMPERATURE: -65°C TO +175°C.
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3M SEC DURATION SUPERIMPOSED ON I_{ZT} (TABLE II).
   - E. THERMAL RESISTANCE (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR): .375°C/MW MAX.
   - F. POWER DISSIPATION: 400 MILLIWATTS MAX, DERATE 2.67 MW/°C ABOVE 25°C AMBIENT.
   - G. PARTS MUST BE CAPABLE OF MEETING A MINIMUM OF 100 MEGOHMS RESISTANCE FROM LEADS TO BODY.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) MONITORED VARIABLE FREQUENCY VIBRATION AT A CONSTANT PEAK ACCELERATION OF 20 G MINIMUM OVER 100-2,000 CPS PER MIL-STD-750, METHOD 2056 WITH FORCE APPLIED PERPENDICULAR TO THE MAIN AXIS. OR MONITORED SHOCK PER MIL-STD-750, METHOD 2021.1 WITH A MINIMUM OF 5 BLOWS IN A DIRECTION PERPENDICULAR TO THE MAJOR AXIS AT A MINIMUM OF 3KG PEAK ACCELERATION. MONITOR DURING TESTING FOR OPENS AND SHORTS USING A MINIMUM INTERMITTENCY CAPABILITY OF 5 μ SECONDS. ALSO MONITOR FOR SIGNIFICANT ELECTRICAL PARAMETER CHANGES.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.
     - (1) AMBIENT TEMPERATURE: 100°C ± 5°C.
     - (2) POWER DISSIPATION: 100 ± 10 MILLIWATTS (DIODE IN VOLTAGE BREAKDOWN CONDITION)
     - (3) MOUNTING: BY CLIPS 7/16 ± 3/32 INCH FROM DIODE BODY.
   - C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) ZENER VOLTAGE AT I_{ZT}.
     - (2) ZENER IMPEDANCE AT I_{ZT}.
     - (3) REVERSE LEAKAGE CURRENT AT 25°C.
   - D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
     - (1) PARAMETRIC CHANGE LIMITS:
       - (a) ZENER VOLTAGE: ±3% OF INITIAL VALUE.
       - (b) ZENER IMPEDANCE: ±15% OF INITIAL VALUE, OR 1 OHM, WHICHEVER IS GREATER.
       - (c) REVERSE LEAKAGE CURRENT: 5 X INITIAL VALUE OR 1μA WHICHEVER IS GREATER.
   - E. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.
   - F. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED FOR EACH SHIPMENT.

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008815
SCALE —
WT
SHEET 2 OF 5.

E.F.

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	WK
C	REVISED PER TDRR 24936	4/[illegible]/66	WK
D	REVISED PER TDRR 28327	8/3/66	WK

TABLE I

DASH NUMBER	MAXIMUM RATINGS AT AMBIENT TEMPERATURE 25°C			
	ZENER CURRENT (I_{ZM}) MA_{DC}	POWER DISSIPATION (P) MW	JUNCTION TEMPERATURE (T_J) °C	EIA TYPE DESIGNATION (FOR REF ONLY)
-1	58	400	175	1N957B
-2	53			1N958B
-3	48			1N959B
-4	44			1N960B
-5	40			1N961B
-6	35			1N962B
-7	32			1N963B
-8	30			1N964B
-9	26			1N965B
-10	25			1N966B
-11	21			1N967B
-12	19			1N968B
-13	17			1N969B
-14	16			1N970B
-15	14			1N971B
-16	13			1N972B
-17	12			1N973B
-18	11			1N974B
-19	9.1			1N975B
-20	8.8			1N976B
-21	7.9			1N977B
-22	7.4			1N978B
-23	6.9			1N979B
-24	6.0			1N980B
-25	26			.4M11.5Z2
-26	16			.4M24Z2
-27	15	400	175	.4M26Z2
-28	14	400	175	.4M27Z2
-29	75	400	175	1N751
-30	5.5	400	175	1N981B
-31	5.1	400	175	1N982B
-32	4.6	400	175	1N983B
-33	4.2	400	175	1N984B
-34	3.7	400	175	1N985B
-35	3.3	400	175	1N986B
-36	3.1	400	175	1N987B
-37	2.7	400	175	1N988B
-38	2.4	400	175	1N989B
-39	2.2	400	175	1N990B
-40	2.0	400	175	1N991B
-41	1.8	400	175	1N992B
-42	120	400	175	1N746A
-43	110	400	175	1N747A
-44	100	400	175	1N748A
-45	90	400	175	1N749A
-46	85	400	175	1N750A
-47	75	400	175	1N751A
-48	70	400	175	1N752A
-49	65	400	175	1N753A
-50	14	400	175	.4M27Z2

NOTES:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL.
   $(Z_Z = \frac{E(AC)}{I(AC)})$
3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC (MINIMUM) AT 10% I_{ZM}, THEN INCREASING CURRENT TO 50% I_{ZM} AND NOTING VALUE OF BREAKDOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN AN AMBIENT OF 25°C.
4. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM) AT 10% I_{ZT}, THEN INCREASING CURRENT TO 100% I_{ZT} AND NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC. (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST, THE DIODE SHALL BE MOUNTED AS SPECIFIED IN NOTE 3.

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LIST OF MATERIALS			

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APPROVAL C Bodengfield 10/4/65
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NASA APPROVAL NASA FP7-59-612
MIT APPROVAL [illegible] 5 Oct 65

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815

SCALE —— WT SHEET 3 OF 5

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SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	
A	REVISED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/21/65	RT WK
C	REVISED PER TDRR 24936	4 Jan 66	WK
D	REVISED RER TDRR 28327	8/3/66	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

DASH NUMBER	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT		MAXIMUM ZENER IMPEDANCE (SEE NOTE 2)		MAXIMUM REVERSE CURRENT			VOLTAGE REGULATION (SEE NOTE 3)		MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
		(I_{ZT}) MADC	(I_{ZK}) MADC	(Z_{ZT}) AT I_{ZT} OHMS	(Z_{ZK}) AT I_{ZK} OHMS	(I_R) AT 25°C UA DC	(I_R) AT 100°C UA DC	AT VOLTS DC	10% I_{ZM} TO 50% I_{ZM} (MADC)	MAX ΔV_Z VDC			
-1	6.8±5%	18.5	1.0	4.5	700	150	300	5.2	5.8 -29	.25	1.5	6.2	.057
-2	7.5±5%	16.5	0.5	5.5		75	150	5.7	5.3 -26.5	.30		7.1	.061
-3	8.2±5%	15.0	0.5	6.5		50	120	6.2	4.8 -24.0	.35		7.6	.065
-4	9.1±5%	14.0	0.5	7.5		25	75	6.9	4.4 -22.0	.40		8.7	.068
-5	10 ±5%	12.5	0.25	8.5		2	30	7.6	4.0 -20.0	.45		9.0	.071
-6	11 ±5%	11.5		9.5				8.4	3.5 -17.5	.50		10.0	.073
-7	12 ±5%	10.5		11.5				9.1	3.2 -16.0	.55		10.5	.076
-8	13 ±5%	9.5		13.0				9.9	3.0 -15.0	.60		11.5	.079
-9	15 ±5%	8.5		16.0				11.0	2.6 -13.0	.70		13.0	.082
-10	16 ±5%	7.8		17.0	700			12.0	2.5 -12.5	.75		14.0	.083
-11	18 ±5%	7.0		21	750			14.0	2.1 -10.5	.85		16.0	.085
-12	20 ±5%	6.2		25	750			15.0	1.9 - 9.5	.95		18.0	.086
-13	22 ±5%	5.6		29	750			17.0	1.7 - 8.5	1.05		19.0	.087
-14	24 ±5%	5.2		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-15	27 ±5%	4.6		41	750			21.0	1.4 - 7.0	1.30		24.0	.090
-16	30 ±5%	4.2		49	1000			23.0	1.3 - 6.5	1.45		27.0	.091
-17	33 ±5%	3.8		58	1000			25.0	1.2 - 6.0	1.60		30.0	.092
-18	36 ±5%	3.4		70	1000			27.0	1.1 - 5.5	1.75		32.5	.093
-19	39 ±5%	3.2		80	1000			30.0	.91- 4.55	1.90		35.0	.094
-20	43 ±5%	3.0		93	1500			33.0	.88- 4.4	2.10		39.0	.095
-21	47 ±5%	2.7		105	1500			36.0	.79- 3.95	2.25		43.0	.095
-22	51 ±5%	2.5		125	1500			39.0	.74- 3.70	2.50		47.0	.096
-23	56 ±5%	2.2		150	2000			43.0	.69- 3.45	2.70		52.5	.096
-24	62 ±5%	2.0		185	2000			47.0	.60- 3.0	2.90		57.5	.097
-25	11.5±2%	10.5		10.5	700			8.7	3.5 -17.5	.50		10.25	.076
-26	24 ±2%	5.1		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-27	26 ±2%	4.7	0.25	41	750	2	30	20.0	1.4 - 7.0	1.30	1.5	23.0	.090
-28	27 ±2%	4.6	0.25	41	750	2	30	21.0	1.4 - 7.0	1.30	1.5	24.0	.090
-29	5.1 ±5%	20	0.25	14	1200	5	50	2.0	7.5 -37.5	.80	1.5	3.4	±.030

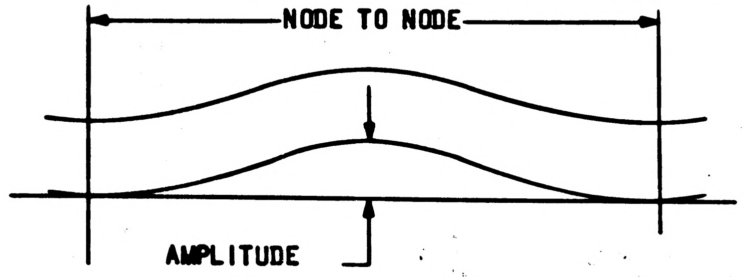

FIGURE A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

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SCALE — WT SHEET 4 OF 5

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SYM	DESCRIPTION	DATE	APPROVED
Ⓜ A	THIS SHEET ADDED PER TDRR 24188	12/7/65	WK
B	REVISED PER TDRR 24271	12/24/65	WK
C	REVISED PER TDRR 24936	4 Jan 66	WK
D	REVISED PER TDRR 28327	5/3/66	WK

TABLE II (CONT'D)

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

~~NASA~~ DASH NO.	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT		MAXIMUM ZENER IMPEDANCE (SEE NOTE 2)		MAXIMUM REVERSE CURRENT			VOLTAGE REGULATION (SEE NOTE 3)		MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
		(I_{ZT}) MADC	(I_{ZK}) MADC	(Z_{ZT}) AT I_{ZT} OHMS	(Z_{ZK}) AT I_{ZK} OHMS	(I_R) AT 25°C UA DC	(I_R) AT 100°C UA DC	AT VOLTS DC	10% I_{ZM} TO 50% I_{ZM} (MADC)	MAX Δ V_Z VDC			
-30	68± 5%	1.8	0.25	230	2000	5	--	52	0.55-2.75	3.2	1.5	--	+0.097
-31	75 ↕	1.7	↕	270	2000	↕	--	56	0.51-2.55	3.4	↕	--	+0.098
-32	82 ↕	1.5	↕	330	3000	↕	--	62	0.46-2.30	3.8	↕	--	+0.098
-33	91 ↕	1.4	↕	400	3000	↕	--	69	0.42-2.10	4.2	↕	--	+0.099
-34	100 ↕	1.3	↕	500	3000	↕	--	76	0.37-1.85	4.4	↕	--	+1.000
-35	110 ↕	1.1	↕	750	4000	↕	--	84	0.33-1.65	4.8	↕	--	↕
-36	120 ↕	1.0	↕	900	4500	↕	--	91	0.31-1.55	5.2	↕	--	↕
-37	130 ↕	0.95	↕	1100	5000	↕	--	99	0.27-1.35	5.6	↕	--	↕
-38	150 ↕	0.85	↕	1500	6000	↕	--	114	0.24-1.20	7.0	↕	--	↕
-39	160 ↕	0.80	↕	1700	6500	↕	--	122	0.22-1.10	7.5	↕	--	↕
-40	180 ↕	0.68	↕	2200	7100	↕	--	137	0.20-1.00	9.0	↕	--	↕
-41	200 ↕	0.65	↕	2500	8000	↕	--	152	0.18-0.90	12.0	↕	--	+1.000
	↕		↕			↕			10% I_{ZT} TO 100% I_{ZT} (MADC) (SEE NOTE 4)		↕		
-42	3.3 ↕	20.0	↕	24	--	↕	30	1.0	2.0-20.0	1.0	↕	1.5	-0.070
-43	3.6 ↕	↕	↕	22	--	↕	30	↕	↕	↕	↕	1.8	-0.065
-44	3.9 ↕	↕	↕	20	--	↕	30	↕	↕	↕	↕	2.0	-0.060
-45	4.3 ↕	↕	↕	18	--	5	50	1.0	↕	↕	↕	2.4	-0.055
-46	4.7 ↕	↕	↕	16	--	10	↕	2.0	↕	1.0	↕	2.8	-0.043
-47	5.1 ↕	↕	↕	14	--	↕	↕	2.0	↕	0.8	↕	3.3	±0.030
-48	5.6 ↕	↕	↕	8	--	↕	↕	3.0	↕	0.8	↕	4.3	±0.028
-49	6.2±5%	20.0	0.25	3	--	10	50	4.0	2.0-20.0	0.6	1.5	5.2	+0.045
-50	27±2%	0.30	- -	150	--	2	30	21.0	1.4-7.0	1.30	1.5	--	.090

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DRAWN	Louis A'Lowe	23 Nov, 65
CHECKED	W. Simpson	6 Dec, 65
APPROVED	R. Bedingfield	7 Dec 65
APPROVED		
APPROVED MIT		7 Dec 65
APPROVED MSC	A. C. METZGER	DATE

SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008815
SCALE //		SHEET 5 OF 5

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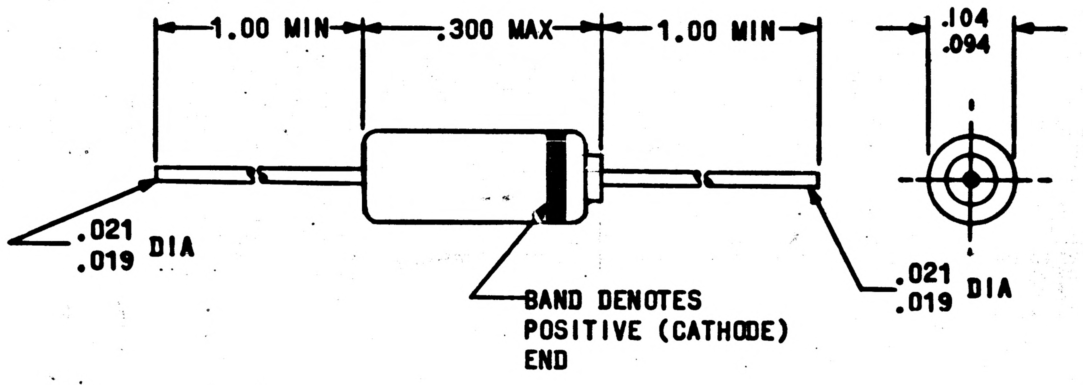
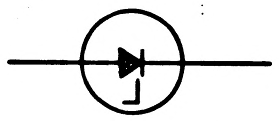
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054.
   - C. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: TO BE IN ACCORDANCE WITH ND 1002215, CLASS I CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA:
       - (a) ANODE: DUMET PER ND 1015401
       - (b) CATHODE: DUMET PER ND 1015401
       - (c) THE LEADS SHALL NOT CONTAIN KINKS AND BENDS WHOSE AMPLITUDES EXCEED 1/2 OF THE RADIUS OF THE LEAD OVER A NODE TO NODE DISTANCE OF 1/8 INCH OR LESS. THE LEADS SHALL FALL FREELY IN A TUBE WITH AN ID EQUAL TO 1-1/2 TIMES THE LEAD DIAMETER AND A MINIMUM TUBE LENGTH EQUAL TO THE LEAD LENGTH. SEE FIG. A.
       - (d) THE FINISH OF THE LEADS SHALL BE FREE OF FOREIGN MATERIAL IN THE AREA 1/16 INCH MAX FROM THE DEVICE BODY TO WITHIN 1/8 INCH OF THE LEAD END. FOREIGN MATERIAL SHALL MEAN ANY MATERIAL NOT COMMON TO THE LEAD FINISH WHICH WOULD REDUCE WELDABILITY AND SOLDERABILITY. THE END OF THE DEVICE BODY IS DEFINED AS THE END OF THE SLUG ON THE CATHODE END AND THE END OF THE GLASS BODY ON THE ANODE END.
       - (e) CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME, TRADEMARK, OR CODE, THE NASA DRAWING NUMBER, (WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS), DASH NUMBER, AND DATE CODE SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. THE CATHODE END OF THE PART SHALL BE IDENTIFIED WITH A COLOR BAND. MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL SPECIFICATION: PER TABLE II
     - (1) ZENER VOLTAGE (V_Z AT I_{ZT})
     - (2) ZENER IMPEDANCE (Z_{ZT})
     - (3) REVERSE CURRENT (IR) AT 25°C

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PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008815
SCALE NONE
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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - B. MAXIMUM RATINGS: PER TABLE I.
   - C. STORAGE TEMPERATURE: -65°C TO +175°C.
   - D. SURGE CURRENT: 5 X I_{ZM} (TABLE I), 5 SURGES AT 1 MINUTE INTERVALS OF 8.3M SEC DURATION SUPERIMPOSED ON I_{ZT} (TABLE II).
   - E. THERMAL RESISTANCE (JUNCTION TO AMBIENT AIR WITH CLIPS 1/2 INCH FROM BODY OF DIODE IN STILL FREE AIR): .375°C/MW MAX.
   - F. POWER DISSIPATION: 400 MILLIWATTS MAX, DERATE 2.67 MW/°C ABOVE 25°C AMBIENT.
   - G. PARTS MUST BE CAPABLE OF MEETING A MINIMUM OF 100 MEGOHMS RESISTANCE FROM LEADS TO BODY.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) MONITORED VARIABLE FREQUENCY VIBRATION AT A CONSTANT PEAK ACCELERATION OF 20 G MINIMUM OVER 100-2,000 CPS PER MIL-STD-750, METHOD 2056 WITH FORCE APPLIED PERPENDICULAR TO THE MAIN AXIS. MONITOR DURING TESTING FOR OPENS AND SHORTS USING A MINIMUM INTERMITTENCY CAPABILITY OF 5 μ SECONDS. ALSO MONITOR FOR SIGNIFICANT ELECTRICAL PARAMETER CHANGES.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1×10^{-8} CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.
   - B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.
     - (1) AMBIENT TEMPERATURE: 100°C ± 5°C.
     - (2) POWER DISSIPATION: 100 ± 10 MILLIWATTS (DIODE IN VOLTAGE BREAKDOWN CONDITION)
     - (3) MOUNTING: BY CLIPS 1/2 ± 1/16 INCH FROM DIODE BODY.
   - C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) ZENER VOLTAGE AT I_{ZT}.
     - (2) ZENER IMPEDANCE AT I_{ZT}.
     - (3) REVERSE LEAKAGE CURRENT AT 25°C.
   - D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
     - (1) PARAMETRIC CHANGE LIMITS:
       - (a) ZENER VOLTAGE: ±3% OF INITIAL VALUE.
       - (b) ZENER IMPEDANCE: ±15% OF INITIAL VALUE.
       - (c) REVERSE LEAKAGE CURRENT: 5 X INITIAL VALUE OR 1 μA WHICHEVER IS GREATER.
   - E. INSPECTION OF SEMICONDUCTORS: PER ND 1002220.
   - F. A CERTIFICATE OF COMPLIANCE FOR THESE INSPECTION REQUIREMENTS SHALL BE INCLUDED FOR EACH SHIPMENT.

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SEMICONDUCTOR DEVICE, DIODE
(VOLTAGE REGULATOR, SILICON,
AXIAL LEAD, GLASS BODY)

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008815
SCALE —	WT	SHEET 2 OF 4

E.F.

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SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 23029	10-5-65	

TABLE I

DASH NUMBER	MAXIMUM RATINGS AT AMBIENT TEMPERATURE 25°C			
	ZENER CURRENT (I_{ZM}) MA_{DC}	POWER DISSIPATION (P) MW	JUNCTION TEMPERATURE (T_J) °C	EIA TYPE DESIGNATION (FOR REF ONLY)
-1	58	400	175	1N957B
-2	53			1N958B
-3	48			1N959B
-4	44			1N960B
-5	40			1N961B
-6	35			1N962B
-7	32			1N963B
-8	30			1N964B
-9	26			1N965B
-10	25			1N966B
-11	21			1N967B
-12	19			1N968B
-13	17			1N969B
-14	16			1N970B
-15	14			1N971B
-16	13			1N972B
-17	12			1N973B
-18	11			1N974B
-19	9.1			1N975B
-20	8.8			1N976B
-21	7.9			1N977B
-22	7.4			1N978B
-23	6.9			1N979B
-24	6.0			1N980B
-25	26			.4M11.5Z2
-26	16			
-27	15	400	175	
-28	14	400	175	1N971
-29	75	400	175	1N751

NOTES:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL. $(Z_Z = \frac{E(AC)}{I(AC)})$
3. VOLTAGE REGULATION IS DETERMINED BY NOTING THE VALUE OF BREAKDOWN VOLTAGE AFTER 90 SEC (MINIMUM) AT 10% I_{ZM}, THEN INCREASING CURRENT TO 90% I_{ZM} AND NOTING VALUE OF BREAKDOWN VOLTAGE AFTER 90 SECONDS (MINIMUM). THE DIFFERENCE IN MEASURED VOLTAGE IS ΔV_Z. DURING THIS TEST THE DIODE SHALL BE SUSPENDED BY ITS LEADS A MINIMUM OF 1/2 INCH FROM THE BODY OF THE DIODE IN A STILL AIR AMBIENT OF 25°C.

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

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TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED) (SEE NOTE 1)

DASH NUMBER	ZENER VOLTAGE (V_Z) VDC AT I_{ZT}	ZENER TEST CURRENT (I_{ZT}) MADC	ZENER TEST CURRENT (I_{ZK}) MADC	MAXIMUM ZENER IMPEDANCE (SEE NOTE 2) (Z_{ZT}) AT I_{ZT} OHMS	MAXIMUM ZENER IMPEDANCE (SEE NOTE 2) (Z_{ZK}) AT I_{ZK} OHMS	MAXIMUM REVERSE CURRENT (I_R) AT 25°C UA DC	MAXIMUM REVERSE CURRENT (I_R) AT 100°C UA DC	MAXIMUM REVERSE CURRENT AT VOLTS DC	VOLTAGE REGULATION (SEE NOTE 3) 10% I_{ZM} TO 50% I_{ZM} (MADC)	VOLTAGE REGULATION (SEE NOTE 3) MAX ΔV_Z VDC	MAXIMUM FORWARD VOLTAGE DROP AT 200 MA DC VDC	MINIMUM BREAKDOWN VOLTAGE AT I_{ZK} VDC	MAXIMUM TEMPERATURE COEFFICIENT AT I_{ZT} (25°C TO 125°C) %/°C
-1	6.8±5%	18.5	1.0	4.5	700	150	300	5.2	5.8 -29	.25	1.5	6.2	.057
-2	7.5±5%	16.5	0.5	5.5		75	150	5.7	5.3 -26.5	.30		7.1	.061
-3	8.2±5%	15.0	0.5	6.5		50	120	6.2	4.8 -24.0	.35		7.6	.065
-4	9.1±5%	14.0	0.5	7.5		25	75	6.9	4.4 -22.0	.40		8.7	.068
-5	10 ±5%	12.5	0.25	8.5		2	30	7.6	4.0 -20.0	.45		9.0	.071
-6	11 ±5%	11.5		9.5				8.4	3.5 -17.5	.50		10.0	.073
-7	12 ±5%	10.5		11.5				9.1	3.2 -16.0	.55		10.5	.076
-8	13 ±5%	9.5		13.0				9.9	3.0 -15.0	.60		11.5	.079
-9	15 ±5%	8.5		16.0				11.0	2.6 -13.0	.70		13.0	.082
-10	16 ±5%	7.8		17.0	700			12.0	2.5 -12.5	.75		14.0	.083
-11	18 ±5%	7.0		21	750			14.0	2.1 -10.5	.85		16.0	.085
-12	20 ±5%	6.2		25	750			15.0	1.9 - 9.5	.95		18.0	.086
-13	22 ±5%	5.6		29	750			17.0	1.7 - 8.5	1.05		19.0	.087
-14	24 ±5%	5.2		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-15	27 ±5%	4.6		41	750			21.0	1.4 - 7.0	1.30		24.0	.090
-16	30 ±5%	4.2		49	1000			23.0	1.3 - 6.5	1.45		27.0	.091
-17	33 ±5%	3.8		58	1000			25.0	1.2 - 6.0	1.60		30.0	.092
-18	36 ±5%	3.4		70	1000			27.0	1.1 - 5.5	1.75		32.5	.093
-19	39 ±5%	3.2		80	1000			30.0	.91- 4.55	1.90		35.0	.094
-20	43 ±5%	3.0		93	1500			33.0	.88- 4.4	2.10		39.0	.095
-21	47 ±5%	2.7		105	1500			36.0	.79- 3.95	2.25		43.0	.095
-22	51 ±5%	2.5		125	1500			39.0	.74- 3.70	2.50		47.0	.096
-23	56 ±5%	2.2		150	2000			43.0	.69- 3.45	2.70		52.5	.096
-24	62 ±5%	2.0		185	2000			47.0	.60- 3.0	2.90		57.5	.097
-25	11.5±2%	10.5		10.5	700			8.7	3.5 -17.5	.50		10.25	.076
-26	24 ±2%	5.1		33	750			18.0	1.6 - 8.0	1.15		21.0	.088
-27	26 ±2%	4.7	0.25	41	750	2	30	20.0	1.4 - 7.0	1.30	1.5		
-28	27 ±2%	4.6	0.25	41	750	2	30	21.0	1.4 - 7.0	1.30	1.5	24.0	.090
-29	5.1 ±5%	20	0.25	14	1200	5	50	2.0	7.5 -37.5	.80	1.5	3.4	±.030

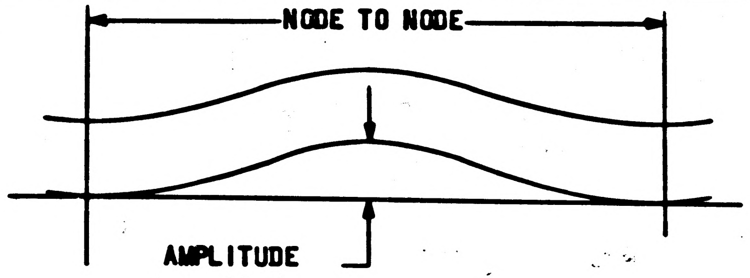

FIGURE A

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SCALE —— WT SHEET 4 OF 4

1008815

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008817 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23278	10-19-65	WR
A	REVISED PER TDRR 24073	11/23/65	WR

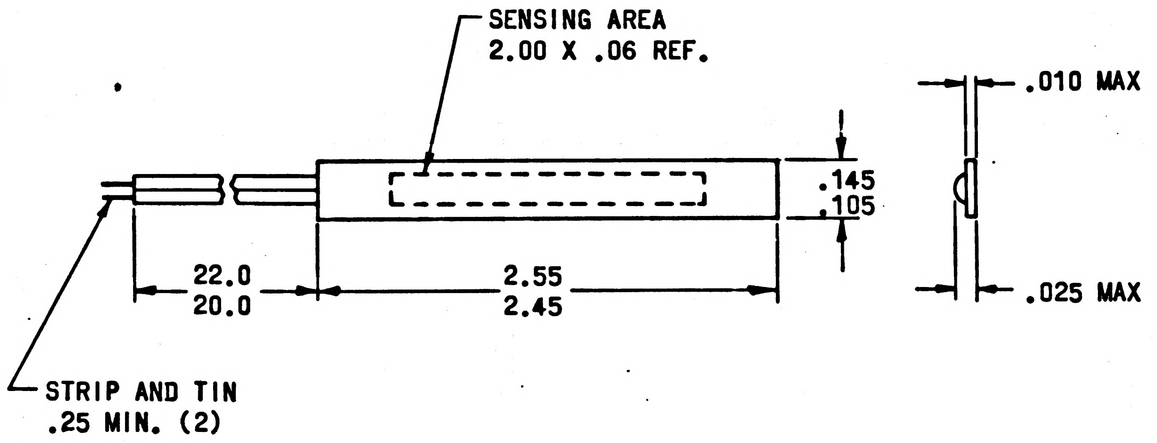
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002057 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. ELECTRICAL REQUIREMENTS:
     - (1) RESISTANCE: 676 OHMS AT 25°C.
     - (2) TOLERANCE: ±.5%.
   - B. MECHANICAL REQUIREMENTS:
     - (1) LEADS: UNITS SHALL BE SUPPLIED WITH TEFLON INSULATED STRANDED NO. 34 AWG WIRE PER MIL-W-16878. A CERTIFICATE OF COMPLIANCE SHALL ACCOMPANY EACH SHIPMENT. LEAD MATERIAL SHALL BE READILY SOLDERABLE.
     - (2) MARKING: THE MANUFACTURER'S NAME OR SYMBOL, THE NASA DRAWING NUMBER, AND DATE CODE, SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019 OR ON A TAG AFFIXED TO LEADS. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART.
     - (3) PART SHALL BE FURNISHED WITH ADHESIVE BACKING.

3. DESIGN:
   - A. ELEMENT: NON-INDUCTIVE NICKEL-IRON ALLOY WINDING.
   - B. COVER MATERIAL: MYLAR.
   - C. DIELECTRIC STRENGTH: 500 VOLTS RMS FOR 1 MINUTE MINIMUM.
   - D. INSULATION RESISTANCE: 10,000 MEGOHMS MINIMUM AT 500 VOLTS DC.
   - E. OPERATING TEMPERATURE RANGE: -200°C TO +160°C.
   - F. TIME CONSTANT:
     - (1) 0.2 SECONDS MEASURED IN AGITATED LIQUID.
     - (2) 0.5 SECONDS MEASURED MOUNTED ON ALUMINUM SURFACE.
   - G. RESISTANCE: PER TABLE I.
     - (1) TOLERANCE: -200°C TO -80°C ± 2%, -80°C TO 0°C ± 1%, 0°C TO +100°C ± .5%, +100°C TO +160°C ± 1.5%.

4. APPLICATION INFORMATION:
   - A. THIS PART MUST BE POTTED IN PLACE



NOTE:
NOT TO BE USED IN FLIGHT HARDWARE WHERE ELECTRICAL FUNCTION DURING FLIGHT IS REQUIRED.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

HEAT TREATMENT
NONE

FINAL FINISH
NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. Contract NAS 9-497
DRAWN T. Kaneshe DATE 9 SEP 65
CHECKED Ed Foster 15 SEP 65
APPROVAL DW Dwo 15 Oct 65
APPROVAL

~~NASA APPROVAL~~ NOT REQUIRED PER LETTER NASA PP7-65-612
MIT APPROVAL WCuffer 19 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, THERMAL - SENSOR, RIBBON

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008817

SCALE NONE WT SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 1008817

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23278	10-19-65	WK
A	REVISED PER TDRR 24073	11/23/65	WK

TABLE I

RESISTANCE VS TEMPERATURE

RES. (Ω)	T (°C)	RES. (Ω)	T (°C)	RES. (Ω)	T (°C)	RES. (Ω)	T (°C)	RES. (Ω)	T (°C)
242.99	-200	357.98	-110	550.65	-20	816.04	70	1135.29	160
244.70	-198	361.42	-108	555.81	-18	822.56	72		
246.45	-196	364.89	-106	561.01	-16	829.12	74		
248.24	-194	368.41	-104	566.26	-14	835.69	76		
250.06	-192	371.96	-102	571.54	-12	842.30	78		
251.93	-190	375.55	-100	576.85	-10	848.92	80		
253.83	-188	379.18	-98	582.21	-8	855.58	82		
255.78	-186	382.85	-96	587.60	-6	862.26	84		
257.76	-184	386.55	-94	593.03	-4	868.96	86		
259.77	-182	390.30	-92	598.50	-2	875.70	88		
261.83	-180	394.08	-90	604.00	0	882.46	90		
263.92	-178	397.90	-88	609.62	2	889.24	92		
266.06	-176	401.76	-86	615.26	4	896.05	94		
268.23	-174	405.66	-84	620.93	6	902.88	96		
270.44	-172	409.60	-82	626.63	8	909.74	98		
272.69	-170	413.57	-80	632.35	10	916.63	100		
274.98	-168	417.58	-78	638.10	12	923.54	102		
277.30	-166	421.63	-76	643.87	14	930.48	104		
279.66	-164	425.72	-74	649.67	16	937.44	106		
282.07	-162	429.85	-72	655.49	18	944.44	108		
284.51	-160	434.02	-70	661.34	20	951.46	110		
286.98	-158	438.23	-68	667.22	22	958.50	112		
289.50	-156	442.47	-66	673.12	24	965.57	114		
292.06	-154	446.75	-64	679.05	26	972.66	116		
294.65	-152	451.07	-62	685.01	28	979.78	118		
297.28	-150	455.43	-60	690.99	30	986.92	120		
299.95	-148	459.83	-58	697.00	32	994.10	122		
302.66	-146	464.26	-56	703.03	34	1001.30	124		
305.41	-144	468.73	-54	709.09	36	1008.52	126		
308.20	-142	473.25	-52	715.17	38	1015.77	128		
311.02	-140	477.79	-50	721.28	40	1023.04	130		
313.88	-138	482.38	-48	727.42	42	1030.35	132		
316.78	-136	487.01	-46	733.58	44	1037.67	134		
319.72	-134	491.67	-44	739.77	46	1045.03	136		
322.70	-132	496.38	-42	745.98	48	1052.41	138		
325.71	-130	501.12	-40	752.22	50	1059.81	140		
328.77	-128	505.90	-38	758.49	52	1067.24	142		
331.86	-126	510.72	-36	764.78	54	1074.70	144		
334.99	-124	515.57	-34	771.10	56	1082.18	146		
338.16	-122	520.47	-32	777.44	58	1089.69	148		
341.37	-120	525.40	-30	783.81	60	1097.23	150		
344.61	-118	530.37	-28	790.20	62	1104.79	152		
347.90	-116	535.39	-26	796.62	64	1112.37	154		
351.22	-114	540.44	-24	803.07	66	1119.99	156		
354.58	-112	545.52	-22	809.54	68	1127.63	158		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DWG. NO.
DRAWN DATE 9 SEP 65
CHECKED 15 SEP 65
APPROVAL 18 Oct 65
APPROVAL
NASA APPROVAL NOT REQUIRED PER LETTER NASA PP7-65-612
MIT APPROVAL 19 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, THERMAL - SENSOR, RIBBON

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008817
SCALE —	WT	SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008817

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23278	10-19-65	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
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2. INSPECTION AND ACCEPTANCE:
   - A. ELECTRICAL REQUIREMENTS:
     - (1) RESISTANCE: 676 OHMS AT 25°C.
     - (2) TOLERANCE: ±.5%.
   - B. MECHANICAL REQUIREMENTS:
     - (1) LEADS: UNITS SHALL BE SUPPLIED WITH TEFLON INSULATED STRANDED NO. 34 AWG WIRE PER MIL-W-16878. A CERTIFICATE OF COMPLIANCE SHALL ACCOMPANY EACH SHIPMENT. LEAD MATERIAL SHALL BE READILY SOLDERABLE.
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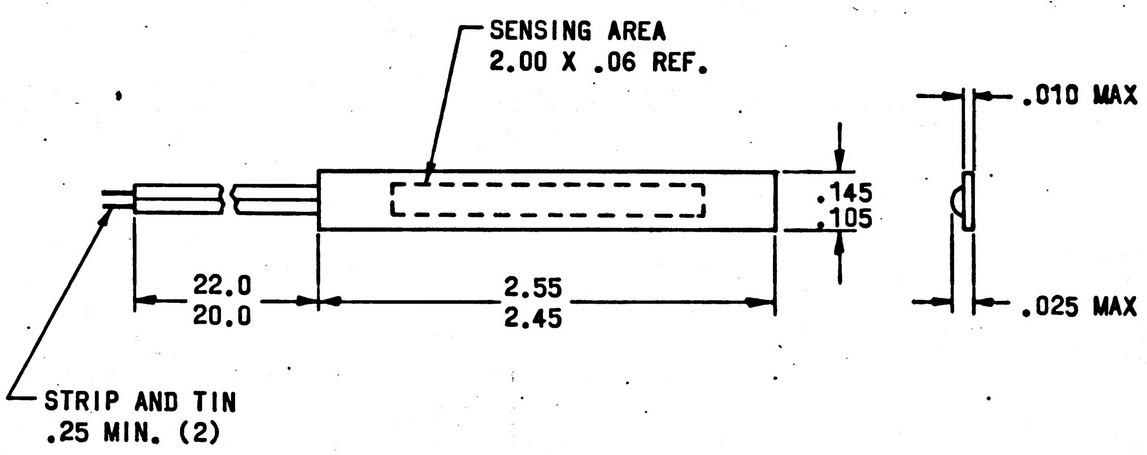
     - (3) PART SHALL BE FURNISHED WITH ADHESIVE BACKING.

3. DESIGN:
   - A. ELEMENT: NON-INDUCTIVE NICKEL-IRON ALLOY WINDING.
   - B. COVER MATERIAL: MYLAR.
   - C. DIELECTRIC STRENGTH: 500 VOLTS RMS FOR 1 MINUTE MINIMUM.
   - D. INSULATION RESISTANCE: 10,000 MEGOHMS MINIMUM AT 500 VOLTS DC.
   - E. OPERATING TEMPERATURE RANGE: -200°C TO +160°C.
   - F. TIME CONSTANT:
     - (1) 0.2 SECONDS MEASURED IN AGITATED LIQUID.
     - (2) 0.5 SECONDS MEASURED MOUNTED ON ALUMINUM SURFACE.
   - G. RESISTANCE: PER TABLE I.
     - (1) TOLERANCE: -200°C TO -80°C ± 2%, -80°C TO 0°C ± 1%, 0°C TO +100°C ± .5%, +100°C TO +160°C ± 1.5%.

4. APPLICATION INFORMATION:
   - A. THIS PART MUST BE POTTED IN PLACE



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL: SEE REQUIREMENTS
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
Contract NAS 9-497

DRAWN T. K[illegible] DATE 9 Sep 65
CHECKED Ed Foster 15 SEP 65
APPROVAL [illegible] 65
APPROVAL

NASA APPROVAL NOT REQUIRED PER LETTER NASA PP7-65-612
MIT APPROVAL [illegible] 19 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, THERMAL - SENSOR, RIBBON

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008817

SCALE NONE WT SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008817

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23278	10-19-65	

TABLE I

RESISTANCE VS TEMPERATURE

RES. (Ω)	T (°C)	RES. (Ω)	T (°C)	RES. (Ω)	T (°C)	RES. (Ω)	T (°C)	RES. (Ω)	T (°C)
242.99	-200	357.98	-110	550.65	-20	816.04	70	1135.29	160
244.70	-198	361.42	-108	555.81	-18	822.56	72		
246.45	-196	364.89	-106	561.01	-16	829.12	74		
248.24	-194	368.41	-104	566.26	-14	835.69	76		
250.06	-192	371.96	-102	571.54	-12	842.30	78		
251.93	-190	375.55	-100	576.85	-10	848.92	80		
253.83	-188	379.18	-98	582.21	-8	855.58	82		
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257.76	-184	386.55	-94	593.03	-4	868.96	86		
259.77	-182	390.30	-92	598.50	-2	875.70	88		
261.83	-180	394.08	-90	604.00	0	882.46	90		
263.92	-178	397.90	-88	609.62	2	889.24	92		
266.06	-176	401.76	-86	615.26	4	896.05	94		
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308.20	-142	473.25	-52	715.17	38	1015.77	128		
311.02	-140	477.79	-50	721.28	40	1023.04	130		
313.88	-138	482.38	-48	727.42	42	1030.35	132		
316.78	-136	487.01	-46	733.58	44	1037.67	134		
319.72	-134	491.67	-44	739.77	46	1045.03	136		
322.70	-132	496.38	-42	745.98	48	1052.41	138		
325.71	-130	501.12	-40	752.22	50	1059.81	140		
328.77	-128	505.90	-38	758.49	52	1067.24	142		
331.86	-126	510.72	-36	764.78	54	1074.70	144		
334.99	-124	515.57	-34	771.10	56	1082.18	146		
338.16	-122	520.47	-32	777.44	58	1089.69	148		
341.37	-120	525.40	-30	783.81	60	1097.23	150		
344.61	-118	530.37	-28	790.20	62	1104.79	152		
347.90	-116	535.39	-26	796.62	64	1112.37	154		
351.22	-114	540.44	-24	803.07	66	1119.99	156		
354.58	-112	545.52	-22	809.54	68	1127.63	158		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. Contract NAS 9-497
DRAWN T. Kowalski DATE 9 SEP 65
CHECKED Ed Foster 16 SEP 65
APPROVAL D Jones 18 Oct 65
APPROVAL

~~NOT REQUIRED PER LETTER~~
~~NASA PP7-65-612~~
MIT APPROVAL W Cuyler 19 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, THERMAL - SENSOR, RIBBON

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008817
SCALE —
WT
SHEET 2 OF 2

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008818 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	W
A	REVISED PER TDRR 25580	2/1/66	WK

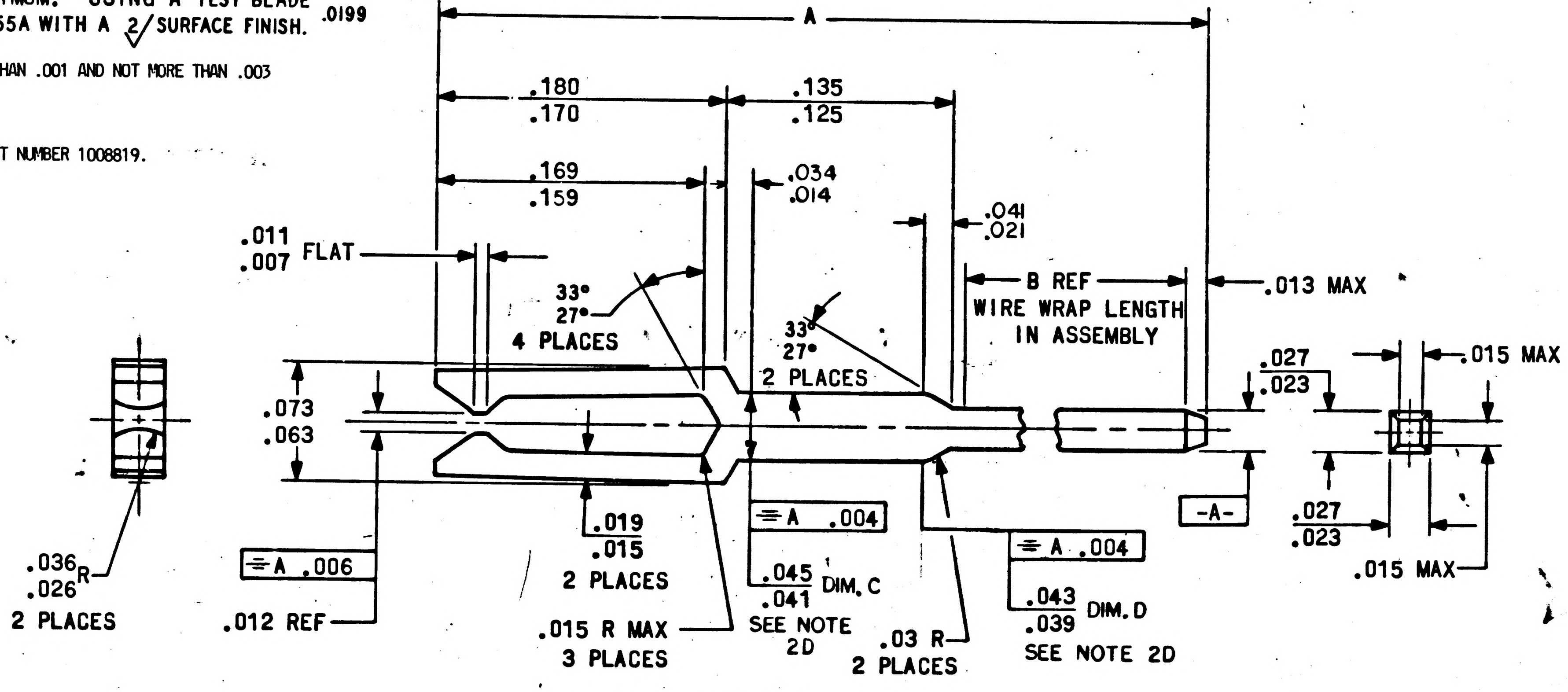
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215, CLASS I, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL BERYLLIUM COPPER PER QQ-C-533 ALLOY 172 HEAT TREATED PER MIL-H 7199, MINIMUM ROCKWELL 59-30N SCALE (BEFORE MANUFACTURING).
   - B. FINISH: .000050 MINIMUM GOLD PLATE PER MIL-G-45204 TYPE II OVER .0002 MIN THICKNESS NICKEL PER QQ-N-290.
   - C. WITHDRAWAL: 2 OZ. MINIMUM, 10 OZ. MAXIMUM. USING A TEST BLADE $^{.0201}_{.0199}$ THICK AND $^{.061}_{.059}$ WIDE, MADE OF CARBIDE -GRADE 55A WITH A 2/ SURFACE FINISH.
   - D. DIMENSION C MUST BE GREATER THAN DIMENSION D BY NOT LESS THAN .001 AND NOT MORE THAN .003

3. APPLICATION DATA:
   TO BE USED WITH ALUMINUM GROUNDING SLEEVE PART NUMBER 1008819.

DASH NUMBER	A	B (REF)
-001	.593 .583	.250
-002	.843 .833	.500
-003	1.093 1.083	.750



THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

HEAT TREATMENT
NONE

FINAL FINISH
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS 9-497

DRAWN J. Patterson DATE 20 AUG 65
CHECKED J. A. Eymoure 25 AUG 65
APPROVAL B. V. Ims 20 Sept 65
APPROVAL
NASA APPROVAL C. Metzger
MIT APPROVAL W Kupfer 21 Sept 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONTACT, ELECTRICAL—WRAPOST, SUB-MINIATURE, FEMALE, GROUNDING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008818
SCALE 15:1
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

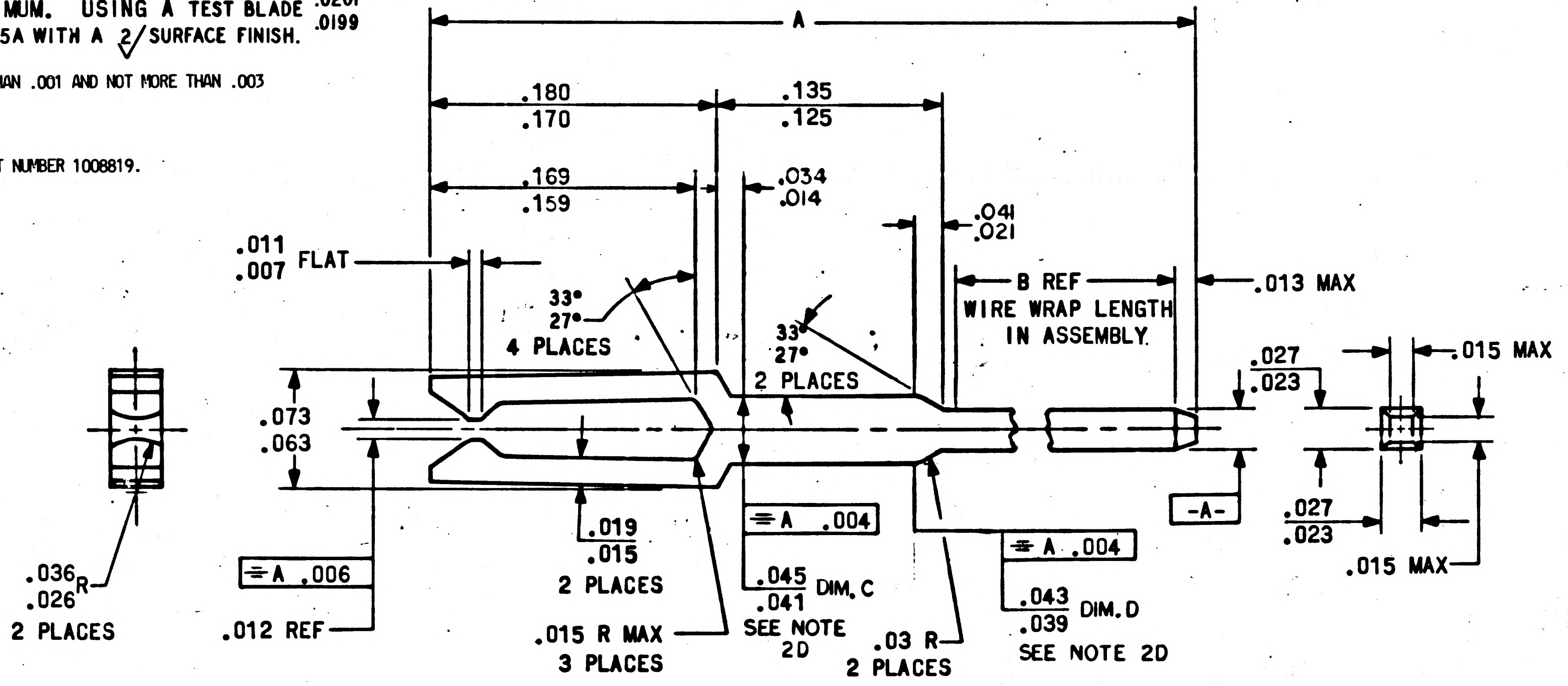
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	W
A	REVISED PER TDRR 25580	2/1/66	WK
B	REVISED PER TDRR 25992	2/15/66	WK.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215, CLASS I, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL BERYLLIUM COPPER PER QQ-C-533 ALLOY 172 HEAT TREATED PER MIL-H 7199, MINIMUM ROCKWELL 59-30N SCALE (BEFORE MANUFACTURING).
   - B. FINISH: .000050 MINIMUM GOLD PLATE PER MIL-G-45204 TYPE II OVER .0002 MIN THICKNESS NICKEL PER QQ-N-290.
   - C. WITHDRAWAL: 2 OZ. MINIMUM, 10 OZ. MAXIMUM. USING A TEST BLADE $^{.0201}_{.0199}$ THICK AND .061 WIDE, MADE OF CARBIDE -GRADE 55A WITH A 2/ SURFACE FINISH. .059
   - D. DIMENSION C MUST BE GREATER THAN DIMENSION D BY NOT LESS THAN .001 AND NOT MORE THAN .003

3. APPLICATION DATA:
   TO BE USED WITH ALUMINUM GROUNDING SLEEVE PART NUMBER 1008819.



DASH NUMBER	A	B (REF)
-001	.593 .583	.250
-002	.843 .833	.500
-003	1.093 1.083	.750
-004	.518 .508	.175
-005	.668 .658	.325
-006	.693 .683	.350

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

HEAT TREATMENT
NONE

FINAL FINISH
SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS 9-497

DRAWN J. Patterson DATE 20 AUG 65
CHECKED J. A. Eymons 25 AUG 65
APPROVAL D. V. Innes 20 Sept '65
APPROVAL

NASA APPROVAL Arthur C. Metzger
MIT APPROVAL W Kuffer 21 Sep 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONTACT, ELECTRICAL—WRAPOST, SUB-MINIATURE, FEMALE, GROUNDING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008818
SCALE 15:1
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008818 C

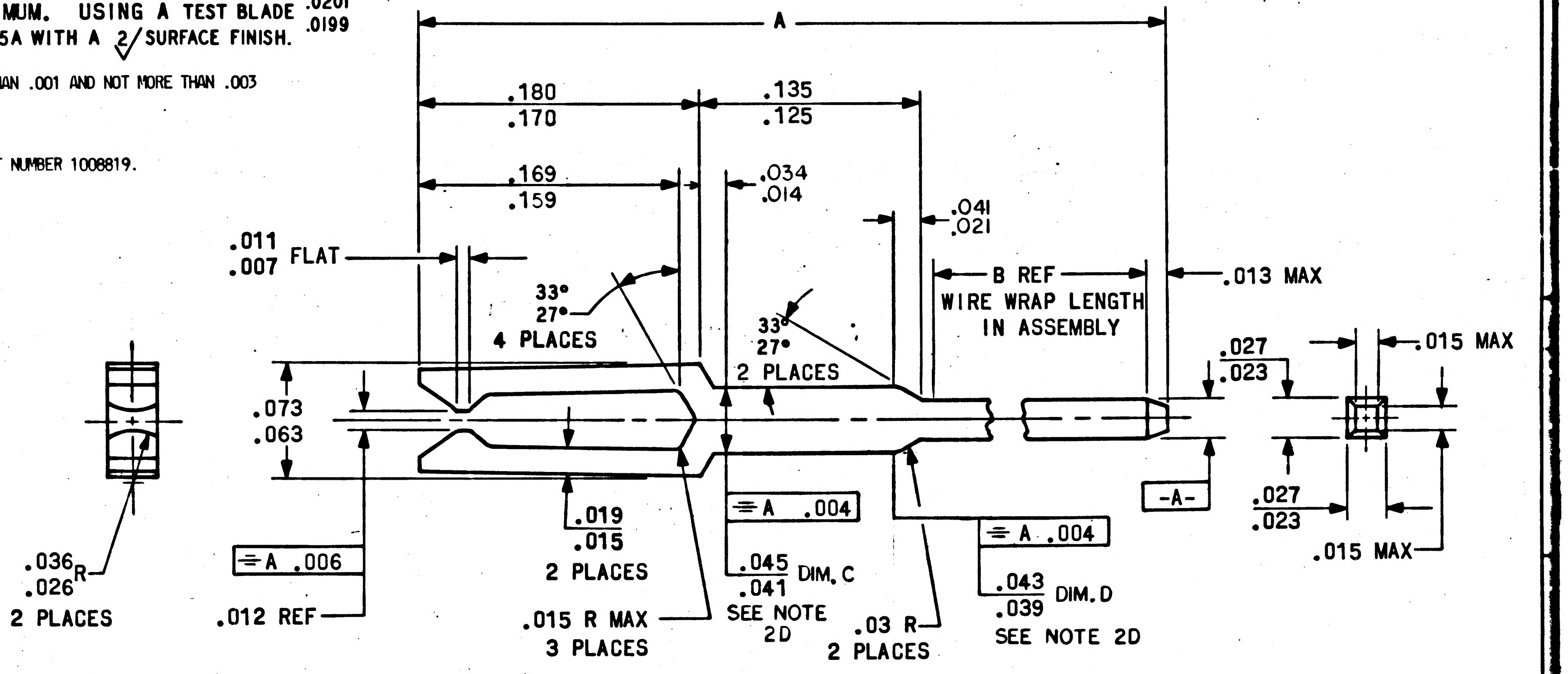
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	W
A	REVISED PER TDRR 25580	2/1/66	WK
B	REVISED PER TDRR 25992	2/15/66	WK
C	REVISED PER TDRR 27403	3/25/66	WK

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215, CLASS I, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL BERYLLIUM COPPER PER QQ-C-533 ALLOY 172 HEAT TREATED PER MIL-H 7199, MINIMUM ROCKWELL 59-30N SCALE (BEFORE MANUFACTURING).
   - B. FINISH: .000050 MINIMUM GOLD PLATE PER MIL-G-45204 TYPE II OVER .0002 MIN THICKNESS NICKEL PER QQ-N-290.
   - C. WITHDRAWAL: 2 OZ. MINIMUM, 10 OZ. MAXIMUM. USING A TEST BLADE $\genfrac{}{}{0pt}{}{.0201}{.0199}$ THICK AND $\genfrac{}{}{0pt}{}{.061}{.059}$ WIDE, MADE OF CARBIDE -GRADE 55A WITH A 2√ SURFACE FINISH.
   - D. DIMENSION C MUST BE GREATER THAN DIMENSION D BY NOT LESS THAN .001 AND NOT MORE THAN .003

3. APPLICATION DATA:
   TO BE USED WITH ALUMINUM GROUNDING SLEEVE PART NUMBER 1008819.



DASH NUMBER	A	B (REF)
-001	.593 .583	.250
-002	.843 .833	.500
-003	1.093 1.083	.750
-004	.518 .508	.175
-005	.668 .658	.325
-006	.693 .683	.350
-007	.793 .783	.450

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH SEE REQUIREMENTS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS 9-497
DRAWN J. Patterson DATE 20 AUG 65
CHECKED J. A. Cymoure 25 AUG 65
APPROVAL B. V. Ivins 20 Sept 65
APPROVAL
NASA APPROVAL Arthur C. Metzger
MIT APPROVAL W Kupfer 21 Sept 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONTACT, ELECTRICAL—WRAPOST,
SUB-MINIATURE, FEMALE, GROUNDING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008818
SCALE 15:1
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008818

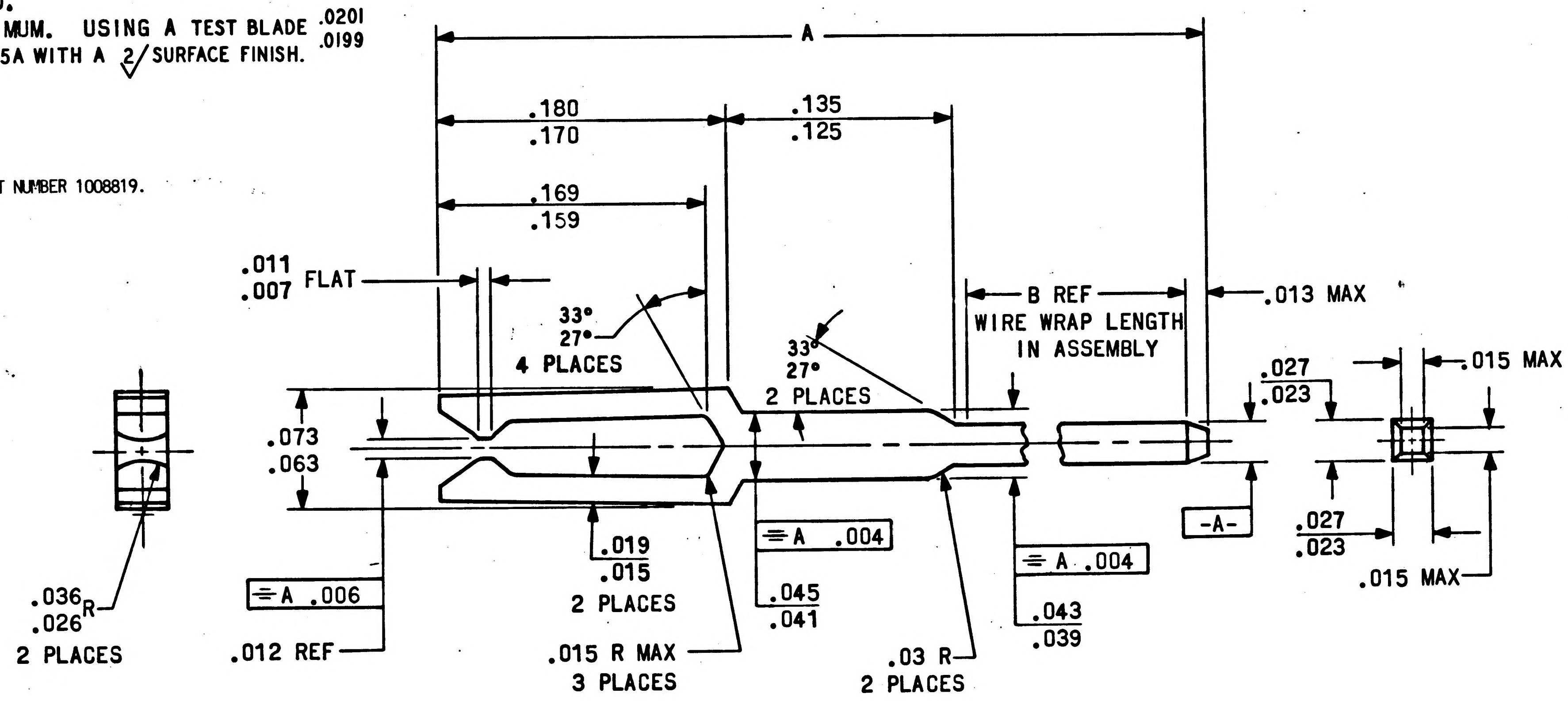
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	

REQUIREMENTS:

1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215, CLASS I, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   A. MATERIAL BERYLLIUM COPPER PER QQ-C-533 ALLOY 172 HEAT TREATED PER MIL-H 7199, MINIMUM ROCKWELL 59-30N SCALE (BEFORE MANUFACTURING).
   B. FINISH: .000050 MINIMUM GOLD PLATE PER MIL-G-45204 TYPE II OVER .0002 MIN THICKNESS NICKEL PER QQ-N-290.
   C. WITHDRAWAL: 2 OZ. MINIMUM, 10 OZ. MAXIMUM. USING A TEST BLADE $^{.0201}_{.0199}$ THICK AND $^{.061}_{.059}$ WIDE, MADE OF CARBIDE -GRADE 55A WITH A $\sqrt{2}$ SURFACE FINISH.

3. APPLICATION DATA:
   TO BE USED WITH ALUMINUM GROUNDING SLEEVE PART NUMBER 1008819.



DASH NUMBER	A	B (REF)
-001	.593 .583	.250
-002	.843 .833	.500
-003	1.093 1.083	.750

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH SEE REQUIREMENTS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT NAS 9-497
DRAWN J. Patterson DATE 20 AUG 65
CHECKED J. A. Gyzmoyne 25 AUG 65
APPROVAL 20 Sept 65
APPROVAL
NASA APPROVAL Arthur C. Metzger
MIT APPROVAL 21 Sep 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONTACT, ELECTRICAL—WRAPOST, SUB-MINIATURE, FEMALE, GROUNDING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008818
SCALE 15:1
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008819 A

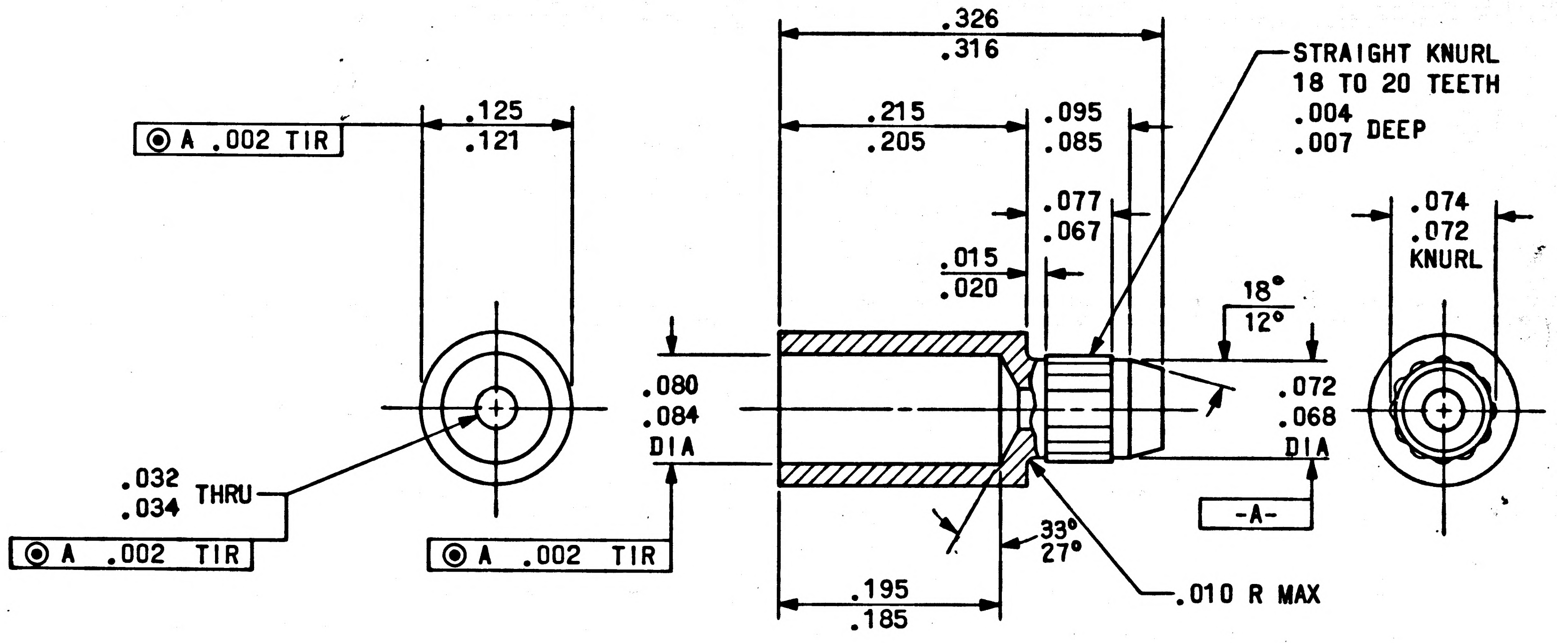
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	WK
A	REVISED PER TDRR 26884	3/15/66	WK

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 7.

2. DESIGN:
   - A. MATERIAL: ALUMINUM 1100-H18 PER QQ-A-250/1
   - B. FINISH: CHEMICAL FILM PER MIL-C-5541 CLASS 3



DASH NUMBER
-001

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

NOTES:
1. TO BE USED WITH CONTACT, PART NO. 1008818.
2. MOUNTING HOLE DIA. .072
   .073

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497
DRAWN Bender DATE 19-AUG-65
CHECKED Ed Foster 20 AUG 65
APPROVAL 20 Sept '65
APPROVAL
NASA APPROVAL C. Metzger
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SLEEVE, GROUNDING—
SUB-MINIATURE, FEMALE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008819
SCALE NONE
WT
SHEET 1 OF 1

B 1008819

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

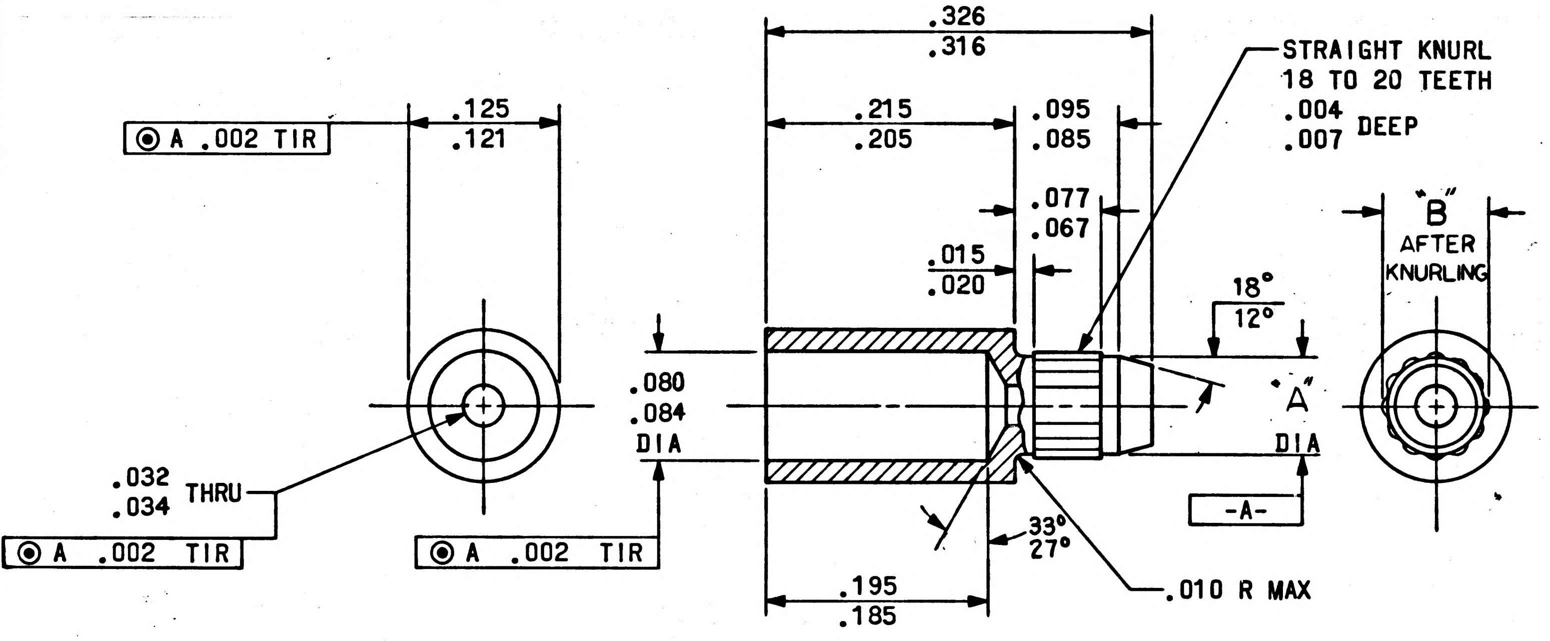
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	WK
A	REVISED PER TDRR 26884	3/15/66	WK
B	REVISED PER TDRR 28182	4-28	WK 4/…

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 7.

2. DESIGN:
   - A. MATERIAL: ALUMINUM 1100-H18 PER QQ-A-250/1
   - B. FINISH: CHEMICAL FILM PER MIL-C-5541 CLASS 3

DASH NUMBER	REFERENCE MTG. HOLE SIZE	DIMENSION A	DIMENSION B
-001	.0715/.0725 DIA	.068/.072 DIA	.074/.072 DIA
-002	.0720/.0730 DIA	.072 REF	.075/.073 DIA



THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

NOTES:
1. TO BE USED WITH CONTACT, PART NO. 1008818.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH SEE REQUIREMENTS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497
DRAWN Bender DATE 19-AUG-65
CHECKED Ed Foster 20 AUG 65
APPROVAL 20 Sept '65
APPROVAL
NASA APPROVAL C. Metzger
MIT APPROVAL 21 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SLEEVE, GROUNDING—
SUB-MINIATURE, FEMALE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008819
SCALE NONE
WT
SHEET 1 OF 1

1008819 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008819 C

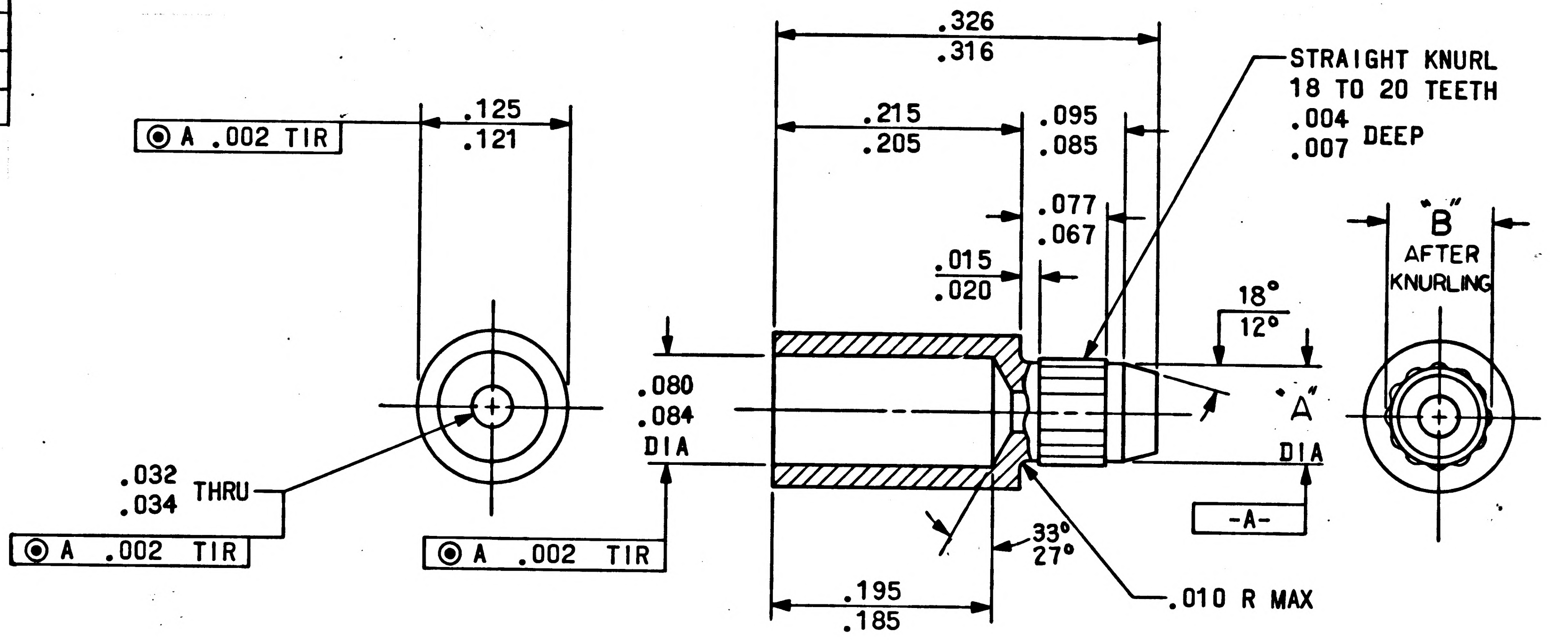
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	WK
A	REVISED PER TDRR 26884	3/15/66	WK
B	REVISED PER TDRR 28182	4-78	WK 4/26/66
C	REVISED PER TDRR 29614	6/16/66	6-21-66

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 7.

2. DESIGN:
   - A. MATERIAL: ALUMINUM 1100-H18 PER QQ-A-250/1
   - B. FINISH: CHEMICAL FILM PER MIL-C-5541 CLASS 3

DASH NUMBER	REFERENCE MTG. HOLE SIZE	DIMENSION A	DIMENSION B
-001	.0715/.0725 DIA	.068/.072 DIA	.074/.072 DIA
-002	.0720/.0730 DIA	.072 REF	.075/.073 DIA
-003	.0805/.0815 DIA	.074/.078	.081/.083 DIA



THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

NOTES:

1. TO BE USED WITH CONTACT, PART NO. 1008818.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: SEE REQUIREMENTS
HEAT TREATMENT: NONE
FINAL FINISH: SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497
DRAWN Bender DATE 19-AUG-65
CHECKED Ed Foster 20 AUG 65
APPROVAL 20 Sept 65
APPROVAL
NASA APPROVAL C. Metzger
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SLEEVE, GROUNDING—
SUB-MINIATURE, FEMALE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008819
SCALE NONE
WT
SHEET 1 OF 1

D 1008819

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

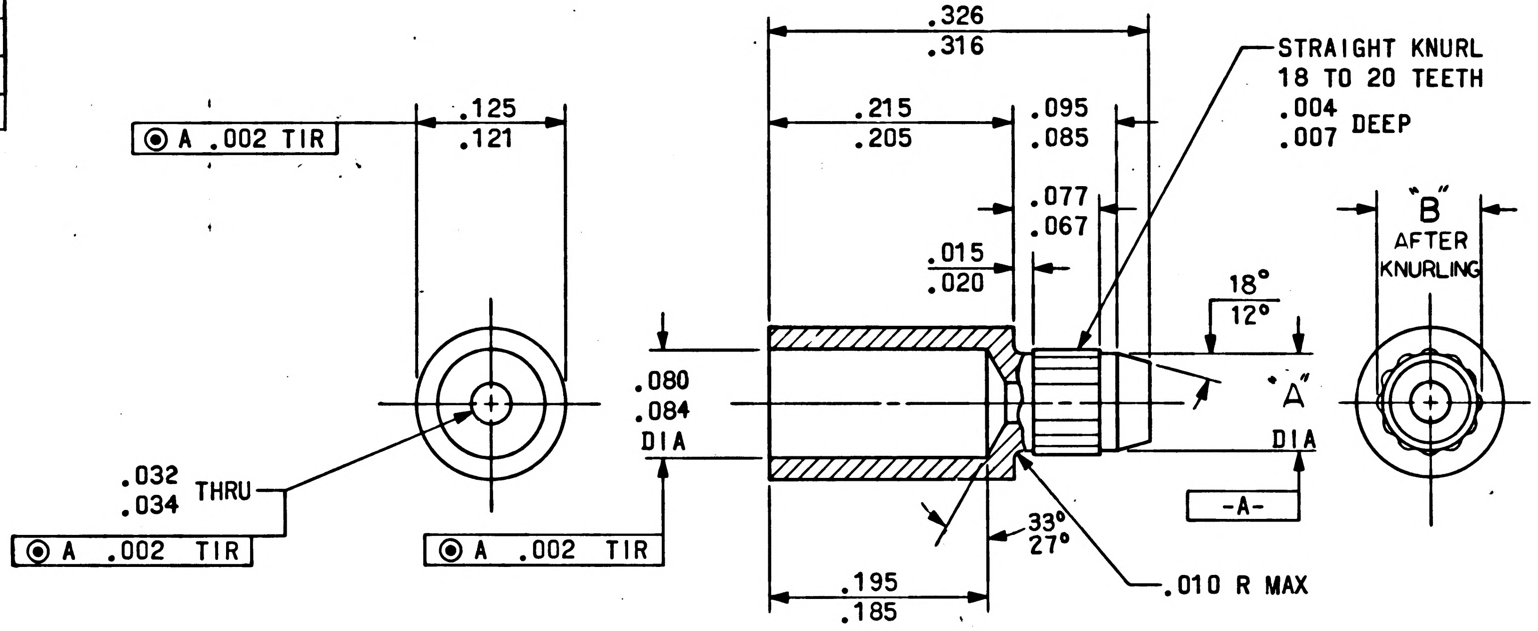
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	WK
A	REVISED PER TDRR 26884	3/15/66	WK
B	REVISED PER TDRR 28182	4-JB	WK 4/6/66
C	REVISED PER TDRR 29614	6/16/66	MGM 6-21-66
D	REVISED PER TDRR 30678	8·25·66	JJB JI

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 7.

2. DESIGN:
   - A. MATERIAL: ALUMINUM 1100-F PER QQ-A-225/1B
   - B. FINISH: CHEMICAL FILM PER MIL-C-5541 CLASS 3

DASH NUMBER	REFERENCE MTG. HOLE SIZE	DIMENSION A	DIMENSION B
-001	.0715/.0725 DIA	.068/.072 DIA	.074/.072 DIA
-002	.0720/.0730 DIA	.072 REF	.075/.073 DIA
-003	.0805/.0815 DIA	.074/.078	.081/.083 DIA



THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

NOTES:

1. TO BE USED WITH CONTACT, PART NO. 1008818.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH SEE REQUIREMENTS

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS 9-497
DRAWN Bender DATE 19-AUG-65
CHECKED Ed Foster 20 AUG 65
APPROVAL 20 Sept '65
APPROVAL
NASA APPROVAL C. Metzger
MIT APPROVAL W. Kupfer 21 Sep 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SLEEVE, GROUNDING—
SUB-MINIATURE, FEMALE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008819
SCALE NONE
WT
SHEET 1 OF 1

1008819 D

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

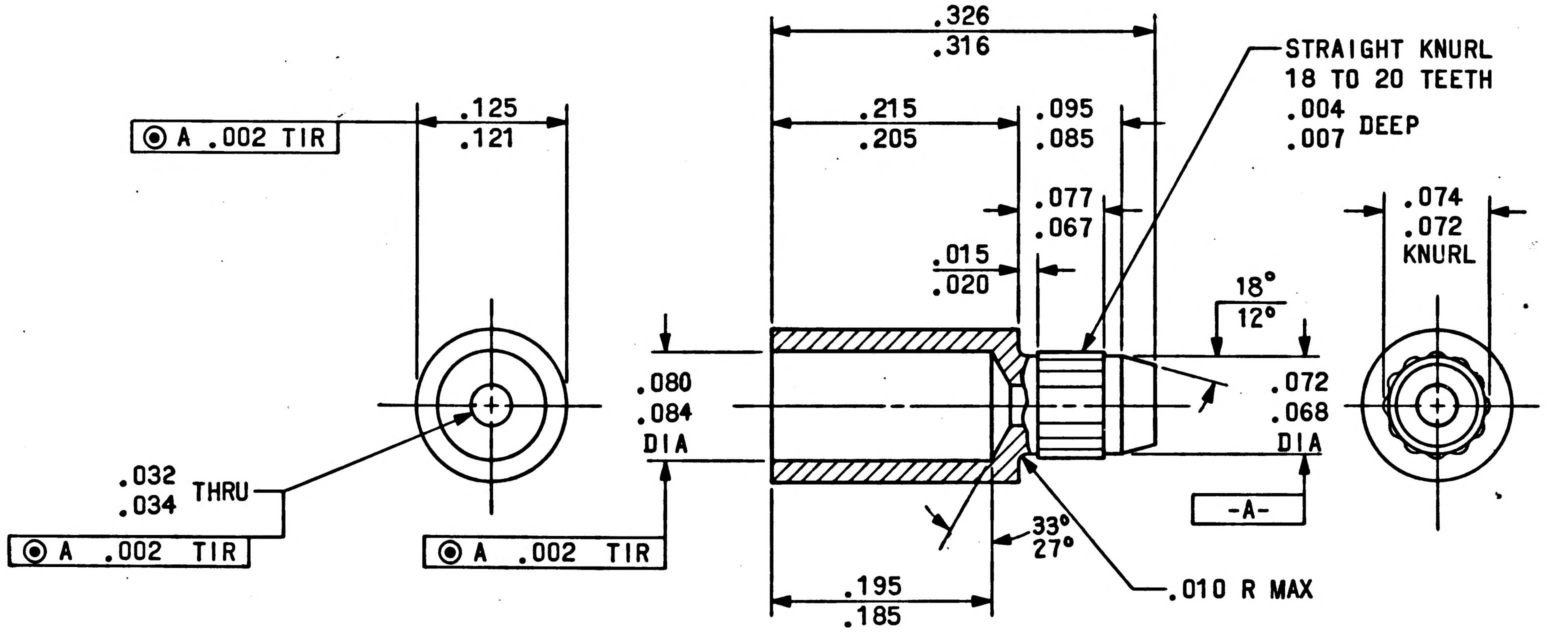
6188001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 22573	9-21-65	WK

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 7.

2. DESIGN:
   - A. MATERIAL: ALUMINUM 1100-H18 PER QQ-A-561
   - B. FINISH: GOLD IRIDITE PER MIL-C-5541



DASH NUMBER
-001

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

NOTES:
1. TO BE USED WITH CONTACT, PART NO. 1008818.
2. MOUNTING HOLE DIA. .072 / .073

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497
DRAWN Bender DATE 19-AUG-65
CHECKED Ed Foster 20 AUG 65
APPROVAL 20 Sept 65
APPROVAL
NASA APPROVAL C. Metzger
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SLEEVE, GROUNDING—
SUB-MINIATURE, FEMALE

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008819
SCALE NONE
WT
SHEET 1 OF 1

1008822 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21865	8-24-65	
A	REVISED PER TDRR 33047	3 MAR 67	VB EF

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. EACH SHIPPING AND UNIT CONTAINER SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, ITEM NAME, NASA DRAWING NUMBER AND REVISION LETTER, NET CONTENTS, LOT NUMBER, DATE OF MANUFACTURE AND EXPIRATION DATE FOR UNOPENED CONTAINERS.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL SHALL BE A COLORANT OF PASTE CONSISTENCY CONSISTING OF A LOW MOLECULAR WEIGHT EPOXY RESIN COMBINED WITH A PIGMENT AS SPECIFIED IN TABLE I.
   - B. WEIGHT PER EPOXY EQUIVALENT SHALL BE 174-186 WHEN TESTED IN ACCORDANCE WITH ASTM D 1652.

3. DESIGN:
   - A. THE MATERIAL SHALL BE FORMULATED TO THE PIGMENT TO RESIN RATIO SHOWN IN TABLE I.
   - B. VISCOSITY AT 25°C SHALL BE 300,000 TO 700,000 CPS AS DETERMINED WITH A BROOKFIELD MODEL RVT VISCOMETER EQUIPPED WITH A HELIPATH STAND USING A TB OR TC SPINDLE OPERATED AT 5 R.P.M.
   - C. SHELF LIFE: THE MATERIAL SHALL HAVE A SHELF LIFE OF 6 MONTHS FROM DATE OF MANUFACTURE WHEN STORED IN UNOPENED CONTAINERS AT AN AMBIENT TEMPERATURE OF +25°C.
   - D. THESE MATERIALS SHALL HAVE A MINIMUM HEGMAN GRIND VALUE OF 4 DETERMINED IN ACCORDANCE WITH ASTMD1210.

TABLE I

NASA DASH NUMBER	COLOR	PIGMENT	PIGMENT TO RESIN RATIO
-1	BLACK	CARBON BLACK	1:9
-2	RED	CADMIUM SELENIDE	1:1

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497
DRAWN Bender DATE 19-AUG-65
CHECKED Ed Foster 19 Aug 65
APPROVAL D. R. [illegible] 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL 24 [illegible] 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COLORANT, EPOXY BASED

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008822
SCALE NONE
WT
SHEET 1 OF 1

1008822

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21865	8-24-65	
Ⓜ A	REVISED PER TDRR 33047	3 MAR 67	VE EJ
Ⓜ B	REVISED PER TDRR 33519	12 APRIL 67	CFB RCB
C	REVISED PER TDRR 33848	10 AUG 67	MTY Cun

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. EACH SHIPPING AND UNIT CONTAINER SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, ITEM NAME, NASA DRAWING NUMBER AND REVISION LETTER, NET CONTENTS, LOT NUMBER, DATE OF MANUFACTURE AND EXPIRATION DATE FOR UNOPENED CONTAINERS.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL SHALL BE A COLORANT OF PASTE CONSISTENCY CONSISTING OF A LOW MOLECULAR WEIGHT EPOXY RESIN COMBINED WITH A PIGMENT AS SPECIFIED IN TABLE I.
   - B. THESE MATERIALS SHALL HAVE A MINIMUM HEGMAN GRIND VALUE OF 4 DETERMINED IN ACCORDANCE WITH ASTM D1210.

3. DESIGN:
   - A. THE MATERIAL SHALL BE FORMULATED TO THE PIGMENT TO RESIN RATIO SHOWN IN TABLE I.
   - B. VISCOSITY AT 25°C SHALL BE 300,000 TO 700,000 CPS AS DETERMINED WITH A BROOKFIELD MODEL RVT VISCOMETER EQUIPPED WITH A HELIPATH STAND USING A TB OR TC SPINDLE OPERATED AT 5 R.P.M.
   - C. SHELF LIFE: THE MATERIAL SHALL HAVE A SHELF LIFE OF NOT LESS THAN 6 MONTHS WHEN RECEIVED BY THE PURCHASER WHEN STORED IN UNOPENED CONTAINERS AT AN AMBIENT TEMPERATURE OF 25° ± 5°C.
   - D. THE COLORANT SHALL BE MANUFACTURED FROM AN EPOXY RESIN THAT HAS A WEIGHT PER EPOXY EQUIVALENT OF 174-186 WHEN TESTED IN ACCORDANCE WITH ASTM D1652.

TABLE I

NASA DASH NUMBER	COLOR	PIGMENT	PIGMENT TO RESIN RATIO
-1	BLACK	CARBON BLACK	1:9 ± 1% BY WEIGHT
-2	RED	CADMIUM SELENIDE	1:1 ± 1% BY WEIGHT

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE REQUIREMENTS

HEAT TREATMENT
NONE

FINAL FINISH
NONE

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS 9-497

DRAWN Bender DATE 19 AUG 65
CHECKED Ed Foster 19 AUG 65
APPROVAL D. W. Test 8/24/65
APPROVAL

NASA APPROVAL G. C. [illegible]
MIT APPROVAL [illegible] 24 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COLORANT, EPOXY BASED

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008822

SCALE NONE WT SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE AID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21865	8-24-65	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. EACH SHIPPING AND UNIT CONTAINER SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, ITEM NAME, NASA DRAWING NUMBER AND REVISION LETTER, NET CONTENTS, LOT NUMBER, DATE OF MANUFACTURE AND EXPIRATION DATE FOR UNOPENED CONTAINERS.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL SHALL BE A COLORANT OF PASTE CONSISTENCY CONSISTING OF A LOW MOLECULAR WEIGHT EPOXY RESIN COMBINED WITH A PIGMENT AS SPECIFIED IN TABLE I.
   - B. WEIGHT PER EPOXY EQUIVALENT: 120-140 ASTMD1652

3. DESIGN:
   - A. THE MATERIAL SHALL BE FORMULATED TO THE PIGMENT TO RESIN RATIO SHOWN IN TABLE I.
   - B. VISCOSITY AT 25°C 500,000-700,000 CP AS DETERMINED WITH A BROOKFIELD MODEL RVT VISCOMETER EQUIPPED WITH A HELIPATH STAND USING A TB SPINDLE AT 5 R.P.M.
   - C. SHELF LIFE: THE MATERIAL SHALL HAVE A SHELF LIFE OF 6 MONTHS FROM DATE OF MANUFACTURE WHEN STORED IN UNOPENED CONTAINERS AT AN AMBIENT TEMPERATURE OF +25°C.
   - D. THESE MATERIALS SHALL HAVE A MINIMUM HEGMAN GRIND VALUE OF 4 DETERMINED IN ACCORDANCE WITH ASTMD1210.

TABLE I

NASA DASH NUMBER	COLOR	PIGMENT	PIGMENT TO RESIN RATIO
-1	BLACK	CARBON BLACK	1:9
-2	RED	CADMIUM SELENIDE	1:1

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT NAS 9-497
DRAWN Bender DATE 19-AUG-65
CHECKED Ed Foster 19 AUG 65
APPROVAL D. R. Test 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL 24 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COLORANT, EPOXY BASED

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008822
SCALE NONE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008823 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
A	REVISED PER TDRR 23271	11/2/65	WC

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

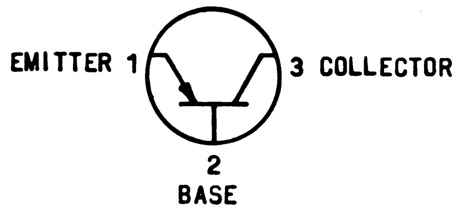
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS AND THE SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT I_{CBO} AT 100°C.
     - (2) SWITCHBACK VOLTAGE, LV_{CEO}.
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$.
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.

3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): 200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 2.0 WATTS. THERMAL RESISTANCE (θ_{JC}): 87°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 360 MILLIWATTS. THERMAL RESISTANCE (θ_{JA}): 486°C/WATT.

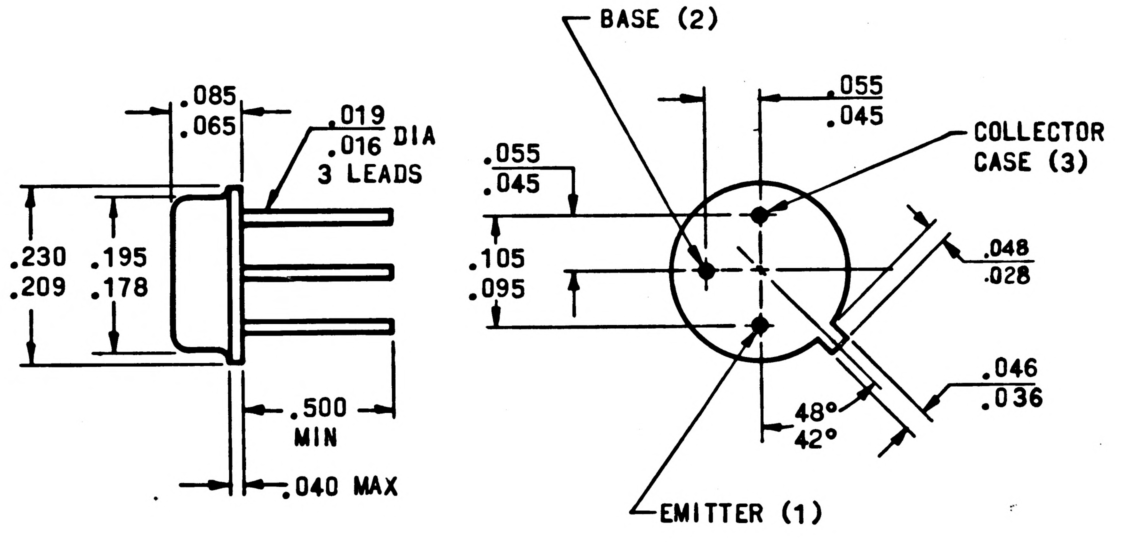
4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. X-RAY ALL PARTS FOR .003 INCH MINIMUM CLEARANCE BETWEEN CAP AND INTERNAL LEADS INCLUDING POSTS.
   - B. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD 750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8}CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



GRAPHICAL SYMBOL



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Carl Johnson DATE 24 Aug 65
CHECKED
APPROVAL Robert Bedingfield 8/27/65
APPROVAL
NASA APPROVAL
MIT APPROVAL 24 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008823
SCALE —
WT
SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008823 A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
A	REVISED PER TDRR 23271	11/2/65	WK

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
   (1) AMBIENT TEMPERATURE = +150°C
   (2) V_{CE} = 80% OF MAX PART RATING.
   (3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10 NANOAMPERES, WHICHEVER IS GREATER

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
   (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
   (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
   (3) POWER DISSIPATION: 300 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
   (1) SWITCHBACK VOLTAGE, LV_{CEO}
   (2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
   (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
   (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATE SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Carl Johnson DATE 24Aug65
CHECKED
APPROVAL Robert Bedingfield 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICONE, PNP
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008823
SCALE —
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVER[illegible] MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAI[illegible] SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER [illegible]SON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A	1008823

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
A	REVISED PER TDRR 23271	11/2/65	WK

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W
-1	-60	-60	-5	-60	2.0
-2	SHALL BE A MATCHED PAIR OF 1008823-1 WITH THE ADDITION THAT h_{FE1} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT				

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}= -50 VDC	I_{CBO1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50VDC T_C=100°C	I_{CBO2}	—	8	μA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V, T_C=+150°C	I_{CBO3}	—	10	μA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE2}	75	125	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 μSEC, DUTY CYCLE ≤ 2%

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN Carl Johnson DATE 24 Aug 65
CHECKED
APPROVAL Robert Bodingfield 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 24 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008823

SCALE — WT SHEET 3 OF 3

1008823 A

4 3 2 1

B	1008823

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	9-24-65	
Ⓜ A	REVISED PER TDRR 23271	11/2/65	W/C
B	REVISED PER TDRR 24703	12/2/65	W/C

REQUIREMENTS:

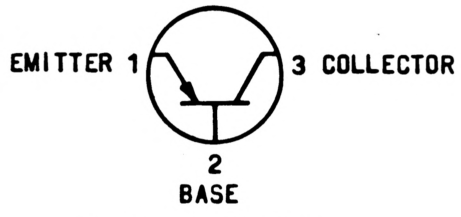
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS AND THE SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT I_{CBO} AT 100°C.
     - (2) SWITCHBACK VOLTAGE, LV_{CEO}.
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE}
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$.
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT $I_C = -150$ MA.

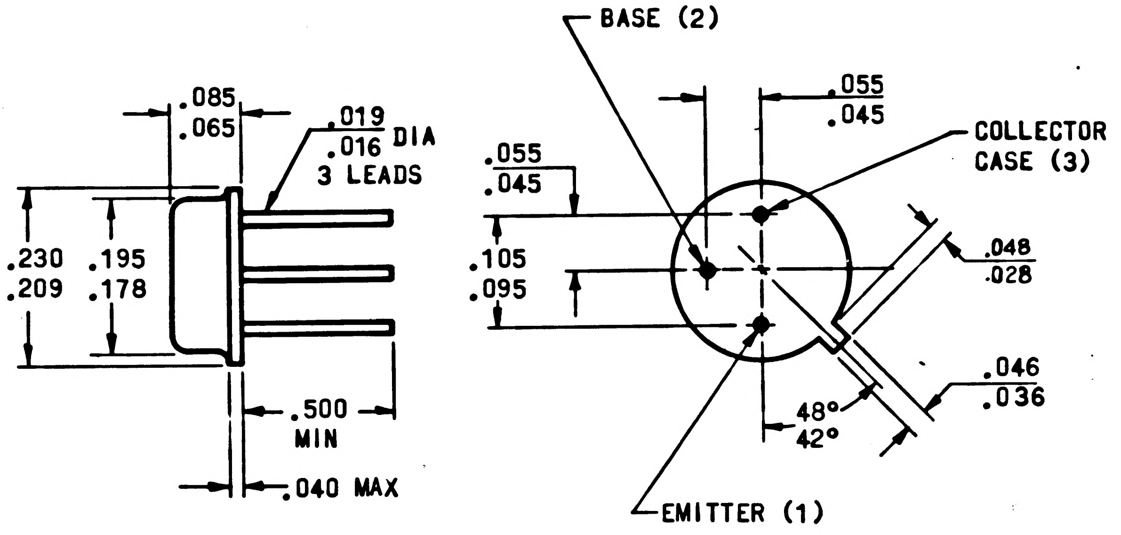
3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): 200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 2.0 WATTS. THERMAL RESISTANCE (θ_{JC}): 87°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 360 MILLIWATTS. THERMAL RESISTANCE (θ_{JA}): 486°C/WATT.

4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. X-RAY ALL PARTS FOR .003 INCH MINIMUM CLEARANCE BETWEEN CAP AND INTERNAL LEADS INCLUDING POSTS.
   - B. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD 750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8}CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Carl Johnson DATE
CHECKED
APPROVAL Robert Bedingfield
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008823
SCALE —	WT	SHEET 1 OF 3

4 3 2 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
Ⓜ A	REVISED PER TDRR 23271	11/2/65	WK
B	REVISED PER TDRR 24703	12/21/65	RB WK

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
  (1) AMBIENT TEMPERATURE = +150°C
  (2) V_{CE} = 80% OF MAX PART RATING.
  (3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10 NANOAMPERES, WHICHEVER IS GREATER

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
  (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
  (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
  (3) POWER DISSIPATION: 300 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
  (1) SWITCHBACK VOLTAGE, LV_{CEO}
  (2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
  (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
  (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATE SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Carl Johnson DATE 24/10/65
CHECKED
APPROVAL Robert Bedingfield 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICONE, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008823
SCALE —	WT	SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B 1008823

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
A	REVISED PER TDRR 23271	11/2/65	W.K.
B	REVISED PER TDRR 24703	12/21/65	W.K.

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS T_C = +25°C					
DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W
−1	-60	-60	-5	-60	2.0
−2	SHALL BE A MATCHED PAIR OF 1008823-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT				

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}= -50 VDC	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50VDC T_C=100°C	I_{CBO_2}	—	8	µA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V, T_C=+150°C	I_{CBO_3}	—	10	µA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE}	75	125	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 2%

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN Carl Johnson DATE 24Aug65
CHECKED
APPROVAL Robert Boedingfield 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kayton 24Aug65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008823
SCALE —
WT
SHEET 3 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
A	REVISED PER TDRR 23271	11/2/65	W/C
B	REVISED PER TDRR 24703	12/21/65	W/C
C	REVISED PER TDRR 29258	6/3/66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

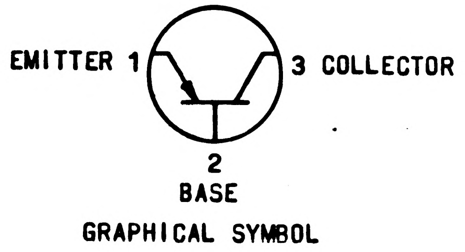
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS AND THE SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT I_{CBO} AT 100°C.
     - (2) SWITCHBACK VOLTAGE, LV_{CEO}.
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE}
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$.
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT $I_C = -150$ MA.

3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): 200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 2.0 WATTS. THERMAL RESISTANCE (θ_{JC}): 87°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 360 MILLIWATTS. THERMAL RESISTANCE (θ_{JA}): 486°C/WATT.

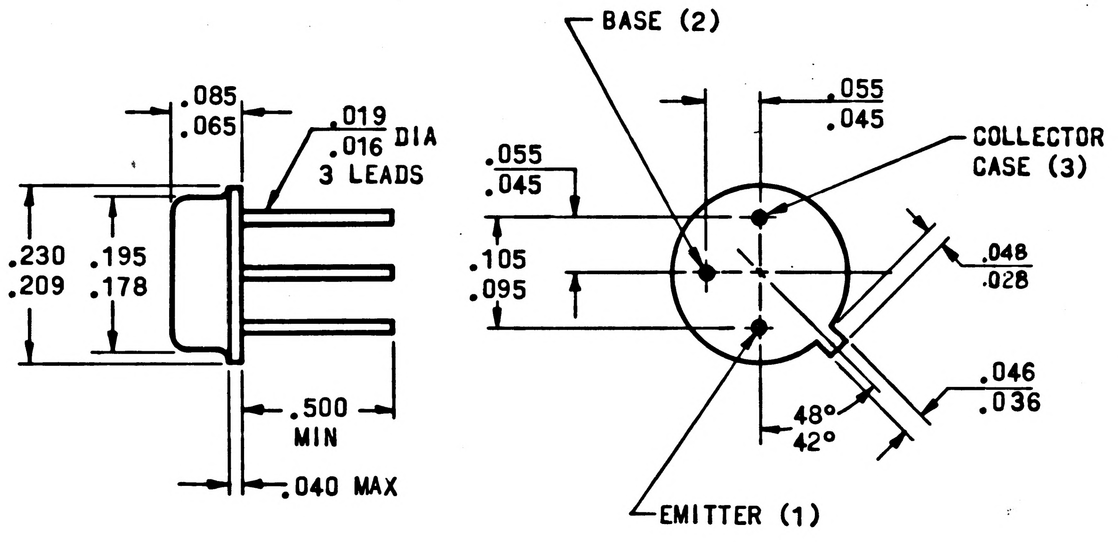
4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. X-RAY ALL PARTS FOR .003 INCH MINIMUM CLEARANCE BETWEEN CAP AND INTERNAL LEADS INCLUDING POSTS.
   - B. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD 750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8}CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



GRAPHICAL SYMBOL



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Carl Johnson DATE 29 Jul 65
CHECKED
APPROVAL Robert Beding 8/20/65
APPROVAL
NASA APPROVAL
MIT APPROVAL 24 Aug 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008823
SCALE —	WT	SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
Ⓜ A	REVISED PER TDRR 23271	11/2/65	WK
Ⓜ B	REVISED PER TDRR 24703	12/21/65	WK
C	REVISED PER TDRR 29258	6/3/66	

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
(1) AMBIENT TEMPERATURE = +150°C
(2) V_{CB} = 80% OF MAX PART RATING.
(3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 100% OR 10 NANOAMPERES, WHICHEVER IS GREATER

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
(1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
(2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
(3) POWER DISSIPATION: 300 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
(1) SWITCHBACK VOLTAGE, LV_{CEO}
(2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
(3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATE SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

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HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Carl Johnson DATE 24Aug65
CHECKED
APPROVAL Robert Bodingfield 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICONE, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008823

SCALE — WT SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	
A	REVISED PER TDRR 23271	11/2/65	WK
B	REVISED PER TDRR 24703	12/21/65	W.K.
C	REVISED PER TDRR 29258	4/3/66	

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS T_C = +25°C

DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W
-1	-60	-60	-5	-60	2.0
-2	SHALL BE A MATCHED PAIR OF 1008823-1 WITH THE ADDITION THAT h_{FE} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT				

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = +25°C (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}= -50 VDC	I_{CBO_1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-50VDC T_C=100°C	I_{CBO_2}	—	8	µA
	COLLECTOR CUTOFF CURRENT	I_E=0, V_{CB}=-30 V, T_C=+150°C	I_{CBO_3}	—	10	µA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	I_C=-10 mA, I_B=0 (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	I_C=-10 mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	I_C=-5 mA, V_{CE}=-10 V (NOTE 1)	h_{FE}	75	125	—
	BASE SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	I_C=-150 mA, I_B=-15 mA(NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	I_C=-50 mA, V_{CE}=-20V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	I_E=0, V_{CB}=-10 V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 µSEC, DUTY CYCLE ≤ 2%

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN Carl Johnson DATE 24Aug65
CHECKED
APPROVAL Robert Boyd...field 24Aug65
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 24Aug65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008823
SCALE —	WT	SHEET 3 OF 3

1008823

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002051, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

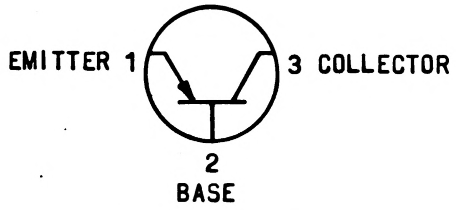
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS AND THE SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEAD DATA: KOVAR, WITH GOLD PLATING PER ND 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT I_{CBO} AT 100°C.
     - (2) SWITCHBACK VOLTAGE, LV_{CEO}.
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}
     - (4) BASE SATURATION VOLTAGE, $V_{BE(SAT)}$.
     - (5) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT $I_C = -150$ MA.

3. DESIGN:
   - A. STORAGE TEMPERATURE (Tstg): -65° TO +200°C.
   - B. JUNCTION OPERATING TEMPERATURE (T_J): 200°C MAXIMUM.
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL CHARACTERISTICS: PER TABLE II.
   - E. POWER DISSIPATION:
     - (1) AT +25°C CASE TEMPERATURE: 2.0 WATTS. THERMAL RESISTANCE (θ_{JC}): 87°C/WATT.
     - (2) AT +25°C AMBIENT TEMPERATURE: 360 MILLIWATTS. THERMAL RESISTANCE (θ_{JA}): 486°C/WATT.

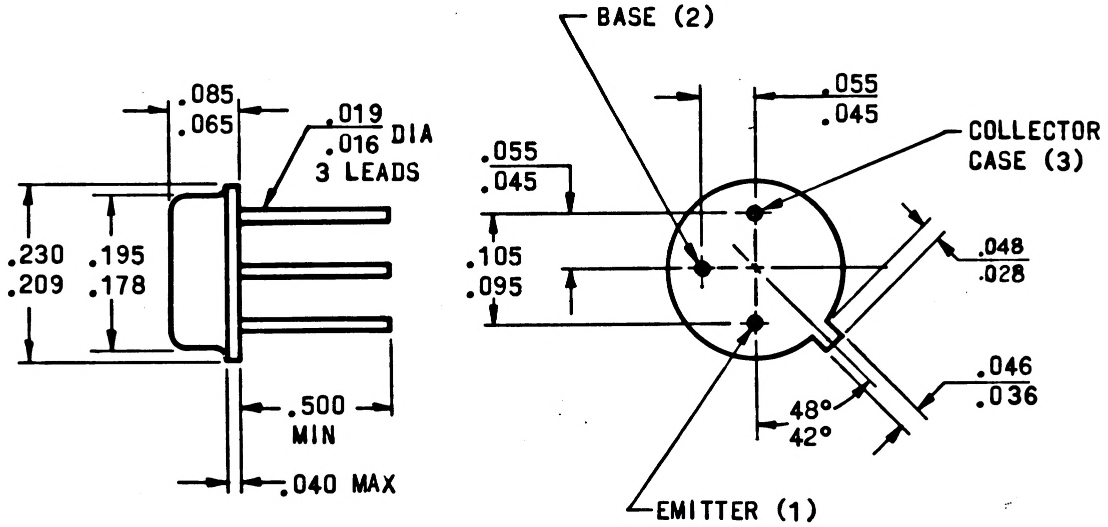
4. SPECIAL 100% CONDITIONING BY SUPPLIER:
   - A. X-RAY ALL PARTS FOR .003 INCH MINIMUM CLEARANCE BETWEEN CAP AND INTERNAL LEADS INCLUDING POSTS.
   - B. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN:
     - (1) ACCELERATION AT 20,000 G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD 750 METHOD 2006 OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8}CC-ATM/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER



GRAPHICAL SYMBOL



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
SEE REQUIREMENTS
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Carl Johnson DATE 29Jul65
CHECKED
APPROVAL Robert Bedingfield 8/23/65
APPROVAL
NASA APPROVAL
MIT APPROVAL 24Aug65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008823

SCALE — WT SHEET 1 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	

REQUIREMENTS: (CONTINUED)

C. REVERSE BIAS HIGH TEMPERATURE STORAGE FOR 48 HOURS AT THE FOLLOWING CONDITIONS:
   (1) AMBIENT TEMPERATURE = +150°C
   (2) V_{CE} = 80% OF MAX PART RATING.
   (3) I_{CES} AT -40V AND I_{EBO} AT -4V MEASURED PRIOR TO AND FOLLOWING THIS SCREEN SHALL NOT CHANGE MORE THAN 10 NA.

D. BURN-IN: PARTS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITION:
   (1) AMBIENT TEMPERATURE, T_A = +25° ± 5°C.
   (2) COLLECTOR VOLTAGE, V_{CE} = -17 VOLTS DC.
   (3) POWER DISSIPATION: 300 MILLIWATTS ±10 PERCENT.

E. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
   (1) SWITCHBACK VOLTAGE, LV_{CEO}
   (2) COLLECTOR CUTOFF CURRENT, I_{CBO_1} AT T_C = 25°C
   (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$ AT I_C = -150 MA.
   (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE_1}

F. BURN-IN DATE SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT OR ABSOLUTE CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 20% IN h_{FE} OR HAVING INCREASED MORE THAN 10 NA IN I_{CBO} SHALL NOT BE ACCEPTABLE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Carl Johnson DATE 24 Aug 65
CHECKED
APPROVAL Robert Bridgefield 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICONE, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008823
SCALE —
WT
SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008823

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 21866	8-24-65	

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS $T_C = +25°C$

DASH NUMBER	COLLECTOR VOLTAGE (V_{CBO})	COLLECTOR VOLTAGE (V_{CER}) ($R_{BE} \leq 10\Omega$)	EMITTER VOLTAGE (V_{EBO})	COLLECTOR VOLTAGE (V_{CEO})	COLLECTOR POWER DISSIPATION
	V_{DC}	V_{DC}	V_{DC}	V_{DC}	W
−1	-60	-60	-5	-60	2.0
−2	SHALL BE A MATCHED PAIR OF 1008812-1 WITH THE ADDITION THAT h_{FE1} SHALL BE MATCHED INITIALLY (AS RECEIVED BY THE USER) TO WITHIN 10% OF THE LOWER h_{FE} UNIT				

TABLE II

ELECTRICAL CHARACTERISTICS AT $T_C = +25°C$ (UNLESS OTHERWISE SPECIFIED)

DASH NUMBER	PARAMETER	CONDITION	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
-1	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-50$ VDC	I_{CBO1}	—	20	NA
	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-50$VDC $T_C=100°C$	I_{CBO2}	—	8	μA
	COLLECTOR CUTOFF CURRENT	$I_E=0$, $V_{CB}=-30$ V, $T_C=+150°C$	I_{CBO3}	—	10	μA
	COLLECTOR EMITTER SWITCHBACK VOLTAGE	$I_C=-10$ mA, $I_B=0$ (NOTE 1)	LV_{CEO}	-60	—	VDC
	COLLECTOR TO EMITTER BREAKDOWN VOLTAGE	$I_C=-10$ mA, $R_{BE} \leq 10\Omega$ (NOTE 1)	LV_{CER}	-60	—	VDC
	STATIC FORWARD CURRENT TRANSFER RATIO	$I_C=-5$ mA, $V_{CE}=-10$ V (NOTE 1)	h_{FE2}	75	125	—
	BASE SATURATION VOLTAGE	$I_C=-150$ mA, $I_B=-15$ mA(NOTE 1)	$V_{BE(SAT)}$	—	-1.3	VDC
	COLLECTOR SATURATION VOLTAGE	$I_C=-150$ mA, $I_B=-15$ mA(NOTE 1)	$V_{CE(SAT)}$	—	-.4	VDC
	SMALL-SIGNAL, SHORT CIRCUIT FORWARD CURRENT TRANSFER RATIO	$I_C=-50$ mA, $V_{CE}=-20$V, f=100 MC	h_{FE}	2.0	—	—
	OUTPUT CAPACITANCE	$I_E=0$, $V_{CB}=-10$ V, f=140 kc	C_{ob}	—	8	pf

NOTES:

1. PULSE MEASUREMENT: PULSE LENGTH = 300 μSEC, DUTY CYCLE ≤ 2%

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Carl Johnson DATE 24Aug65
CHECKED
APPROVAL Robert Boeding field 8/24/65
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kayton 24Aug65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR - SILICON, PNP

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008823
SCALE —
WT
SHEET 3 OF 3

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 25088			1-5-66	WK

PARTS PROCURED TO THIS DRAWING SHALL MEET THE REQUIREMENTS OF NORTH AMERICAN AVIATION SPECIFICATION SPECIFIED

1008824-001	ME-452-0060-1003 REV H, DATED 5-27-65 AS AMENDED BY PDC-1, DATED, 8-5-65

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

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HOUSTON, TEXAS

DRAWN 12-21-65
CHECKED 12-21-65
APPROVED Paul Watson DEC 22-65
APPROVED 12/22/65
APPROVED MIT 5 Jan 66
A.C. MET
APPROVED MSC
DATE

SWITCH, PUSHBUTTON HERMETICALLY SEALED

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008824
SCALE
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008826

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23266	10-19-65	

REQUIREMENTS:

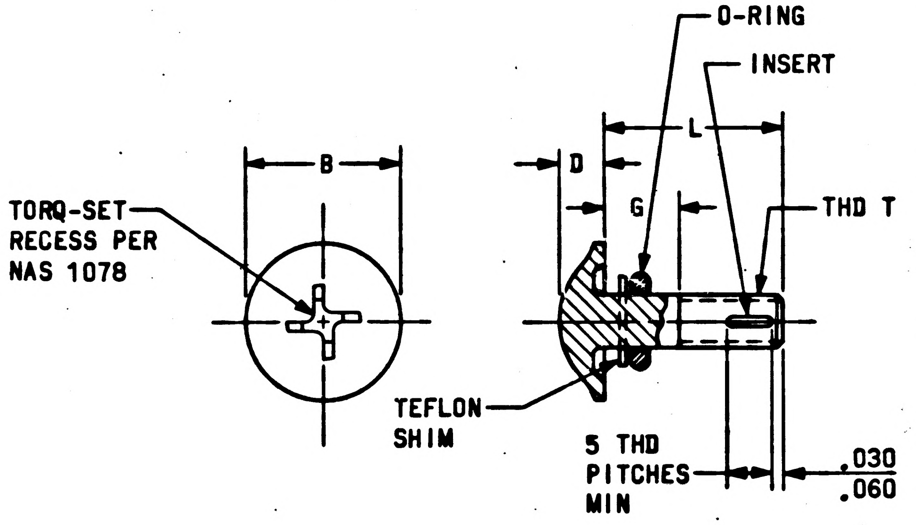
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL:
     - (1) SCREW: STAINLESS STEEL, TYPE 431 PER QQ-S-763. HEAT TREAT PER MIL-H-6875, 125,000-145,000 PSI.
     - (2) O-RING: SILICONE RUBBER PER MIL-R-5847, CLASS III, GRADE 60.
     - (3) INSERT: NYLON OR EQUIVALENT.
   - B. FINISH:
     - (1) SCREW: PASSIVATE PER MIL-F-14072, FINISH E300.

3. DESIGN:
   - A. INSERT SHALL MEET THE REQUIREMENTS OUTLINED IN MIL-F-18240, TYPE B.
   - B. O-RING GROOVE CONFIGURATION MUST GUARNTEE METAL TO METAL CONTACT AND PROVIDE SUFFICIENT O-RING SQUEEZE SO THAT SCREW ASSEMBLY SHALL WITHSTAND 30 PSI AIR PRESSURE. TOURQING ACTION SHALL IN NO WAY CHAFE, TEAR OR MUTILATE O-RING.

DASH NUMBER	THREAD T	B		D		L LENGTH		G GRIP		APPLICATION DATA
		MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	HOLE DIA. (MAX)
-001	6-32 UNC-2A	.378	.360	.105	.095	.812	.781	.250	.125	.149
-002	↓	↓	↓	↓	↓	.875	.844	↓	↓	↓
-003	↓	↓	↓	↓	↓	.938	.907	↓	↓	↓
-004	↓	↓	↓	↓	↓	1.000	.979	↓	↓	↓

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL: SEE REQUIREMENTS
HEAT TREATMENT: NONE
FINAL FINISH: SEE REQUIREMENTS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT NAS 9-497
DRAWN Bender DATE 20-SEP-65
CHECKED Ed Foster 20 SEP65
APPROVAL D.A. Test 10/18/65
APPROVAL
NASA APPROVAL NOT REQUIRED PER LETTER NASA PP7-65-612
MIT APPROVAL W Kupfer 19 Oct 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, SELF-LOCKING, SEALING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008826
SCALE NONE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1008827 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23250	10-19-65	
A	REVISED PER TDRR 31137	29 SEP 66	vlw

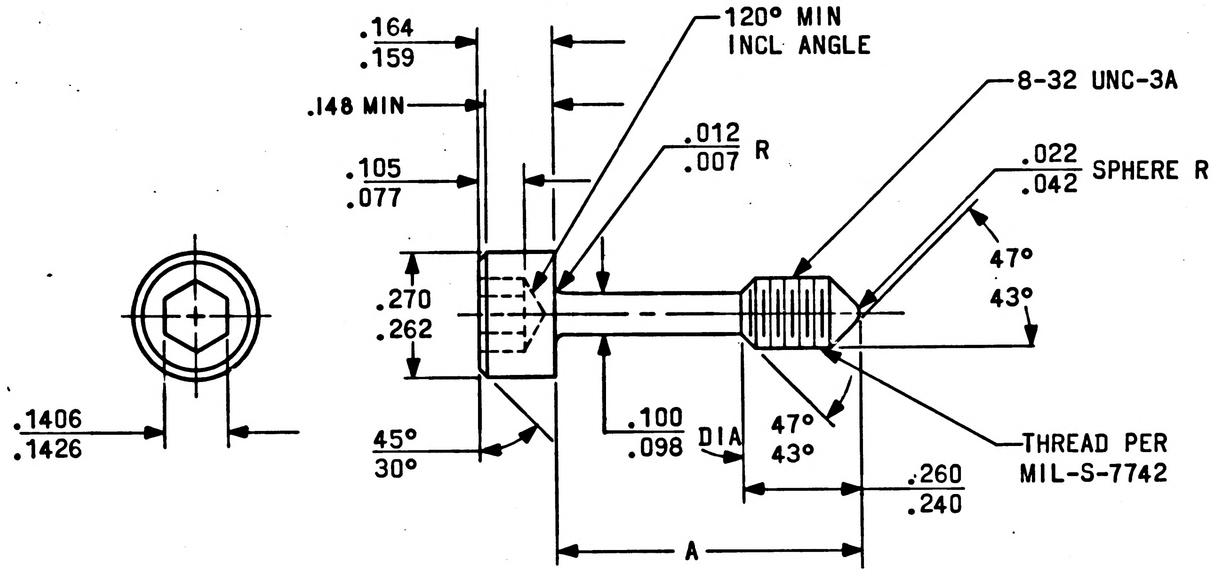
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: HIGH GRADE ALLOY STEEL PER FEDERAL STANDARD 66.
   - B. HEAT TREAT: 200,000 PSI MINIMUM TENSILE STRENGTH PER MIL-H-6875.
   - C. FINISH: NICKEL PLATE .0002/.0004 THICKNESS PER QQ-N-290, CLASS 2.
   - D. DIMENSIONS TO BE MET AFTER PLATING.

3. DESIGN:
   - A. HEAD MAY BE MACHINED OR FORGED AT MANUFACTURER'S OPTION.
   - B. THREADS TO BE FORMED BY ROLLING.
   - C. REMOVE ALL BURRS AND SHARP EDGES .005/.015.
   - D. ALL SURFACES 125✓ PER MIL-STD-10.
   - E. CONCENTRICITY: BODY AND HEAD WITHIN .006 T.I.R. BODY AND SOCKET WITHIN .005 T.I.R.
   - F. STANDARD RING GAGE SHALL BE ABLE TO PASS ON TO SHANK.

DASH NUMBER	A	
	MAX	MIN
-001	.650	.640
-002	.755	.745
-003	.932	.922



1008827

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
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SCREW, CAP, SOCKET HEAD - CAPTIVE

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CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008827
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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23250	10-17-65	

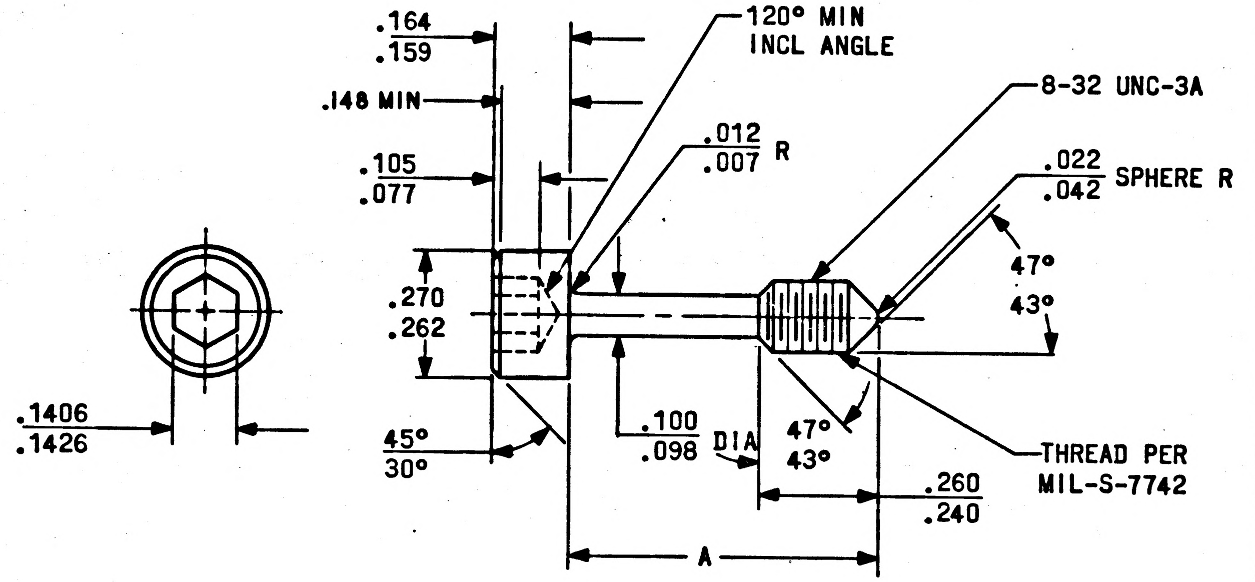
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: HIGH GRADE ALLOY STEEL PER FEDERAL STANDARD 66.
   - B. HEAT TREAT: 200,000 PSI MINIMUM TENSILE STRENGTH PER MIL-H-6875.
   - C. FINISH: NICKEL PLATE .0002/.0004 THICKNESS PER QQ-N-290, CLASS 2.
   - D. DIMENSIONS TO BE MET AFTER PLATING.

3. DESIGN:
   - A. HEAD MAY BE MACHINED OR FORGED AT MANUFACTURER'S OPTION.
   - B. THREADS TO BE FORMED BY ROLLING.
   - C. REMOVE ALL BURRS AND SHARP EDGES .005/.015.
   - D. ALL SURFACES 125✓ PER MIL-STD-10.
   - E. CONCENTRICITY: BODY AND HEAD WITHIN .006 T.I.R. BODY AND SOCKET WITHIN .005 T.I.R.
   - F. STANDARD RING GAGE SHALL BE ABLE TO PASS ON TO SHANK.

DASH NUMBER	A	
	MAX	MIN
-001	.650	.640



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SCREW, CAP, SOCKET HEAD - CAPTIVE

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1008832

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23291	10-19-65	

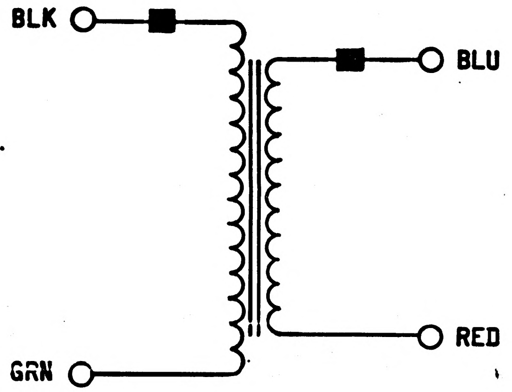
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   - D. UNITS SHALL BE DESIGNED TO MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.
   - E. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215 CLASS I, CODE 1.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MINIMUM MARKING: MARK PER ND 1002019 (EXCEPT ACRYLIC LACQUER SHALL NOT BE USED AS A PROTECTIVE COATING) WITH THE NASA DRAWING NUMBER, MANUFACTURER'S SERIAL NUMBER AND/OR LOT CODE NUMBER AND CONNECTION DATA. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
     - (2) LEADS: LEAD MATERIAL SHALL BE DUMET ALLOY PER ND 1015401 EXCEPT NICKEL STRIKE SHALL BE 100 MICROINCHES MAXIMUM AND LEAD DIAMETER SHALL BE 0.016 ± .001 DIA. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT. LEADS SHALL BE NYLON INSULATED, COLOR CODED PER SCHEMATIC DIAGRAM AND ENDS SHALL BE STRIPPED PER FIGURE I.
   - B. ELECTRICAL REQUIREMENTS:
     - (1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE I.

3. DESIGN:
   - A. THIS UNIT SHALL MEET ALL REQUIREMENTS OF MIL-T-27 FOR GRADE 4, CLASS R LIFE EXPECTANCY X, FAMILY 16, IN AN AMBIENT TEMPERATURE OF 85°C.
   - B. THE UNIT SHALL MEET ALL ELECTRICAL REQUIREMENTS EXCEPT WHERE NOTED, BEFORE, DURING, AND AFTER THE FOLLOWING EXPOSURES.
     - (1) HIGH TEMPERATURE: 71°C OPERATING.
     - (2) LOW TEMPERATURE: -18°C OPERATING.
     - (3) VIBRATION: 10 TO 2000 CPS, 20 G (PER MIL-STD-202, METHOD 204A, CONDITION D).
     - (4) REDUCED PRESSURE: 96 HOURS AT A PRESSURE OF 10^{-4} MM OF MERCURY.
   - C. DC UNBALANCE IN PRIMARY: 0 MA MAXIMUM.
   - D. RATED POWER LEVEL: 25 MW.
   - E. WORKING VOLTAGE BETWEEN WINDINGS AND FROM WINDINGS TO CASE: 49 VOLTS MAXIMUM INSTANTANEOUS.
   - F. EXTERNAL CASE SHALL BE "MU METAL" OR EQUIVALENT.

SCHEMATIC DIAGRAM



VOLTAGES AND CURRENTS ARE RMS VALUES UNLESS OTHERWISE NOTED. RESISTANCES ARE D.C. VALUES AT 25°C

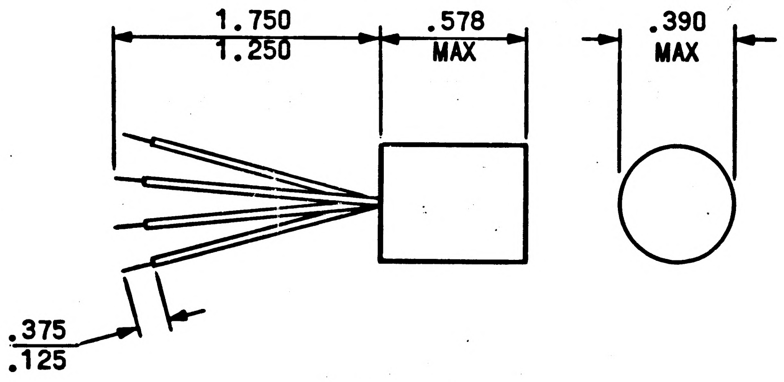


FIG. 1

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

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TRANSFORMER, AUDIO FREQUENCY - 14.14:1 TURNS RATIO

SPECIFICATION CONTROL DRAWING

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SHEET 1 OF 2

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23281	10-19-65	

TABLE I
INSPECTION TESTS

SEE MIL-T-27A FOR TEST PROCEDURES

TITLES IN PARAGRAPH COLUMN REFER TO PARAGRAPH TITLES IN SPECIFICATION MIL-T-27.

PARAGRAPH	
SEALING	IMMERSE IN LIQUID AS INDICATED.
DIELECTRIC STRENGTH	APPLY 200 VOLTS (RMS) BETWEEN WINDINGS AND BETWEEN WINDINGS AND CASE.
INDUCED VOLTAGE	APPLY 140 VOLTS, 2000 CPS TO LEADS BLACK AND GREEN, SECONDARY OPEN.
INSULATION RESISTANCE	10,000 MEGOHMS MINIMUM AT 25°C. (USE 100 VDC MAX.)
DC RESISTANCE (AT 25°C)	R(BLACK-GREEN)= 10,625 OHMS MAXIMUM, R(BLUE-RED) = 125 OHMS MAXIMUM.
INDUCTANCE	SHALL BE 25^{+5}_{-4} HENRIES WITH 5 VOLTS, 1000CPS, 0 MADC (BLACK TO GREEN).
DISTORTION (AT 1 KC)	5% MAXIMUM WITH 2000 OHM LOAD AT 25 MW OUTPUT.
FREQUENCY RESPONSE	(REFERENCE FREQUENCY 1000 CPS) ± 4 DB FROM 300 CPS TO 20 KC. E_S SHALL BE DETERMINED AT 1 KC WITH AN OUTPUT LOAD BLUE TO RED OF 1000 OHMS AT 1 MW, A SOURCE IMPEDANCE OF 200,000 OHMS AND 0 MADC. E_S SHALL BE HELD CONSTANT OVER THE FREQUENCY RANGE.
POLARITY	LEADS BLACK AND BLUE SHALL BE OF LIKE POLARITY.
NO LOAD VOLTAGE RATIO	WITH 5 VOLTS, 1 KC (BLACK TO GREEN), V(BLACK TO GREEN)/V(BLUE TO RED) = 14.14:1 ± 3%.

4. SPECIAL CONDITIONING BY MANUFACTURER (100%):
   A. REACTOR SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202 METHOD 102 EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE UNIT SHALL PASS NORMAL PRODUCTION TESTS.

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23563	11-3-65	WR

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS AS LISTED IN TABLE III WITH REFERENCES TO MIL-T-23648 AND ND 1002057. ANY UNIT WILL BE CONSIDERED A FAILURE IF ITS ZERO-POWER RESISTANCE CHANGES BY MORE THAN 0.5% AS A RESULT OF HAVING BEEN SUBJECTED TO ANY OF THE ENVIRONMENTAL TESTS SPECIFIED.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2. UNIT PACKAGES SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, SERIAL NUMBER, DATE OF MANUFACTURE AND THE NASA PART NUMBER AND DASH NUMBER.

2. ACCEPTANCE AND INSPECTION (100%):
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD MATERIAL: COPPER AWG 26 7/34 STRANDS, TEFLON INSULATED PER MIL-W-16878 TYPE E. TEFLON INSULATION TO BE .0625 MAX FROM RESISTOR BODY.
     - (2) PROTECTIVE VARNISH: MOISTURE AND FUNGUS PROOF VARNISH PER MIL-V-173.
     - (3) MATERIAL AND FINISH CERTIFICATION: LEAD MATERIAL AND RESISTOR MOISTURE PROOF VARNISH COMPLIANCE SHALL BE CERTIFIED WITH EACH SHIPMENT.
     - (4) MARKING: PARTS SHALL BE MARKED WITH A SERIAL NUMBER. SERIALIZATION MAY BE ACCOMPLISHED BY TAGGING LEADS.
   - B. ELECTRICAL CHARACTERISTICS (AT 25° ± 0.02°C):
     - (1) ZERO-POWER RESISTANCE VALUE: TABLE I

3. DESIGN:
   - A. DISSIPATION CONSTANT: SEE TABLE I FOR THE AMOUNT OF POWER WHICH WILL RAISE THE THERMISTOR ONE DEGREE CENTIGRADE ABOVE AMBIENT.
   - B. TIME CONSTANT: SEE TABLE I FOR THE TIME REQUIRED FOR THE THERMISTOR TO REACH 63% OF THE TEMPERATURE CHANGE FOR CERTAIN CHANGE IN AMBIENT TEMPERATURE. THE THERMISTOR WILL REACH 98% OF TEMPERATURE CHANGE IN APPROX 5 TIMES THE CONSTANT LISTED.
   - C. STORAGE LIFE: 1 YEAR MINIMUM AT ROOM TEMPERATURE AND HUMIDITY WHEN STORED IN UNOPENED CONTAINERS.
   - D. CONSTRUCTION: RESISTIVE WAFER MATERIAL WITH LEADS SOLDERED IN PLACE.
   - E. ENVIRONMENTAL: CAPABLE OF OPERATION OVER THE AMBIENT TEMPERATURE RANGE OF -55°C TO +105°C.

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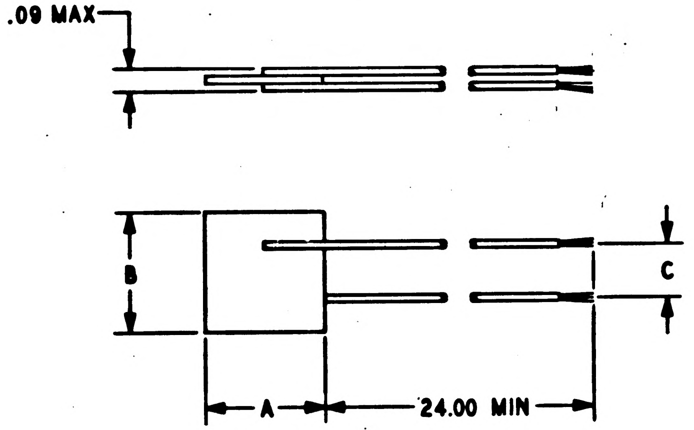

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APPROVAL 25 Oct 65
APPROVAL

NASA APPROVAL A. C. METZGER

MIT APPROVAL 2 Mar 65

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RESISTOR, THERMAL—
TEMPERATURE SENSITIVE, WAFER

SPECIFICATION CONTROL DRAWING

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NASA DRAWING NO. 1008833
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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 23563	11-2-65	WK

REQUIREMENTS: (CONTINUED)

4. SPECIAL CONDITIONING:
   - A. TEMPERATURE CYCLING: RESISTORS SHALL BE TESTED PER MIL-STD-202, METHOD 102, CONDITION C EXCEPT TEMPERATURE EXTREMES OF -55°C AND +105°C. RESISTANCE, ONE HOUR AFTER TESTING, SHALL NOT VARY MORE THAN ± 1% FROM THE INITIAL MEASUREMENT. THERE SHALL BE NO MECHANICAL DAMAGE.
   - B. BURN-IN: RESISTORS SHALL BE BURNED IN NON-OPERATING AT 50°C FOR 100 HOURS. RESISTANCE, ONE HOUR AFTER TESTING SHALL NOT VARY MORE THAN ± 1% FROM THE INITIAL MEASUREMENT. THERE SHALL BE NO MECHANICAL DAMAGE.
   - C. FOLLOWING BURN-IN. THE ZERO-POWER RESISTANCE OF EACH UNIT SHALL BE MEASURED AT THREE (3) TEMPERATURES; 0° ± 0.02°C, 25° ± 0.02°C, AND 50° ± 0.02°C. THE RESISTANCE MEASURED AT THESE TEMPERATURES SHALL BE SUPPLIED FOR EACH UNIT. A CERTIFICATE OF COMPLIANCE TO THE REQUIREMENTS OF PARA. 4A AND 4B ABOVE SHALL ALSO BE SUPPLIED WITH EACH LOT SHIPPED. BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT AND SHALL BE PRESENTED IN SUCH A MANNER AS TO INDICATE THE INITIAL TEST READING AND THE FINAL TEST READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

5. VENDOR SUPPLIED INFORMATION:
   - A. THE FOLLOWING DATA AND INFORMATION TO BE SUPPLIED WITH EACH SHIPMENT UNLESS OTHERWISE SPECIFIED. ALL DATA SUPPLIED WILL REFERENCE THE UNIT PART NUMBER, APPLICABLE DASH NUMBER, AND APPLICABLE PURCHASE ORDER NUMBER.
     - (1) A CERTIFICATE OF COMPLIANCE COVERING REQUIREMENTS OF PARA 2.A(3) AND 4.C. OF THIS SPECIFICATION AND PARA 3.3.3 OF ND 1015404.
     - (2) TEST DATA AS REQUIRED BY PARA 4.C OF THIS SPECIFICATION.

TABLE I

DASH NUMBER	ZERO-POWER RESISTANCE IN OHMS			DISSIPATION CONSTANT MW/°C MIN	TIME CONSTANT SECONDS MAX	DIMENSIONS		
	+25° ±0.02°C	0° ±0.02°C	+50° ±0.02°C			A MAX	B MAX	C NOM
-001	5,000±1%	17,700±3%	1,630±3%	4	12	.28	.28	.20

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

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RESISTOR, THERMAL—
TEMPERATURE SENSITIVE, WAFER

SPECIFICATION CONTROL DRAWING

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23563	11-2-65	

TABLE II

EXAMINATION OR TEST	REQUIREMENT PARAGRAPHS
GENERAL QUALIFICATION REQUIREMENTS	PARA. 3.2 THRU 3.9.2 OF ND 1002057
GROUP I (ALL SAMPLES)	
VISUAL & MECHANICAL	PARA 4.2.1 OF ND 1002057
ZERO-POWER RESISTANCE	PARA 4.5.2 OF MIL-T-23648 EXCEPT MEASURE AT 25°C, +50°C & 0°C
DISSIPATION CONSTANT	PARA 4.5.4 OF MIL-T-23648
THERMAL TIME CONSTANT	PARA 4.5.5 OF MIL-T-23648
MAXIMUM POWER RATING	PARA 3.3.7 OF MIL-T-23648 EXCEPT MEASURE POWER THAT PRODUCES TEMPERATURE RISE OF +80°C
GROUP II (1/3 OF SAMPLES)	
CHARACTERISTICS	
TEMPERATURE CYCLING	PARA 4.5.8 OF MIL-T-23648 (EXCEPT USE TEST CONDITION A OF MIL-STD-202)
THERMAL STABILITY	PARA 4.5.6 OF MIL-T-23648 EXCEPT TEMPERATURE IN PARA 4.5.6.2 WILL BE +105° ± 2°C
LOW TEMPERATURE STORAGE	PARA 4.5.7 OF MIL-T-23648 EXCEPT LOW TEMPERATURE WILL BE -55° ± 3°C
TERMINAL STRENGTH	PARA 4.5.10 OF MIL-T-23648
GROUP III (1/3 OF SAMPLES)	
VIBRATION	PARA 4.2.11 OF ND 1002057 (SEE NOTE 1)
SHOCK	PARA 4.2.12 OF ND 1002057 (SEE NOTE 1)
MOISTURE RESISTANCE	PARA 4.5.13 OF MIL-T-23648 (SEE NOTE 2)
GROUP IV (1/3 OF SAMPLES)	
LOAD LIFE	PARA 4.5.15 OF MIL-T-23648 EXCEPT INITIAL RESISTANCE MAY BE MEASURED PRIOR TO START OF LIFE. MAX OPERATING TEMPERATURE IS +105°C
LEAD COMPOSITION	PARA 4.2.16 OF ND 1002057

NOTES:

1. THE AMOUNT OF POWER TO BE APPLIED WILL BE THAT NECESSARY TO RAISE THE THERMISTOR TEMPERATURE TO APPROX. +65°C UNDER NORMAL FREE AIR CONDITIONS. ZERO-POWER RESISTANCE WILL BE MEASURED BEFORE AND AFTER TEST PER PARA. 4.5.2. OF MIL-T-23648.
2. INDICATED STEPS (a), (d), AND (f) REPLACED BY (1), (4), AND (7) RESPECTIVELY.

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS 9-497

DRAWN Bender DATE 28-SEP-65
CHECKED J. Stalma 29 SEP 65
APPROVAL 25 Oct 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL 2 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

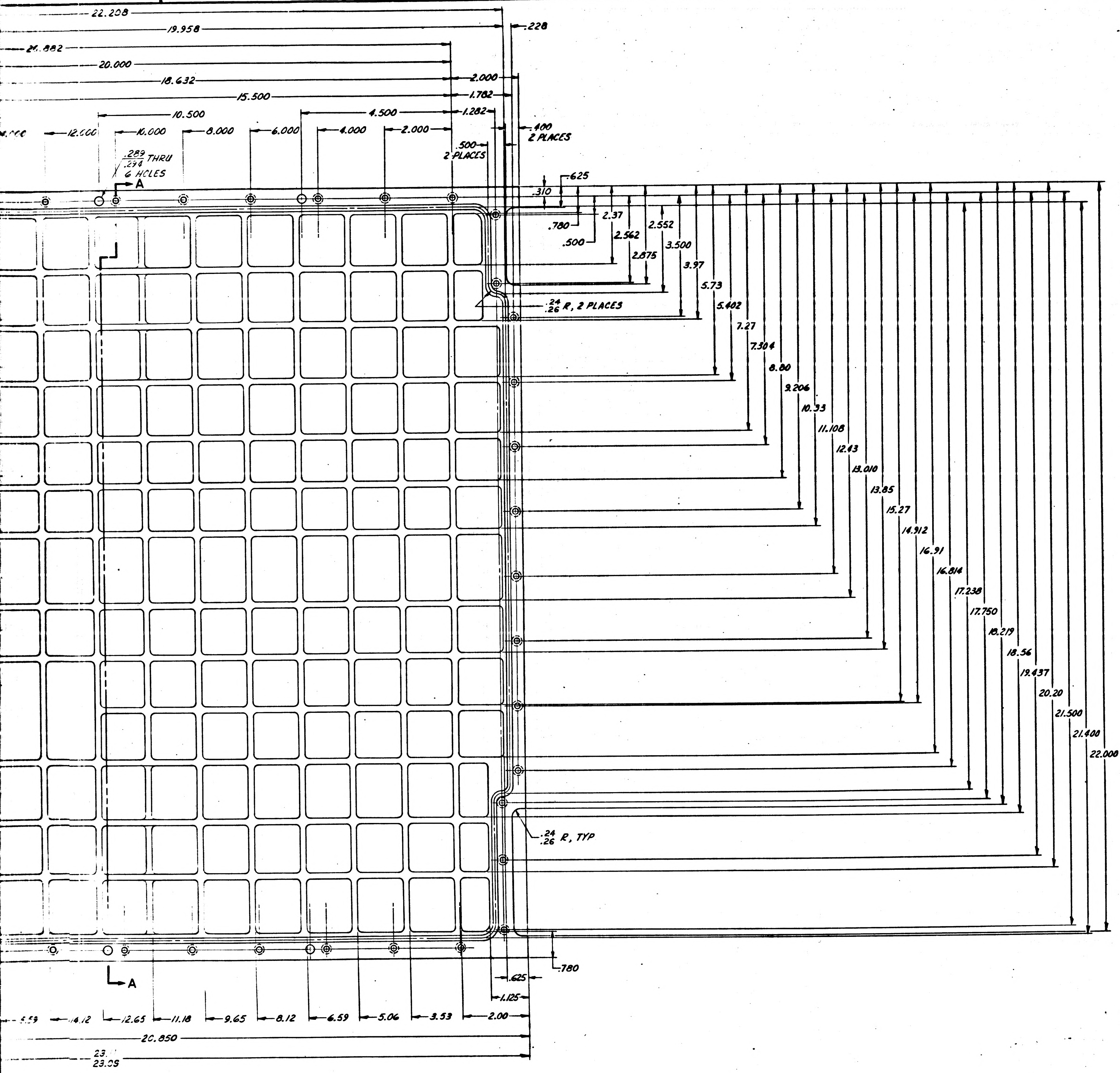
RESISTOR, THERMAL—
TEMPERATURE SENSITIVE, WAFER

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008833
SCALE
WT
SHEET 3 OF 3

J.S.

SYM	DESCRIPTION	DATE	APPD
—	INITIAL RELEASE CLASS A PER TDRR 24678	12-14-65	
A	REVISED PER TDRR 27406	3/28/66	



22.208
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.400 2 PLACES
.289 / .294 THRU 6 HOLES
.500 2 PLACES
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.24 / .26 R, 2 PLACES
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16.814
17.238
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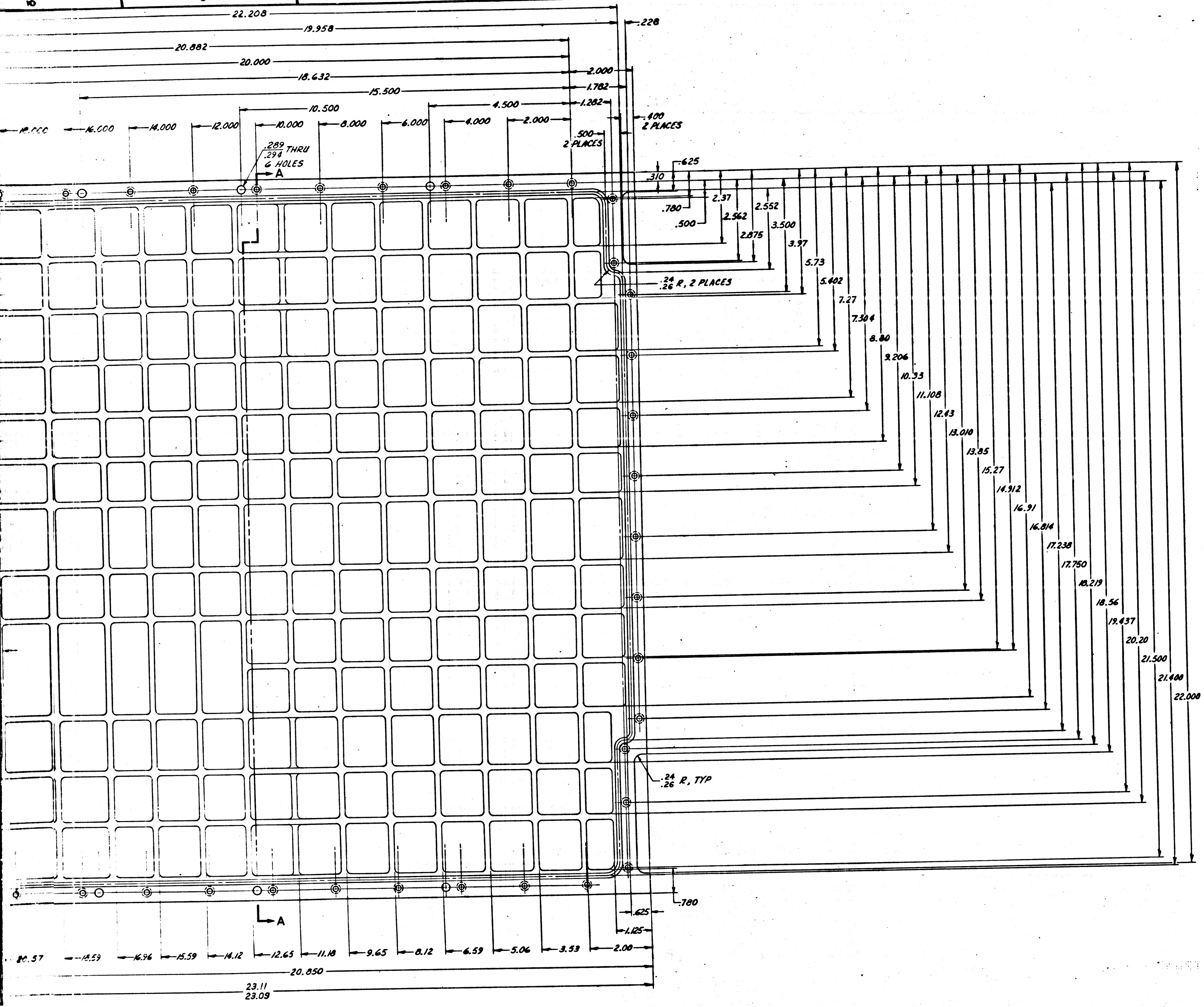
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	AC ELECTRONICS DIVISION GENERAL MOTORS CORP MILWAUKEE WIS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
FRACTIONS ± DECIMALS ±.02 / ±.005 ANGLES ±	DRAWN C.M. Kulp DATE 7 OCT 65 CHECKED Ed Fost 14 Oct 65 APPROVAL APPROVAL D.R. Fast 12/7/65	GASKET, RETAINED SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING		
MATERIAL SEE NOTE 2A	NASA APPROVAL A. C. METZGER	CODE IDENT NO. 80230 SIZE J 1008834
CONTRACT NAS 9-497	MIT APPROVAL	SCALE FULL SHEET 1 OF 1

1008834 A SH 1

1008834

2H

REVISIONS			
SYM	DESCRIPTION	DATE	APPD
—	INITIAL RELEASE CLASS A PER TDRR 24678		
A	REVISED PER TDRR 27406	[illegible]	[illegible]



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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	AC ELECTRONICS DIVISION GENERAL MOTORS CORP MILWAUKEE WIS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
FRACTIONS + − DECIMALS ±.02 ±.005 ANGLES + −	DRAWN C.M. Kulp DATE 7 OCT 65 CHECKED Ed Foster 14 Oct 65 APPROVAL APPROVAL 12/7/65	GASKET, RETAINED SPECIFICATION CONTROL DRAWING	
DO NOT SCALE THIS DRAWING			
MATERIAL SEE NOTE 2A	NASA APPROVAL A. C. METZGER	CODE IDENT NO. 80230	SIZE J | 1008834
CONTRACT NAS 9-497	MIT APPROVAL	SCALE FULL	SHEET 1 OF 1

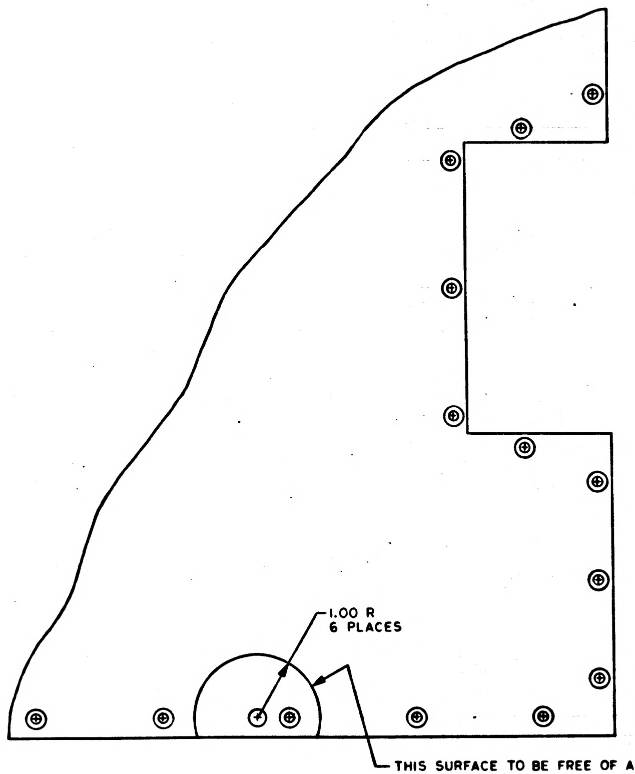
1008834 A SH 1

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I, CODE 4.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL:
     - (1) COVER: MAGNESIUM ALLOY AZ31B-H24 PER QQ-M-44,
     - (2) SEAL: BUTYL RUBBER PER AMS-3238.
   - B. FINISH: (1) COVER: ANODIZE PER MIL-M-45202, TYPE I, CLASS C TOUCH UP AS REQUIRED PER ND1002040 USING MATERIAL PER MIL-M-3171, TYPE VI EXCEPT DO NOT OVERCOAT WITH EPOXY
   - C. REMOVE ALL BURRS AND BREAK SHARP EDGES.
   - D. SURFACE ROUGHNESS SHALL BE 125✓ PER MIL-STD-10 UNLESS OTHERWISE SPECIFIED.
   - E. VENDOR SHALL SUPPLY CURE DATE OF ELASTOMER
   - F. DIMENSIONS MUST BE MET WHEN THE PART IS IN THE RESTRAINED POSITION.
   - G. FLATNESS BETWEEN ADJACENT .059/.064 HOLES SHALL NOT EXCEED .002
   - H. PAINT OUTSIDE SURFACE IN VIEWING PLANE A (EXCEPT SEE NOTE IN PARTIAL VIEW A-A) AND OUTSIDE PERIPHERAL SURFACE BETWEEN VIEWING PLANES A AND B PER ND 1002279, USING PRIMER 1010992 AND PAINT 1008809-1

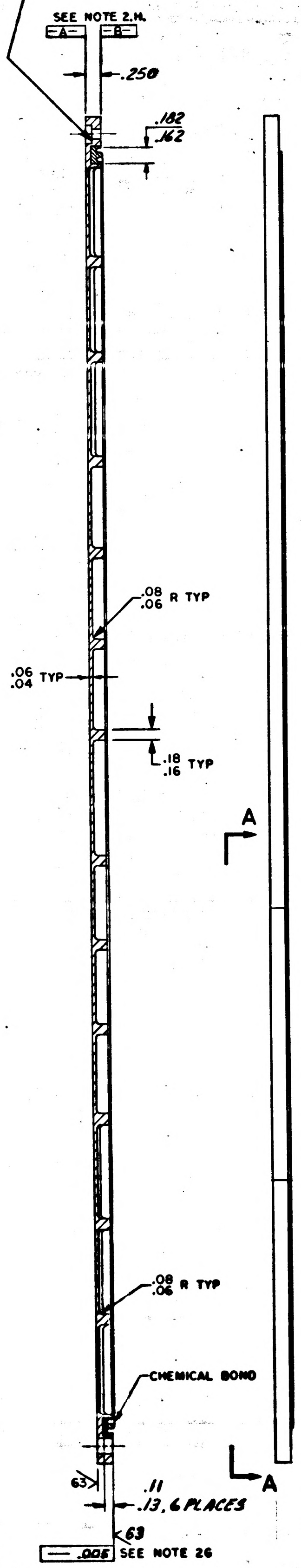
3. DESIGN:
   - A. OPERATING TEMPERATURE: +200°F
   - B. OPERATING PRESSURE: 0-17 PSI DIFFERENTIAL
   - C. MEDIUM SEALED: 90% NITROGEN 10% HELIUM
   - D. VACUUM SERVICE: 10^{-6} TORR
   - E. SEALING: WHEN PROPERLY INSTALLED AND COMPRESSED TO THE PLATE LEVEL (ZERO DEFLECTION OF MATING FLANGES) THE RUBBER SHALL BE CAPABLE OF SEALING AGAINST A LEAKAGE OF 10^{-8} ATM CC/SEC/INCH OF SEAL OF DRY NITROGEN AT A PRESSURE DIFFERENTIAL OF ONE ATMOSPHERE AT 72°F


1.00 R
6 PLACES

THIS SURFACE TO BE FREE OF ANODIZE PAINT AND PRIMER. AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL-M 3171, TYPE VI DO NOT EPOXY COAT 6 PLACES .289/.294 THRU HOLES

PARTIAL VIEW A-A

THIS SURFACE TO BE FREE OF ANODIZE, PRIMER AND PAINT AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL M 3171, TYPE VI DO NOT EPOXY COAT. 50 HOLES


SEE NOTE 2.H.
-A-
-B-
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.04 TYP
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.16 TYP
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.08
.06 R TYP
CHEMICAL BOND
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.13, 6 PLACES
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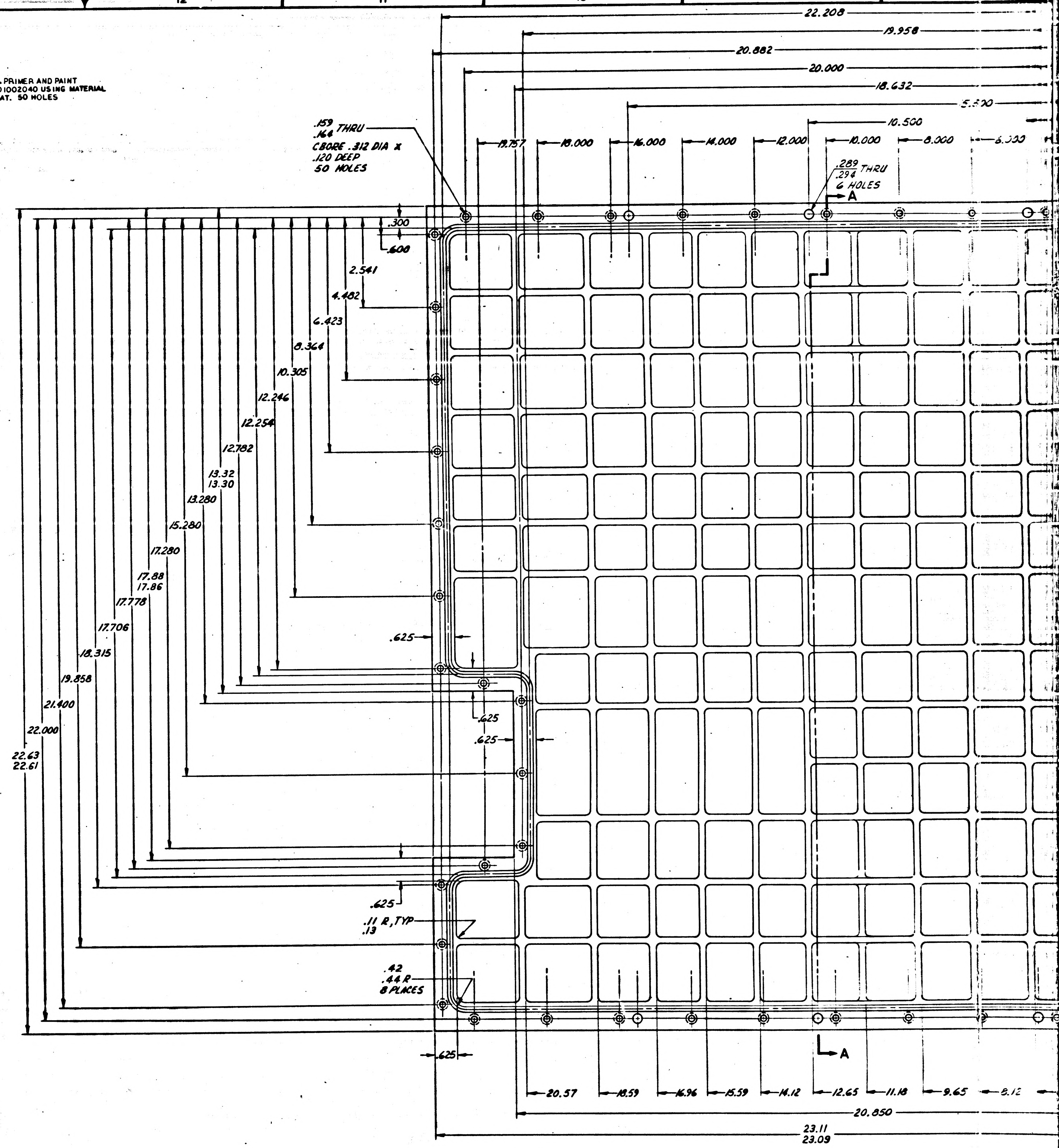
— .005 SEE NOTE 26
A

SECTION A-A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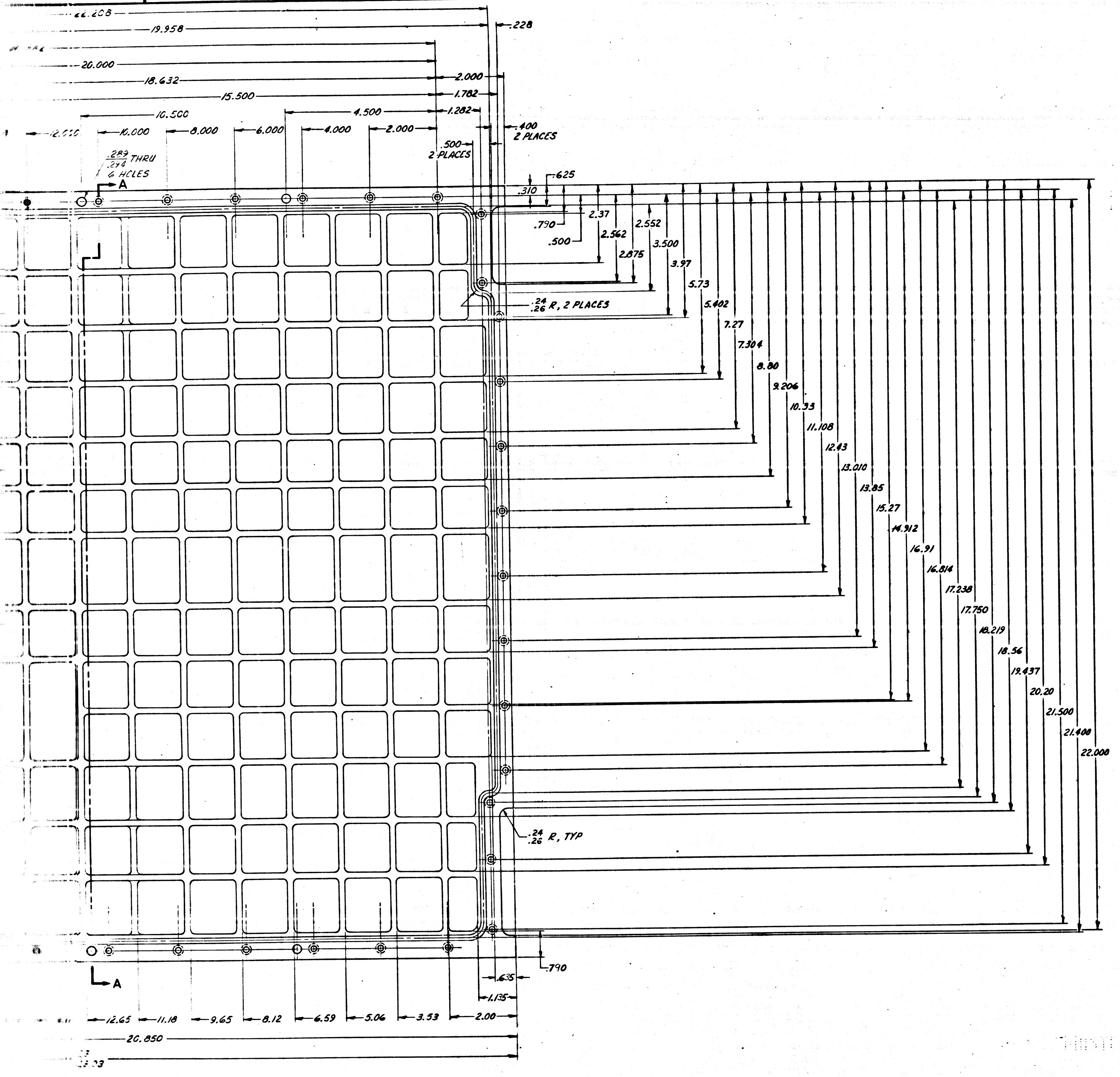
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

1008834 A SH 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPD
—	INITIAL RELEASE CLASS A PER TDRR 24678	12-14-65	
A	REVISED PER TDRR 27406	2/29/66	
B	REVISED PER TDRR 28441		5-4-66



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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	±.02	+
−	±.005	−

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2A

CONTRACT NAS 9-497

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP MILWAUKEE WIS

DRAWN C.M. Kulp DATE 7 OCT 65
CHECKED Ed Foster 14 Oct 65
APPROVAL
APPROVAL D.R. 12/7/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET, RETAINED

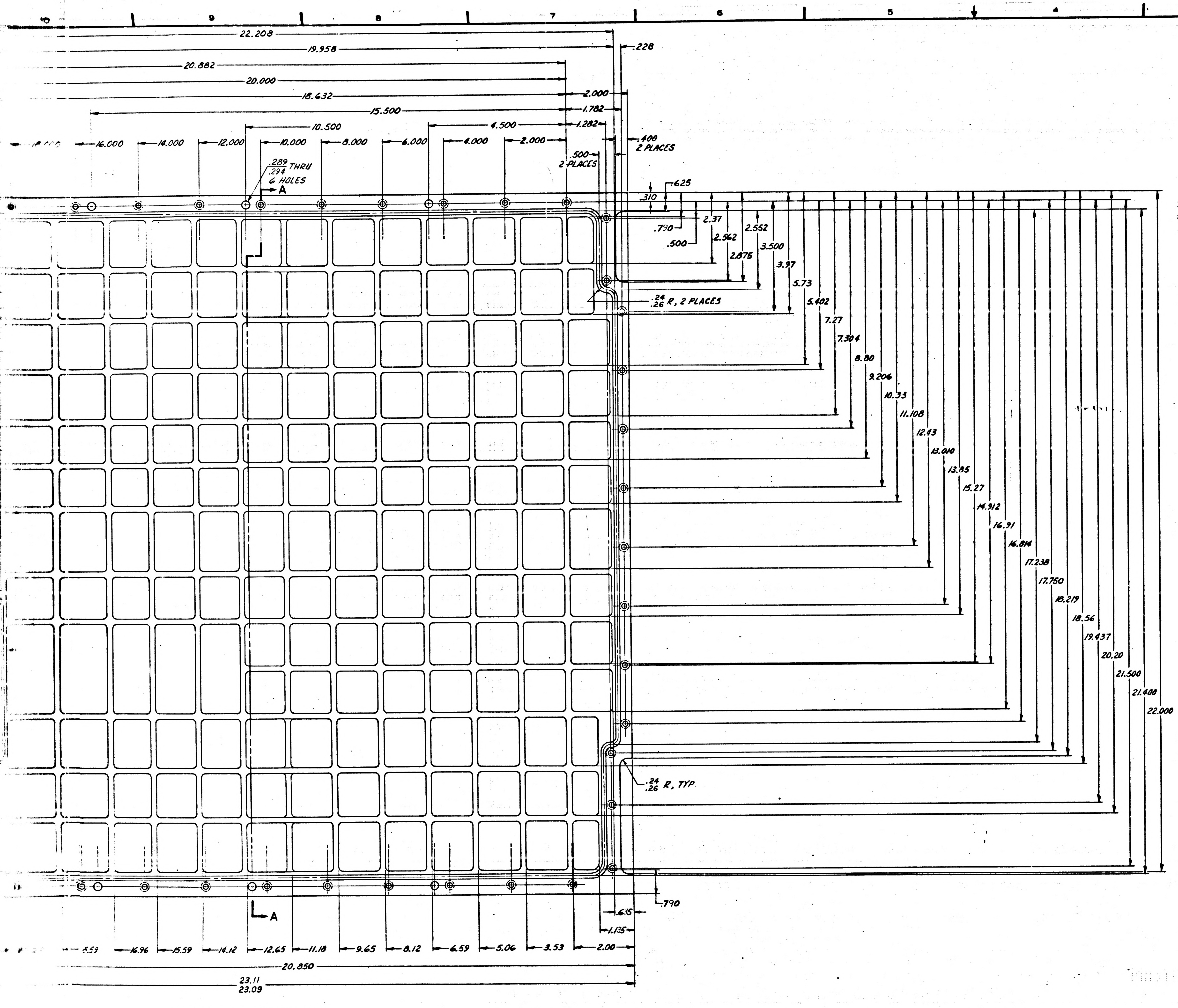
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
80230	J	1008834

SCALE FULL SHEET 1 OF 1

1008834 A

SYM	REVISIONS DESCRIPTION	DATE	APPR
—	INITIAL RELEASE CLASS A PER TDRR 24678		
A	REVISED PER TDRR 27406		
B	REVISED PER TDRR 28441		



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1008834	A	SH 1

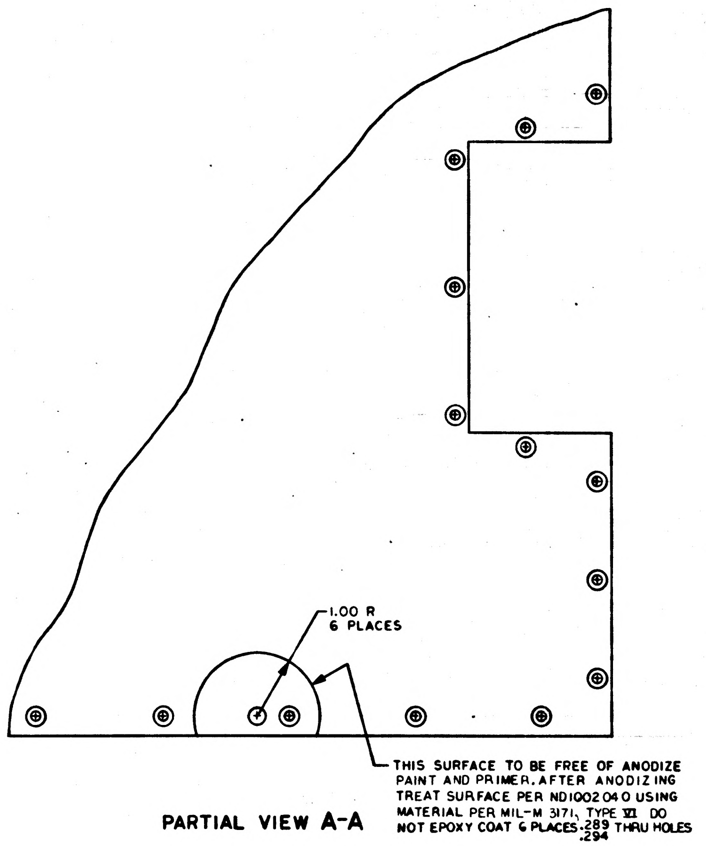
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS ±.02 ±.005 ANGLES + −	AC ELECTRONICS DIVISION GENERAL MOTORS CORP MILWAUKEE WIS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN C.M. Kulp DATE 7 OCT 65 CHECKED Ed Foster 14 OCT 65 APPROVAL APPROVAL	GASKET, RETAINED SPECIFICATION CONTROL DRAWING
MATERIAL SEE NOTE 2A	NASA APPROVAL MIT APPROVAL	CODE IDENT NO. 80230 SIZE J 1008834
CONTRACT NAS 9-497		SCALE FULL

REQUIREMENTS:

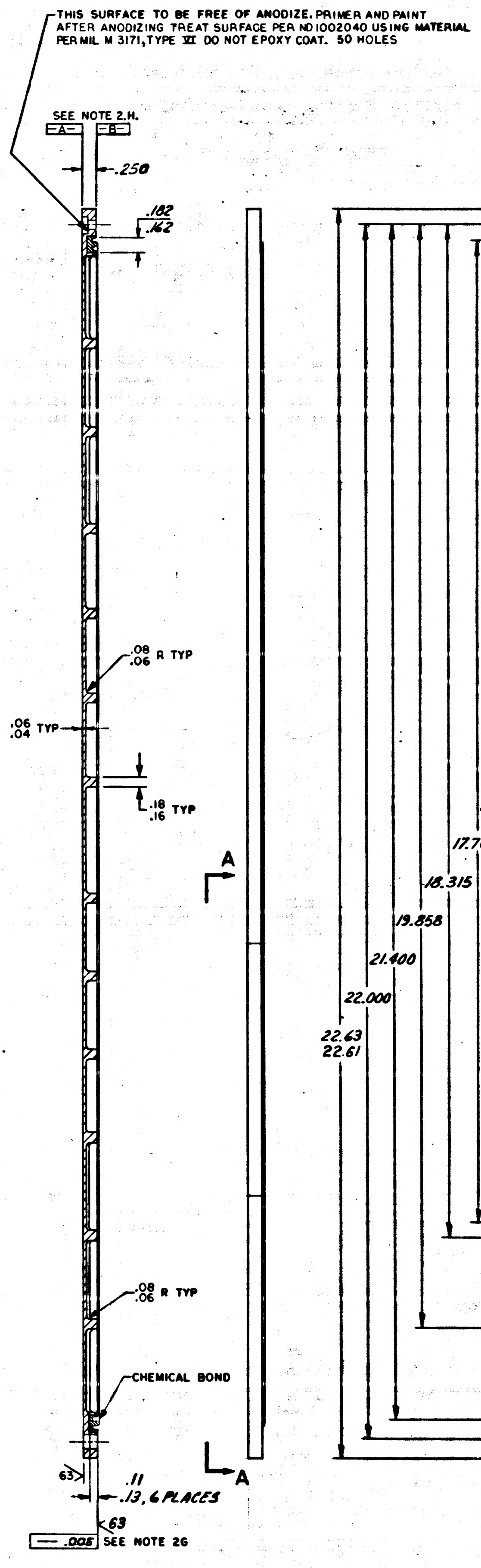
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I, CODE 4.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL:
     - (1) COVER: MAGNESIUM ALLOY AZ31B-H24 PER QQ-M-44.
     - (2) SEAL: BUTYL RUBBER PER AMS-3238.
   - B. FINISH: (I) COVER: ANODIZE PER MIL-M-45202, TYPE I, CLASS C TOUCH UP AS REQUIRED PER ND1002040 USING MATERIAL PER MIL-M-3171, TYPE VI EXCEPT DO NOT OVERCOAT WITH EPOXY
   - C. REMOVE ALL BURRS AND BREAK SHARP EDGES.
   - D. SURFACE ROUGHNESS SHALL BE 125√ PER MIL-STD-10 UNLESS OTHERWISE SPECIFIED.
   - E. VENDOR SHALL SUPPLY CURE DATE OF ELASTOMER
   - F. DIMENSIONS MUST BE MET WHEN THE PART IS IN THE RESTRAINED POSITION.
   - G. FLATNESS BETWEEN ADJACENT .059/.064 HOLES SHALL NOT EXCEED .002
   - H. PAINT OUTSIDE SURFACE IN VIEWING PLANE A (EXCEPT SEE NOTE IN PARTIAL VIEW A-A) AND OUTSIDE PERIPHERAL SURFACE BETWEEN VIEWING PLANES A AND B PER ND 1002279, USING PRIMER 1010992 AND PAINT 1008809-1

3. DESIGN:
   - A. OPERATING TEMPERATURE: +200°F
   - B. OPERATING PRESSURE: 0-17 PSI DIFFERENTIAL
   - C. MEDIUM SEALED: 90% NITROGEN 10% HELIUM
   - D. VACUUM SERVICE: 10^{-6} TORR
   - E. SEALING: WHEN PROPERLY INSTALLED AND COMPRESSED TO THE PLATE LEVEL (ZERO DEFLECTION OF MATING FLANGES) THE RUBBER SHALL BE CAPABLE OF SEALING AGAINST A LEAKAGE OF 10^{-8} ATM CC/SEC/INCH OF SEAL OF DRY NITROGEN AT A PRESSURE DIFFERENTIAL OF ONE ATMOSPHERE AT 72°F


1.00 R
6 PLACES
THIS SURFACE TO BE FREE OF ANODIZE PAINT AND PRIMER. AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL-M 3171, TYPE VI DO NOT EPOXY COAT 6 PLACES .289/.294 THRU HOLES

PARTIAL VIEW A-A


THIS SURFACE TO BE FREE OF ANODIZE. PRIMER AND PAINT AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL M 3171, TYPE VI DO NOT EPOXY COAT. 50 HOLES
SEE NOTE 2.H.
A
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.250
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.08
.06 R TYP
.06
.04 TYP
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.16 TYP
.08
.06 R TYP
CHEMICAL BOND
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.11
.13, 6 PLACES
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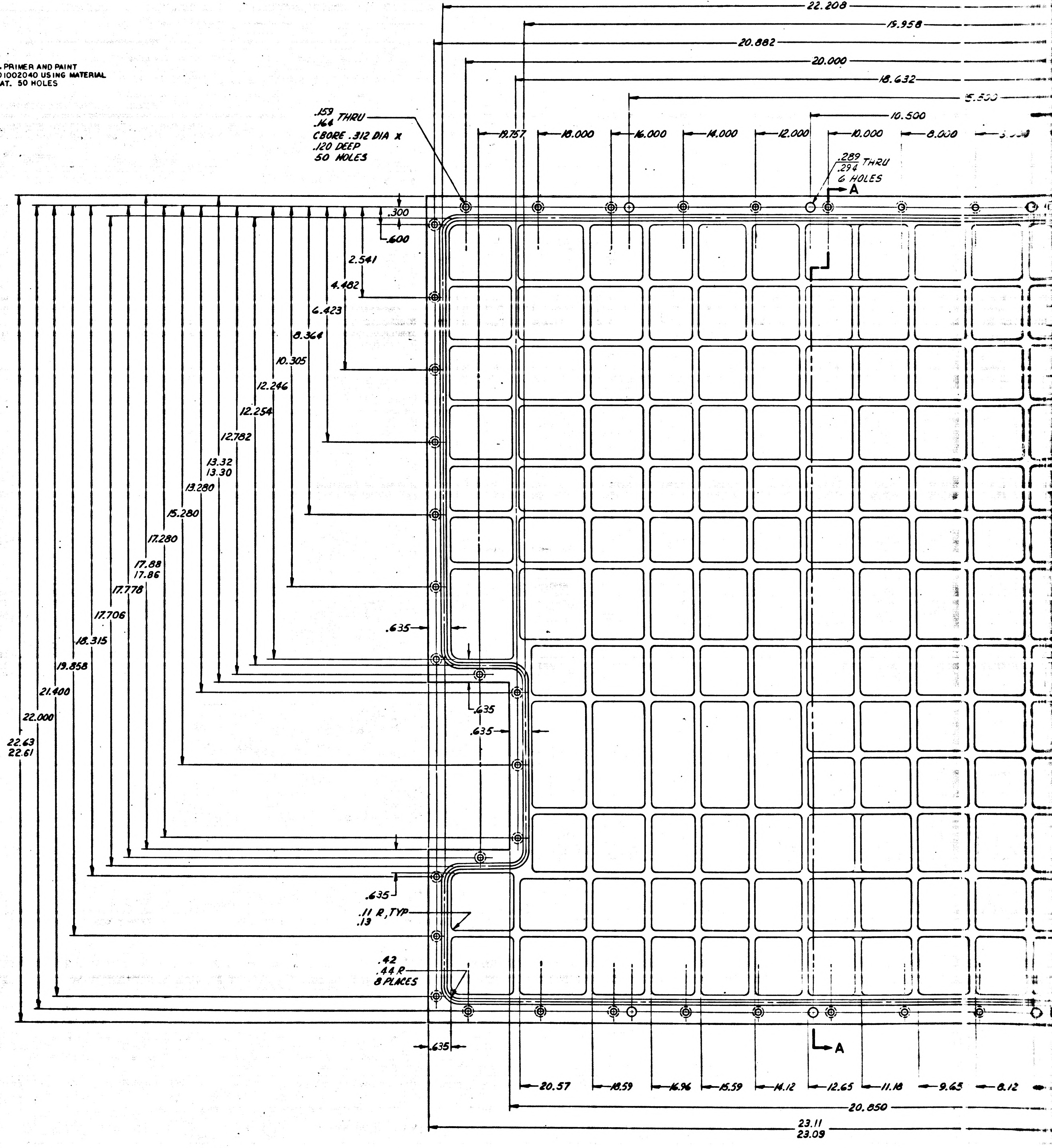
.005 SEE NOTE 26
A
A

SECTION A-A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PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

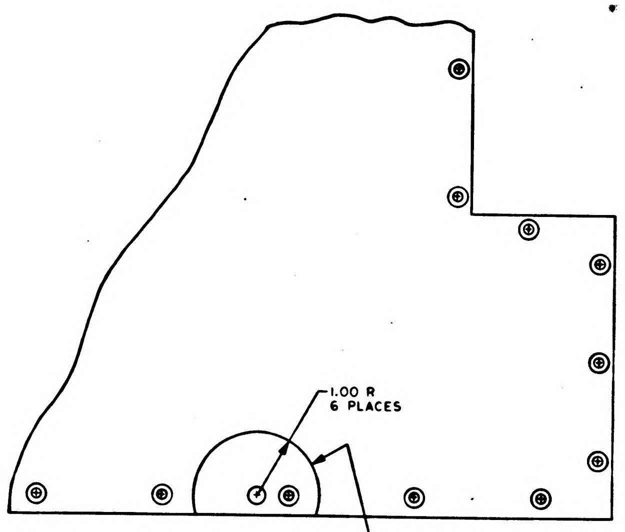
1008834 A SH 1

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I, CODE 4.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL:
     - (1) COVER: MAGNESIUM ALLOY AZ31B-H24 PER QQ-M-44.
     - (2) SEAL: BUTYL RUBBER PER AMS-3238.
       - a. SIMULTANEOUS VULCANIZE AND BOND. RUBBER IS TO BE SECURELY BONDED IN THE GROOVE. NO SEPARATION SHALL BE PERMITTED.
       - b. ANY REPLACEMENT OR REPAIR TO THE SEAL MUST BE APPROVED IN ADVANCE BY THE CONTRACTOR.
   - B. FINISH:
     - (1) COVER:
       - a. ANODIZE PER MIL-M-45202, TYPE 1, CLASS C, USING MATERIAL PER MIL-M-3171, TYPE VI, EXCEPT DO NOT OVERCOAT WITH EPOXY.
       - b. PAINT OUTSIDE SURFACE IN VIEWING PLANE A (EXCEPT SEE NOTE IN PARTIAL VIEW A-A) AND OUTSIDE PERIPHERAL SURFACE BETWEEN VIEWING PLANES A & B PER ND 1002279, USING PRIMER 1010992 AND PAINT 1008809-1.
   - C. REMOVE ALL BURRS AND BREAK SHARP EDGES.
   - D SURFACE ROUGHNESS SHALL BE $\sqrt{125}$ PER MIL-STD-10 UNLESS OTHERWISE SPECIFIED.
   - E. DIMENSIONS MUST BE MET WHEN THE PART IS IN THE RESTRAINED POSITION.
   - F. FLATNESS BETWEEN ADJACENT .059/.064 HOLES SHALL NOT EXCEED .002
   - G. SEALING SURFACES ARE TO BE FREE OF DEFECTS SUCH AS BLEMISHES, LAPS, CUTS CRACKS OR ANY IRREGULARITIES.
   - H. LEAK TEST-100%
     - (1) LEAK RATE SHALL NOT EXCEED 1 X 10^{-8} ATM CC/SEC. WHEN TESTED UNDER THE FOLLOWING CONDITIONS:
       - a. TEST PRESSURE OF 15 PSIA APPLIED AGAINST THE GASKET SIDE OF THE COVER.
       - b. FILL COVER WITH 100% HELIUM.
       - c. THE COVEER SHALL BE MOUNTED IN A VACUUM CHAMBER AND THE CHAMBER PRESSURE REDUCED TO AND MAINTAINED AT LESS THAN 2 X 10^{-5} MM HG FOR 15 MINUTES PRIOR TO FINAL LEAK RATE TEST.
       - d. COVER IS TO BE RETAINED TO COVER MOUNTING FIXTURE WITH ONLY 50 MOUNTING SCREWS WITH ALUMINUM WASHERS UNDER THE HEADS AND TORQUED TO 17 TO 19 IN. LBS. MOUNT THE OUTER COVER SURFACE FLUSH AGAINST A ONE INCH ALUMINUM PLATE TO PREVENT EXCESSIVE COVER DEFLECTION DURING TEST. USE ONLY THE SIX .289/.294 THRU HOLES FOR HOLDING.
   - I. THE FOLLOWING DATA IS TO BE SUPPLIED WITH EACH COVER:
     - (1) LEAK TEST DATA.
     - (2) RECORD OF REPLACEMENT OR REPAIR OF SEAL
     - (3) CURE DATE OF ELASTOMER.
   - J. PIECEMARKING
     PART SHALL BE PERMANENTLY AND LEGIBILY MARKED PER ND1002019 WITH THE FOLLOWING INFORMATION:
     - (1) CURE DATE OF ELASTOMER BY QUARTER AND YEAR.
     - (2) NASA PART NUMBER AND REVISION LETTER
     - (3) SERIAL NO.

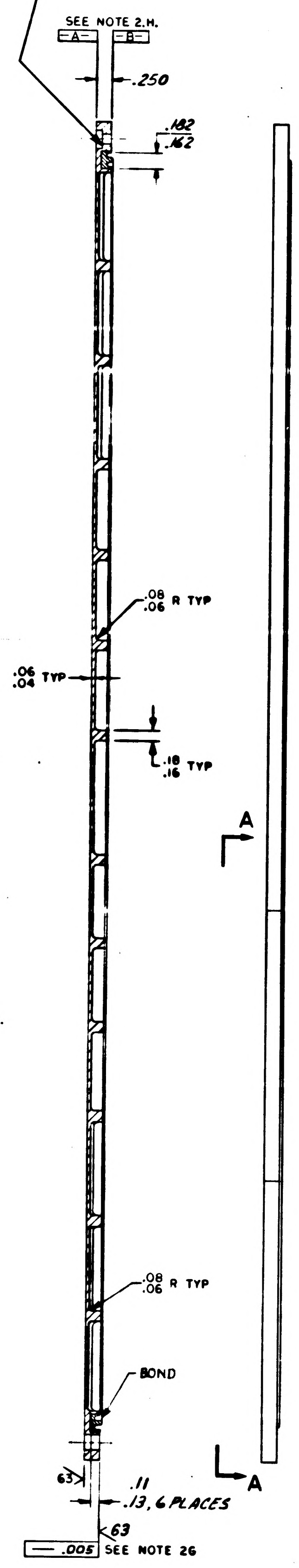
3. DESIGN:
   - A. OPERATING TEMPERATURE: +200°F
   - B. OPERATING PRESSURE: 0-15 PSI DIFFERENTIAL.
   - C. MEDIUM SEALED: 90% NITRO 10% HELIUM.
   - D. VACUUM SERVICE: 10^{-6} TORR
   - E. SEALING: WHEN PRORERLY INSTALLED AND COMPRESSED TO THE PLATE LEVEL (ZERO DEFLECTION OF MATING FLANGES) THE RUBBER SHALL BE CAPABLE OF SEALING AGAINST A LEAD OF 10^{-8} ATM CC/SEC/INCH OF SEAL OF DRY NITROGEN AT A PRESSURE DIFFERENTIAL OF ONE ATMOSPHERE AT 72°F.


1.00 R
6 PLACES

THIS SURFACE TO BE FREE OF ANODIZE PAINT AND PRIMER. AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL-M 3171. TYPE VI DO NOT EPOXY COAT 6 PLACES .289/.294 THRU HOLES

PARTIAL VIEW A-A

THIS SURFACE TO BE FREE OF ANODIZE. PRIMER AND PAINT AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL M 3171, TYPE VI DO NOT EPOXY COAT. 50 HOLES


SEE NOTE 2.H.
-A-
-B-
.250
.182
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.06 R TYP
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.04 TYP
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.16 TYP
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.06 R TYP
BOND
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.11
.13, 6 PLACES
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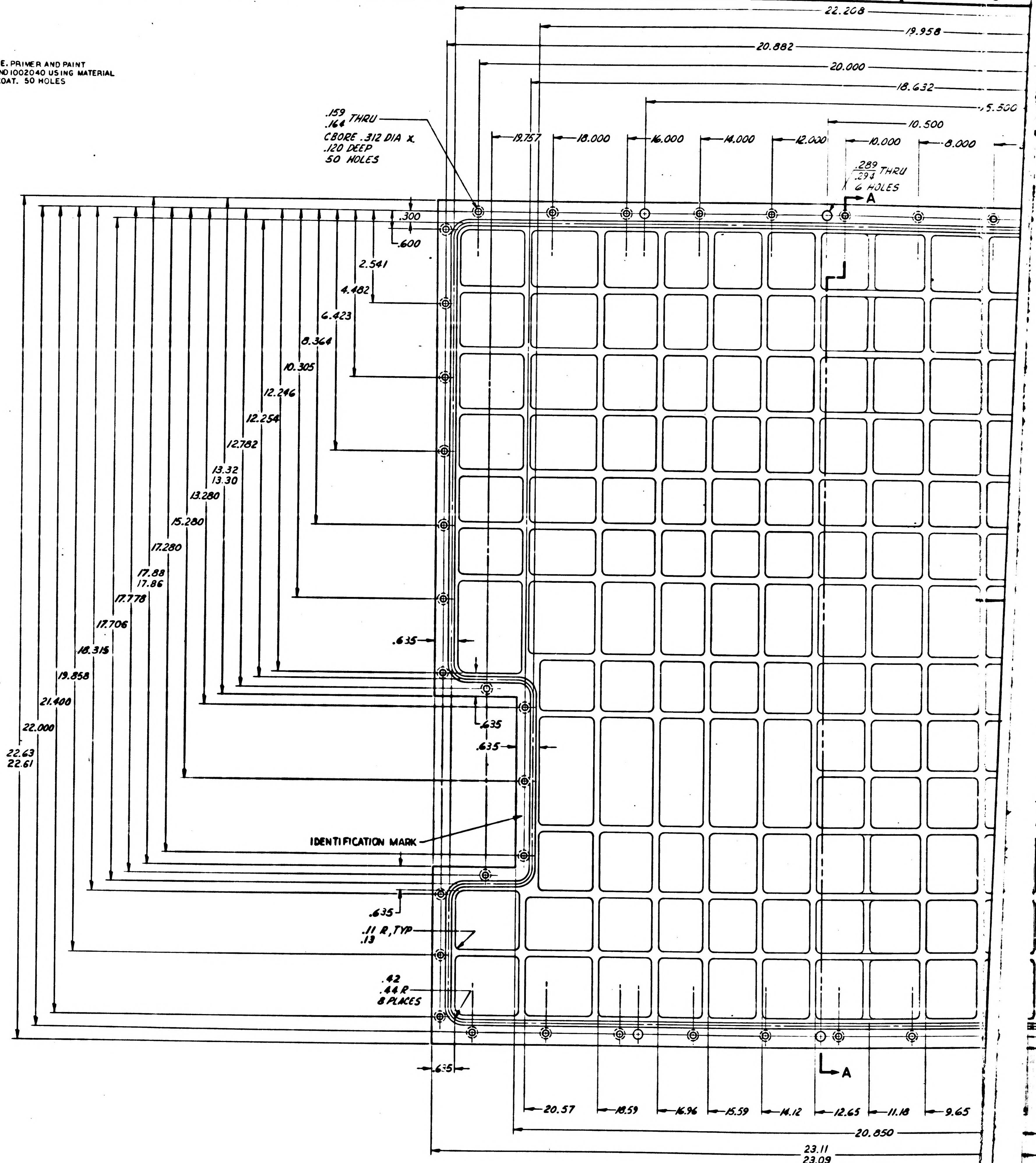
.005 SEE NOTE 26
A

SECTION A-A


22.208
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CBORE .312 DIA X .120 DEEP
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6.423
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22.000
22.63
22.61
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IDENTIFICATION MARK
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.11 R, TYP
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.44 R
8 PLACES
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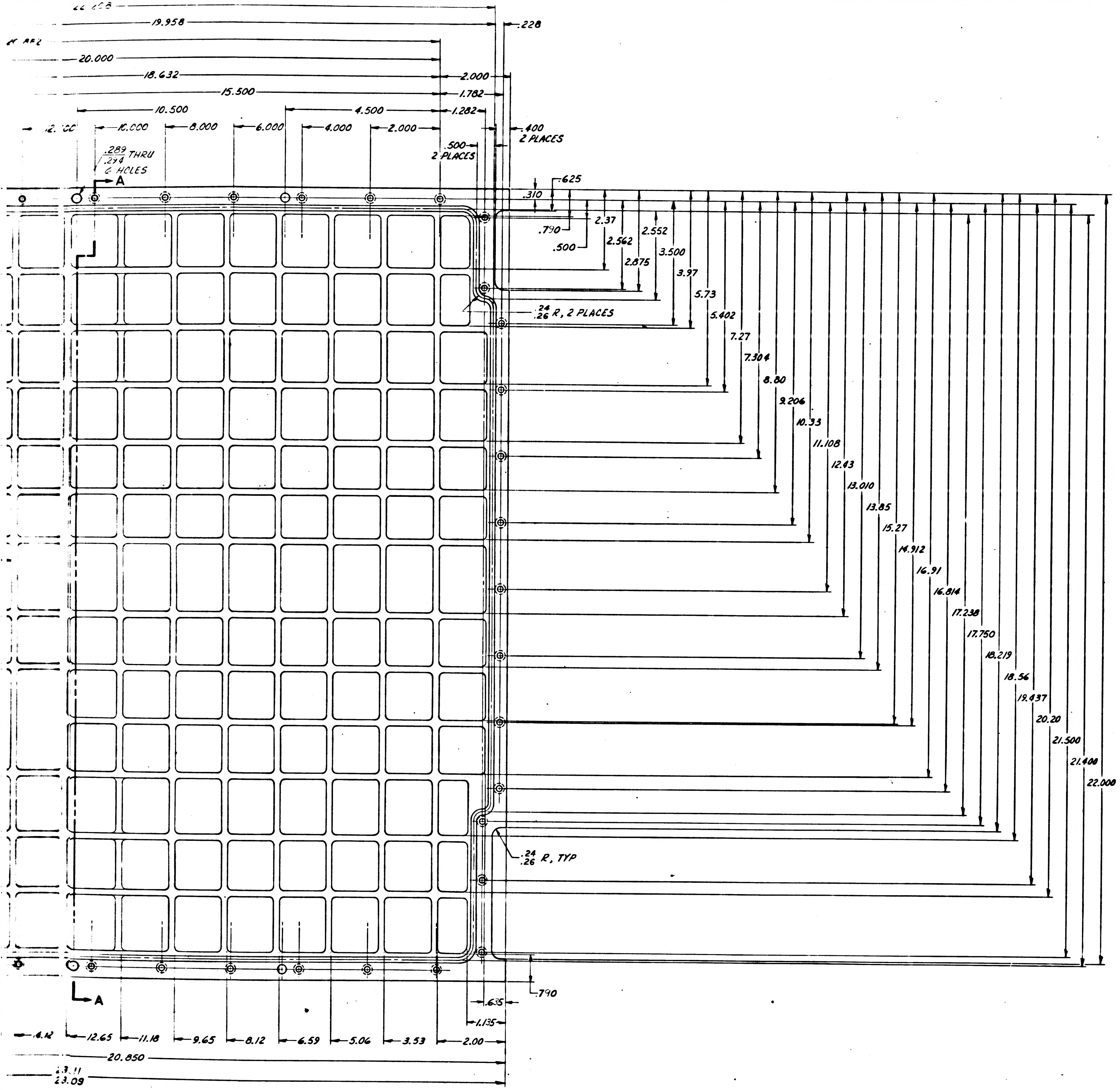
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

1008834 C SH 1

1/1008834



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.26 R, 2 PLACES
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11.18
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8.12
6.59
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REVISIONS

SYM	DESCRIPTION	DATE	APP'D
—	INITIAL RELEASE CLASS A PER TDRR 24678		
A	REVISED PER TDRR 27406		
B	REVISED PER TDRR 28441		
C	REVISED PER TDRR 30056	JUL 66	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS +/− DECIMALS ±.02 ±.005 ANGLES +/−	AC ELECTRONICS DIVISION GENERAL MOTORS CORP MILWAUKEE WIS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN C.M. Kulp DATE 7 OCT 65 CHECKED Ed Foster 14 OCT 65 APPROVAL APPROVAL 12/7/65	GASKET, RETAINED SPECIFICATION CONTROL DRAWING
MATERIAL SEE NOTE 2A	NASA APPROVAL	CODE IDENT NO. 80230 · SIZE J · 1008834
CONTRACT NAS 9-497	MIT APPROVAL	SCALE FULL · SHEET 1 OF 1

1008834 C

00883.4 C SH 1

2H

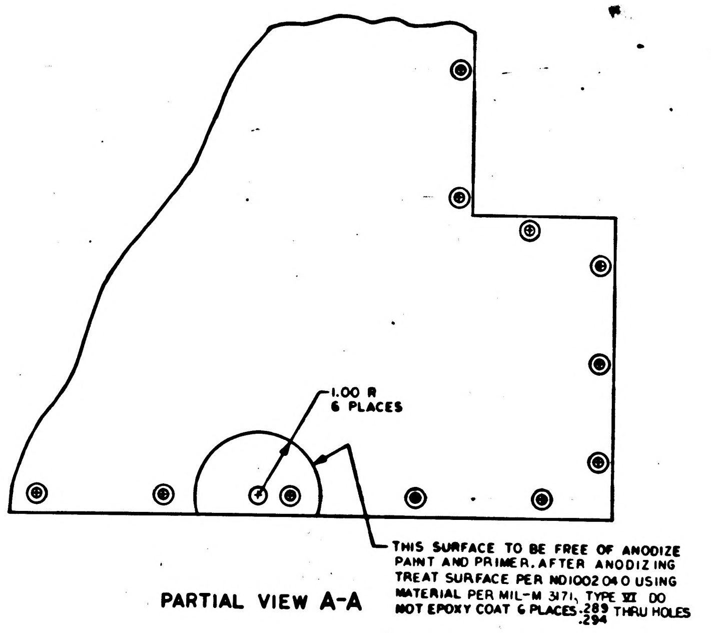
2/1008834

REQUIREMENTS:

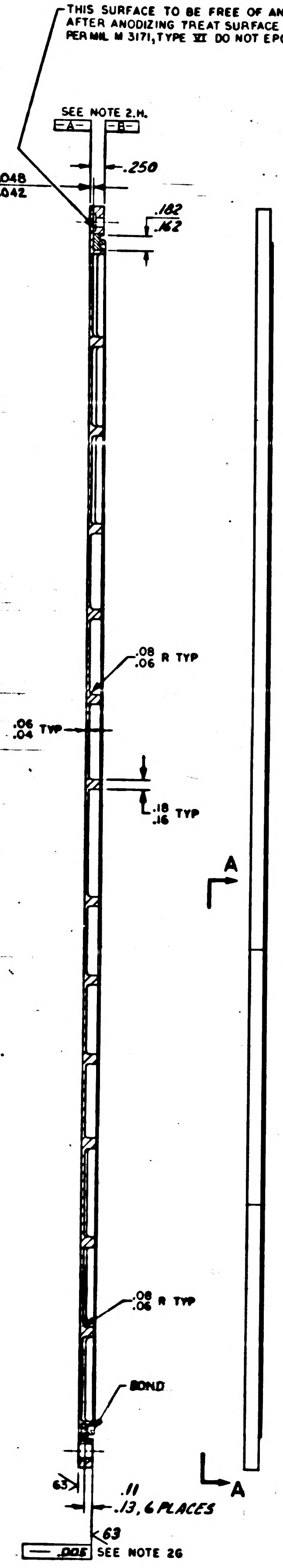
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I, CODE 4.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL:
     - (1) COVER: MAGNESIUM ALLOY AZ31B-H24 PER QQ-M-44.
     - (2) SEAL: BUTYL RUBBER PER AMS-3238.
       - a. SIMULTANEOUS VULCANIZE AND BOND. RUBBER IS TO BE SECURELY BONDED IN THE GROOVE. NO SEPARATION SHALL BE PERMITTED.
       - b. ANY REPLACEMENT OR REPAIR TO THE SEAL MUST BE APPROVED IN ADVANCE BY THE CONTRACTOR.
   - B. FINISH:
     - (1) COVER:
       - a. ANODIZE PER MIL-M-45202, TYPE 1, CLASS C, USING MATERIAL PER MIL-M-3171, TYPE VI, EXCEPT DO NOT OVERCOAT WITH EPOXY.
       - b. PAINT OUTSIDE SURFACE IN VIEWING PLANE A (EXCEPT SEE NOTE IN PARTIAL VIEW A-A) AND OUTSIDE PERIPHERAL SURFACE BETWEEN VIEWING PLANES A & B PER ND 1002279, USING PRIMER 1010992 AND PAINT 1008809-1.
   - C. REMOVE ALL BURRS AND BREAK SHARP EDGES.
   - D. SURFACE ROUGHNESS SHALL BE 125 PER MIL-STD-10 UNLESS OTHERWISE SPECIFIED.
   - E. DIMENSIONS MUST BE MET WHEN THE PART IS IN THE RESTRAINED POSITION.
   - F. FLATNESS BETWEEN ADJACENT .059/.064 HOLES SHALL NOT EXCEED .002
   - G. SEALING SURFACES ARE TO BE FREE OF DEFECTS SUCH AS BLEMISHES, LAPS, CUTS CRACKS OR ANY IRREGULARITIES.
   - H. LEAK TEST-100%
     - (1) LEAK RATE SHALL NOT EXCEED 1×10^{-5} ATM CC/SEC. WHEN TESTED UNDER THE FOLLOWING CONDITIONS:
       - a. TEST PRESSURE OF 15 PSIA APPLIED AGAINST THE GASKET SIDE OF THE COVER.
       - b. FILL COVER WITH 100% HELIUM.
       - c. THE COVEER SHALL BE MOUNTED IN A VACUUM CHAMBER AND THE CHAMBER PRESSURE REDUCED TO AND MAINTAINED AT LESS THAN 2×10^{-5} MM HG FOR 15 MINUTES PRIOR TO FINAL LEAK RATE TEST.
       - d. COVER IS TO BE RETAINED TO COVER MOUNTING FIXTURE WITH ONLY 50 MOUNTING SCREWS WITH ALUMINUM WASHERS UNDER THE HEADS AND TORQUED TO 17 TO 19 IN. LBS. MOUNT THE OUTER COVER SURFACE FLUSH AGAINST A ONE INCH ALUMINUM PLATE TO PREVENT EXCESSIVE COVER DEFLECTION DURING TEST. USE ONLY THE SIX .289/.294 THRU HOLES FOR HOLDING.
   - I. THE FOLLOWING DATA IS TO BE SUPPLIED WITH EACH COVER:
     - (1) LEAK TEST DATA.
     - (2) RECORD OF REPLACEMENT OR REPAIR OF SEAL
     - (3) CURE DATE OF ELASTOMER.
   - J. PIECEMARKING
     PART SHALL BE PERMANENTLY AND LEGIBILY MARKED PER ND1002019 WITH THE FOLLOWING INFORMATION:
     - (1) CURE DATE OF ELASTOMER BY QUARTER AND YEAR.
     - (2) NASA PART NUMBER AND REVISION LETTER
     - (3) SERIAL NO.

3. DESIGN:
   - A. OPERATING TEMPERATURE: +200°F
   - B. OPERATING PRESSURE: 0-15 PSI DIFFERENTIAL.
   - C. MEDIUM SEALED: 90% NITRO 10% HELIUM.
   - D. VACUUM SERVICE: 10^{-6} TORR
   - E. SEALING: WHEN PRORERLY INSTALLED AND COMPRESSED TO THE PLATE LEVEL (ZERO DEFLECTION OF MATING FLANGES) THE RUBBER SHALL BE CAPABLE OF SEALING AGAINST A LEAD OF 10^{-8} ATM CC/SEC/INCH OF SEAL OF DRY NITROGEN AT A PRESSURE DIFFERENTIAL OF ONE ATMOSPHERE AT 72°F.


1.00 R
6 PLACES
THIS SURFACE TO BE FREE OF ANODIZE PAINT AND PRIMER. AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL-M 3171, TYPE VI DO NOT EPOXY COAT 6 PLACES .289/.294 THRU HOLES

PARTIAL VIEW A-A


THIS SURFACE TO BE FREE OF ANODIZE. PRIMER AND PAINT AFTER ANODIZING TREAT SURFACE PER ND1002040 USING MATERIAL PER MIL M 3171, TYPE VI DO NOT EPOXY COAT. 50 HOLES
SEE NOTE 2.H.
-A-
-B-
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.06 R TYP
.06
.04 TYP
.18
.16 TYP
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.06 R TYP
BOND
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.13, 6 PLACES
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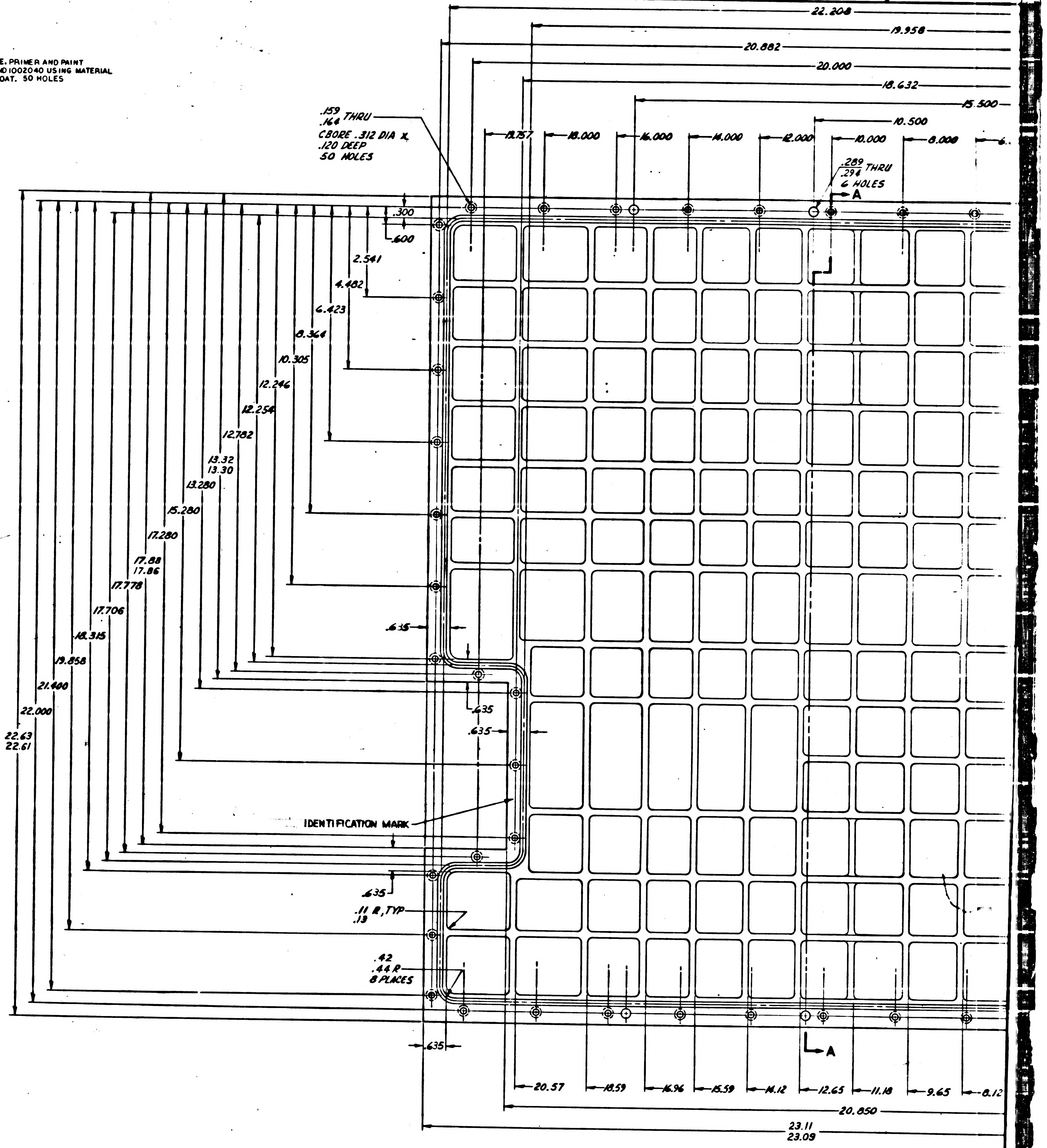
.005 SEE NOTE 26
A
A

SECTION A-A


22.208
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CBORE .312 DIA X
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IDENTIFICATION MARK
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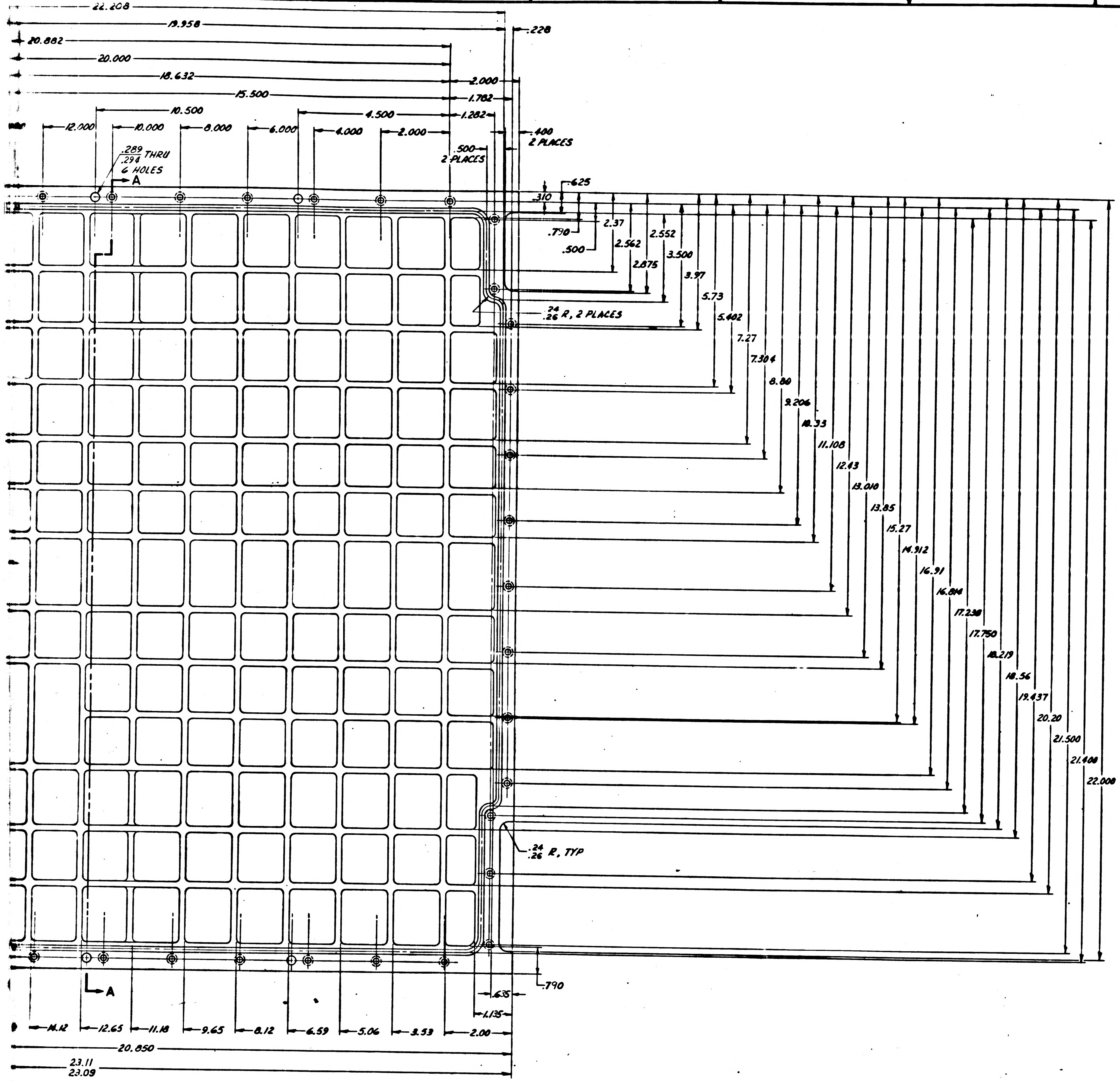
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

1008834 D SH 1

1/1008834

REVISIONS

SYM	DESCRIPTION	DATE	APPD
—	INITIAL RELEASE CLASS A PER TDRR 24678		
A	REVISED PER TDRR 27406		
B	REVISED PER TDRR 28441		
C	REVISED PER TDRR 30056	JUL 66	
D	REVISED PER TDRR 34448	30 AUG 67	DG



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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	±.02	+
−	±.005	−

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTE 2A

CONTRACT NAS 9-497

AC ELECTRONICS DIVISION
GENERAL MOTORS CORP MILWAUKEE WIS

DRAWN G.M. Kufo DATE 9 OCT 65
CHECKED Ed Foster 14 Oct 65
APPROVAL
APPROVAL D.R. Hurst 12/7/65
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET, RETAINED

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 SIZE J 1008834

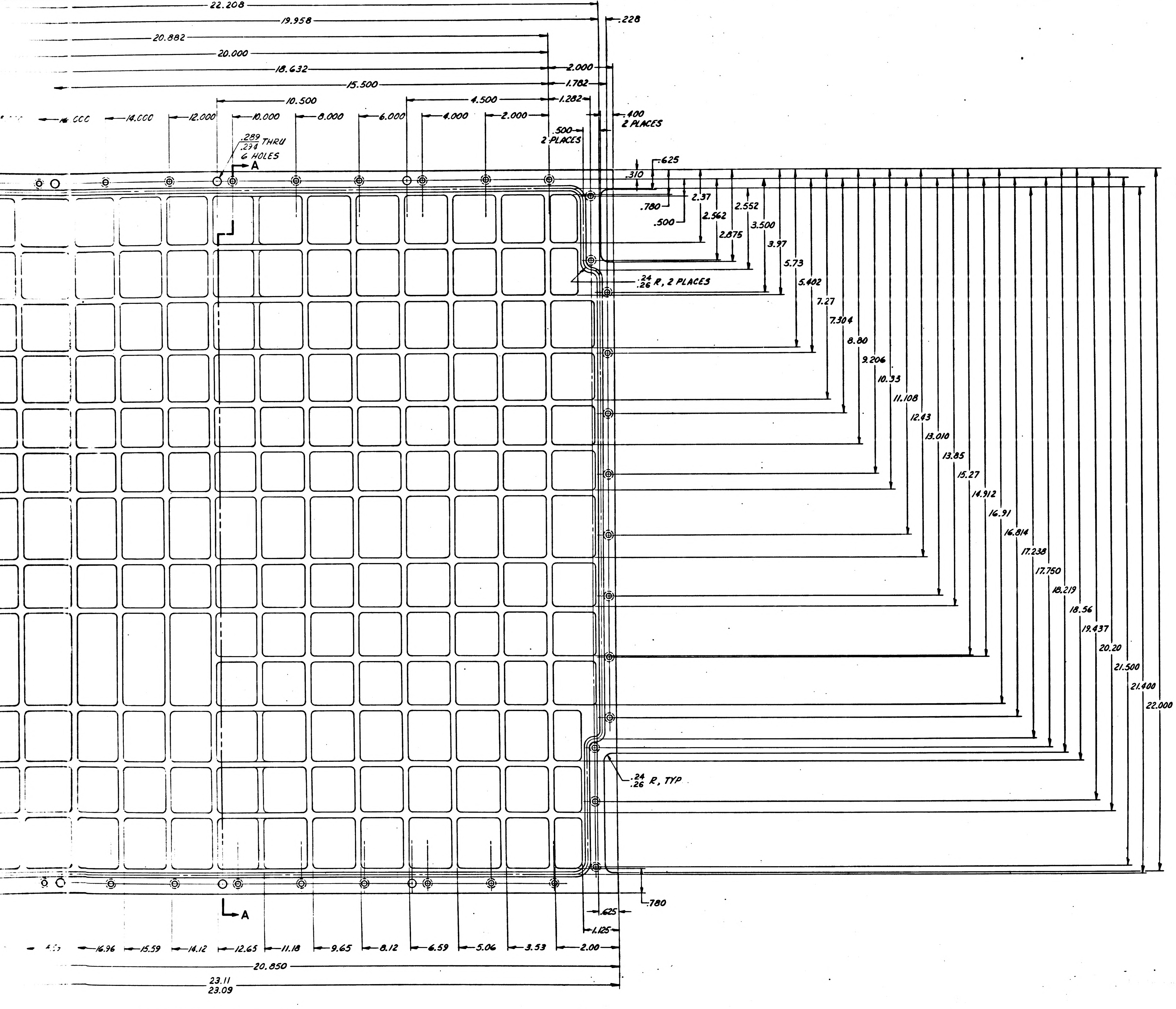
SCALE FULL SHEET 1 OF 1

1008834 D

008834 D SH 1

2/1008834

REVISIONS			
SYM	DESCRIPTION	DATE	APPD
	INITIAL RELEASE CLASS A PER TDRR 24678		



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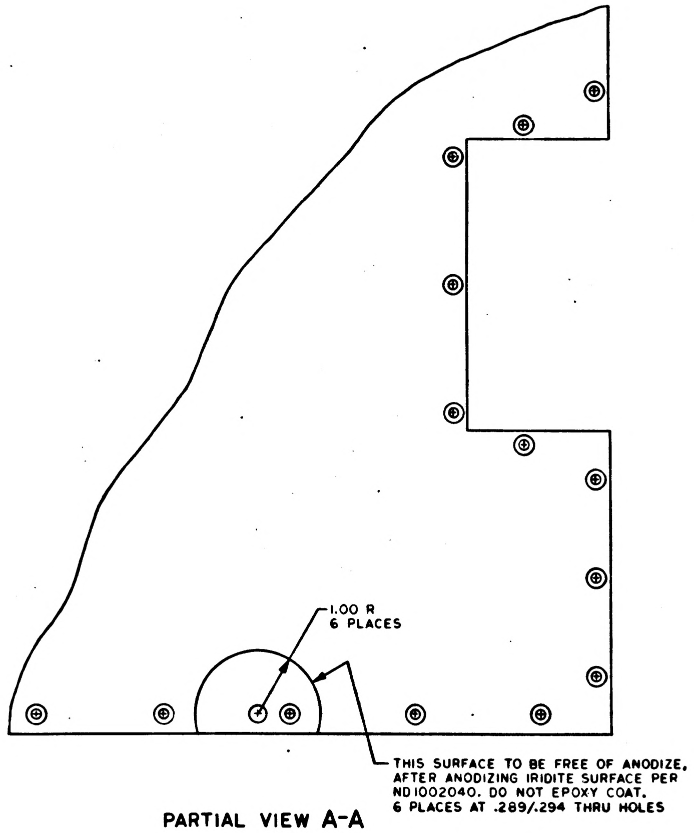
1008834 SH 1

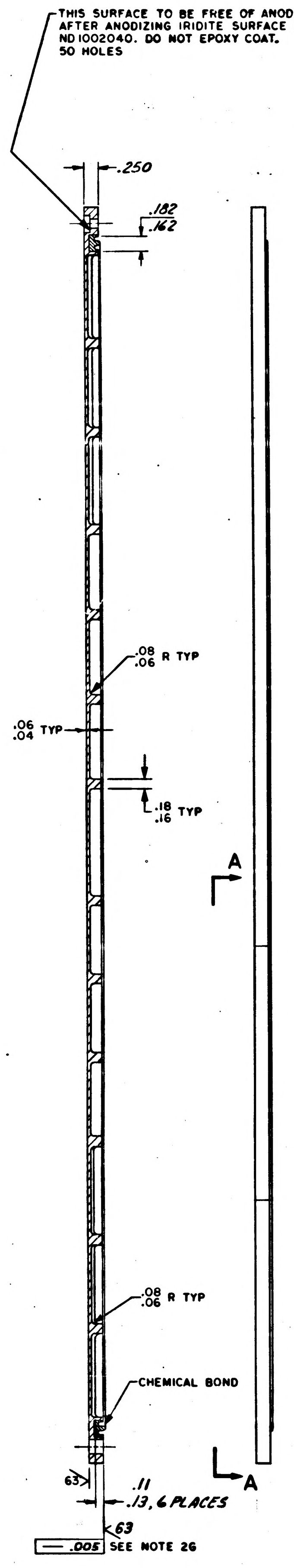
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS ±.02 ±.005 ANGLES + −	AC ELECTRONICS DIVISION GENERAL MOTORS CORP MILWAUKEE WIS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN C.M. Kufo DATE 7 OCT 65 CHECKED Ed Foster 14 OCT 65 APPROVAL APPROVAL	GASKET, RETAINED SPECIFICATION CONTROL DRAWING
MATERIAL SEE NOTE 2A	NASA APPROVAL	CODE IDENT NO. 80230 · SIZE J · 1008834
CONTRACT NAS 9-497	MIT APPROVAL	SCALE FULL · SHEET 1

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I, CODE 4.
2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL:
     - (1) COVER: MAGNESIUM ALLOY AZ31B-H24 PER QQ-M-44, CONDITION H24.
     - (2) SEAL: BUTYL RUBBER PER AMS-3238.
   - B. FINISH: (I) COVER: ANODIZE PER MIL-M-45202, TYPE I, CLASS C TOUCH UP AS REQUIRED PER ND1002040 EXCEPT DO NOT OVERCOAT WITH EPOXY.
   - C. REMOVE ALL BURRS AND BREAK SHARP EDGES.
   - D. SURFACE ROUGHNESS SHALL BE 125√ PER MIL-STD-10 UNLESS OTHERWISE SPECIFIED.
   - E. VENDOR SHALL SUPPLY CURE DATE OF ELASTOMETER.
   - F. DIMENSIONS MUST BE MET WHEN THE PART IS IN THE RESTRAINED POSITION.
   - G. FLATNESS BETWEEN ADJACENT .059/.064 HOLES SHALL NOT EXCEED .002
3. DESIGN:
   - A. OPERATING TEMPERATURE: +200°F.
   - B. OPERATING PRESSURE: 0-17 PSI DIFFERENTIAL.
   - C. MEDIUM SEALED: 90% NITROGEN 10% HELIUM.
   - D. VACUUM SERVICE: 10^{-6} TORR.
   - E. SEALING: WHEN PROPERLY INSTALLED AND COMPRESSED TO THE PLATE LEVEL (ZERO DEFLECTION OF MATING FLANGES) THE RUBBER SHALL BE CAPABLE OF SEALING AGAINST A LEAKAGE OF 10^{-8} ATM. CC/SEC/INCH OF SEAL OF DRY NITROGEN AT A PRESSURE DIFFERENTIAL OF ONE ATMOSPHERE AT 72° F


1.00 R
6 PLACES
THIS SURFACE TO BE FREE OF ANODIZE, AFTER ANODIZING IRIDITE SURFACE PER ND1002040. DO NOT EPOXY COAT. 6 PLACES AT .289/.294 THRU HOLES

PARTIAL VIEW A-A


THIS SURFACE TO BE FREE OF ANODIZE. AFTER ANODIZING IRIDITE SURFACE PER ND1002040. DO NOT EPOXY COAT. 50 HOLES
.250
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.16 TYP
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CHEMICAL BOND
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.13, 6 PLACES
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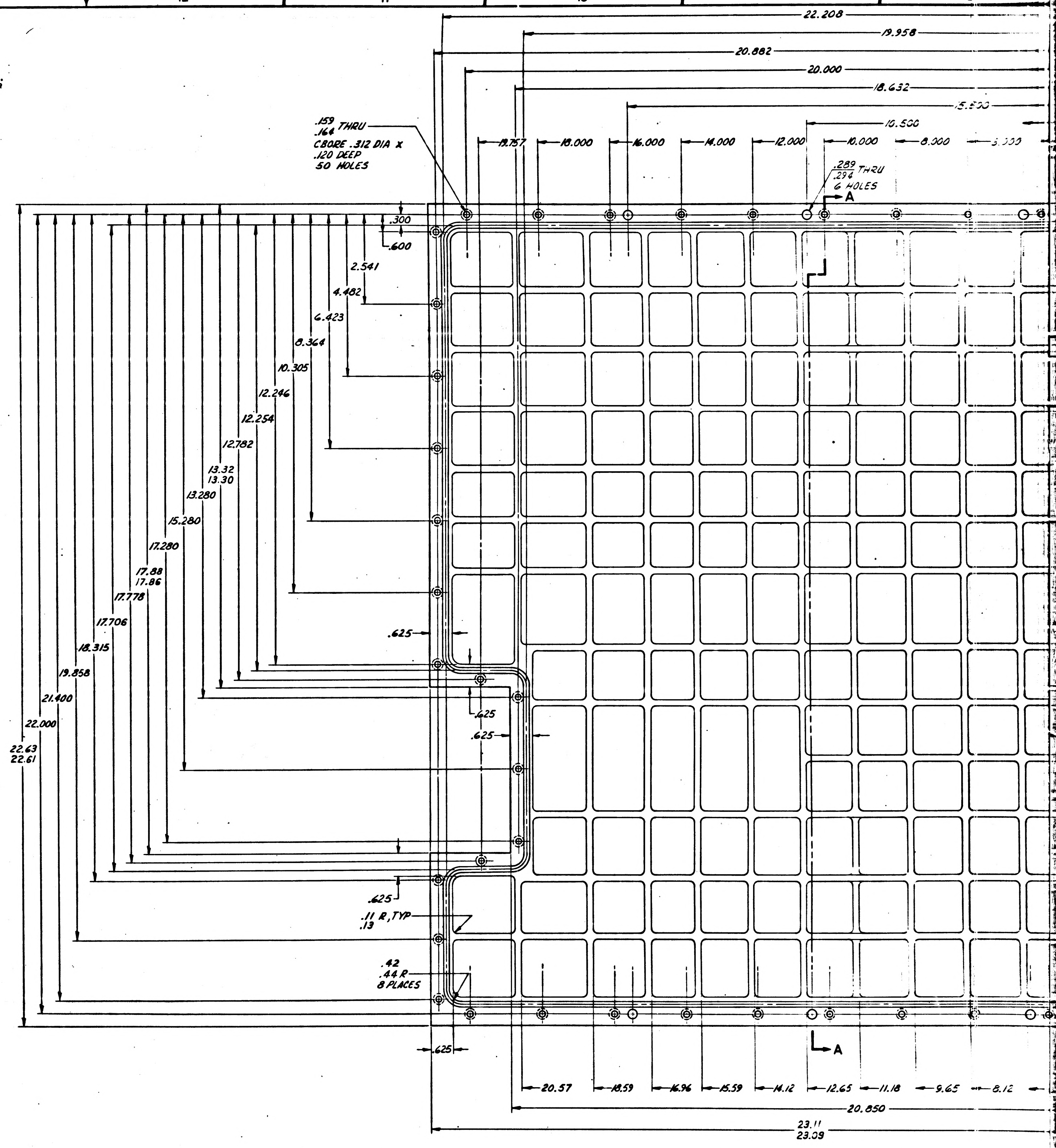
.005 SEE NOTE 26
A
A

SECTION A-A


22.208
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PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

1008834 SH 1

F-1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

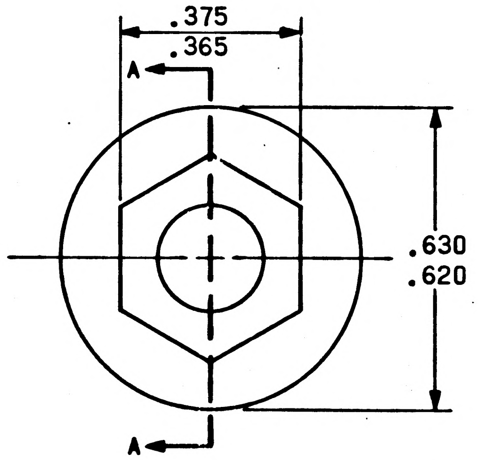
1008835 A

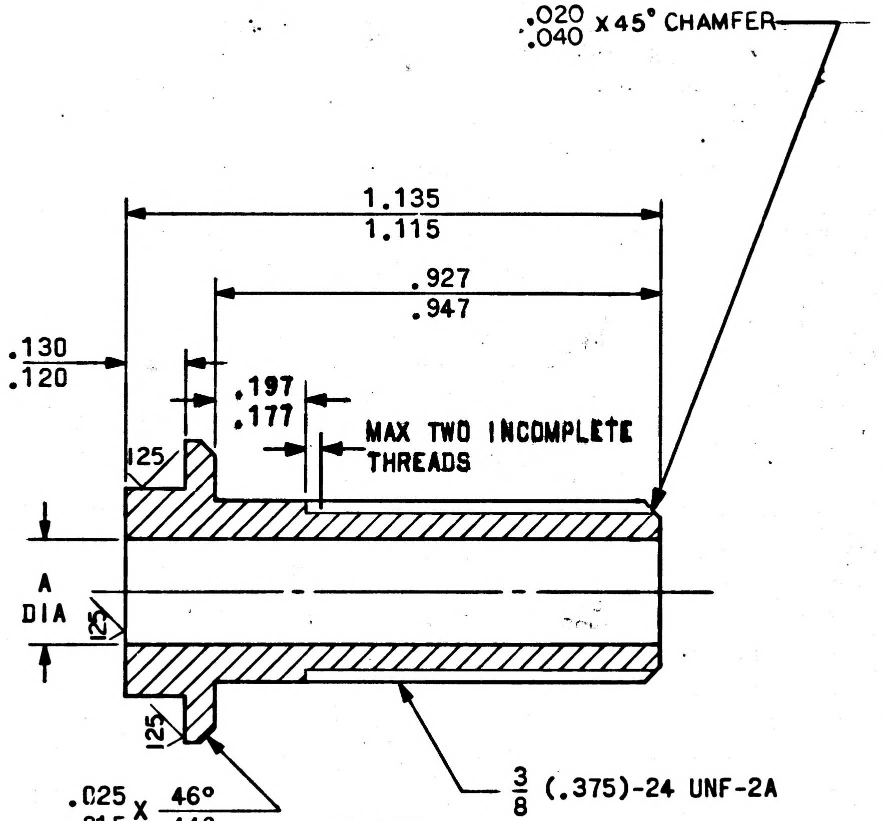
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
—	INITIAL RELEASE CLASS A PER TDRR 23564	11-2-65	WK
A	REVISED PER TDRR 25520	2/8/66	WK

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 3.
2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: HIGH GRADE ALLOY STEEL PER FED. STD. NO. 66.
   - B. HEAT TREAT: 200,000 PSI MIN TENSILE STRENGTH PER MIL-H-6875.
   - C. FINISH: NICKEL PLATE (.0002 - .0004 THICKNESS) PER QQ-N-290, CLASS 2.
   - D. BREAK SHARP EDGES .005/.015.
   - E. ALL SURFACES 63✓ PER MIL-STD-10 UNLESS OTHERWISE SPECIFIED.
3. DESIGN:
   - A. BUSHING HEAD TO BE FORMED BY COLD HEADING. THREADS TO BE FORMED BY GRINDING.
   - B. CONCENTRICITY: HOLE DIAMETER "A" TO BE CONCENTRIC TO THREAD O.D. WITHIN .010 TIR.

DASH NUMBER	A DIA MAX	A DIA MIN
-001	.214	.208
-002	.225	.222





SECTION A-A

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ± 2/2
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT SEE REQUIREMENTS
FINAL FINISH SEE REQUIREMENTS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497
DRAWN Bender DATE 6-OCT-65
CHECKED 7 OCT 65
APPROVAL Nov 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL 2 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BUSHING, MACHINE THREAD

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008835
SCALE 4:1
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008835

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 23564	11-2-65	WK

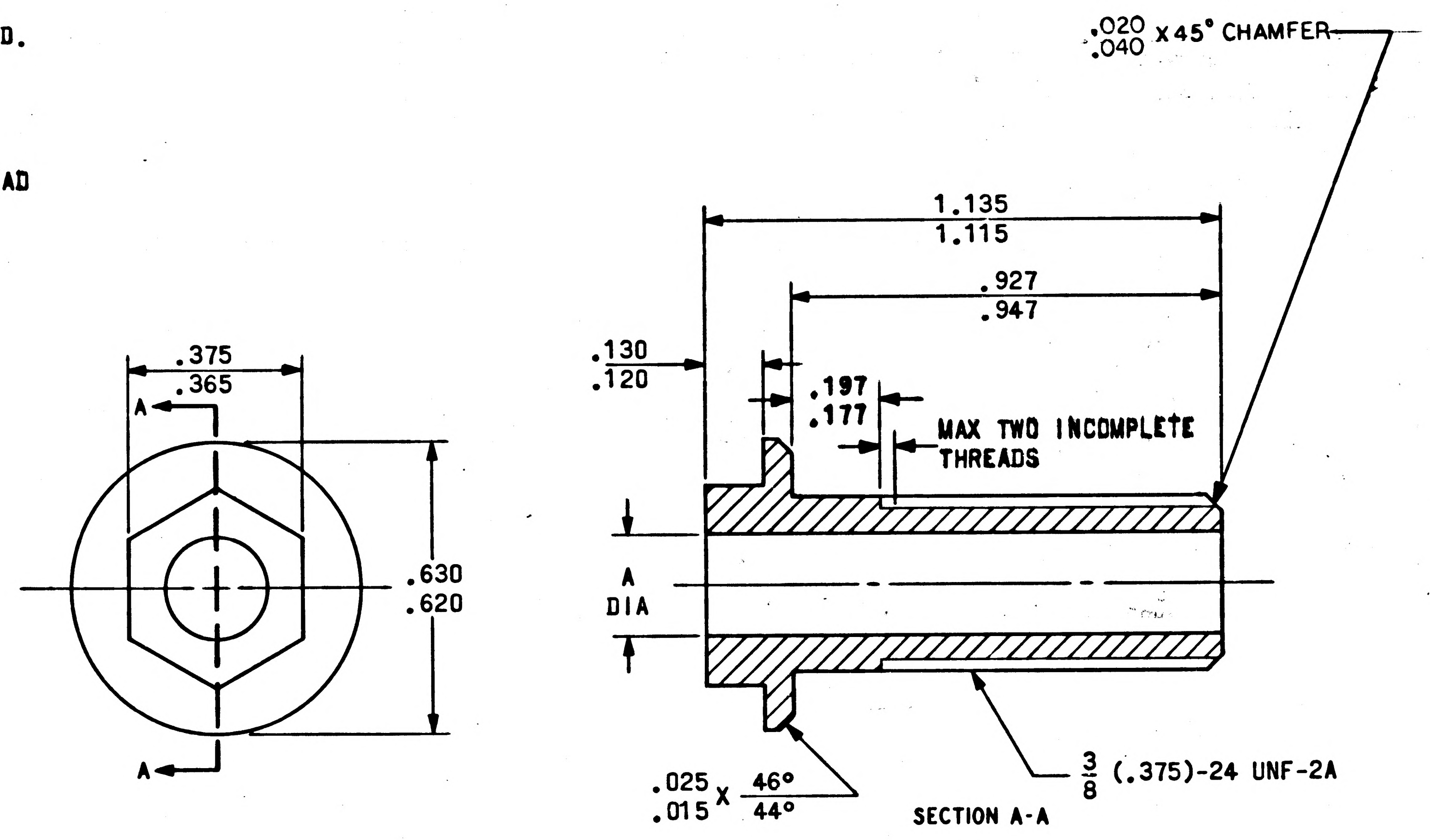
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 3.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: HIGH GRADE ALLOY STEEL PER FED. STD. NO. 66.
   - B. HEAT TREAT: 200,000 PSI MIN TENSILE STRENGTH PER MIL-H-6875.
   - C. FINISH: NICKEL PLATE (.0002 - .0004 THICKNESS) PER QQ-N-290, CLASS 2.
   - D. BREAK SHARP EDGES .005/.015.
   - E. ALL SURFACES 63/ PER MIL-STD-10 UNLESS OTHERWISE SPECIFIED.

3. DESIGN:
   - A. BUSHING HEAD TO BE FORMED BY COLD HEADING. THREADS TO BE FORMED BY ROLLING.
   - B. CONCENTRICITY: HOLE DIAMETER "A" TO BE CONCENTRIC TO THREAD O.D. WITHIN .010 TIR.

DASH NUMBER	A DIA MAX	A DIA MIN
-001	.214	.208
-002	.225	.222



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± 2/2
DO NOT SCALE THIS DRAWING

MATERIAL SEE REQUIREMENTS
HEAT TREATMENT SEE REQUIREMENTS
FINAL FINISH SEE REQUIREMENTS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT NAS 9-497

DRAWN Bender DATE 6-OCT-65
CHECKED 7 OCT 65
APPROVAL Nov 65
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL 2 Nov 65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BUSHING, MACHINE THREAD

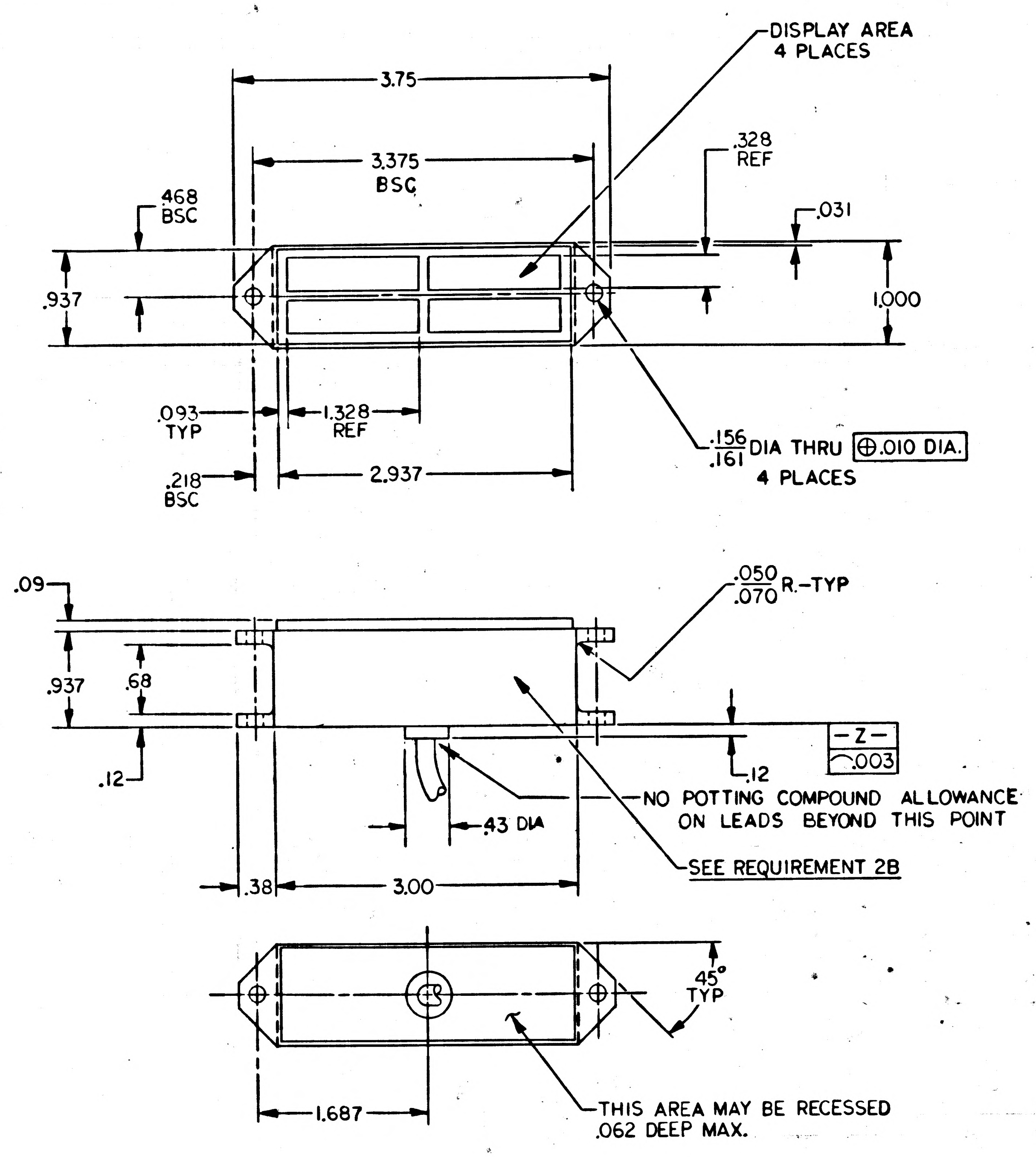
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008835
SCALE 4:1
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
A		REVISED PER TDRR 27361			3/29/66	



DISPLAY AREA 4 PLACES
3.75
3.375 BSC
.328 REF
.031
.468 BSC
.937
1.000
.093 TYP
1.328 REF
.218 BSC
2.937
.156/.161 DIA THRU ⊕.010 DIA. 4 PLACES
.09
.050/.070 R.-TYP
.937
.68
.12
-Z-
⌒.003
.12
NO POTTING COMPOUND ALLOWANCE ON LEADS BEYOND THIS POINT
.43 DIA
SEE REQUIREMENT 2B
.38
3.00
45° TYP
1.687
THIS AREA MAY BE RECESSED .062 DEEP MAX.

DASH 1

ZERO ENCODER	MASTER ALARM
IMU DELAY	

DASH 2

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

DASH 3

PGNS	IMU FAIL
	AGC PWR FAIL

DASH 4

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

FIGURE 1

DISPLAY AREA ARRANGEMENT

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ±.005 .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	MACCARRONE	9-28-65
CHECKED		1 Nov 65
APPROVED	Paul Watson	1 NOV 65
APPROVED		11/1/65
APPROVED MIT	A. C. METZGER	2 Nov 65
APPROVED MSC		DATE

ANNUNCIATOR—CAUTION/WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838

SCALE 1/1 SHEET 1 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65		
A		REVISED PER TDRR 27361			3/29/66		

Dash No.	Legend	Energized Color	No. of Lamps	Wire Color (PAIR)	Rated Lamp Voltage	Current Drain Per Display	Lamp Type (Ref)
-1	Master Alarm	Red	3	Red	28 Volts	.120 Amps ±10%	1764AS-10 or Equiv.
	(Blank)	White	2	Black	"	"	1764LSV or Equiv.
	Zero Encoder	White	2	White	"	"	"
	IMU Delay	White	2	Yellow	"	"	"
-2	Gimbal Lock	Yellow	2	Red	"	"	"
	IMU Temp	"	2	Black	"	"	"
	Accel. Fail	"	2	White	"	"	"
	CDU Fail	"	2	Yellow	"	"	"
-3	IMU Fail	YELLOW	2	Red	"	"	"
	AGC PWR Fail	"	2	Black	"	"	"
	PGNS	"	2	White	"	"	"
	(Blank)	"	2	Yellow	"	"	"
-4	Gimbal Lock	YELLOW	2	Green	5.0 Volts	.360Amps ±15%	1784AS-15 or Equiv.
	IMU Temp	"	2	Black	28 Volts	.120 Amps ±10%	1764LSV or Equiv.
	Accel. Fail	"	2	White	"	.120 AMPS ±10%	1764LSV or Equiv.
	CDU Fail	"	2	Yellow	"	" "	1764LSV or Equiv.

TABLE 1

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Simpson 1NOV65
CHECKED P. SCHULTE 1NOV65
APPROVED Paul Watson 1NOV65
APPROVED 11/1/65
APPROVED MIT 2NOV65
APPROVED MSC A. C. METZGER
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR—CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 2 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELASE CLASS A PER TDRR 23562			11-2-65	
A		REVISED PER TDRR 27361				

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002056 EXCEPT AS MODIFIED BY THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 1. EACH UNIT TO BE SEPARATELY PACKAGED.

2. INSPECTION AND ACCEPTANCE:
   - A. DIMENSIONS TO BE AS SHOWN.
   - B. MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE FOLLOWING INFORMATION PER ND 1002019.
     - (1) NASA DRAWING NUMBER
     - (2) MANUFACTURER'S NAME OR SYMBOL
     - (3) MANUFACTURER'S SERIAL NUMBER
   - C. LEGENDS: AS SHOWN IN TABLE 1 AND IN FIGURE 1. CHARACTERS TO BE BLACK. COLOR NUMBER 37038, PER FEDERAL STD-595 & SHALL BE OPAQUE WHEN LEGEND IS ENERGIZED. CHARACTERS TO BE 0.125 OVERALL HEIGHT WITH PROPORTIONS PER ND1002122. CHARACTER STROKE WIDTH TO BE .022/.025 INCHES. WORDING TO BE CENTERED ON DISPLAY.
   - D. CURRENT DRAIN: ELECTRICAL CURRENT DRAIN PER DISPLAY SHALL BE PER TABLE 1.
   - E. BRIGHTNESS: BACKGROUND BRIGHTNESS WITH LAMPS ENERGIZED AT RATED VOLTAGE (±1 VOLT) SHALL BE AS FOLLOWS:
     - (1) AVIATION RED: 50 ± 10 FOOT LAMBERTS
     - (2) AVIATION YELLOW: 50 ± 10 FOOT LAMBERTS
     - (3) AVIATION WHITE: 50 ± 10 FOOT LAMBERTS
   - F. LIGHT LEAKAGE: NO LIGHT LEAKAGE FROM LIGHTED TO UNLIGHTED LEGENDS OR THROUGH ANY EXTERIOR SURFACE OTHER THAN DISPLAY AREA. PAINT SHALL NOT BE CONSIDERED AN ADEQUATE LIGHT SHIELD.
   - G. DIELECTRIC STRENGTH: SHALL WITHSTAND 200 ± 25 VRMS, 60 CPS FOR 5 SECONDS BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS, IN ACCORDANCE WITH MIL-STD-202, METHOD 301. MAXIMUM ALLOWABLE LEAKAGE SHALL BE $2 \mu A$.
   - H. INSULATION RESISTANCE: SHALL BE 100 MEGOHMS MINIMUM WHEN MEASURED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, TEST CONDITION A, BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Simpson	1 Nov 65
CHECKED	R. Schulte	1 Nov 65
APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT		2 Nov 65
APPROVED MSC	C. METZGER	
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR - CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE		SHEET 3 OF 5

1008838A

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
A		REVISED PER TDRR 27361			3/29/66	WK

REQUIREMENTS: (CONTINUED)

3. DESIGN:

A. MATERIALS: ALL MATERIALS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF THIS DRAWING AND SHALL NOT EXHIBIT TOXIC OR CORROSIVE OUTGASSING WHEN SUBJECTED TO THE ENVIRONMENTAL CONDITIONS SPECIFIED ON THIS DRAWING.

(1) LEGEND FACE PLATE: PLASTIC ACRYLIC PER MIL-P-5425.

(2) CASE: ALUMINUM ALLOY 6061-T6 PER QQ-A-250/11B.

(3) THERMAL CONDUCTIVITY: LAMPS SHALL BE MOUNTED TO CASE USING A SUITABLE THERMALLY CONDUCTIVE MATERIAL.

B. FINISHES:

(1) HOUSING: CHEMICAL FILM ALUMINUM HOUSING PER MIL-C-5541, CLASS 3.

(2) EXPOSED ACRYLIC SURFACES TO BE COATED WITH EPOXY RESIN SYSTEM PER SCD 1008876 USING CATALYST SCD 1010686 COATING TO BE SMOOTH & UNIFORM. LEGEND AREA TO BE FINE BLASTED TO SATISIFY REQUIREMENTS 3E & 3G

(3) PAINT: PAINT ALL EXTERIOR SURFACES OF LEGEND MODULE EXCEPT LEGAND AREA, AND SURFACE INDICATED -Z- WITH LUSTERLESS GREY EPOXY OR ENAMEL, COLOR NUMBER 36231 PER FED-STD-595

C. LAMPS: THE NUMBER OF LAMPS PER LEGEND MODULE SHALL BE AS SPECIFIED IN TABLE 1 & SHALL BE PARALLEL WIRED IN EACH LEGEND. THE LAMPS SHALL BE TERMINATED AS SHOWN IN TABLE 1. THE LAMPS SHALL BE T-1-3/4 STYLE AND SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF THIS DRAWING.

D. ENERGIZED COLORS: LIGHTED DISPLAY COLORS SHALL BE AS SPECIFIED IN TABLE 1 WHEN ENERGIZED WITH RATED VOLTAGE ±1%. COLORS TO CONFORM TO AVIATION COLOR CO-ORDINATES AS SPECIFIED IN MIL-C-25050

E. UNENERGIZED COLOR: UNLIGHTED DISPLAY COLOR TO BE LOW REFLECTIVE, DIFFUSE, NEUTRAL GREY.

F. GLOSS: SURFACE GLOSS OF LEGEND AREA TO BE 5 UNITS OR LESS WHEN MEASURED PER MIL-P-7788 IN THE UNENERGIZED CONDITION.

G. CONTRAST: CONTRAST BETWEEN CHARACTERS & UNENERGIZED BACKGROUND SHALL BE 2 TO 4 UNITS WHEN MEASURED PER ND1002284.

H. WIRING AND HARNESS:

(1) HARNESS WIRE TO BE 24 AWG TEFLON INSULATED PER SCD 2021582. INSULATION COLOR TO BE AS SPECIFIED IN TABLE 1 AND SHALL CONFORM TO MIL-STD-104.

(2) HARNESS LEADS TO BE 36 INCHES LONG.

(3) ENCAPSULATE WIRE LEADS PER ND 1002236 AT MODULE USING SCD 1012504 AND SCD 1012505, PRIMERS: AND SCD 1012503, POLYURETHANE POTTING COMPOUND.

(4) REINFORCE HARNESS EXIT FROM UNIT WITH PLASTIC (OR ALUM). FERRULE AND ENCAPSULATE.

J. WEIGHT: FOUR (5) OUNCES MAXIMUM.

K. ENVIRONMENTAL CAPABILITIES: UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF ND1002056 EXCEPT AS MODIFIED BELOW.

(1) VIBRATION: WITH THE SAMPLES DE-ENERGIZED, THE VIBRATION TEST SHALL BE PERFORMED AT 15 G'S (ZERO TO PEAK) AT FREQUENCIES FROM 5 CPS TO 2000 CPS TO 5 CPS SWEPT AT A LOGARITHMIC RATE OF ONE MIN. PER OCTAVE, ONCE IN EACH OF THREE ORTHOGONAL AXES, DOUBLE AMPLITUDE LIMITED TO 0.12 INCHES.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Simpson	1 Nov 65
CHECKED	R. Schulte	1 Nov 65
APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT		2 Nov 65
APPROVED MSC	A. C. METZGER	
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR-CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 4 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	
A		REVISED PER TDRR 27361			3/25/66	

REQUIREMENTS: (CONTINUED)

3. DESIGN: (CONTINUED)
   (2) SHOCK: THE SAMPLES, DE-ENERGIZED, SHALL BE SUBJECTED TO ONE SHOCK OF 20 G'S, TERMINAL PEAK SAWTOOTH WAVE SHAPE OF 6 ± 1 MILLISECONDS DURATION IN EACH PLUS AND MINUS DIRECTION OF 3 ORTHOGONAL AXES (TOTAL OF 6 SHOCKS).
   (3) ACCELERATION: AS SPECIFIED IN ND 1002056 EXCEPT WITH THE SAMPLES DE-ENERGIZED.
   (4) LIFE: AS SPECIFIED IN ND 1002056 EXCEPT THE LENGTH OF THE TEST SHALL BE 200 HOURS.

4. NOTES
   A. THIS UNIT IS TO BE MOUNTED TO A HEAT SINK WHEN ENERGIZED FOR PERIODS LONGER THAN TWO (2) MINUTES. A SATISFACTORY HEAT SINK IS AN ALUMINUM (OR BRASS) PLATE APPROXIMATELY 15 X 15 X 1/4" THICK.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Simpson 1 NOV 65
CHECKED R. SCHULTE 1 NOV 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT 2 NOV 65
APPROVED MSC A. C. METZGER
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR-CAUTION / WARNING

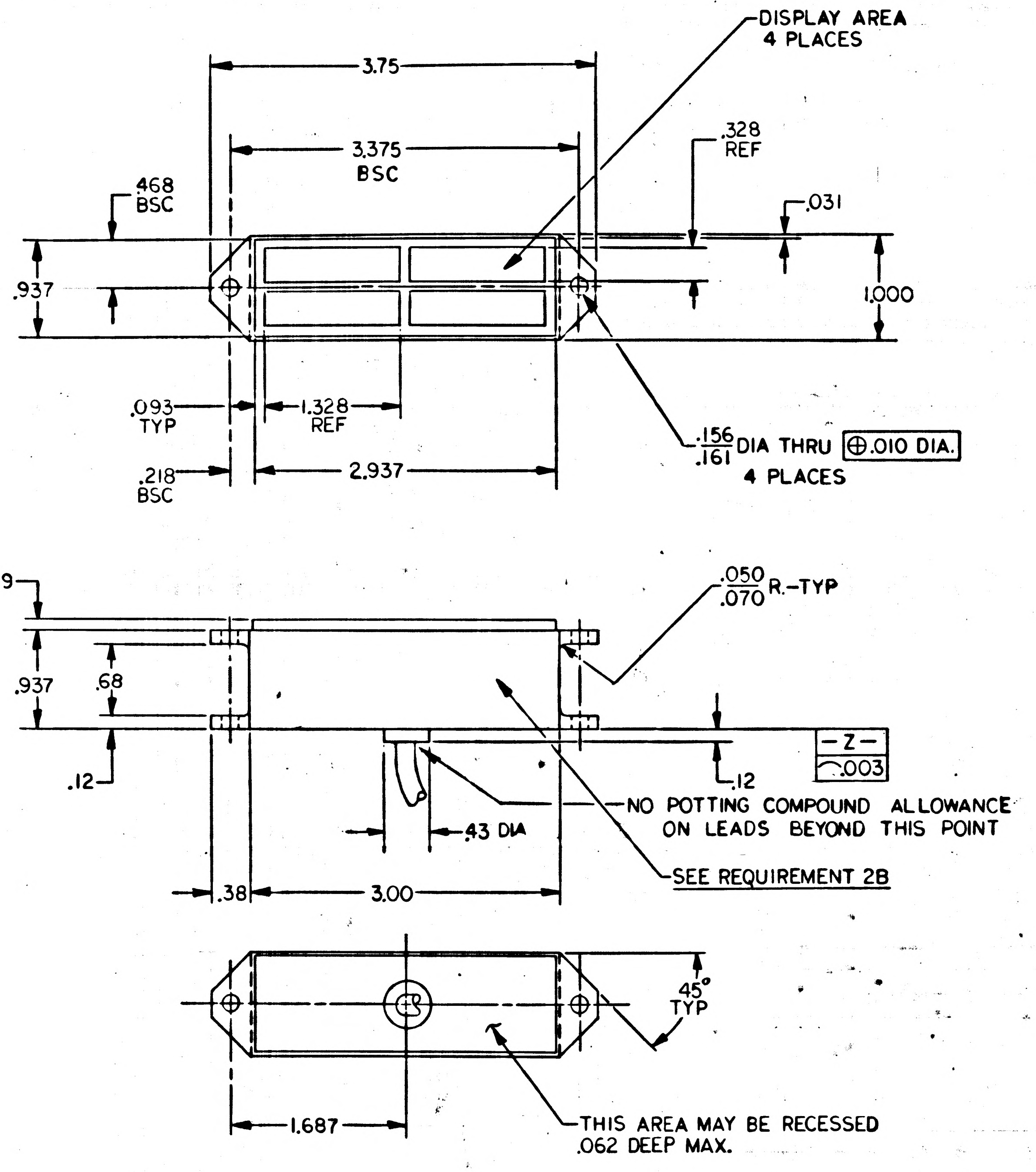
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 5 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
Ⓜ —		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
Ⓐ A		REVISED PER TDRR 27361			3/29/66	WK
B		REVISED PER TDRR 27361			4/5/66	WK



DISPLAY AREA
4 PLACES
3.75
3.375
BSC
.328
REF
.031
.468
BSC
.937
1.000
.093
TYP
1.328
REF
.218
BSC
2.937
.156
.161
DIA THRU ⊕.010 DIA.
4 PLACES
.09
.050
.070
R.-TYP
.937
.68
.12
.12
-Z-
⌒.003
NO POTTING COMPOUND ALLOWANCE
ON LEADS BEYOND THIS POINT
.43 DIA
SEE REQUIREMENT 2B
.38
3.00
45°
TYP
1.687
THIS AREA MAY BE RECESSED
.062 DEEP MAX.

DASH 1

ZERO ENCODER	MASTER ALARM
IMU DELAY	

DASH 2

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

DASH 3

PGNS	IMU FAIL
	AGC PWR FAIL

DASH 4

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

FIGURE 1

DISPLAY AREA ARRANGEMENT

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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TOLERANCES ON
FRACTIONS ± DECIMALS ± .005 ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN MACCARRONE 9-28-65
CHECKED HEP Schulte 1 Nov 65
APPROVED Paul Watson 1 NOV 65
APPROVED EGT 11/1/65
APPROVED MIT W Kupfer 2 Nov 65
A. C. METZGER
APPROVED MSC
DATE

ANNUNCIATOR—CAUTION/WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE 1/1
SHEET 1 OF 5

MASTER

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
A		REVISED PER TDRR 27361			3/26/66	WK
B		REVISED PER TDRR 27362			4/5/66	WK

Dash No.	Legend	Energized Color	No. of Lamps	Wire Color (PAIR)	Rated Lamp Voltage	Current Drain Per Display	Lamp Type (Ref)
-1	Master Alarm	Red	3	Red	28 Volts	.120 Amps ±10%	1764AS-10 or Equiv.
	(Blank)	White	2	Black	"	"	1764LSV or Equiv.
	Zero Encoder	White	2	White	"	"	"
	IMU Delay	White	2	Yellow	"	"	"
-2	Gimbal Lock	Yellow	2	Red	"	"	"
	IMU Temp	"	2	Black	"	"	"
	Accel. Fail	"	2	White	"	"	"
	CDU Fail	"	2	Yellow	"	"	"
-3	IMU Fail	YELLOW	2	Red	"	"	"
	AGC PWR Fail	"	2	Black	"	"	"
	PGNS	"	2	White	"	"	"
	(Blank)	"	2	Yellow	"	"	"
-4	Gimbal Lock	YELLOW	2	Green	5.0 Volts	.360 Amps ±15%	1784AS-15 or Equiv.
	IMU Temp	"	2	Black	28 Volts	.120 Amps ±10%	1764LSV or Equiv.
	Accel. Fail	"	2	White	"	.120 AMPS ±10%	1764LSV or Equiv.
	CDU Fail	"	2	Yellow	"	" "	1764LSV or Equiv.

TABLE 1

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Simpson	1 NOV 65
CHECKED	P. Schulte	1 NOV 65
APPROVED	Paul Watson	1 NOV 65
APPROVED	J. J. Harris	11/1/65
APPROVED MIT	W. Kupfer	2 Nov 65
APPROVED MSC	A. C. METZGER	DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR – CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838

SCALE

SHEET 2 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELASE CLASS A PER TDRR 23562			11-2-65	
A		REVISED PER TDRR 27361				
B		REVISED PER TDRR 27362				

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002056 EXCEPT AS MODIFIED BY THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 1. EACH UNIT TO BE SEPARATELY PACKAGED.

2. INSPECTION AND ACCEPTANCE:
   - A. DIMENSIONS TO BE AS SHOWN.
   - B. MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE FOLLOWING INFORMATION PER ND 1002019.
     - (1) NASA DRAWING NUMBER
     - (2) MANUFACTURER'S NAME OR SYMBOL
     - (3) MANUFACTURER'S SERIAL NUMBER
   - C. LEGENDS: AS SHOWN IN TABLE 1 AND IN FIGURE 1. CHARACTERS TO BE BLACK. COLOR NUMBER 37038, PER FEDERAL STD-595 & SHALL BE OPAQUE WHEN LEGEND IS ENERGIZED. CHARACTERS TO BE 0.125 OVERALL HEIGHT WITH PROPORTIONS PER ND1002122. CHARACTER STROKE WIDTH TO BE .022/.025 INCHES. WORDING TO BE CENTERED ON DISPLAY.
   - D. CURRENT DRAIN: ELECTRICAL CURRENT DRAIN PER DISPLAY SHALL BE PER TABLE 1.
   - E. BRIGHTNESS: BACKGROUND BRIGHTNESS WITH LAMPS ENERGIZED AT RATED VOLTAGE (±1 VOLT) SHALL BE AS FOLLOWS:
     - (1) AVIATION RED: 50 ± 10 FOOT LAMBERTS
     - (2) AVIATION YELLOW: 50 ± 10 FOOT LAMBERTS
     - (3) AVIATION WHITE: 50 ± 10 FOOT LAMBERTS
   - F. LIGHT LEAKAGE: NO LIGHT LEAKAGE FROM LIGHTED TO UNLIGHTED LEGENDS OR THROUGH ANY EXTERIOR SURFACE OTHER THAN DISPLAY AREA. PAINT SHALL NOT BE CONSIDERED AN ADEQUATE LIGHT SHIELD.
   - G. DIELECTRIC STRENGTH: SHALL WITHSTAND 200 ± 25 VRMS, 60 CPS FOR 5 SECONDS BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS, IN ACCORDANCE WITH MIL-STD-202, METHOD 301. MAXIMUM ALLOWABLE LEAKAGE SHALL BE 2μA.
   - H. INSULATION RESISTANCE: SHALL BE 100 MEGOHMS MINIMUM WHEN MEASURED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, TEST CONDITION A, BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS.

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Simpson 1 NOV 65
CHECKED R. Schulte 1 NOV 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT W Kupfer 2 NOV 65
APPROVED MSC C. METZGER
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR - CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 3 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT HEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A. PER TDRR 23562			11-8-65	WK
A		REVISED PER TDRR 27361			3/29/66	WK
B		REVISED PER TDRR 27362			4/4/66	WK

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. MATERIALS: ALL MATERIALS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF THIS DRAWING AND SHALL NOT EXHIBIT TOXIC OR CORROSIVE OUTGASSING WHEN SUBJECTED TO THE ENVIRONMENTAL CONDITIONS SPECIFIED ON THIS DRAWING.
     - (1) LEGEND FACE PLATE: PLASTIC ACRYLIC PER MIL-P-5425.
     - (2) CASE: ALUMINUM ALLOY 6061-T6 PER QQ-A-250/11B.
     - (3) THERMAL CONDUCTIVITY: LAMPS SHALL BE MOUNTED TO CASE USING A SUITABLE THERMALLY CONDUCTIVE MATERIAL.
   - B. FINISHES:
     - (1) HOUSING: CHEMICAL FILM ALUMINUM HOUSING PER MIL-C-5541, CLASS 3.
     - (2) PAINT: PAINT ALL EXTERIOR SURFACES OF LEGEND MODULE EXCEPT LEGAND AREA, AND SURFACE INDICATED -Z- WITH LUSTERLESS GREY EPOXY OR ENAMEL, COLOR NUMBER 36231 PER FED-STD-595
   - C. LAMPS: THE NUMBER OF LAMPS PER LEGEND MODULE SHALL BE AS SPECIFIED IN TABLE 1 & SHALL BE PARALLEL WIRED IN EACH LEGEND. THE LAMPS SHALL BE TERMINATED AS SHOWN IN TABLE 1. THE LAMPS SHALL BE T-1-3/4 STYLE AND SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF THIS DRAWING.
   - D. ENERGIZED COLORS: LIGHTED DISPLAY COLORS SHALL BE AS SPECIFIED IN TABLE 1 WHEN ENERGIZED WITH RATED VOLTAGE ±1%. COLORS TO CONFORM TO AVIATION COLOR CO-ORDINATES AS SPECIFIED IN MIL-C-25050
   - E. UNENERGIZED COLOR: UNLIGHTED DISPLAY COLOR TO BE LOW REFLECTIVE, DIFFUSE, NEUTRAL GREY.
   - F. GLOSS: SURFACE GLOSS OF LEGEND AREA TO BE 5 UNITS OR LESS WHEN MEASURED PER MIL-P-7788 IN THE UNENERGIZED CONDITION.
   - G. CONTRAST: CONTRAST BETWEEN CHARACTERS & UNENERGIZED BACKGROUND SHALL BE 2 TO 4 UNITS WHEN MEASURED PER ND1002284.
   - H. WIRING AND HARNESS:
     - (1) HARNESS WIRE TO BE 24 AWG TEFLON INSULATED PER SCD 2021582. INSULATION COLOR TO BE AS SPECIFIED IN TABLE 1 AND SHALL CONFORM TO MIL-STD-104.
     - (2) HARNESS LEADS TO BE 36 INCHES LONG.
     - (3) ENCAPSULATE WIRE LEADS PER ND 1002236 AT MODULE USING SCD 1012504 AND SCD 1012505, PRIMERS: AND SCD 1012503, POLYURETHANE POTTING COMPOUND.
     - (4) REINFORCE HARNESS EXIT FROM UNIT WITH PLASTIC (OR ALUM). FERRULE AND ENCAPSULATE.
   - J. WEIGHT: FOUR (5) OUNCES MAXIMUM.
   - K. ENVIRONMENTAL CAPABILITIES: UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF ND1002056 EXCEPT AS MODIFIED BELOW.
     - (1) VIBRATION: WITH THE SAMPLES DE-ENERGIZED, THE VIBRATION TEST SHALL BE PERFORMED AT 15 G'S (ZERO TO PEAK) AT FREQUENCIES FROM 5 CPS TO 2000 CPS TO 5 CPS SWEPT AT A LOGARITHMIC RATE OF ONE MIN. PER OCTAVE, ONCE IN EACH OF THREE ORTHOGONAL AXES, DOUBLE AMPLITUDE LIMITED TO 0.12 INCHES.

MASTER

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LIST OF MATERIALS

NEXT ASSY	USED ON

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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Simpson	1 Nov 65
CHECKED	R. Schulte	1 Nov 65
APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT		2 Nov 65
APPROVED MSC	A. C. METZGER	
		DATE

ANNUNCIATOR-CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE		SHEET 4 OF 5

1008838

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS							
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-3-65		WK
A		REVISED PER TDRR 27361		-	3/25/66		WK
B		REVISED PER TDRR 27362			4/8/66		WK

REQUIREMENTS: (CONTINUED)

3. DESIGN: (CONTINUED)
   (2) SHOCK: THE SAMPLES, DE-ENERGIZED, SHALL BE SUBJECTED TO ONE SHOCK OF 20 G'S, TERMINAL PEAK SAWTOOTH WAVE SHAPE OF 6 ± 1 MILLISECONDS DURATION IN EACH PLUS AND MINUS DIRECTION OF 3 ORTHOGONAL AXES (TOTAL OF 6 SHOCKS).
   (3) ACCELERATION: AS SPECIFIED IN ND 1002056 EXCEPT WITH THE SAMPLES DE-ENERGIZED.
   (4) LIFE: AS SPECIFIED IN ND 1002056 EXCEPT THE LENGTH OF THE TEST SHALL BE 200 HOURS.

4. NOTES
   A. THIS UNIT IS TO BE MOUNTED TO A HEAT SINK WHEN ENERGIZED FOR PERIODS LONGER THAN TWO (2) MINUTES. A SATISFACTORY HEAT SINK IS AN ALUMINUM (OR BRASS) PLATE APPROXIMATELY 15 X 15 X 1/4" THICK.

MASTER

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CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Simpson	1 NOV 65
CHECKED	R. SCHULTE	1 Nov 65
APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT		2 Nov 65
APPROVED MSC	A. C. METZGER	
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR-CAUTION/WARNING

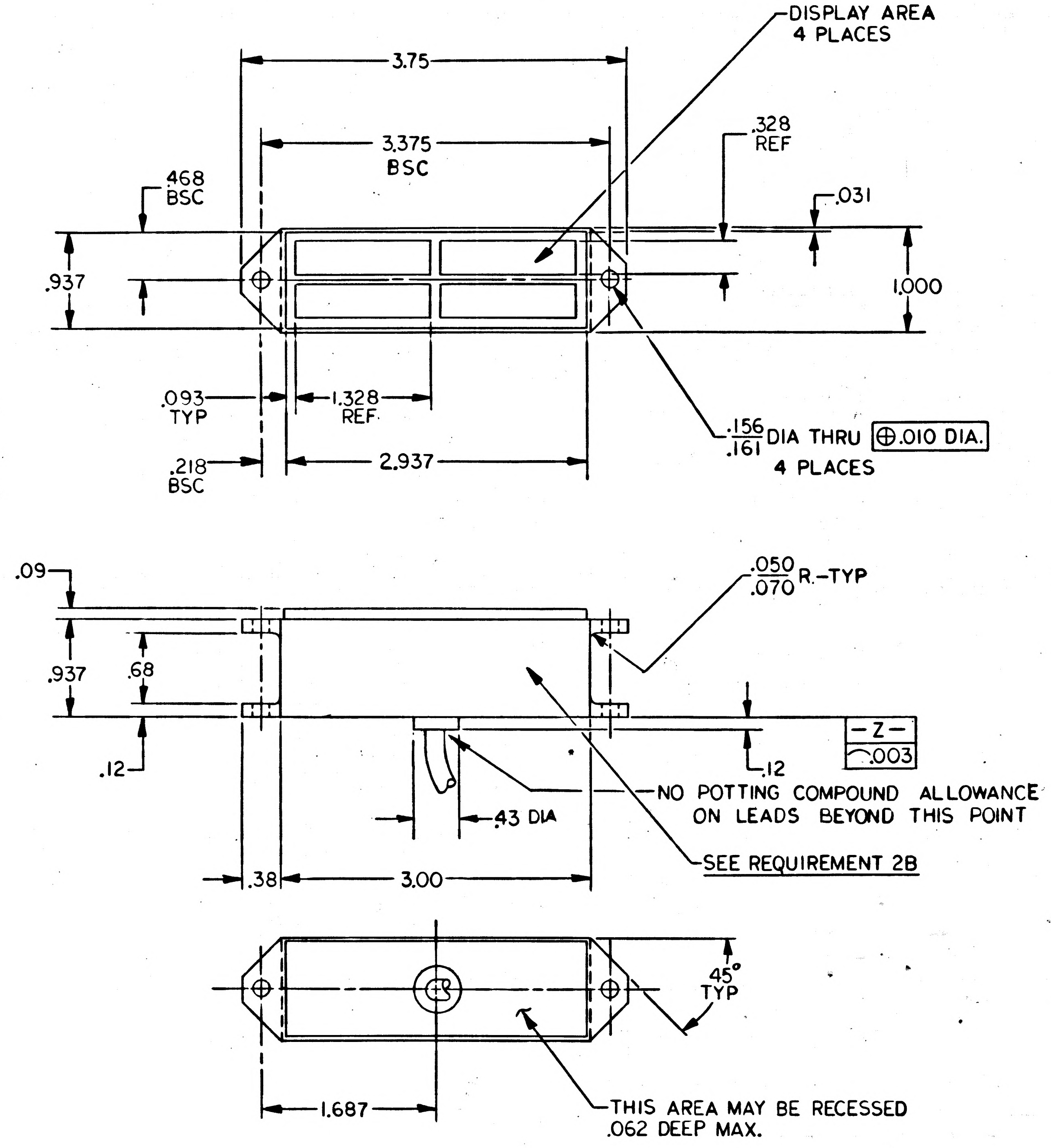
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE		SHEET 5 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
A		REVISED PER TDRR 27361			3/29/66	WK
B		REVISED PER TDRR 27362			4/5/66	WK
C		REVISED PER TDRR 28444			5-10-66	



DISPLAY AREA
4 PLACES
3.75
3.375
BSC
.328
REF
.031
.468
BSC
.937
1.000
.093
TYP
1.328
REF
.218
BSC
2.937
.156
.161
DIA THRU ⊕.010 DIA.
4 PLACES
.09
.050
.070
R.-TYP
.937
.68
.12
-Z-
⌒.003
.12
NO POTTING COMPOUND ALLOWANCE
ON LEADS BEYOND THIS POINT
.43 DIA
SEE REQUIREMENT 2B
.38
3.00
45°
TYP
1.687
THIS AREA MAY BE RECESSED
.062 DEEP MAX.

DASH 1

ZERO ENCODER	MASTER ALARM
IMU DELAY	

DASH 2

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

DASH 3

PGNS	IMU FAIL
	AGC PWR FAIL

DASH 4

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

FIGURE 1

DISPLAY AREA ARRANGEMENT

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± .005 .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN MACCARRONE 9-28-65
CHECKED 1 Nov 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT A. G. METZGER 2 Nov 65
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR–CAUTION/WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE 1/1
SHEET 1 OF 5

1008838 C

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
A		REVISED PER TDRR 27361			3/29/66	WK
B		REVISED PER TDRR 27362			4/5/66	WK
C		REVISED PER TDRR 28444			5/10/66	

Dash No.	Legend	Energized Color	No. of Lamps	Wire Color (PAIR)	Rated Lamp Voltage	Current Drain Per Display	Lamp Type (Ref)
-1	Master Alarm	Red	3	Red	28 Volts	.120 Amps +10%	1764AS-10 or Equiv.
	(Blank)	White	2	Black	"	" -15%	1764LSV or Equiv.
	Zero Encoder	White	2	White	"	"	"
	IMU Delay	White	2	Yellow	"	"	"
-2	Gimbal Lock	Yellow	2	Red	"	"	"
	IMU Temp	"	2	Black	"	"	"
	Accel. Fail	"	2	White	"	"	"
	CDU Fail	"	2	Yellow	"	"	"
-3	IMU Fail	YELLOW	2	Red	"	"	"
	AGC PWR Fail	"	2	Black	"	"	"
	PGNS	"	2	White	"	"	"
	(Blank)	"	2	Yellow	"	"	"
-4	Gimbal Lock	YELLOW	2	Green	5.0 Volts	.360Amps ±15%	1784AS-15 or Equiv.
	IMU Temp	"	2	Black	28 Volts	.120 Amps ±10%	1764LSV or Equiv.
	Accel. Fail	"	2	White	"	.120 AMPS ±10%	1764LSV or Equiv.
	CDU Fail	"	2	Yellow	"	" "	1764LSV or Equiv.

TABLE 1

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Simpson 1 NOV 65
CHECKED R. SCHULTE 1 NOV 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT W Kupfer 2 NOV 65
APPROVED MSC A. C. METZGER
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR – CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 2 OF 5

1008838 C

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELASE CLASS A PER TDRR 23562			11-2-65	
A		REVISED PER TDRR 27361			3/29/66	
B		REVISED PER TDRR 27362			4/5/66	
C		REVISED PER TDRR 28444			5-16-66	

REQUIREMENTS:

1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002056 EXCEPT AS MODIFIED BY THIS DRAWING.
   D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 1. EACH UNIT TO BE SEPARATELY PACKAGED.

2. INSPECTION AND ACCEPTANCE:
   A. DIMENSIONS TO BE AS SHOWN.
   B. MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE FOLLOWING INFORMATION PER ND 1002019.
      (1) NASA DRAWING NUMBER
      (2) MANUFACTURER'S NAME OR SYMBOL
      (3) MANUFACTURER'S SERIAL NUMBER
   C. LEGENDS: AS SHOWN IN TABLE 1 AND IN FIGURE 1. CHARACTERS TO BE BLACK. COLOR NUMBER 37038, PER FEDERAL STD-595 & SHALL BE OPAQUE WHEN LEGEND IS ENERGIZED. CHARACTERS TO BE 0.125 OVERALL HEIGHT WITH PROPORTIONS PER ND1002122. CHARACTER STROKE WIDTH TO BE .022/.025 INCHES. WORDING TO BE CENTERED ON DISPLAY.
   D. CURRENT DRAIN: ELECTRICAL CURRENT DRAIN PER DISPLAY SHALL BE PER TABLE 1.

   E. BRIGHTNESS: BACKGROUND BRIGHTNESS WITH LAMPS ENERGIZED AT RATED VOLTAGE (±1 VOLT) SHALL BE AS FOLLOWS:
      (1) AVIATION RED: 50 ± 10 FOOT LAMBERTS
      (2) AVIATION YELLOW: 50 ± 10 FOOT LAMBERTS
      (3) AVIATION WHITE: 50 ± 10 FOOT LAMBERTS
   F. LIGHT LEAKAGE: NO LIGHT LEAKAGE FROM LIGHTED TO UNLIGHTED LEGENDS OR THROUGH ANY EXTERIOR SURFACE OTHER THAN DISPLAY AREA. PAINT SHALL NOT BE CONSIDERED AN ADEQUATE LIGHT SHIELD.
   G. DIELECTRIC STRENGTH: SHALL WITHSTAND 200 ± 25 VRMS, 60 CPS FOR 5 SECONDS BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS, IN ACCORDANCE WITH MIL-STD-202, METHOD 301. MAXIMUM ALLOWABLE LEAKAGE SHALL BE 2 μA.
   H. INSULATION RESISTANCE: SHALL BE 100 MEGOHMS MINIMUM WHEN MEASURED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, TEST CONDITION A, BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS.

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Simpson	1 NOV 65
CHECKED	R. Schulte	1 NOV 65
APPROVED	Paul Watson	1 NOV 65
APPROVED		11/1/65
APPROVED MIT		2 NOV 65
APPROVED MSC	A. C. METZGER	
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR - CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE		SHEET 3 OF 5

1008838C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS							
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65		WK
A		REVISED PER TDRR 27361			3/29/66		WK
B		REVISED PER TDRR 27362			4/4/66		WK
C		REVISED PER TDRR 28444			5-10-66		

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. MATERIALS: ALL MATERIALS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF THIS DRAWING AND SHALL NOT EXHIBIT TOXIC OR CORROSIVE OUTGASSING WHEN SUBJECTED TO THE ENVIRONMENTAL CONDITIONS SPECIFIED ON THIS DRAWING.
     - (1) LEGEND FACE PLATE: PLASTIC ACRYLIC PER MIL-P-5425.
     - (2) CASE: ALUMINUM ALLOY 6061-T6 PER QQ-A-250/11B.
     - (3) THERMAL CONDUCTIVITY: LAMPS SHALL BE MOUNTED TO CASE USING A SUITABLE THERMALLY CONDUCTIVE MATERIAL.
   - B. FINISHES:
     - (1) HOUSING: CHEMICAL FILM ALUMINUM HOUSING PER MIL-C-5541, CLASS 3.
     - (2) PAINT: PAINT ALL EXTERIOR SURFACES OF LEGEND MODULE EXCEPT LEGAND AREA, AND SURFACE INDICATED -Z- WITH LUSTERLESS GREY EPOXY OR ENAMEL, COLOR NUMBER 36231 PER FED-STD-595
   - C. LAMPS: THE NUMBER OF LAMPS PER LEGEND MODULE SHALL BE AS SPECIFIED IN TABLE 1 & SHALL BE PARALLEL WIRED IN EACH LEGEND. THE LAMPS SHALL BE TERMINATED AS SHOWN IN TABLE 1. THE LAMPS SHALL BE T-1-3/4 STYLE AND SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF THIS DRAWING.
   - D. ENERGIZED COLORS: LIGHTED DISPLAY COLORS SHALL BE AS SPECIFIED IN TABLE 1 WHEN ENERGIZED WITH RATED VOLTAGE ±1%. COLORS TO CONFORM TO AVIATION COLOR CO-ORDINATES AS SPECIFIED IN MIL-C-25050
   - E. UNENERGIZED COLOR: UNLIGHTED DISPLAY COLOR TO BE LOW REFLECTIVE, DIFFUSE, NEUTRAL GREY.
   - F. GLOSS: SURFACE GLOSS OF LEGEND AREA TO BE 5 UNITS OR LESS WHEN MEASURED PER MIL-P-7788 IN THE UNENERGIZED CONDITION.
   - G. CONTRAST: CONTRAST BETWEEN CHARACTERS & UNENERGIZED BACKGROUND SHALL BE 2 TO 4 UNITS WHEN MEASURED PER ND1002284.
   - H. WIRING AND HARNESS:
     - (1) HARNESS WIRE TO BE 24 AWG TEFLON INSULATED PER SCD 2021582. INSULATION COLOR TO BE AS SPECIFIED IN TABLE 1 AND SHALL CONFORM TO MIL-STD-104.
     - (2) HARNESS LEADS TO BE 36 INCHES LONG.
     - (3) ENCAPSULATE WIRE LEADS PER ND 1002236 AT MODULE USING SCD 1012504 AND SCD 1012505, PRIMERS: AND SCD 1012503, POLYURETHANE POTTING COMPOUND.
     - (4) REINFORCE HARNESS EXIT FROM UNIT WITH PLASTIC (OR ALUM). FERRULE AND ENCAPSULATE.
   - J. WEIGHT: FOUR (5) OUNCES MAXIMUM.
   - K. ENVIRONMENTAL CAPABILITIES: UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF ND1002056 EXCEPT AS MODIFIED BELOW.
     - (1) VIBRATION: WITH THE SAMPLES DE-ENERGIZED, THE VIBRATION TEST SHALL BE PERFORMED AT 15 G'S (ZERO TO PEAK) AT FREQUENCIES FROM 5 CPS TO 2000 CPS TO 5 CPS SWEPT AT A LOGARITHMIC RATE OF ONE MIN. PER OCTAVE, ONCE IN EACH OF THREE ORTHOGONAL AXES, DOUBLE AMPLITUDE LIMITED TO 0.12 INCHES.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	W. Simpson	1 Nov 65
CHECKED	R. Schulte	1 Nov 65
APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT	W Kupfer	2 Nov 65
APPROVED MSC	A. C. METZGER	

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR-CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE		SHEET 4 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 23562			11-8-65	WK
A		REVISED PER TDRR 27361			3/25/66	WK
B		REVISED PER TDRR 27362			4/8/66	WK
C		REVISED PER TDRR 28444			5-16-66	

REQUIREMENTS: (CONTINUED)

3. DESIGN: (CONTINUED)
   (2) SHOCK: THE SAMPLES, DE-ENERGIZED, SHALL BE SUBJECTED TO ONE SHOCK OF 20 G'S, TERMINAL PEAK SAWTOOTH WAVE SHAPE OF 6 ± 1 MILLISECONDS DURATION IN EACH PLUS AND MINUS DIRECTION OF 3 ORTHOGONAL AXES (TOTAL OF 6 SHOCKS).
   (3) ACCELERATION: AS SPECIFIED IN ND 1002056 EXCEPT WITH THE SAMPLES DE-ENERGIZED.
   (4) LIFE: AS SPECIFIED IN ND 1002056 EXCEPT THE LENGTH OF THE TEST SHALL BE 200 HOURS.

4. NOTES
   A. THIS UNIT IS TO BE MOUNTED TO A HEAT SINK WHEN ENERGIZED FOR PERIODS LONGER THAN TWO (2) MINUTES. A SATISFACTORY HEAT SINK IS AN ALUMINUM (OR BRASS) PLATE APPROXIMATELY 15 X 15 X 1/4" THICK.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Simpson 1 NOV 65
CHECKED R. SCHULTE 1 NOV 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT 2 NOV 65
APPROVED MSC L. C. METZGER
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR-CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

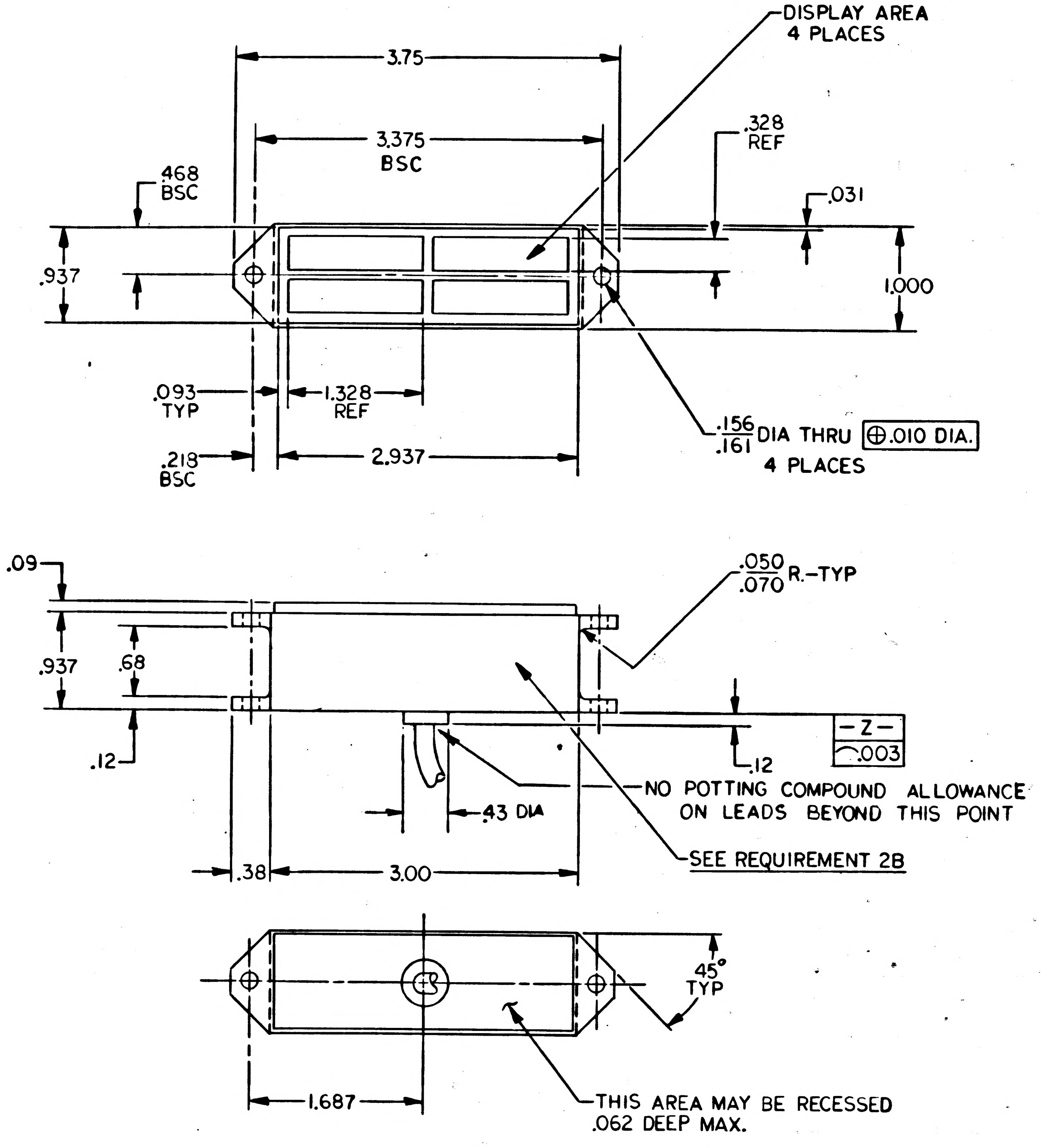
CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 5 OF 5

1008838 C

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
A		REVISED PER TDRR 27361				WK
B		REVISED PER TDRR 27362			4/5/66	WK
C		REVISED PER TDRR 28444			5-10-66	
D		REVISED PER TDRR 29611				


DISPLAY AREA
4 PLACES
3.75
3.375
BSC
.328
REF
.031
468
BSC
.937
1.000
.093
TYP
1.328
REF
.218
BSC
2.937
.156
.161
DIA THRU
⊕.010 DIA.
4 PLACES
.09
.050
.070
R.–TYP
.937
.68
.12
–Z–
⌒.003
.12
NO POTTING COMPOUND ALLOWANCE
ON LEADS BEYOND THIS POINT
.43 DIA
SEE REQUIREMENT 2B
.38
3.00
45°
TYP
1.687
THIS AREA MAY BE RECESSED
.062 DEEP MAX.

DASH 1

ZERO ENCODER	MASTER ALARM
IMU DELAY	

DASH 2

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

DASH 3

PGNS	IMU FAIL
	AGC PWR FAIL

DASH 4

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

FIGURE 1
DISPLAY AREA ARRANGEMENT

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTER

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CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± .005 ± .02 ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN MACCARRONE 9-28-65
CHECKED 1 Nov 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT A. G. METZGER 2 Nov 65
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

ANNUNCIATOR–CAUTION/WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE 1/1
SHEET 1 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK
A		REVISED PER TDRR 27361			3/29/66	WK
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C		REVISED PER TDRR 28444			5/10/66	
D		REVISED PER TDRR 29611				

Dash No.	Legend	Energized Color	No. of Lamps	Wire Color (PAIR)	Rated Lamp Voltage	Current Drain Per Display	Lamp Type (Ref)
-1	Master Alarm	Red	3	Red	28 Volts	.120 Amps +10%	1764AS-10 or Equiv.
	(Blank)	White	2	Black	"	" −15%	1764LSV or Equiv.
	Zero Encoder	White	2	White	"	"	"
	IMU Delay	White	2	Yellow	"	"	"
-2	Gimbal Lock	Yellow	2	Red	"	"	"
	IMU Temp	"	2	Black	"	"	"
	Accel. Fail	"	2	White	"	"	"
	CDU Fail	"	2	Yellow	"	"	"
-3	IMU Fail	YELLOW	2	Red	"	"	"
	AGC PWR Fail	"	2	Black	"	"	"
	PCNS	"	2	White	"	"	"
	(Blank)	"	2	Yellow	"	"	"
-4	Gimbal Lock	YELLOW	2	Green	5.0 Volts	.360Amps ±15%	1784AS-15 or Equiv.
	IMU Temp	"	2	Black	28 Volts	.120 AMPS $^{+10\%}_{-15\%}$	1764LSV or Equiv.
	Accel. Fail	"	2	White	"	.120 AMPS $^{+10\%}_{-15\%}$	1764LSV or Equiv.
	CDU Fail	"	2	Yellow	"	" " "	1764LSV or Equiv.

TABLE 1

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W. Simpson 1 NOV 65
CHECKED P. Schulte 1 NOV 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT 2 NOV 65
APPROVED MSC A. C. METZGER
DATE

ANNUNCIATOR-CAUTION/WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 2 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELASE CLASS A PER TDRR 23562			11-2-65	
A		REVISED PER TDRR 27361			3/29/66	
B		REVISED PER TDRR 27362			4/5/66	
C		REVISED PER TDRR 28444			5-16-66	
D		REVISED PER TDRR 29611				

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002056 EXCEPT AS MODIFIED BY THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 1. EACH UNIT TO BE SEPARATELY PACKAGED.

2. INSPECTION AND ACCEPTANCE:
   - A. DIMENSIONS TO BE AS SHOWN.
   - B. MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE FOLLOWING INFORMATION PER ND 1002019.
     - (1) NASA DRAWING NUMBER
     - (2) MANUFACTURER'S NAME OR SYMBOL
     - (3) MANUFACTURER'S SERIAL NUMBER
   - C. LEGENDS: AS SHOWN IN TABLE 1 AND IN FIGURE 1. CHARACTERS TO BE BLACK. COLOR NUMBER 37038, PER FEDERAL STD-595 & SHALL BE OPAQUE WHEN LEGEND IS ENERGIZED. CHARACTERS TO BE 0.125 OVERALL HEIGHT WITH PROPORTIONS PER ND1002122. CHARACTER STROKE WIDTH TO BE .022/.025 INCHES. WORDING TO BE CENTERED ON DISPLAY.
   - D. CURRENT DRAIN: ELECTRICAL CURRENT DRAIN PER DISPLAY SHALL BE PER TABLE 1.
   - E. BRIGHTNESS: BACKGROUND BRIGHTNESS WITH LAMPS ENERGIZED AT RATED VOLTAGE (±1 VOLT) SHALL BE AS FOLLOWS:
     - (1) AVIATION RED: 50 ± 10 FOOT LAMBERTS
     - (2) AVIATION YELLOW: 50 ± 10 FOOT LAMBERTS
     - (3) AVIATION WHITE: 50 ± 10 FOOT LAMBERTS
   - F. LIGHT LEAKAGE: NO LIGHT LEAKAGE FROM LIGHTED TO UNLIGHTED LEGENDS OR THROUGH ANY EXTERIOR SURFACE OTHER THAN DISPLAY AREA. PAINT SHALL NOT BE CONSIDERED AN ADEQUATE LIGHT SHIELD.
   - G. DIELECTRIC STRENGTH: SHALL WITHSTAND 200 ± 25 VRMS, 60 CPS FOR 5 SECONDS BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS, IN ACCORDANCE WITH MIL-STD-202, METHOD 301. MAXIMUM ALLOWABLE LEAKAGE SHALL BE 2 μA.
   - H. INSULATION RESISTANCE: SHALL BE 100 MEGOHMS MINIMUM WHEN MEASURED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, TEST CONDITION A, BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS.

MASTER

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QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Simpson	1 Nov 65
CHECKED	R. Schulte	1 Nov 65
APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT	W Kupfer	2 Nov 65
APPROVED MSC	C. METZGER	
		DATE

ANNUNCIATOR - CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE		SHEET 3 OF 5

1008838 D

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SYM.	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 23562			1-8-65	WK
A		REVISED PER TDRR 27361			3/29/66	WK
B		REVISED PER TDRR 27362			4/1/66	WK
C		REVISED PER TDRR 28444			5-16-66	
D		REVISED PER TDRR 29611				

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. MATERIALS: ALL MATERIALS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF THIS DRAWING AND SHALL NOT EXHIBIT TOXIC OR CORROSIVE OUTGASSING WHEN SUBJECTED TO THE ENVIRONMENTAL CONDITIONS SPECIFIED ON THIS DRAWING.
     - (1) LEGEND FACE PLATE: PLASTIC ACRYLIC PER MIL-P-5425.
     - (2) CASE: ALUMINUM ALLOY 6061-T6 PER QQ-A-250/11B.
     - (3) THERMAL CONDUCTIVITY: LAMPS SHALL BE MOUNTED TO CASE USING A SUITABLE THERMALLY CONDUCTIVE MATERIAL.
   - B. FINISHES:
     - (1) HOUSING: CHEMICAL FILM ALUMINUM HOUSING PER MIL-C-5541, CLASS 3.
     - (2) PAINT: PAINT ALL EXTERIOR SURFACES OF LEGEND MODULE EXCEPT LEGAND AREA, AND SURFACE INDICATED -Z- WITH LUSTERLESS GREY EPOXY OR ENAMEL, COLOR NUMBER 36231 PER FED-STD-595
   - C. LAMPS: THE NUMBER OF LAMPS PER LEGEND MODULE SHALL BE AS SPECIFIED IN TABLE 1 & SHALL BE PARALLEL WIRED IN EACH LEGEND. THE LAMPS SHALL BE TERMINATED AS SHOWN IN TABLE 1. THE LAMPS SHALL BE T-1-3/4 STYLE AND SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF THIS DRAWING.
   - D. ENERGIZED COLORS: LIGHTED DISPLAY COLORS SHALL BE AS SPECIFIED IN TABLE 1 WHEN ENERGIZED WITH RATED VOLTAGE ±1%. COLORS TO CONFORM TO AVIATION COLOR CO-ORDINATES AS SPECIFIED IN MIL-C-25050
   - E. UNENERGIZED COLOR: UNLIGHTED DISPLAY COLOR TO BE LOW REFLECTIVE, DIFFUSE, NEUTRAL GREY.
   - F. GLOSS: SURFACE GLOSS OF LEGEND AREA TO BE 5 UNITS OR LESS WHEN MEASURED PER MIL-P-7788 IN THE UNENERGIZED CONDITION.
   - G. CONTRAST: CONTRAST BETWEEN CHARACTERS & UNENERGIZED BACKGROUND SHALL BE 2 TO 4 UNITS WHEN MEASURED PER ND1002284.
   - H. WIRING AND HARNESS:
     - (1) HARNESS WIRE TO BE 24 AWG TEFLON INSULATED PER SCD 2021582. INSULATION COLOR TO BE AS SPECIFIED IN TABLE 1 AND SHALL CONFORM TO MIL-STD-104.
     - (2) HARNESS LEADS TO BE 36 INCHES LONG.
     - (3) ENCAPSULATE WIRE LEADS PER ND 1002236 AT MODULE USING SCD 1012504 AND SCD 1012505, PRIMERS: AND SCD 1012503, POLYURETHANE POTTING COMPOUND.
     - (4) REINFORCE HARNESS EXIT FROM UNIT WITH PLASTIC (OR ALUM). FERRULE AND ENCAPSULATE.
   - J. WEIGHT: FOUR (5) OUNCES MAXIMUM.
   - K. ENVIRONMENTAL CAPABILITIES: UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF ND1002056 EXCEPT AS MODIFIED BELOW.
     - (1) VIBRATION: WITH THE SAMPLES DE-ENERGIZED, THE VIBRATION TEST SHALL BE PERFORMED AT 15 G'S (ZERO TO PEAK) AT FREQUENCIES FROM 5 CPS TO 2000 CPS TO 5 CPS SWEPT AT A LOGARITHMIC RATE OF ONE MIN. PER OCTAVE, ONCE IN EACH OF THREE ORTHOGONAL AXES, DOUBLE AMPLITUDE LIMITED TO 0.12 INCHES.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Simpson 1 Nov 65
CHECKED R. SCHULTE 1 Nov 65
APPROVED Paul Watson 1 NOV 65
APPROVED 11/1/65
APPROVED MIT 2 Nov 65
APPROVED MSC A. C. METZGER
DATE

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ANNUNCIATOR-CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80320
SIZE C
DRAWING NO. 1008838
SCALE
SHEET 4 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHEP THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 23562			11-8-65	
A		REVISED PER TDRR 27361			3/25/66	
B		REVISED PER TDRR 27362			4/5/66	
C		REVISED PER TDRR 28444			5-10-66	
D		REVISED PER TDRR 29611				

REQUIREMENTS: (CONTINUED)

3. DESIGN: (CONTINUED)
   - (2) SHOCK: THE SAMPLES, DE-ENERGIZED, SHALL BE SUBJECTED TO ONE SHOCK OF 20 G'S, TERMINAL PEAK SAWTOOTH WAVE SHAPE OF 6 ± 1 MILLISECONDS DURATION IN EACH PLUS AND MINUS DIRECTION OF 3 ORTHOGONAL AXES (TOTAL OF 6 SHOCKS).
   - (3) ACCELERATION: AS SPECIFIED IN ND 1002056 EXCEPT WITH THE SAMPLES DE-ENERGIZED.
   - (4) LIFE: AS SPECIFIED IN ND 1002056 EXCEPT THE LENGTH OF THE TEST SHALL BE 200 HOURS.

4. NOTES
   - A. THIS UNIT IS TO BE MOUNTED TO A HEAT SINK WHEN ENERGIZED FOR PERIODS LONGER THAN TWO (2) MINUTES. A SATISFACTORY HEAT SINK IS AN ALUMINUM (OR BRASS) PLATE APPROXIMATELY 15 X 15 X 1/4" THICK.

MASTER

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APPROVED	Paul Watson	1 NOV 65
APPROVED		11/1/65
APPROVED MIT		2 NOV 65
APPROVED MSC	A. C. METZGER	
		DATE

ANNUNCIATOR-CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838

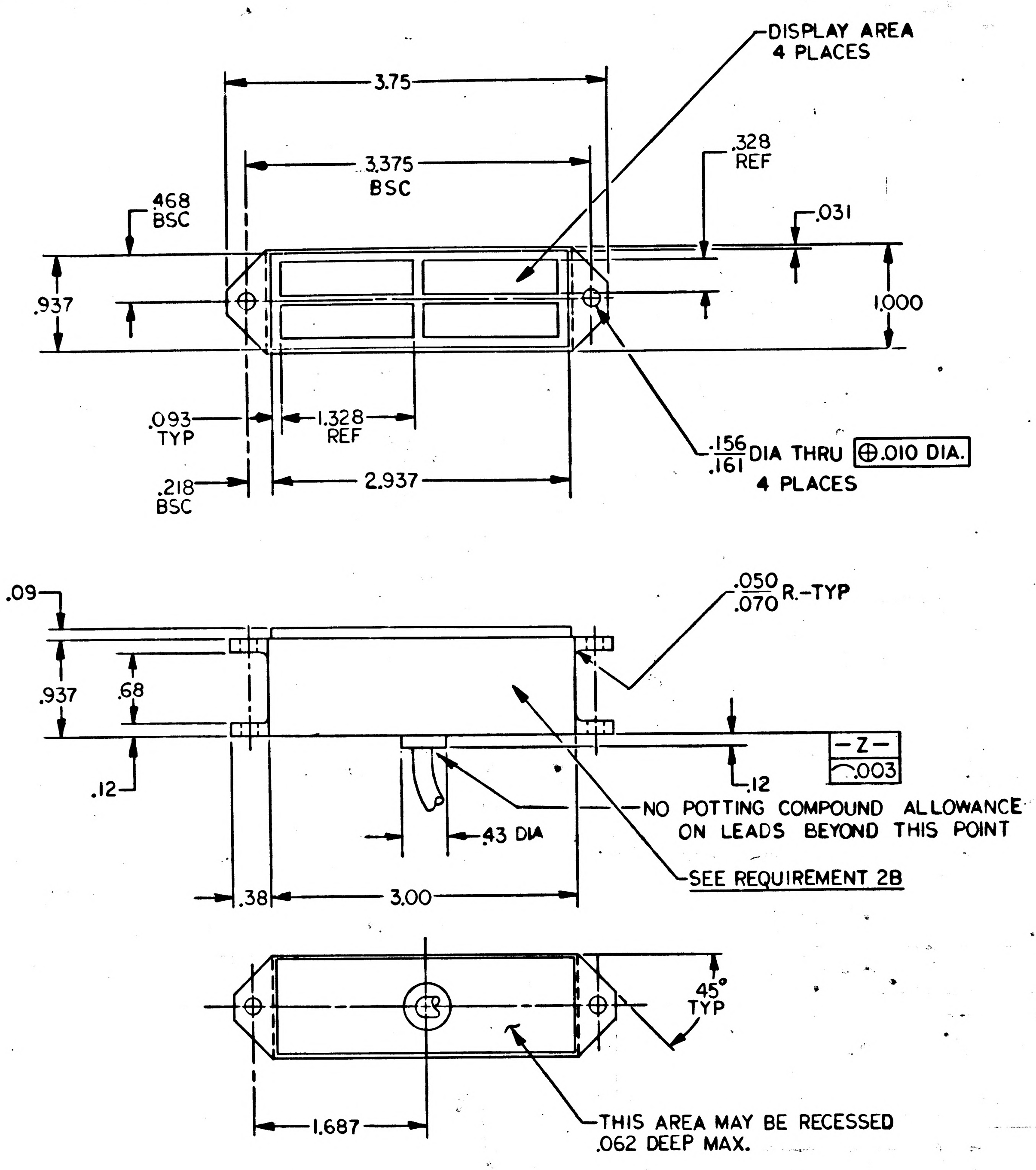
SCALE

SHEET 5 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WK


DISPLAY AREA
4 PLACES
3.75
3.375
BSC
.328
REF
.031
468
BSC
.937
1.000
.093
TYP
1.328
REF
.218
BSC
2.937
.156
.161
DIA THRU
⊕.010 DIA.
4 PLACES
.09
.050
.070
R.-TYP
.937
.68
-Z-
⌒.003
.12
.12
.43 DIA
NO POTTING COMPOUND ALLOWANCE
ON LEADS BEYOND THIS POINT
.38
3.00
SEE REQUIREMENT 2B
45°
TYP
1.687
THIS AREA MAY BE RECESSED
.062 DEEP MAX.

DASH 1

ZERO ENCODER	MASTER ALARM
IMU DELAY	

DASH 2

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

DASH 3

PGNS	IMU FAIL
	AGC PWR FAIL

DASH 4

ACCEL FAIL	GIMBAL LOCK
CDU FAIL	IMU TEMP

FIGURE 1
DISPLAY AREA ARRANGEMENT

MASTER

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DRAWN	MACCARRONE	9-28-65
CHECKED	HEP	1 Nov 65
APPROVED	Paul Watson	1 NOV 65
APPROVED	E.T.	11/1/65
APPROVED MIT	A. C. METZGER	2 Nov 65
APPROVED MSC		DATE

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE 1/1		SHEET 1 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-2-65	WR

Dash No.	Legend	Energized Color	No. of Lamps	Wire Color (PAIR)	Rated Lamp Voltage	Current Drain Per Display	Lamp Type (Ref)
-1	Master Alarm	Red	3	Red	28 Volts	.120 Amps ±10%	1764AS-10 or Equiv.
	(Blank)	White	2	Black	"	"	1764LSV or Equiv.
	Zero Encoder	White	2	White	"	"	"
	IMU Delay	White	2	Yellow	"	"	"
-2	Gimbal Lock	Yellow	2	Red	"	"	"
	IMU Temp	"	2	Black	"	"	"
	Accel. Fail	"	2	White	"	"	"
	CDU Fail	"	2	Yellow	"	"	"
-3	IMU Fail	YELLOW	2	Red	"	"	"
	AGC PWR Fail	"	2	Black	"	"	"
	PGNS	"	2	White	"	"	"
	(Blank)	"	2	Yellow	"	"	"
-4	Gimbal Lock	YELLOW	2	Green	5.0 Volts	.360Amps ±15%	1784AS-15 or Equiv.
	IMU Temp	"	2	Black	28 Volts	.120 Amps ±10%	1764LSV or Equiv.
	Accel. Fail	"	2	White	"	.120 AMPS ±10%	1764LSV or Equiv.
	CDU Fail	"	2	Yellow	"	" "	1764LSV or Equiv.

TABLE 1

MASTER

NEXT ASSY	USED ON
APPLICATION	

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CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Simpson	1 NOV 65
CHECKED	R. SCHULTE	1 NOV 65
APPROVED	Paul Watson	1 NOV 65
APPROVED	JJ Kevin	11/1/65
APPROVED MIT	W Kupfer	2 Nov 65
APPROVED MSC	A. C. METZGER	
		DATE

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ANNUNCIATOR–CAUTION / WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838

SCALE

SHEET 2 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
–		INITIAL RELASE CLASS A PER TDRR 23562			11-2-65	U/(

REQUIREMENTS:

1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002056 EXCEPT AS MODIFIED BY THIS DRAWING.
   D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 1. EACH UNIT TO BE SEPARATELY PACKAGED.

2. INSPECTION AND ACCEPTANCE:
   A. DIMENSIONS TO BE AS SHOWN.
   B. MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE FOLLOWING INFORMATION PER ND 1002019.
      (1) NASA DRAWING NUMBER
      (2) MANUFACTURER'S NAME OR SYMBOL
      (3) MANUFACTURER'S SERIAL NUMBER
   C. LEGENDS: AS SHOWN IN TABLE 1 AND IN FIGURE 1. CHARACTERS TO BE BLACK. COLOR NUMBER 37038, PER FEDERAL STD-595 & SHALL BE OPAQUE WHEN LEGEND IS ENERGIZED. CHARACTERS TO BE 0.125 OVERALL HEIGHT WITH PROPORTIONS PER ND1002122. CHARACTER STROKE WIDTH TO BE .022/.025 INCHES. WORDING TO BE CENTERED ON DISPLAY.
   D. CURRENT DRAIN: ELECTRICAL CURRENT DRAIN PER DISPLAY SHALL BE PER TABLE 1.
   E. BRIGHTNESS: BACKGROUND BRIGHTNESS WITH LAMPS ENERGIZED AT RATED VOLTAGE (±1 VOLT) SHALL BE AS FOLLOWS:
      (1) AVIATION RED: 50 ± 10 FOOT LAMBERTS
      (2) AVIATION YELLOW: 50 ± 10 FOOT LAMBERTS
      (3) AVIATION WHITE: 50 ± 10 FOOT LAMBERTS
   F. LIGHT LEAKAGE: NO LIGHT LEAKAGE FROM LIGHTED TO UNLIGHTED LEGENDS OR THROUGH ANY EXTERIOR SURFACE OTHER THAN DISPLAY AREA. PAINT SHALL NOT BE CONSIDERED AN ADEQUATE LIGHT SHIELD.
   G. DIELECTRIC STRENGTH: SHALL WITHSTAND 200 ± 25 VRMS, 60 CPS FOR 5 SECONDS BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS, IN ACCORDANCE WITH MIL-STD-202, METHOD 301. MAXIMUM ALLOWABLE LEAKAGE SHALL BE 2μA.
   H. INSULATION RESISTANCE: SHALL BE 100 MEGOHMS MINIMUM WHEN MEASURED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, TEST CONDITION A, BETWEEN ALL TERMINALS AND CASE, AND BETWEEN TERMINALS OF ADJACENT LEGEND SECTIONS.

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

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MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Simpson	1 Nov 65
CHECKED	R. Schulte	1 Nov 65
APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT	W Kupfer	2 Nov 65
APPROVED MSC	C. METZGER	
		DATE

ANNUNCIATOR-CAUTION/WARNING

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80320	C	1008838
SCALE		SHEET 3 OF 5

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
—		INITIAL RELEASE CLASS A. PER TDRR 23562			11-2-65	WK

REQUIREMENTS: (CONTINUED)

3. DESIGN:

A. MATERIALS: ALL MATERIALS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF THIS DRAWING AND SHALL NOT EXHIBIT TOXIC OR CORROSIVE OUTGASSING WHEN SUBJECTED TO THE ENVIRONMENTAL CONDITIONS SPECIFIED ON THIS DRAWING.

(1) LEGEND FACE PLATE: PLASTIC ACRYLIC PER MIL-P-5425.

(2) CASE: ALUMINUM ALLOY 6061-T6 PER QQ-A-250/11B.

(3) THERMAL CONDUCTIVITY: LAMPS SHALL BE MOUNTED TO CASE USING A SUITABLE THERMALLY CONDUCTIVE MATERIAL.

B. FINISHES:

(1) HOUSING: CHEMICAL FILM ALUMINUM HOUSING PER MIL-C-5541, CLASS 3.

(2) EXPOSED ACRYLIC SURFACES TO BE COATED WITH EPOXY RESIN PER SCD 1010657 USING CATALYST SCD 1010686. COATING TO BE SMOOTH & UNIFORM. LEGEND AREA TO BE FINE BLASTED TO SATISIFY REQUIREMENTS 3E & 3G

(3) PAINT: PAINT ALL EXTERIOR SURFACES OF LEGEND MODULE EXCEPT LEGAND AREA, AND SURFACE INDICATED -Z- WITH LUSTERLESS GREY EPOXY OR ENAMEL, COLOR NUMBER 36231 PER FED-STD-595

C. LAMPS: THE NUMBER OF LAMPS PER LEGEND MODULE SHALL BE AS SPECIFIED IN TABLE 1 & SHALL BE PARALLEL WIRED IN EACH LEGEND. THE LAMPS SHALL BE TERMINATED AS SHOWN IN TABLE 1. THE LAMPS SHALL BE T-1-3/4 STYLE AND SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF THIS DRAWING.

D. ENERGIZED COLORS: LIGHTED DISPLAY COLORS SHALL BE AS SPECIFIED IN TABLE 1 WHEN ENERGIZED WITH RATED VOLTAGE ±1%. COLORS TO CONFORM TO AVIATION COLOR CO-ORDINATES AS SPECIFIED IN MIL-C-25050

E. UNENERGIZED COLOR: UNLIGHTED DISPLAY COLOR TO BE LOW REFLECTIVE, DIFFUSE, NEUTRAL GREY.

F. GLOSS: SURFACE GLOSS OF LEGEND AREA TO BE 5 UNITS OR LESS WHEN MEASURED PER MIL-P-7788 IN THE UNENERGIZED CONDITION.

G. CONTRAST: CONTRAST BETWEEN CHARACTERS & UNENERGIZED BACKGROUND SHALL BE 2 TO 4 UNITS WHEN MEASURED PER ND1002284.

H. WIRING AND HARNESS:

(1) HARNESS WIRE TO BE 24 AWG TEFLON INSULATED PER SCD 2021582. INSULATION COLOR TO BE AS SPECIFIED IN TABLE 1 AND SHALL CONFORM TO MIL-STD-104.

(2) HARNESS LEADS TO BE 36 INCHES LONG.

(3) ENCAPSULATE WIRE LEADS PER ND 1002236 AT MODULE USING SCD 1012504 AND SCD 1012505, PRIMERS: AND SCD 1012503, POLYURETHANE POTTING COMPOUND.

(4) REINFORCE HARNESS EXIT FROM UNIT WITH PLASTIC (OR ALUM). FERRULE AND ENCAPSULATE.

J. WEIGHT: FOUR (4) OUNCES MAXIMUM.

K. ENVIRONMENTAL CAPABILITIES: UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF ND1002056 EXCEPT AS MODIFIED BELOW.

(1) VIBRATION: WITH THE SAMPLES DE-ENERGIZED, THE VIBRATION TEST SHALL BE PERFORMED AT 15 G'S (ZERO TO PEAK) AT FREQUENCIES FROM 5 CPS TO 2000 CPS TO 5 CPS SWEPT AT A LOGARITHMIC RATE OF ONE MIN. PER OCTAVE, ONCE IN EACH OF THREE ORTHOGONAL AXES, DOUBLE AMPLITUDE LIMITED TO 0.12 INCHES.

MASTER

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MATERIAL

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		DATE
DRAWN	W. Simpson	1 Nov 65
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APPROVED	Paul Watson	1 Nov 65
APPROVED		11/1/65
APPROVED MIT	W Kupfer	2 Nov 65
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SPECIFICATION CONTROL DRAWING

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80320	C	1008838

SCALE

SHEET 4 OF 5

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS							
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED	
—		INITIAL RELEASE CLASS A PER TDRR 23562			11-8-65		WK

REQUIREMENTS: (CONTINUED)

3. DESIGN: (CONTINUED)
   (2) SHOCK: THE SAMPLES, DE-ENERGIZED, SHALL BE SUBJECTED TO ONE SHOCK OF 20 G'S, TERMINAL PEAK SAWTOOTH WAVE SHAPE OF 6 ± 1 MILLISECONDS DURATION IN EACH PLUS AND MINUS DIRECTION OF 3 ORTHOGONAL AXES (TOTAL OF 6 SHOCKS).
   (3) ACCELERATION: AS SPECIFIED IN ND 1002056 EXCEPT WITH THE SAMPLES DE-ENERGIZED.
   (4) LIFE: AS SPECIFIED IN ND 1002056 EXCEPT THE LENGTH OF THE TEST SHALL BE 200 HOURS.

4. NOTES
   A. THIS UNIT IS TO BE MOUNTED TO A HEAT SINK WHEN ENERGIZED FOR PERIODS LONGER THAN TWO (2) MINUTES. A SATISFACTORY HEAT SINK IS AN ALUMINUM (OR BRASS) PLATE APPROXIMATELY 15 X 15 X 1/4" THICK.

MASTER

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APPROVED MIT 2 NOV 65
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DATE

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DRAWING NO. 1008838
SCALE
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1008842 A

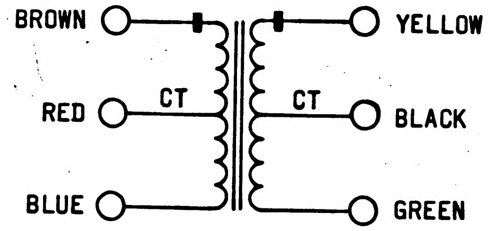
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 25197	1-11-66	
A	REVISED PER TDRR 32508	13 JAN 67	LL SC

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   - D. UNITS SHALL BE DESIGNED TO MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.
   - E. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215 CLASS I, CODE 1.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MINIMUM MARKING: MARK PER ND 1002019 (EXCEPT ACRYLIC LACQUER SHALL NOT BE USED AS A PROTECTIVE COATING) WITH THE NASA DRAWING NUMBER, MANUFACTURER'S SERIAL NUMBER AND/OR LOT CODE NUMBER AND CONNECTION DATA. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
     - (2) LEADS: LEAD MATERIAL SHALL BE DUMET ALLOY PER PS 1015401 EXCEPT NICKEL STRIKE SHALL BE 100 MICROINCHES MAXIMUM AND LEAD DIAMETER SHALL BE 0.016 ± .001 DIA. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT. LEADS SHALL BE NYLON INSULATED, COLOR CODED PER SCHEMATIC DIAGRAM AND ENDS SHALL BE STRIPPED PER FIGURE I.
   - B. ELECTRICAL REQUIREMENTS:
     - (1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE I.

3. DESIGN:
   - A. THIS UNIT SHALL MEET ALL REQUIREMENTS OF MIL-T-27 FOR GRADE 4, CLASS R LIFE EXPECTANCY X, FAMILY 13, IN AN AMBIENT TEMPERATURE OF 85°C.
   - B. THE UNIT SHALL MEET ALL ELECTRICAL REQUIREMENTS EXCEPT WHERE NOTED, BEFORE, DURING, AND AFTER THE FOLLOWING EXPOSURES.
     - (1) HIGH TEMPERATURE: 71°C OPERATING.
     - (2) LOW TEMPERATURE: -18°C OPERATING.
     - (3) VIBRATION: 10 TO 2000 CPS, 20 G (PER MIL-STD-202, METHOD 204A, CONDITION D).
     - (4) REDUCED PRESSURE: 96 HOURS AT A PRESSURE OF 10^{-4} MM OF MERCURY.
   - C. DC UNBALANCE IN PRIMARY: 1 MA MAXIMUM.
   - D. RATED POWER LEVEL: 100 MW.
   - E. WORKING VOLTAGE BETWEEN WINDINGS AND FROM WINDINGS TO CASE: 49 VOLTS MAXIMUM INSTANTANEOUS.
   - F. CASE MATERIAL SHALL BE MU METAL.



SCHEMATIC DIAGRAM

VOLTAGES AND CURRENTS ARE RMS VALUES UNLESS OTHERWISE NOTED. RESISTANCE ARE D.C. VALUES AT 25°C

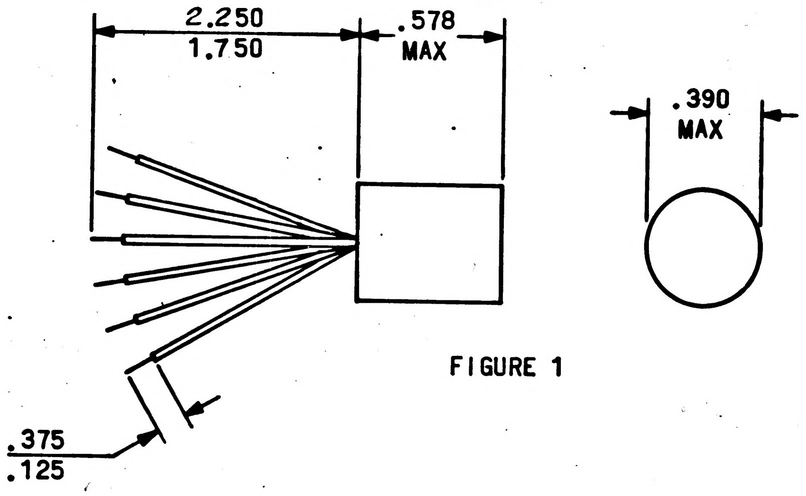


FIGURE 1

1008842

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS 9-497
DRAWN Bender DATE 18-OCT-65
CHECKED Ed Foster 21 OCT 65
APPROVAL 1/11/66
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, AUDIO FREQUENCY -
1:1 TURNS RATIO

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008842
SCALE NONE
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 25197	1-11-66	
A	REVISION STATUS CHANGED	13 JAN67	LL SC

M

REQUIREMENTS: (CONTINUED)

4. SPECIAL CONDITIONING, 100%: (BY MANUFACTURER)
   A. TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202B METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE UNIT SHALL PASS NORMAL INSPECTION TESTS.

TABLE I

INSPECTION TESTS

SEE MIL-T-27 FOR TEST PROCEDURES	
TITLES IN PARAGRAPH COLUMN REFER TO PARAGRAPH TITLES IN SPECIFICATION MIL-T-27.	
PARAGRAPH	
SEALING	IMMERSE IN LIQUID AS INDICATED.
DIELECTRIC STRENGTH	APPLY 200 VOLTS (RMS) BETWEEN WINDINGS AND BETWEEN WINDINGS AND CASE.
INDUCED VOLTAGE	APPLY 64 VOLTS, 2000 CPS TO LEADS BROWN AND BLUE, SECONDARY OPEN.
INSULATION RESISTANCE	10,000 MEGOHMS MINIMUM AT 25°C. (USE 100 VDC)
DC RESISTANCE (AT 25°C)	R(BROWN-BLUE) = 1219 OHMS MAXIMUM; R(YELLOW-GREEN) = 1469 OHMS MAXIMUM.
INDUCTANCE	SHALL BE 2.0 HENRIES MINIMUM WITH 5 VOLTS, 1000 CPS, 0 MADC (BROWN-BLUE), SECONDARY OPEN.
DISTORTION (AT 1 KC)	5% MAXIMUM WITH 10,000 OHM LOAD AT 100 MW OUTPUT.
FREQUENCY RESPONSE	(REFERENCE FREQUENCY 1000 CPS) ± 3 DB FROM 300 CPS TO 20 KC. E_S SHALL BE DETERMINED AT 1KC WITH AN OUTPUT LOAD YELLOW TO GREEN OF 10,000 OHMS AT 1MW, A SOURCE IMPEDANCE OF 10,000 OHMS AND 1 MADC. E_S SHALL BE HELD CONSTANT OVER THE FREQUENCY RANGE.
POLARITY	LEADS BROWN AND YELLOW SHALL BE OF LIKE POLARITY.
NO LOAD VOLTAGE RATIO	WITH 5 VOLTS, 1 KC (BROWN TO BLUE), V(BROWN TO BLUE/V(YELLOW TO GREEN) = 1:1 ±3%. V(BROWN TO RED)/V(RED TO BLUE) = 1 ±2%. V(YELLOW TO BLACK)/V(BLACK TO GREEN) = 1 ±2%.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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CAMBRIDGE, MASS
DWG. NO.
CONTRACT NAS 9-497

DRAWN Bender DATE 18-OCT-65
CHECKED Ed Foster 21 Oct 65
APPROVAL 1/11/66
APPROVAL

NASA APPROVAL A. C. METZGER

MIT APPROVAL 11 Jan 66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, AUDIO FREQUENCY -
1:1 TURNS RATIO

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008842

SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008842

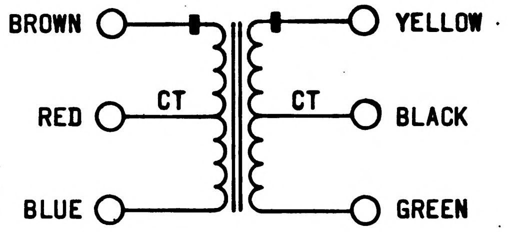
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 25197	1-11-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.
   - C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   - D. UNITS SHALL BE DESIGNED TO MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.
   - E. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215 CLASS I, CODE 1.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MINIMUM MARKING: MARK PER ND 1002019 (EXCEPT ACRYLIC LACQUER SHALL NOT BE USED AS A PROTECTIVE COATING) WITH THE NASA DRAWING NUMBER, MANUFACTURER'S SERIAL NUMBER AND/OR LOT CODE NUMBER AND CONNECTION DATA. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
     - (2) LEADS: LEAD MATERIAL SHALL BE DUMET ALLOY PER PS 1015401 EXCEPT NICKEL STRIKE SHALL BE 100 MICROINCHES MAXIMUM AND LEAD DIAMETER SHALL BE 0.016 ± .001 DIA. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT. LEADS SHALL BE NYLON INSULATED, COLOR CODED PER SCHEMATIC DIAGRAM AND ENDS SHALL BE STRIPPED PER FIGURE I.
   - B. ELECTRICAL REQUIREMENTS:
     - (1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE I.

3. DESIGN:
   - A. THIS UNIT SHALL MEET ALL REQUIREMENTS OF MIL-T-27 FOR GRADE 4, CLASS R LIFE EXPECTANCY X, FAMILY 13, IN AN AMBIENT TEMPERATURE OF 85°C.
   - B. THE UNIT SHALL MEET ALL ELECTRICAL REQUIREMENTS EXCEPT WHERE NOTED, BEFORE, DURING, AND AFTER THE FOLLOWING EXPOSURES.
     - (1) HIGH TEMPERATURE: 71°C OPERATING.
     - (2) LOW TEMPERATURE: -18°C OPERATING.
     - (3) VIBRATION: 10 TO 2000 CPS, 20 G (PER MIL-STD-202, METHOD 204A, CONDITION D).
     - (4) REDUCED PRESSURE: 96 HOURS AT A PRESSURE OF 10^{-4} MM OF MERCURY.
   - C. DC UNBALANCE IN PRIMARY: 1 MA MAXIMUM.
   - D. RATED POWER LEVEL: 100 MW.
   - E. WORKING VOLTAGE BETWEEN WINDINGS AND FROM WINDINGS TO CASE: 49 VOLTS MAXIMUM INSTANTANEOUS.
   - F. CASE MATERIAL SHALL BE MU METAL.



SCHEMATIC DIAGRAM

VOLTAGES AND CURRENTS ARE RMS VALUES UNLESS OTHERWISE NOTED. RESISTANCE ARE D.C. VALUES AT 25°C

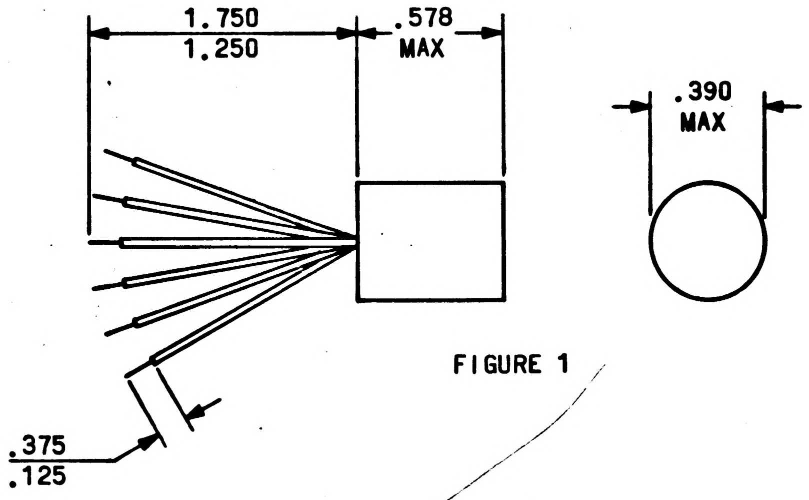


FIGURE 1

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT NAS 9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL SEE REQUIREMENTS	DRAWN Bender DATE 18-OCT-65 CHECKED Ed Foster 21 OCT 65 APPROVAL 1/11/66 APPROVAL	TRANSFORMER, AUDIO FREQUENCY - 1:1 TURNS RATIO SPECIFICATION CONTROL DRAWING
		HEAT TREATMENT NONE	NASA APPROVAL A. C. METZGER	CODE IDENT NO. 80230 SIZE C NASA DRAWING NO. 1008842
		FINAL FINISH NONE	MIT APPROVAL	SCALE NONE WT SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
	INITIAL RELEASE CLASS A PER TDRR 25197	1-11-66	

REQUIREMENTS: (CONTINUED)

4. SPECIAL CONDITIONING, 100%: (BY MANUFACTURER)
   A. TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202B METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE UNIT SHALL PASS NORMAL INSPECTION TESTS.

TABLE I
INSPECTION TESTS

SEE MIL-T-27 FOR TEST PROCEDURES

TITLES IN PARAGRAPH COLUMN REFER TO PARAGRAPH TITLES IN SPECIFICATION MIL-T-27.

PARAGRAPH	
SEALING	IMMERSE IN LIQUID AS INDICATED.
DIELECTRIC STRENGTH	APPLY 200 VOLTS (RMS) BETWEEN WINDINGS AND BETWEEN WINDINGS AND CASE.
INDUCED VOLTAGE	APPLY 64 VOLTS, 2000 CPS TO LEADS BROWN AND BLUE, SECONDARY OPEN.
INSULATION RESISTANCE	10,000 MEGOHMS MINIMUM AT 25°C. (USE 100 VDC)
DC RESISTANCE (AT 25°C)	R(BROWN-BLUE) = 1219 OHMS MAXIMUM; R(YELLOW-GREEN) = 1469 OHMS MAXIMUM.
INDUCTANCE	SHALL BE 2.0 HENRIES MINIMUM WITH 5 VOLTS, 1000 CPS, 0 MADC (BROWN-BLUE), SECONDARY OPEN.
DISTORTION (AT 1 KC)	5% MAXIMUM WITH 10,000 OHM LOAD AT 100 MW OUTPUT.
FREQUENCY RESPONSE	(REFERENCE FREQUENCY 1000 CPS) ± 3 DB FROM 300 CPS TO 20 KC. E_S SHALL BE DETERMINED AT 1KC WITH AN OUTPUT LOAD YELLOW TO GREEN OF 10,000 OHMS AT 1MW, A SOURCE IMPEDANCE OF 10,000 OHMS AND 1 MADC. E_S SHALL BE HELD CONSTANT OVER THE FREQUENCY RANGE.
POLARITY	LEADS BROWN AND YELLOW SHALL BE OF LIKE POLARITY.
NO LOAD VOLTAGE RATIO	WITH 5 VOLTS, 1 KC (BROWN TO BLUE), V(BROWN TO BLUE/V(YELLOW TO GREEN) = 1:1 ±3%. V(BROWN TO RED)/V(RED TO BLUE) = 1 ±2%. V(YELLOW TO BLACK)/V(BLACK TO GREEN) = 1 ±2%.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT NAS 9-497
DRAWN Bender DATE 18-OCT-65
CHECKED Ed Foster 21 Oct 65
APPROVAL 1/11/66
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL 11 Jan 66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, AUDIO FREQUENCY -
1:1 TURNS RATIO

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008842
SCALE	WT	SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008844

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 25197	1-11-66	

REQUIREMENTS:

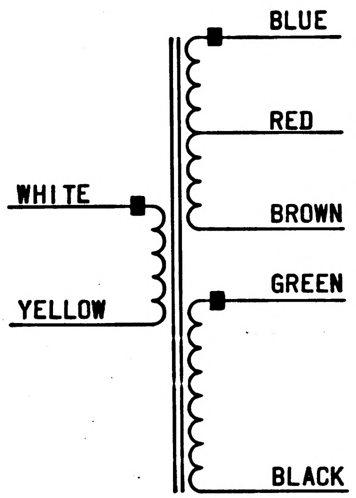
1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. UNITS SHALL BE CAPABLE OF MEETING THE REQUIREMENTS OF MIL-T-27 WITH THE ADDITIONS AND EXCEPTIONS SPECIFIED HEREIN.
   C. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   D. UNITS SHALL BE DESIGNED TO MEET THE QUALIFICATION REQUIREMENTS OF ND 1002047.
   E. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING: PER ND 1002215 CLASS I, CODE 1.

2. INSPECTION AND ACCEPTANCE:
   A. MECHANICAL REQUIREMENTS:
      (1) MINIMUM MARKING: MARK PER ND 1002019 (EXCEPT ACRYLIC LACQUER SHALL NOT BE USED AS A PROTECTIVE COATING) WITH THE NASA DRAWING NUMBER, MANUFACTURER'S SERIAL NUMBER AND/OR LOT CODE NUMBER AND CONNECTION DATA. THE MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
      (2) LEADS: LEAD MATERIAL SHALL BE DUMET ALLOY PER PS 1015401 EXCEPT NICKEL STRIKE SHALL BE 100 MICROINCHES MAXIMUM AND LEAD DIAMETER SHALL BE 0.016 ± .001 DIA. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT. LEADS SHALL BE NYLON INSULATED, COLOR CODED PER SCHEMATIC DIAGRAM AND ENDS SHALL BE STRIPPED PER FIGURE 1.
   B. ELECTRICAL REQUIREMENTS:
      (1) UNITS SHALL MEET ALL REQUIREMENTS OF TABLE I.

3. DESIGN:
   A. THIS UNIT SHALL MEET ALL REQUIREMENTS OF MIL-T-27 FOR GRADE 4, CLASS R, LIFE EXPECTANCY X, FAMILY 09, IN AN AMBIENT TEMPERATURE OF 85°C.
   B. THE UNIT SHALL MEET ALL ELECTRICAL REQUIREMENTS EXCEPT WHERE NOTED, BEFORE, DURING, AND AFTER THE FOLLOWING EXPOSURES.
      (1) HIGH TEMPERATURE: 71°C OPERATING.
      (2) LOW TEMPERATURE: -18°C OPERATING.
      (3) VIBRATION: 10 TO 2000 CPS, 20 G (PER MIL-STD-202, METHOD 204A, CONDITION D).
      (4) REDUCED PRESSURE: 96 HOURS AT A PRESSURE OF 10^{-4} MM OF MERCURY.
   C. DC UNBALANCE IN PRIMARY: 2 MA MAXIMUM.
   D. MAXIMUM POWER LEVEL: 10 MW.
   E. WORKING VOLTAGE BETWEEN WINDINGS AND FROM WINDINGS TO CASE: 50 VOLTS MAXIMUM INSTANTANEOUS.
   F. MAXIMUM DC EACH SECONDARY: 1 MA

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

SCHEMATIC DIAGRAM



VOLTAGES AND CURRENTS ARE RMS VALUES UNLESS OTHERWISE NOTED. RESISTANCES ARE D.C. VALUES AT 25°C.

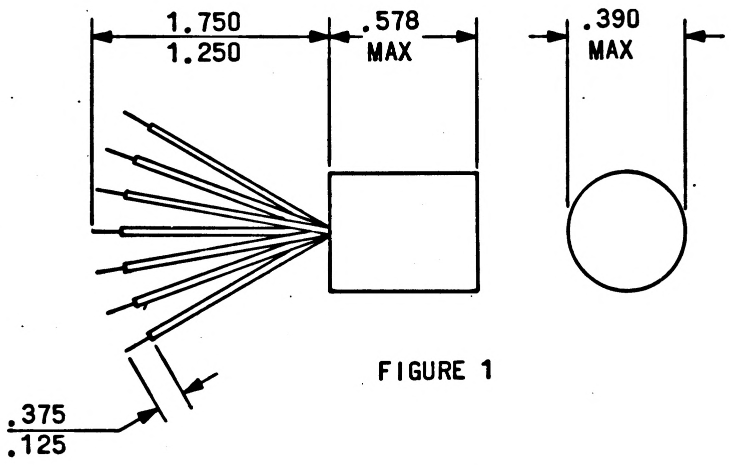


FIGURE 1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT NAS 9-497
DRAWN Bender DATE 15-OCT-65
CHECKED Ed Foster 21 OCT 65
APPROVAL 1/17/66
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEP-UP—
1:2.5 TURNS RATIO, 3200 CPS

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008844
SCALE NONE
WT
SHEET 1 OF 2

1008844

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
–	INITIAL RELEASE CLASS A PER TDRR 25197	1-11-66	

REQUIREMENTS: (CONTINUED)

4. SPECIAL CONDITIONING: 100% (BY MANUFACTURER)
   A. TRANSFORMER SHALL BE TEMPERATURE CYCLED FOR 5 CYCLES PER MIL-STD-202 METHOD 102A EXCEPT THAT THE TEMPERATURES SHALL BE -55°C, +25°C AND +105°C AND EXPOSURE TIME SHALL BE 15 MINUTES AT EACH TEMPERATURE. DURING THE LAST CYCLE THE UNIT SHALL BE TESTED FOR CONTINUITY AT EACH OF THE AMBIENT CONDITIONS. AFTER STABILIZATION AT ROOM TEMPERATURE UNIT SHALL PASS NORMAL INSPECTION TESTS.

TABLE I
INSPECTION TESTS

TITLES IN PARAGRAPH COLUMN REFER TO PARAGRAPH TITLES IN SPECIFICATION MIL-T-27.	
PARAGRAPH	
SEALING	IMMERSE IN LIQUID AS INDICATED.
DIELECTRIC STRENGTH	APPLY 100 VOLTS (RMS) BETWEEN WINDINGS AND BETWEEN WINDINGS AND CASE.
INSULATION RESISTANCE	10,000 MEGOHMS MINIMUM AT 25°C AT 100 V DC.
DC RESISTANCE (AT 25°C)	R(WHITE-YELLOW) = 1220 OHMS MAXIMUM; R(BROWN-BLUE) = 335 OHMS MAXIMUM; R(BLACK-GREEN) = 3000 OHMS MAXIMUM.
OPEN CIRCUIT IMPEDANCE	SHALL BE 6280 OHMS MINIMUM WITH 5 VOLTS 1 KC, 0 DC (WHITE TO YELLOW).
POLARITY	LEADS WHITE, BLUE AND GREEN SHALL BE OF LIKE POLARITY.
NO LOAD VOLTAGE RATIO	WITH 5 VOLTS, 3200 CPS (WHITE TO YELLOW), V(WHITE TO YELLOW)/V(BLUE TO BROWN) = 2.08 ±3%: V(WHITE TO YELLOW)/V(GREEN TO BLACK) = 0.5 ± 5% ALSO V(BLUE TO RED)/V(RED TO BROWN) = 1 ±2%.
PHASE SHIFT	3° MAX PRIMARY TO EITHER SECONDARY. MEASURE WITH 5 VOLTS, 3200 CPS, 0 DC (WHITE TO YELLOW), WITH A LOAD (BROWN TO BLUE) OF 11 K OHMS AND WITH NO LOAD ON BLACK TO GREEN.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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DWG. NO.
CONTRACT NAS 9-497

DRAWN Bender DATE 15-OCT-65
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APPROVAL 1/11/66
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSFORMER, POWER, STEP-UP—
1:2.5 TURNS RATIO, 3200 CPS

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008844
SCALE
WT
SHEET 2 OF 2

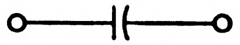
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
Ⓜ	INITIAL RELEASE CLASS A PER TDRR 25307	1/13/66	WK
A	REVISED PER TDRR 27156	3/22/66	WK

REQUIREMENTS:

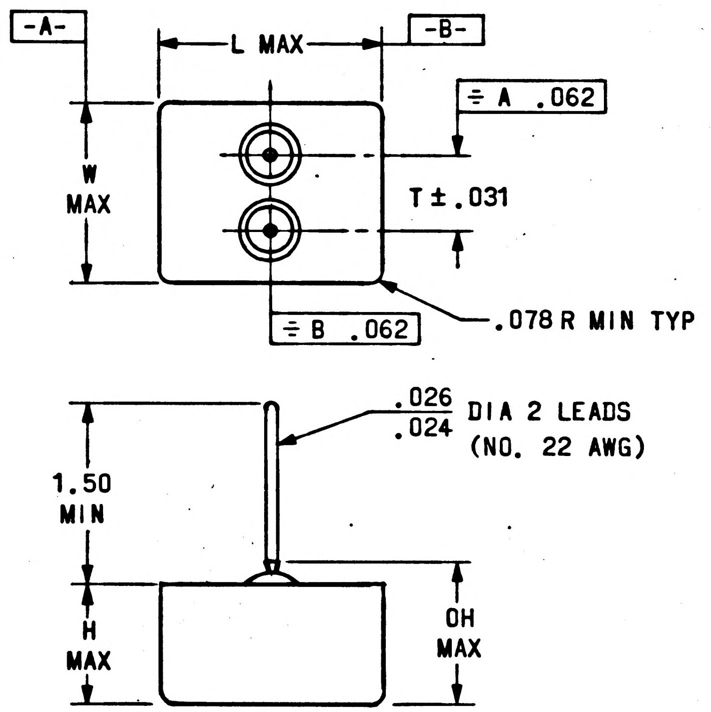
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I CODE I.
     - (1) HANDLING OF LEADS TO BE HELD TO A MINIMUM.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-19978 EXCEPT AS SPECIFIED HEREIN. PARAGRAPHS 4.6.11 AND 4.6.16 DO NOT APPLY.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) DIMENSIONS PER OUTLINE.
   - B. LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (1) MARKING: PER ND 1002019. EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, NASA DRAWING NUMBER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE VALUE, TOLERANCE, VOLTAGE RATING, AND MANUFACTURER'S TYPE OR PART NUMBER MAY APPEAR ON PART OR PACKAGE. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER.
   - C. ELECTRICAL REQUIREMENTS:
     - (1) CAPACITANCE: PER TABLE.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +55°C AND AT OR REFERRED TO 3200 ± 100CPS
     - (3) DIELECTRIC WITHSTANDING VOLTAGE: UNITS SHALL WITHSTAND 2 TIMES THE RATED DC WORKING VOLTAGE APPLIED IN SERIES WITH 1000 OHMS TO THE CAPACITOR TERMINALS FOR 1 MIN. WITHOUT DIELECTRIC BREAKDOWN.

3. DESIGN:
   - A. DC WORKING VOLTAGE: PER TABLE. AC WORKING VOLTAGE: 5VRMS @ 3200 CPS
   - B. OPERATING TEMPERATURE RANGE: -55°C TO +65°C.
   - C. DISSIPATION FACTOR: 0.6% MAX AT +55°C AND AT OR REFERRED TO 3200 ± 100 CPS.
   - D. INSULATION RESISTANCE:
     - (1) AT +25°C: 100,000 MEGOHM MIN. BETWEEN TERMINALS. 50,000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.
     - (2) AT +65°C: 25,000 MEGOHMS MIN. BETWEEN TERMINALS.
   - E. DIELECTRIC ABSORPTION: 0.6% MAX.
   - F. CAPACITANCE CHANGE: +25°C TO -55°C: -6% MAX
     +25°C TO +65°C: + 1.% MAX
   - G. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM MYLAR DIELECTRIC FILM. THE CASE SHALL BE OF METAL AND HERMETICALLY SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE, EXTENDED FOIL CONSTRUCTION.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DRAWN Bender DATE 17-NOV-65 CHECKED C. Piojda 18Nov65 APPROVAL J. Stone 12 JAN 66 CONTRACT NAS 9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS CAPACITOR, FIXED, PLASTIC DIELECTRIC SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING		
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. C. METZGER	SIZE C · CODE IDENT NO. 80230 · 1008848
APPROVAL	MIT APPROVAL 13 Jan 66	SCALE NONE · SHEET 1 OF 2

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
Ⓜ	INITIAL RELEASE CLASS A PER TDRR 25307	1/13/66	WK
A	REVISED PER TDRR 27156	3/24/66	WK

REQUIREMENTS: (CONTINUED)

H. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

J. ENVIRONMENTAL:
   (1) TEMPERATURE CYCLING: TEMPERATURE CYCLING PER PARAGRAPH 4.2.5 OF ND 1002045 SHALL BE PER TEST CONDITION "A" EXCEPT +60°C MAX; 20°C MIN. MAXIMUM CAPACITANCE CHANGE: 0.3% OF INITIAL VALUE AT 55°C.
   (2) SEALING TEST: UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.
   (3) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.
   (4) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST, OF 2000 HOURS, +55°C AND 5 VRMS @ 3200 CPS, SHALL BE ±0.5%

4. SPECIAL CONDITIONING BY SUPPLIER:
   A. TEMPERATURE CYCLING: PRIOR TO BURN-IN ALL CAPACITORS SHALL BE TEMPERATURE CYCLED PER PARAGRAPH 4.2.5 OF ND 1002045, TEST CONDITION "A" EXCEPT +65°C MAXIMUM.
   B. BURN-IN: THE MANUFACTURER SHALL BURN-IN ALL CAPACITORS FOR 168 HOURS AT +65°C, WITH 1.5 TIMES RATED DC VOLTAGE APPLIED. CAPACITORS SHALL THEN BE STRESSED BY 2 TIMES THE RATED DC VOLTAGE FOR 1 MINUTE MINIMUM.
   C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING TEMPERATURE CYCLING AND BURN-IN:
      (1) CAPACITANCE
      (2) DIELECTRIC STRENGTH
      (3) INSULATION RESISTANCE
      (4) DISSIPATION FACTOR
   D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE SERIAL NUMBER IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
      (1) PARTS MUST MEET INITIAL REQUIREMENTS BEFORE AND AFTER TEMPERATURE CYCLING.
      (2) BURN-IN PARAMETRIC CHANGE LIMITS:
         (a) CAPACITANCE: ±.5% OF INITIAL VALUE.
         (b) DIELECTRIC STRENGTH: NO BREAKDOWN.
         (c) INSULATION RESISTANCE: MEET INITIAL LIMIT.
         (d) DISSIPATION FACTOR: .0004 MAXIMUM CHANGE FROM INITIAL VALUE.

TABLE I

DASH NUMBER	CAPACITANCE VALUE	CASE DIMENSIONS MAX					WORKING VOLTAGE VDC AT 65°C
		L	W	H	OH	T	
-001	0.31UF	.937	.750	.500	.593	.312	100

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN Bender DATE 17-NOV-65
CHECKED C. Pajda 18NOV65
APPROVAL J. Sitomer 12 JAN 66
CONTRACT NAS 9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 13 Jan 66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
PLASTIC DIELECTRIC

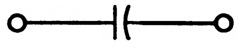
SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008848
SCALE
SHEET 2 OF 2

SYM	DESCRIPTION	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 25307	1/13/66	WK
A	REVISED PER TDRR 27156	3/22/66	WK
B	REVISED PER TDRR 34444	8/30/67	JWL

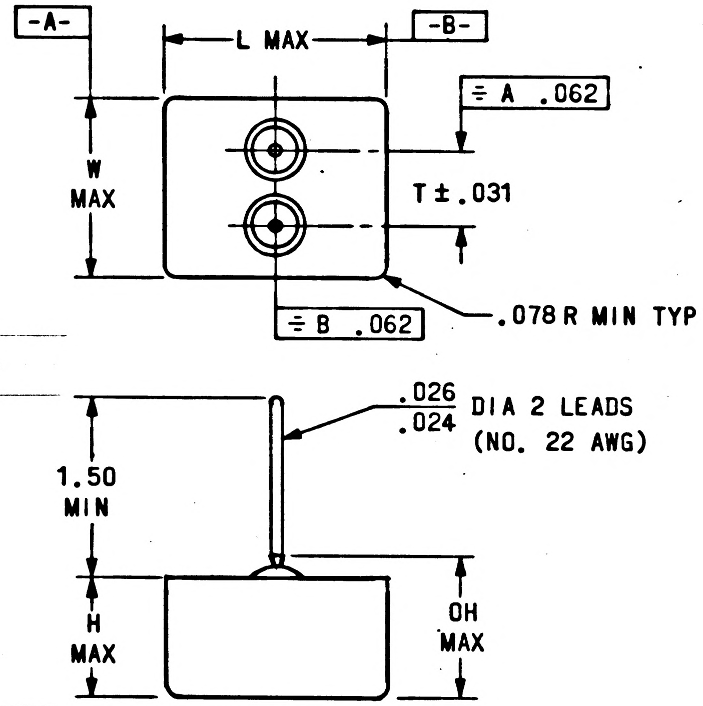
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I CODE I.
     - (1) HANDLING OF LEADS TO BE HELD TO A MINIMUM.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-19978 EXCEPT AS SPECIFIED HEREIN. PARAGRAPHS 4.6.11 AND 4.6.16 DO NOT APPLY.


GRAPHICAL SYMBOL

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) DIMENSIONS PER OUTLINE.
   - B. LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (1) MARKING: PER ND 1002019. EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, NASA DRAWING NUMBER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE VALUE, TOLERANCE, VOLTAGE RATING, AND MANUFACTURER'S TYPE OR PART NUMBER MAY APPEAR ON PART OR PACKAGE. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER.
   - C. ELECTRICAL REQUIREMENTS:
     - (1) CAPACITANCE: PER TABLE.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +55°C AND AT OR REFERRED TO 3200 ±100 CPS FOR DASH NUMBER 001. ±1% AT +25°C AND AT OR REFERRED TO 1000 ±100 CPS FOR DASH NUMBER 002.
     - (3) DIELECTRIC WITHSTANDING VOLTAGE: UNITS SHALL WITHSTAND 2 TIMES THE RATED DC WORKING VOLTAGE APPLIED IN SERIES WITH 1000 OHMS TO THE CAPACITOR TERMINALS FOR 1 MIN. WITHOUT DIELECTRIC BREAKDOWN.

3. DESIGN:
   - A. DC WORKING VOLTAGE: PER TABLE. AC WORKING VOLTAGE: 5VRMS @ 3200 CPS
   - B. OPERATING TEMPERATURE RANGE: -55°C TO +65°C.
   - C. DISSIPATION FACTOR: 0,6% MAX AT +55°C AND AT OR REFERRED TO ±3200 ± 100 CPS.
   - D. INSULATION RESISTANCE:
     - (1) AT +25°C: 100,000 MEGOHM MIN. BETWEEN TERMINALS. 50,000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.
     - (2) AT +65°C: 25,000 MEGOHMS MIN. BETWEEN TERMINALS.
   - E. DIELECTRIC ABSORPTION: 0.6% MAX.
   - F. CAPACITANCE CHANGE: -001; +25°C TO -55°C: -6% MAX +25°C TO +65°C: +1% MAX -002; +25°C TO 0°C: -1% MAX +25°C TO -18°C: -2% MAX +25° TO -55°C: -6% MAX +25° TO +65°C: +1% MAX
   - G. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM MYLAR DIELECTRIC FILM. THE CASE SHALL BE OF METAL AND HERMETICALLY SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE, EXTENDED FOIL CONSTRUCTION.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN Bender DATE 17-NOV-65 CHECKED C. Piojda 18Nov65 APPROVAL J. Stone 12 JAN 66 CONTRACT NAS 9-497	CAPACITOR, FIXED, PLASTIC DIELECTRIC SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. C. METZGER	SIZE C CODE IDENT NO. 80230 1008848
APPROVAL	MIT APPROVAL 13 Jan 66	SCALE NONE SHEET 1 OF 2

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 25307	1/13/66	WK
A	REVISED PER TDRR 27156	3/22/66	WK
B	REVISED PER TDRR 34444	8/30/67	JWL

REQUIREMENTS: (CONTINUED)

H. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

J. ENVIRONMENTAL:
- (1) TEMPERATURE CYCLING: TEMPERATURE CYCLING PER PARAGRAPH 4.2.5 OF ND 1002045 SHALL BE PER TEST CONDITION "A" EXCEPT +60°C MAX; 20°C MIN. MAXIMUM CAPACITANCE CHANGE: 0.3% OF INITIAL VALUE AT 55°C.
- (2) SEALING TEST: UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.
- (3) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.
- (4) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST, OF 2000 HOURS, +55°C AND 5 VRMS @ 3200 CPS, SHALL BE ±0.5%

4. SPECIAL CONDITIONING BY SUPPLIER:

A. TEMPERATURE CYCLING: PRIOR TO BURN-IN ALL CAPACITORS SHALL BE TEMPERATURE CYCLED PER PARAGRAPH 4.2.5 OF ND 1002045, TEST CONDITION "A" EXCEPT +65°C MAXIMUM.

B. BURN-IN: THE MANUFACTURER SHALL BURN-IN ALL CAPACITORS FOR 168 HOURS AT +65°C, WITH 1.5 TIMES RATED DC VOLTAGE APPLIED. CAPACITORS SHALL THEN BE STRESSED BY 2 TIMES THE RATED DC VOLTAGE FOR 1 MINUTE MINIMUM.

C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING TEMPERATURE CYCLING AND BURN-IN:
- (1) CAPACITANCE
- (2) DIELECTRIC STRENGTH
- (3) INSULATION RESISTANCE
- (4) DISSIPATION FACTOR

D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE SERIAL NUMBER IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
- (1) PARTS MUST MEET INITIAL REQUIREMENTS BEFORE AND AFTER TEMPERATURE CYCLING.
- (2) BURN-IN PARAMETRIC CHANGE LIMITS:
  - (a) CAPACITANCE: ±.5% OF INITIAL VALUE.
  - (b) DIELECTRIC STRENGTH: NO BREAKDOWN.
  - (c) INSULATION RESISTANCE: MEET INITIAL LIMIT.
  - (d) DISSIPATION FACTOR: .0004 MAXIMUM CHANGE FROM INITIAL VALUE.

TABLE I

DASH NUMBER	CAPACITANCE VALUE	CASE DIMENSIONS MAX					WORKING VOLTAGE VDC AT 65°C
		L	W	H	OH	T	
-001	0.31UF	.937	.750	.500	.593	.312	100
-002	0.13UF	.828	.718	.500	.593	.312	100

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN Bender DATE 17-NOV-65 CHECKED C. Pizida 18NOV65 APPROVAL J. Sitomer 12 JAN 66 CONTRACT NAS 9-497	CAPACITOR, FIXED, PLASTIC DIELECTRIC SPECIFICATION CONTROL DRAWING
MATERIAL	A. C. METZGER NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008848
APPROVAL	MIT APPROVAL W Kupfer 13 Jan 66	SCALE SHEET 2 OF 2

1008848

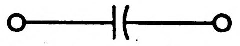
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 25307	1/13/66	WK
A	REVISED PER TDRR 27156	3/22/66	WK
B	REVISED PER TDRR 34444	8/30/67	JWL
C	REVISION STATUS CHANGED	10/9/67	

REQUIREMENTS:

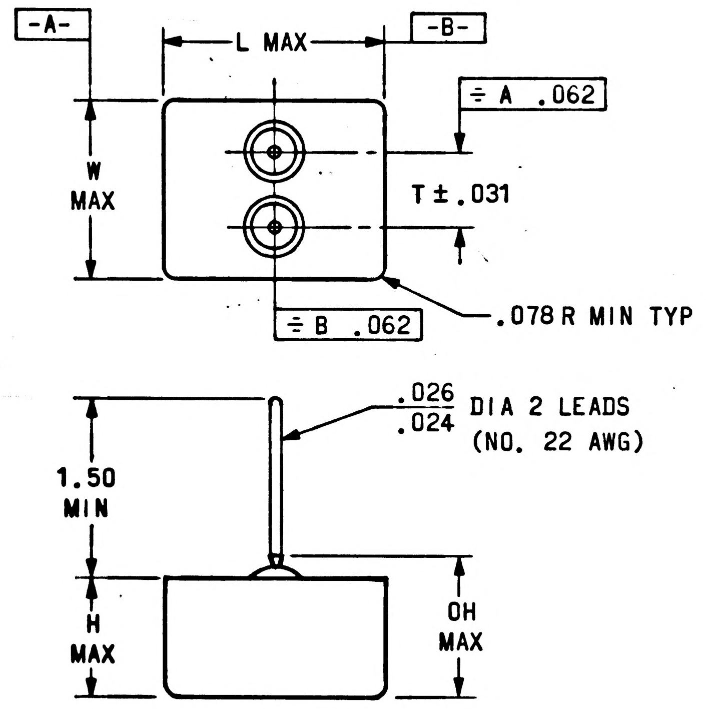
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I CODE I.
     - (1) HANDLING OF LEADS TO BE HELD TO A MINIMUM.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-19978 EXCEPT AS SPECIFIED HEREIN. PARAGRAPHS 4.6.11 AND 4.6.16 DO NOT APPLY.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) DIMENSIONS PER OUTLINE.
   - B. LEAD DATA: NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (1) MARKING: PER ND 1002019. EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, NASA DRAWING NUMBER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE VALUE, TOLERANCE, VOLTAGE RATING, AND MANUFACTURER'S TYPE OR PART NUMBER MAY APPEAR ON PART OR PACKAGE. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER.
   - C. ELECTRICAL REQUIREMENTS:
     - (1) CAPACITANCE: PER TABLE.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +55°C AND AT OR REFERRED TO 3200 ±100 CPS FOR DASH NUMBER 001. ±1% AT +25°C AND AT OR REFERRED TO 1000 ±100 CPS FOR DASH NUMBER 002.
     - (3) DIELECTRIC WITHSTANDING VOLTAGE: UNITS SHALL WITHSTAND 2 TIMES THE RATED DC WORKING VOLTAGE APPLIED IN SERIES WITH 1000 OHMS TO THE CAPACITOR TERMINALS FOR 1 MIN. WITHOUT DIELECTRIC BREAKDOWN.

3. DESIGN:
   - A. DC WORKING VOLTAGE: PER TABLE. AC WORKING VOLTAGE: 5VRMS @ 3200 CPS
   - B. OPERATING TEMPERATURE RANGE: -55°C TO +65°C.
   - C. DISSIPATION FACTOR: 0.6% MAX AT +55°C AND AT OR REFERRED TO 3200 ± 100 CPS.
   - D. INSULATION RESISTANCE:
     - (1) AT +25°C: 100,000 MEGOHM MIN. BETWEEN TERMINALS. 50,000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.
     - (2) AT +65°C: 25,000 MEGOHMS MIN. BETWEEN TERMINALS.
   - E. DIELECTRIC ABSORPTION: 0.6% MAX.
   - F. CAPACITANCE CHANGE: -001; +25°C TO -55°C: -6% MAX; +25°C TO +65°C: +1% MAX
     -002; +25°C TO 0°C: -1% MAX; +25°C TO -18°C: -2% MAX; +25° TO -55°C: -6% MAX; +25° TO +65°C: +1% MAX
   - G. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM MYLAR DIELECTRIC FILM. THE CASE SHALL BE OF METAL AND HERMETICALLY SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE, EXTENDED FOIL CONSTRUCTION.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± .005
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN Bender DATE 17-NOV-65
CHECKED C. Pioda 18Nov65
APPROVAL J. Stone 12 Jan 66
CONTRACT NAS 9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL W. Kugler 13 Jan 66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
PLASTIC DIELECTRIC

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008848
SCALE NONE
SHEET 1 OF 2

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 25307	1/13/66	WK
A	REVISED PER TDRR 27156	3/22/66	WK
B	REVISED PER TDRR 34444	8/30/67	JWL
C	REVISED PER TDRR 34809	10/9/67	J.S.

REQUIREMENTS: (CONTINUED)

H. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

J. ENVIRONMENTAL:
  (1) TEMPERATURE CYCLING: TEMPERATURE CYCLING PER PARAGRAPH 4.2.5 OF ND 1002045 SHALL BE PER TEST CONDITION "A" EXCEPT +60°C MAX; 20°C MIN. MAXIMUM CAPACITANCE CHANGE: 0.3% OF INITIAL VALUE AT 55°C.
  (2) SEALING TEST: UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.
  (3) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.
  (4) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST, OF 2000 HOURS, +55°C AND 5 VRMS @ 3200 CPS, SHALL BE ±0.5%

4. SPECIAL CONDITIONING BY SUPPLIER:

A. TEMPERATURE CYCLING: PRIOR TO BURN-IN ALL CAPACITORS SHALL BE TEMPERATURE CYCLED PER PARAGRAPH 4.2.5 OF ND 1002045, TEST CONDITION "A" EXCEPT +65°C MAXIMUM.

B. BURN-IN: THE MANUFACTURER SHALL BURN-IN ALL CAPACITORS FOR 168 HOURS AT +65°C, WITH 1.5 TIMES RATED DC VOLTAGE APPLIED. CAPACITORS SHALL THEN BE STRESSED BY 2 TIMES THE RATED DC VOLTAGE FOR 1 MINUTE MINIMUM.

C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING TEMPERATURE CYCLING AND BURN-IN:
  (1) CAPACITANCE
  (2) DIELECTRIC STRENGTH
  (3) INSULATION RESISTANCE
  (4) DISSIPATION FACTOR

D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE SERIAL NUMBER IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
  (1) PARTS MUST MEET INITIAL REQUIREMENTS BEFORE AND AFTER TEMPERATURE CYCLING.
  (2) BURN-IN PARAMETRIC CHANGE LIMITS:
    (a) CAPACITANCE: ±.5% OF INITIAL VALUE.
    (b) DIELECTRIC STRENGTH: NO BREAKDOWN.
    (c) INSULATION RESISTANCE: MEET INITIAL LIMIT.
    (d) DISSIPATION FACTOR: .0004 MAXIMUM CHANGE FROM INITIAL VALUE.

TABLE I

DASH NUMBER	CAPACITANCE VALUE	CASE DIMENSIONS MAX					WORKING VOLTAGE VDC AT 65°C
		L	W	H	OH	T	
-001	0.31UF	.937	.750	.500	.593	.312	100
-002	0.13UF	.828	.718	.500	.593	.312	100
-003	0.68UF	.937	.750	.500	.593	.312	100

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± | 3 PLACE DECIMALS ± | ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN Bender 17-NOV-65 DATE
CHECKED C. Piojda 18NOV65
APPROVAL J. Sitomer 12 JAN 66
CONTRACT NAS 9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL W Kupfer 13 Jan 66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
PLASTIC DIELECTRIC

SPECIFICATION CONTROL DRAWING

SIZE C | CODE IDENT NO. 80230 | 1008848
SCALE | SHEET 2 OF 2

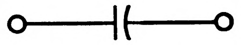
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 25 307	1/13/66	WK

REQUIREMENTS:

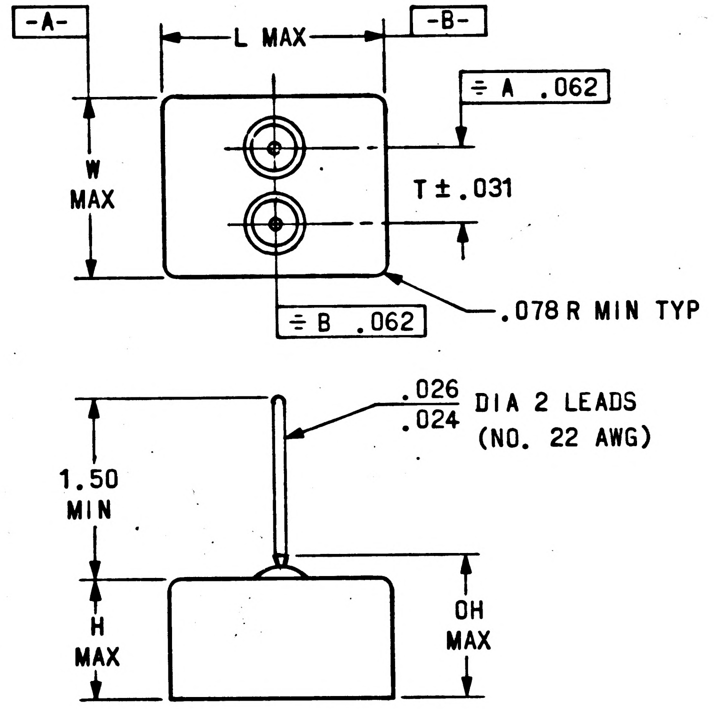
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PACKAGING AND PACKING: PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I CODE I.
     - (1) HANDLING OF LEADS TO BE HELD TO A MINIMUM.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-19978 EXCEPT AS SPECIFIED HEREIN. PARAGRAPHS 4.6.11 AND 4.6.16 DO NOT APPLY.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) DIMENSIONS PER OUTLINE.
   - B. LEAD DATA: GOLD PLATED NICKEL PER ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (1) MARKING: PER ND 1002019. EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, NASA DRAWING NUMBER, AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE VALUE, TOLERANCE, VOLTAGE RATING, AND MANUFACTURER'S TYPE OR PART NUMBER MAY APPEAR ON PART OR PACKAGE. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER.
   - C. ELECTRICAL REQUIREMENTS:
     - (1) CAPACITANCE: PER TABLE.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +55°C AND 1000 ± 100 CPS.
     - (3) DIELECTRIC WITHSTANDING VOLTAGE: UNITS SHALL WITHSTAND 2 TIMES THE RATED DC WORKING VOLTAGE APPLIED IN SERIES WITH 1000 OHMS TO THE CAPACITOR TERMINALS FOR 1 MIN. WITHOUT DIELECTRIC BREAKDOWN.

3. DESIGN:
   - A. DC WORKING VOLTAGE: PER TABLE.
   - B. OPERATING TEMPERATURE RANGE: -55°C TO +65°C.
   - C. DISSIPATION FACTOR: 0.5% MAX AT +25°C AND 1000 ± 100 CPS.
   - D. INSULATION RESISTANCE:
     - (1) AT +25°C: 100,000 MEGOHM MIN. BETWEEN TERMINALS. 50,000 MEGOHMS MIN. BETWEEN CASE AND EITHER TERMINAL.
     - (2) AT +65°C: 25,000 MEGOHMS MIN. BETWEEN TERMINALS.
   - E. DIELECTRIC ABSORPTION: 0.6 % MAX.
   - F. CAPACITANCE CHANGE: +25°C TO -55°C: -6% MAX
     +25°C TO +65°C: + 1.% MAX
   - G. CONSTRUCTION: PARTS SHALL BE CONSTRUCTED FROM MYLAR DIELECTRIC FILM. THE CASE SHALL BE OF METAL AND HERMETICALLY SEALED. CONNECTIONS SHALL BE SUCH THAT THE PARTS SHALL BE ESSENTIALLY NON-INDUCTIVE, EXTENDED FOIL CONSTRUCTION.



GRAPHICAL SYMBOL



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN Bender DATE 17-NOV-65 CHECKED C. Piojda 18Nov65 APPROVAL J. Sitanel 12 JAN 66 CONTRACT NAS 9-497	CAPACITOR, FIXED, PLASTIC DIELECTRIC SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. C. METZGER	SIZE C CODE IDENT NO. 80230 1008848
APPROVAL	MIT APPROVAL W Kupler 13 Jan 66	SCALE NONE SHEET 1 OF 2

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
	INITIAL RELEASE CLASS A PER TDRR 25307	1/13/66	WK

REQUIREMENTS: (CONTINUED)

H. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR 1 MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

J. ENVIRONMENTAL:
- (1) TEMPERATURE CYCLING: TEMPERATURE CYCLING PER PARAGRAPH 4.2.5 OF ND 1002045 SHALL BE PER TEST CONDITION "A" EXCEPT +60°C MAX; 20°C MIN. LIMITS: 0.3% OF INITIAL VALUE.
- (2) SEALING TEST: UNITS SHALL GIVE NO INDICATION OF LEAKAGE WHEN TESTED PER METHOD 512, PROCEDURE I OF MIL-STD-810.
- (3) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.
- (4) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST, PER PARAGRAPH 4.2.7.1 OF ND 1002045, EXCEPT AT +55°C, SHALL BE ±0.5 %.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. TEMPERATURE CYCLING: PRIOR TO BURN-IN ALL CAPACITORS SHALL BE TEMPERATURE CYCLED PER PARAGRAPH 4.2.5 OF ND 1002045, TEST CONDITION "A" EXCEPT +65°C MAXIMUM.

B. BURN-IN: THE MANUFACTURER SHALL BURN-IN ALL CAPACITORS FOR 168 HOURS AT +65°C, WITH 1.5 TIMES RATED VOLTAGE APPLIED. CAPACITORS SHALL THEN BE STRESSED BY 2 TIMES THE RATED VOLTAGE FOR 1 MINUTE MINIMUM.

C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING TEMPERATURE CYCLING AND BURN-IN:
- (1) CAPACITANCE
- (2) DIELECTRIC STRENGTH
- (3) INSULATION RESISTANCE
- (4) DISSIPATION FACTOR

D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
- (1) PARTS MUST MEET INITIAL REQUIREMENTS BEFORE AND AFTER TEMPERATURE CYCLING.
- (2) BURN-IN PARAMETRIC CHANGE LIMITS:
  - (a) CAPACITANCE: ±.5% OF INITIAL VALUE.
  - (b) DIELECTRIC STRENGTH: NO BREAKDOWN.
  - (c) INSULATION RESISTANCE: MEET INITIAL LIMIT.
  - (d) DISSIPATION FACTOR: .0004 MAXIMUM CHANGE FROM INITIAL VALUE.

TABLE I

DASH NUMBER	CAPACITANCE VALUE	CASE DIMENSIONS MAX					WORKING VOLTAGE VDC AT 65°C
		L	W	H	OH	T	
-001	0.31UF	.937	.750	.500	.593	.312	100

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN Bender DATE 17-NOV-65 CHECKED C. Pijda 18NOV65 APPROVAL 12 JAN'66 CONTRACT NAS 9-497	CAPACITOR, FIXED, PLASTIC DIELECTRIC SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL A. C. METZGER	SIZE C CODE IDENT NO. 80230 1008848
APPROVAL	MIT APPROVAL W Kupfer 13 Jan 66	SCALE SHEET 2 OF 2

MASTER

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 26558	2-25-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002054, UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - C. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - D. PRESERVATION, PACKING, PACKAGING, AND CONTAINER MARKING SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS I, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. LEAD DATA:
     - (1) COPPER CORED NO. 52 ALLOY, WITH COPPER FLASH, 50-150 MICRO INCHES NICKEL AND 50-200 MICROINCHES GOLD OUTSIDE PLATING COMPOSITION OF THE NO. 52 ALLOY SHALL BE AS FOLLOWS:

NICKEL AND COBALT	50-51%
MANGANESE	.60% MAX
SILICON	.30% MAX
CARBON	.10% MAX
PHOSPHORUS	.02% MAX
SULPHUR	.02% MAX
IRON	REMAINDER

THE NO. 52 ALLOY SHALL HAVE A WALL THICKNESS OF 28% TO 38% OF THE TOTAL DIAMETER.

   - (2) THE LEADS SHALL NOT CONTAIN KINKS OR BENDS WHOSE AMPLITUDES EXCEED 1/2 OF THE RADIUS OF THE LEAD OVER A NODE TO NODE DISTANCE OF 1/8 OR LESS. THE LEADS SHALL FALL FREELY IN A TUBE WITH AN I.D. EQUAL TO 1-1/2 TIMES THE LEAD DIAMETER AND A MINIMUM TUBE LENGTH EQUAL TO THE LEAD LENGTH. THE FINISH OF THE LEADS SHALL BE FREE OF FOREIGN MATERIAL IN THE AREA 1/16 MAXIMUM FROM THE DEVICE BODY TO WITHIN 1/8 OF THE LEAD END. FOREIGN MATERIAL SHALL MEAN ANY MATERIAL NOT COMMON TO THE LEAD FINISH WHICH WOULD REDUCE WELDABILITY AND SOLDERABILITY.
   - (3) A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
   - B. ELECTRICAL CHARACTERISTICS: PER TABLE II
     - (1) ZENER VOLTAGE (V_Z)
     - (2) IMPEDANCE (Z_{ZT})
     - (3) REVERSE CURRENT (I_R)
   - C. MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED), DASH NUMBER, AND THE MANUFACTURER'S NAME; TRADEMARK; OR CODE; DATE CODE; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART.

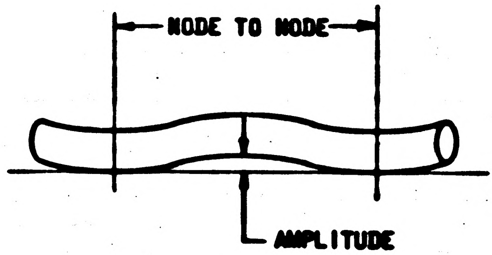
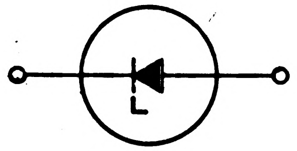
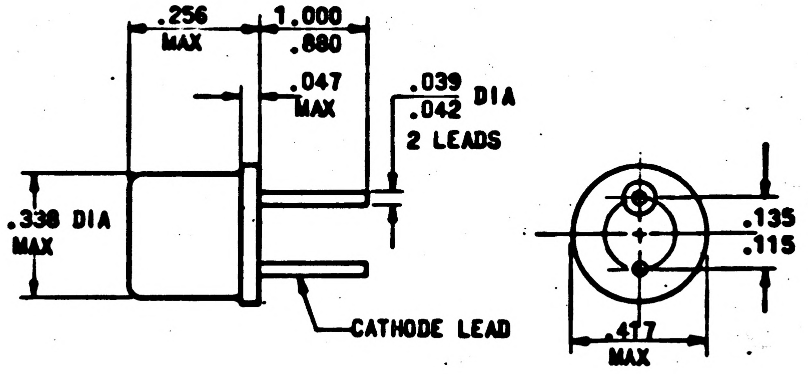


FIGURE A



GRAPHICAL SYMBOL



. PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± ___ 3 PLACE DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN Linnain DATE 27-DEC-65
CHECKED M. Manning 28 DEC 65
APPROVAL J. Sutton 2/17/66
CONTRACT NAS9-497
NASA APPROVAL A. G. METZGER
MIT APPROVAL W. Kupfer 23 Feb 66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE—
VOLTAGE REGULATOR, SILICON,
SINGLE-ENDED, METAL BODY

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008858
SCALE NONE
SHEET 1 of 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 26558	2-23-66	

REQUIREMENTS: (CONTINUED)

3. DESIGN:
   - A. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - B. MAXIMUM RATINGS: PER TABLE I.
   - C. STORAGE TEMPERATURE: -65°C TO +175°C.
   - D. THERMAL RESISTANCE: 100°C/W MAXIMUM, JUNCTION-TO-AMBIENT.
   - E. POWER DISSIPATION: 1.5 WATTS MAX, DERATE 10MW/°C ABOVE 25°C AMBIENT.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS.
     - (1) AMBIENT TEMPERATURE: 25°C ± 2°C.
     - (2) POWER DISSIPATION: 800 MILLIWATTS (DIODE IN VOLTAGE BREAKDOWN CONDITION)
   - B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) ZENER VOLTAGE (V_Z)
     - (2) DYNAMIC IMPEDANCE AT I_{ZT} (Z_{ZT})
     - (3) REVERSE LEAKAGE CURRENT (I_R)
   - C. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL DIODE WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.
     - (1) PARAMETRIC CHANGE LIMITS:
       - (a) ZENER VOLTAGE: ±3% OF INITIAL VALUE
       - (b) ZENER IMPEDANCE: AN ABSOLUTE CHANGE EQUAL TO 20% OF SPECIFIED MAXIMUM ZENER IMPEDANCE.
       - (c) REVERSE LEAKAGE CURRENT: 5 X INITIAL VALUE OR 50 NA WHICHEVER IS GREATER.
   - D. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN.
     - (1) MONITORED VARIABLE FREQUENCY VIBRATION AT A CONSTANT PEAK ACCELERATION OF 20 G MINIMUM OVER 100-2000 CPS PER MIL-STD-750 METHOD 2056 WITH FORCE APPLIED PERPENDICULAR TO THE MAJOR AXIS. MONITORED SHOCK PER MIL-STD-750 METHOD 2021.1 WITH A MINIMUM OF 5 BLOWS IN A DIRECTION PERPENDICULAR TO THE MAJOR AXIS AT A MINIMUM OF 3KG PEAK ACCELERATION. MONITOR DURING TESTING FOR OPENS AND SHORTS USING A MINIMUM INTERMITTENCY CAPABILITY OF 5 MICROSECONDS. ALSO MONITOR SIGNIFICANT ELECTRICAL PARAMETER CHANGES.
     - (2) HERMETIC SEAL PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III; WITH GROSS LEAK PER TEST CONDITION A. A LEAK RATE OF 1 X 10^{-8} ATM-CC/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

NOTES:

1. ALL SPECIFICATIONS (EXCEPT FORWARD VOLTAGE DROP) ARE BASED ON A DC CURRENT FLOW THRU THE DIODE IN SUCH A DIRECTION THAT THE CATHODE IS POSITIVE WITH RESPECT TO THE ANODE.
2. ZENER IMPEDANCE IS MEASURED BY SUPERIMPOSING A 60 CYCLE AC CURRENT ON THE DC TEST CURRENT. THE MAGNITUDE OF THE AC CURRENT SHALL BE 10% OF THE DC LEVEL. $(Z_Z = \frac{E(AC)}{I(AC)})$

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN Bender DATE 27-DEC-65 CHECKED M. Manning 28 DEC 65 APPROVAL J. Sutamas 2/17/66 CONTRACT NAS9-497	SEMICONDUCTOR DEVICE, DIODE - VOLTAGE REGULATOR, SILICON, SINGLE-ENDED, METAL BODY SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL A. C. METZGER	SIZE C CODE IDENT NO. 80230 1008858
APPROVAL	MIT APPROVAL W Kupfer 23 Feb 66	SCALE NONE SHEET 2 OF 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 26558	2-23-66	

TABLE I

MAXIMUM RATINGS AT AMBIENT TEMPERATURE = 25°C				
NASA DASH NUMBER	ZENER CURRENT (I_{ZM}) MA DC	POWER DISSIPATION (P) W	JUNCTION TEMPERATURE (T_J) °C	EIA TYPE DESIGNATION (FOR REF ONLY)
-1	125	1.5	175	1N3789B
-2	62	1.5	175	1N3796B
-3	51	1.5	175	1N3798B

TABLE II

ELECTRICAL CHARACTERISTICS AT AMBIENT TEMPERATURE = 25°C (UNLESS OTHERWISE SPECIFIED)

PARAMETER		CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
				MIN	MAX	UNITS
ZENER VOLTAGE	-1	I_{ZT} = 37MA	V_Z	9.5	10.5	VOLTS
	-2	I_{ZT} = 19MA	V_Z	19	21	VOLTS
	-3	I_{ZT} = 16MA	V_Z	22.8	25.2	VOLTS
ZENER IMPEDANCE	-1	I_{ZT} = 37MA	Z_{ZT}		5	OHMS
		I_{ZK} = 0.25MA	Z_{ZK}		700	OHMS
	-2	I_{ZT} = 19MA	Z_{ZT}		10	OHMS
		I_{ZK} = 0.25MA	Z_{ZK}		750	OHMS
	-3	I_{ZT} = 16MA	Z_{ZT}		13	OHMS
		I_{ZK} = 0.25MA	Z_{ZK}		750	OHMS
REVERSE CURRENT	-1	V_R = 7.6 VOLT	I_R		100	NA
	-2	V_R = 15.2V	I_R		100	NA
	-3	V_R = 18.2V	I_R		100	NA
ZENER VOLTAGE CHANGE	-1	$\Delta V_Z = V_{Z2} - V_{Z1}$	ΔV_Z		.75	VOLTS
	-2	V_{Z1} AT I_{ZK}	ΔV_Z		.75	VOLTS
	-3	V_{Z2} AT I_{ZT}	ΔV_Z		.75	VOLTS
FORWARD VOLTAGE DROP	-1	I_F = 300MA	V_F		1.0	VOLTS
	-2	I_F = 300MA	V_F		1.0	VOLTS
	-3	I_F = 300MA	V_F		1.0	VOLTS

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN Lander DATE 27-DEC-65
CHECKED M. Manning 28 DEC 65
APPROVAL 2/17/66
CONTRACT NAS9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL 23 Feb 66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEMICONDUCTOR DEVICE, DIODE—VOLTAGE REGULATOR, SILICON, SINGLE-ENDED, METAL BODY
SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008858
SCALE NONE
SHEET 3 of 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REPLACES REV(-) WITH CHANGE PER TDRR 32233	12 DEC '66	JAG

REQUIREMENTS:

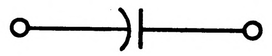
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS IN ND 1002044 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS OF THIS DRAWING
   - D. UNIT PACKAGING AND PACKING SHALL BE ACCOMPLISHED PER ND 1002215 CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) DIMENSIONS: PER FIGURE I AND TABLE I
     - (2) MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019 WITH NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER MANUFACTURER'S AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN IN. THE MANUFACTURER'S NAME AND/OR SYMBOL, CAPACITANCE VALUE, TOLERANCE, AND MANUFACTURER'S PART OR TYPE NUMBER MAY ALSO APPEAR ON PART AND PACKAGE. EACH CONTAINER SHALL BE MARKED WITH THE NASA DRAWING NUMBER AND REVISION LETTER.
   - B. ELECTRICAL REQUIREMENTS: TEST PER MIL-C-3965
     - (1) CAPACITANCE AND CAPACITANCE TOLERANCE: PER TABLE II
     - (2) POWER FACTOR: PER TABLE II
     - (3) DC LEAKAGE CURRENT: PER TABLE II
     - (4) TERMINAL TO CASE INSULATION RESISTANCE: THE INSULATION RESISTANCE, MEASURED AT 250 VDC, BETWEEN THE TWO TERMINALS TIED TOGETHER AND THE CASE SHALL BE 100 MEGOHMS MIN.

3. DESIGN REQUIREMENTS:
   - A. OPERATING TEMPERATURE RANGE: -55°C. TO +125°C.
   - B. DC WORKING VOLTAGE: 45 VOLTS AT 85°C DERATED TO 30 VOLTS AT 125°C.
   - C. MAX CAPACITANCE CHANGE AT -55°C.: -45%. AT 125°C: +75%
   - D. INTERNAL CAPACITOR SECTIONS SHALL BE SECURELY POTTED IN PLACE.
   - E. RATED SURGE VOLTAGE: 50 VDC AT 85°C DERATED TO 35 VOLTS AT 125°C.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURNIN: ALL CAPACITORS SHALL BE BURNED-IN FOR 250 HOURS MINIMUM AT RATED DC VOLTAGE AT A TEMPERATURE OF +125°C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL

NOTE: CAPACITOR INSULATED FROM CASE.

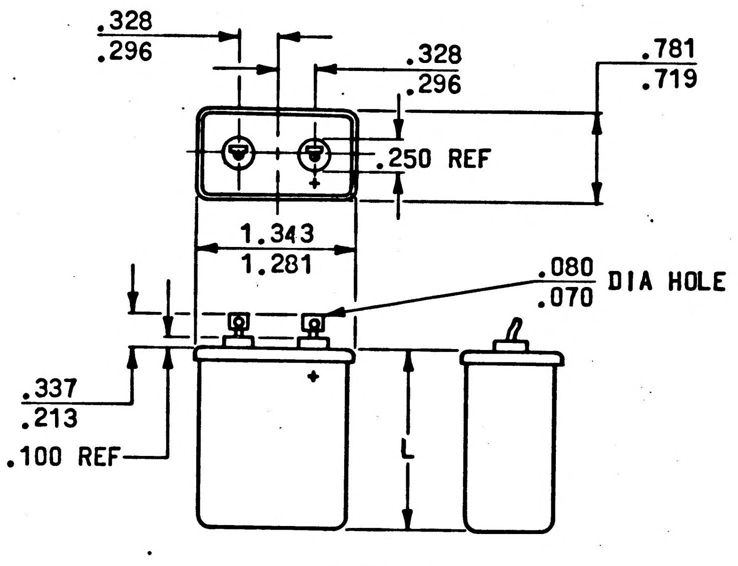


FIGURE 1

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± — ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R.W. TURNER DATE 12 AUG 63 CHECKED WILSON 13 AUG. 63 APPROVAL G.W. MAYO 1 NOV. 66 CONTRACT NAS-9-497	CAPACITOR - FIXED TANTALUM - FOIL, POLAR RECTANGULAR, 125°C SPECIFICATION CONTROL DRAWING
MATERIAL —	NASA APPROVAL A.C. METZGER	SIZE C CODE IDENT NO. 80230 1008860
APPROVAL	MIT APPROVAL W. KUPFER 11 JAN 64	SCALE — SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REPLACES REV(-) WITH CHANGE PER TDRR 32233	12 DEC '66	JAG

REQUIREMENTS: CONTINUED

(1) CAPACITANCE
(2) POWER FACTOR
(3) LEAKAGE CURRENT

B. THE BURN IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

(1) PARAMETRIC CHANGE LIMITS:
(2) CAPACITANCE: ±20% OF INITIAL 125°C VALUE.

TABLE I

CASE SIZE	L MAX
10	2.562
20	2.062
30	1.437

TABLE II

DASH NO.	CASE SIZE	CAPACITANCE-15%+50% (UF) AT 25°C AND 120 CPS	MAX POWER FACTOR AT 120 CPS %		MAX DC LEAKAGE CURRENT (UA)		MAX ESR (OHMS) AT 120 CPS AND 25°C
			25°C	125°C	25°C	125°C	
-1	20	550	20	50	58	580	0.58

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± — ANGLES ± —	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R.W. TURNER DATE 12 AUG 63 CHECKED WILSON 13 AUG 63 APPROVAL G.W. MAYO CONTRACT NAS9-497	CAPACITOR - FIXED TANTALUM - FOIL, POLAR RECTANGULAR, 125°C SPECIFICATION CONTROL DRAWING
MATERIAL —	NASA APPROVAL A.C. METZGER	SIZE C CODE IDENT NO. 80230 1008860
APPROVAL	MIT APPROVAL W. KUPFER 11 JAN 66	SCALE — SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

-	0988001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A 25198 PER TDRR	1-11-66	

REQUIREMENT:

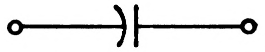
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS IN ND 1002044 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS OF THIS DRAWING
   - D. UNIT PACKAGING AND PACKING SHALL BE ACCOMPLISHED PER ND 1002215 CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) DIMENSIONS: PER FIGURE I AND TABLE I
     - (2) MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019 WITH NASA DRAWING NUMBER, DASH NUMBER AND REVISION LETTER MANUFACTURERS AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN IN. THE MANUFACTURES NAME AND/OR SYMBOL, CAPACITANCE VALUE, TOLERANCE, AND MANUFACTURES PART OR TYPE NUMBER MAY ALSO APPEAR ON PART AND PACKAGE. EACH CONTAINER SHALL BE MARKED WITH THE NASA DRAWING NUMBER AND THE REVISION LETTER.
   - B. ELECTRICAL REQUIREMENTS: TEST PER MIL-C-3965
     - (1) CAPACITANCE AND CAPACITANCE TOLERANCE: PER TABLE II
     - (2) POWER FACTOR: PER TABLE II
     - (3) DC LEAKAGE CURRENT: PER TABLE II

3. DESIGN REQUIREMENTS:
   - A. OPERATING TEMPERATURE RANGE: -55°C. TO +125°C.
   - B. DC WORKING VOLTAGE: 45 VOLTS @ 85°C DERATED TO 30 VOLTS @ 125°C
   - C. MAX CAPACITANCE CHANGE AT -55°C.: -45%. AT 125°C: + 75%
   - D. INTERNAL CAPACITOR SECTIONS SHALL BE SECURELY POTTED IN PLACE.
   - E. RATED SURGE VOLTAGE: 50 VDC @ 85°C DERATED TO 35 VOLTS AT 125°C

4. SPECIAL CONDITIONING BY SUPPLIER
   - A. BURNIN: ALL CAPACITORS SHALL BE BURNED-IN FOR 250 HOURS MINIMUM AT RATED DC VOLTAGE AT A TEMPERATURE OF +125°C. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN IN:
     - (1) CAPACITANCE
     - (2) POWER FACTOR
     - (3) LEAKAGE CURRENT
   - B. THE BURN IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.


GRAPHICAL SYMBOL

NOTE: CAPACITOR INSULATED FROM CASE.

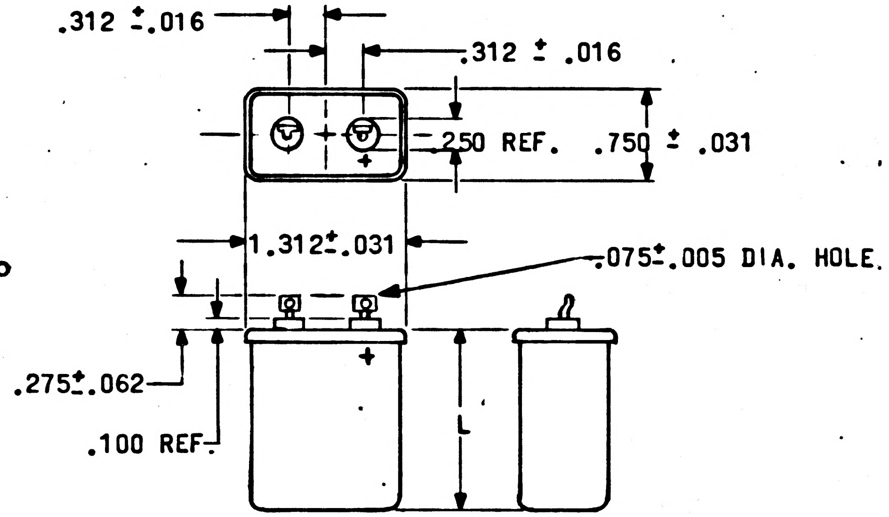


FIG. 1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT NAS-9-497
DRAWN R.W. Dunn DATE 12 AUG 63
CHECKED WILSON 13 AUG 63
APPROVAL 1/11/66
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR - FIXED
TANTALUM - FOIL, POLAR
RECTANGULAR, 125°C
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1008860
SCALE NONE
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

—	0988001

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	INITIAL RELEASE CLASS A PER TDRR 25198	1-11-66	

REQUIREMENTS: CONTINUED

MEET THE SPECIFIED REQUIREMENTS. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR WHICH EXCEED THE SPECIFIED LIMITS FOR PARAMETRIC CHANGES FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

(1) PARAMETRIC CHANGE LIMITS:

(2) CAPACITANCE: ±20% OF INITIAL 125°C VALUE.

TABLE I

CASE SIZE	L MAX
10	2.562
20	2.062
30	1.437

TABLE II

NASA PART NUMBER	CASE SIZE	CAPACITANCE -15%+50% (U F) AT 25°C AND 120 CPS	MAX POWER FACTOR AT 120 CPS %		MAX DC LEAKAGE CURRENT (UA)		MAX ESR (OHMS) AT 120 CPS AND 25°C
			25°C	125°C	25°C	125°C	
1008860-1	20	550	20	50	58	580	0.58

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS9-497

DRAWN R.W. Timmons DATE 12 AUG 63
CHECKED Wilson 13 AUG 63
APPROVAL 1/11/66
APPROVAL

NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR - FIXED
TANTALUM - FOIL, POLAR
RECTANGULAR, 125°C
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008860
SCALE —	WT	SHEET 2 OF 2

RE'/ISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	INITIAL RELEASE CLASS A PER TDRR 25860	2-1-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. EACH UNIT CONTAINER SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, ITEM NAME, NASA DRAWING NUMBER, NET CONTENTS, LOT NUMBER AND DATE OF MANUFACTURE.
   - D. PRESERVATION, PACKING, PACKAGING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 8.

2. ACCEPTANCE AND INSPECTION:
   - A. MATERIAL: THIS TAPE SHALL CONSIST OF TFE FLUOROCARBON FILM WITH A BONDABLE BACKING COATED ON ONE SIDE WITH A THERMOSETTING ACRYLIC PRESSURE-SENSITIVE ADHESIVE.
   - B. COLOR: CLEAR TRANSLUCENT.
   - C. PHYSICAL PROPERTIES:

PROPERTY	UNITS	VALUE	TEST METHOD
THICKNESS	MILS	2.2 ± .5	ASTM D 1000
TENSILE STRENGTH	LBS/IN	10 MIN.	ASTM D 1000
ELONGATION	PERCENT	50 MIN.	ASTM D 1000
WIDTH	INCHES	1-1/2 ± 1/32	ASTM D 1000

3. DESIGN:
   - A. INTENDED USE: THIS TAPE IS DESIGNED FOR APPLICATIONS WHERE MOISTURE RESISTANCE IS REQUIRED USING A THIN, BONDABLE TFE TAPE HAVING VERY LOW MOISTURE PERMEABILITY.
   - B. ELECTRICAL PROPERTIES:

PROPERTY	UNITS	VALUE	TEST METHOD
ELECTRIC STRENGTH	VOLTS	4000 MIN.	ASTM D 1000
INSULATION RESISTANCE	MEGOHMS	500,000 MIN.	ASTM D 1000

   - C. PHYSICAL PROPERTIES:

PROPERTY	UNITS	VALUE	TEST METHOD
ADHESION TO STEEL	OZS./IN.	18 MIN.	ASTM D 1000
ADHESION TO BACKING	OZS./IN	8 MIN.	ASTM D 1000
MOISTURE VAPOR TRANSMISSION	GRMS/100 SQ IN/24 HRS.	0.0 TO 0.5 NOM	JAN-P-127
LENGTH/ROLL	YARDS	36 MIN	ASTM D 1000

   - D. SHELF LIFE: THE TAPE SHALL HAVE A MINIMUM SHELF LIFE OF ONE YEAR FROM DATE OF MANUFACTURE WHEN STORED AT ROOM CONDITIONS (TEMPERATURE $\leq$ 75°F) AND SHALL HAVE NOT LESS THAN 75% OF THE USABLE SHELF LIFE REMAINING WHEN RECEIVED BY THE PURCHASER.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 10 2034 FOR THIS DRAWING.

MASTER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + – – 3 PLACE DECIMALS + – – ANGLES + – –	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	DRAWN Jamaurio 20 JAN 66 DATE CHECKED D.L. Fox 20 JAN 66 APPROVAL D. Hoag 1 Feb '66	INSULATION TAPE, ELECTRICAL
DO NOT SCALE THIS DRAWING	CONTRACT NAS 9-497	SPECIFICATION CONTROL DRAWING
MATERIAL —	NASA APPROVAL A. C. METZGER	SIZE C CODE IDENT NO. 80230 1008866
APPROVAL —	MIT APPROVAL W Kupfer 1 Feb 66	SCALE — SHEET 1 OF 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 26893	3-8-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 4.

2. DESIGN:
   - A. MATERIAL:
     - 1. LAMINATION:
       ALUMINUM PER QQ-A-250/1. LAMINATION THICKNESS .003 (REF)
     - 2. FILLER:
       UNSATURATED POLYESTER STYRENE RESIN (PARAPLEX P-43)
       ZERO WATER ABSORBTION, STABLE TO 200°F UNLAMINATED,
       400°F LAMINATED.
   - B. EDGE BONDED: 3 SIDES

DASH NUMBER	FIGURE NUMBER
-001	1
-002	2

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

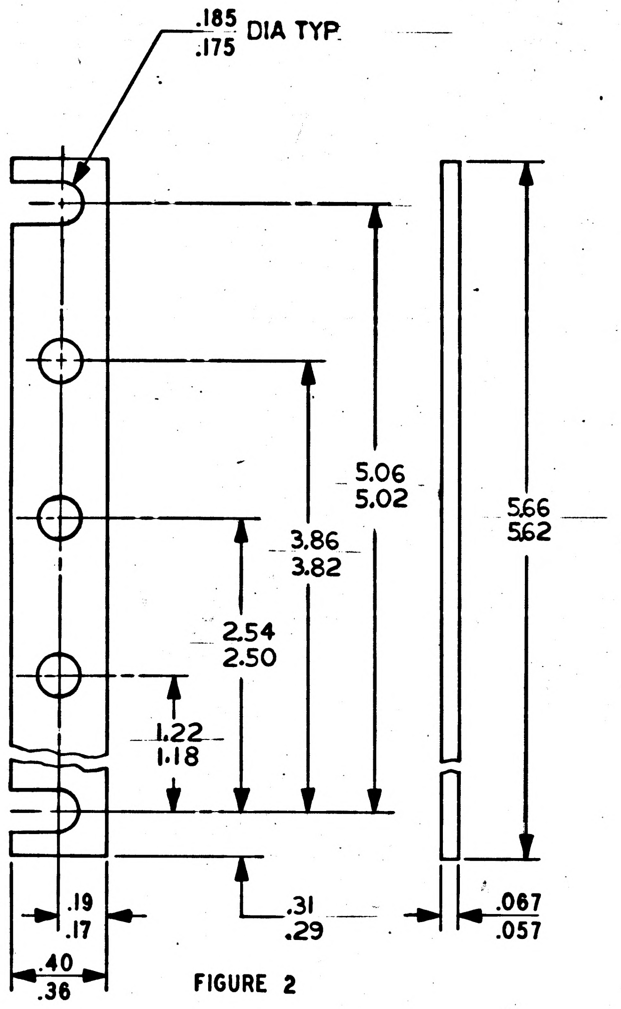


FIGURE 2

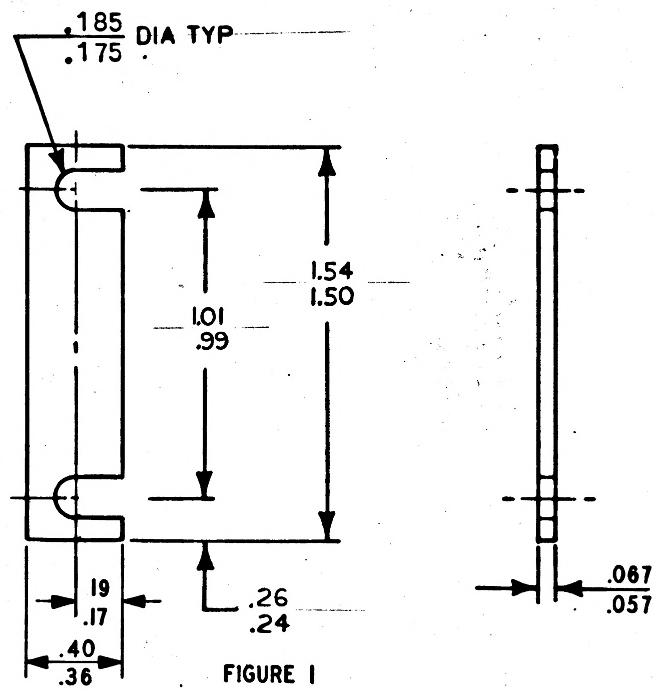


FIGURE 1

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + — − 3 PLACE DECIMALS + — − ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL —
APPROVAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN M. Gelner DATE 13 JAN 66
CHECKED Kampke 4 JAN 66
APPROVAL R.W. Brun 3/1/66
CONTRACT NAS 9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SHIM - LAMINATED,
EYEPIECE STOWAGE

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008871
SCALE
SHEET 1 OF 1

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	—	INITIAL RELEASE CLASS A 27158 PER TDRR	3-15-66	

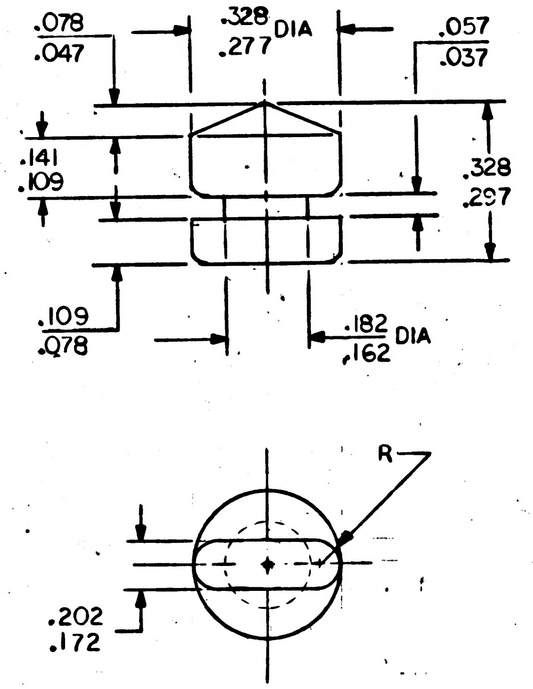
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS I, CODE 7.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: NEOPRENE RUBBER PER MIL-R-6855, CLASS II, GRADE 60.
   - B. DUROMETER: SHORE A 60 ± 5 PER MIL-R-6855.

DASH NUMBER	MANUFACTURER'S PART NUMBER (FOR REF)
-001	1914 NEOPRENE

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + — −
3 PLACE DECIMALS + — −
ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
APPROVAL

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN Bender DATE 1-FEB-66
CHECKED Jaylor 2 FEB 66
APPROVAL R.W. Boss 3/14/66
CONTRACT NAS9-497
NASA APPROVAL A. G. METZGER
MIT APPROVAL W Cup 15 Mar 66

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BUMPER, RUBBER

SPECIFICATION CONTROL DRAWING

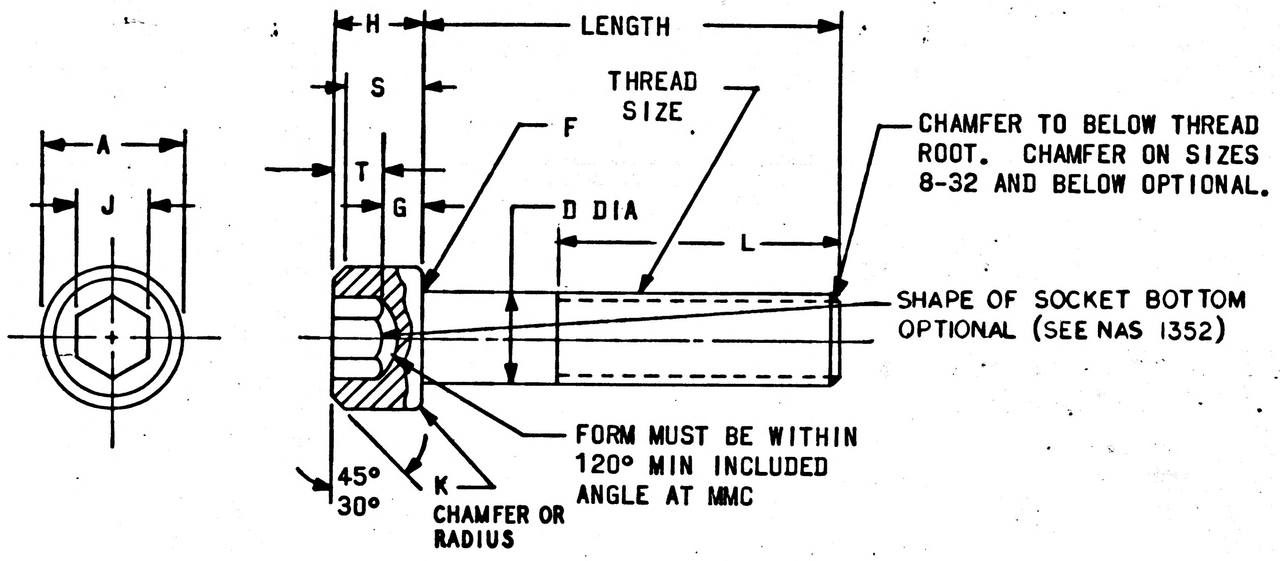
SIZE C
CODE IDENT NO. 80230
1008872
SCALE NONE
SHEET 1 OF 1

ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A 27354 PER TDRR	3-23-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 7.
   - D. SCREWS SHALL MEET THE REQUIREMENTS OF FF-S-86, TYPE VI EXCEPT AS SPECIFIED BELOW.
2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: ALLOY STEEL PER FF-S-86.
   - B. FINISH: (SEE TABLE I)
     - (1) NICKEL PLATE (.0002 -.0004 THICK) PER QQ-N-290, CLASS 2.
     - (2) TIN PLATE (.0002 -.0004 THICK) PER MIL-T-10727, TYPE I.
3. DESIGN:
   - A. HEAD TO BE FORMED BY COLD HEADING.
   - B. MINIMUM ULTIMATE TENSILE STRENGTH: 160,000 PSI.
   - C. SCREWS WHICH HAVE A LENGTH LESS THAN THE MINIMUM BASIC THREAD LENGTH, SHALL BE THREADED AS CLOSE TO THE HEAD AS PRACTICABLE.

L (SEE NOTE 3 C)	
NO. 2	.625
NO. 4 NO. 6	.750
NO. 8 NO. 10	.875
1/4	1.000


H
LENGTH
S
THREAD SIZE
F
T
G
A
J
D DIA
L
CHAMFER TO BELOW THREAD ROOT. CHAMFER ON SIZES 8-32 AND BELOW OPTIONAL.
SHAPE OF SOCKET BOTTOM OPTIONAL (SEE NAS 1352)
FORM MUST BE WITHIN 120° MIN INCLUDED ANGLE AT MMC
45°
30°
K
CHAMFER OR RADIUS

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN D. Dobbst DATE 15 FEB 66 CHECKED J. Stalney 16 FEB 66 APPROVAL 22 Mar '66 CONTRACT NAS9-497	SCREW, CAP, SOCKET HEAD SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. C. METZGER	SIZE CODE IDENT NO. 80230 1008874
APPROVAL	MIT APPROVAL 22/6/66	SCALE SHEET 1 OF 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 27354	3-22-66	

DASH NUMBER	LENGTH		THREAD SIZE	D		A		H		S	G	F		K	T	J		FINISH
	MAX	MIN		MAX	MIN	MAX	MIN	MAX	MIN	MIN	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
-001	.203	.172	2-56 UNC-3A	.0860	.0822	.140	.134	.086	.083	.077	.028	.008	.004	.003	.038	.0791	.0781	NICKEL PLATE SEE NOTE 2.B.(1)
-002	.266	.234																
-003	.391	.359																
-004	.516	.484																
-005	.766	.734																
-006																		
-007																		
-008																		
-009	.391	.359	4-40 UNC-3A	.1120	.1075	.183	.176	.112	.108	.101	.036	.009	.005	.005	.051	.0952	.0937	
-010	.516	.484																
-011	.641	.609																
-012	.766	.734																
-013	1.015	.984																
-014																		
-015																		
-016																		
-017	.391	.359	6-32 UNC-3A	.1380	.1329	.226	.218	.138	.134	.124	.044	.010	.006	.005	.064	.1111	.1094	
-018	.516	.484																
-019	.641	.609																
-020	.766	.734																
-021	1.015	.984																
-022																		
-023																		
-024																		
-025	.391	.359	8-32 UNC-3A	.1640	.1585	.270	.262	.164	.159	.148	.052	.012	.007	.005	.077	.1426	.1406	
-026	.516	.484																
-027	.766	.734																
-028	1.015	.984																
-029	1.531	1.484																
-030																		
-031																		
-032																		

THE PART NUMBER IS THE DRAWING NUMBER
PLUS THE APPLICABLE DASH NUMBER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN D. Dubbs 15 FEB 66 DATE
CHECKED J. Stelma 16 FEB 66
APPROVAL 22 Mar '66
CONTRACT
NASA APPROVAL A. G. METZGER
MIT APPROVAL 22 Mar 66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, SOCKET HEAD

SPECIFICATION CONTROL DRAWING

SIZE
CODE IDENT NO. 80230
1008874
SCALE
SHEET 2 OF 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 27354	3-22-6	

DASH NUMBER	LENGTH		THREAD SIZE	D		A		H		S	G	F		K	T	J		FINISH
	MAX	MIN		MAX	MIN	MAX	MIN	MAX	MIN	MIN	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
-033	.391	.359	10-32 UNF-3A	.1900	.1840	.312	.303	.190	.185	.171	.061	.014	.009	.005	.090	.1587	.1562	NICKEL PLATE SEE NOTE 2.B.(1)
-034	.516	.484																
-035	.766	.734																
-036	1.015	.984																
-037	1.531	1.484																
-038																		
-039																		
-040																		
-041	.391	.359	1/4-28 UNF-3A	.2500	.2435	.375	.365	.250	.244	.225	.080	.014	.009	.008	.120	.1900	.1875	
-042	.516	.484																
-043	.766	.734																
-044	1.015	.984																
-045	1.531	1.484																
-046	2.031	1.984																
-047																		
-048																		
-151	.203	.172	2-56 UNC-3A	.0860	.0822	.140	.134	.086	.083	.077	.028	.008	.004	.003	.038	.0791	.0781	TIN PLATE SEE NOTE 2.B.(2)
-152	.266	.234																
-153	.391	.359																
-154	.516	.484																
-155	.766	.734																
-156																		
-157																		
-158																		
-159	.391	.359	4-40 UNC-3A	.1120	.1075	.183	.176	.112	.108	.101	.036	.009	.005	.005	.051	.0952	.0937	
-160	.516	.484																
-161	.641	.609																
-162	.766	.734																
-163	1.015	.984																
-164																		
-165																		
-166																		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE 15 FEB 66
CHECKED 16 FEB 66
APPROVAL 22 Mar '66
CONTRACT
NASA APPROVAL A. C. METZGER
MIT APPROVAL 22 Mar 66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, SOCKET HEAD

SPECIFICATION CONTROL DRAWING

SIZE
CODE IDENT NO. 80230
1008874
SCALE
SHEET 3 OF 4

MIL-1000C D

ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 27354	3-22-66	

DASH	LENGTH		THREAD	D		A		H		S	G	F		K	T	J		FINISH
NUMBER	MAX	MIN	SIZE	MAX	MIN	MAX	MIN	MAX	MIN	MIN	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
-167	.391	.359	6-32 UNC-3A	.1380	.1329	.226	.218	.138	.134	.124	.044	.010	.006	.005	.064	.1111	.1094	TIN PLATE SEE NOTE 2.B.(2)
-168	.516	.484																
-169	.641	.609																
-170	.766	.734																
-171	1.015	.984																
-172																		
-173																		
-174																		
-175	.391	.359	8-32 UNC-3A	.1640	.1585	.270	.262	.164	.159	.148	.052	.012	.007	.005	.077	.1426	.1406	
-176	.516	.484																
-177	.766	.734																
-178	1.015	.984																
-179	1.531	1.484																
-180																		
-181																		
-182																		
-183	.391	.359	10-32 UNF-3A	.1900	.1840	.312	.303	.190	.185	.171	.061	.014	.009	.005	.090	.1587	.1562	
-184	.516	.484																
-185	.766	.734																
-186	1.015	.984																
-187	1.531	1.484																
-188																		
-189																		
-190																		
-191	.391	.359	1/4-28 UNF-3A	.2500	.2435	.375	.365	.250	.244	.225	.080	.014	.009	.008	.120	.1900	.1875	
-192	.516	.484																
-193	.766	.734																
-194	1.015	.984																
-195	1.531	1.484																
-196	2.031	1.984																
-197																		
-198																		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN 3-8-66 DATE
CHECKED J. Stelma 16FEB66
APPROVAL 22 Mar 66
CONTRACT
NASA APPROVAL A. C. METZGER
MIT APPROVAL 22/4/66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCREW, CAP, SOCKET HEAD

SPECIFICATION CONTROL DRAWING

SIZE
CODE IDENT NO. 80230
1008874
SCALE
SHEET 4 OF 4

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 28150		

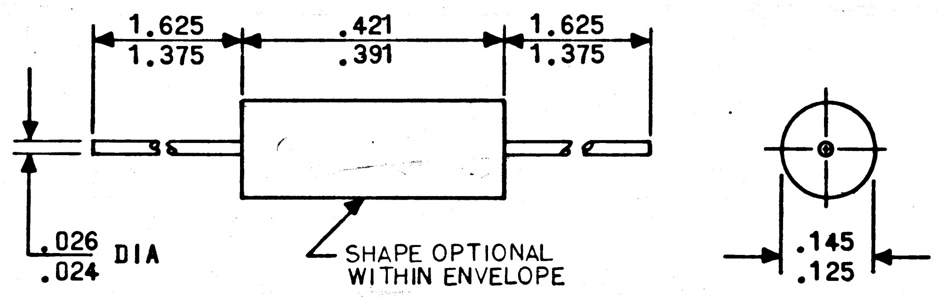
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. UNITS SHALL MEET THE REQUIREMENTS OF MIL-R-10509, STYLE RN60, CHARACTERISTIC E, TOLERANCE B; EXCEPT AS SPECIFIED HEREIN.
   - C. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015404, CLASS 2.
   - D. UNITS SHALL BE CAPABLE OF MEETING ALL THE QUALIFICATION REQUIREMENTS OF ND 1002057 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - E. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING PER ND 1002215 CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. ELECTRICAL REQUIREMENTS:
     - (1) RESISTANCE VALUE: PER TABLE.
     - (2) TOLERANCE: ± .1%
   - B. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER, DASH NUMBER, LOT CODE NUMBER OR SERIAL NUMBER, RESISTANCE VALUE AND TOLERANCE, MANUFACTURER'S NAME OR SYMBOL SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) LEADS: IRON-NICKEL ALLOY, COPPER CLAD, GOLD PLATED PER PS 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

3. DESIGN:
   - A. DIELECTRIC VOLTAGE: 750 VOLTS RMS, MINIMUM.
   - B. TEMPERATURE COEFFICIENT: ± 25 PPM/°C FROM -55°C TO +175°C.
   - C. MAX VOLTAGE RATING: 250 VOLTS.
   - D. POWER RATING: 1/8 WATT AT 125°C; DERATING LINEAR TO +175°C.

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: ALL RESISTORS SHALL BE BURNED IN FOR 100 HOURS AT +125°C AT 1/8 WATT.
   - B. LIMITS: RESISTANCE CHANGE AT CONCLUSION OF BURN-IN SHALL NOT EXCEED 0.05% AND THE UNIT SHALL MEET THE INITIAL TOLERANCE BEFORE AND AFTER BURN-IN.
   - C. DATA: BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL RESISTOR WITH THE INITIAL TEST READINGS, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS THAT FAIL TO MEET INITIAL DRAWING REQUIREMENTS OR THAT EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DRAWN D. Pyatt DATE 10 MAR 66 CHECKED 11 MAR 66 APPROVAL 14 CONTRACT NAS9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS RESISTOR, FIXED, FILM— 1/8 WATT, ±0.1% SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING		
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. C. METZGER	SIZE CODE IDENT NO. 80230 1008878
APPROVAL	MIT APPROVAL	SCALE NONE SHEET 1 of 2

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
		INITIAL RELEASE CLASS A PER TDRR 28150	4-20-66	W.H.

NASA DASH NUMBER	RESISTANCE K OHMS	NASA DASH NUMBER	RESISTANCE K OHMS	NASA DASH NUMBER	RESISTANCE K OHMS	NASA DASH NUMBER	RESISTANCE K OHMS	NASA DASH NUMBER	RESISTANCE K OHMS	NASA DASH NUMBER	RESISTANCE K OHMS
-001	5.300	-046	14.225	-091	24.468	-136	59.317	-181	85.024	-226	121.562
-002	5.342	-047	14.339	-092	24.664	-137	59.792	-182	85.704	-227	122.530
-003	5.385	-048	14.454	-093	24.861	-138	60.270	-183	86.390	-228	123.500
-004	5.428	-049	14.570	-094	25.060	-139	60.752	-184	87.081	-229	124.478
-005	5.471	-050	14.687	-095	25.260	-140	61.238	-185	87.778	-230	125.474
-006	5.515	-051	14.804	-096	25.462	-141	61.728	-186	88.480	-231	126.076
-007	5.559	-052	14.922	-097	25.666	-142	62.222	-187	89.188	-232	127.087
-008	5.603	053	15.041	-098	25.871	-143	62.720	-188	89.901	-233	128.104
-009	5.648	-054	15.161	-099	26.078	-144	63.222	-189	90.620	-234	129.129
-010	5.693	-055	15.282	-100	26.287	-145	63.728	-190	91.345	-235	130.162
-011	5.739	-056	15.404	-101	26.497	-146	64.238	-191	92.076	-236	131.203
-012	5.785	-057	15.527	-102	26.709	-147	64.752	-192	92.813	-237	132.252
-013	5.831	-058	15.651	-103	26.923	-148	65.270	-193	93.556	-238	133.310
-014	5.878	-059	15.776	-104	27.138	-149	65.792	-194	94.304	-239	134.376
-015	5.925	-060	15.902	-105	27.455	-150	66.318	-195	95.058	-240	135.451
-016	5.972	-061	16.029	-106	27.675	-151	66.849	-196	95.818	-241	136.536
-017	6.020	-062	16.157	-107	27.896	-152	67.484	-197	96.584	-242	137.628
-018	6.068	-063	16.286	-108	28.119	-153	68.024	-198	97.357	-243	138.731
-019	6.117	-064	16.416	-109	28.344	-154	68.568	-199	98.136	-244	139.841
-020	6.166	-065	16.547	-110	28.571	-155	69.117	-200	98.921	-245	140.960
-021	6.200	-066	16.679	-111	28.800	-156	69.670	-201	99.712	-246	142.088
-022	7.000	-067	16.812	-112	29.030	-157	70.227	-202	100.510	-247	143.225
-023	7.056	-068	16.900	-113	29.262	-158	70.789	-203	101.314	-248	144.371
-024	7.112	-069	17.035	-114	29.496	-159	71.355	-204	102.114	-249	145.526
-025	7.169	-070	17.171	-115	29.732	-160	71.926	-205	102.931	-250	146.690
-026	7.227	-071	17.308	-116	29.970	-161	72.501	-206	103.754	-251	147.864
-027	7.284	-072	17.446	-117	30.210	-162	73.081	-207	104.584	-252	149.047
-028	7.343	-073	17.586	-118	30.452	-163	73.666	-208	105.421	-253	150.000
-029	7.401	-074	17.727	-119	30.696	-164	74.255	-209	106.264		
-030	7.461	-075	17.869	-120	30.942	-165	74.849	-210	107.114		
-031	7.520	-076	18.012	-121	31.190	-166	75.448	-211	107.971		
-032	7.580	-077	18.156	-122	31.440	-167	76.052	-212	108.835		
-033	7.641	-078	18.301	-123	31.692	-168	76.660	-213	109.606		
-034	7.702	-079	18.447	-124	31.946	-169	77.273	-214	110.483		
-035	7.764	-080	18.595	-125	32.202	-170	77.891	-215	111.367		
-036	7.826	-081	18.744	-126	32.460	-171	78.514	-216	112.258		
-037	7.888	-082	18.894	-127	32.720	-172	79.142	-217	113.156		
-038	7.951	-083	19.045	-128	32.982	-173	79.775	-218	114.061		
-039	8.015	-084	19.197	-129	33.200	-174	80.413	-219	114.973		
-040	8.079	-085	19.351	-130	57.000	-175	81.056	-220	115.893		
-041	8.144	-086	19.400	-131	57.465	-176	81.704	-221	116.820		
-042	8.208	-087	23.700	-132	57.600	-177	82.358	-222	117.755		
-043	8.250	-088	23.890	-133	57.916	-178	83.016	-223	118.691		
-044	14.000	-089	24.081	-134	58.379	-179	83.680	-224	119.640		
-045	14.112	-090	24.274	-135	58.846	-180	84.349	-225	120.597		

THE PART NUMBER IS THE DRAWING NUMBER
PLUS THE APPLICABLE DASH NUMBER.

MASTER

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + −
3 PLACE DECIMALS + −
ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN D. Dahl DATE 10 MAR '66
CHECKED W. Diehl, 1 APR. '66
APPROVAL Ben Katz 14 Apr 66
CONTRACT NAS9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, FILM—
1/8 WATT, ±0.1%

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008878
SCALE —
SHEET 2 of 2

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 27610	3-29-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 3.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE APPLICABLE QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 7.
   - E. CONTACTS PROCURED SEPARATELY PER SCD 1008883 (SEE NOTE 3).
2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL:
     - (1) INSULATOR: POLYTETRAFLUOROETHYLENE PLASTIC MEETING PERFORMANCE REQUIREMENTS OF MIL-I-22129.
     - (2) CONTACT CLIP: COPPER ALLOY PER QQ-C-533, 1/4 HT.
3. DESIGN:
   - A. OPERATING TEMPERATURE: +175°C, MAX
   - B. CONTACT RETENTION: 15 LBS, MINIMUM, BOTH DIRECTIONS AFTER 10 INSERTIONS AND WITHDRAWALS; MAXIMUM AXIAL DISPLACEMENT OF CONTACT IN CLIP: .020.

NASA DASH NUMBER	FIG. NO.
-001	1

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

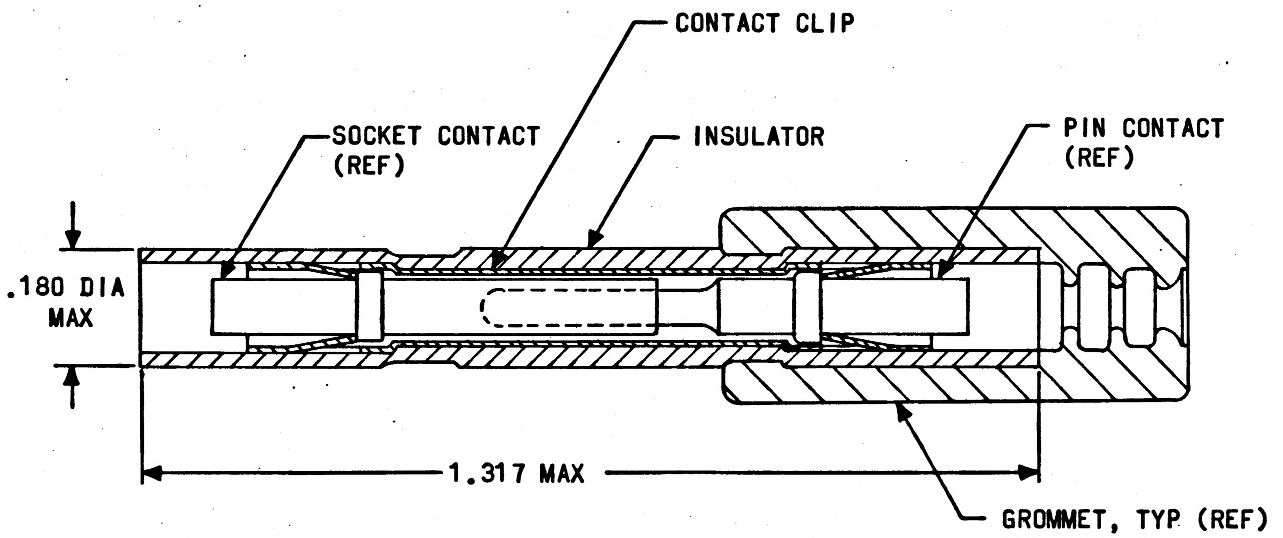


FIGURE I

NOTES:

1. SPECIAL TOOLING REQUIRED FOR CRIMPING, INSERTION AND REMOVAL OF CONTACTS.
2. INTENDED FOR USE IN THERMOCOUPLE APPLICATIONS.
3. WHEN RESISTANCE TO ENVIRONMENTS IS REQUIRED, BOTH ENDS OF ASSEMBLY TO BE COVERED WITH GROMMETS PER SCD 1008882.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± ___ 3 PLACE DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL: SEE REQUIREMENTS
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN D. Dellert DATE 9 MAR 66
CHECKED W. Diehl 10 Mar '66
APPROVAL E. S. Hickey 3/29/66
CONTRACT NAS9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL 29 Mar 66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

INSULATOR ASSEMBLY, CONNECTOR

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008885
SCALE NONE
SHEET 1 of 1

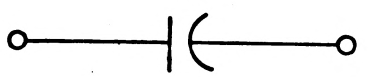
w.t.

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	12-10-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING: PER ND 1002215, CLASS 1, CODE 2.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-11015 EXCEPT AS SPECIFIED HEREIN.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: LEADS PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: PER ND 1002019, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE NASA PART NUMBER AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE, CAPACITANCE TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER. MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL REAUIREMENTS:
     - (1) CAPACITANCE: PER TABLE I AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 $\mu\mu$f OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 $\mu\mu$f.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 $\mu\mu$f OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 $\mu\mu$f.
     - (3) DISSIPATION FACTOR: 0.015 MAX MEASURED AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUE OF 100 $\mu\mu$f OR LESS AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 $\mu\mu$f.
     - (4) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C; 500 MEGOHMS MIN AT +125°C.
3. DESIGN:
   - A. PER MIL-C-11015/18 AND MIL-C-11015/19 IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.
   - B. DC WORKING VOLTAGE: PER TABLE I
   - C. OPERATING TEMPERATURE RANGE: -55°C TO +125°C.
   - D. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR ONE MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL

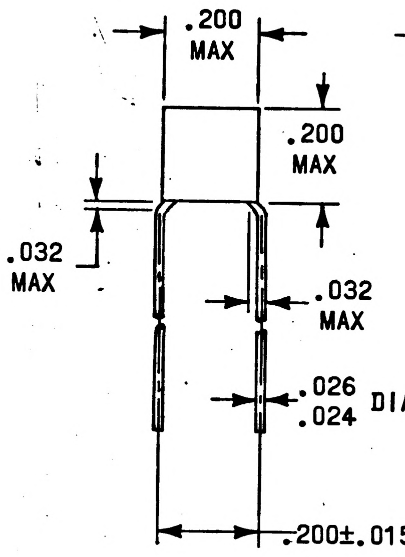


FIGURE 1

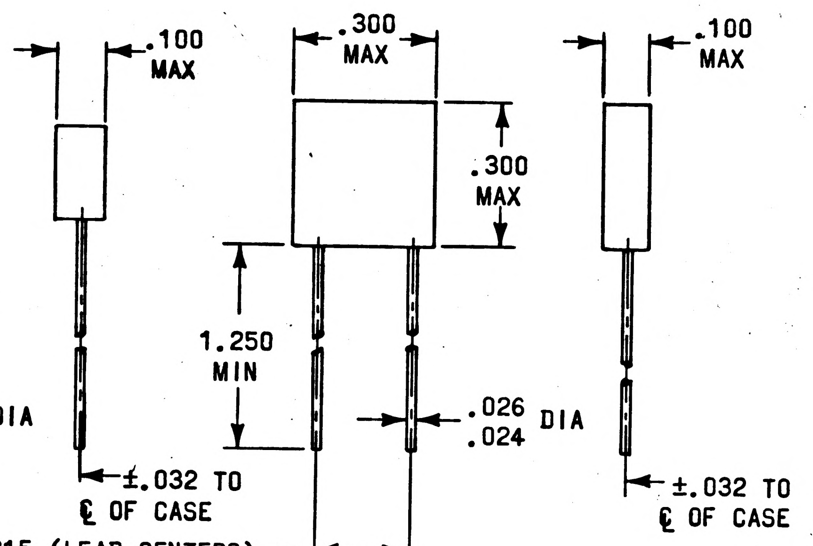


FIGURE 2

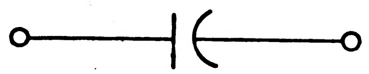
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ±.005 ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN D. Dolbet DATE 3 MAY 66 CHECKED M. Manning 4 MAY 66 APPROVAL 10 May '66 CONTRACT NAS9-497	CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. G. METZGER	SIZE C CODE IDENT NO. 80230 1008900
APPROVAL	MIT APPROVAL 5-10-66	SCALE NONE SHEET 1 of 2

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	12-10-66	JPW K

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING: PER ND 1002215, CLASS 1, CODE 2.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-11015 EXCEPT AS SPECIFIED HEREIN.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: LEADS PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: PER ND 1002019, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE NASA PART NUMBER AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE, CAPACITANCE TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER. MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL REAUIREMENTS:
     - (1) CAPACITANCE: PER TABLE I AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 µµf OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 µµf.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 µµf OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 µµf.
     - (3) DISSIPATION FACTOR: 0.015 MAX MEASURED AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUE OF 100 µµf OR LESS AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 µµf.
     - (4) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C; 500 MEGOHMS MIN AT +125°C.
3. DESIGN:
   - A. PER MIL-C-11015/18 AND MIL-C-11015/19 IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.
   - B. DC WORKING VOLTAGE: PER TABLE I
   - C. OPERATING TEMPERATURE RANGE: -55°C TO +125°C.
   - D. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR ONE MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL

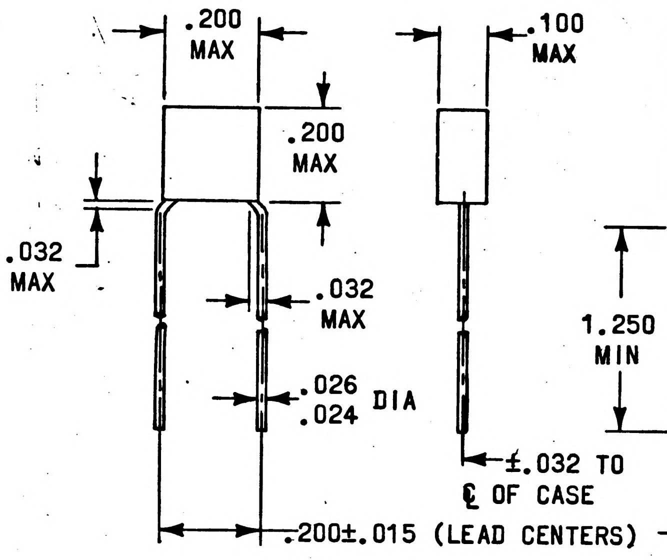


FIGURE 1

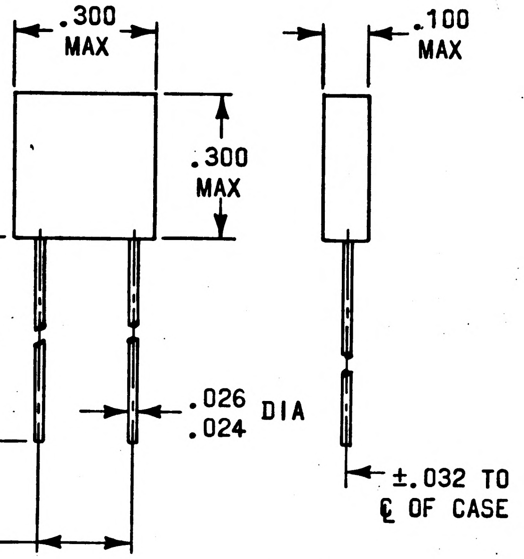


FIGURE 2

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ±.005 ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DRAWN D. Dobbt 3 MAY 66 CHECKED M. Manning DATE 4 MAY 66 APPROVAL 10 May '66	MANNED SPACECRAFT CENTER HOUSTON, TEXAS CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING	CONTRACT NAS9-497	
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. G. METZGER	SIZE C CODE IDENT NO. 80230 1008900
APPROVAL	MIT APPROVAL 5-10-66	SCALE NONE SHEET 1 of 2

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	10DEC66	JPW K

REQUIREMENTS: (CONTINUED)

E. ENVIRONMENTAL:

(1) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

(2) CAPACITANCE CHANGE SHALL BE ±0.5% THROUGHOUT THE OPERATING TEMPERATURE RANGE.

(3) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045 SHALL BE ±1%.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 48 ± 2 HOURS AT TWICE RATED DC VOLTAGE AT A TEMPERATURE OF +125°C.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

(1) CAPACITANCE
(2) DISSIPATION FACTOR
(3) INSULATION RESISTANCE

C. DATA: BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READINGS, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS THAT FAIL TO MEET INITIAL DRAWING REQUIREMENTS OR THAT EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

(1) LIMITS:

(a) CAPACITANCE CHANGE: ±0.5%
(b) DISSIPATION FACTOR: 0.015 MAX AT +25°C AND 1000± 100 CPS
(c) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C
500 MEGOHMS MIN AT +125°C

TABLE I

DASH NO.	CAPACITANCE (UUF)	DIMENSIONS PER FIGURE	DC WORKING VOLTAGE
-001	47	1	100
-002	56	1	
-003	68	1	
-004	82	1	
-005	100	1	
-006	120	1	
-007	150	1	
-008	180	1	100
-009	220	1	50
-010	270	1	
-011	330	1	
-012	390	1	
-013	460	1	
-014	470	1	
-015	560	1	50
-016	680	2	100
-017	820	2	
-018	1000	2	
-019	1200	2	100
-020	1500	2	50
-021	1800	2	
-022	2200	2	
-023	2700	2	50

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN D. Dabbert 3MAY66 DATE CHECKED M. Manning 4MAY66 APPROVAL 10May66 CONTRACT NAS9-497	CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL A. C. METZGER	SIZE C CODE IDENT NO. 80230 1008900
APPROVAL	MIT APPROVAL 5-10-66	SCALE SHEET 2 of 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	10DEC66	JPW K

REQUIREMENTS: (CONTINUED)

E. ENVIRONMENTAL:

(1) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

(2) CAPACITANCE CHANGE SHALL BE ±0.5% THROUGHOUT THE OPERATING TEMPERATURE RANGE.

(3) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045 SHALL BE ±1%.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 48 ± 2 HOURS AT TWICE RATED DC VOLTAGE AT A TEMPERATURE OF +125°C.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

(1) CAPACITANCE
(2) DISSIPATION FACTOR
(3) INSULATION RESISTANCE

C. DATA: BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READINGS, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS THAT FAIL TO MEET INITIAL DRAWING REQUIREMENTS OR THAT EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

(1) LIMITS:

(a) CAPACITANCE CHANGE: ±0.5%
(b) DISSIPATION FACTOR: 0.015 MAX AT +25°C AND 1000± 100 CPS
(c) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C
500 MEGOHMS MIN AT +125°C

TABLE I

DASH NO.	CAPACITANCE (UUF)	DIMENSIONS PER FIGURE	DC WORKING VOLTAGE
-001	47	1	100
-002	56	1	
-003	68	1	
-004	82	1	
-005	100	1	
-006	120	1	
-007	150	1	
-008	180	1	100
-009	220	1	50
-010	270	1	
-011	330	1	
-012	390	1	
-013	460	1	
-014	470	1	
-015	560	1	50
-016	680	2	100
-017	820	2	
-018	1000	2	
-019	1200	2	100
-020	1500	2	50
-021	1800	2	
-022	2200	2	
-023	2700	2	50

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN D. Dabbst DATE 3MAY66
CHECKED M. Manning 4MAY66
APPROVAL 10May66
CONTRACT NAS9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL 5-10-66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
CERAMIC DIELECTRIC (NPO)

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008900
SCALE
SHEET 2 of 2

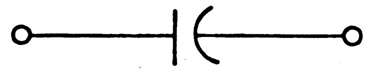
REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	12-10-66	
	B	REVISION STATUS CHANGED	10 AUG 67	A.N.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING: PER ND 1002215, CLASS 1, CODE 2.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-11015 EXCEPT AS SPECIFIED HEREIN.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: LEADS PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: PER ND 1002019, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE NASA PART NUMBER AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE, CAPACITANCE TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER. MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL REAUIREMENTS:
     - (1) CAPACITANCE: PER TABLE I AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 μμf OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 μμf.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 μμf OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 μμf.
     - (3) DISSIPATION FACTOR: 0.015 MAX MEASURED AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUE OF 100 μμf OR LESS AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 μμf.
     - (4) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C; 500 MEGOHMS MIN AT +125°C.
3. DESIGN:
   - A. PER MIL-C-11015/18 AND MIL-C-11015/19 IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.
   - B. DC WORKING VOLTAGE: PER TABLE I
   - C. OPERATING TEMPERATURE RANGE: -55°C TO +125°C.
   - D. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR ONE MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



GRAPHICAL SYMBOL

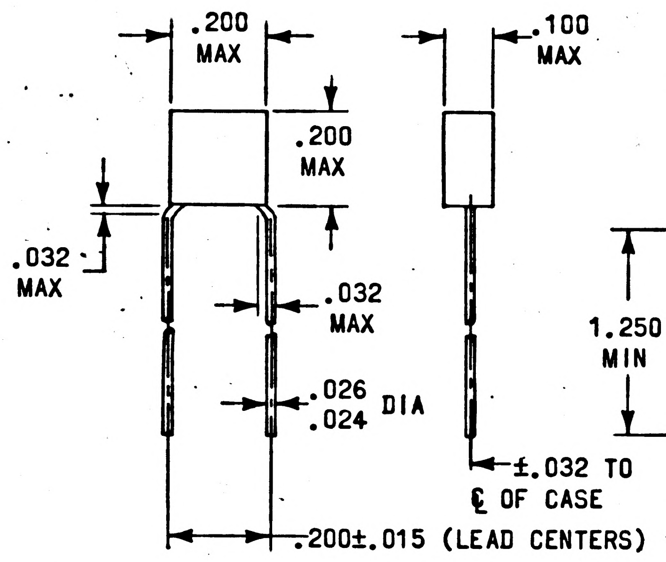


FIGURE 1

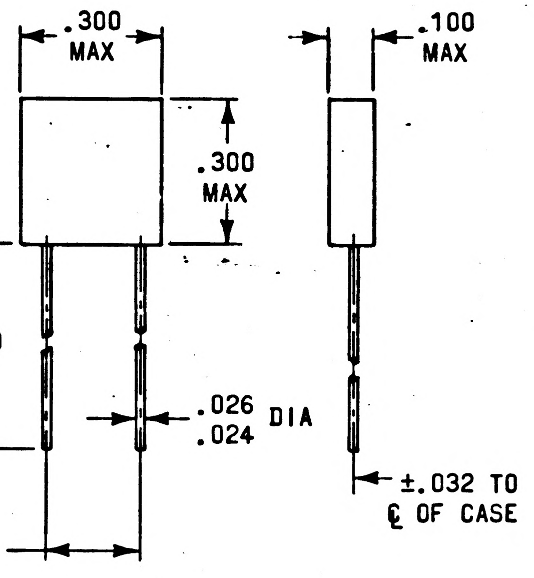


FIGURE 2

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ±.005 ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN D. Dolbel DATE 3 MAY 66 CHECKED M. Manning 4 MAY 66 APPROVAL CONTRACT NAS9-497	CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL C. MILLGAR	SIZE C CODE IDENT NO. 80230 1008900
APPROVAL	MIT APPROVAL 5-10-66	SCALE NONE SHEET 1 of 2

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	10 DEC 66	JPW K
	B	REVISED PER TDRR 34002	10 AUG 67	A.N.

REQUIREMENTS: (CONTINUED)

E. ENVIRONMENTAL:

(1) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

(2) CAPACITANCE CHANGE SHALL BE ±0.5% THROUGHOUT THE OPERATING TEMPERATURE RANGE.

(3) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045 SHALL BE ±1%.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 48 ± 2 HOURS AT TWICE RATED DC VOLTAGE AT A TEMPERATURE OF +125°C.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

(1) CAPACITANCE
(2) DISSIPATION FACTOR
(3) INSULATION RESISTANCE

C. DATA: BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READINGS, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS THAT FAIL TO MEET INITIAL DRAWING REQUIREMENTS OR THAT EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

(1) LIMITS:

(a) CAPACITANCE CHANGE: ±0.5%
(b) DISSIPATION FACTOR: 0.015 MAX AT +25°C AND 1000± 100 CPS
(c) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C
500 MEGOHMS MIN AT +125°C

TABLE I

DASH NO.	CAPACITANCE (UUF)	DIMENSIONS PER FIGURE	DC WORKING VOLTAGE
-001	47	1	100
-002	56	1	
-003	68	1	
-004	82	1	
-005	100	1	
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-008	180	1	100
-009	220	1	50
-010	270	1	
-011	330	1	
-012	390	1	
-013	460	1	
-014	470	1	
-015	560	1	50
-016	680	2	100
-017	820	2	
-018	1000	2	
-019	1200	2	100
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-021	1800	2	
-022	2200	2	
-023	2700	2	50
-024	130000	3	50

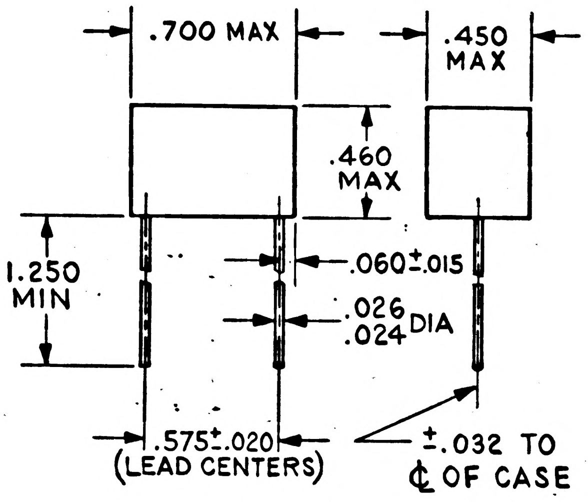


FIGURE 3

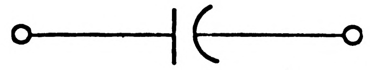
THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN D. Dobbat DATE 3 MAY 66 CHECKED M. Manning 4 MAY 66 APPROVAL CONTRACT NAS9-497	CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C · CODE IDENT NO. 80230 · 1008900
APPROVAL	MIT APPROVAL 5-10-66	SCALE · SHEET 2 of 2

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	12-10-66	
	B	REVISION STATUS CHANGED	10 AUG 67	A.N.
	C	REVISED PER TDRR 34267	21-AUG 67	M. G.

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING: PER ND 1002215, CLASS 1, CODE 2.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-11015 EXCEPT AS SPECIFIED HEREIN.
2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: LEADS PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: PER ND 1002019, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE NASA PART NUMBER AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE, CAPACITANCE TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER. MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL REAUIREMENTS:
     - (1) CAPACITANCE: PER TABLE I AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 μμf OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 μμf.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUES OF 100 μμf OR LESS AND AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 μμf.
     - (3) DISSIPATION FACTOR: 0.1% MAX MEASURED AT +25°C AND 1 MC/SEC ±100 KC/SEC FOR CAPACITANCE VALUE OF 100 μμf OR LESS AT 1 KC/SEC ±100 HZ FOR CAPACITANCE VALUES GREATER THAN 100 μμf.
     - (4) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C; 500 MEGOHMS MIN AT +125°C FOR DASH NUMBERS 001 THRU 023. 500 MEGOHMS MIN AT +25°C; 100 MEGOHMS MIN AT +85°C FOR DASH NUMBER -024.
3. DESIGN:
   - A. PER MIL-C-11015/18 AND MIL-C-11015/19 IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.
   - B. DC WORKING VOLTAGE: PER TABLE I
   - C. OPERATING TEMPERATURE RANGE: -55°C TO +125°C FOR DASH NUMBERS 001 THRU 023 AND -55°C TO +85°C FOR DASH NUMBER 024.
   - D. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR ONE MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.



GRAPHICAL SYMBOL

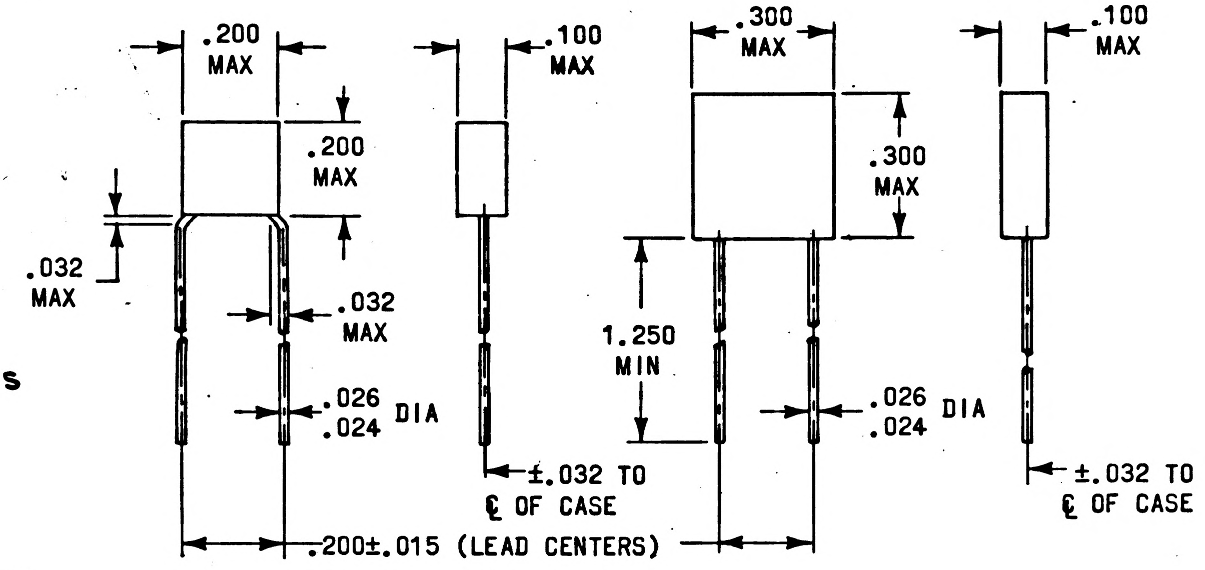


FIGURE 1

FIGURE 2

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ±.005 ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN D. Dolbet DATE 3 MAY 66 CHECKED M. Manning 4 MAY 66 APPROVAL CONTRACT NAS9-497	CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. C. METZGER	SIZE C CODE IDENT NO. 80230 1008900
APPROVAL	MIT APPROVAL 5-10-66	SCALE NONE SHEET 1 of 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	
	A	REVISED PER TDRR 32234	10 DEC 66	JPW K
	B	REVISED PER TDRR 34002	10 AUG 67	A.N.
	C	REVISED PER TDRR 34267	21-AUG 67	M.G.

REQUIREMENTS: (CONTINUED)

E. ENVIRONMENTAL:

(1) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

(2) CAPACITANCE CHANGE SHALL NOT EXCEED ±30 PPM/°C THROUGHOUT THE OPERATING TEMPERATURE RANGE.

(3) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045 SHALL BE ±1%.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED-IN FOR 48 ± 2 HOURS AT TWICE RATED DC VOLTAGE AT A TEMPERATURE OF +125°C EXCEPT DASH NUMBER 024 WHICH SHALL BE BURNED IN AT +85°C.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

(1) CAPACITANCE

(2) DISSIPATION FACTOR

(3) INSULATION RESISTANCE

C. DATA: BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READINGS, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS THAT FAIL TO MEET INITIAL DRAWING REQUIREMENTS OR THAT EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

(1) LIMITS:

(a) CAPACITANCE CHANGE: ±0.5%

(b) DISSIPATION FACTOR: 0.1% MAX AT +25°C AND 1000 ± 100 CPS

(c) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C
500 MEGOHMS MIN AT +125°C
FOR DASH NUMBERS 001 THRU 023.
500 MEGOHMS MIN AT +25°C;
100 MEGOHMS MIN AT +85°C
FOR DASH NUMBER 024.

TABLE I

DASH NO.	CAPACITANCE (UUF)	DIMENSIONS PER FIGURE	DC WORKING VOLTAGE
-001	47	1	100
-002	56	1	
-003	68	1	
-004	82	1	
-005	100	1	
-006	120	1	
-007	150	1	
-008	180	1	100
-009	220	1	50
-010	270	1	
-011	330	1	
-012	390	1	
-013	460	1	
-014	470	1	
-015	560	1	50
-016	680	2	100
-017	820	2	
-018	1000	2	
-019	1200	2	100
-020	1500	2	50
-021	1800	2	
-022	2200	2	
-023	2700	2	50
-024	130000	3	50

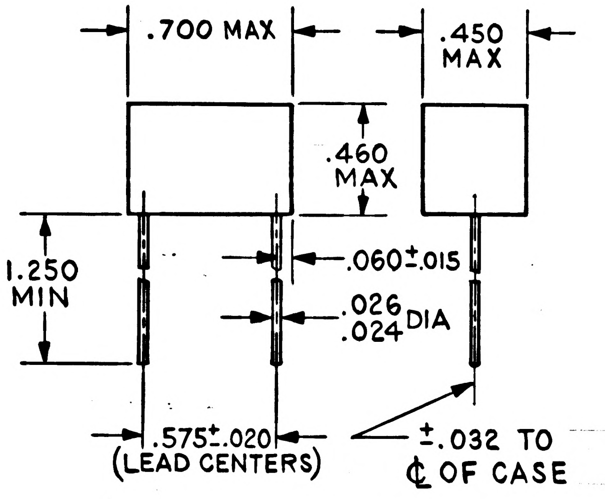


FIGURE 3

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN D. Dabbet DATE 3 MAY 66 CHECKED M. Manning 4 MAY 66 APPROVAL 10 May 66 CONTRACT NAS9-497	CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL A. C. METZGER	SIZE C · CODE IDENT NO. 80230 · 1008900
APPROVAL	MIT APPROVAL M6 Wurley 5-10-66	SCALE · SHEET 2 of 2

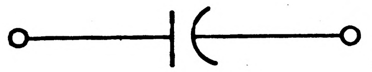
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002045 UNLESS MODIFIED OR AMENDED BY DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING: PER ND 1002215, CLASS 1, CODE 2.
   - E. UNITS SHALL MEET ALL REQUIREMENTS OF MIL-C-11015 EXCEPT AS SPECIFIED HEREIN.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: LEADS PER ND 1015401. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: PER ND 1002019, EACH CAPACITOR SHALL BE PERMANENTLY AND LEGIBLY MARKED WITH THE NASA PART NUMBER AND SERIAL NUMBER TO INDICATE COMPLETION OF BURN-IN. CAPACITANCE, CAPACITANCE TOLERANCE AND VOLTAGE RATING MAY ALSO BE MARKED ON PART. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING AND DASH NUMBER. MANUFACTURER'S PART OR TYPE NUMBER MAY APPEAR ON THE PART AND PACKAGE.
   - B. ELECTRICAL REQUIREMENTS:
     - (1) CAPACITANCE: PER TABLE I AT +25°C AND 2 ± 0.2 V RMS, 1000 ± 100 CPS.
     - (2) CAPACITANCE TOLERANCE: ±1% AT +25°C AND 2 ± 0.2 V RMS, 1000 ± 100 CPS.
     - (3) DISSIPATION FACTOR: 0.015 MAX AT +25°C AND 1000 ± 100 CPS
     - (4) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C; 500 MEGOHMS MIN AT +125°C.

3. DESIGN:
   - A. PER MIL-C-11015/18 AND MIL-C-11015/19 IN ADDITION TO THE REQUIREMENTS SPECIFIED HEREIN.
   - B. DC WORKING VOLTAGE: PER TABLE I
   - C. OPERATING TEMPERATURE RANGE: -55°C TO +125°C.
   - D. LEAD STRENGTH: LEADS SHALL WITHSTAND A 4 POUND AXIAL PULL FOR ONE MINUTE. THEY SHALL ALSO WITHSTAND THE FOLLOWING TEST TWICE-WITH A 2 POUND LOAD SUSPENDED FROM THE LEAD IN A VERTICAL AXIAL POSITION, BEND THE CAPACITOR BODY IN A PLANE 90°, THEN BACK 180° TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.



GRAPHICAL SYMBOL

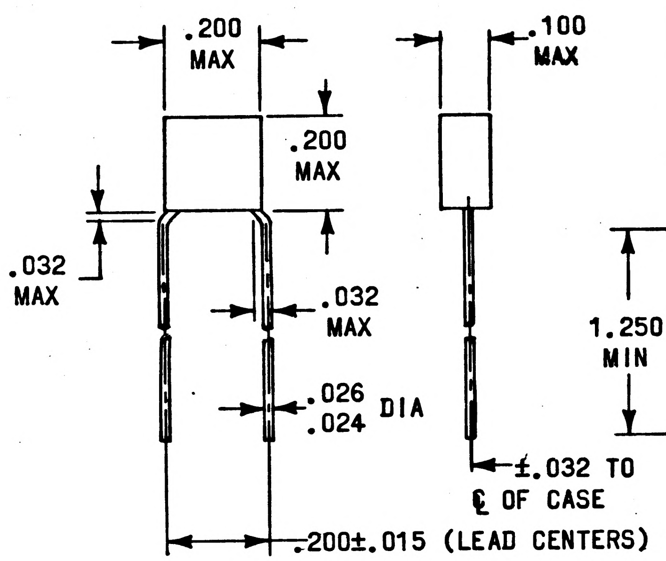


FIGURE 1

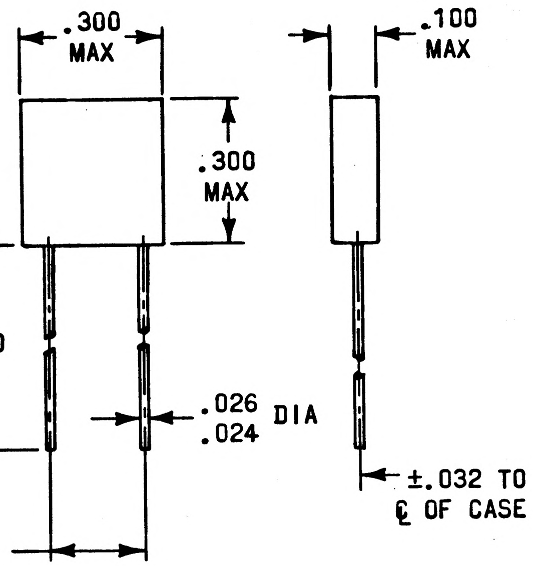


FIGURE 2

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ±.005 ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	DRAWN D. Dolbel 3 MAY 66 DATE M. Manning 4 MAY 66 CHECKED APPROVAL 10 May '66	CAPACITOR, FIXED, CERAMIC DIELECTRIC (NPO) SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING	CONTRACT NAS9-497	
MATERIAL SEE REQUIREMENTS	NASA APPROVAL A. G. METZGER	SIZE C CODE IDENT NO. 80230 1008900
APPROVAL	MIT APPROVAL 5-10-66	SCALE NONE SHEET 1 of 2

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	-	INITIAL RELEASE CLASS A PER TDRR 28652	5-10-66	

REQUIREMENTS: (CONTINUED)

E. ENVIRONMENTAL:

(1) REDUCED PRESSURE: UNITS SHALL BE OPERATIVE DURING AND AFTER AND SHALL SUSTAIN NO DAMAGE AS A RESULT OF EXPOSURE TO 10^{-4} MM OF MERCURY FOR 96 HOURS.

(2) CAPACITANCE CHANGE SHALL BE ±0.5% THROUGHOUT THE OPERATING TEMPERATURE RANGE.

(3) LIFE: MAXIMUM CAPACITANCE CHANGE DURING LIFE TEST PER ND 1002045 SHALL BE ±1%.

4. SPECIAL CONDITIONING BY SUPPLIER:

A. BURN-IN: ALL CAPACITORS SHALL BE BURNED IN FOR 48 ± 2 HOURS AT TWICE RATED DC VOLTAGE AT A TEMPERATURE OF +125°C.

B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

(1) CAPACITANCE
(2) DISSIPATION FACTOR
(3) INSULATION RESISTANCE

C. DATA: BURN-IN DATA SHALL BE INCLUDED WITH EACH SHIPMENT. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION BY SERIAL NUMBER OF EACH INDIVIDUAL CAPACITOR WITH THE INITIAL TEST READINGS, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READINGS. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. UNITS THAT FAIL TO MEET INITIAL DRAWING REQUIREMENTS OR THAT EXCEED THE SPECIFIED LIMITS FOLLOWING BURN-IN SHALL NOT BE ACCEPTABLE.

(1) LIMITS:

(a) CAPACITANCE CHANGE: ±0.5%
(b) DISSIPATION FACTOR: 0.015 MAX AT +25°C AND 1000± 100 CPS
(c) INSULATION RESISTANCE: 100,000 MEGOHMS MIN AT +25°C
500 MEGOHMS MIN AT +125°C

TABLE I

DASH NO.	CAPACITANCE (UUF)	DIMENSIONS PER FIGURE	DC WORKING VOLTAGE
-001	47	1	100
-002	56	1	
-003	68	1	
-004	82	1	
-005	100	1	
-006	120	1	
-007	150	1	
-008	180	1	100
-009	220	1	50
-010	270	1	
-011	330	1	
-012	390	1	
-013	460	1	
-014	470	1	
-015	560	1	50
-016	680	2	100
-017	820	2	
-018	1000	2	
-019	1200	2	100
-020	1500	2	50
-021	1800	2	
-022	2200	2	
-023	2700	2	50

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + −
3 PLACE DECIMALS + −
ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN D. Dabbst DATE 3 MAY 66
CHECKED M. Manning 4 MAY 66
APPROVAL 10 May 66
CONTRACT NAS9-497
NASA APPROVAL A. C. METZGER
MIT APPROVAL 5-10-66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

CAPACITOR, FIXED,
CERAMIC DIELECTRIC (NPO)

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008900
SCALE
SHEET 2 of 2

MIL-1068C D

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	—	INITIAL RELEASE CLASS A PER TDRR 28881	5-17-66	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 8.
2. ACCEPTANCE AND INSPECTION REQUIREMENTS:
   - A. MATERIAL: THE MATERIAL SHALL BE HOLLOW, THIN WALLED, EPOXY RESIN SPHERES.
   - B. BULK DENSITY: THE BULK DENSITY OF THE MATERIAL SHALL BE 0.125 GRAMS/CC MAXIMUM WHEN TESTED IN ACCORDANCE WITH ASTM D1895 OR EQUIVALENT METHOD.
   - C. COLOR: THE COLOR OF THE MATERIAL SHALL BE LIGHT TO DARK TAN.
3. DESIGN:
   - A. MESH SIZE: THE MATERIAL SHALL PASS THRU A NO. 6 SIEVE BUT BE RETAINED ON A NO. 10 SIEVE WHEN TESTED IN ACCORDANCE WITH ASTM D 1921 OR EQUIVALENT.
   - B. COMPRESSIVE STRENGTH: THE MINIMUM COMPRESSIVE STRENGTH OF THE MATERIAL SHALL BE 500 PSI WHEN TESTED IN ACCORDANCE WITH ASTM D 1621 OR EQUIVALENT.
   - C. INTENDED USE: THIS MATERIAL IS INTENDED FOR USE AS A LOW DENSITY, BULK FILLER FOR CASTING AND ENCAPSULATING RESINS.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN S. Patterson DATE 11 MAY 66 CHECKED A. Hensley 11 MAY 66 APPROVAL R. W. 5/16/66 CONTRACT	FILLER, EPOXY MICROSPHERES SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL METZGER	SIZE C CODE IDENT NO. 80230 1008901
APPROVAL	MIT APPROVAL 5-17-66	SCALE SHEET 1 OF 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISED PER DO 48505	8 AUG 66	
	B	INITIAL RELEASE CLASS A PER TDRR 30860	30Aug. '66	8-30

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKING, PACKAGING, AND CONTAINER MARKING INCLUDING EXPIRATION DATE PER ND 1002215, CLASS 1, CODE 8.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL SHALL BE A TWO COMPONENT ADHESIVE FURNISHED IN KIT FORM CONSISTING OF A THIXOTROPIC FILLED EPOXY RESIN PART A (1008903-1), AND A CURING AGENT, PART B (1008903-2), FORMULATED FROM A BLEND OF AMINES AND POLYAMIDES.
   - B. PROPERTIES:
     - (1) VISCOSITY: THE VISCOSITY AT 25°C OF PART A SHALL BE 3,000 TO 15,000 POISES WHEN TESTED WITH A BROOKFIELD MODEL HBT VISCOSIMETER USING A NUMBER 7 SPINDLE AT 20 RPM. THE VISCOSITY OF PART B SHALL BE 10 TO 30 POISES UNDER THE SAME CONDITIONS EXCEPT A NUMBER 1 SPINDLE SHALL BE USED.
     - (2) COLOR: THE COLOR OF PART A SHALL BE GRAY; THE COLOR OF PART B SHALL BE GREEN-BLUE.
     - (3) LAP SHEAR STRENGTH: THE AVERAGE LAP SHEAR STRENGTH AT 75° ± 5°F. SHALL NOT BE LESS THAN 2500 PSI FOR AT LEAST 5 SPECIMENS PREPARED AND TESTED IN ACCORDANCE WITH THE PROCEDURE DESIGNATED AS NORMAL TEMPERATURE TENSILE SHEAR TEST (ACCEPTANCE) IN MMM-A-132. THE ADHESIVE SHALL BE PREPARED BY MIXING 100 PARTS BY WEIGHT OF PART A TO 27 ± 1 PARTS BY WEIGHT OF PART B. WITHIN 40 MINUTES AFTER MIXING, THE ADHESIVE SHALL BE APPLIED TO THE LAP AREA OF 2024-T3 ALUMINUM TEST PANELS PREVIOUSLY CLEANED BY DICHROMATE ETCHING. THE SPECIMENS SHALL BE CURED FOR ONE HOUR AT 200° ± 5°F. USING A BONDING PRESSURE OF 30 ± 5 PSI.

3. DESIGN:
   - A. SHELF LIFE: ONE YEAR AT 40°F. MAXIMUM AND NOT LESS THAN 9 MONTHS WHEN RECEIVED BY THE PURCHASER AND STORED IN UNOPENED CONTAINERS AT 40°F. MAXIMUM.
   - B. PROPERTIES:
     - (1) POT LIFE: THE MIXED MATERIAL SHALL BE USABLE FOR 40 MINUTES MINIMUM WHEN TESTED BY PLACING ONE POUND OF THE ADHESIVE IN A QUART PAINT CAN PARTIALLY IMMERSED IN A WATER BATH AT 75° ± 2°F.
     - (2) LAP SHEAR STRENGTH: THE LAP SHEAR STRENGTH OF TEST SPECIMENS SHALL BE AS SPECIFIED IN TABLE I WHEN PREPARED AS SPECIFIED IN 2.B.3.

TABLE I
LAP SHEAR STRENGTH

CURE TEMPERATURE & TIME	TEST TEMPERATURE	MINIMUM LAP SHEAR STRENGTH - AVERAGE OF 5 (PSI)
75° ± 5°F., 7 DAYS	+180° ± 5°F.	1800
200° ± 5°F., 1 HOUR	+180° ± 5°F.	2000
200° ± 5°F., 1 HOUR	-67° ± 5°F.	1500

PROCURE ONLY FROM APPROVED SOURCE LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Bender DATE 3-AUG-66
CHECKED J. GRIEB 3-AUG-66
APPROVAL
CONTRACT NAS9-497
NASA APPROVAL
AC APPROVAL 8/30/66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ADHESIVE - EPOXY

SPECIFICATION CONTROL DRAWING

SIZE	CODE IDENT NO.	
C	80230	1008903

SCALE
SHEET 1 of 1

MIL-1002C D

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISED PER DO 48505	8 AUG 66	Glom
	B	INITIAL RELEASE CLASS A, PER TDRR 30860	30Aug. '66	8-30
	C	REVISED PER TDRR 32370	10JAN 67	EC N.W.

Ⓜ

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKING, PACKAGING, AND CONTAINER MARKING INCLUDING EXPIRATION DATE PER ND 1002215, CLASS 1, CODE 8.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL SHALL BE A TWO COMPONENT ADHESIVE FURNISHED IN KIT FORM CONSISTING OF A THIXOTROPIC FILLED EPOXY RESIN PART A (1008903-1), AND A CURING AGENT, PART B (1008903-2), FORMULATED FROM A BLEND OF AMINES AND POLYAMIDES.
   - B. PROPERTIES:
     - (1) VISCOSITY: THE VISCOSITY AT 25°C OF PART A SHALL BE 3,000 TO 15,000 POISES WHEN TESTED WITH A BROOKFIELD MODEL HBT VISCOSIMETER USING A NUMBER 7 SPINDLE AT 20 RPM. THE VISCOSITY OF PART B SHALL BE 10 TO 30 POISES UNDER THE SAME CONDITIONS EXCEPT A NUMBER 1 SPINDLE SHALL BE USED.
     - (2) COLOR: THE COLOR OF PART A SHALL BE GRAY; THE COLOR OF PART B SHALL BE GREEN-BLUE.
     - (3) LAP SHEAR STRENGTH: THE AVERAGE LAP SHEAR STRENGTH AT 75° ± 5°F. SHALL NOT BE LESS THAN 2500 PSI FOR AT LEAST 5 SPECIMENS PREPARED AND TESTED IN ACCORDANCE WITH THE PROCEDURE DESIGNATED AS NORMAL TEMPERATURE TENSILE SHEAR TEST (ACCEPTANCE) IN MMM-A-132. THE ADHESIVE SHALL BE PREPARED BY MIXING 100 PARTS BY WEIGHT OF PART A TO 27 ± 1 PARTS BY WEIGHT OF PART B. WITHIN 40 MINUTES AFTER MIXING, THE ADHESIVE SHALL BE APPLIED TO THE LAP AREA OF 2024-T3 ALUMINUM TEST PANELS PREVIOUSLY CLEANED BY DICHROMATE ETCHING. THE SPECIMENS SHALL BE CURED FOR ONE HOUR AT 200° ± 5°F. USING A BONDING PRESSURE OF 30 ± 5 PSI.

3. DESIGN:
   - A. SHELF LIFE: ONE YEAR FROM DATE OF MANUFACTURE WHEN STORED IN UNOPENED CONTAINERS AT 40°F. MAXIMUM, OR 6 MONTHS FROM DATE OF MANUFACTURE WHEN STORED IN UNOPENED CONTAINERS AT ROOM AMBIENT. NOT LESS THAN 9 MONTHS WHEN RECEIVED BY PURCHASER AND STORED AT 40°F. MAXIMUM, OR 18 WEEKS WHEN RECEIVED BY PURCHASER AND STORED AT ROOM AMBIENT.
   - B. PROPERTIES:
     - (1) POT LIFE: THE MIXED MATERIAL SHALL BE USABLE FOR 40 MINUTES MINIMUM WHEN TESTED BY PLACING ONE POUND OF THE ADHESIVE IN A QUART PAINT CAN PARTIALLY IMMERSED IN A WATER BATH AT 75° ± 2°F.
     - (2) LAP SHEAR STRENGTH: THE LAP SHEAR STRENGTH OF TEST SPECIMENS SHALL BE AS SPECIFIED IN TABLE I WHEN PREPARED AS SPECIFIED IN 2.B.3.

TABLE I
LAP SHEAR STRENGTH

CURE TEMPERATURE & TIME	TEST TEMPERATURE	MINIMUM LAP SHEAR STRENGTH - AVERAGE OF 5 (PSI)
75° ± 5°F., 7 DAYS	+180° ± 5°F.	1800
200° ± 5°F., 1 HOUR	+180° ± 5°F.	2000
200° ± 5°F., 1 HOUR	-67° ± 5°F.	1500

PROCURE ONLY FROM APPROVED SOURCE LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + −
3 PLACE DECIMALS + −
ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN Bender DATE 3-AUG-66
CHECKED J. GRIEB 3-AUG-66
APPROVAL
CONTRACT NAS9-4971
NASA APPROVAL 8/30/66
AC APPROVAL 8/30/66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ADHESIVE - EPOXY

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008903
SCALE
SHEET 1 of 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISED PER DO 48505	8 AUG 66	
(M)	B	INITIAL RELEASE CLASS A PER TDRR 30860	30Aug. '66	8-30
(M	C	REVISED PER TDRR 32370	10JAN 67	EC N.W.
	D	REVISED PER TDRR 36736	17SEP 67	FRW

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PRESERVATION, PACKING, PACKAGING, AND CONTAINER MARKING INCLUDING EXPIRATION DATE PER ND 1002215, CLASS 1, CODE 8.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL SHALL BE A TWO COMPONENT ADHESIVE FURNISHED IN KIT FORM CONSISTING OF A THIXOTROPIC FILLED EPOXY RESIN PART A (1008903-1), AND A CURING AGENT, PART B (1008903-2), FORMULATED FROM A BLEND OF AMINES AND POLYAMIDES.
   - B. PROPERTIES:
     - (1) VISCOSITY: THE VISCOSITY AT 25°C OF PART A SHALL BE 3,000 TO 15,000 POISES WHEN TESTED WITH A BROOKFIELD MODEL HBT VISCOSIMETER USING A NUMBER 7 SPINDLE AT 20 RPM. THE VISCOSITY OF PART B SHALL BE 10 TO 30 POISES UNDER THE SAME CONDITIONS EXCEPT A NUMBER 1 SPINDLE SHALL BE USED.
     - (2) COLOR: THE COLOR OF PART A SHALL BE GRAY; THE COLOR OF PART B SHALL BE GREEN-BLUE.
     - (3) LAP SHEAR STRENGTH: THE AVERAGE LAP SHEAR STRENGTH AT 75° ± 5°F. SHALL NOT BE LESS THAN 2500 PSI FOR AT LEAST 5 SPECIMENS PREPARED AND TESTED IN ACCORDANCE WITH THE PROCEDURE DESIGNATED AS NORMAL TEMPERATURE TENSILE SHEAR TEST (ACCEPTANCE) IN MMM-A-132. THE ADHESIVE SHALL BE PREPARED BY MIXING 100 PARTS BY WEIGHT OF PART A TO 27 ± 1 PARTS BY WEIGHT OF PART B. WITHIN 40 MINUTES AFTER MIXING, THE ADHESIVE SHALL BE APPLIED TO THE LAP AREA OF 2024-T3 ALUMINUM TEST PANELS PREVIOUSLY CLEANED BY DICHROMATE ETCHING. THE SPECIMENS SHALL BE CURED FOR ONE HOUR AT 200° ± 5°F. USING A BONDING PRESSURE OF 30 ± 5 PSI.

3. DESIGN:
   - A. SHELF LIFE: ONE YEAR FROM DATE OF MANUFACTURE WHEN STORED IN UNOPENED CONTAINERS BELOW 40°F AND NOT LESS THAN 9 MONTHS WHEN RECEIVED BY PURCHASER AND STORED BELOW 40°F. WHEN STORED AT ROOM AMBIENT, MATERIAL SHALL HAVE A SHELF LIFE OF 3 MONTHS FROM THE DATE OF MANUFACTURE, AND NOT LESS THAN 9 WEEKS WHEN RECEIVED BY THE PURCHASER AND STORED BELOW 80°F.
   - B. PROPERTIES:
     - (1) POT LIFE: THE MIXED MATERIAL SHALL BE USABLE FOR 40 MINUTES MINIMUM WHEN TESTED BY PLACING ONE POUND OF THE ADHESIVE IN A QUART PAINT CAN PARTIALLY IMMERSED IN A WATER BATH AT 75° ± 2°F.
     - (2) LAP SHEAR STRENGTH: THE LAP SHEAR STRENGTH OF TEST SPECIMENS SHALL BE AS SPECIFIED IN TABLE I WHEN PREPARED AS SPECIFIED IN 2.B.3.

TABLE I
LAP SHEAR STRENGTH

CURE TEMPERATURE & TIME	TEST TEMPERATURE	MINIMUM LAP SHEAR STRENGTH - AVERAGE OF 5 (PSI)
75° ± 5°F., 7 DAYS	+180° ± 5°F.	1800
200° ± 5°F., 1 HOUR	+180° ± 5°F.	2000
200° ± 5°F., 1 HOUR	-67° ± 5°F.	1500

PROCURE ONLY FROM APPROVED SOURCE LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

2 PLACE DECIMALS	3 PLACE DECIMALS	ANGLES
+	+	+
−	−	−

DO NOT SCALE THIS DRAWING

MATERIAL

APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Bender DATE 3-AUG-66
CHECKED J. GRIEB 3-AUG-66
APPROVAL
CONTRACT NAS9-497
NASA APPROVAL
AC APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ADHESIVE - EPOXY

SPECIFICATION CONTROL DRAWING

SIZE	CODE IDENT NO.	
C	80230	1008903

SCALE
SHEET 1 of 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISED PER DO 48504	8 AUG 66	
	B	REVISED PER DO 48534	10 AUG 66	JHP / RWH
	C	INITIAL RELEASE CLASS A PER TDRR 30860	30 AUG '66	8-30

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 1.
   - C. PREPARATION FOR DELIVERY. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 8.

2. ACCEPTANCE AND INSPECTION:
   - A. THIS MATERIAL AS RECEIVED SHALL BE SHEET STOCK WITH THE FOLLOWING DIMENSIONS:

PART NUMBER	LENGTH	WIDTH	THICKNESS
1008905-001	2 FEET	4 FEET	TO BE SPECIFIED ON THE
1008905-002	2 FEET	3 FEET	PURCHASE ORDER 4.5 INCH
1008905-003	1 FOOT	1 FOOT	WIDTH MAXIMUM AVAILABLE

THE MATERIAL SHALL BE FORMULATED AND FABRICATED IN ACCORDANCE WITH AVCO SPECIFICATIONS RAD-P-70065 AND RAD-P-70050.

   - B. PHYSICAL PROPERTIES:
     - (1) SPECIFIC GRAVITY = .57-.63
     - (2) MATERIAL MIXED IN ACCORDANCE WITH RAD-P-70065 SHALL MEET ALL REQUIREMENTS OF RAD-M-70010 & RAD-P-70050.

3. DESIGN:
   - A. INTENDED USE: THIS MATERIAL IS TO BE USED IN FABRICATING PARTS WHICH REQUIRE HIGH TEMPERATURE ABLATIVE MATERIAL.
   - B. ONLY THE ITEM LISTED ON THIS DRAWING AND IDENTIFIED BY VENDOR'S NAME, ADDRESS AND PART NUMBER HAVE BEEN TESTED. A SUBSTITUTE ITEM SHALL NOT BE USED WITHOUT PRIOR TESTING AND APPROVAL.

SUPPLIER DATA:
AVCOAT 5026-39/M

SUPPLIER DATA:
AVCO CORP. (22372)
LOWELL, MASS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + −
3 PLACE DECIMALS + −
ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Bender DATE 3-AUG-66
CHECKED J. GRIEB 3-AUG-66
APPROVAL 8/30
CONTRACT NAS9-497
NASA APPROVAL 8/30/66
MIT APPROVAL 8/30/66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

MOLDED ABLATIVE MATERIAL

SOURCE CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008905
SCALE
SHEET 1 of 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISED PER DO 48506	8 AUG 66	Gim
	B	REVISED PER DO 48528	9 AUG 66	PHG RWH
	C	INITIAL RELEASE CLASS A PER TDRR 30860	30 AUG '66	8-30

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PREPARATION FOR DELIVERY. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING INCLUDING EXPIRATION DATE PER ND 1002215, CLASS 1 CODE 8.

2. ACCEPTANCE AND INSPECTION:
   - A. THE MATERIAL SHALL BE A ONE COMPONENT RESIN SYSTEM WITH THE FOLLOWING PROPERTIES.
     - (1) PHYSICAL STATE: THE MATERIAL SHALL BE SUPPLIED AS A LIQUID. SEE NOTE 1.
     - (2) COLOR: YELLOW
     - (3) SOLIDS, PERCENT: THE SOLIDS CONTENT SHALL BE 10 TO 12 PERCENT WHEN TESTED AS FOLLOWS:
       - (a) A 1.0 ± 0.1 GRAM SAMPLE IS PLACED IN AN EVAPORATING DISH. THE DISH IS PLACED IN AN AIR CIRCULATING OVEN OPERATING AT 150° ± 5°C FOR 45 MINUTES. THE SAMPLE IS AGAIN WEIGHED AND THE PERCENT SOLIDS CALCULATED AS FOLLOWS:

$$\frac{\text{FINAL WEIGHT}}{\text{INITIAL WEIGHT}} \times 100 = \text{PERCENT SOLIDS}$$

3. DESIGN:
   - A. INTENDED USE: THIS MATERIAL IS INTENDED FOR USE AS A SEALER ON POROUS MATERIALS, SUCH AS ABLATIVE COMPOUNDS, PRIOR TO BONDING OF OTHER SILICONE MATERIALS TO THE POROUS SUBSTRATE.
   - B. ONLY THE ITEM LISTED ON THIS DRAWING AND IDENTIFIED BY VENDOR'S NAME AND PART NUMBER SHALL BE USED. A SUBSTITUTE ITEM SHALL NOT BE USED WITHOUT PRIOR APPROVAL.
   - C. SHELF LIFE: WHEN STORED AT ROOM TEMPERATURE IN UNOPENED CONTAINERS, THE MATERIAL SHALL HAVE A MINIMUM OF 6 MONTHS USABLE SHELF LIFE WHEN RECEIVED BY THE PURCHASER.

DATA SOURCE:
GENERAL ELECTRIC DESIGNATION - SS4056 PRIMER

SUPPLIER DATA:
GENERAL ELECTRIC CO. (01139)
SILICONE PRODUCTS DEPT.
WATERFORD, N.Y.

NOTES:

1. UPON AGING, A SMALL AMOUNT OF DARK MATERIAL MAY SETTLE OUT. THE CLEAR FLUID ABOVE THIS PRECIPITATE CAN STILL BE USED.

PROCURE ONLY FROM APPROVED SOURCES LISTED
ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − ; 3 PLACE DECIMALS + − ; ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN Bender DATE 5-AUG-66 CHECKED J. GRIEB 5-AUG-66 APPROVAL Jim Paglione 8/30/66 CONTRACT NAS9-4971	PRIMER FOR SILICONE RUBBER SOURCE CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008909
APPROVAL	AC APPROVAL 8/30/66	SCALE SHEET 1 of 1

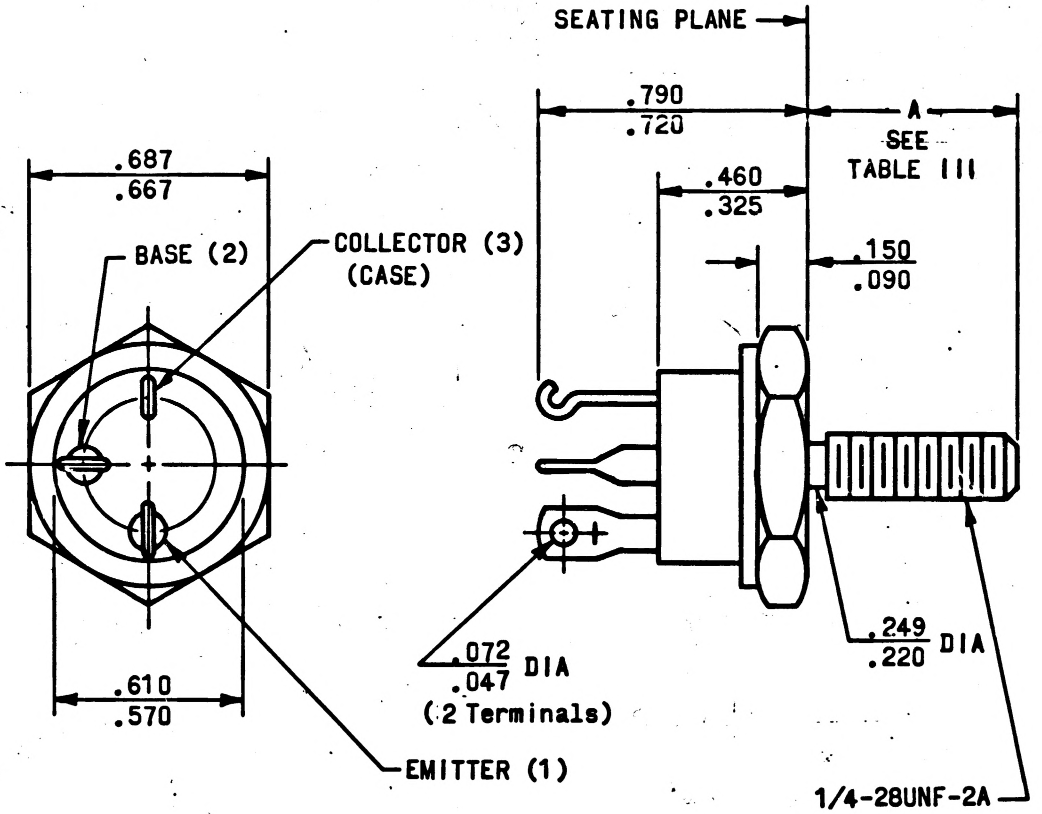
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 32365	12/29/66	G.H.

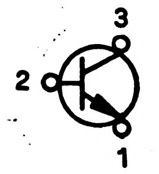
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED); DASH NUMBER; MANUFACTURER'S NAME, TRADEMARK, OR CODE; LOT CODE; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) TERMINAL DATA: KOVAR, GOLD-PLATE (10 TO 150 MICRO-INCHES) OVER NICKEL PLATE (30 MICRO INCHES MIN)
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO})
     - (2) SWITCHBACK VOLTAGE (LV_{CEO})
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE1}, h_{FE2}, h_{FE3}, AND MATCH)
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$)
     - (5) BASE TURN-ON VOLTAGE (V_{BE})

3. DESIGN:
   - A. STORAGE TEMPERATURE RANGE: -65°C TO +200°C
   - B. OPERATING JUNCTION TEMPERATURE: +200°C MAXIMUM
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - E. THERMAL RESISTANCE (JUNCTION-TO-CASE) θ_{JC}: 2°C/W MAXIMUM
   - F. STUD TORQUE: UNITS SHALL WITHSTAND 18 IN.-LB TORQUE WITHOUT DAMAGE OR DEGRADATION.





GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN J. Gragg DATE 8 Nov. '66
CHECKED Zesler 12 NOV 66
R.G. Knowles R L Johnson
APPROVAL J. Barker
CONTRACT
NASA APPROVAL A.C.M.
CCB APPROVAL J.J. Pizzo 12/29/66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR—NPN, 10 AMP,
SILICON STUD MOUNTED

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008922
SCALE NONE
SHEET 1 of 3

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 32365	12/28/66	

REQUIREMENTS: (CONTINUED)

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN.
     - (1) ACCELERATION AT 10,000 "G" MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750, METHOD 2006, OR IMPACT SHOCK AT 28 "G" MINIMUM IN THE Y_1 ORIENTATION.
     - (2) FINE LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE IV, A LEAK RATE OF 1×10^{-8} ATM-CC/SEC. OR GREATER SHALL CONSTITUTE A FAILURE.
     - (3) GROSS LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION A. GLYCERIN MAY BE USED IN LIEU OF MINERAL OIL.
   - B. BURN-IN: UNITS SHALL BE BURNED-IN AT FULL RATED POWER FOR 240 HOURS MINIMUM AT THE FOLLOWING CONDITIONS:
     - (1) $T_C = 100 \pm 5°C$
     - (2) $V_{CE} = 10$ V MIN
     - (3) P = 50 WATTS MAX
   - C. THE MANUFACTURER SHALL MEASURE AND RECORD THE FOLLOWING CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO-1})
     - (2) SWITCHBACK VOLTAGE (LV_{CEO})
     - (3) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)1}$)
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE-1})
   - D. UNITS FAILING TO MEET THE REQUIREMENTS OF TABLE II AND THE FOLLOWING PARAMETRIC DRIFT CRITERIA DURING BURN-IN SHALL NOT BE SHIPPED:
     - (1) h_{FE} SHALL NOT CHANGE MORE THAN ± 10%
     - (2) I_{CBO} SHALL NOT INCREASE MORE THAN TWO TIMES (2X) OR 20 nA WHICHEVER IS GREATER.
     - (3) $V_{CE(SAT)}$ SHALL NOT CHANGE MORE THAN ± 15%
     - (4) LV_{CEO} SHALL NOT DECREASE MORE THAN 10%
   - E. THE DATA SHALL BE PRESENTED IN A MANNER WHICH PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE TEST READINGS. THE TEST DATA SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT T_C = 25°C UNLESS OTHERWISE SPECIFIED

DASH NO.	COLLECTOR VOLTAGE V_{CB}	COLLECTOR VOLTAGE V_{CE}	EMITTER VOLTAGE V_{EB}	COLLECTOR CURRENT I_C	POWER DISSIPATION P	POWER DISSIPATION AT T_C=100°C
	VOLTS	VOLTS	VOLTS	AMP	WATTS	WATTS
-001	120	90	8	10	87.5	50
-002	120	90	8	10	87.5	50
-003	120	90	8	10	87.5	50

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN J. Gagé DATE 8 Nov. '66
CHECKED Zeller 12 NOV 66
R. G. Brown R. F. Johnson
APPROVAL J. H. Porter
CONTRACT
NASA APPROVAL
CCB APPROVAL 12/28/66

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR—NPN, 10 AMP, SILICON STUD MOUNTED

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008922
SCALE NONE
SHEET 2 of 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 32365	12/28/66	

TABLE II

ELECTRICAL CHARACTERISTICS AT T_C = 25°C UNLESS OTHERWISE SPECIFIED

DASH NO.	PARAMETER	CONDITIONS	SYMBOL	LIMITS MIN	LIMITS MAX	UNITS	SHALL BE MATCHED TO WITHIN	NO. OF DEVICES PER SET
-001	SWITCHBACK VOLTAGE	I_C = 100mA, I_B=0 (NOTE 1)	LV_{CEO}	90	-	VOLTS	-	1
	COLLECTOR CUTOFF CURRENT	V_{CB} = 60V, I_E = 0	I_{CBO-1}	-	100	nA		
		V_{CB} = 60V, I_E = 0, T_C = 150°C	I_{CBO-2}	-	10	µA		
		V_{CE} = 40V, I_B = 0	I_{CEO}	-	1	µA		
	STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 10V, I_C = 100mA (NOTE 1)	h_{FE-1}	30	90	-		
		V_{CE} = 10V, I_C = 1A (NOTE 1)	h_{FE-2}	30	90	-		
		V_{CE} = 10V, I_C = 3.5A (NOTE 1)	h_{FE-3}	30	90	-		
	EMITTER CUTOFF CURRENT	V_{EB} = 5V, I_C = 0	I_{EBO}	-	100	nA		
	BASE TURN-ON VOLTAGE	I_C = 3.5A, V_{CE} = 12V (NOTE 1)	V_{BE}	0.6	1.4	VOLTS		
	SMALL SIGNAL CURRENT GAIN	V_{CE} = 10V, I_C = 1A, f = 10m HZ	h_{fe}	4	-	-		
	COLLECTOR SATURATION VOLTAGE	I_C = 2A, I_B = 200mA (NOTE 1)	$V_{CE(SAT)1}$	-	0.8	VOLT		
-002	SWITCHBACK VOLTAGE	I_C = 100mA, I_B = 0 (NOTE 1)	LV_{CEO}	90	-	VOLTS		2
	COLLECTOR CUTOFF CURRENT	V_{CB} = 60V, I_E = 0	I_{CBO-1}	-	100	nA		
		V_{CB} = 60V, I_E = 0, T_C = 150°C	I_{CBO-2}	-	10	µA		
		V_{CE} = 40V, I_B = 0	I_{CEO}	-	1	µA		
	EMITTER CUTOFF CURRENT	V_{EB} = 5V, I_C = 0	I_{EBO}	-	100	nA		
	STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5V, I_C = 3.5A (NOTE 1)	h_{FE-1}	30	90	-	10% OF LOWEST h_{FE} UNIT	
		V_{CE} = 10V, I_C = 1A (NOTE 1)	h_{FE-2}	30	90	-		
	BASE TURN-ON VOLTAGE	I_C = 3.5A, V_{CE} = 12V (NOTE 1)	V_{BE}	0.6	1.4	VOLTS		
	COLLECTOR SATURATION VOLTAGE	I_C = 2A, I_B = 200mA (NOTE 1)	$V_{CE(SAT)1}$	-	0.8	VOLT		
	SMALL SIGNAL CURRENT GAIN	V_{CE} = 10V, I_C = 1A, f = 10m HZ	h_{fe}	4	-	-		
-003	SWITCHBACK VOLTAGE	I_C = 100mA, I_B = 0 (NOTE 1)	LV_{CEO}	90	-	VOLTS	-	1
	COLLECTOR CUTOFF CURRENT	V_{CB} = 60V, I_E = 0	I_{CBO-1}	-	100	nA		
		V_{CB} = 60V, I_E = 0, T_C = 150°C	I_{CBO-2}	-	10	µA		
		V_{CE} = 40V, I_B = 0	I_{CEO}	-	1	µA		
	EMITTER CUTOFF CURRENT	V_{EB} = 5V, I_C = 0	I_{EBO}	-	100	nA		
	STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5V, I_C = 10A (NOTE 1)	h_{FE-1}	10	-	-		
	BASE TURN-ON VOLTAGE	I_C = 3.5A, V_{CE} = 12V (NOTE 1)	V_{BE}	0.6	1.4	VOLTS		
	COLLECTOR SATURATION VOLTAGE	I_C = 3.75A, I_B = 110mA (NOTE 1)	$V_{CE(SAT)1}$	-	1.4	VOLTS		
		I_C = 3.75A, I_B = 110mA, T_C = 60°C (NOTE 1)	$V_{CE(SAT)2}$	-	1.6	VOLTS		
	SMALL SIGNAL CURRENT GAIN	V_{CE} = 10V, I_C = 1A, f = 10 mHZ	h_{FE}	4	—	—		

TABLE III

DASH NO.	DIMENSION "A"
-001	.440 ± .015
-002	.440 ± .015
-003	.353 ± .015

NOTES:

1. PULSE TESTED: 350 µSEC PULSE WIDTH AT ≤ 2% DUTY CYCLE.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + — −
3 PLACE DECIMALS + — −
ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE 8 NOV '66
CHECKED 12 NOV 66
APPROVAL
CONTRACT
NASA APPROVAL
CCB APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR—NPN, 10 AMP,
SILICON STUD MOUNTED

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008922
SCALE NONE
SHEET 3 of 3

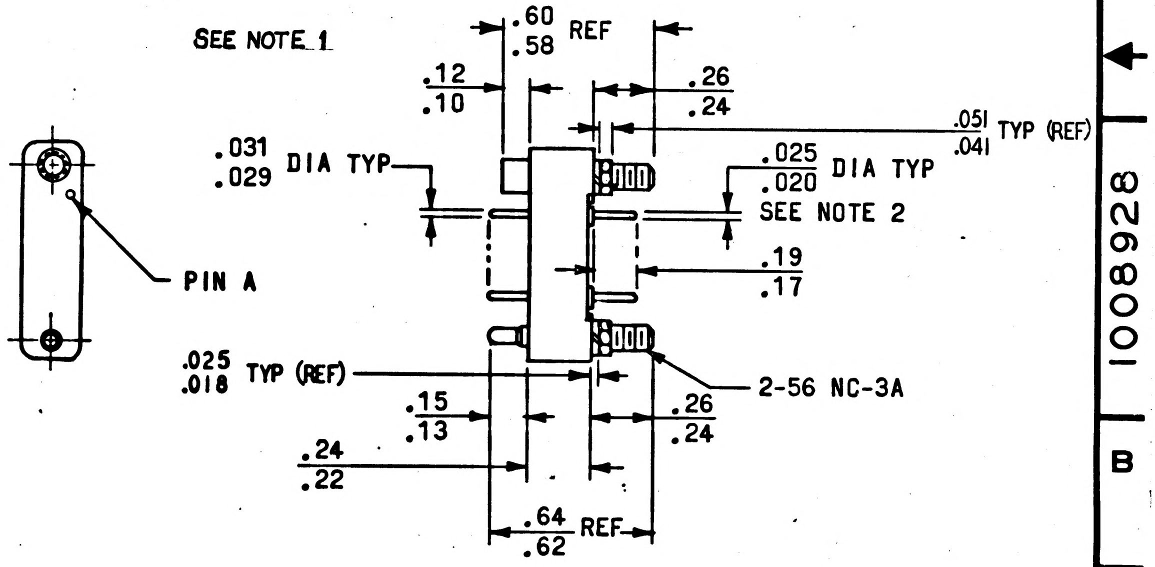
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	INITIAL RELEASE PER TDRR 33086	28 FEB 67	

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING APPLICABLE QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - D. UNITS SHALL BE CAPABLE OF MEETING APPLICABLE REQUIREMENTS OF MIL-C-8384 UNLESS MODIFIED PER THIS DRAWING.
   - E. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING SHALL BE PER ND 1002215, CLASS I, CODE 3.

2. INSPECTION AND ACCEPTANCE:
   - A. PIECEMARKING: UNITS SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, AND NASA PART NUMBER. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART.
   - B. MECHANICAL REQUIREMENTS:
     - (1) MATERIAL:
       - (a) CONTACTS: PHOSPHOR BRONZE, GOLD PLATED PER MIL-G-45204, TYPE II, CLASS 1 OVER COPPER FLASH.
       - (b) SCREWS, LOCKWASHERS, AND NUTS: CORROSION RESISTANT STEEL. QQ-S-763, CLASS 303 CONDITION A PASSIVATE PER MIL-STD-171 FINISH 5.4.2.
       - (c) BODY: GLASS FILLED DIALLYLPHTHALATE PER MIL-M-19833, TYPE GDI-30 (GREEN)
   - C. ELECTRICAL REQUIREMENTS:
     - (1) INSULATION RESISTANCE: 1000 MEGOHMS MIN AT 500 VDC
     - (2) DIELECTRIC STRENGTH: 1600 VRMS AT SEA LEVEL
   - D. INSPECT OPTICALLY 10 X MAGNIFICATION FOR EVIDENCE OF CRACKS, BURRS LOOSE CONTACTS, CONTACT ALIGNMENT, VOIDS, FLAWS OR ANY FOREIGN MATTER DETRIMENTAL TO THE FUNCTION OF THE CONNECTOR. CONTACT MATING SURFACES SHALL BE FREE FROM CRACKS, BURRS, BENDS AND FOREIGN PARTICLES.

3. DESIGN:
   - A. SERVICE RATING: 350 VRMS AT 60 CPS AT SEA LEVEL
     70 VRMS AT 60 CPS AT 70,000 FT
   - B. DIELECTRIC STRENGTH: 425 VRMS AT 70,000 FT
   - C. CONTACT RATINGS: 3 AMPS
   - D. CONTACT RESISTANCE:
     - (1) 20 MV AT 3 AMPS
     - (2) 25 MICROVOLTS MAX AT 250 MICROAMPS DC WHEN MATED WITH PROPER MATING PLUG.
   - E. TORQUE: MOUNTING HARDWARE NUTS SHALL BE TORQUED 2 IN. LBS MAX.



PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE REQUIREMENTS
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN Gruenewald DATE 2 AUG 66
CHECKED Hogue 6 AUG 66
APPROVAL 8 Aug 66
CONTRACT NAS9-497
NASA APPROVAL
MIT APPROVAL 2-17-67

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR, RECEPTACLE, ELECTRICAL—
PRINTED CIRCUIT

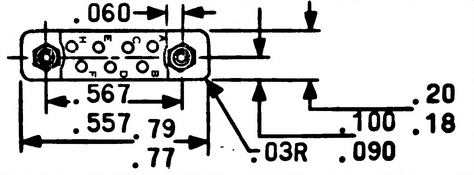
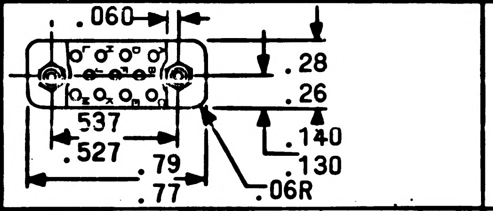
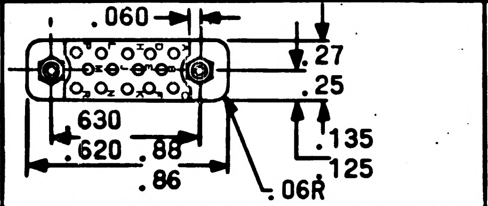
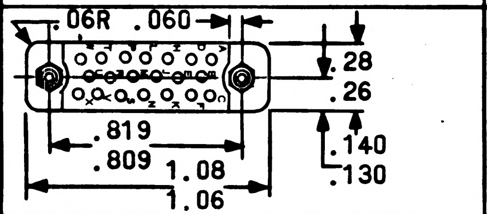
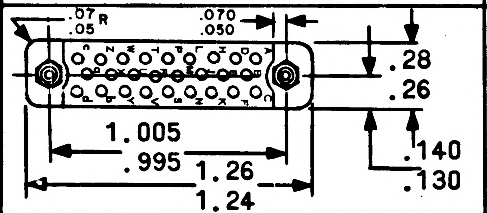
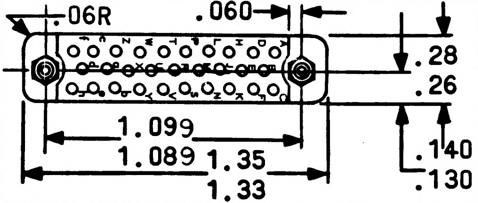
SPECIFICATION CONTROL DRAWING

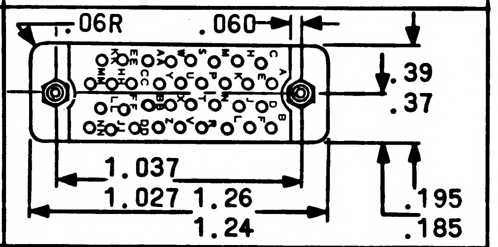
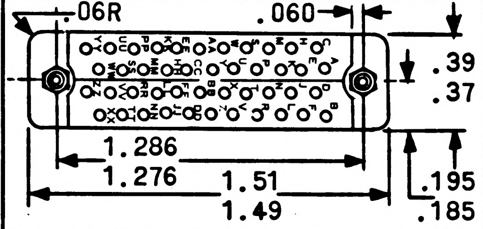
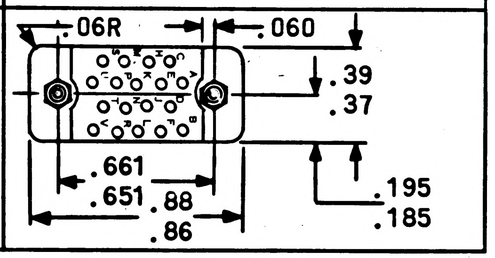
SIZE C
CODE IDENT NO. 80230
1008928
SCALE NONE
SHEET 1 of 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1008928 B

REVISIONS TDRR 33086			
SYM	DESCRIPTION	DATE	APPROVAL
B	INITIAL RELEASE PER TDRR	28 FEB 67	

DASH NUMBER	NUMBER OF CONTACTS	DRILL PATTERN DETAIL	CONTACT LAYOUT (TERMINAL REAR VIEW)	MATING CONNECTOR (SCD REF)
-7	7	A	 .060 .567 .557 .79 .77 .03R .100 .090 .20 .18	1010917
-11	11	B	 .060 .28 .26 537 .527 .79 .77 .140 .130 .06R	1010917
-14	14	B	 .060 .27 .25 630 .620 .88 .86 .135 .125 .06R	1010917
-20	20	B	 .06R .060 .28 .26 .819 .809 1.08 1.06 .140 .130	1010917
-26	26	B	 .07 .05 R .070 .050 .28 .26 1.005 .995 1.26 1.24 .140 .130	1010917
-29	29	B	 .06R .060 .28 .26 1.099 1.089 1.35 1.33 .140 .130	1010917

DASH NUMBER	NUMBER OF CONTACTS	DRILL PATTERN DETAIL	CONTACT LAYOUT (TERMINAL VIEW)
-34	34	C	 .06R .060 .39 .37 1.037 1.027 1.26 1.24 .195 .185
-44	44	C	 .06R .060 .39 .37 1.286 1.276 1.51 1.49 .195 .185
-18	18	C	 .06R .060 .39 .37 .661 .651 .88 .86 .195 .185

1008928

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. Contract NAS 9-497
DRAWN Gruenewald DATE 2 AUG 66
CHECKED Hogue 5 AUG 66
APPROVAL
APPROVAL 2/17/67
NASA APPROVAL
MIT APPROVAL M C Manley 2-17-67

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR - RECEPTACLE, ELECTRICAL,
PRINTED CIRCUIT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008928
SCALE	WT	SHEET 2 OF 3

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B	1008928

REVISIONS TDRR 33086			
SYM	DESCRIPTION	DATE	APPROVAL
B	INITIAL RELEASE PER TDRR	28 FEB 67	

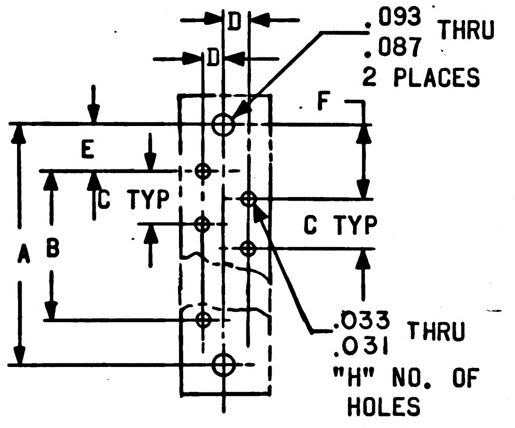
APPLICATION INFORMATION
(REF)

TABLE II

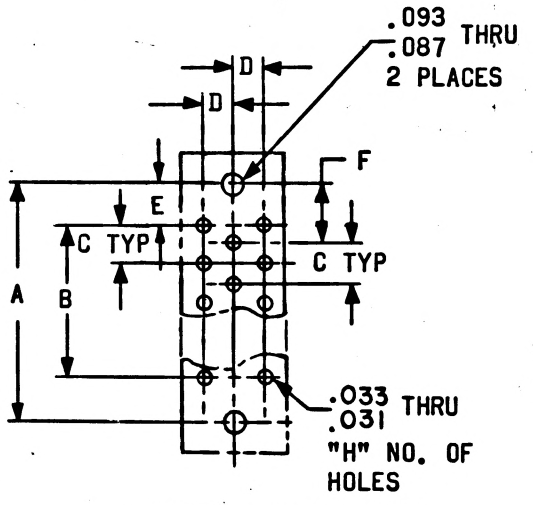
DASH NUMBER	DIMENSIONS A	B	C AS REQ'D	D	E	F	G	DETAIL	"H" NO. OF HOLES
-7	.564 .560	.284 .280	.096 .092	.042 .038	.142 .138	.189 .185	—	A	7
-11	.534 .530	.284 .280	↓	.083 .079	.127 .123	.174 .170	—	B	11
-14	.627 .623	.377 .373	↓	.083 .079	.127 .123	.174 .170	—	B	14
-20	.816 .812	.378 .374	↓	.083 .079	.127 .123	.174 .170	—	B	20
-26	1.002 .998	.754 .750	↓	.083 .079	.127 .123	.174 .170	—	B	26
-29	1.096 1.092	.794 .790	↓	.083 .079	.127 .123	.174 .170	—	B	29
-34	1.034 1.030	.794 .790	↓	.092 .088	.142 .138	.189 .185	.047 .043	C	34

NASA DASH NUMBER	DIMENSIONS A	B	C AS REQ'D	D	E	F	G	DETAIL	"H" NO. OF HOLES
-44	1.283 1.279	.942 .938	.096 .092	.092 .088	.149 .145	.189 .185	.047 .043	C	44

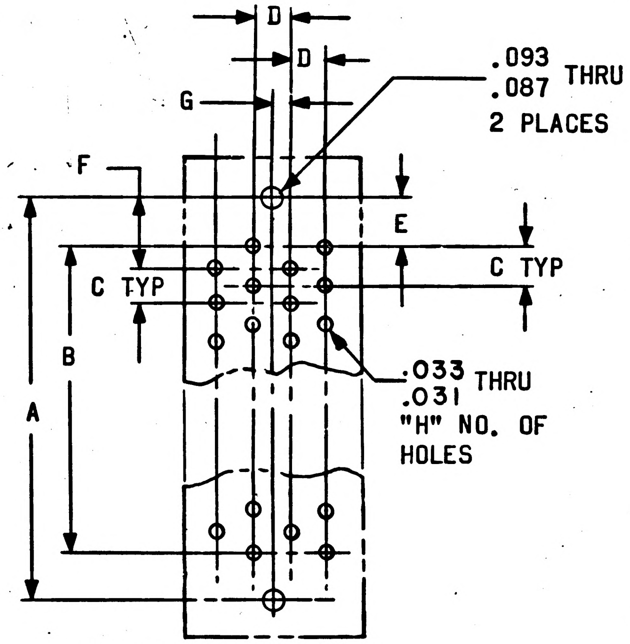
THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.



PRINTED CIRCUIT BOARD
MTG DATA
DETAIL "A"



PRINTED CIRCUIT BOARD
MTG DATA
DETAIL "B"



PRINTED CIRCUIT BOARD
MTG DATA
DETAIL "C"

NOTES:
1. FOR CONTACT LAYOUT AND DIMENSIONS SEE TABLE II
2. TERMINATIONS ARE DESIGNED TO BE DIP SOLDERED TO PRINTED CIRCUIT BOARDS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. Contract NAS 9-497
DRAWN Grunewald DATE 2 Aug 66
CHECKED Hogue 5 AUG 66
APPROVAL
~~APPROVAL~~ Zimmerman 2/15/67
NASA APPROVAL
MIT APPROVAL M16 Marley 2-17-67

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR - RECEPTACLE, ELECTRICAL, PRINTED CIRCUIT

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	C	1008928
SCALE	WT	SHEET 3 OF 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 33206	16 MAR 67	2 FEB 67 GA

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING, SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PREPARATION FOR DELIVERY. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 8.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL COVERED BY THIS SPECIFICATION SHALL BE A MIXTURE OF THE FOLLOWING CONSTITUENTS:
     - (1) 40 PBW NOMINAL, SOAP THICKENED MINERAL OIL
     - (2) 60 PBW NOMINAL, POWDERED MOLYBDENUM DISULFIDE CONFORMING TO MIL-M-7866.
   - B. PROPERTIES:
     - (1) COPPER CORROSION - AFTER 2 HOURS AT 212°F = 2.0 MAX (SLIGHT TARNISH) PER ASTM-D-130.
     - (2) EVAPORATION LOSS - AFTER 24 HOURS AT 248°F = 1.0% MAX PER ASTM-D-972.
     - (3) PENETRATION - PER ASTM-D-217
       - (a) UNWORKED: 310 - 360
       - (b) WORKED 60 STROKES: 310 - 360
       - (c) WORKED 1000 STROKES: 310 - 360

3. DESIGN:
   - A. RECOMMENDED SERVICE RANGE: 0° - 250°F
   - B. DENSITY: 15.5 LBS/GAL. MINIMUM
   - C. INTENDED USE: THIS MATERIAL IS INTENDED FOR USE AS GENERAL PURPOSE ANTI-SEIZE LUBRICANT ON MOST COMMON METALS. THIS MATERIAL SHALL NOT BE USED IN AREAS THAT INTERFACE CREW BAY ENVIRONMENT.

SUPPLIER: DOW CHEMICAL CO.
MIDLAND, MICH.

PART NO: MOLYKOTE "G"

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± ___ 3 PLACE DECIMALS ± ___ ANGLES ± ___	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN J. Patterson DATE 23 JAN 67 CHECKED Kustoque 23 JAN 67 APPROVAL 3 Mar 67 CONTRACT NAS9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS GREASE, MOLYBDENUM DISULFIDE SOURCE CONTROL DRAWING
DO NOT SCALE THIS DRAWING		
MATERIAL SEE REQUIREMENTS	NASA APPROVAL AC	SIZE C CODE IDENT NO. 80230 1008930
APPROVAL	CCB MIT APPROVAL 3/14/67	SCALE NONE SHEET 1 of 1

MIL-1008C D

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 34055	30 JUN 67	~~[illegible]~~ 31 MAR 67

REQUIREMENTS:

1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   C. MAKE MEASUREMENTS PER MIL-R-12934.
   D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215 CLASS I, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   A. MECHANICAL REQUIREMENTS:
      (1) MARKING: UNITS SHALL BE MARKED PER ND 1002019 WITH THE NASA PART NUMBER AND REVISION LETTER AND WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, POWER RATING, RESISTANCE VALUE AND TOLERANCE. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART.
   B. ELECTRICAL REQUIREMENTS:
      (1) TOTAL RESISTANCE: PER TABLE I (AT ROOM AMBIENT CONDITIONS).
      (2) INDEPENDENT LINEARITY IN FILM REGION OF UNIT: ±0.5%

      (3) RESISTANCE (TERMINAL 1 TO 2) AS THE SLIDER IS VARIED FROM CCW STOP TO JUMP OFF POINT: 1 OHM MAX
      (4) JUMP OFF VOLTAGE: 1% OF APPLIED VOLTAGE MAX

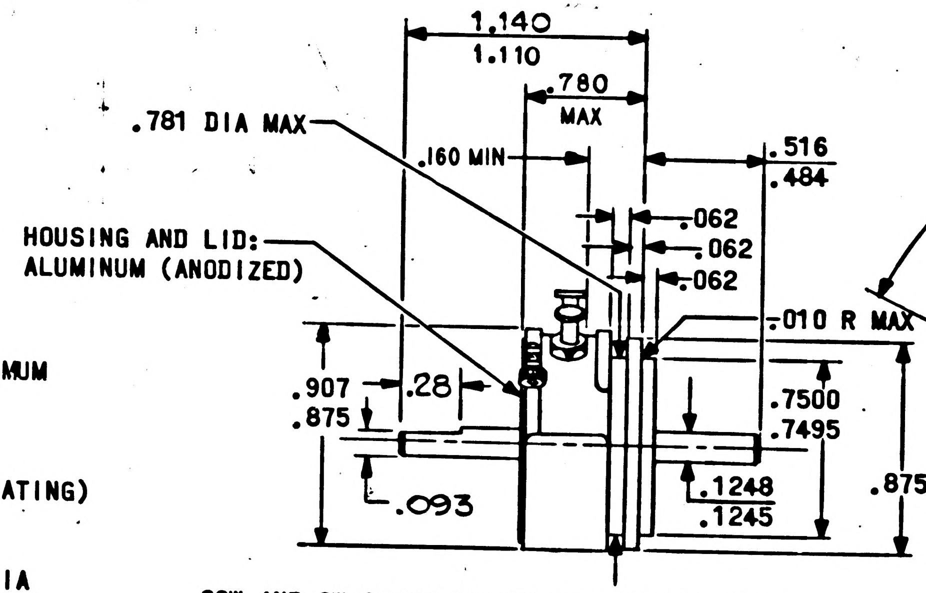
      (5) DIELECTRIC STRENGTH: 1000 VRMS

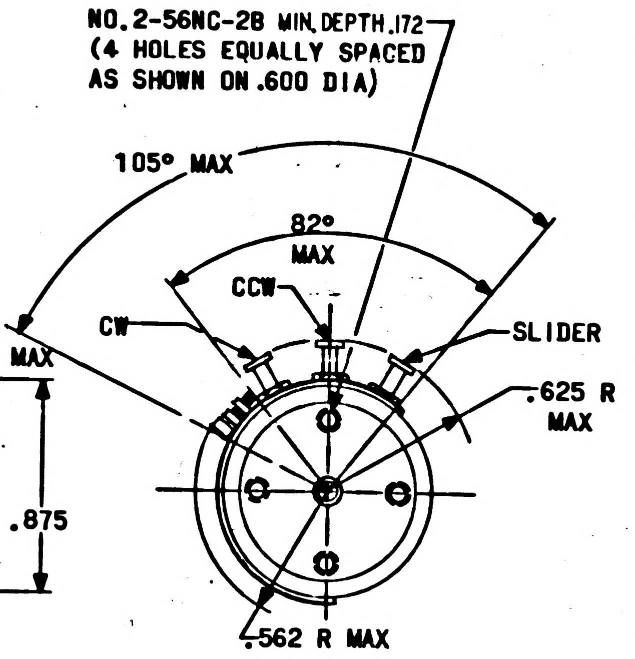
3. DESIGN:
   A. POWER RATING: 3 WATTS AT 85°C DERATED TO 0 AT 150°C.
   B. RESOLUTION: INFINITE (THEORETICAL).
   C. STOP STRENGTH: 6 INCH LBS.
   D. TOTAL MECHANICAL TRAVEL: 341°- 333°
   E. EFFECTIVE ELECTRICAL TRAVEL: 337° - 333°
   F. AMBIENT TEMPERATURE RANGE: -55°C TO +150° C
   G. INSULATION RESISTANCE: (AT 500 VDC 1000 MEGOHMS MIN)
   H. UTILIZE MAXIMUM CONTACT PRESSURE COMMENSURATE WITH A MINIMUM LIFE OF 25,000 CYCLES.
   I. ENVIRONMENTAL REQUIREMENTS: (PER MIL-R-12934, EXCEPT AS MODIFIED BY THIS DRAWING)
      (1) MECHANICAL SHOCK: 75 G FOR 11 MILLISECONDS (NON-OPERATING)
      (2) VIBRATION: 5 TO 2000 CPS AT 20 G.
      (3) ACCELERATION: 20 G
      (4) OXYGEN ATMOSPHERE: 100% OXYGEN ATMOSPHERE AT 14.7 PSIA (2-3 HRS)
      (5) ALTITUDE: 4 DAYS OPERATION AT 10^{-4} MM OF HG ABSOLUTE.
      (6) MATERIAL: MATERIAL MUST NOT EXHIBIT TOXIC OR CORROSIVE OUTGASING.
      (7) SALT FOG: PER METHOD 509 OF MIL-STD-810.

TABLE I

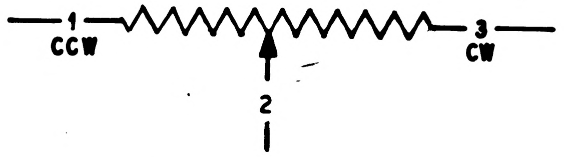
NASA DASH NUMBER	RESISTANCE (OHMS)	RESISTANCE TOLERANCE	END RESISTANCE OHMS	
			CW	CCW
-1	100	±5%	1.0 MAX	1.0 MAX

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.





CCW AND CW SHAFT POSITIONS IDENTIFIED FROM MOUNTING SURFACE END OF UNIT



GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ±.005 ±.02 ANGLES ±2° DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DWG. NO. Contract NAS 9-497	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
MATERIAL SEE REQUIREMENTS	DRAWN D. J. Schitz DATE 21MAR67 CHECKED [illegible] 21 MAR 67 APPROVAL [illegible] 3-21-67 APPROVAL [illegible] 4/16/67	RESISTOR, VARIABLE — FILM, 3 WATT 1 TURN, 7/8 INCH DIA SPECIFICATION CONTROL DRAWING		
HEAT TREATMENT NONE	NASA APPROVAL A. C. [illegible]	CODE IDENT NO. 80230	SIZE C	1008932
FINAL FINISH NONE	~~MIT~~ APPROVAL [illegible] 6/30/67	SCALE NONE	WT	SHEET 1 OF 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 34868	19 OCT 67	AC

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PREPARATION FOR DELIVERY. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING INCLUDING EXPIRATION DATE, PER ND 1002215, CLASS 1, CODE 8.
   - D. MATERIAL SHALL MEET THE REQUIREMENTS OF SPECIFICATION L-P-001174.

2. INSPECTION AND ACCEPTANCE:
   - A. MATERIAL: THE MATERIAL SHALL BE A FLEXIBLE THERMOPLASTIC FILM MADE FROM FLUORINATED-CHLORINATED RESINS IN SHEET FORM.
   - B. COLOR: THE MATERIAL SHALL CONTAIN NO PIGMENT AND SHALL BE A CLEAR TRANSPARENT OR TRANSLUSCENT FILM.
   - C. THE PHYSICAL PROPERTIES LISTED IN TABLE I SHALL BE MET.

3. DESIGN:
   - A. PROPERTIES - THE NOMINAL PHYSICAL PROPERTIES ARE SHOWN IN TABLE II.
   - B. INTENDED USE - THIS MATERIAL IS DESIGNED TO BE USED AS AN ELECTRIC INSULATOR WHERE HIGH-TEMPERATURE AND MOISTURE RESISTANCE REQUIREMENTS ARE NEEDED.
   - C. THIS MATERIAL CAN BE HEAT SEALED, LAMINATED, PRINTED, THERMOFORMED AND METALIZED.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034
FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	DRAWN J W Lutz DATE 23 JUNE 67 CHECKED C. Piojda 23 JUN 67 APPROVAL K. N. Christensen	FILM, FLUORINATED-CHLORINATED THERMOPLASTIC SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING	CONTRACT NAS 9-497	
MATERIAL SEE REQUIREMENTS	NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008941
APPROVAL	CCB ~~MIT~~ APPROVAL	SCALE — SHEET 1 of 2

TDRR 34868 REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISION STATUS CHANGED	19 OCT 67	JAC

TABLE I
PHYSICAL PROPERTIES

PROPERTY	VALUE	TEST METHOD
TENSILE STRENGTH PSI (MACHINE DIRECTION)	8,000 - 10,000 (1/2-MIL) 8,000 - 10,000 (1 MIL) 6,000 - 8,000 (5 MIL)	ASTM-D-882
TENSILE STRENGTH PSI (TRANSVERSE DIRECTION)	5,000 - 8,000 (1/2-MIL) 6,000 - 8,000 (1 MIL) 6,000 - 8,000 (5 MIL)	ASTM-D-882
DIMENSIONAL CHANGE % EITHER MACHINE OR TRANSVERSE	LESS THAN 2 ALL GAUGES	ASTM-D-1204 FILM EXPOSED 30 MIN AT 300°F
DASH NO	THICKNESS-INCHES	ASTM-D-374
001	0.00050 ±15%	
002	0.00075 ±15%	
003	0.00100 ±15%	
004	0.00200 ±15%	
005	0.00500 ±15%	
006	0.00750 ±15%	
007	0.00900 ±15%	
008	0.01000 ±15%	
009	0.01500 ±15%	
010	0.02000 ±15%	
011	0.02500 ±15%	
012	0.03000 ±15%	

TABLE II
NOMINAL PHYSICAL PROPERTIES

PROPERTIES	VALUE	TEST METHOD
YIELD, SQ. IN./LB./MIL	13,000	
CLARITY	CLEAR UPTO 5 MILS SLIGHT HAZE AT 5 MILS	
WATER ABSORPTION	0.00	ASTM D-570
YOUNG'S MODULUS, PSI	297,000	
ELONGATION %		
MACHINE DIRECTION	50-150	
TRANSVERSE DIRECTION	50-150	
TEAR STRENGTH INITIAL (GRAVES) GM MACHINE DIRECTION	120 (1/2 MIL) 410 (1 MIL) 2,500 (5 MIL)	ASTM D-1004
TRANSVERSE DIRECTION	230 (1/2 MIL) 410 (1 MIL) 2,600 (5 MIL)	
TEAR STRENGTH PROPAGATED (ELMENDORF) GM		
MACHINE DIRECTION	8 (1 MIL)	ASTM D-689
TRANSVERSE DIRECTION	26 (1 MIL)	
BURST STRENGTH (MULLEN) PSI	23 (1 MIL) 73 (5 MIL)	
THERMAL CONDUCTIVITY CAL./SQ.CM./SEC °C/CM	4.7×10^{-4}	
SERVICE TEMPERATURE	-320° TO +390°F	
ABRASION RESISTANCE MG (WT. LOSS PER 1000 CYCLES)	4.0	TABER ABRADER CS 17 WHEEL, 1000 GM PER WHEEL

TABLE II (CONTINUED)

PROPERTY	VALUE		TEST METHOD
FLAMMABILITY	NON FLAMMABLE		
CRYSTALLINE MELTING POINT	202-204		
VOLUME RESISTIVITY AT 77°F OHM-CM	$>10^{17}$		ASTM-D-257
SURFACE RESISTIVITY AT 77°F	$>10^{16}$		ASTM-D-257
ARC RESISTANCE, SEC	130-140		ASTM-D-495
DIELECTRIC CONSTANT 15-MIL	24°C	120°C	
0.1 KC/SEC	2.56	2.89	
1. KC/SEC	2.50	2.82	
10. KC/SEC	2.42	2.77	
100. KC/SEC	2.32	2.75	
DISSIPATION FACTOR	24°C	120°C	
0.1 KC/SEC	.0152	.0114	
1.0 KC/SEC	.0220	.0103	
10.0 KC/SEC	.0240	.0087	
100.0 KC/SEC	.0159	.0160	
WIDTH INCHES	26 ± 2		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN J W Lutz DATE 23 JUNE 67
CHECKED C Pigda 23 JUN 67
APPROVAL
CONTRACT NAS 9-497
NASA APPROVAL
CIB ~~MIT~~ APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

FILM, FLUORINATED-CHLORINATED
THERMOPLASTIC
SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008941
SCALE —
SHEET 2

MIL-1008C D

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		INITIAL RELEASE CLASS A PER TDRR 34925			26 OCT 67	26 SEP 67

REQUIREMENTS

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISION CONTAINED IN ND 1015404, CLASS 3
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS OF ND 1002056, EXCEPT THAT THE MAXIMUM TEMPERATURE RANGE SHALL BE PER 3.C. (TO BE QUALIFIED BY USER).
   - D. PART MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED, IN ACCORDANCE WITH ND 1002019, WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, LOT CODE OR NUMBER, TERMINAL IDENTIFICATION AND NASA PART NUMBER
   - E. PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS 1, CODE 1.
     - (1) MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215.

REQUIREMENTS CONTINUED ON SHEET 12

TABLE NO. 1

DASH NO.	FIGURE	CURRENT-MAX MILLIAMPERES	POWER-MAX WATTS
001	1	80	1.560
002	2	5	.096
003	3	6	.104
004	4	2	.032
005	5	17	.268
006	6	5	.088
007	7	50	.960
008	8	2	.032
009	9	1	.016
010	10	70	1.400

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J. Klevanger 27 JUN 67
CHECKED R W Hogue 29 JUN 67
APPROVED C R Crowe 29 JUN 67
APPROVED
APPROVED MIT McMurley 10-4-67
APPROVED MSC 10/23/67
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP, ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008943
SCALE —		SHEET 1 OF 14

1008943 E

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 34925

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		REVISION STATUS CHANGED				26 SEP 67

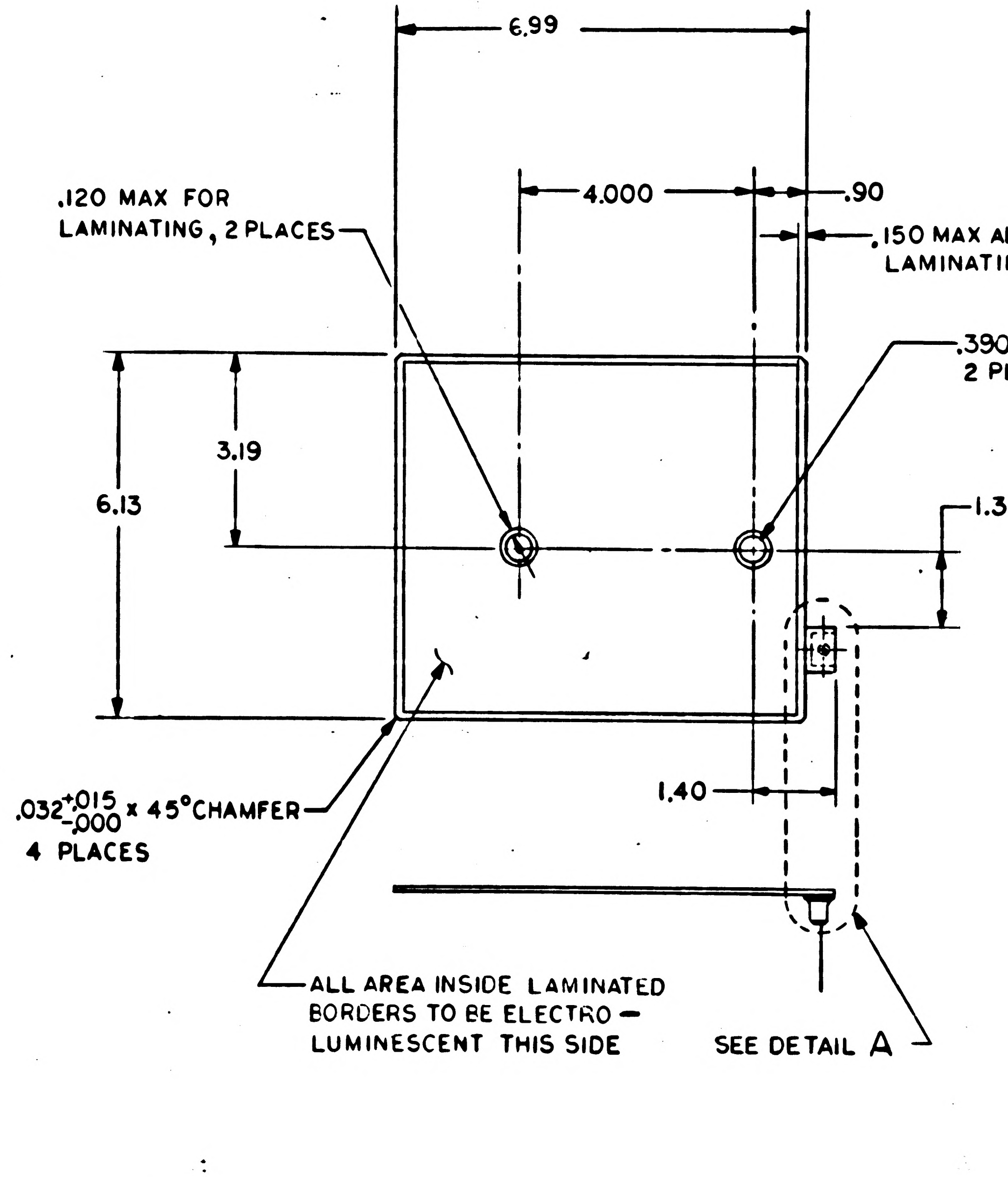
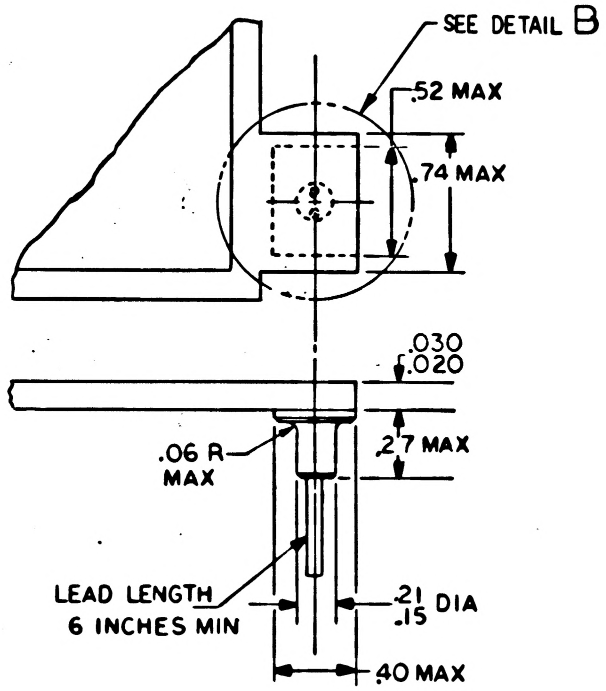
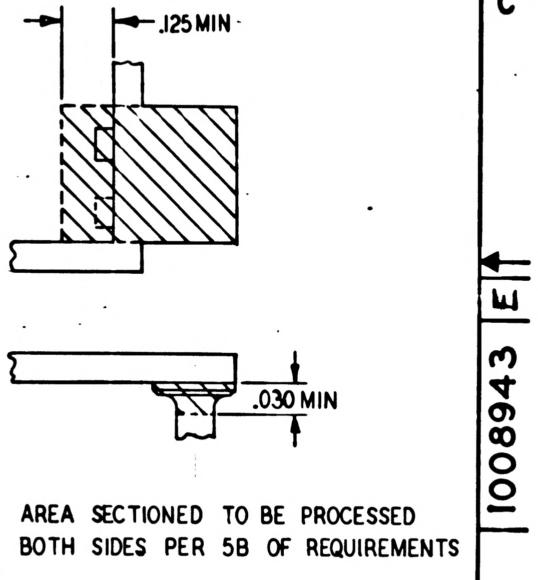

6.99
4.000
.90
.120 MAX FOR LAMINATING, 2 PLACES
.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.390 DIA THRU 2 PLACES
3.19
6.13
1.31
1.40
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO-LUMINESCENT THIS SIDE
SEE DETAIL A

FIGURE 1


SEE DETAIL B
.52 MAX
.74 MAX
.030
.020
.06 R MAX
.27 MAX
LEAD LENGTH 6 INCHES MIN
.21
.15 DIA
.40 MAX

DETAIL A


.125 MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5B OF REQUIREMENTS

DETAIL B

1008943 E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ± .02
3 PLC DEC ± .010
ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J. Kilvinger 27 JUN 67
CHECKED R W Hoque 29 JUN 67
APPROVED C R Crane 29 JUN 67
APPROVED
APPROVED MIT 10 19 67
APPROVED MSC 10/21
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP, ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008943

SCALE ——
SHEET 2 OF 14

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 34925

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		REVISION STATUS CHANGED				26SEP67

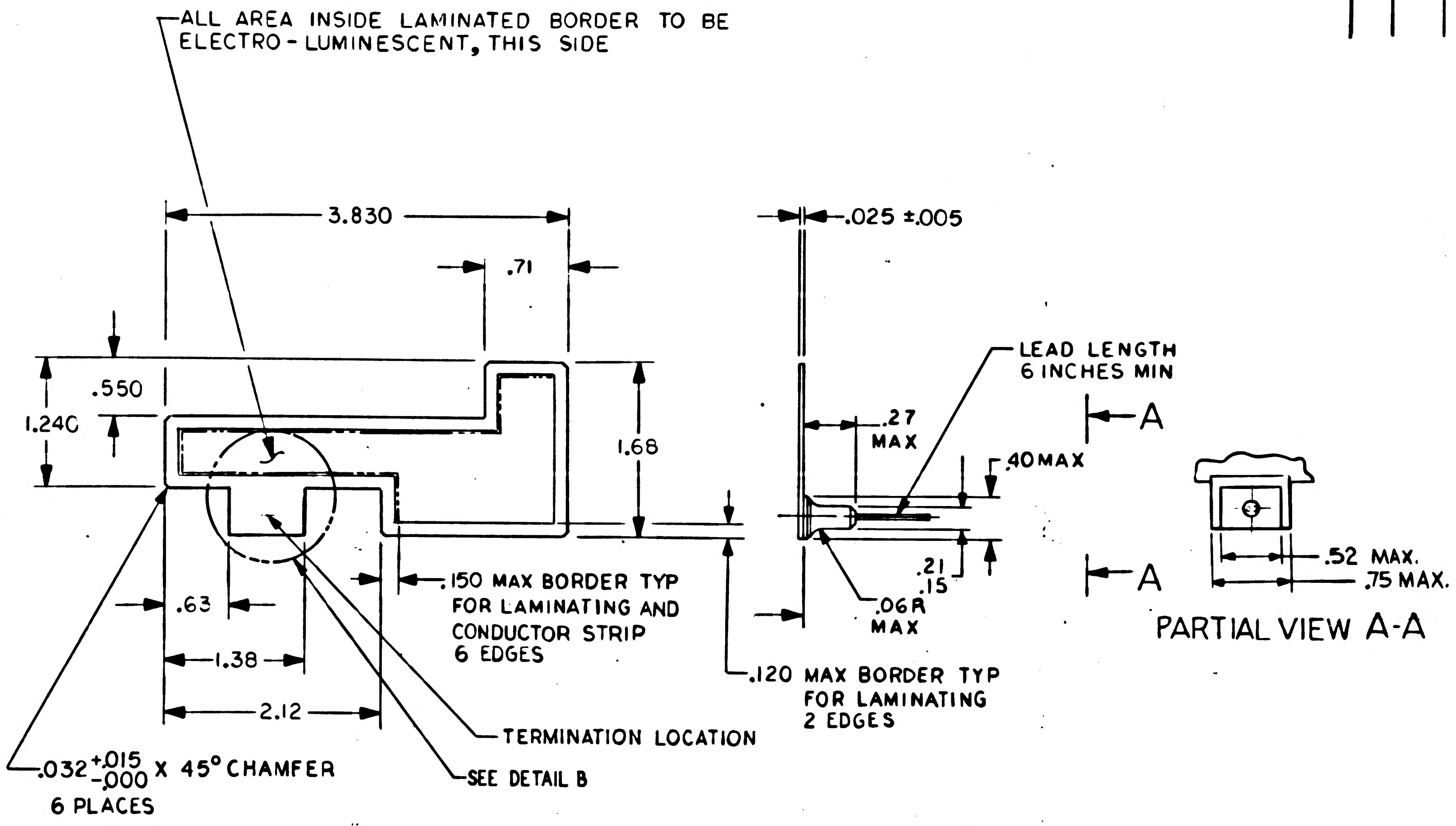
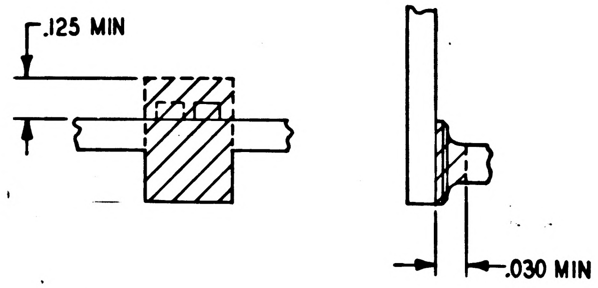

ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
3.830
.71
.550
1.240
1.68
.63
1.38
2.12
.150 MAX BORDER TYP FOR LAMINATING AND CONDUCTOR STRIP 6 EDGES
.032 +.015 -.000 X 45° CHAMFER 6 PLACES
TERMINATION LOCATION
SEE DETAIL B
.025 ±.005
LEAD LENGTH 6 INCHES MIN
.27 MAX
.40 MAX
.21
.15
.06R MAX
.120 MAX BORDER TYP FOR LAMINATING 2 EDGES
A
A
.52 MAX.
.75 MAX.
PARTIAL VIEW A-A

FIGURE 2


.125 MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5B OF REQUIREMENTS

DETAIL B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.015 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN J. Kilvinger 27 JUN 67
CHECKED R W Hogue 29 JUN 67
APPROVED C R Crane 29 Jun 67
APPROVED
APPROVED MIT 10-19-67
APPROVED MSC A 10/23/67
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008943
SCALE —
SHEET 3 OF 14

1008943 E

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 34925

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		REVISION STATUS CHANGED				26 SEP 67

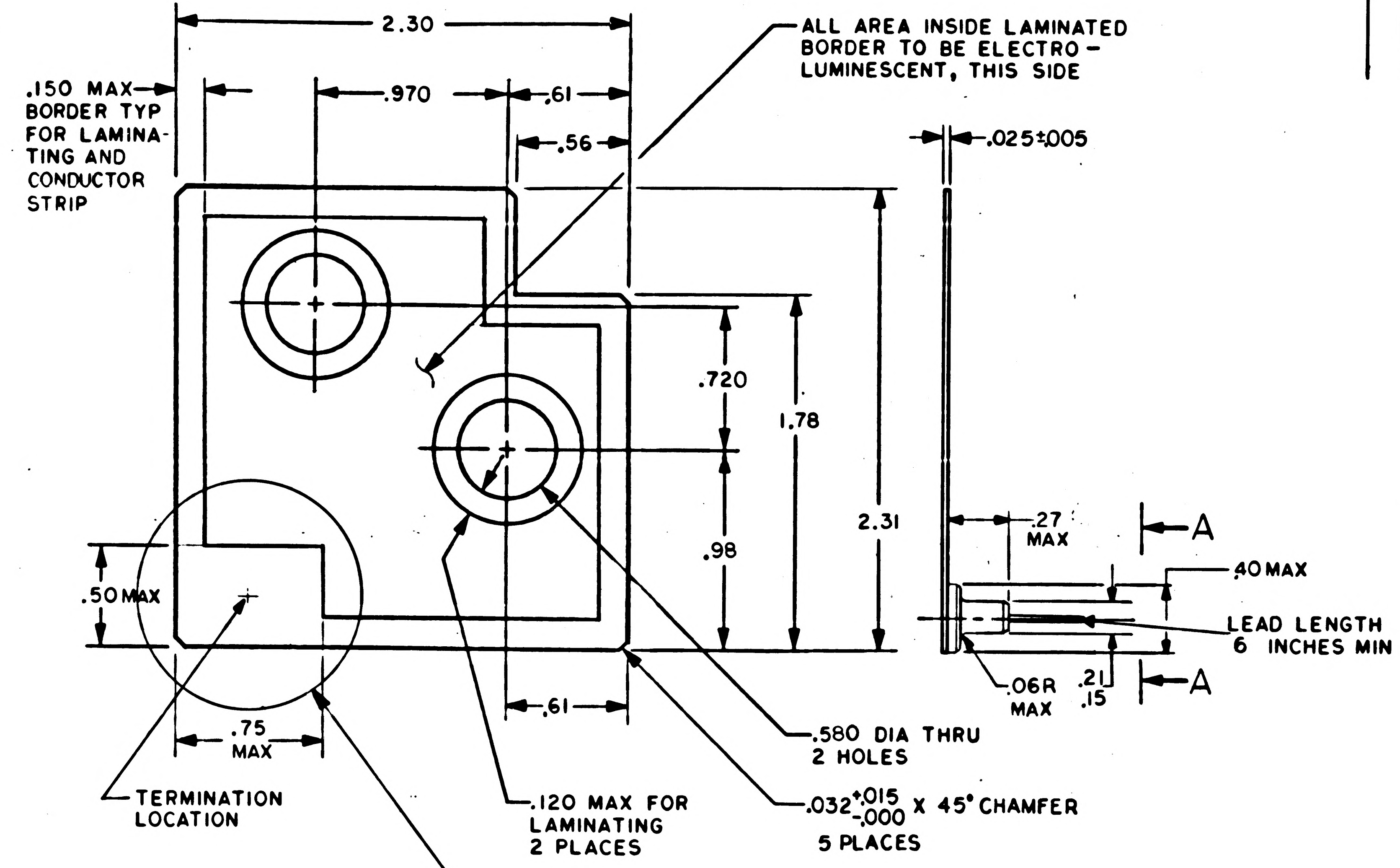
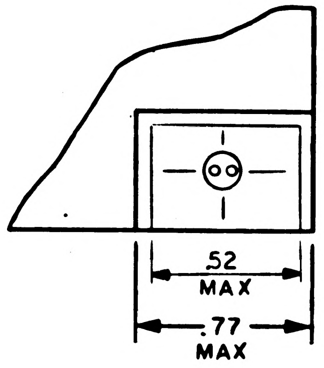
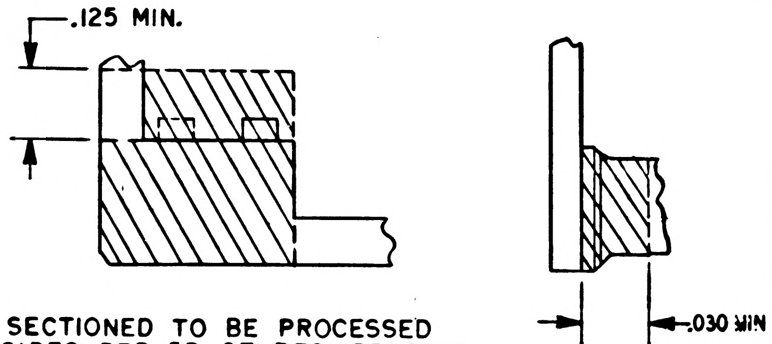

2.30
.150 MAX
BORDER TYP FOR LAMINATING AND CONDUCTOR STRIP
.970
.61
.56
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
.025±.005
.720
1.78
2.31
.98
.50 MAX
.27 MAX
A
.40 MAX
LEAD LENGTH 6 INCHES MIN
.06R MAX
.21
.15
A
.61
.75 MAX
.580 DIA THRU 2 HOLES
TERMINATION LOCATION
.120 MAX FOR LAMINATING 2 PLACES
.032 +.015 -.000 X 45° CHAMFER 5 PLACES
SEE DETAIL B

FIGURE 3


.52 MAX
.77 MAX

PARTIAL VIEW A-A


.125 MIN.
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5B OF REQUIREMENTS

DETAIL B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	R. Weiner	28 JUN 67
CHECKED	R W Hogue	29 JUN 67
APPROVED	C R Grava	29 JUN 67
APPROVED		
APPROVED MIT	W Murphy	10-19-67
APPROVED MSC		10/27/67
		DATE

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008943

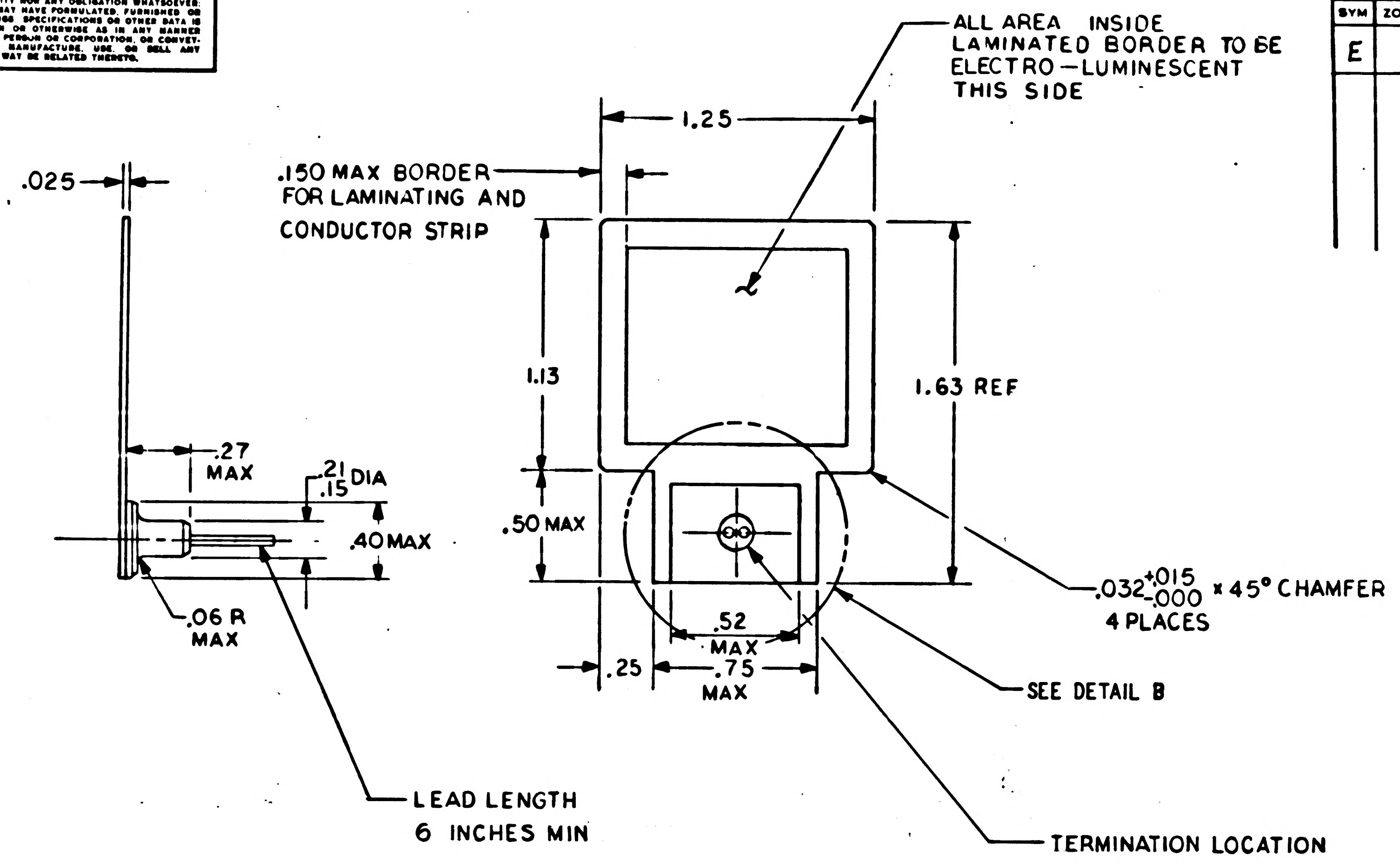
SCALE ___ SHEET 4 OF 14

1008943 E

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

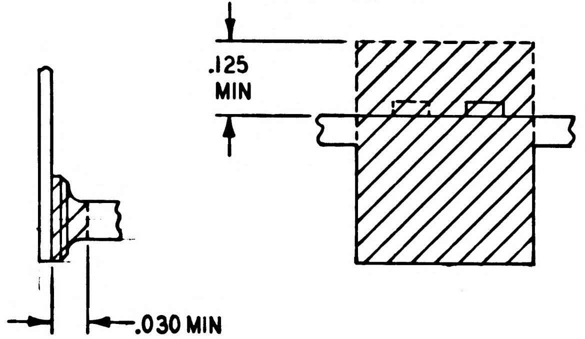
REVISIONS TDRR 34925

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		REVISION STATUS CHANGED				26SEP67



ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.025
.150 MAX BORDER FOR LAMINATING AND CONDUCTOR STRIP
1.13
1.63 REF
.27 MAX
.21
.15 DIA
.40 MAX
.50 MAX
.06 R MAX
.032 +.015 -.000 × 45° CHAMFER 4 PLACES
.52 MAX
.25
.75 MAX
SEE DETAIL B
LEAD LENGTH 6 INCHES MIN
TERMINATION LOCATION

FIGURE 4



.125 MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5B OF REQUIREMENTS

DETAIL B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	J. Kilouzer	27 JUN 67
CHECKED	R W Hogue	29 JUN 67
APPROVED	C R Crane	29 Jun 67
APPROVED		
APPROVED MIT	W G Murley	10-19-67
APPROVED MSC	A Cha	10/27/67
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008943
SCALE ——		SHEET 5 OF 14

1008943 E

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 34925

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		REVISION STATUS CHANGED			-	26 SEP 67

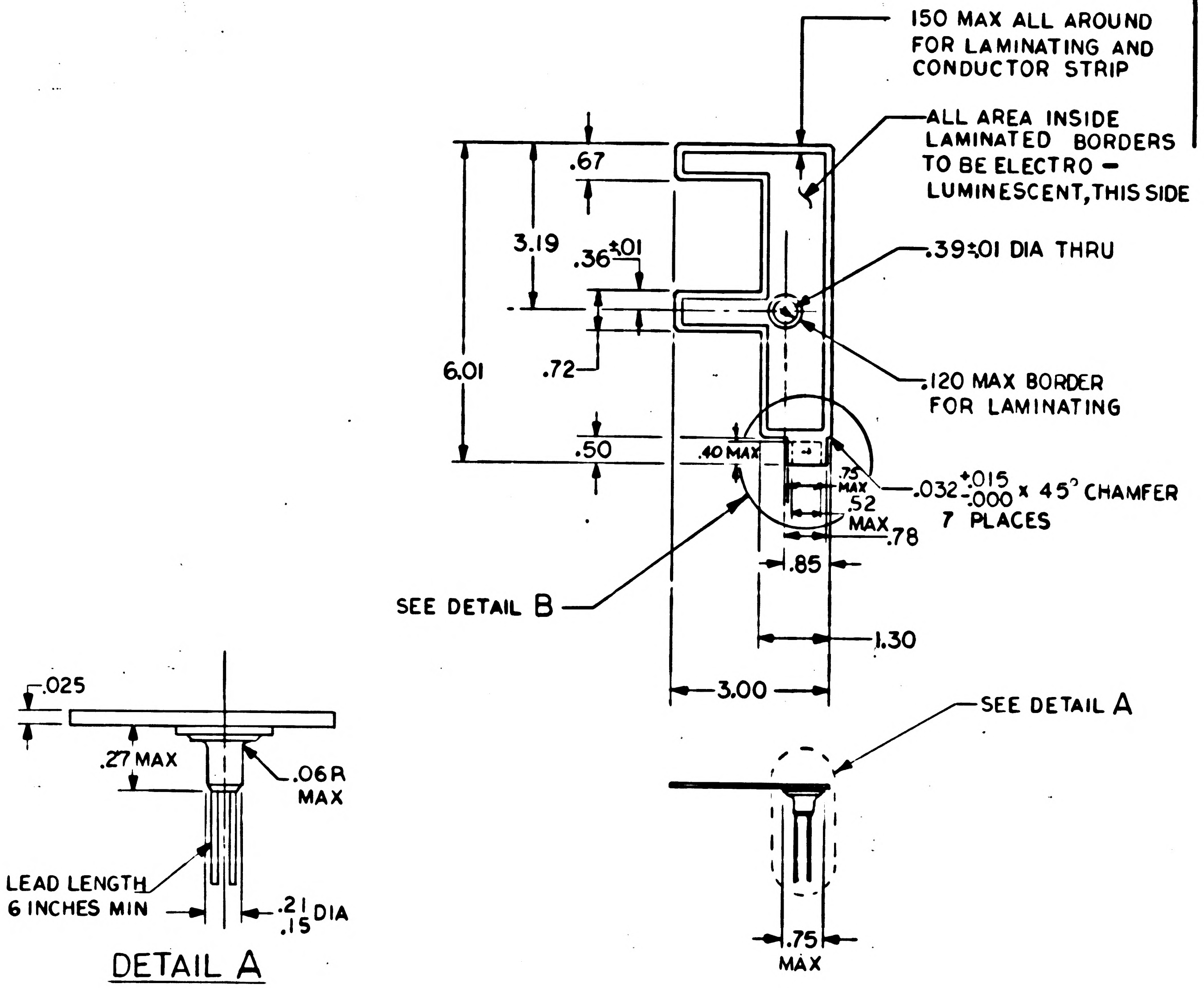
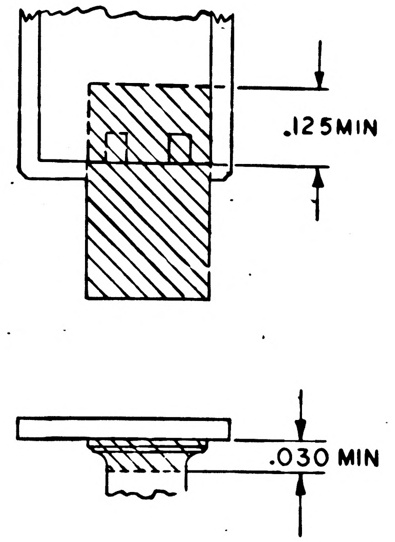

150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO – LUMINESCENT, THIS SIDE
.39±.01 DIA THRU
.120 MAX BORDER FOR LAMINATING
.032 +.015 -.000 x 45° CHAMFER 7 PLACES
.67
3.19
.36±.01
.72
6.01
.50
.40 MAX
.75 MAX
.52 MAX
.78
.85
1.30
3.00
SEE DETAIL B
SEE DETAIL A
.75 MAX
.025
.27 MAX
.06R MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
DETAIL A

FIGURE 5


.125MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5B OF REQUIREMENTS

DETAIL B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ± .02 | 3 PLC DEC ±.005 | ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN Walisiewicz 6-28-67
CHECKED RW Hogue 29 JUN 67
APPROVED CR Crane 29 Jun 67
APPROVED
APPROVED MIT WC McMurtry 10-19-67
APPROVED MSC 10/27/67
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

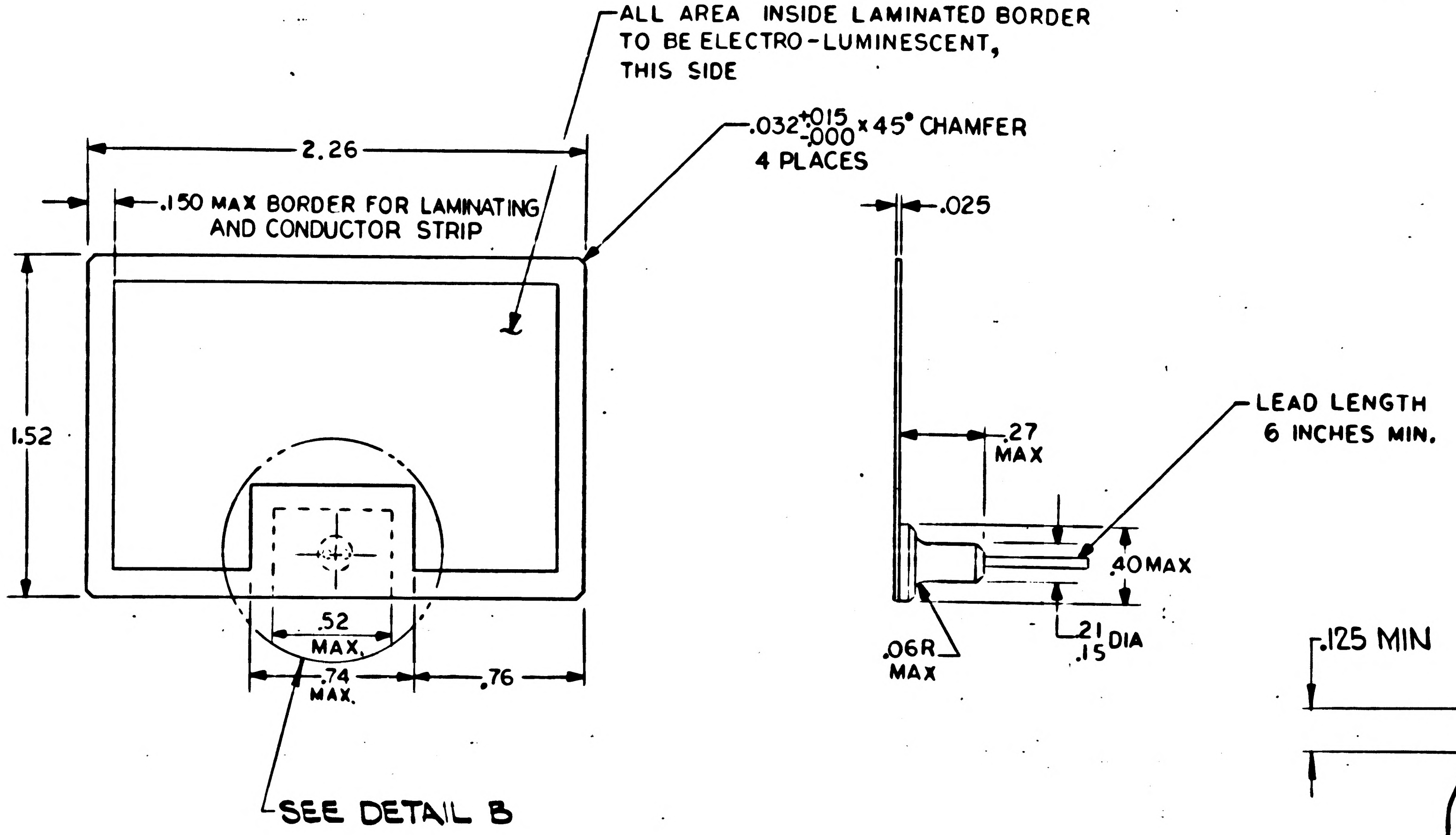
CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008943
SCALE —
SHEET 6 OF 14

1008943 E

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

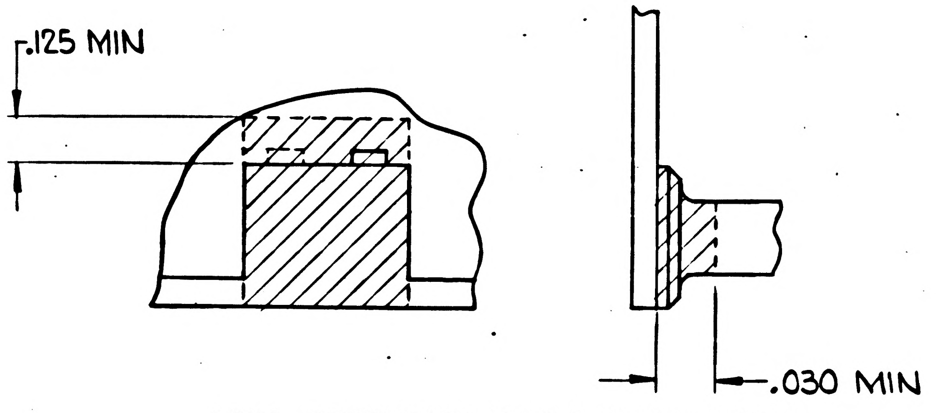
REVISIONS TDRR 34925

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		REVISION STATUS CHANGED				26 SEP 67



ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
2.26
.150 MAX BORDER FOR LAMINATING AND CONDUCTOR STRIP
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
.025
1.52
.27 MAX
LEAD LENGTH 6 INCHES MIN.
.40 MAX
.52 MAX.
.74 MAX.
.76
.06R MAX
.21 .15 DIA
SEE DETAIL B

FIGURE 6



.125 MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5.B OF REQUIREMENTS

DETAIL B

1008943 E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN		29 Jun 67
CHECKED	RW Hogue	29 Jun 67
APPROVED	CR Cravan	29 Jun 67
APPROVED		
APPROVED MIT	M G Murley	10-19-67
APPROVED MSC		11/29/67
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

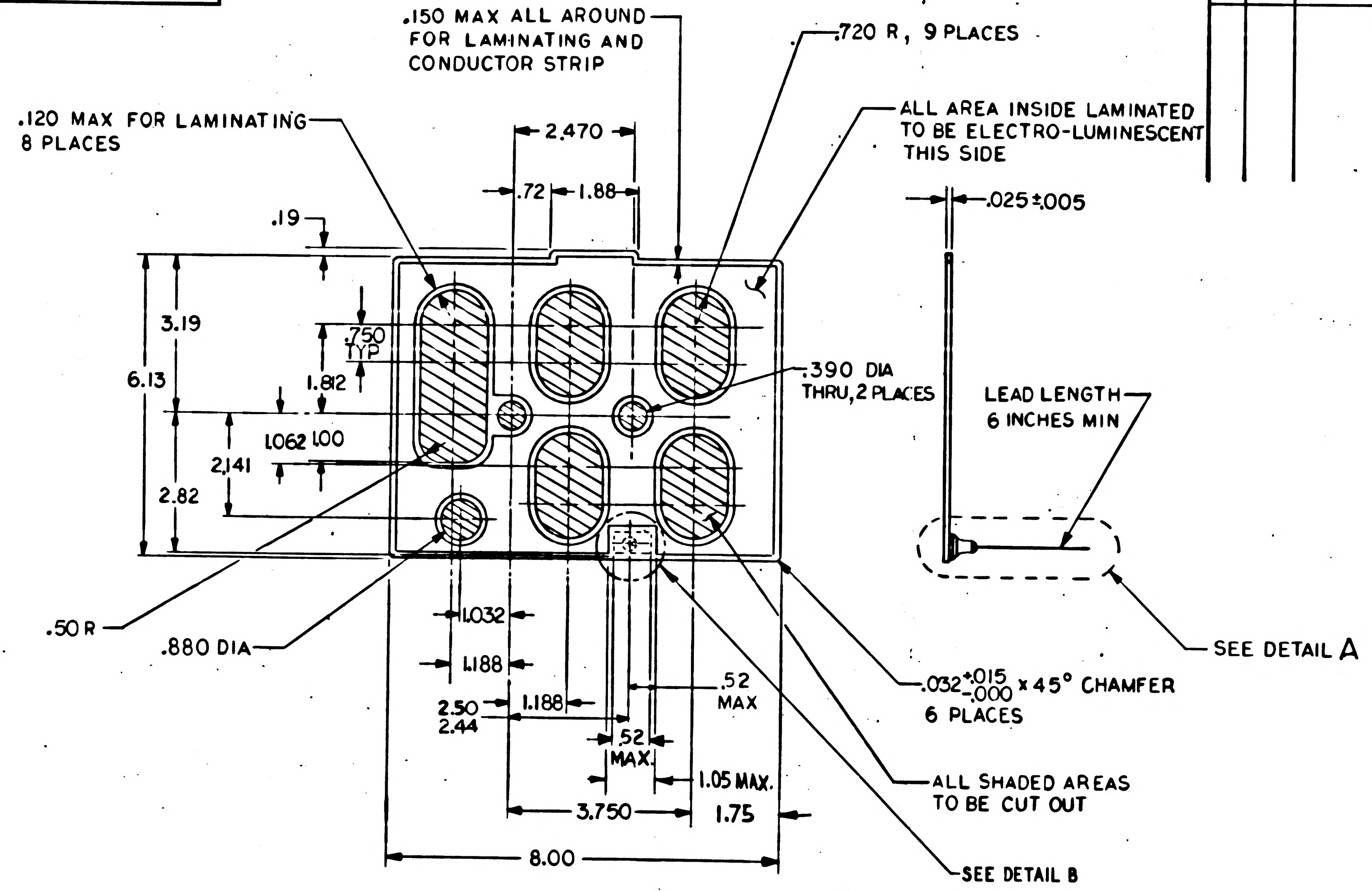
LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

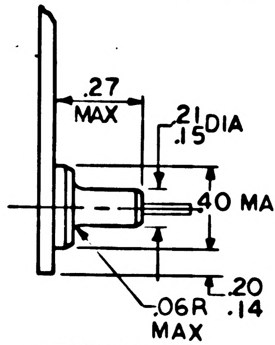
CODE IDENT NO	SIZE	DRAWING NO.
80230	C	1008943
SCALE —		SHEET 7 OF 14

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 34925

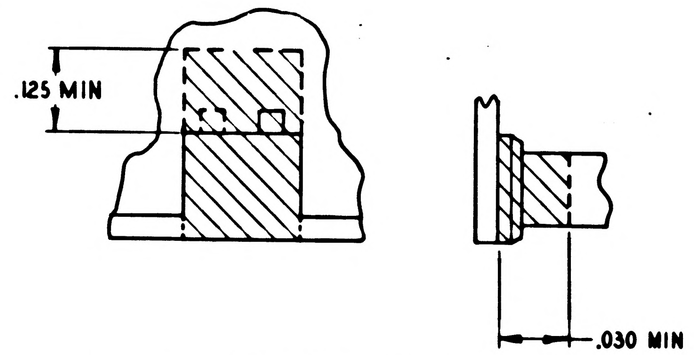
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
E		REVISION STATUS CHANGED				[illegible]


.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.720 R, 9 PLACES
.120 MAX FOR LAMINATING 8 PLACES
ALL AREA INSIDE LAMINATED TO BE ELECTRO-LUMINESCENT THIS SIDE
2.470
.72
1.88
.19
.025±.005
3.19
6.13
.750 TYP
1.812
1.062
1.00
2.141
2.82
.390 DIA THRU, 2 PLACES
LEAD LENGTH 6 INCHES MIN
.50 R
.880 DIA
1.032
1.188
2.50
2.44
1.188
.52 MAX
.52 MAX
1.05 MAX.
1.75
3.750
8.00
SEE DETAIL A
.032+.015/-.000 x 45° CHAMFER 6 PLACES
ALL SHADED AREAS TO BE CUT OUT
SEE DETAIL B


.27 MAX
.21/.15 DIA
.40 MAX
.20/.14
.06R MAX

DETAIL A

FIGURE 7


.125 MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5.B OF REQUIREMENTS

DETAIL B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
~~CAPACITOR VALUES ARE IN µf~~
~~RESISTOR VALUES ARE IN OHMS~~
TOLERANCES ON
2 PLC DEC. ±.02 3 PLC DEC. ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

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APPROVED	C R Crane	29 Jun 67
APPROVED		
APPROVED MIT	M G Nlurle	10-19-67
APPROVED MSC		10/27/67
		DATE

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LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008943

SCALE —— SHEET 8 OF 14

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E		REVISION STATUS CHANGED				26SEP67

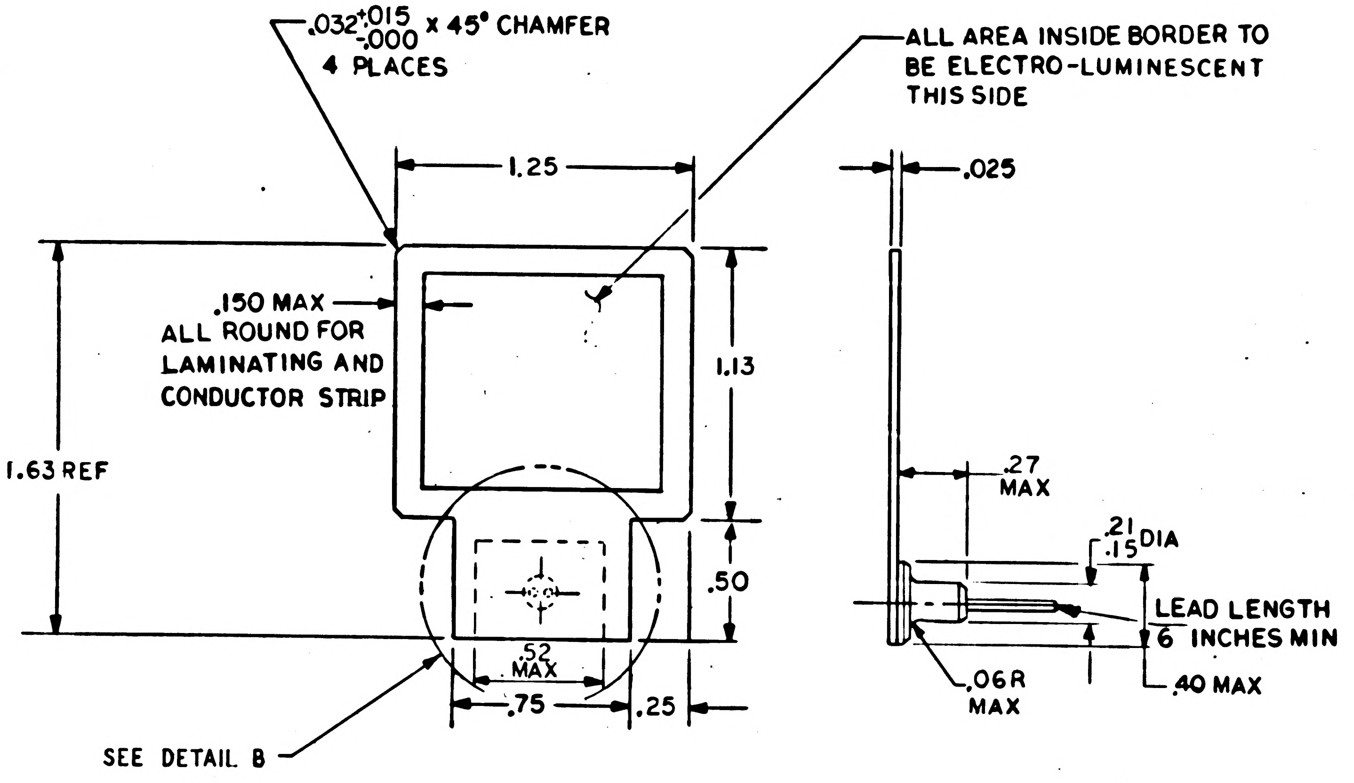
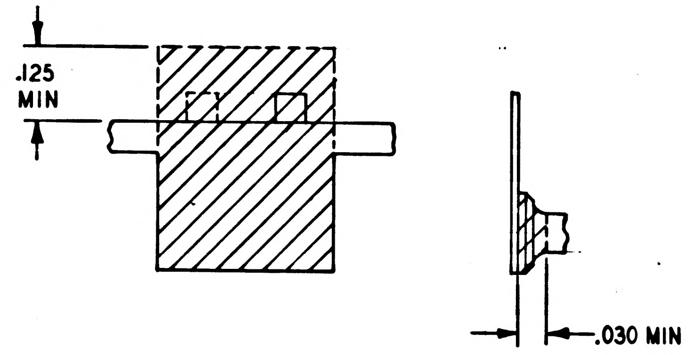

.032 +.015 -.000 X 45° CHAMFER
4 PLACES
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.025
.150 MAX
ALL ROUND FOR LAMINATING AND CONDUCTOR STRIP
1.13
1.63 REF
.27 MAX
.21 .15 DIA
.50
LEAD LENGTH 6 INCHES MIN
.52 MAX
.75
.25
.06R MAX
.40 MAX
SEE DETAIL B

FIGURE 8


.125 MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5B OF REQUIREMENTS

DETAIL B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ± .02 3 PLC DEC ± .005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
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APPROVED	C.R. Crane	29 Jun 67
APPROVED		
APPROVED MIT	M6 Murley	10-19-67
APPROVED MSC		10/23/67
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008943
SCALE —		SHEET 9 OF 14

1008943 E

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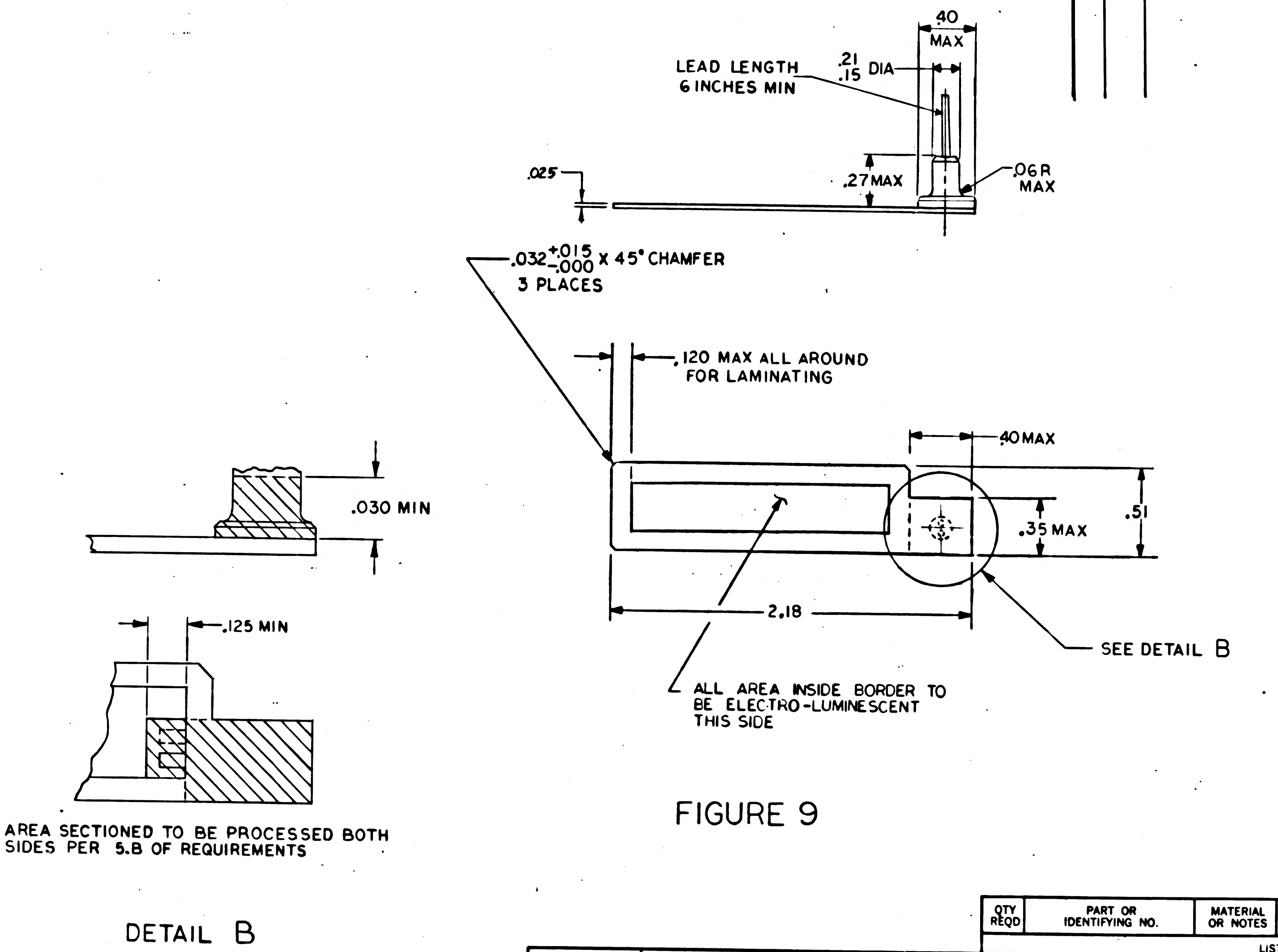

.40 MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
.27 MAX
.06 R MAX
.025
.032 +.015 -.000 X 45° CHAMFER 3 PLACES
.120 MAX ALL AROUND FOR LAMINATING
.40 MAX
.51
.35 MAX
2.18
SEE DETAIL B
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
.030 MIN
.125 MIN
AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5.B OF REQUIREMENTS
DETAIL B

FIGURE 9

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

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SCALE ——— SHEET 10 OF 14

1008943 E

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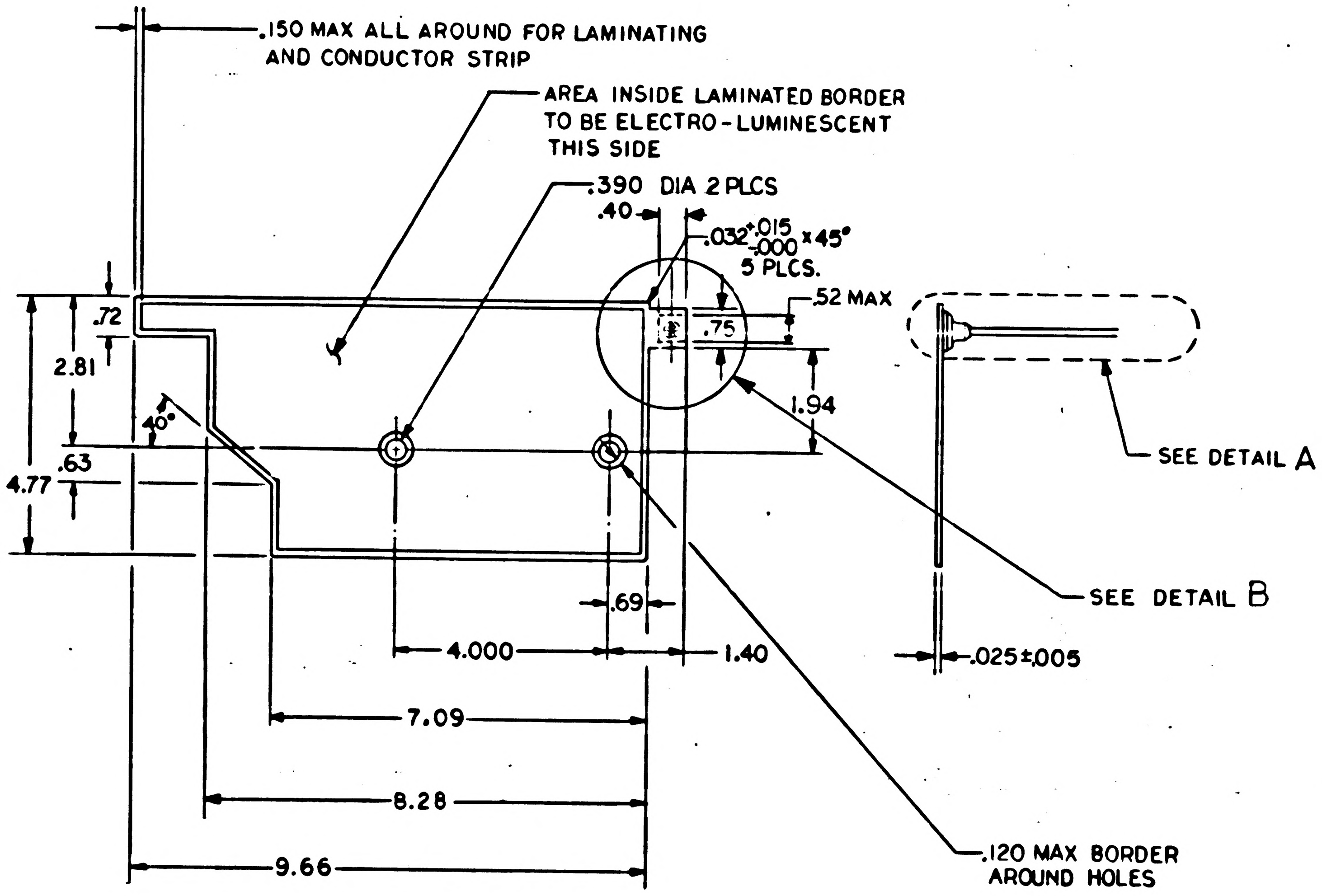
E		REVISION STATUS CHANGED				26SEP67


.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
.390 DIA 2 PLCS
.40
.032 +.015 -.000 x 45° 5 PLCS.
.52 MAX
.75
.72
2.81
40°
1.94
.63
4.77
SEE DETAIL A
SEE DETAIL B
.69
4.000
1.40
.025±.005
7.09
8.28
9.66
.120 MAX BORDER AROUND HOLES

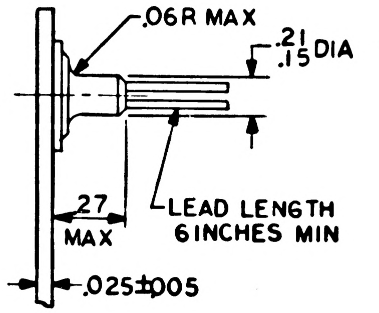
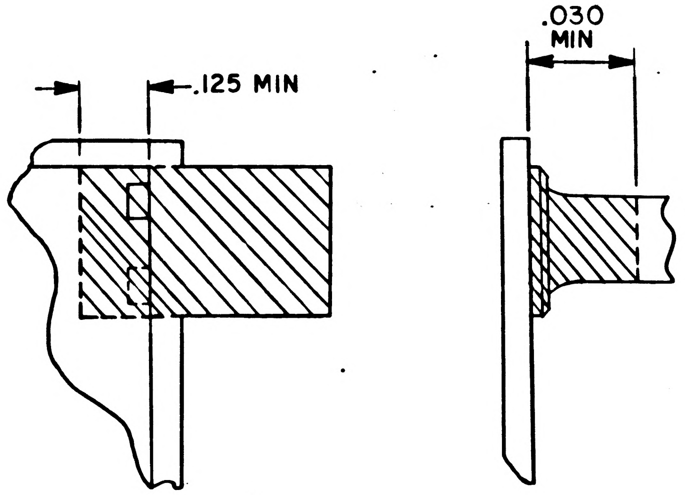

.06R MAX
.21 .15 DIA
.27 MAX
LEAD LENGTH 6 INCHES MIN
.025±.005

FIGURE 10

DETAIL A


.125 MIN
.030 MIN

AREA SECTIONED TO BE PROCESSED BOTH SIDES PER 5B OF REQUIREMENTS

DETAIL B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC. ±.02 3 PLC DEC. ±.010 ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL

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APPROVED	CR Crane	29 JUN 67
APPROVED		
APPROVED MIT	N G Mueller	10/19/67
APPROVED MSC		10/23/67
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008943

SCALE ——— SHEET 11 OF 14

1008943 E

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REVISIONS TDRR 34925

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	E	REVISION STATUS CHANGED		26 SEP 67

REQUIREMENTS: (CONTINUED)

2. ACCEPTANCE AND INSPECTION (100%):
   A. MECHANICAL PROPERTIES:
      (1) DIMENSION: SHALL BE AS SHOWN PER TABLE NO. 1.
      (2) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING A 2 POUND AXIAL PULL.
      (3) LEAD MATERIAL: SHALL BE PER MIL-W-16878 (TYPE E-26). THE LEAD CONNECTED TO THE ELECTRO-LUMINESCENT SIDE SHALL HAVE LIGHT BROWN INSULATION AND THE LEAD CONNECTED TO THE REVERSE SIDE SHALL HAVE BLACK INSULATION. THE COLORS SHALL BE EASILY DISCERNIBLE.
      (4) VISUAL INSPECTION: EACH UNIT SHALL BE INSPECTED IN THE "TOP HAT" AREA UNDER 20X MAGNIFICATION FOR THE FOLLOWING REQUIREMENTS:
         a. COPPER BRAID SHALL BE FREE OF FOLD-OVER.
         b. VISIBLE OPENS TO THE BRAID OR WIRE LEAD SHALL NOT EXCEED 2 AND THE MAXIMUM OPENING SHALL NOT EXCEED 0.020 INCH IN ANY DIRECTION. NO COATING SHALL BE APPLIED TO THE LAMP TOP HAT.
      (5) TOP HAT LOCATION: THE TOP HAT SHALL BE CENTERED WITHIN THE TAB AREA WITHIN 3/64 INCH IN ANY DIRECTION.
   B. ELECTRICAL AND PHOTOMETRIC PROPERTIES:
      (1) TRANSIENT VOLTAGE: THE LAMP SHALL BE EXCITED WITH 160 ± 5 VOLTS RMS, 400 Hz, FOR 5 SECONDS MINIMUM. AFTER APPLICATION OF THIS VOLTAGE THE LAMP MUST BE CAPABLE OF MEETING THE OTHER REQUIREMENTS OF SECTION B.
      (2) LIGHT INTENSITY: 1.2 TO 2.0 FOOT-LAMBERTS INITIALLY WHEN EXCITED WITH 75 ± 1.0 VOLTS RMS, 400 ± 10 Hz.
      (3) CURRENT: PER TABLE NO. 1, WHEN EXCITED PER 2.B.(2).
      (4) POWER: PER TABLE NO. 1, WHEN EXCITED PER 2.B.(2).
      (5) LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE AS SPECIFIED IN 3.F.(1). AS DETERMINED BY MEASUREMENT OF A PRESENTATIVE SAMPLE OF EACH PRODUCTION RUN AND VISUAL COMPARISON OF THE LAMPS WITH THE SAMPLE.

3. DESIGN:
   A. OPERATING LIFE: 2000 HOURS MINIMUM AT 25°C WITH A LOSS OF NOT MORE THAN 90% OF ORIGINAL LIGHT INTENSITY. MEASUREMENTS ACCOMPLISHED WHEN EXCITED PER 2.B.(2) AT 25°C.
   B. STORAGE LIFE: 1 YEAR MINIMUM WITHOUT LOSS OF ELECTRICAL PERFORMANCE AT 0° TO +76°C.
   C. OPERATING TEMPERATURE RANGE: -55°C TO +65°C. ACCELERATED LIFE DEGRADATION IS NOTED WITH OPERATION ABOVE 25°C.
   D. SEAL DESIGN OBJECTIVE: THE LAMPS SHALL BE SUBJECTED TO THE IMMERSION TEST (CONDITION B) SPECIFIED IN MIL-STD-202C. THE LIGHT INTENSITY OF PARAGRAPH 2.B.(2) AND THE DC INSULATION RESISTANCE OF PARAGRAPH 5.B.(8) SHALL BE CHECKED AFTER THE IMMERSION AS ACCEPTANCE CRITERIA.
   CTFE → E. MATERIAL:
      (1) ACLAR ENCAPSULATED ELECTRO-LUMINESCENT LAMP.
      (2) THE LEAD INSULATION SHALL BE CHEMICALLY TREATED IN A MANNER TO ALLOW ADHESIVE BONDING OR POTTING AND ALLOW THE UNIT TO MEET THE IMMERSION TEST REQUIREMENT OF 3.D.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
APPROVAL

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LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO 80230
1008943
SCALE —
SHEET 12 OF 14

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

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ZONE	LTR	DESCRIPTION	DATE	APPROVED
	E	REVISION STATUS CHANGED		26 SEP 67

REQUIREMENTS: (CONTINUED)

F. RATING:

(1) LIGHT OUTPUT COLOR: X = 0.33 ± 0.02, Y = 0.33 ± 0.02 PER CIE DIAGRAM.

(2) MAXIMUM CONTINUOUS VOLTAGE: 120 V RMS, 400 Hz.

(3) UNIFORMITY OF LIGHT INTENSITY: THE LIGHT INTENSITY SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN 10%.

(4) UNIFORMITY OF LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN THE TOLERANCE SPECIFIED IN 3.F.(1).

4. SPECIAL CONDITIONING BY MANUFACTURER:

A. ALL LAMPS SHALL BE BURNED-IN FOR A PERIOD OF 50 TO 100 HOURS PRIOR TO THE ACCEPTANCE AND INSPECTION TESTS IN 2.B. ABOVE. THE BURN-IN CONDITIONS SHALL BE AS FOLLOWS:

(1) TEMPERATURE: 25° ± 5°C.

(2) OPERATING VOLTAGE: 115 ± 10V RMS, 60 ± 5 Hz FOR THE FIRST 50 HOURS, AND 120 V RMS, 400 ± 10 Hz FOR REMAINDER OF BURN-IN.

5. SPECIAL PROCESSING BY USER: PRIOR TO ANY REWORK, THE UNIT SHALL BE CURED FOR 4 HOURS MINIMUM UNDER A TEMPERATURE OF 140°F ± 5°F AND A PRESSURE OF 1 MM OF Hg NOMINAL.

A. MATERIAL PREPARATION: CHLOROTRIFLUOROETHYLENE COPOLYMER SOLUTION (CTFE) (SUPPLIER: ALLIED CHEMICALS: TYPE ACLAR 22A)

(1) CLEAN CTFE FILM OR SHEET PER FED SPECIFICATION L-P-001174 (GSA-FSS) TYPE I BY SCRUBBING WITH COMMERCIAL GRADE ISOPROPYL ALCOHOL.

(2) DISSOLVE THE CLEANED CTFE IN COMMERCIAL GRADE HEXAFLUOROBENZENE TO FORM A 10% BY WEIGHT SOLIDS CONTENT SOLUTION. THE SOLUTION SHALL BE ACCOMPLISHED IN A SEALED CONTAINER AT ROOM TEMPERATURE IN 16 HOURS.

CAUTION: THE TOXICITY OF HEXAFLUOROBENZENE HAS NOT BEEN ESTABLISHED ALTHOUGH IT HAS BEEN FOUND TO BE AN ANESTHETIC EVEN IN RELATIVELY LOW CONCENTRATIONS. THE MATERIAL SHOULD THEREFORE BE TREATED AS POTENTIALLY HAZARDOUS. CAUTION SHOULD BE TAKEN TO USE THE MATERIAL ONLY IN WELL VENTILATED AREAS, SUCH AS IN OR DIRECTLY IN FRONT OF A FUME HOOD. BREATHING OF THE VAPOR SHOULD BE AVOIDED.

(3) DYE THE SOLUTION TO A GARDNER COLOR OF 13 ± 1 AS DETERMINED BY ASTM-D-1544 USING A SOLVENT YELLOW 14 DYE HAVING A COLOR INDEX NUMBER OF 12055.

B. APPLICATION OF CTFE SOLUTION: (NOTE: THIS PRECONDITIONING APPLIES TO PIECE PART LEVEL REPAIR ONLY.)

(1) CLEAN DETAIL B AREAS WITH FREON TF TO REMOVE PREVIOUS COATING.

(2) ABRADE AREA B INCLUDING TOP HAT AS A MINIMUM WITH 320 GRIT ALUMINUM OXIDE PAPER TO REDUCE SURFACE GLOSS.

(3) FLUSH WITH COMMERCIAL GRADE ISOPROPYL ALCOHOL AND DRY AT ROOM TEMPERATURE.

(4) BRUSH A THIN COAT OF CTFE SOLUTION ON DETAIL B AREAS.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —

DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTES

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SPECIFICATION CONTROL DRAWING

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1008943
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NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

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REQUIREMENTS: (CONTINUED)

NOTE: TO PREVENT BUBBLING OR BLUSHING OF THE APPLIED COATING THE ROOM TEMPERATURE SHALL BE 70 TO 75°F, AND THE RELATIVE HUMIDITY 50% MAXIMUM. HEAT SOURCES SHALL BE REMOVED FROM THE IMMEDIATE VICINITY AND THE LAMPS SHOULD NOT BE HANDLED DIRECTLY.

(5) CURE FOR 30 MINUTES MINIMUM AT 75°F MAXIMUM, FOLLOWED BY A 30 MINUTE MINIMUM CURE AT 140° ± 5°F.

(6) REPEAT STEP 4 AND CURE FOR 60 MINUTES MINIMUM AT 75°F MAXIMUM AFTER EACH COAT UNTIL A UNIFORM DRY FILM THICKNESS OF 0.003 INCHES MINIMUM IS OBTAINED. (NORMALLY OBTAINED BY APPLICATION OF 4 COATS).

(7) FINAL CURE TO BE 24 HOURS MINIMUM AT 140 ± 5°F.

(8) FOLLOWING FINAL CURE THE UNIT SHALL BE VISUALLY INSPECTED FOR THE FOLLOWING:

a. COATING SHALL BE CLEAR

b. BUBBLES SHALL NOT BE CONTINUOUS TO THE OUTER SURFACE.

c. NO INDIVIDUAL BUBBLE OR CLUSTER OF BUBBLES SHALL EXCEED 1/32 INCH IN ANY DIRECTION. TOTAL SURFACE AREA COVERED BY BUBBLES SHALL NOT EXCEED 5% OF THE REPAIRED AREA.

d. COATING SHALL BE FREE OF CRACKS AND CRAZING WHEN VIEWED UNDER 3X MAGNIFICATION.

UNIT SHALL ALSO PASS THE FOLLOWING DC INSULATION RESISTANCE TEST: THE LEADS OF THE LAMP SHALL BE CONNECTED TOGETHER AND THE DC INSULATION RESISTANCE MEASURED USING A LOW VOLTAGE OHMMETER BETWEEN THE LEADS TIED TOGETHER AND THE REPAIRED SURFACE. THE UNIT MAY BE CHECKED EITHER BY IMMERSION IN A 1% SALT SOLUTION OR WITH A PROBE WETTED WITH 1% SALT WATER SOLUTION OR EQUIVALENT. THE DC RESISTANCE SHALL NOT BE LESS THAN 10 MEGOHMS.

(9) IF REPAIRED UNIT DOES NOT PASS THE REQUIREMENTS AFTER REPAIR, REMOVE THE COATINGS WITH HEXAFLUOROBENZENE AND REAPPLY PER PARAGRAPH 5.

(10) SUBJECT ALL REPAIRED LAMPS TO AN ALTITUDE TEST PERFORMED IN ACCORDANCE WITH MIL-STD-810, METHOD 500, PROCEDURE II. THE TEST SHALL BE PERFORMED AT AN ATMOSPHERIC PRESSURE OF 10^{-4} MM OF HG. AND AT A TEMPERATURE OF 90° ± 5°F FOR 4 HOURS AND RETURN TO ROOM PRESSURE IN 1 HOUR. THIS TEST MAY BE PERFORMED AT THE PIECE PART OR ASSEMBLY LEVEL. FOLLOWING THE ALTITUDE TEST, THE DC INSULATION RESISTANCE SPECIFIED IN PARAGRAPH 5.B(8) SHALL BE PERFORMED.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
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APPROVAL

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ELECTRO-LUMINESCENT

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CODE IDENT NO 80230
1008943
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SHEET 14 OF 14

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		INITIAL RELEASE CLASS A PER TDRR 34643	DG	JAC	21 SEPT 67	

REQUIREMENTS

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISION CONTAINED IN ND 1015404, CLASS 3
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS OF ND 1002056, EXCEPT THAT THE MAXIMUM TEMPERATURE RANGE SHALL BE PER 3.C. (TO BE QUALIFIED BY USER).
   - D. PART MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED, IN ACCORDANCE WITH ND 1002019, WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, LOT CODE OR NUMBER, TERMINAL IDENTIFICATION AND NASA PART NUMBER
   - E. PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS 1, CODE 1.
     - (1) MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215, CLASS 1, CODE 2.

REQUIREMENTS CONTINUED ON SHEET 12

TABLE NO. 1

DASH NO.	FIGURE	CURRENT-MAX MILLIAMPERES	POWER-MAX WATTS
001	1	80	1.560
002	2	5	.096
003	3	6	.104
004	4	2	.032
005	5	17	.268
006	6	5	.088
007	7	50	.960
008	8	2	.032
009	9	1	.016
010	10	70	1.400

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

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APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Knoll	26 JUNE 67
CHECKED	RW Hogue	27 JUN 67
APPROVED	CR Cramer	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	AUG 23, 67
APPROVED MSC		9/1/67
		DATE

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

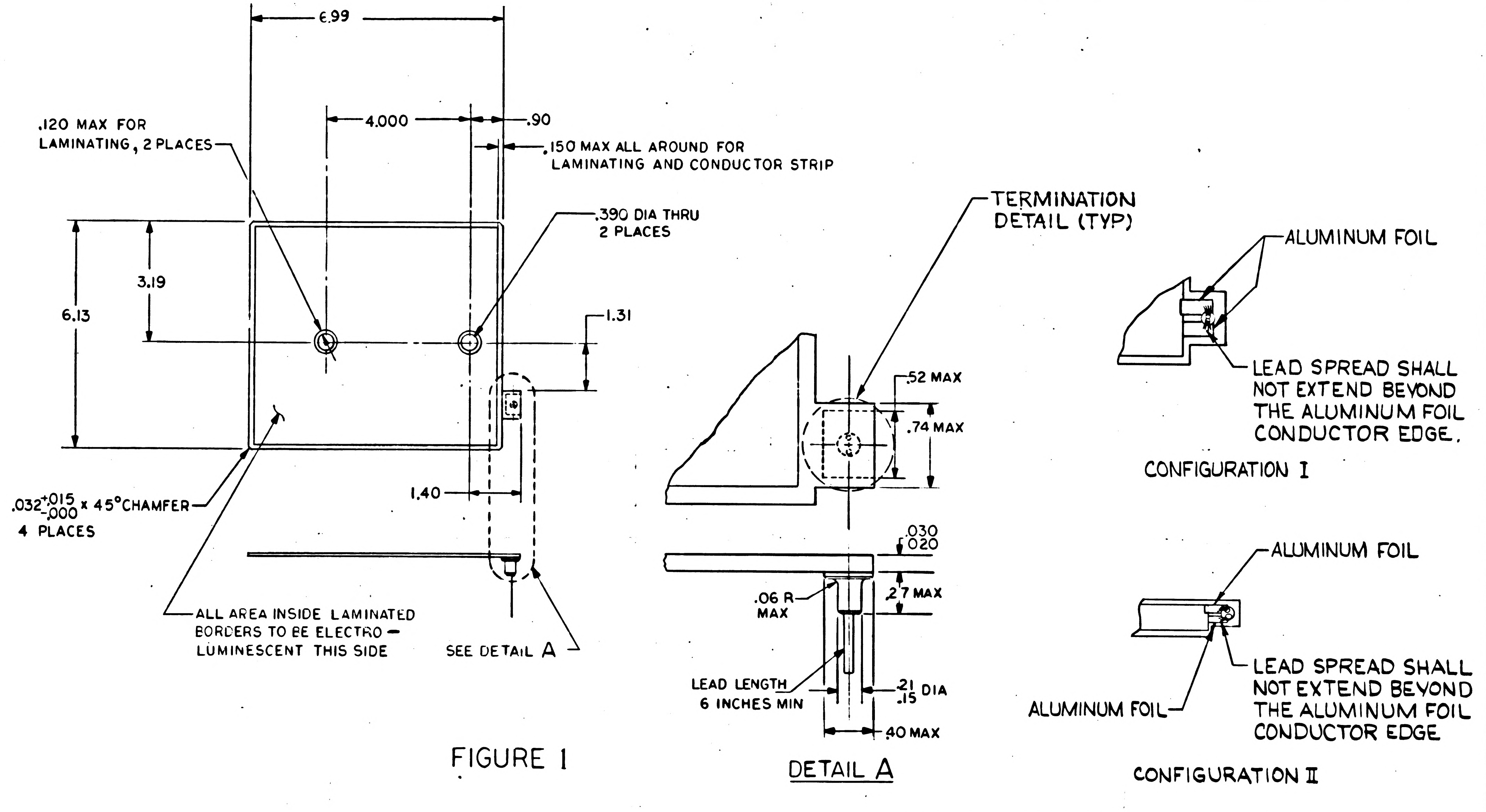
CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 1 OF 13

1008944 A

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	



6.99
4.000
.90
.120 MAX FOR LAMINATING, 2 PLACES
.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.390 DIA THRU 2 PLACES
3.19
6.13
1.31
1.40
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO-LUMINESCENT THIS SIDE
SEE DETAIL A
TERMINATION DETAIL (TYP)
.52 MAX
.74 MAX
.030 .020
.06 R MAX
.27 MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
.40 MAX
ALUMINUM FOIL
LEAD SPREAD SHALL NOT EXTEND BEYOND THE ALUMINUM FOIL CONDUCTOR EDGE.
CONFIGURATION I
ALUMINUM FOIL
ALUMINUM FOIL
LEAD SPREAD SHALL NOT EXTEND BEYOND THE ALUMINUM FOIL CONDUCTOR EDGE
CONFIGURATION II

FIGURE 1

DETAIL A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ± .02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Knoll 26 JUN 67
CHECKED R. Hogue 27 JUN 67
APPROVED C.R. Cronan 27 June 67
APPROVED
NAS 9-497
APPROVED MIT Paul Watson AUG 23, 67
APPROVED MSC 9 13 67
DATE

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LAMP, ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 2 OF 13

1008944 A

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REVISIONS

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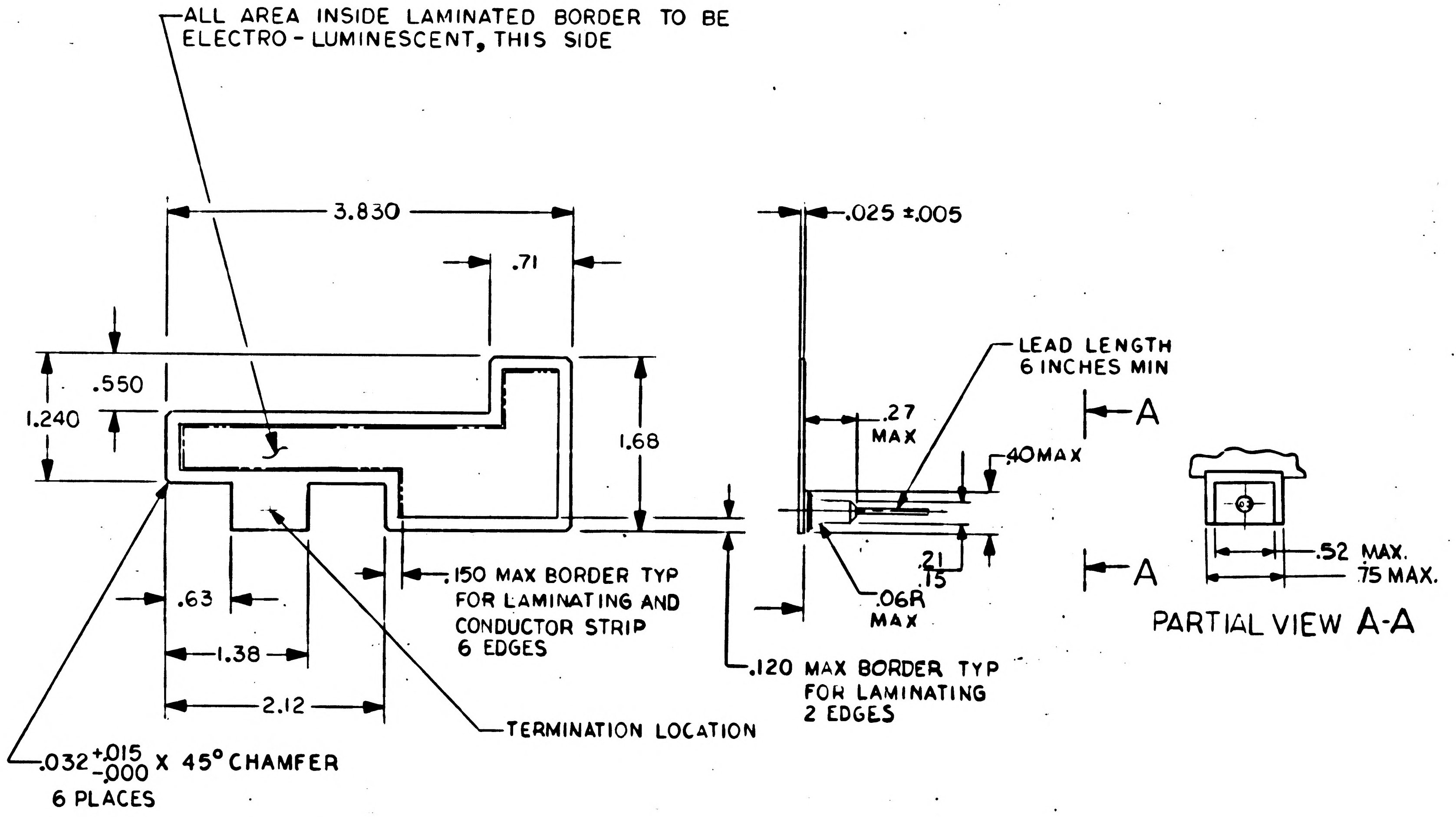
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	2 SEPT 67	FnA



ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
3.830
.71
.550
1.240
1.68
.63
1.38
2.12
.150 MAX BORDER TYP FOR LAMINATING AND CONDUCTOR STRIP 6 EDGES
TERMINATION LOCATION
.032 +.015 -.000 X 45° CHAMFER 6 PLACES
.025 ±.005
LEAD LENGTH 6 INCHES MIN
.27 MAX
.40 MAX
.21 .15
.06R MAX
.120 MAX BORDER TYP FOR LAMINATING 2 EDGES
A
A
.52 MAX.
.75 MAX.
PARTIAL VIEW A-A

FIGURE 2

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC 3 PLC DEC ANGLES
±.02 ±.015 ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W Knoll 26 JUNE 67
CHECKED R W Hogue 27 JUN 67
APPROVED C R Craven 27 June 67
APPROVED Paul Watson AUG. 23, 67
NAS9-497
APPROVED CCD
APPROVED MSC 9/13/67
DATE

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LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

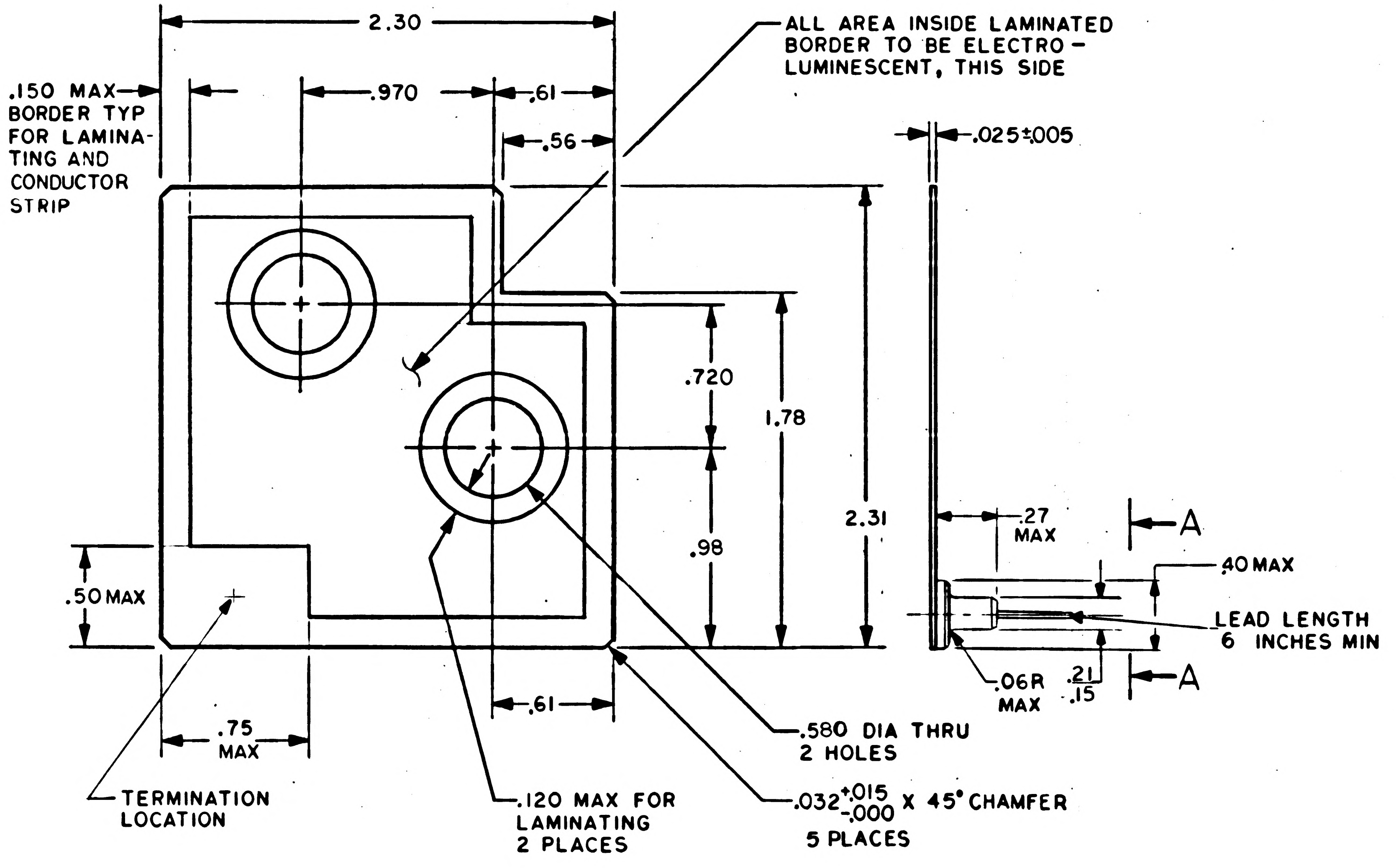
CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 3 OF 13

1008944 A

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

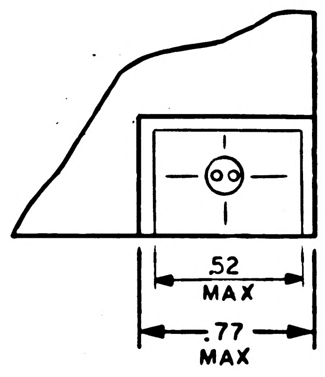
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	



2.30
.150 MAX BORDER TYP FOR LAMINATING AND CONDUCTOR STRIP
.970
.61
.56
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
.025±.005
.720
1.78
2.31
.98
.50 MAX
.27 MAX
A
.40 MAX
LEAD LENGTH 6 INCHES MIN
.06R MAX
.21
.15
A
.61
.75 MAX
TERMINATION LOCATION
.120 MAX FOR LAMINATING 2 PLACES
.580 DIA THRU 2 HOLES
$.032^{+.015}_{-.000}$ X 45° CHAMFER 5 PLACES

FIGURE 3



.52 MAX
.77 MAX

PARTIAL VIEW A-A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W Knoll	26 JUNE 67
CHECKED	Rw Hogue	27 JUN 67
APPROVED	C.R. Craven	27 June 67
APPROVED		
APPROVED MIT	Paul Watson	AUG 23, 67
APPROVED MSC		9/13/67
		DATE

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HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944

SCALE ———
SHEET 4 OF 13

1008944 A

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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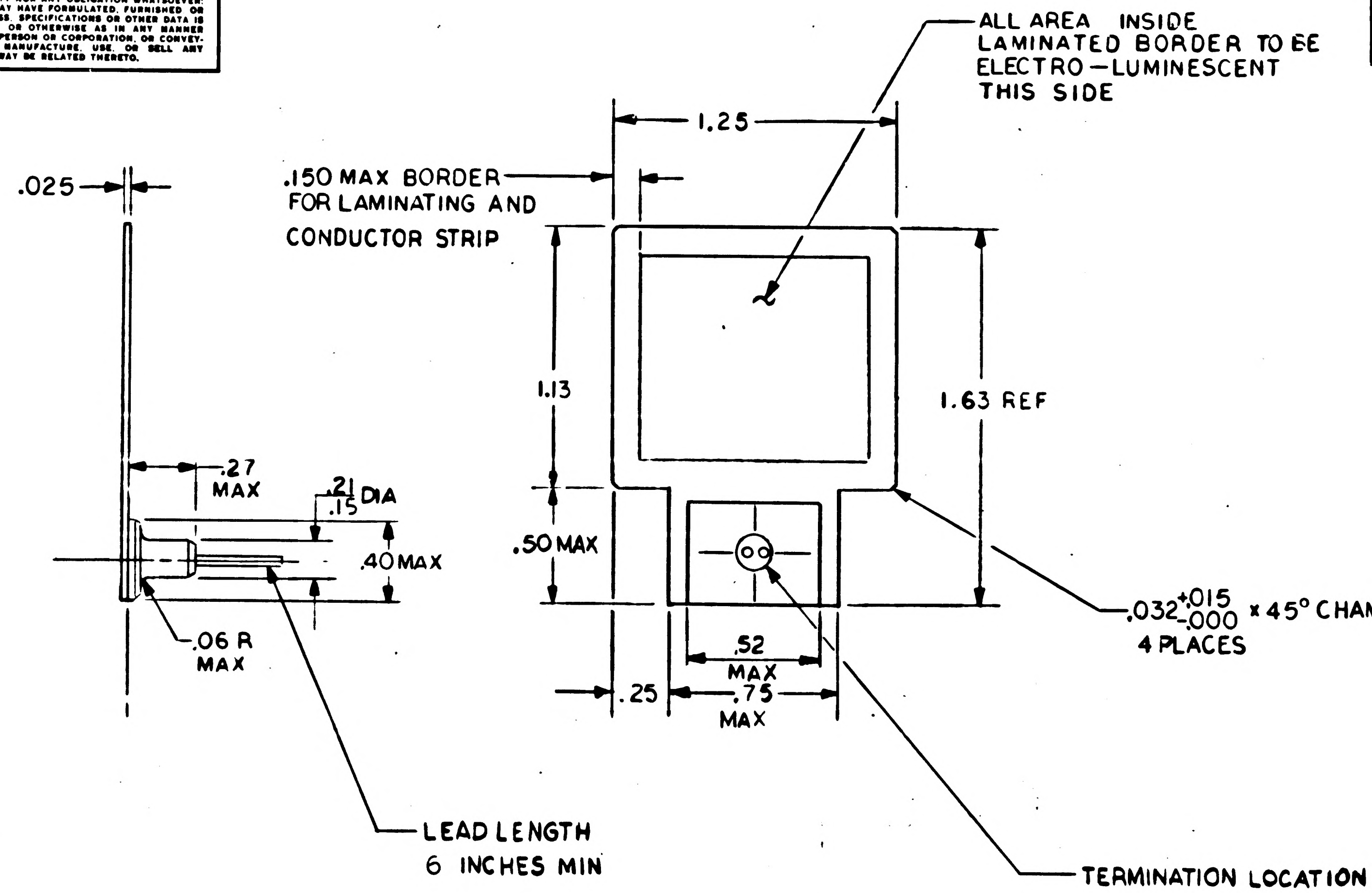
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.025
.150 MAX BORDER FOR LAMINATING AND CONDUCTOR STRIP
1.13
1.63 REF
.27 MAX
.21/.15 DIA
.40 MAX
.50 MAX
.06 R MAX
.032 +.015/-.000 × 45° CHAMFER 4 PLACES
.52 MAX
.25
.75 MAX
LEAD LENGTH 6 INCHES MIN
TERMINATION LOCATION

FIGURE 4

1008944 A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Knoll 26 June 67
CHECKED Ruthogue 27 JUN 67
APPROVED C.R. Crane 27 June 67
APPROVED
NAS 9-497
APPROVED MIT Paul Watson Aug 23, 67
APPROVED MSC A Cml
DATE

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LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 5 OF 13

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEP	

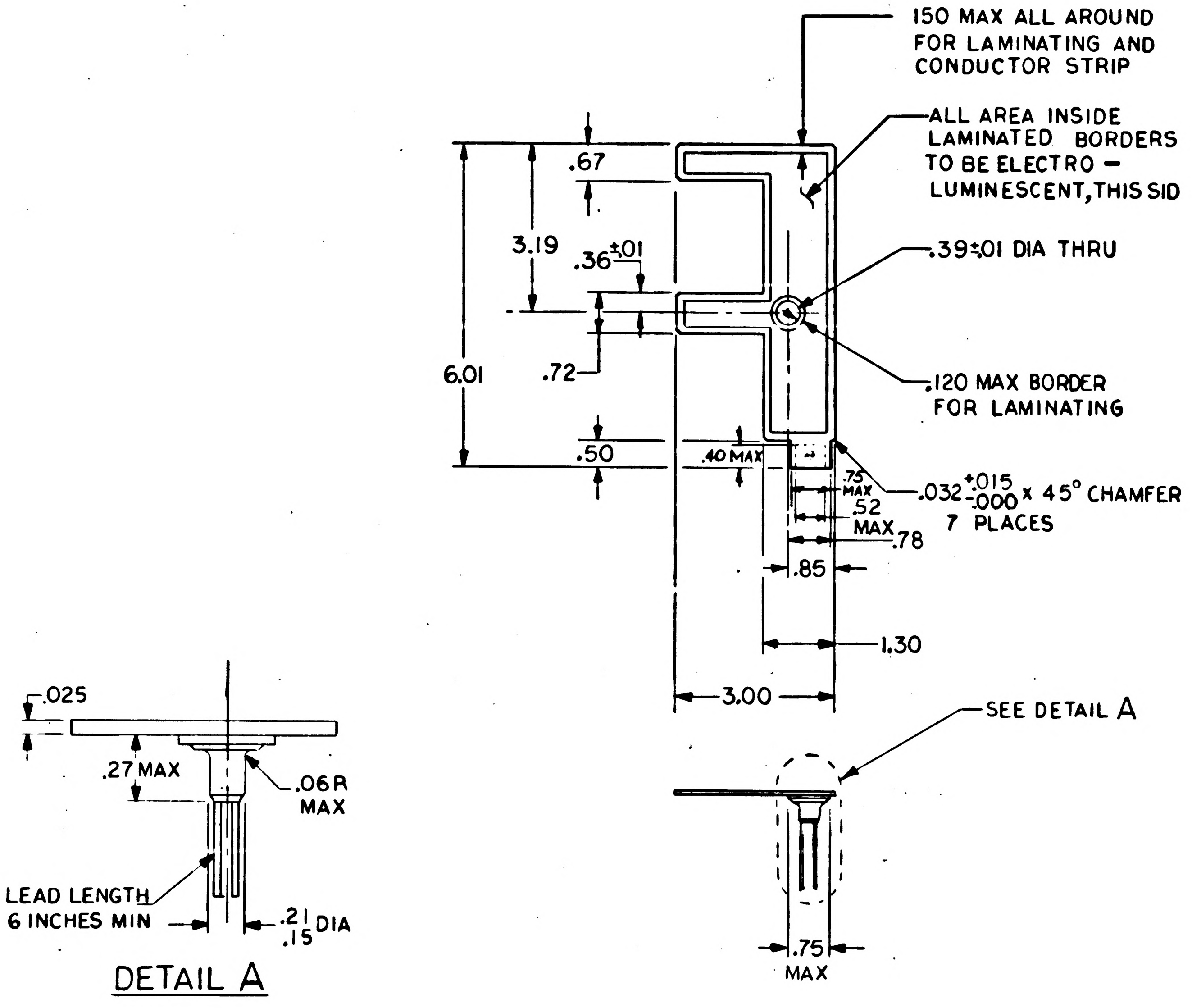
150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO - LUMINESCENT, THIS SID
.39±.01 DIA THRU
.120 MAX BORDER FOR LAMINATING
.032 +.015 -.000 x 45° CHAMFER 7 PLACES
.67
3.19
.36±.01
.72
6.01
.50
.40 MAX
.75 MAX
.52 MAX
.78
.85
1.30
3.00
SEE DETAIL A
.75 MAX
.025
.27 MAX
.06R MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
DETAIL A

FIGURE 5

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 5 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

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CHECKED	Rurtogue	27 Jun 67
APPROVED	C.R. Crane	27 Jun 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	Aug 23 67
APPROVED MSC		9/13/67
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 6 OF 13

1008944 A

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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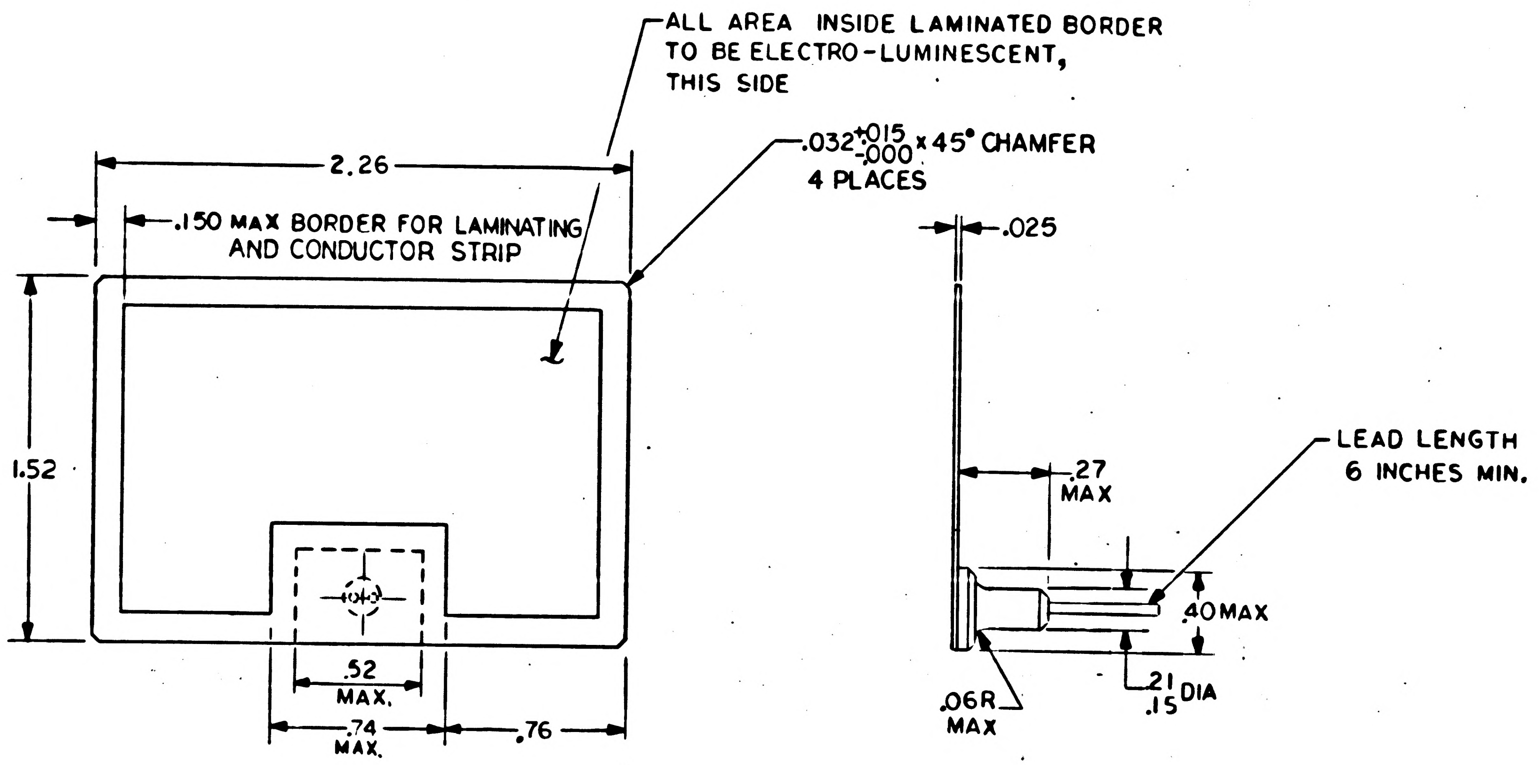

ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
2.26
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
.150 MAX BORDER FOR LAMINATING AND CONDUCTOR STRIP
.025
1.52
.27 MAX
LEAD LENGTH 6 INCHES MIN.
.40 MAX
.52 MAX.
.74 MAX.
.76
.06R MAX
.21 .15 DIA

FIGURE 6

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W Knoll	26 JUNE 67
CHECKED RuHogue	27 JUN 67
APPROVED CR Cronan	27 June 67
APPROVED NAS 9-497	
APPROVED MIT Paul Watson	Aug. 23, 67
APPROVED MSC	9/1
	DATE

LAMP, ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

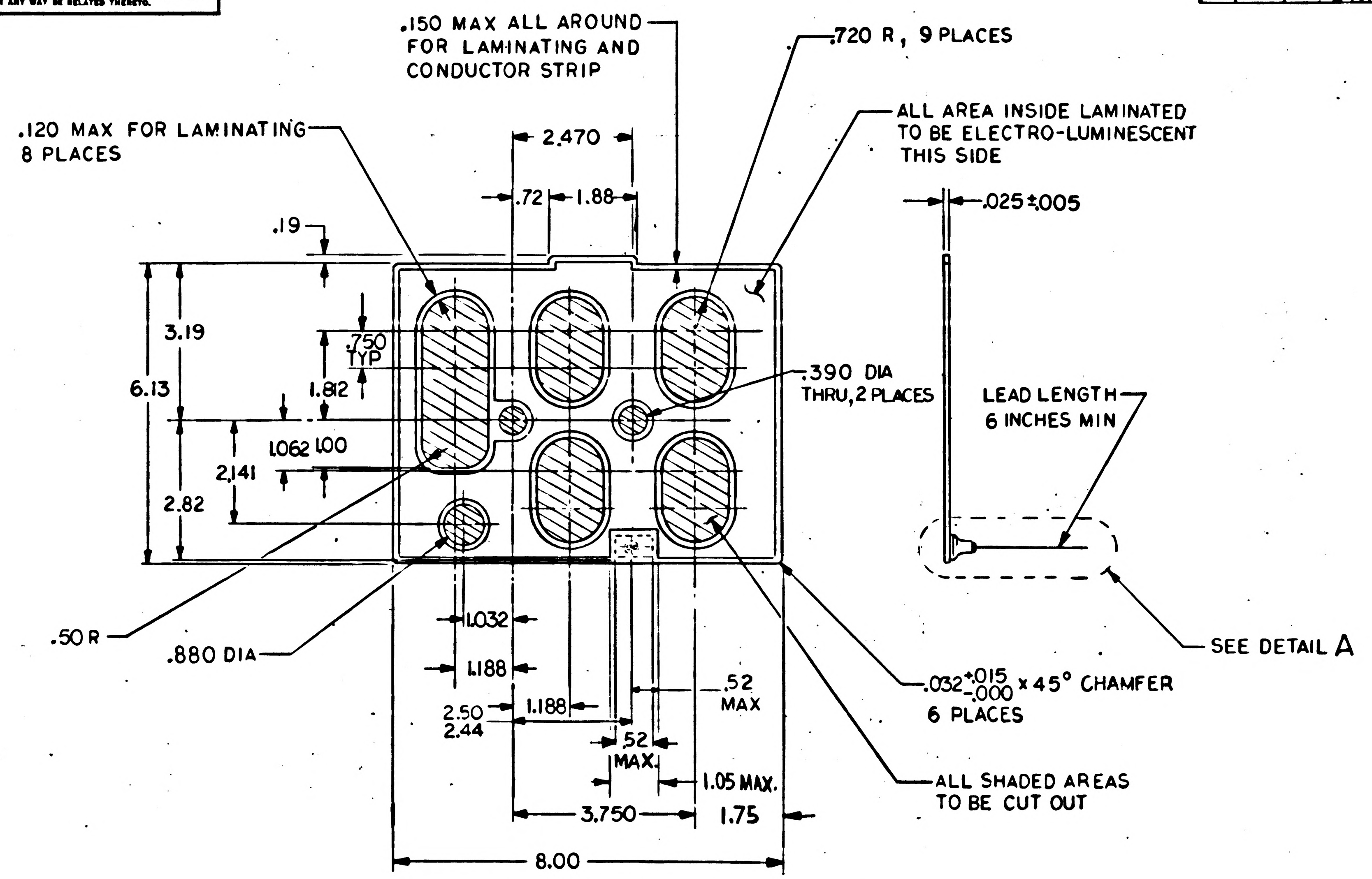
CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 7 OF 13

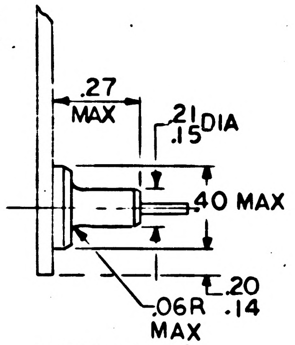
1008944 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	


.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.720 R, 9 PLACES
ALL AREA INSIDE LAMINATED TO BE ELECTRO-LUMINESCENT THIS SIDE
.120 MAX FOR LAMINATING 8 PLACES
2.470
.72
1.88
.025±.005
.19
3.19
.750 TYP
6.13
1.812
.390 DIA THRU, 2 PLACES
LEAD LENGTH 6 INCHES MIN
1.062
1.00
2.141
2.82
.50 R
.880 DIA
1.032
1.188
SEE DETAIL A
.032 +.015 -.000 x 45° CHAMFER 6 PLACES
.52 MAX
2.50
2.44
1.188
.52 MAX
ALL SHADED AREAS TO BE CUT OUT
1.05 MAX.
3.750
1.75
8.00


.27 MAX
.21
.15 DIA
.40 MAX
.20
.14
.06R MAX

DETAIL A

FIGURE 7

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
~~CAPACITOR VALUES ARE IN μF~~
~~RESISTOR VALUES ARE IN OHMS~~
TOLERANCES ON

2 PLC DEC.	3 PLC DEC.	ANGLES
±.02	±.010	± 5°

DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

NEXT ASSY	USED ON

APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W Knoll	26 JUNE 67
CHECKED	R W Hogue	27 JUN 67
APPROVED	C R Crona	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Carl Watson	AUG 23 67
APPROVED MSC		9/14/67
		DATE

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HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO	SIZE	DRAWING NO.
80230	C	1008944

SCALE ——

SHEET 8 OF 13

1008944 A

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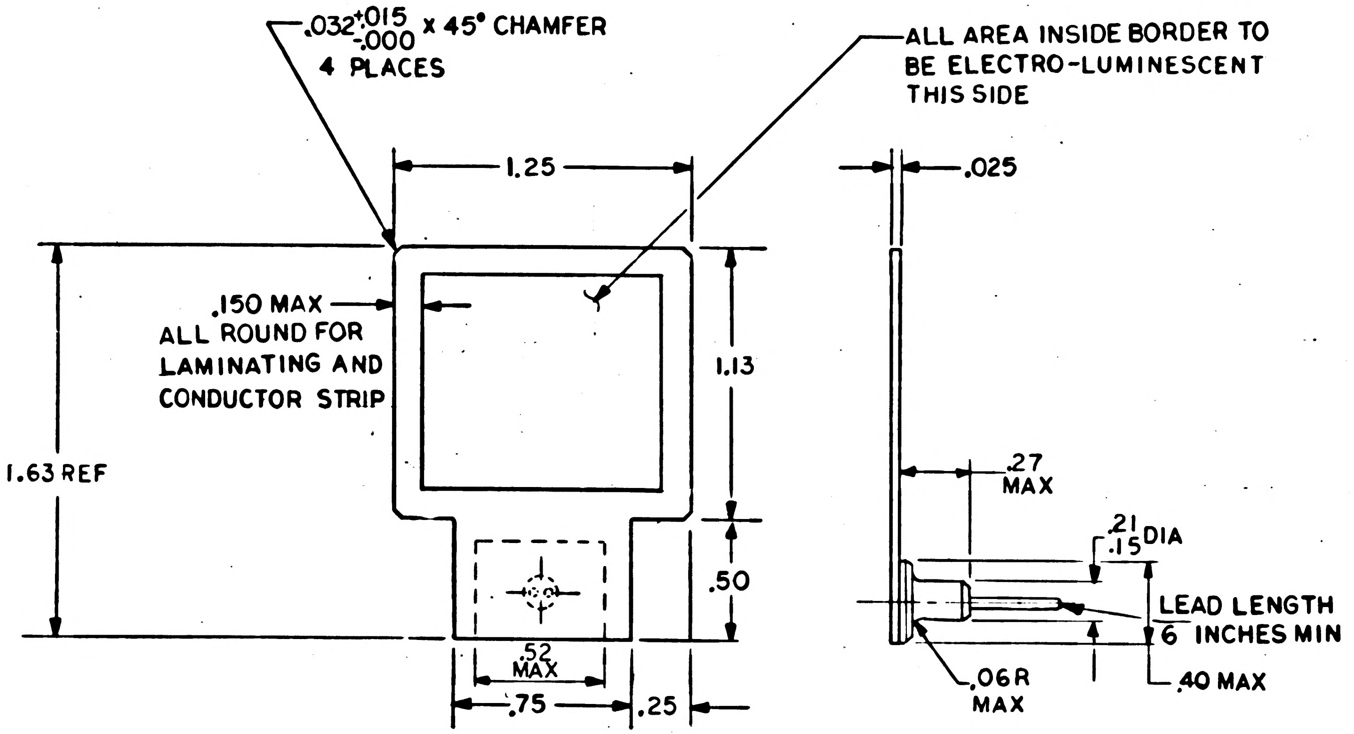
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 Sept 67	

1008944 A



.032 +.015 -.000 X 45° CHAMFER 4 PLACES
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.025
.150 MAX ALL ROUND FOR LAMINATING AND CONDUCTOR STRIP
1.13
1.63 REF
.27 MAX
.21 .15 DIA
LEAD LENGTH 6 INCHES MIN
.50
.52 MAX
.75
.25
.06R MAX
.40 MAX

FIGURE 8

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W. Knell 26 June 67
CHECKED R. Hogue 27 JUN 67
APPROVED C R Crane 27 June 67
APPROVED
NAS 9-497
APPROVED MIT Paul Watson AUG 23, 67
APPROVED MSC 9/13/67
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 9 OF 13

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED - DRR 34643	DG	JAC	21 SEPT 68	

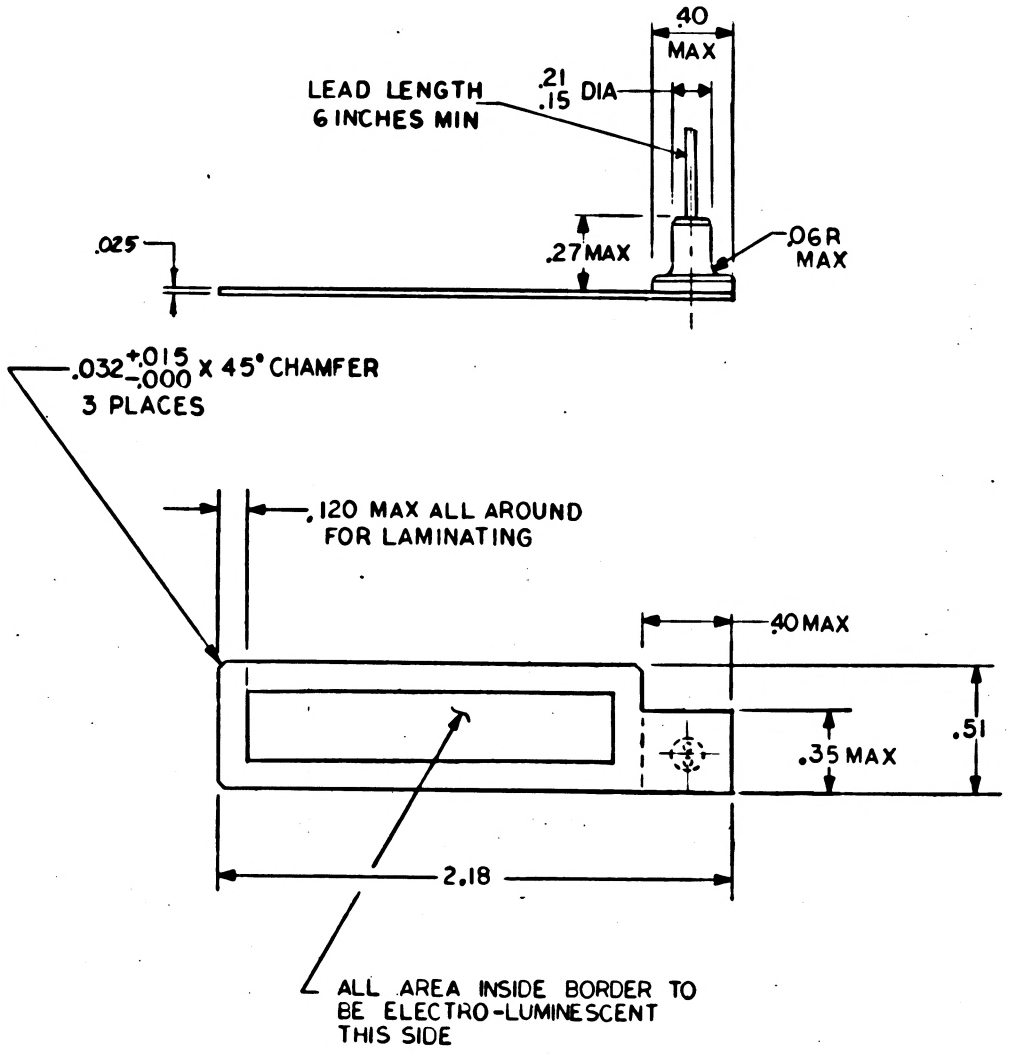

.40 MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
.27 MAX
.06 R MAX
.025
.032 +.015 -.000 X 45° CHAMFER 3 PLACES
.120 MAX ALL AROUND FOR LAMINATING
.40 MAX
.35 MAX
.51
2.18
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE

FIGURE 9

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC 3 PLC DEC ANGLES
±.02 ±.005 ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Knoll	26 JUN 67
CHECKED	R. Hogue	27 JUN 67
APPROVED	C.R. Crom	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	AUG. 23, 67
APPROVED MSC		9/13/67
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO	SIZE	DRAWING NO
80230	C	1008944

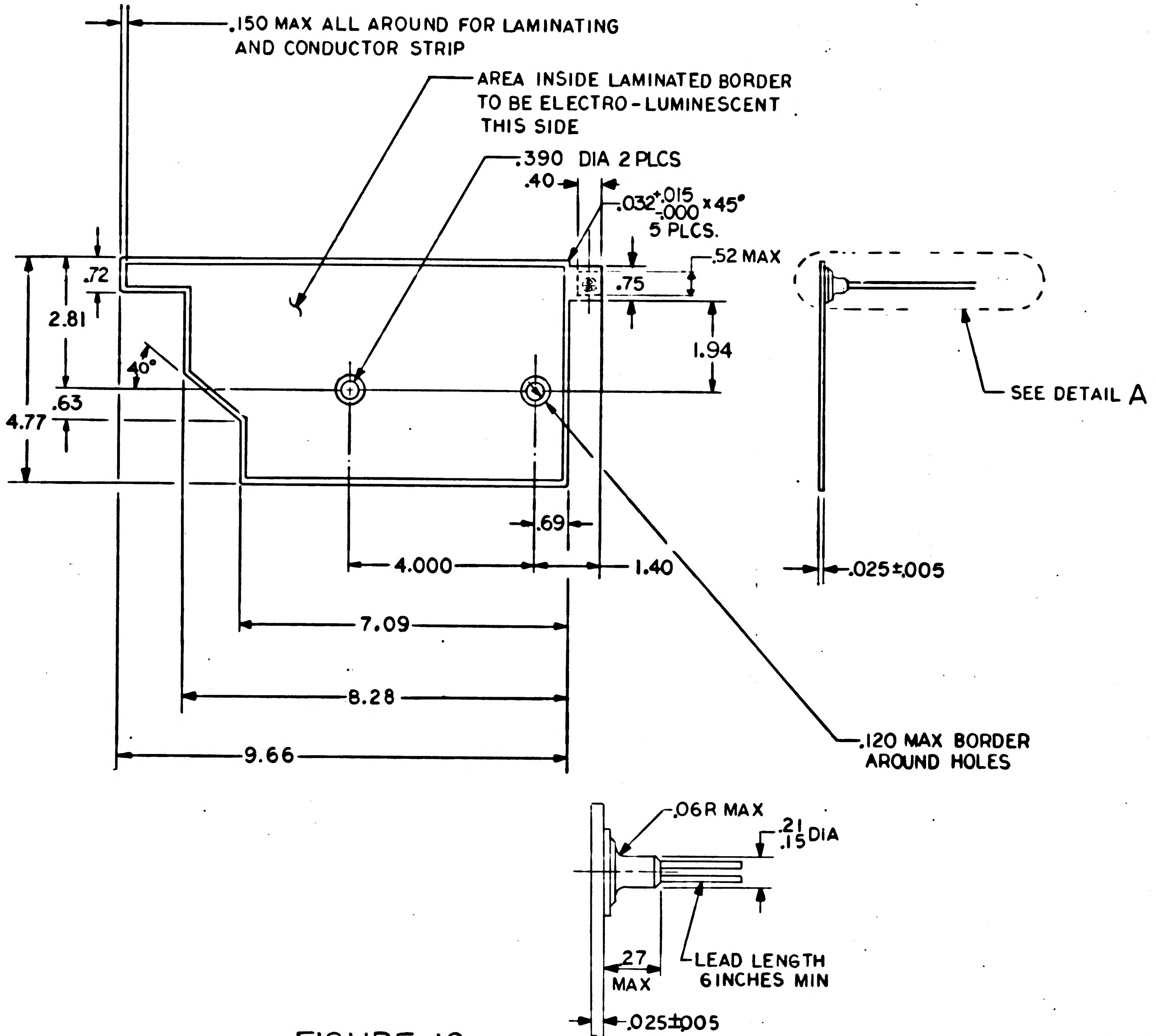
SCALE —— SHEET 10 OF 13

1008944 A

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	



.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
.390 DIA 2 PLCS
.40
.032 +.015 -.000 x 45° 5 PLCS.
.52 MAX
.72
.75
2.81
1.94
40°
.63
4.77
.69
4.000
1.40
7.09
8.28
9.66
.120 MAX BORDER AROUND HOLES
SEE DETAIL A
.025±.005
.06R MAX
.21 .15 DIA
.27 MAX
LEAD LENGTH 6 INCHES MIN
.025±.005

FIGURE 10

DETAIL A

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC. 3 PLC DEC. ANGLES
±.02 ±.010 ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Knall	26 June 67
CHECKED	R. Hogue	27 JUN 67
APPROVED	C.R. Crane	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	AUG 23 67
APPROVED MSC		9/12/67
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE ——		SHEET 11 OF 13

1008944 A

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISION STATUS CHANGED TDRR 34643	21 SEP 67	DG JAC

REQUIREMENTS: (CONTINUED)

2. ACCEPTANCE AND INSPECTION (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) VISUAL INSPECTION: EACH LAMP TERMINATION AREA SHALL BE INSPECTED UNDER MAGNIFICATION AND COMPARED TO CONTAMINATION STANDARDS SELECTED AND APPROVED BY SUPPLIER AND USER FOR THE FOLLOWING:
       - a. PARTICLE CONTAMINATION WITHIN, WHEN VIEWED UNDER 10X MAGNIFICATION.
       - b. SCRATCHES, CHIPS, PITTING AND CRACKS ON THE EXTERNAL SURFACE WHEN VIEWED UNDER 10X MAGNIFICATION.
       - c. THE ENCAPSULATED CONDUCTORS SHALL BE FREE OF BENDS, KINKS AND OTHER PROTRUSIONS WHICH WOULD CAUSE THEM TO BE EXPOSED ON THE SURFACE.
     - (2) DIMENSIONS: SHALL BE AS SHOWN PER TABLE NO. I.
     - (3) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING A 2 POUND AXIAL PULL.
     - (4) LEAD MATERIAL: SHALL BE PER MIL-W-16878 (TYPE E-26). THE LEAD CONNECTED TO THE ELECTRO-LUMINESCENT SIDE SHALL HAVE LIGHT BROWN INSULATION AND THE LEAD CONNECTED TO THE REVERSE SIDE SHALL HAVE BLACK INSULATION. THE COLORS SHALL BE EASILY DISCERNIBLE.
   - B. ELECTRICAL AND PHOTOMETRIC PROPERTIES:
     - (1) TRANSIENT VOLTAGE: THE LAMP SHALL BE EXCITED WITH 160 ± 5 VOLTS RMS 400 Hz, FOR 5 SECONDS MINIMUM. AFTER APPLICATION OF THIS VOLTAGE THE LAMP MUST BE CAPABLE OF MEETING THE OTHER REQUIREMENTS OF SECTION B.
     - (2) LIGHT INTENSITY: 1.2 TO 2.0 FOOT-LAMBERTS INITIALLY WHEN EXCITED WITH 75 ± 1.0 VOLTS RMS, 400 ± 10 Hz.
     - (3) CURRENT: PER TABLE NO. I, WHEN EXCITED PER 2.B.(2).
     - (4) POWER: PER TABLE NO. I, WHEN EXCITED PER 2.B.(2).
     - (5) LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE AS SPECIFIED IN 3.F.(1). AS DETERMINED BY MEASUREMENT OF A REPRESENTATIVE SAMPLE OF EACH PRODUCTION RUN AND VISUAL COMPARISON OF THE LAMPS WITH THE SAMPLE.
     - (6) DC INSULATION RESISTANCE: THE LEADS OF THE LAMP SHALL BE CONNECTED TOGETHER AND THE LAMP IMMERSED IN A 1% SOLUTION OF SALT WATER. THE DC RESISTANCE MEASURED BETWEEN THE LEADS AND THE WATER SHALL NOT BE LESS THAN 10 MEGOHMS.

3. DESIGN REQUIREMENTS:
   - A. OPERATING LIFE: 2000 HOURS MINIMUM AT 25°C WITH A LOSS OF NOT MORE THAN 90% OF ORIGINAL LIGHT INTENSITY. MEASUREMENTS ACCOMPLISHED WHEN EXCITED PER 2.B.(2). AT 25°C.
   - B. STORAGE LIFE: 1 YEAR MINIMUM WITHOUT LOSS OF ELECTRICAL PERFORMANCE AT 0° TO +65°C.
   - C. OPERATING TEMPERATURE RANGE: -55°C TO +65°C. ACCELERATED LIFE DEGRADATION IS NOTED WITH OPERATION AVOBE 25°C.
   - D. SEAL: THE LAMPS SHALL BE SUBJECTED TO THE IMMERSION TEST (CONDITION B) SPECIFIED IN MIL-STD-202C. THE LIGHT INTENSITY OF PARAGRAPH 2.B.(2) AND THE DC INSULATION RESISTANCE OF PARAGRAPH 2.B.(6) SHALL BE CHECKED AFTER THE IMMERSION AS ACCEPTANCE CRITERIA.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN W. Knoll DATE 26 JUN 67
CHECKED R. Hogue 27 JUN 67
APPROVAL C R Cronin 27 June 67
CONTRACT NAS 9-497
NASA APPROVAL 9/21/67
Paul Watson 6/23/67
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008944
SCALE —
SHEET 12 OF 13

MIL-1008C D

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	REVISION STATUS CHANGED TDRR 34643	21 sept 67	DG / JAC

REQUIREMENTS: (CONTINUED)

E. MATERIAL:
  (1) ACLAR ENCAPSULATED ELECTRO-LUMINESCENT LAMP.
  (2) THE LEAD INSULATION SHALL BE CHEMICALLY TREATED IN A MANNER TO ALLOW ADHESIVE BONDING OR POTTING AND ALLOW THE UNIT TO MEET THE IMMERSION TEST REQUIREMENT OF 3.D.
  (3) THE ENCAPSULATED LEADS SHALL BE ALUMINUM FOIL.
  (4) NO MATERIAL SHALL BE USED AS AN OVERCOAT OR PROTECTIVE COVERING TO INSURE AN ADEQUATE SEAL OR PROTECTION.

F. RATING:
  (1) LIGHT OUTPUT COLOR: X - 0.33 ± 0.02, Y = 0.33 ± 0.02 PER CIE DIAGRAM.
  (2) MAX. CONTINUOUS VOLTAGE: 120 V RMS 400 H_Z.
  (3) UNIFORMITY OF LIGHT INTENSITY: THE LIGHT INTENSITY SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN 10%.
  (4) UNIFORMITY OF LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN THE TOLERANCE SPECIFIED IN 3.F.(1).

4. SPECIAL CONDITIONING BY MANUFACTURER:

A. ALL LAMPS SHALL BE BURNED-IN FOR A PERIOD OF 50 TO 100 HOURS PRIOR TO THE ACCEPTANCE AND INSPECTION TESTS IN 2.B. ABOVE. THE BURN-IN CONDITIONS SHALL BE AS FOLLOWS:
  (1) TEMPERATURE: 25° ± 5°C.
  (2) OPERATING VOLTAGE: 115 ± 10 V RMS, 60 ± 5 H_Z FOR THE FIRST 50 HOURS, AND 120 V RMS, 400 ± 10 H_Z FOR REMAINDER OF BURN-IN.

1008944

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + — −
3 PLACE DECIMALS + — −
ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN W Knoll DATE 26 June 67
CHECKED Rw Hogue 27 JUN 67
APPROVAL C.R. Crone 27 Jun 67
CONTRACT NAS 9-497
NASA APPROVAL Paul Watson AUG 23 67
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008944
SCALE —
SHEET 3 OF 13

MIL-1092C D

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		INITIAL RELEASE CLASS A PER TDRR 34643	DG	JAC	21 SEPT 67	
B		REVISED PER TDRR34833	B.	CP	17-OCT -67	

REQUIREMENTS

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISION CONTAINED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS OF ND 1002056, EXCEPT THAT THE MAXIMUM TEMPERATURE RANGE SHALL BE PER 3.C. (TO BE QUALIFIED BY USER).
   - D. PART MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED, IN ACCORDANCE WITH ND 1002019, WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, LOT CODE OR NUMBER, TERMINAL IDENTIFICATION AND NASA PART NUMBER
   - E. PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS 1, CODE 1.
     - (1) MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215, CLASS 1, CODE 2.

REQUIREMENTS CONTINUED ON SHEET 12

TABLE NO. 1

DASH NO.	FIGURE	CURRENT-MAX MILLIAMPERES	POWER-MAX WATTS
001	1	80	1.560
002	2	5	.096
003	3	6	.104
004	4	2	.032
005	5	17	.268
006	6	5	.088
007	7	50	.960
008	8	2	.032
009	9	1	.016
010	10	70	1.400

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Knoll 26 JUNE 67
CHECKED 27 JUN 67
APPROVED 27 June 67
APPROVED NAS 9-497
APPROVED MIT Paul Watson AUG 23 67
APPROVED MSC 9/13/17
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 1 OF 13

1008944 B

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 Sept 67	SmA
B		REVISION STATUS CHANGED	B.		17-OCT-67	

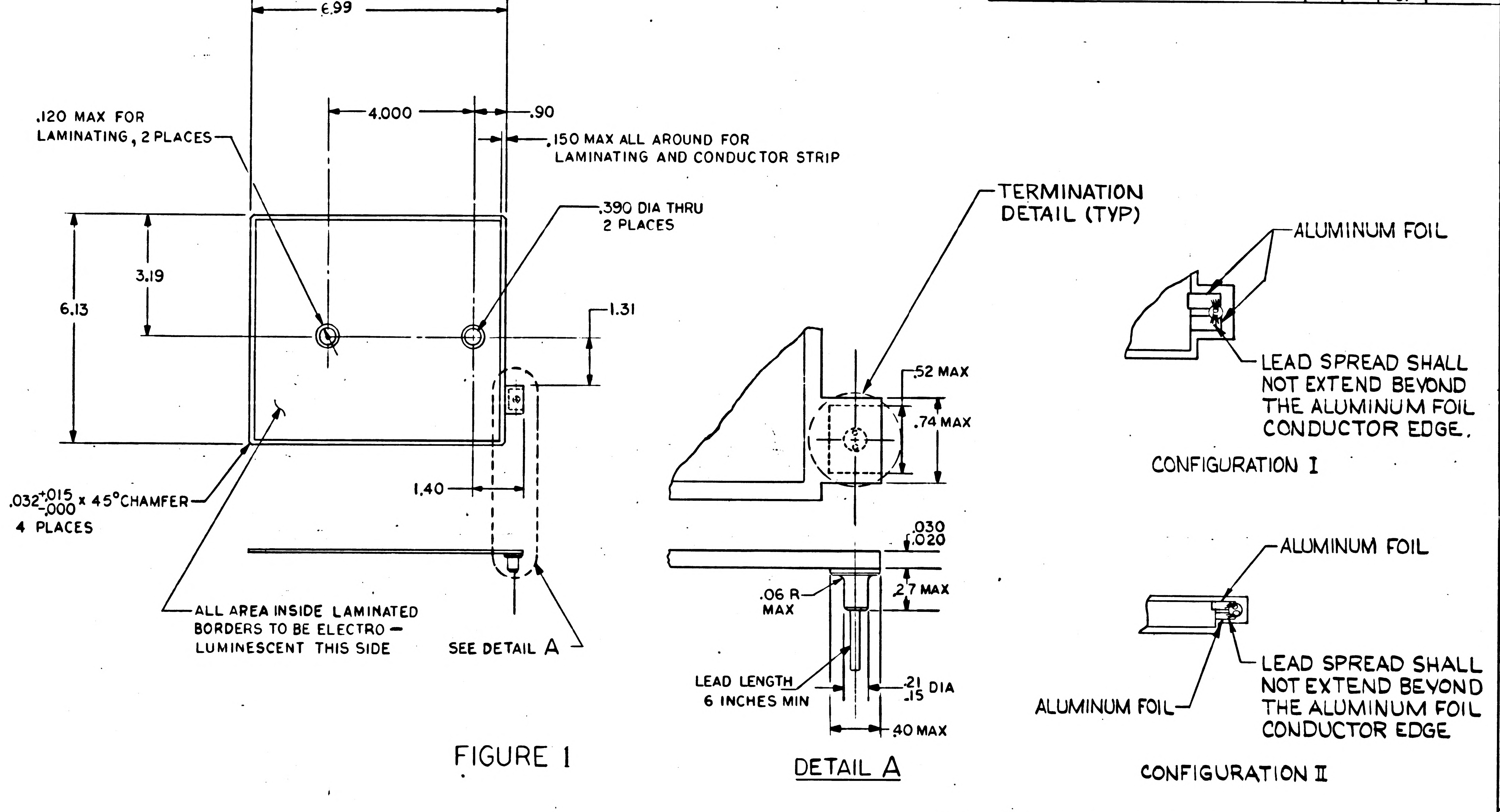

6.99
4.000
.90
.120 MAX FOR LAMINATING, 2 PLACES
.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.390 DIA THRU 2 PLACES
3.19
6.13
1.31
1.40
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO-LUMINESCENT THIS SIDE
SEE DETAIL A
TERMINATION DETAIL (TYP)
.52 MAX
.74 MAX
.030 .020
.27 MAX
.06 R MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
.40 MAX
ALUMINUM FOIL
LEAD SPREAD SHALL NOT EXTEND BEYOND THE ALUMINUM FOIL CONDUCTOR EDGE.
CONFIGURATION I
ALUMINUM FOIL
ALUMINUM FOIL
LEAD SPREAD SHALL NOT EXTEND BEYOND THE ALUMINUM FOIL CONDUCTOR EDGE
CONFIGURATION II

FIGURE 1

DETAIL A

1008944 B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Knoll	26 JUN 67
CHECKED	Rutogue	27 JUN 67
APPROVED	C R Cronan	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul [illegible]	AUG 23, 67
APPROVED MSC		9 13 67
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP, ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944

SCALE ——— SHEET 2 OF

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
Ⓜ A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	FmA
B		REVISION STATUS CHANGED	B.		17-OCT-67	

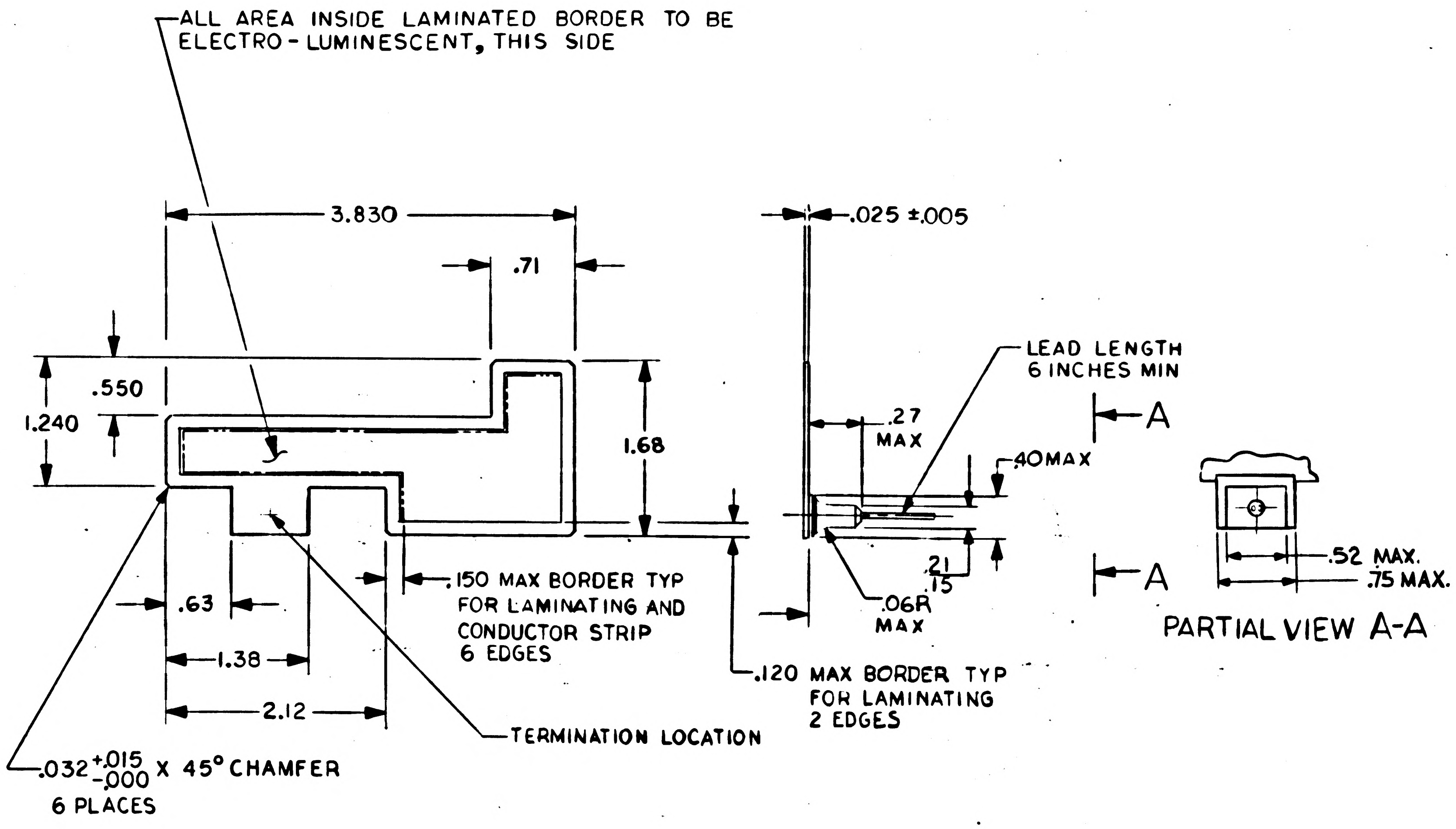

ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
3.830
.71
.550
1.240
1.68
.63
1.38
2.12
.150 MAX BORDER TYP FOR LAMINATING AND CONDUCTOR STRIP 6 EDGES
TERMINATION LOCATION
.032 +.015 -.000 X 45° CHAMFER 6 PLACES
.025 ±.005
LEAD LENGTH 6 INCHES MIN
.27 MAX
.40 MAX
.21
.15
.06R MAX
.120 MAX BORDER TYP FOR LAMINATING 2 EDGES
A
A
.52 MAX.
.75 MAX.
PARTIAL VIEW A-A

FIGURE 2

1008944 B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.015 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W Knoll 26 JUNE 67
CHECKED RwHogue 27 JUN 67
APPROVED CR Craven 27 June 67
APPROVED Paul Watson Aug. 23,67
NAS9-497
APPROVED CCD
APPROVED MSC A C M 9/3/67
DATE

LAMP, ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 3 OF

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 Sept. 67	
B		REVISED PER TDRR 34833	B.	CP	17-OCT -67	

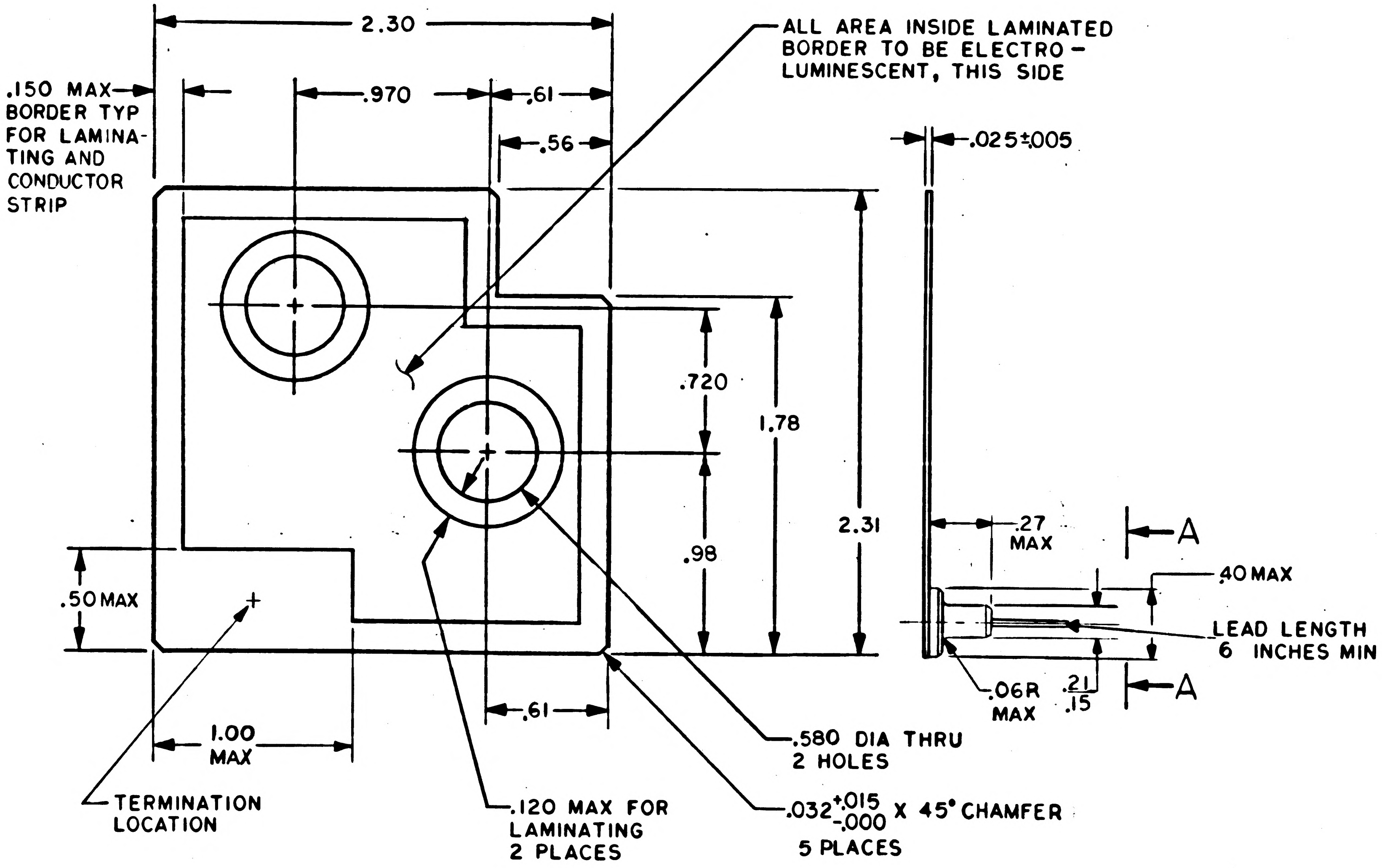
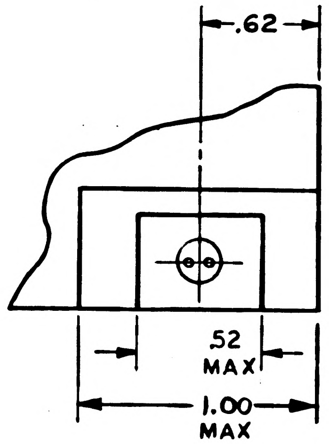

2.30
.150 MAX
BORDER TYP
FOR LAMINA-
TING AND
CONDUCTOR
STRIP
.970
.61
.56
ALL AREA INSIDE LAMINATED
BORDER TO BE ELECTRO-
LUMINESCENT, THIS SIDE
.025±.005
.720
1.78
2.31
.98
.27
MAX
A
.40 MAX
LEAD LENGTH
6 INCHES MIN
.06R
MAX
.21
.15
A
.50 MAX
.61
1.00
MAX
TERMINATION
LOCATION
.120 MAX FOR
LAMINATING
2 PLACES
.580 DIA THRU
2 HOLES
.032 +.015 -.000 X 45° CHAMFER
5 PLACES

FIGURE 3


.62
.52
MAX
1.00
MAX

PARTIAL VIEW A-A

1008944 B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W Knoll	26 June 67
CHECKED	RwHogue	27 JUN 67
APPROVED	C.R Craver	27 June 67
APPROVED		
APPROVED MIT	Paul Watson	Aug 23 67
APPROVED MSC		9/13/
		DATE

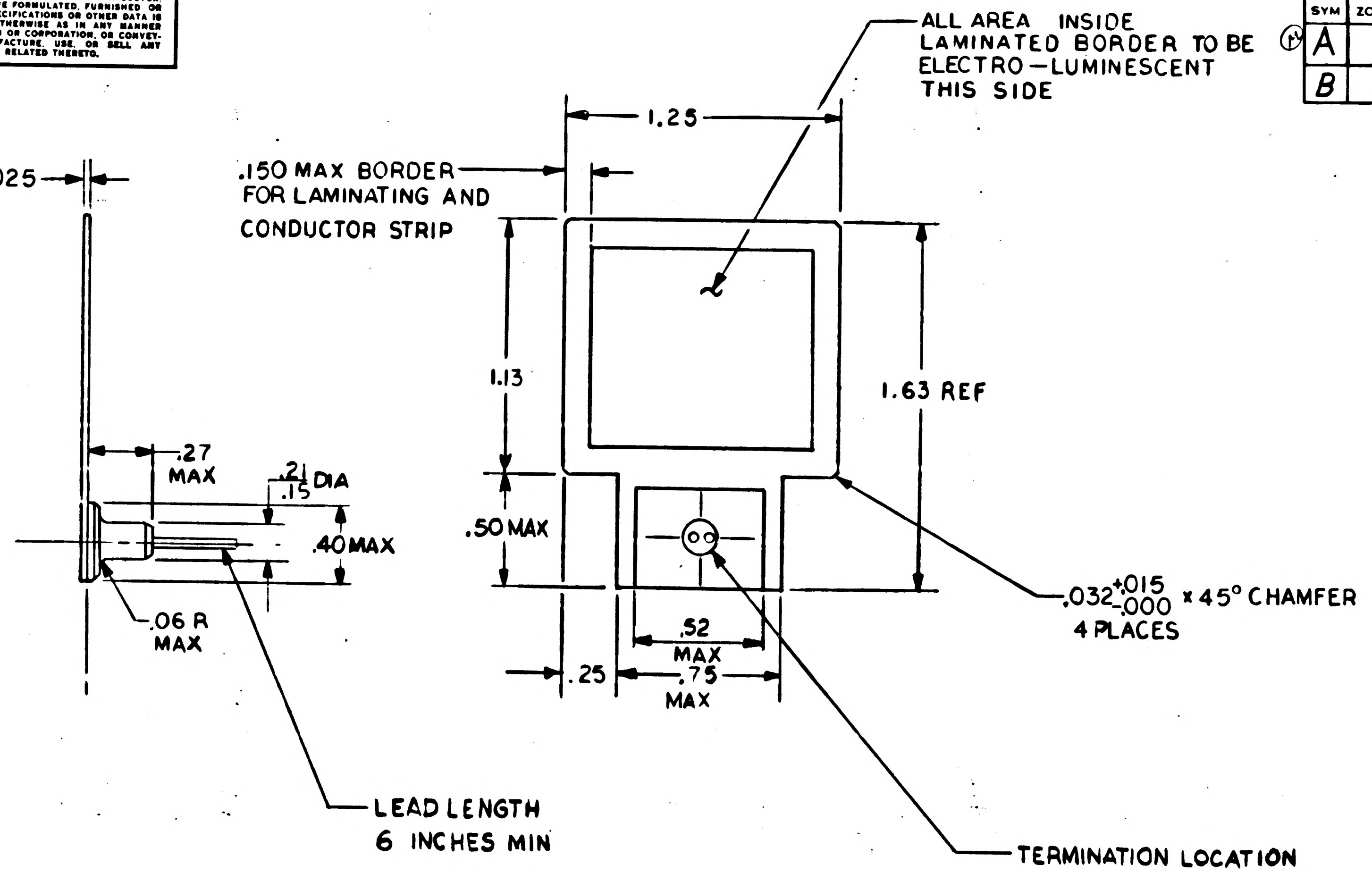
LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 4 OF

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	
B		REVISION STATUS CHANGED	B.		17-OCT-67	



ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.025
.150 MAX BORDER FOR LAMINATING AND CONDUCTOR STRIP
1.13
1.63 REF
.27 MAX
.21 / .15 DIA
.40 MAX
.50 MAX
.06 R MAX
.032 +.015 / -.000 × 45° CHAMFER 4 PLACES
.52 MAX
.25
.75 MAX
LEAD LENGTH 6 INCHES MIN
TERMINATION LOCATION

FIGURE 4

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W. Knoll 26 JUNE 67
CHECKED Rutlogue 27 JUN 67
APPROVED C.R. Cranor 27 June 67
APPROVED NAS 9-497
APPROVED MIT Paul Watson AUG 23, 67
APPROVED MSC A Cm
DATE

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 5 OF

1008944 B

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEP-67	
		REVISION STATUS CHANGED	B.		17-OCT-67	

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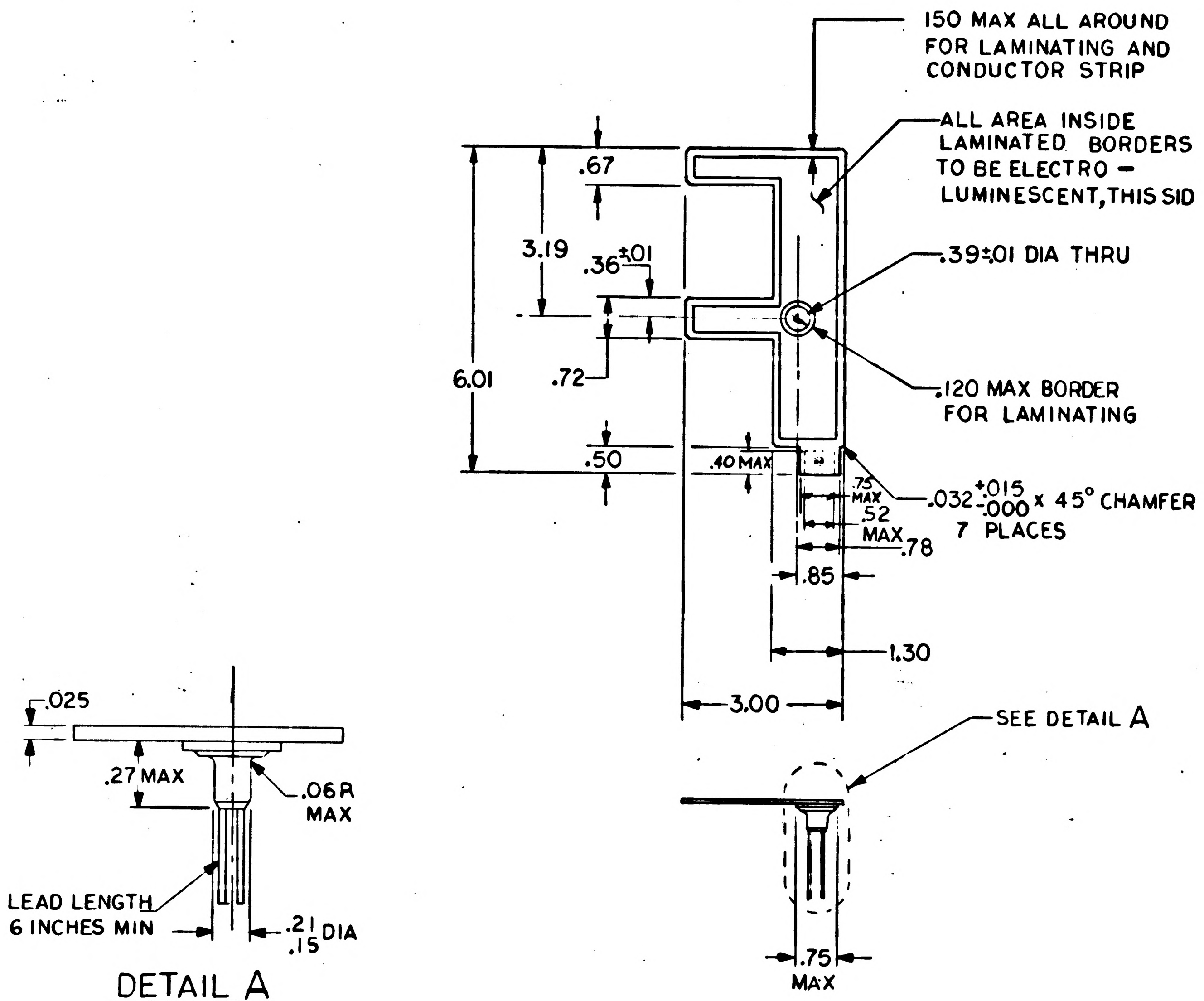
150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO – LUMINESCENT, THIS SID
.39±.01 DIA THRU
.120 MAX BORDER FOR LAMINATING
.032 +.015 -.000 x 45° CHAMFER 7 PLACES
.67
3.19
.36±.01
.72
6.01
.50
.40 MAX
.75 MAX
.52 MAX
.78
.85
1.30
3.00
SEE DETAIL A
.75 MAX
.025
.27 MAX
.06R MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
DETAIL A

FIGURE 5

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 5 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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DRAWN	W. Knoll	26 June 67
CHECKED	Rustogue	27 Jun 67
APPROVED	C.R. Crane	27 Jun 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	Nov. 23 67
APPROVED MSC		9/13/67
		DATE

LAMP
ELECTRO – LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944

SCALE —— SHEET 6 OF

1008944 B

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	
B		REVISION STATUS CHANGED	B.		17-OCT-67	

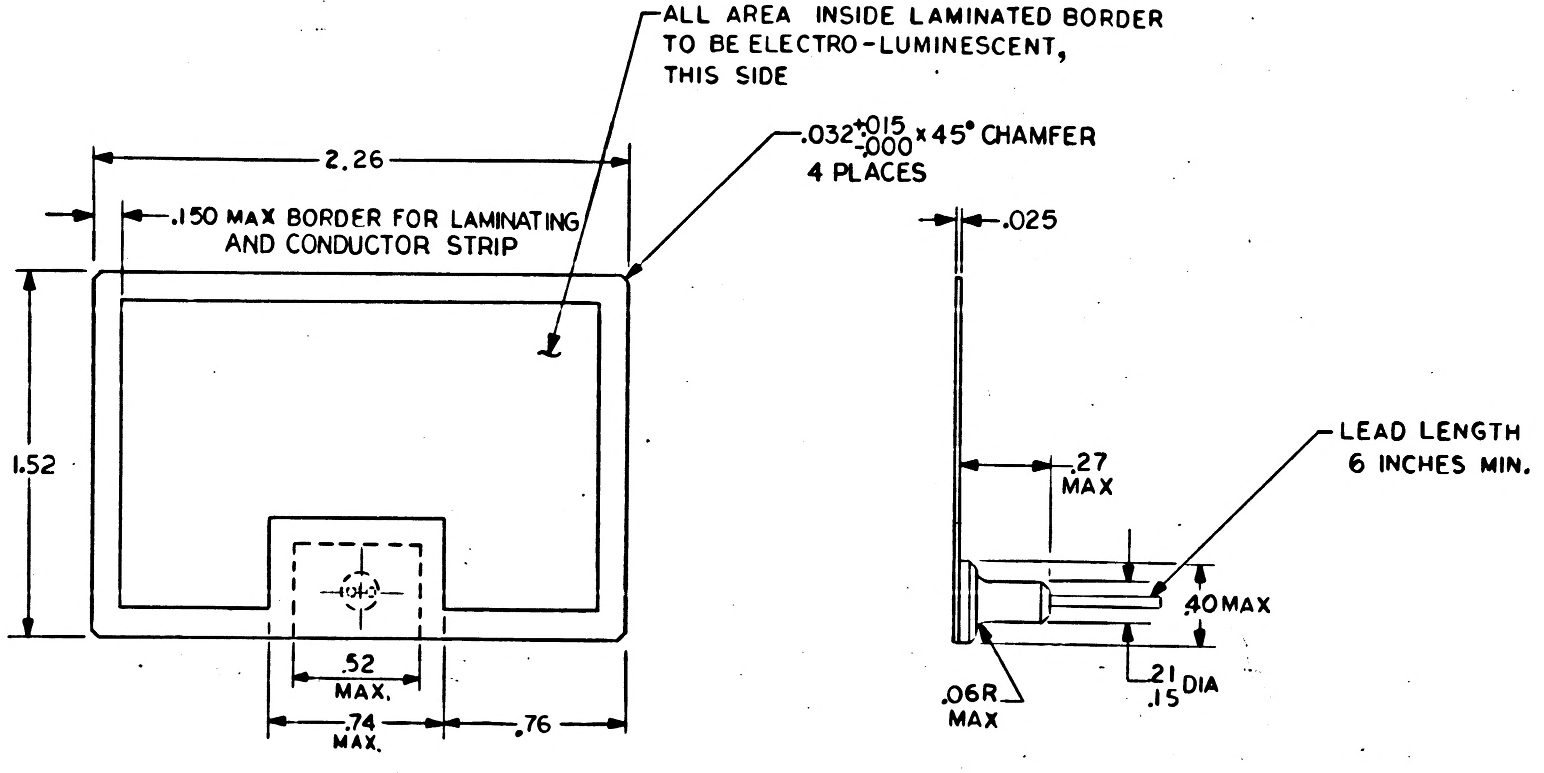
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
2.26
.150 MAX BORDER FOR LAMINATING AND CONDUCTOR STRIP
1.52
.52 MAX.
.74 MAX.
.76
.025
.27 MAX
LEAD LENGTH 6 INCHES MIN.
.40 MAX
.21 .15 DIA
.06R MAX

FIGURE 6

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W Knoll 26 JUNE 67
CHECKED RuHogue 27 JUN 67
APPROVED CR Crane 27 June 67
APPROVED
NAS 9-497
APPROVED M.I.T Paul Watson Aug. 23, 67
APPROVED MSC 9/1
DATE

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LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944

SCALE —
SHEET 7 OF

1008944 B

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
② A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	
B		REVISION STATUS CHANGED	B.		17-OCT-67	

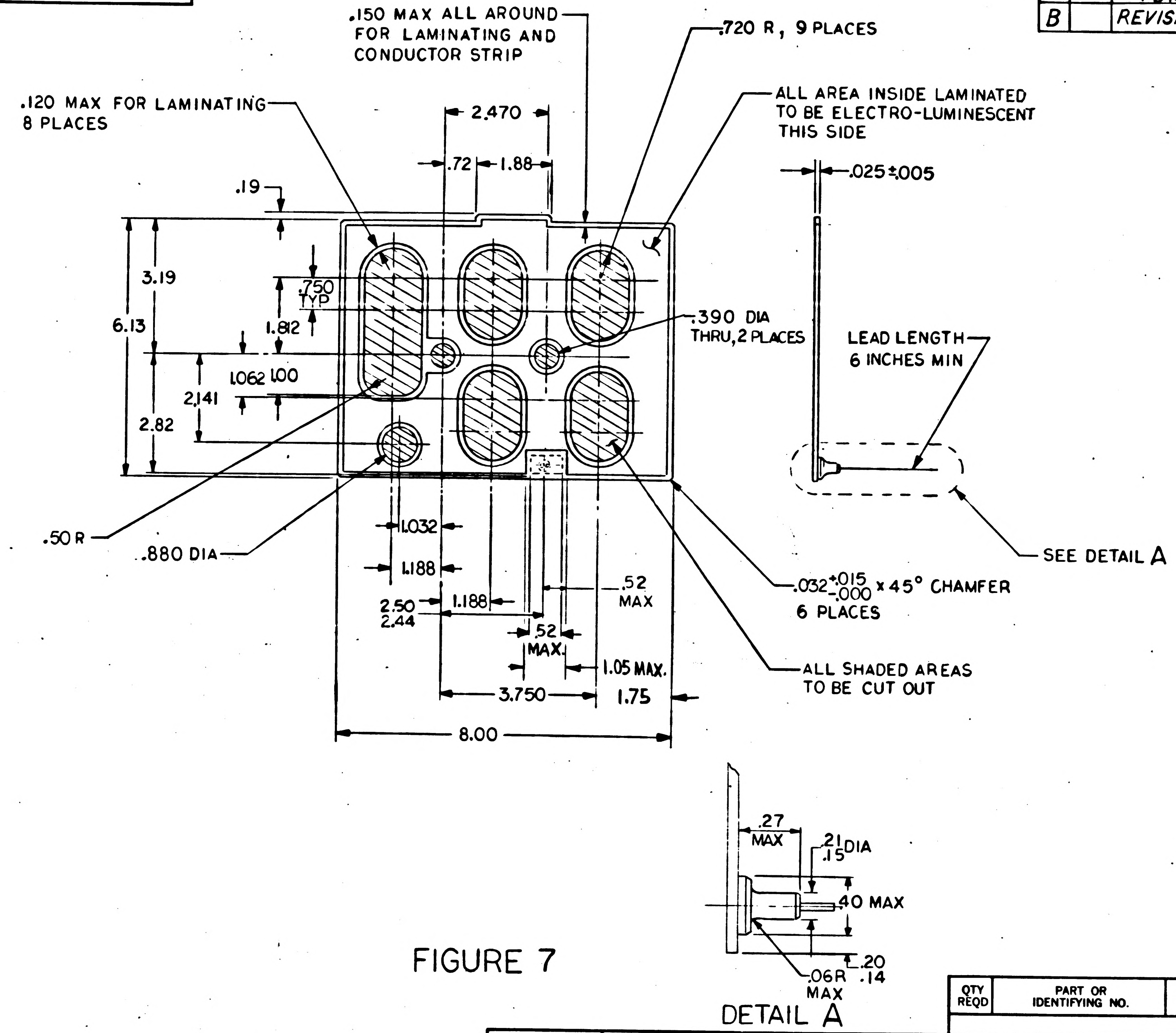

.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.720 R, 9 PLACES
.120 MAX FOR LAMINATING 8 PLACES
ALL AREA INSIDE LAMINATED TO BE ELECTRO-LUMINESCENT THIS SIDE
2.470
.72
1.88
.025±.005
.19
3.19
6.13
.750 TYP
1.812
.390 DIA THRU, 2 PLACES
LEAD LENGTH 6 INCHES MIN
1.062
1.00
2.141
2.82
.50 R
.880 DIA
1.032
1.188
2.50
2.44
1.188
.52 MAX
.52 MAX
1.05 MAX.
3.750
1.75
8.00
.032 +.015 -.000 x 45° CHAMFER 6 PLACES
ALL SHADED AREAS TO BE CUT OUT
SEE DETAIL A
.27 MAX
.21 .15 DIA
.40 MAX
.20 .14
.06R MAX
DETAIL A

FIGURE 7

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
~~CAPACITOR VALUES ARE IN µf~~
~~RESISTOR VALUES ARE IN OHMS~~
TOLERANCES ON
2 PLC DEC. ±.02 3 PLC DEC. ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W. Knoll 26 JUNE 67
CHECKED R.W. Hogue 27 JUN 67
APPROVED C R Crane 27 June 67
APPROVED
NAS 9-497
APPROVED MIT Paul Watson AUG. 23 67
APPROVED MSC 9/1/67
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

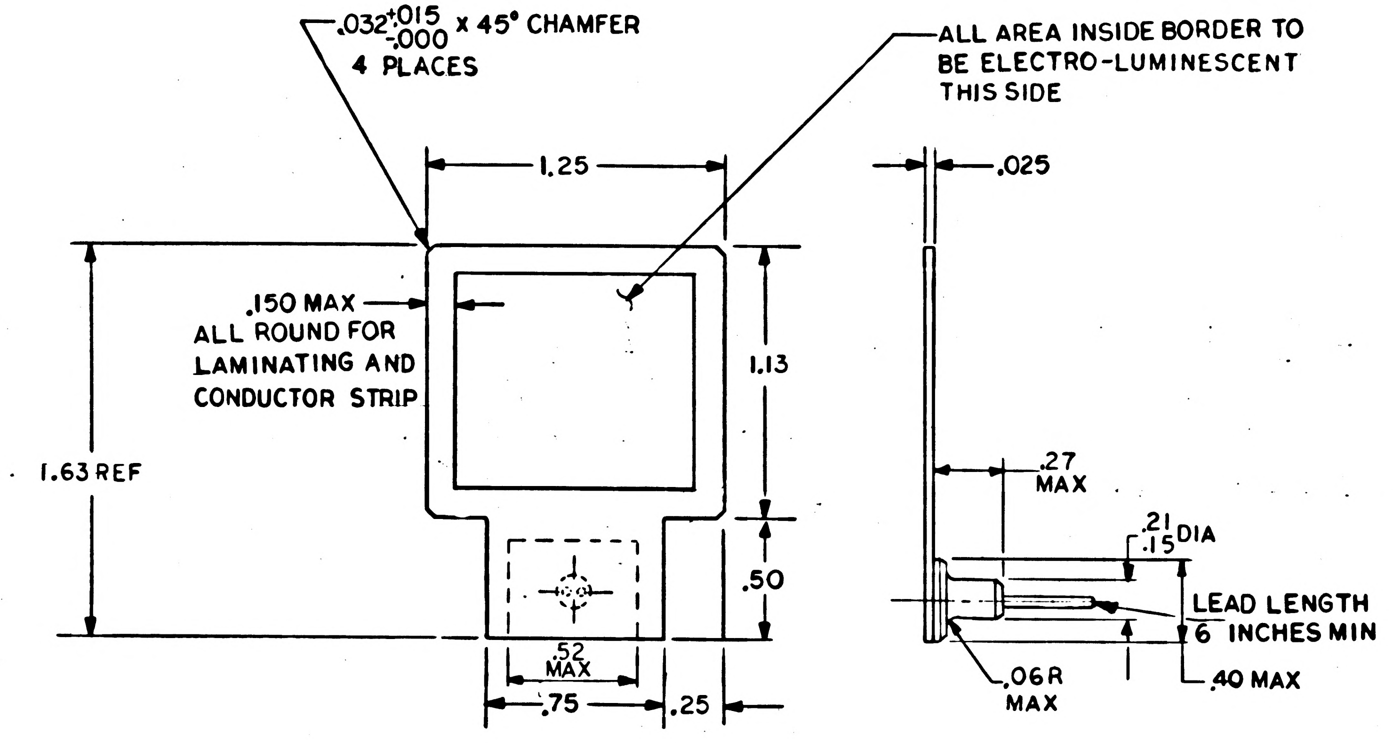
CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 8 OF

1008944 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21-SEP-67	
B		REVISION STATUS CHANGED	B.		17-OCT-67	



.032 +.015 -.000 x 45° CHAMFER
4 PLACES
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.025
.150 MAX
ALL ROUND FOR LAMINATING AND CONDUCTOR STRIP
1.13
1.63 REF
.27 MAX
.21 .15 DIA
.50
LEAD LENGTH 6 INCHES MIN
.52 MAX
.06 R MAX
.40 MAX
.75
.25

FIGURE 8

1008944 B

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Knoll	26 JUNE 67
CHECKED	R.W. Hogue	27 JUN 67
APPROVED	C.R. Crouse	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	AUG. 23, 67
APPROVED MSC		9/13/67
		DATE

LAMP ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 9 OF

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21 SEPT 67	
B		REVISED PER TDRR 34833	B.		17-OCT-67	

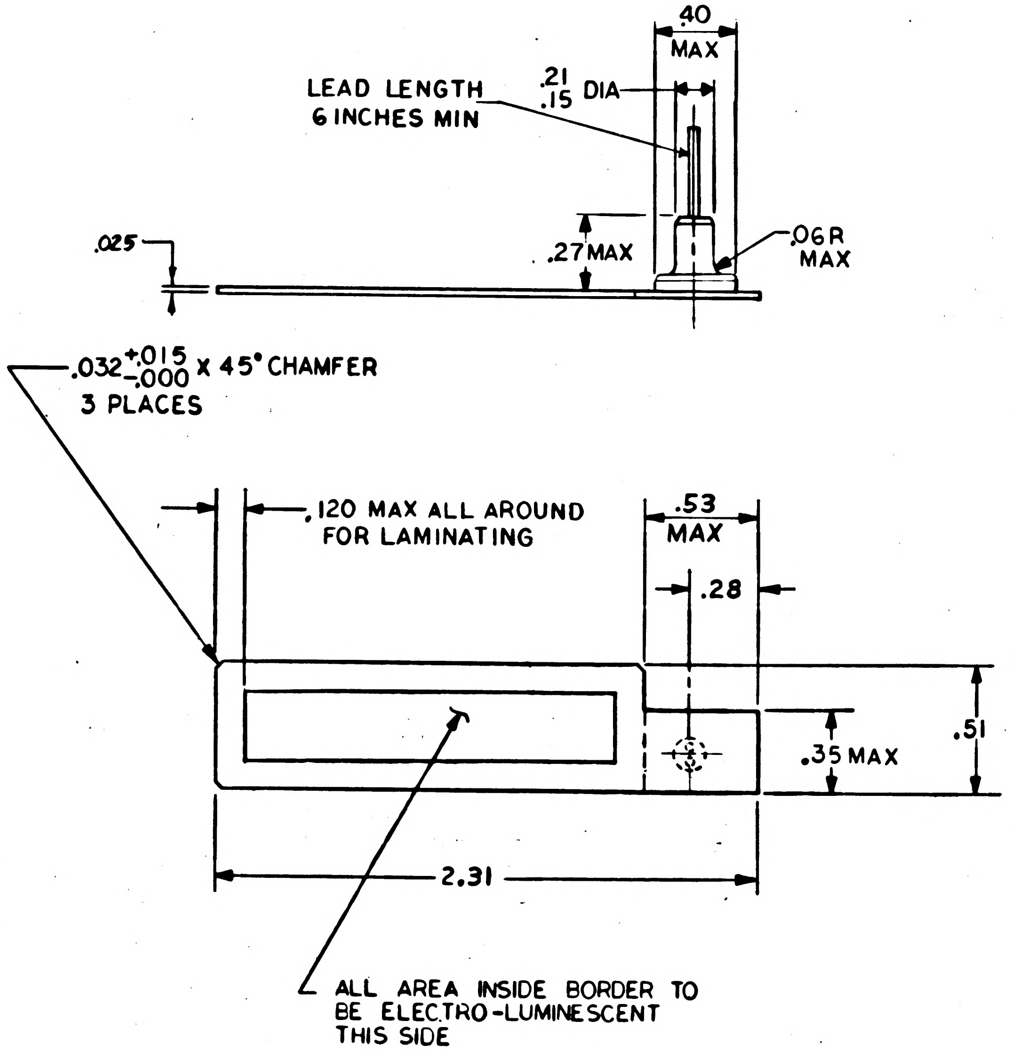

.40 MAX
LEAD LENGTH 6 INCHES MIN
.21 .15 DIA
.025
.27 MAX
.06R MAX
.032 +.015 -.000 X 45° CHAMFER 3 PLACES
.120 MAX ALL AROUND FOR LAMINATING
.53 MAX
.28
.35 MAX
.51
2.31
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE

FIGURE 9

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W. Knoll 26 JUN 67
CHECKED Ru Hogue 27 JUN 67
APPROVED C.R. Crowe 27 JUN 67
APPROVED
NAS 9-497
APPROVED MIT Paul Watson AUG. 23, 67
APPROVED MSC 9/13/67
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO 1008944
SCALE ——
SHEET 10 OF

1008944 B

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISION STATUS CHANGED TDRR 34643	DG	JAC	21-SEP-67	
B		REVISION STATUS CHAGED	B.		17-OCT-67	

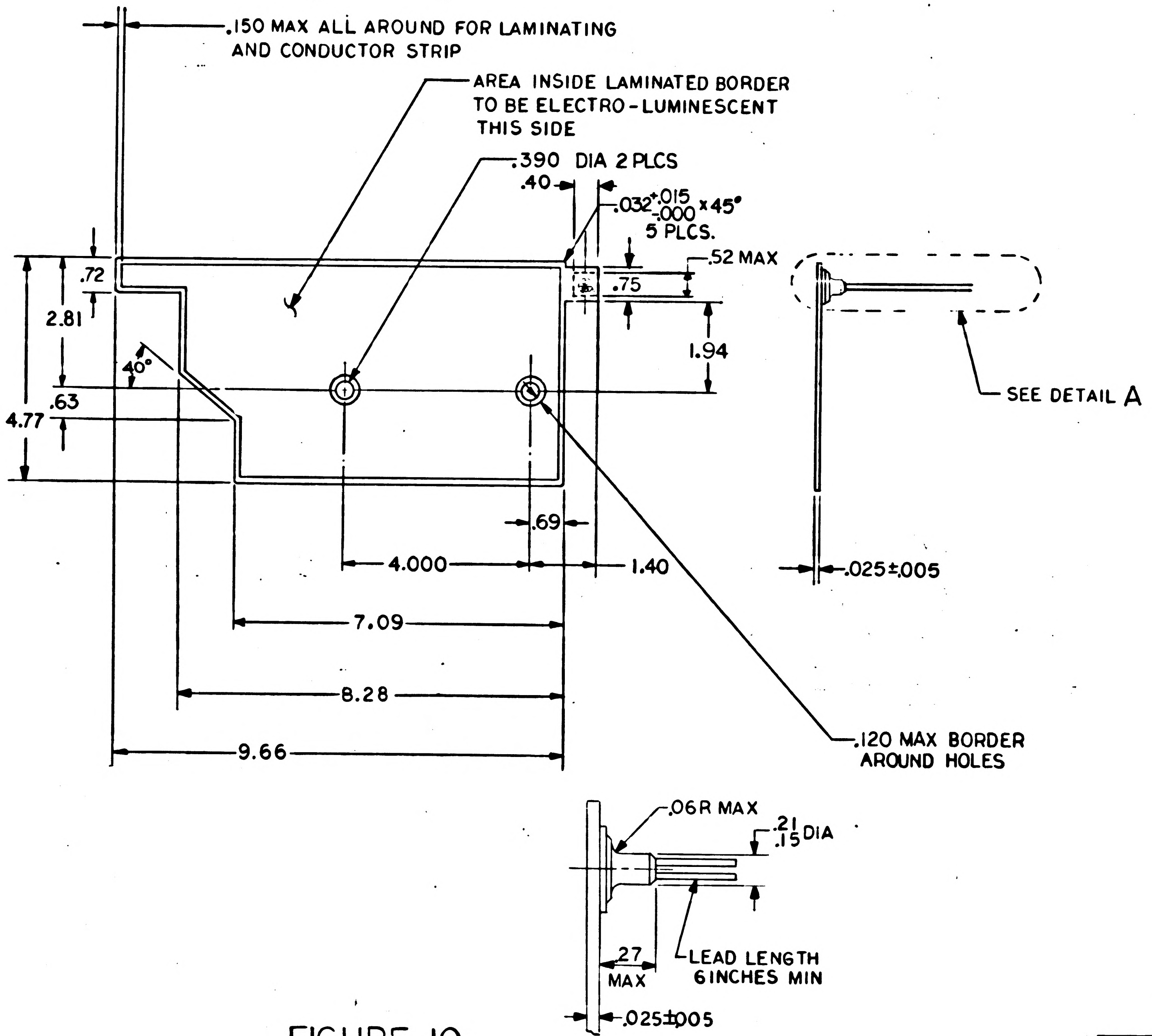

.150 MAX ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
.390 DIA 2 PLCS
.40
.032 +.015 -.000 x 45° 5 PLCS.
.52 MAX
.72
.75
2.81
1.94
40°
.63
4.77
.69
4.000
1.40
7.09
8.28
9.66
.120 MAX BORDER AROUND HOLES
SEE DETAIL A
.025±.005
.06R MAX
.21 .15 DIA
.27 MAX
LEAD LENGTH 6 INCHES MIN
.025±.005
DETAIL A

FIGURE 10

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC. ±.02 3 PLC DEC. ±.010 ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Kmall	26 June 67
CHECKED	RuHogue	27 JUN 67
APPROVED	C.R. Crane	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	AUG. 23 67
APPROVED MSC		9/12/67
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE		SHEET 11 OF

1008944 B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	REPLACES REV A WITH CHANGE PER TDRR 34833	18-OCT-67	B. CP

REQUIREMENTS: (CONTINUED)

2. ACCEPTANCE AND INSPECTION (100%):
   A. MECHANICAL PROPERTIES:
      (1) VISUAL INSPECTION: EACH LAMP TERMINATION AREA SHALL BE INSPECTED UNDER MAGNIFICATION AND COMPARED TO CONTAMINATION STANDARDS SELECTED AND APPROVED BY SUPPLIER AND USER FOR THE FOLLOWING:
         a. PARTICLE CONTAMINATION WITHIN, WHEN VIEWED UNDER 10X MAGNIFICATION.
         b. SCRATCHES, CHIPS, PITTING AND CRACKS ON THE EXTERNAL SURFACE WHEN VIEWED UNDER 10X MAGNIFICATION.
         c. THE ENCAPSULATED CONDUCTORS SHALL BE FREE OF BENDS, KINKS AND OTHER PROTRUSIONS WHICH WOULD CAUSE THEM TO BE EXPOSED ON THE SURFACE.
      (2) DIMENSIONS: SHALL BE AS SHOWN PER TABLE I.
      (3) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING A 2 POUND AXIAL PULL.
      (4) LEAD MATERIAL: SHALL BE PER MIL-W-16878 (TYPE E-26). THE LEAD CONNECTED TO THE ELECTRO-LUMINESCENT SIDE SHALL HAVE LIGHT BROWN INSULATION AND THE LEAD CONNECTED TO THE REVERSE SIDE SHALL HAVE BLACK INSULATION. THE COLORS SHALL BE EASILY DISCERNIBLE.
      (5) DELAMINATION AND/OR SEPARATION: THERE SHALL BE NO VISIBLE EVIDENCE OF DELAMINATION AND/OR SEPARATION IN ANY OF THE VARIOUS BONDS OF THE LAMP IN EITHER THE ENERGIZED OR UNENERGIZED STATE.
   B. ELECTRICAL AND PHOTOMETRIC PROPERTIES:
      (1) TRANSIENT VOLTAGE: THE LAMP SHALL BE EXCITED WITH 160 ± 5 VOLTS RMS 400 HZ, FOR 5 SECONDS MINIMUM. AFTER APPLICATION OF THIS VOLTAGE THE LAMP MUST BE CAPABLE OF MEETING THE OTHER REQUIREMENTS OF SECTION B.
      (2) LIGHT INTENSITY: 1.2 TO 2.0 FOOT-LAMBERTS INITIALLY WHEN EXCITED WITH 75 ± 1.0 VOLTS RMS, 400 ± 10 HZ.
      (3) CURRENT: PER TABLE I, WHEN EXCITED PER 2.B.(2).
      (4) POWER: PER TABLE I, WHEN EXCITED PER 2.B.(2).
      (5) LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE AS SPECIFIED IN 3.F.(1). AS DETERMINED BY MEASUREMENT OF A REPRESENTATIVE SAMPLE OF EACH PRODUCTION RUN AND VISUAL COMPARISON OF THE LAMPS WITH THE SAMPLE.
      (6) DC INSULATION RESISTANCE: THE LEADS OF THE LAMP SHALL BE CONNECTED TOGETHER AND THE LAMP IMMERSED IN A 1% SOLUTION OF SALT WATER. THE DC RESISTANCE MEASURED BETWEEN THE LEADS AND THE WATER SHALL NOT BE LESS THAN 10 MEGOHMS.

3. DESIGN REQUIREMENTS:
   A. OPERATING LIFE: 2000 HOURS MINIMUM AT 25°C WITH A LOSS OF NOT MORE THAN 90% OF ORIGINAL LIGHT INTENSITY. MEASUREMENTS ACCOMPLISHED WHEN EXCITED PER 2.B.(2). AT 25°C.
   B. STORAGE LIFE: 1 YEAR MINIMUM WITHOUT LOSS OF ELECTRICAL PERFORMANCE AT 0° TO +65°C.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + — − 3 PLACE DECIMALS + — − ANGLES + — −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN W. KNOLL DATE 26-JUN-67 CHECKED R.W. HOGUE 27-JUN-67 APPROVAL CRAMER 27-JUN-67 CONTRACT NAS9-497	LAMP ELECTRO-LUMINESCENT SPECIFICATION CONTROL DRAWING
MATERIAL	AG, MIT NASA APPROVAL 13 SEP 67	SIZE C CODE IDENT NO. 80230 1008944
APPROVAL	P. WATSON 23-AUG-67 MIT APPROVAL	SCALE — SHEET 12

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	REPLACES REV A WITH CHANGE PER TDRR 34833	18-OCT-67	B. CP

REQUIREMENTS: (CONTINUED)

C. OPERATING TEMPERATURE RANGE: -55°C TO +65°C. ACCELERATED LIFE DEGRADATION IS NOTED WITH OPERATION ABOVE 25°C.

D. SEAL: THE LAMPS SHALL BE SUBJECTED TO THE IMMERSION TEST (CONDITION B) SPECIFIED IN MIL-STD-202C. THE LIGHT INTENSITY OF PARAGRAPH 2.B.(2) AND THE DC INSULATION RESISTANCE OF PARAGRAPH 2.B.(6) SHALL BE CHECKED AFTER THE IMMERSION AS ACCEPTANCE CRITERIA.

E. MATERIAL:
- (1) ACLAR ENCAPSULATED ELECTRO-LUMINESCENT LAMP.
- (2) THE LEAD INSULATION SHALL BE CHEMICALLY TREATED IN A MANNER TO ALLOW ADHESIVE BONDING OR POTTING AND ALLOW THE UNIT TO MEET THE IMMERSION TEST REQUIREMENT OF 3.D.
- (3) THE ENCAPSULATED LEADS SHALL BE ALUMINUM FOIL AND SHALL BE ELECTRICALLY CONNECTED TO THE ALUMINUM PLATE AND EXTERNAL LEAD WIRES WITH A CONDUCTIVE CEMENT.
- (4) NO MATERIAL SHALL BE USED AS AN OVERCOAT OR PROTECTIVE COVERING TO INSURE AN ADEQUATE SEAL OR PROTECTION.

F. RATING:
- (1) LIGHT OUTPUT COLOR: X = 0.33 ± 0.02, Y = 0.33 ± 0.02 PER CIE DIAGRAM.
- (2) MAXIMUM CONTINUOUS VOLTAGE: 120 V RMS, 400 Hz.
- (3) UNIFORMITY OF LIGHT INTENSITY: THE LIGHT INTENSITY SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN 10%.
- (4) UNIFORMITY OF LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN THE TOLERANCE SPECIFIED IN 3.F.(1).

4. SPECIAL CONDITIONING BY MANUFACTURER:

A. ALL LAMPS SHALL BE BURNED-IN FOR A PERIOD OF 50 TO 100 HOURS PRIOR TO THE ACCEPTANCE AND INSPECTION TESTS IN 2.B. ABOVE. THE BURN-IN CONDITIONS SHALL BE AS FOLLOWS:
- (1) TEMPERATURE: 25° ± 5°C.
- (2) OPERATING VOLTAGE: 115 ± 10 V RMS, 60 ± 5 Hz FOR THE FIRST 50 HOURS, AND 120 V RMS, 400 ± 10 Hz FOR REMAINDER OF BURN-IN.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± ___ 3 PLACE DECIMALS ± ___ ANGLES ± ___	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	DRAWN W. KNOLL DATE 26-JUN-67 CHECKED R.W. HOGUE 27-JUN-67 APPROVAL CRAMER 27-JUN-67	LAMP ELECTRO-LUMINESCENT SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING	CONTRACT NAS9-497	
MATERIAL	A.C, MIT NASA APPROVAL 13 SEP 67	SIZE C CODE IDENT NO. 80230 1008944
APPROVAL	P. WATSON 23-AUG-67 MIT APPROVAL	SCALE —— SHEET 13

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B. Lw

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS OF ND 1002056, EXCEPT THAT THE MAXIMUM TEMPERATURE RANGE SHALL BE PER 3.C. (TO BE QUALIFIED BY USER).
   - D. PART MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED, IN ACCORDANCE WITH ND 1002019, WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, LOT CODE OR NUMBER, TERMINAL IDENTIFICATION AND NASA PART NUMBER. THE INK USED SHALL BE PER SCD 1010920 AND MARKINGS SHALL BE COATED WITH A CHLOROTRIFLUOROETHYLENE COPOLYMER SOLUTION.
   - E. PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS 1, CODE 1.
     - (1) MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215, CLASS 1, CODE 2.

2. ACCEPTANCE AND INSPECTION (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) VISUAL INSPECTION: EACH LAMP TERMINATION AREA SHALL BE INSPECTED UNDER MAGNIFICATION AND COMPARE~~D TO~~ CONTAMINATION STANDARDS SELECTED AND APPROVED BY SUPPLIER AND USER FOR THE FOLLOWING:
       - a. PARTICLE CONTAMINATION WITHIN, WHEN VIEWED UNDER 10X MAGNIFICATION. VISIBLE EVIDENCE OF CONDUCTIVE EPOXY SHALL BE ACCEPTABLE.
       - b. SCRATCHES, CHIPS, PITTING AND CRACKS ON THE EXTERNAL SURFACE WHEN VIEWED UNDER 10X MAGNIFICATION.
       - c. THE ENCAPSULATED CONDUCTORS SHALL BE FREE OF BENDS, KINKS AND OTHER PROTRUSIONS WHICH WOULD CAUSE THEM TO BE EXPOSED ON THE SURFACE.
     - (2) DIMENSIONS: SHALL BE AS SHOWN PER APPLICABLE FIGURE IDENTIFIED IN TABLE I.
     - (3) LEAD STRENGTH: EACH LEAD SHALL WITHSTAND A TWO (2) POUND AXIAL PULL. FORCE SHALL BE APPLIED AND REMOVED GRADUALLY.
     - (4) LEAD MATERIAL: SHALL BE PER MIL-W-16878 (TYPE E-26). THE LEAD CONNECTED TO THE ELECTRO-LUMINESCENT SIDE SHALL HAVE LIGHT BROWN INSULATION (ETCHED WHITE WIRE) AND THE LEAD CONNECTED TO THE REVERSE SIDE SHALL HAVE BLACK INSULATION (ETCHED). THE COLORS SHALL BE EASILY DISCERNIBLE.
     - (5) DELAMINATION AND/OR SEPARATION: THE EL LAMP SHALL SHOW NO SIGNS OF DELAMINATION. SEPARATION OF THE LAMP ENVELOPE FROM THE LAMP SHALL NOT BE PRESENT IN THE LIGHTED AREA AND SEPARATION IN OTHER AREAS SHALL NOT AFFECT THE PERFORMANCE OF THE LAMP.

REQUIREMENTS CONTINUED ON SHEET 12.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN KNOLL DATE 26-JUN-67
CHECKED HOGUE 27-JUN-67
APPROVAL CRAMER 27-JUN-67
CONTRACT NAS9 — 497
A.C. MIT 13-SEP-67
NASA APPROVAL
WATSON 23-AUG-67
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO 80230
1008944
SCALE —
SHEET 1 OF 13

MIL-1002E D

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	21-FEB-68	

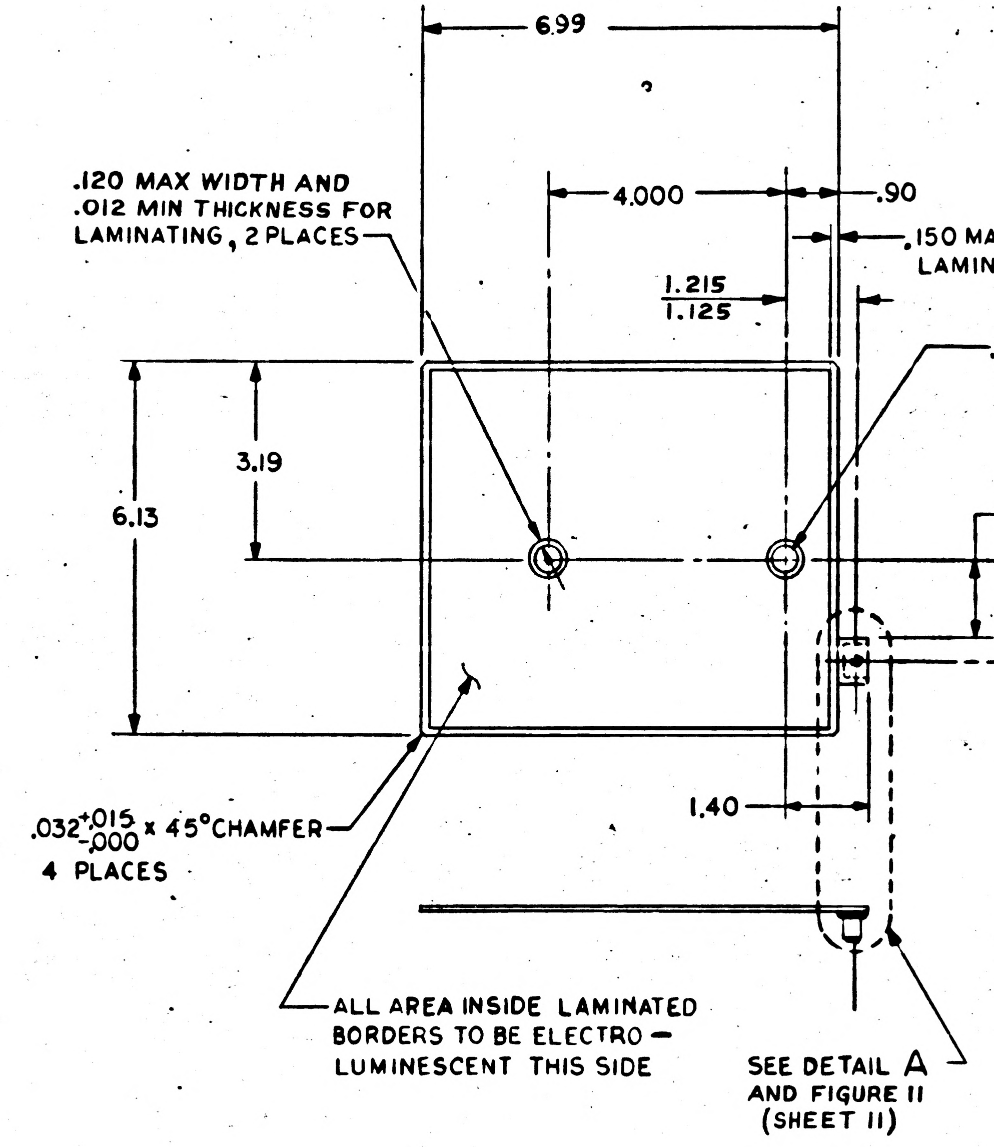
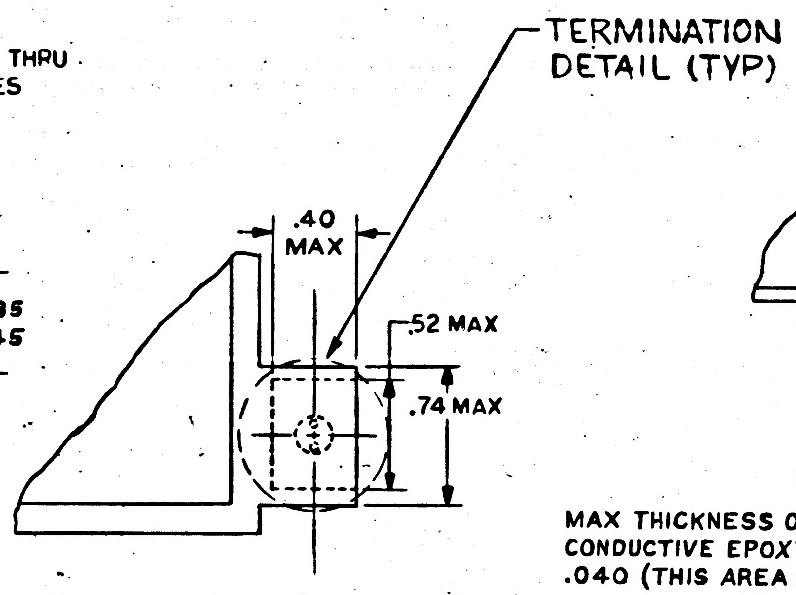
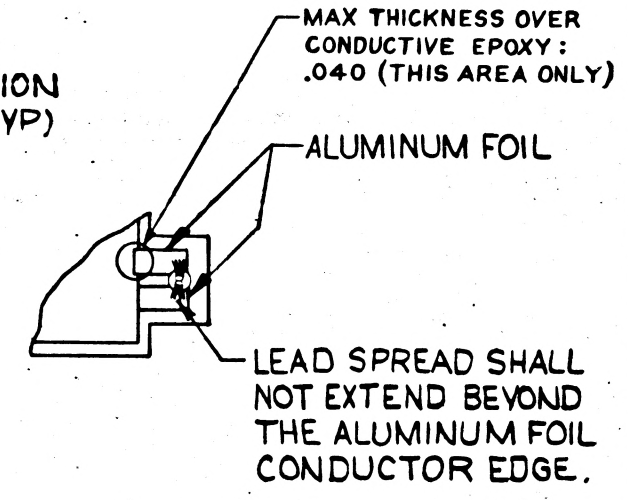

6.99
4.000
.90
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING, 2 PLACES
.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
1.215
1.125
.390 DIA THRU 2 PLACES
3.19
6.13
1.31
1.735
1.645
1.40
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO-LUMINESCENT THIS SIDE
SEE DETAIL A AND FIGURE 11 (SHEET 11)

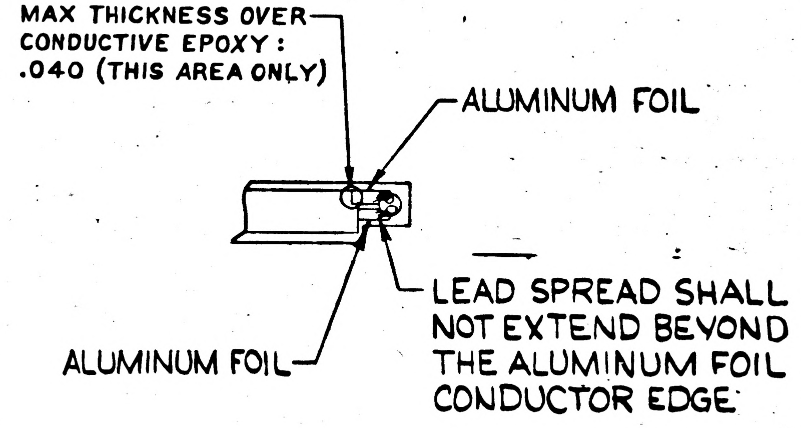
FIGURE 1


TERMINATION DETAIL (TYP)
.40 MAX
.52 MAX
.74 MAX

DETAIL A


MAX THICKNESS OVER CONDUCTIVE EPOXY: .040 (THIS AREA ONLY)
ALUMINUM FOIL
LEAD SPREAD SHALL NOT EXTEND BEYOND THE ALUMINUM FOIL CONDUCTOR EDGE.

CONFIGURATION I


MAX THICKNESS OVER CONDUCTIVE EPOXY: .040 (THIS AREA ONLY)
ALUMINUM FOIL
ALUMINUM FOIL
LEAD SPREAD SHALL NOT EXTEND BEYOND THE ALUMINUM FOIL CONDUCTOR EDGE

CONFIGURATION II

FIGURE 12

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W. Knoll	26 JUN 67
CHECKED	RW Hogue	27 JUN 67
APPROVED	C R Cronan	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Carl Watson	AUG 23, 67
APPROVED MSC		9/13/67
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 2 OF

C 1008944

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	JW	21-FEB-68	

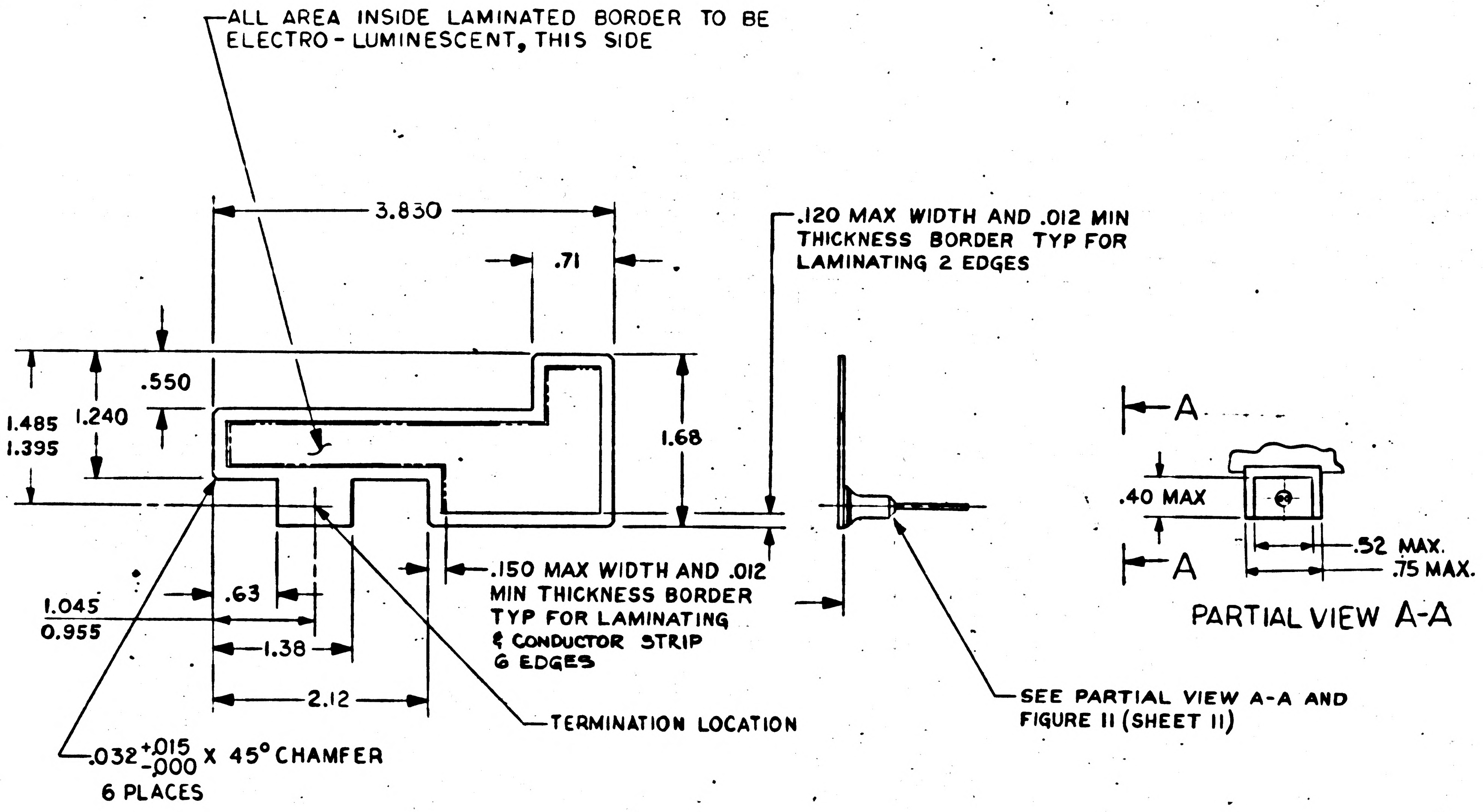

ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
3.830
.71
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATING 2 EDGES
.550
1.485
1.395
1.240
1.68
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATING & CONDUCTOR STRIP 6 EDGES
1.045
0.955
.63
1.38
2.12
TERMINATION LOCATION
.032 +.015 -.000 X 45° CHAMFER 6 PLACES
SEE PARTIAL VIEW A-A AND FIGURE II (SHEET II)
A
A
.40 MAX
.52 MAX.
.75 MAX.
PARTIAL VIEW A-A

FIGURE 2

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.015 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W Knoll 26 JUNE 67
CHECKED [illegible] 27 JUN 67
APPROVED C R Craven 27 June 67
APPROVED Paul Votaw Aug. 23, 67
NAS9-4197
APPROVED CCD
APPROVED MSC 7/3/67
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO	SIZE	DRAWING NO
80230	C	1008944

SCALE — SHEET 3 OF

1008944 C

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	lw	22-FEB-68	

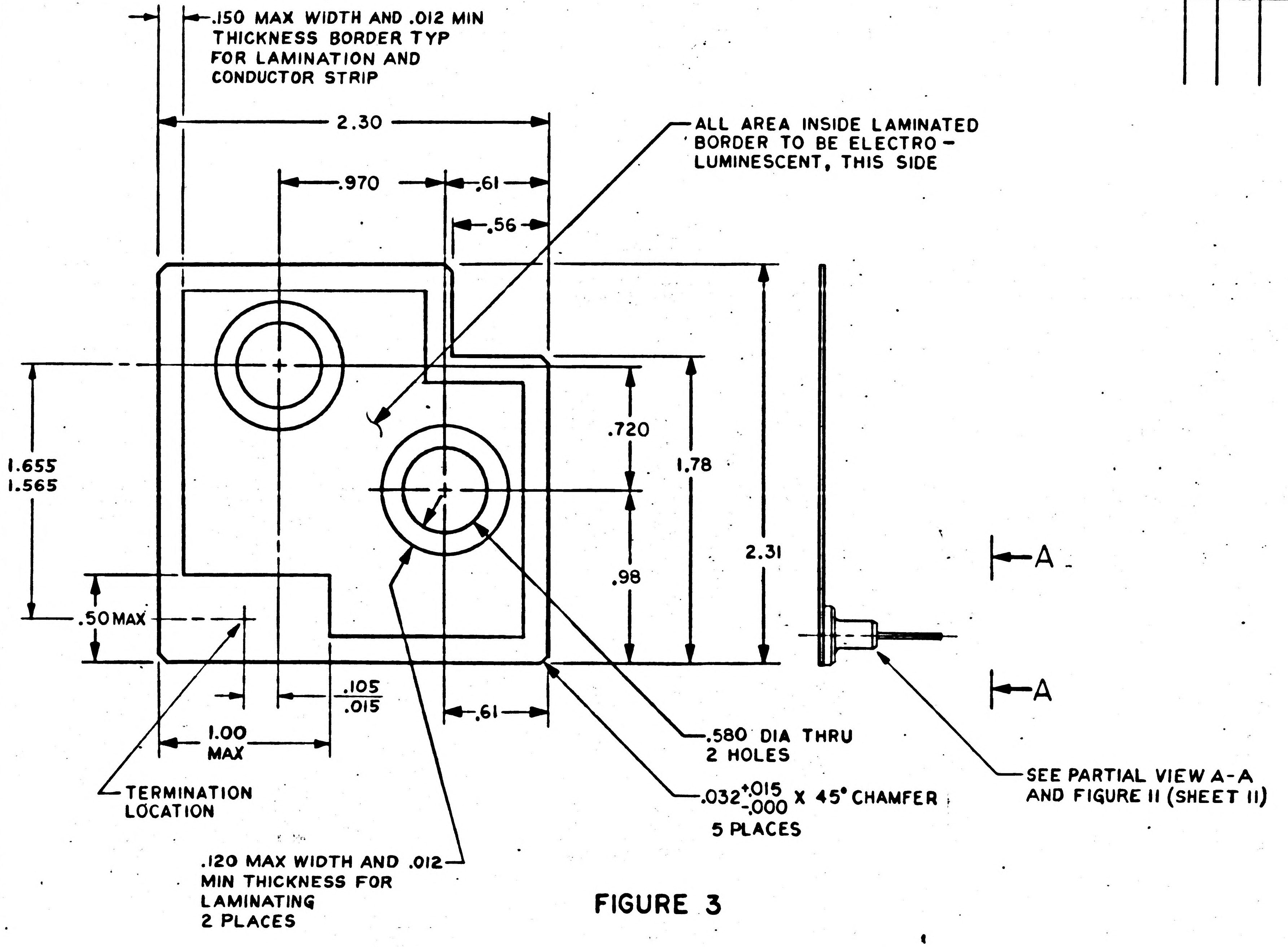
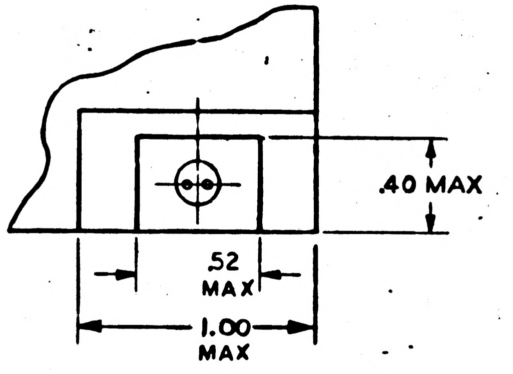

.150 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATION AND CONDUCTOR STRIP
2.30
.970
.61
.56
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
1.655
1.565
.720
1.78
2.31
.98
.50 MAX
.105
.015
1.00 MAX
.61
TERMINATION LOCATION
.580 DIA THRU 2 HOLES
.032 +.015 -.000 X 45° CHAMFER 5 PLACES
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING 2 PLACES
A
A
SEE PARTIAL VIEW A-A AND FIGURE II (SHEET II)

FIGURE 3


.40 MAX
.52 MAX
1.00 MAX

PARTIAL VIEW A-A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W Knell	26 June 67
CHECKED	Rudoque	27 JUN 67
APPROVED	C.R. Crover	27 June 67
APPROVED		
APPROVED MIT	Paul Watson	Feb 23 67
APPROVED MSC		9/13/
		DATE

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

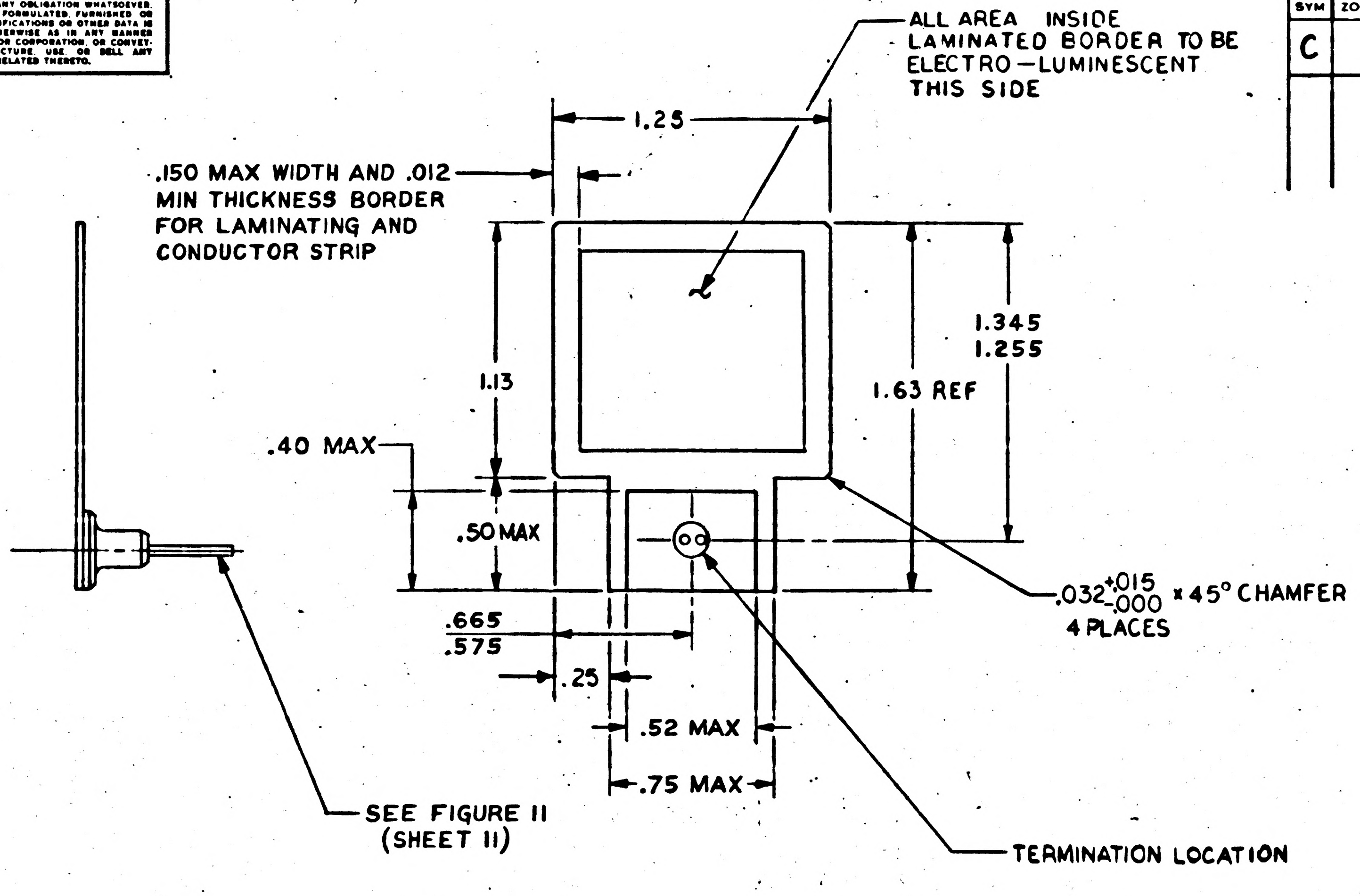
CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE ———		SHEET 4 OF

1008944 C

NOTICE – WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	22-FEB-68	



ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING AND CONDUCTOR STRIP
1.345
1.255
1.13
1.63 REF
.40 MAX
.50 MAX
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
.665
.575
.25
.52 MAX
.75 MAX
SEE FIGURE II (SHEET II)
TERMINATION LOCATION

FIGURE 4

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Knoll	26 June 67
CHECKED	Ruhlogue	27 JUN 67
APPROVED	C.R. Cramer	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Nelson	Aug 23, 67
APPROVED MSC		DATE

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944

SCALE —— SHEET 8 OF

1008944 | C

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	22-FEB-68	

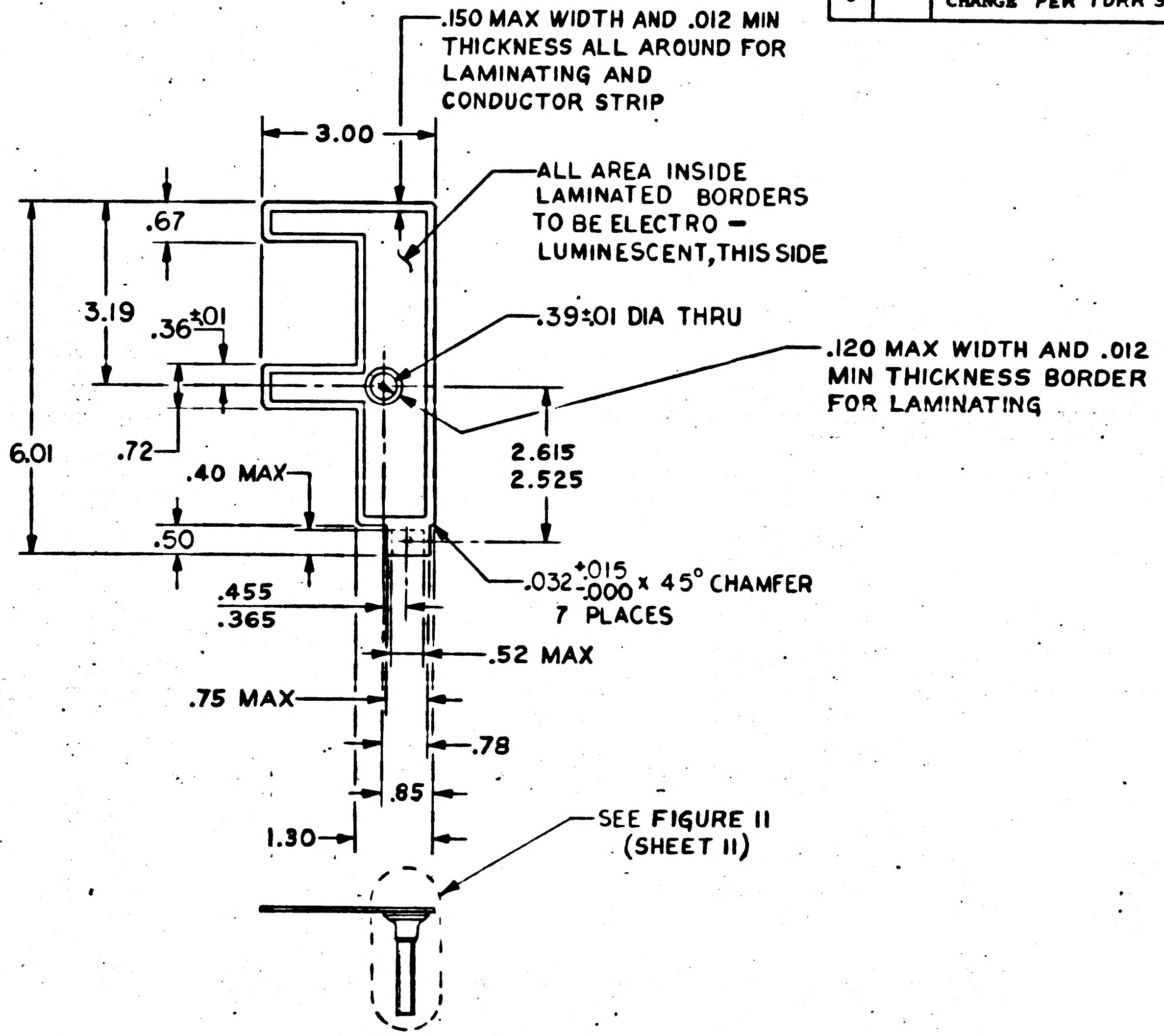

.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
3.00
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO – LUMINESCENT, THIS SIDE
.67
3.19
.36±.01
.39±.01 DIA THRU
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING
6.01
.72
2.615
2.525
.40 MAX
.50
.032 +.015 -.000 x 45° CHAMFER 7 PLACES
.455
.365
.52 MAX
.75 MAX
.78
.85
1.30
SEE FIGURE II (SHEET II)

FIGURE 5

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 5 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W. Knoll	26 JUNE 67
CHECKED	Rustogue	27 JUN 67
APPROVED	C.R. Crane	27 JUN 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Nelson	NOV 23 67
APPROVED MSC		9/2/67
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 6 OF

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	22-FEB-68	

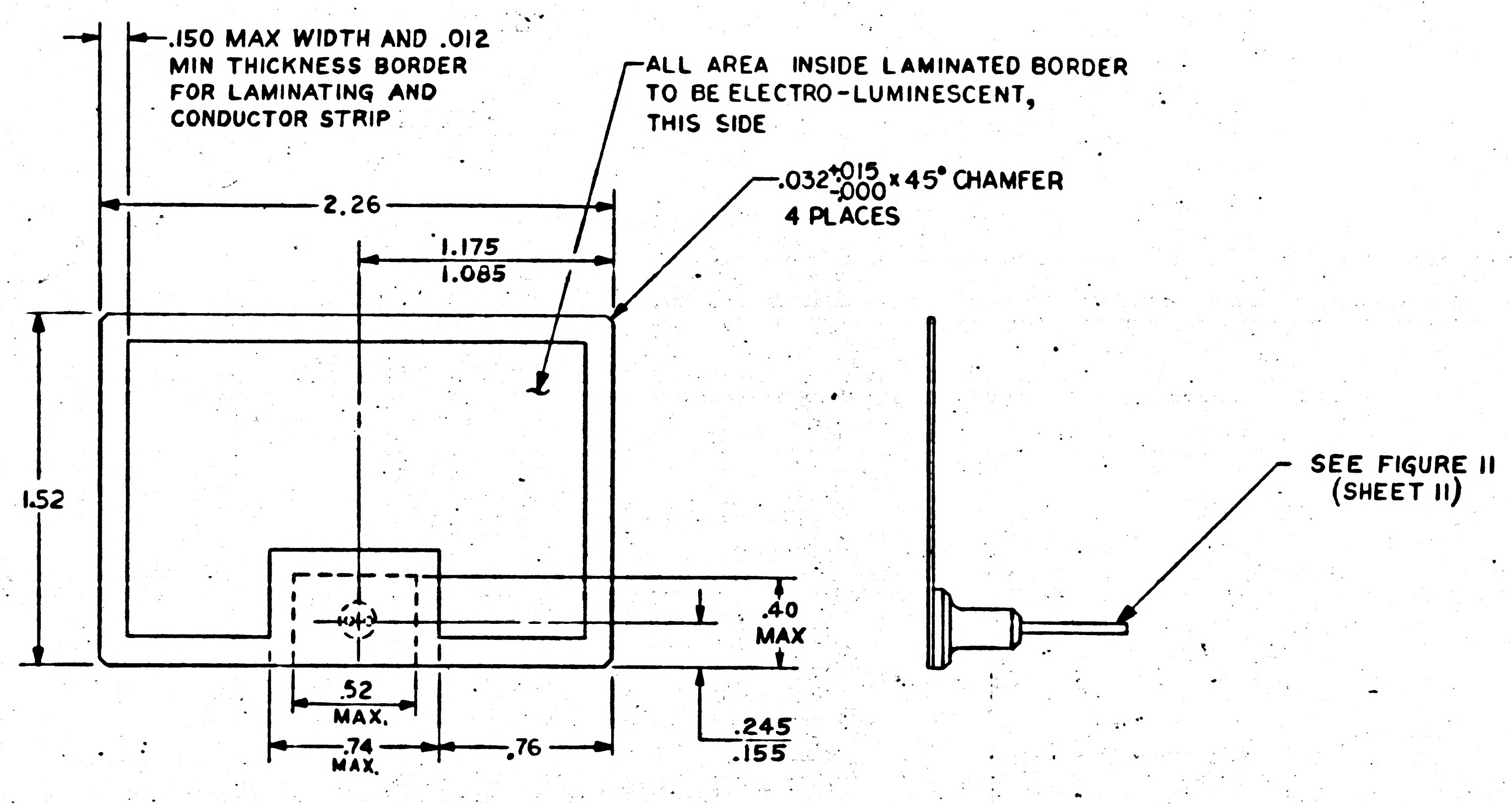

.150 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING AND CONDUCTOR STRIP
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
.032 +.015 −.000 x 45° CHAMFER 4 PLACES
2.26
1.175
1.085
1.52
.40 MAX
.52 MAX.
.74 MAX.
.76
.245
.155
SEE FIGURE II (SHEET II)

FIGURE 6

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

NEXT ASSY | USED ON
APPLICATION

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W Knoll 26 JUNE 67
CHECKED RW Hogue 27 JUN 67
APPROVED CR Crane 27 June 67
APPROVED
NAS 9-497
APPROVED MIT Paul Nolan Aug. 23, 67
APPROVED MSC
DATE

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 7 OF

1008944 C

NOTICE - WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TORR 35494	B.	Lw	22-FEB-68	

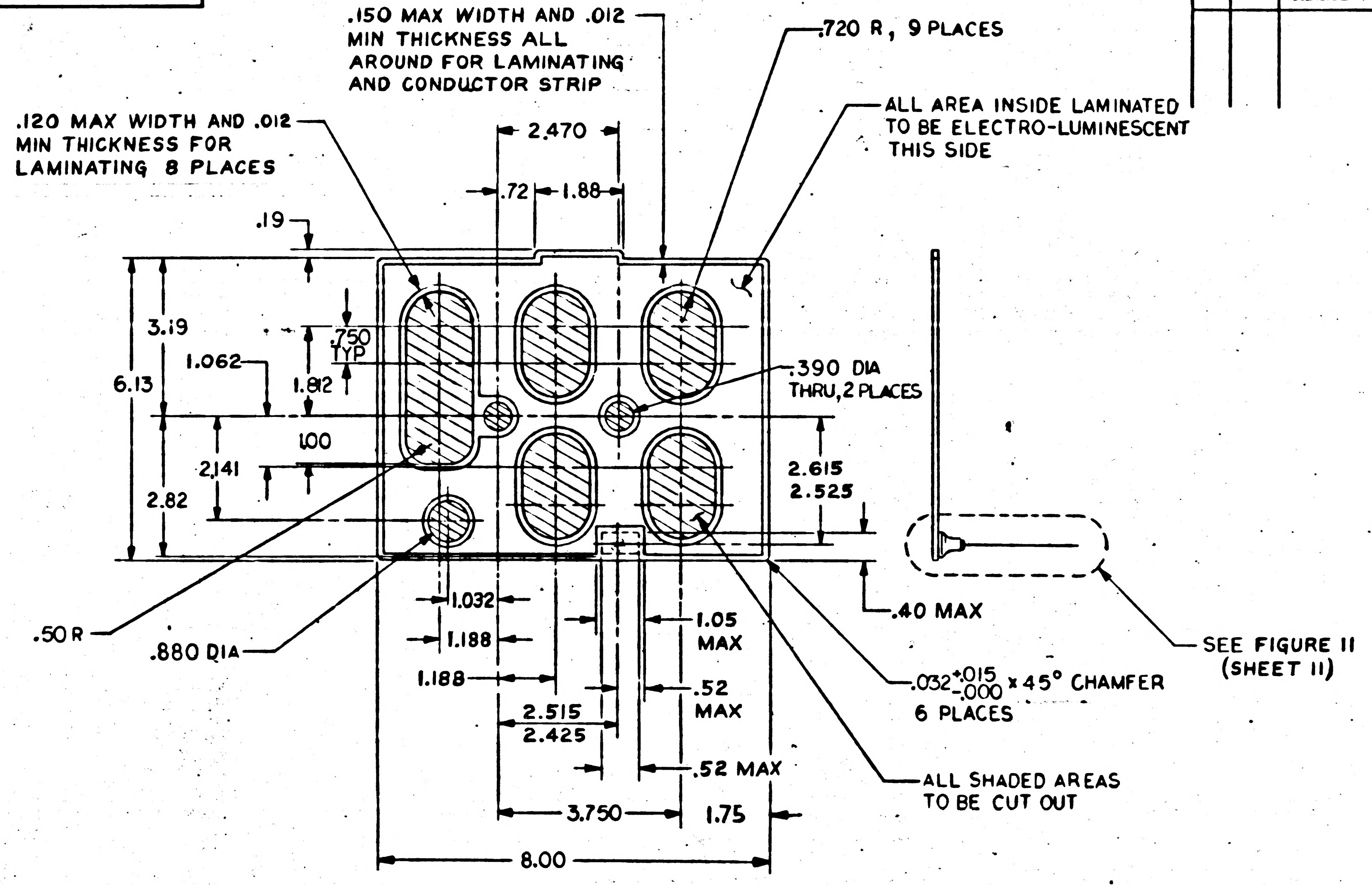

.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING 8 PLACES
.720 R, 9 PLACES
ALL AREA INSIDE LAMINATED TO BE ELECTRO-LUMINESCENT THIS SIDE
2.470
.72
1.88
.19
3.19
6.13
1.062
.750 TYP
1.812
.390 DIA THRU, 2 PLACES
1.00
2.141
2.82
2.615
2.525
.50 R
.880 DIA
1.032
1.188
1.188
1.05 MAX
.52 MAX
2.515
2.425
.52 MAX
.40 MAX
.032 +.015 -.000 x 45° CHAMFER 6 PLACES
SEE FIGURE II (SHEET II)
ALL SHADED AREAS TO BE CUT OUT
3.750
1.75
8.00

FIGURE 7

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
~~CAPACITOR VALUES ARE IN μf~~
~~RESISTOR VALUES ARE IN OHMS~~
TOLERANCES ON
2 PLC DEC. 3 PLC DEC. ANGLES
±.02 ±.010 ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W Knoll	26 JUNE 67
CHECKED	Rw Hogue	27 JUN 67
APPROVED	CR Crane	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Carl Watson	AUG 23 67
APPROVED MSC		9/1
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 8 OF

1008944 C

NOTICE – WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE, PER TDRR 35494	B.	JW	23-FEB-68	

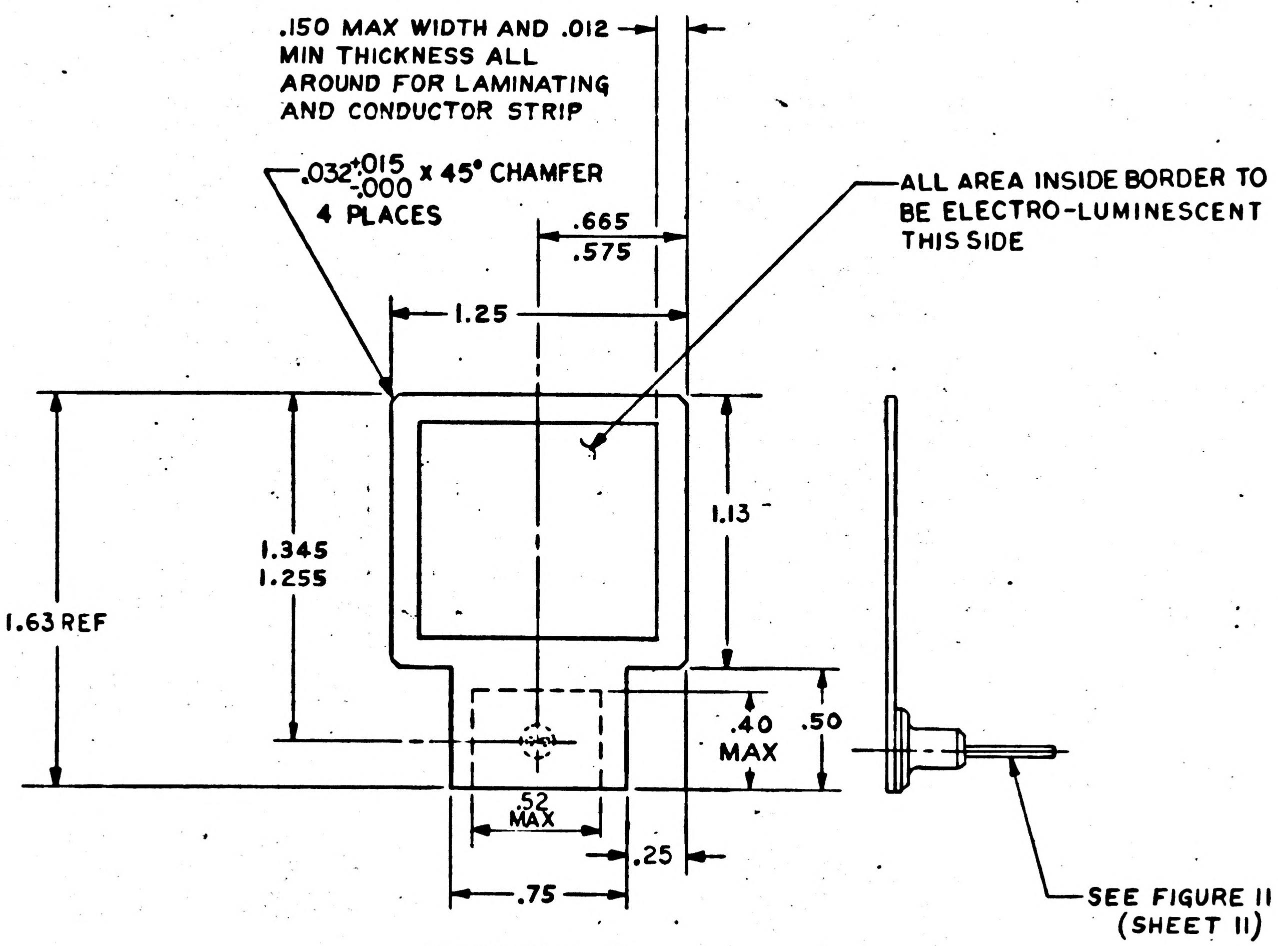

.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.032 +.015 −.000 x 45° CHAMFER 4 PLACES
.665
.575
1.25
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.13
1.345
1.255
1.63 REF
.40 MAX
.50
.52 MAX
.25
.75
SEE FIGURE 11 (SHEET 11)

FIGURE 8

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ± .02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W. Knell 26 June 67
CHECKED RuHogue 27 JUN 67
APPROVED C R Crowe 27 June 67
APPROVED NAS 9-497
APPROVED MIT Paul Watson AUG 23, 67
APPROVED MSC 9/3/67
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 9 OF

1008944 C

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	23-FEB-68	

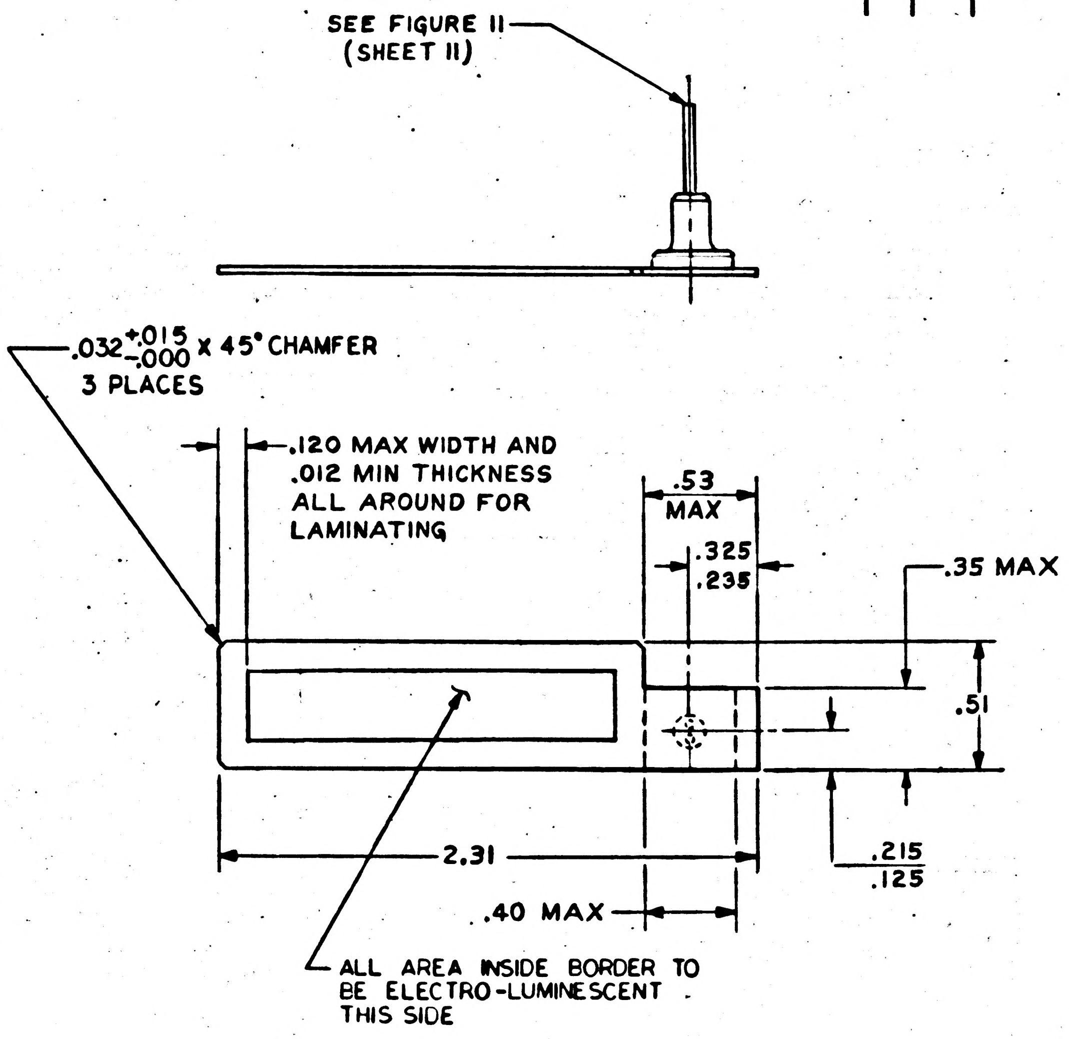

SEE FIGURE 11
(SHEET 11)
.032 +.015 -.000 X 45° CHAMFER
3 PLACES
.120 MAX WIDTH AND
.012 MIN THICKNESS
ALL AROUND FOR
LAMINATING
.53
MAX
.325
.235
.35 MAX
.51
2.31
.215
.125
.40 MAX
ALL AREA INSIDE BORDER TO
BE ELECTRO-LUMINESCENT
THIS SIDE

FIGURE 9

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Knell 26 JUN 67
CHECKED Ru Hogue 27 JUN 67
APPROVED C R Crown 27 JUN 67
APPROVED
NAS 9-497
APPROVED MIT Saul Watson AUG 23, 67
APPROVED MSC 9/13/
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO 1008944
SCALE ——
SHEET 10 OF

1008944 C

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	23-FEB-68	

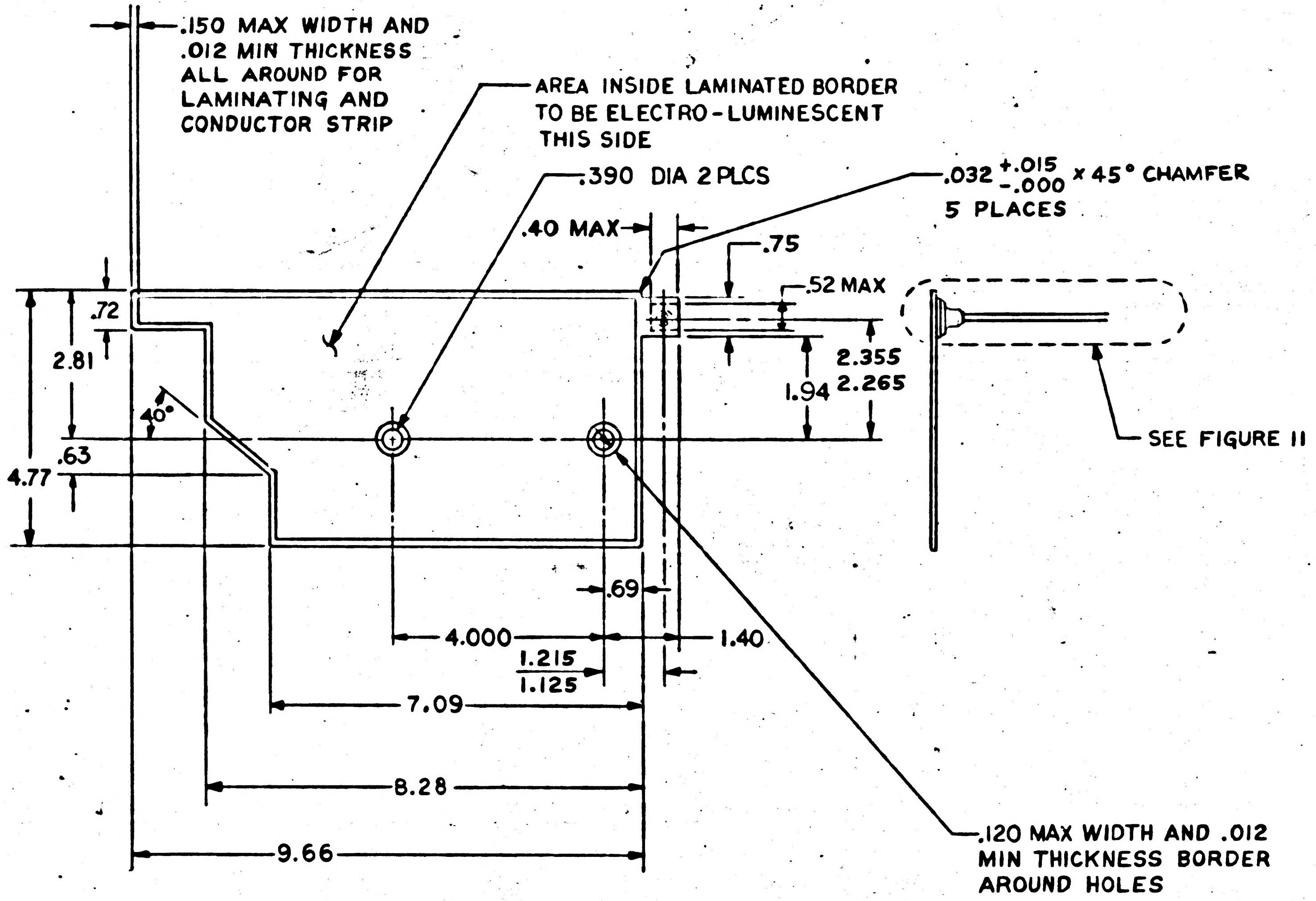

.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
.390 DIA 2 PLCS
.032 +.015 -.000 x 45° CHAMFER 5 PLACES
.40 MAX
.75
.52 MAX
2.355
2.265
1.94
.72
2.81
40°
.63
4.77
SEE FIGURE II
.69
4.000
1.40
1.215
1.125
7.09
8.28
9.66
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER AROUND HOLES

FIGURE 10

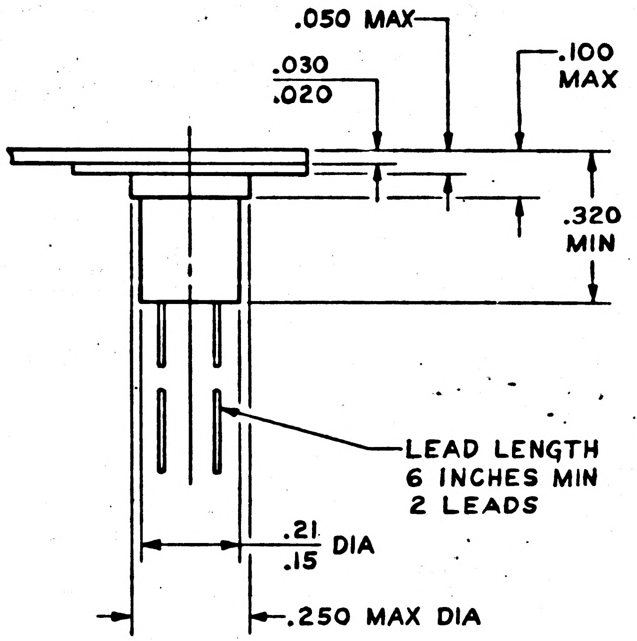

.050 MAX
.030
.020
.100 MAX
.320 MIN
LEAD LENGTH 6 INCHES MIN 2 LEADS
.21
.15
DIA
.250 MAX DIA

FIGURE II

TOP HAT (LEAD TERMINATION) CONFIGURATION (APPLICABLE TO ALL DASH NUMBER)

1008944 C

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC: 3 PLC DEC. ANGLES
±.02 ±.010 ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

		DATE
DRAWN	W. Knall	26 June 67
CHECKED	RuHogue	27 Jun 67
APPROVED	CR Crowe	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	Aug 23, 67
APPROVED MSC		9/2/67

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 11 OF

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B. Lw

REQUIREMENTS: (CONTINUED)

B. ELECTRICAL AND PHOTOMETRIC PROPERTIES:

(1) TRANSIENT VOLTAGE: THE LAMP SHALL BE EXCITED WITH 160 ± 5 VOLTS RMS 400 HZ, FOR 5 SECONDS MINIMUM. AFTER APPLICATION OF THIS VOLTAGE THE LAMP MUST BE CAPABLE OF MEETING THE OTHER REQUIREMENTS OF SECTION B.

(2) LIGHT INTENSITY: 1.2 TO 2.0 FOOT-LAMBERTS INITIALLY WHEN EXCITED WITH 75 ± 1.0 VOLTS RMS, 400 ± 10 HZ.

(3) CURRENT: PER TABLE I, WHEN EXCITED PER 2.B.(2).

(4) POWER: PER TABLE I, WHEN EXCITED PER 2.B.(2).

(5) LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE AS SPECIFIED IN 3.F.(1). AS DETERMINED BY MEASUREMENT OF A REPRESENTATIVE SAMPLE OF EACH PRODUCTION RUN AND VISUAL COMPARISON OF THE LAMPS WITH THE SAMPLE.

(6) DC INSULATION RESISTANCE: THE LEADS OF THE LAMP SHALL BE CONNECTED TOGETHER AND THE LAMP IMMERSED IN A 1% SOLUTION OF SALT WATER. THE DC RESISTANCE MEASURED BETWEEN THE LEADS AND THE WATER SHALL NOT BE LESS THAN 10 MEGOHMS.

3. DESIGN

A. OPERATING LIFE: 2000 HOURS MINIMUM AT 25°C WITH A LOSS OF NOT MORE THAN 90% OF ORIGINAL LIGHT INTENSITY. MEASUREMENTS ACCOMPLISHED WHEN EXCITED PER 2.B.(2) AT 25°C.

B. STORAGE LIFE: 1 YEAR MINIMUM WITHOUT LOSS OF ELECTRICAL PERFORMANCE AT 0° TO +65°C. LAMP SHALL BE PACKAGED AS SPECIFIED PER PARAGRAPH 1.E.

C. OPERATING TEMPERATURE RANGE: -55°C TO +65°C. ACCELERATED LIFE DEGRADATION IS NOTED WITH OPERATION ABOVE 25°C.

D. SEAL: THE LAMPS SHALL BE SUBJECTED TO THE IMMERSION TEST (CONDITION B) SPECIFIED IN MIL-STD-202C. THE LIGHT INTENSITY OF PARAGRAPH 2.B.(2) AND THE DC INSULATION RESISTANCE OF PARAGRAPH 2.B.(6) SHALL BE CHECKED AFTER THE IMMERSION AS ACCEPTANCE CRITERIA.

E. MATERIAL:

(1) FLUOROHALOCARBON FILL ENCAPSULATED ELECTRO-LUMINESCENT LAMP.

(2) THE LEAD INSULATION SHALL BE CHEMICALLY TREATED IN A MANNER TO ALLOW ADHESIVE BONDING OR POTTING AND ALLOW THE UNIT TO MEET THE IMMERSION TEST REQUIREMENT OF 3.D.

(3) THE ENCAPSULATED LEADS SHALL BE ALUMINUM FOIL AND SHALL BE ELECTRICALLY CONNECTED TO THE ALUMINUM PLATE AND EXTERNAL LEAD WIRES WITH A CONDUCTIVE CEMENT.

(4) NO MATERIAL SHALL BE USED AS AN OVERCOAT OR PROTECTIVE COVERING TO INSURE AN ADEQUATE SEAL OR PROTECTION.

F. RATING:

(1) LIGHT OUTPUT COLOR: X = 0.33 ± 0.02, Y = 0.33 ± 0.02 PER CIE DIAGRAM.

(2) MAXIMUM CONTINUOUS VOLTAGE: 120 V RMS, 400 HZ.

(3) UNIFORMITY OF LIGHT INTENSITY: THE LIGHT INTENSITY SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN 10%.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN KNOLL DATE 26-JUN-67 CHECKED HOGUE 27-JUN-67 APPROVAL CRAMER 27-JUN-67 CONTRACT NAS9—497	LAMP ELECTRO-LUMINESCENT SPECIFICATION CONTROL DRAWING
MATERIAL	AC. MIT NASA APPROVAL 13-SEP-67	SIZE C · CODE IDENT NO. 80230 · 1008944
APPROVAL	WATSON MIT ROVAL 23-AUG-67	SCALE — · SHEET 12

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B. fw

REQUIREMENTS: (CONTINUED)

(4) UNIFORMITY OF LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN THE TOLERANCE SPECIFIED IN 3.F.(1).

4. SPECIAL CONDITIONING BY MANUFACTURER:

A. ALL LAMPS SHALL BE BURNED-IN FOR A PERIOD OF 50 TO 100 HOURS PRIOR TO THE ACCEPTANCE AND INSPECTION TESTS IN 2.B. ABOVE. THE BURN-IN CONDITIONS SHALL BE AS FOLLOWS:

(1) TEMPERATURE: 25° ± 5°C AND A RELATIVE HUMIDITY LESS THAN 70%.

(2) OPERATING VOLTAGE: 115 ± 10V RMS, 60 ± 5 HZ FOR THE FIRST 50 HOURS, AND 120 V RMS, 400 ± 10 HZ FOR REMAINDER OF BURN-IN.

TABLE I

DASH NO.	FIGURE	CURRENT-MAX MILLIAMPERES	POWER-MAX WATTS
-001	1	80	1.560
-002	2	5	.096
-003	3	6	.104
-004	4	2	.032
-005	5	17	.268
-006	6	5	.088
-007	7	50	.960
-008	8	2	.032
-009	9	1	.016
-010	10	70	1.400

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± ___ 3 PLACE DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN KNOLL 26-JUN-67 DATE
CHECKED HOGUE 27-JUN-67
APPROVAL CRAMER 27-JUN-67
CONTRACT NAS9-497
A.C. MIT
NASA APPROVAL 13-SEP-67
P WATSON 23-AUG-67
MIT APPROVAL

MANNED
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HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008944
SCALE —
SHEET [illegible]

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B. Lw
	D	REVISION STATUS CHANGED	6 MAR 68	LK YH.

REQUIREMENTS:

1. GENERAL:
   A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
   C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS OF ND 1002056, EXCEPT THAT THE MAXIMUM TEMPERATURE RANGE SHALL BE PER 3.C. (TO BE QUALIFIED BY USER).
   D. PART MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED, IN ACCORDANCE WITH ND 1002019, WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, LOT CODE OR NUMBER, TERMINAL IDENTIFICATION AND NASA PART NUMBER. THE INK USED SHALL BE PER SCD 1010920 AND MARKINGS SHALL BE COATED WITH A CHLOROTRIFLUOROETHYLENE COPOLYMER SOLUTION.
   E. PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS 1, CODE 1.
      (1) MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215, CLASS 1, CODE 2.

2. ACCEPTANCE AND INSPECTION (100%):
   A. MECHANICAL PROPERTIES:
      (1) VISUAL INSPECTION: EACH LAMP TERMINATION AREA SHALL BE INSPECTED UNDER MAGNIFICATION AND COMPARE~~D TO~~ CONTAMINATION STANDARDS SELECTED AND APPROVED BY SUPPLIER AND USER FOR THE FOLLOWING:
         a. PARTICLE CONTAMINATION WITHIN, WHEN VIEWED UNDER 10X MAGNIFICATION. VISIBLE EVIDENCE OF CONDUCTIVE EPOXY SHALL BE ACCEPTABLE.
         b. SCRATCHES, CHIPS, PITTING AND CRACKS ON THE EXTERNAL SURFACE WHEN VIEWED UNDER 10X MAGNIFICATION.
         c. THE ENCAPSULATED CONDUCTORS SHALL BE FREE OF BENDS, KINKS AND OTHER PROTRUSIONS WHICH WOULD CAUSE THEM TO BE EXPOSED ON THE SURFACE.
      (2) DIMENSIONS: SHALL BE AS SHOWN PER APPLICABLE FIGURE IDENTIFIED IN TABLE I.
      (3) LEAD STRENGTH: EACH LEAD SHALL WITHSTAND A TWO (2) POUND AXIAL PULL. FORCE SHALL BE APPLIED AND REMOVED GRADUALLY.
      (4) LEAD MATERIAL: SHALL BE PER MIL-W-16878 (TYPE E-26). THE LEAD CONNECTED TO THE ELECTRO-LUMINESCENT SIDE SHALL HAVE LIGHT BROWN INSULATION (ETCHED WHITE WIRE) AND THE LEAD CONNECTED TO THE REVERSE SIDE SHALL HAVE BLACK INSULATION (ETCHED). THE COLORS SHALL BE EASILY DISCERNIBLE.
      (5) DELAMINATION AND/OR SEPARATION: THE EL LAMP SHALL SHOW NO SIGNS OF DELAMINATION. SEPARATION OF THE LAMP ENVELOPE FROM THE LAMP SHALL NOT BE PRESENT IN THE LIGHTED AREA AND SEPARATION IN OTHER AREAS SHALL NOT AFFECT THE PERFORMANCE OF THE LAMP.

REQUIREMENTS CONTINUED ON SHEET 12.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + __ − 3 PLACE DECIMALS + __ − ANGLES + __ −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN KNOLL DATE 26-JUN-67
CHECKED HOGUE 27-JUN-67
APPROVAL CRAMER 27-JUN-67
CONTRACT NAS9 — 497
NASA APPROVAL A.C. MIT 13-SEP-67
MIT APPROVAL WATSON 23-AUG-67

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

LAMP
ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

SIZE	CODE IDENT NO	
C	80230	1008944
SCALE ——		SHEET 1 OF 13

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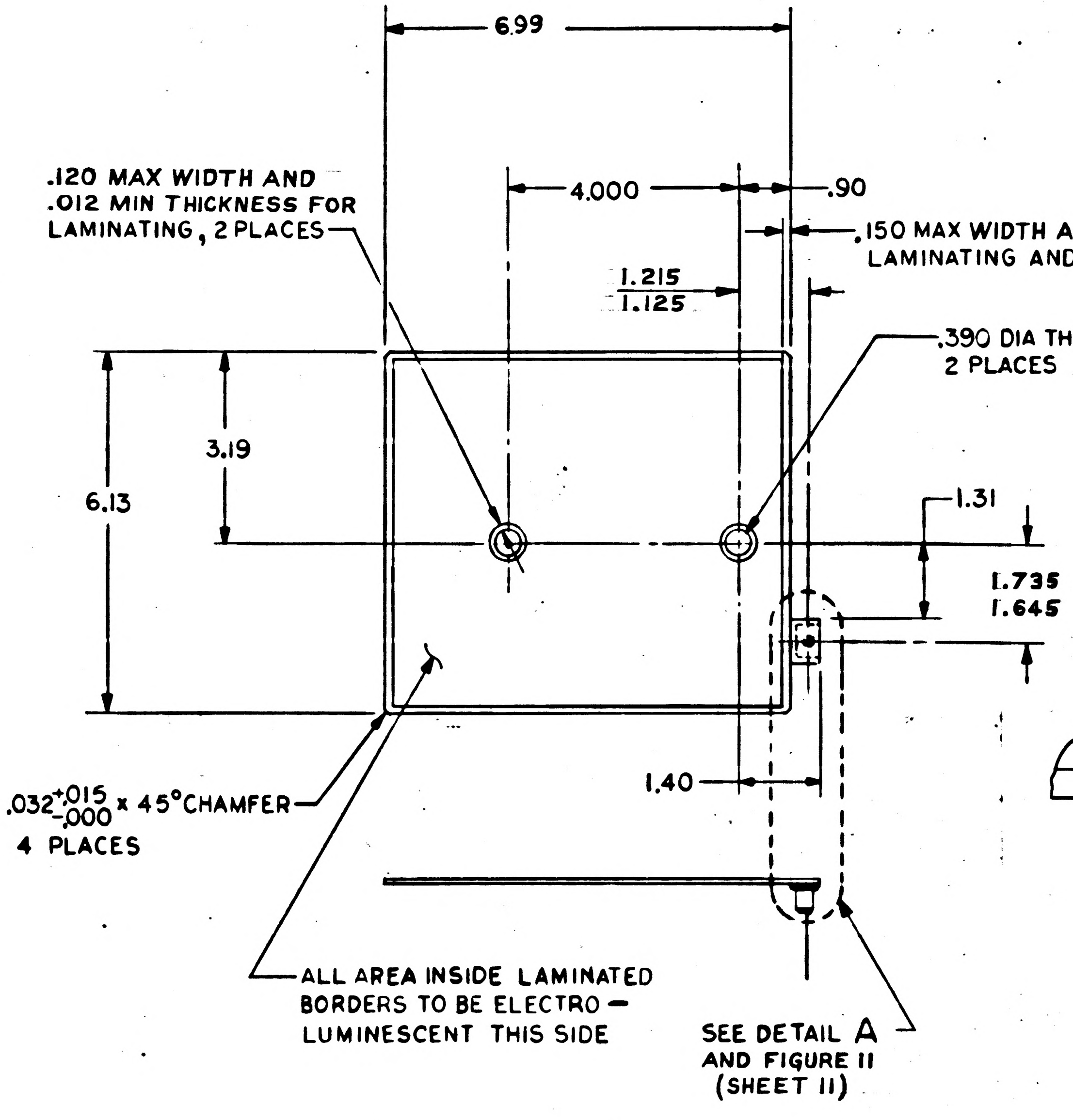
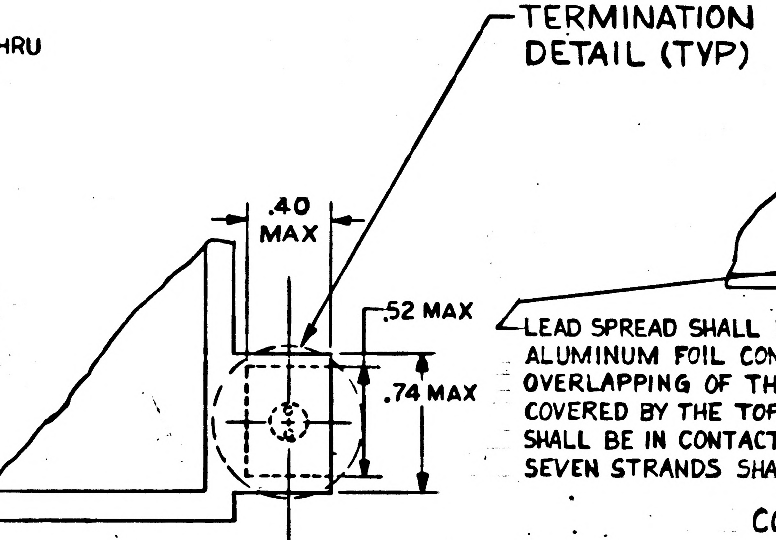
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	21-FEB-68	
D		REVISED PER TDRR 35542	LK	V.M.	8 MAR 68	



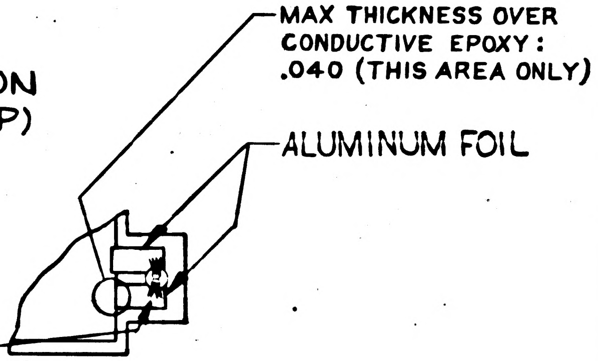
6.99
4.000
.90
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING, 2 PLACES
.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
1.215
1.125
.390 DIA THRU 2 PLACES
3.19
6.13
1.31
1.735
1.645
1.40
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO-LUMINESCENT THIS SIDE
SEE DETAIL A AND FIGURE 11 (SHEET 11)

FIGURE 1



TERMINATION DETAIL (TYP)
.40 MAX
.52 MAX
.74 MAX

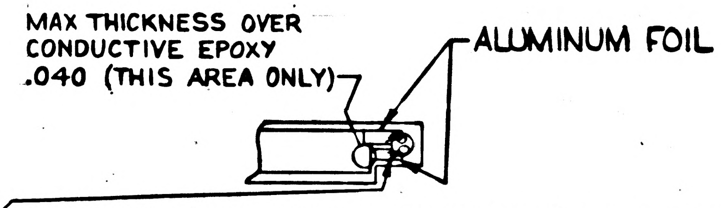
DETAIL A



MAX THICKNESS OVER CONDUCTIVE EPOXY: .040 (THIS AREA ONLY)
ALUMINUM FOIL

LEAD SPREAD SHALL NOT EXTEND BEYOND 1/32 INCH PAST THE ALUMINUM FOIL CONDUCTOR EDGE. THERE SHALL BE NO OVERLAPPING OF THE LEAD STRANDS OUTSIDE THE ZONE COVERED BY THE TOP HAT STEM. A MINIMUM OF 5 STRANDS SHALL BE IN CONTACT WITH THE CONDUCTIVE EPOXY AND ALL SEVEN STRANDS SHALL CONTACT THE FOIL.

CONFIGURATION I



MAX THICKNESS OVER CONDUCTIVE EPOXY .040 (THIS AREA ONLY)
ALUMINUM FOIL

LEAD SPREAD SHALL NOT EXTEND BEYOND 1/32 INCH PAST THE ALUMINUM FOIL CONDUCTOR EDGE. THERE SHALL BE NO OVERLAPPING OF THE LEAD STRANDS OUTSIDE THE ZONE COVERED BY THE TOP HAT STEM. A MINIMUM OF 5 STRANDS SHALL BE IN CONTACT WITH THE CONDUCTIVE EPOXY AND ALL SEVEN STRANDS SHALL CONTACT THE FOIL.

CONFIGURATION II

FIGURE 12

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02   3 PLC DEC ±.010   ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN	W. Knoll	26 JUN 67
CHECKED		27 JUN 67
APPROVED	C.R. Cravan	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT		AUG 23, 67
APPROVED MSC		9/13/67

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE —		SHEET 2 OF

1008944 D

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	21-FEB-68	
D		REVISED PER TDRR 35542	LK	J.W.	6 MAR 68	

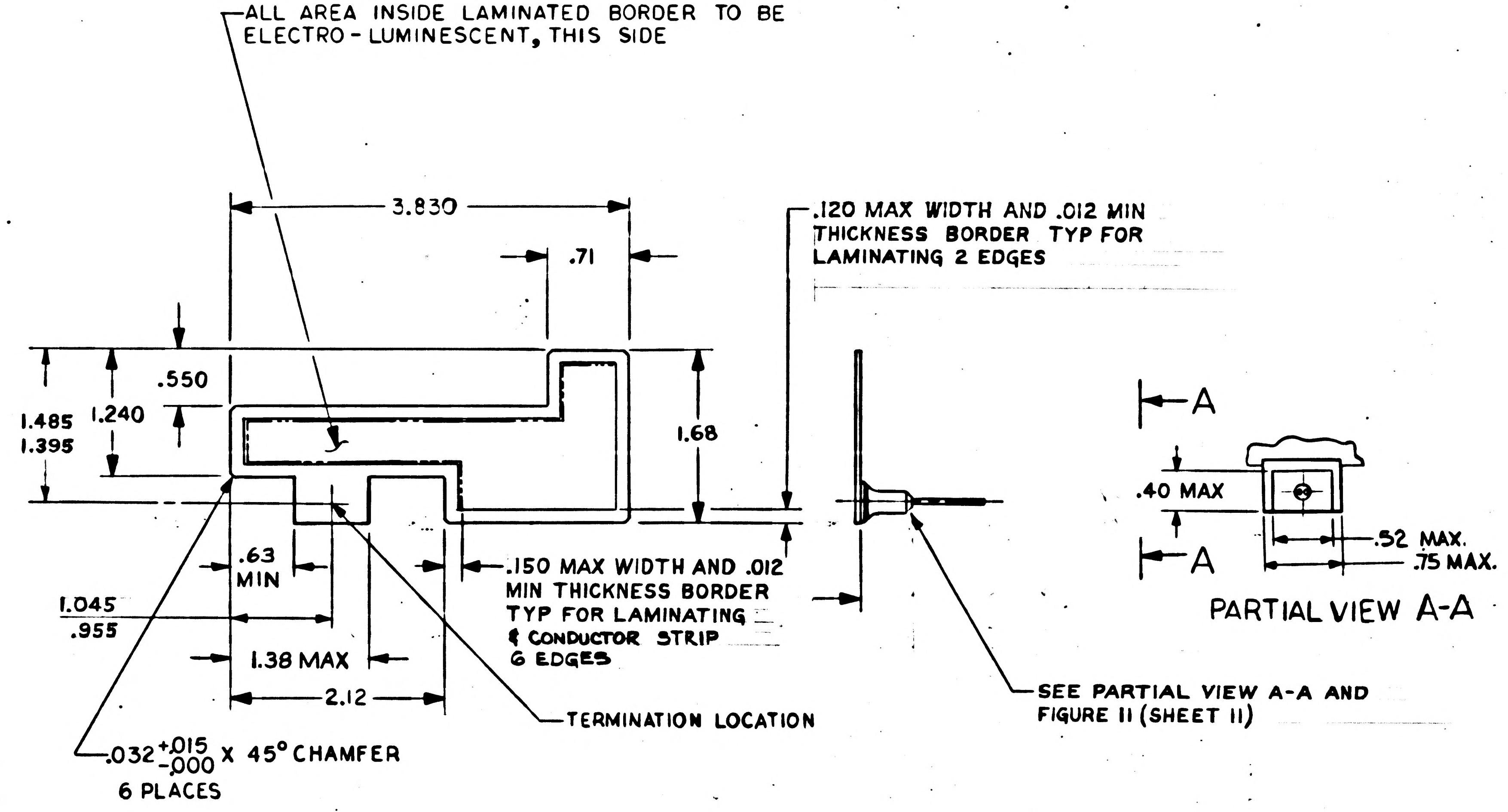

ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
3.830
.71
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATING 2 EDGES
.550
1.485
1.395
1.240
1.68
.63 MIN
1.045
.955
1.38 MAX
2.12
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATING ℄ CONDUCTOR STRIP 6 EDGES
TERMINATION LOCATION
.032 +.015 -.000 X 45° CHAMFER 6 PLACES
SEE PARTIAL VIEW A-A AND FIGURE II (SHEET II)
A
A
.40 MAX
.52 MAX.
.75 MAX.
PARTIAL VIEW A-A

FIGURE 2

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC 3 PLC DEC ANGLES
±.02 ±.015 ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W Knoll 26 JUNE 67
CHECKED R W Hogue 27 JUN 67
APPROVED C R Cranner 27 June 67
APPROVED Paul Watson Aug. 23, 67
NASA-497
APPROVED ~~MIT~~ SCD
APPROVED MSC 9/13/67
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 3 OF

1008944 D

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	fw	22-FEB-68	
D	—	REVISED PER TDRR 35542	LK	V.N.	6 MAR 68	

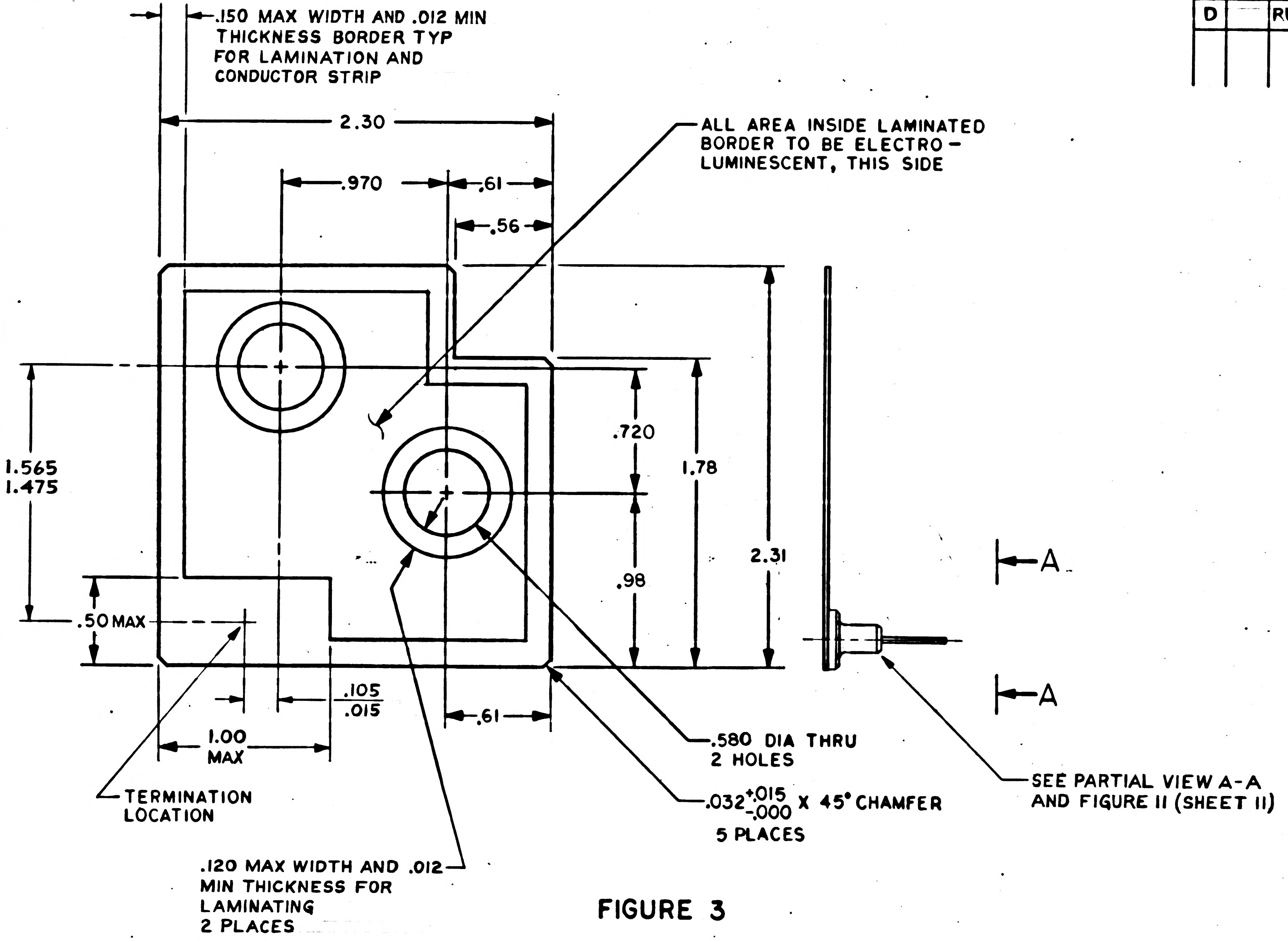
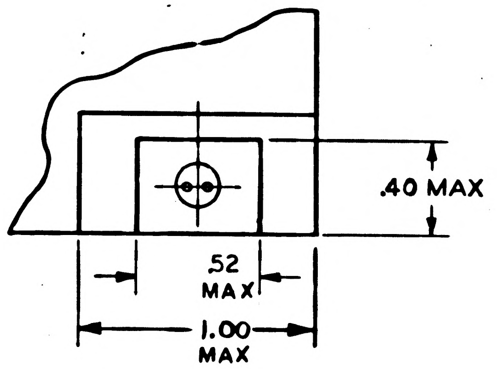

.150 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATION AND CONDUCTOR STRIP
2.30
.970
.61
.56
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
1.565
1.475
.720
1.78
2.31
.98
.50 MAX
.105
.015
.61
1.00 MAX
TERMINATION LOCATION
.580 DIA THRU 2 HOLES
$.032^{+.015}_{-.000}$ X 45° CHAMFER 5 PLACES
A
A
SEE PARTIAL VIEW A-A AND FIGURE II (SHEET II)
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING 2 PLACES

FIGURE 3


.40 MAX
.52 MAX
1.00 MAX

PARTIAL VIEW A-A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
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CAMBRIDGE, MASS.

DRAWN W Knell 26 June 67
CHECKED RuHogue 27 JUN 67
APPROVED C.R. Craver 27 June 67
APPROVED
APPROVED MIT Paul Watson Aug 23 67
APPROVED MSC dCwd 9/13/
DATE

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LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 4 OF

1008944 D

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	22-FEB-68	
D		REVISION STATUS CHANGED	LK	V.W.	6 MAR 68	

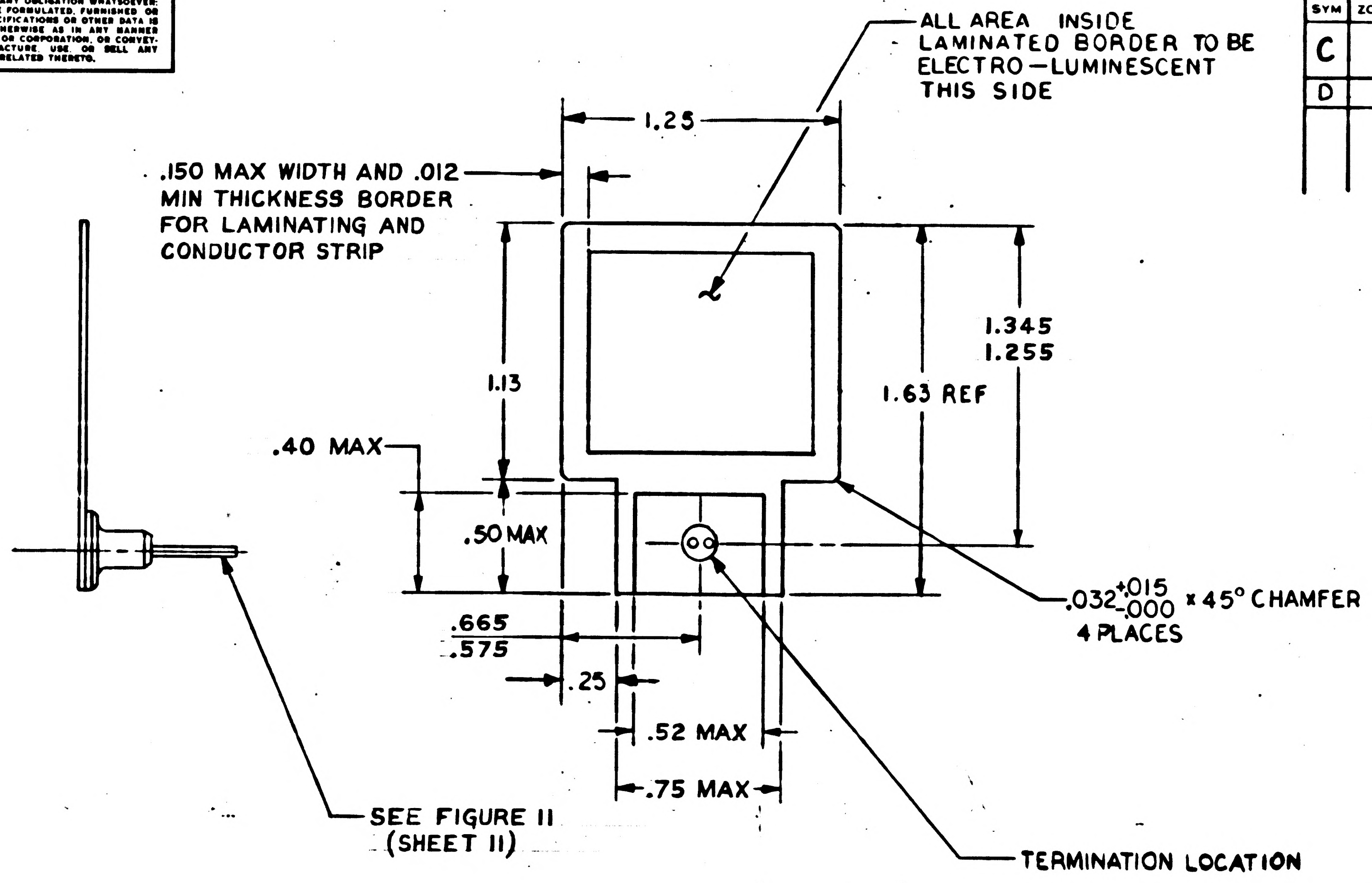
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO–LUMINESCENT THIS SIDE
1.25
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING AND CONDUCTOR STRIP
1.345
1.255
1.13
1.63 REF
.40 MAX
.50 MAX
.032 +.015 −.000 × 45° CHAMFER 4 PLACES
.665
.575
.25
.52 MAX
.75 MAX
SEE FIGURE II (SHEET II)
TERMINATION LOCATION

FIGURE 4

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
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CAMBRIDGE, MASS.

DRAWN	W. Knoll	26 JUNE 67
CHECKED	RicHogue	27 JUN 67
APPROVED	C.R. Cramer	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Walker	AUG 23, 67
APPROVED MSC		
		DATE

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LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE ——		SHEET 5 OF

1008944 D

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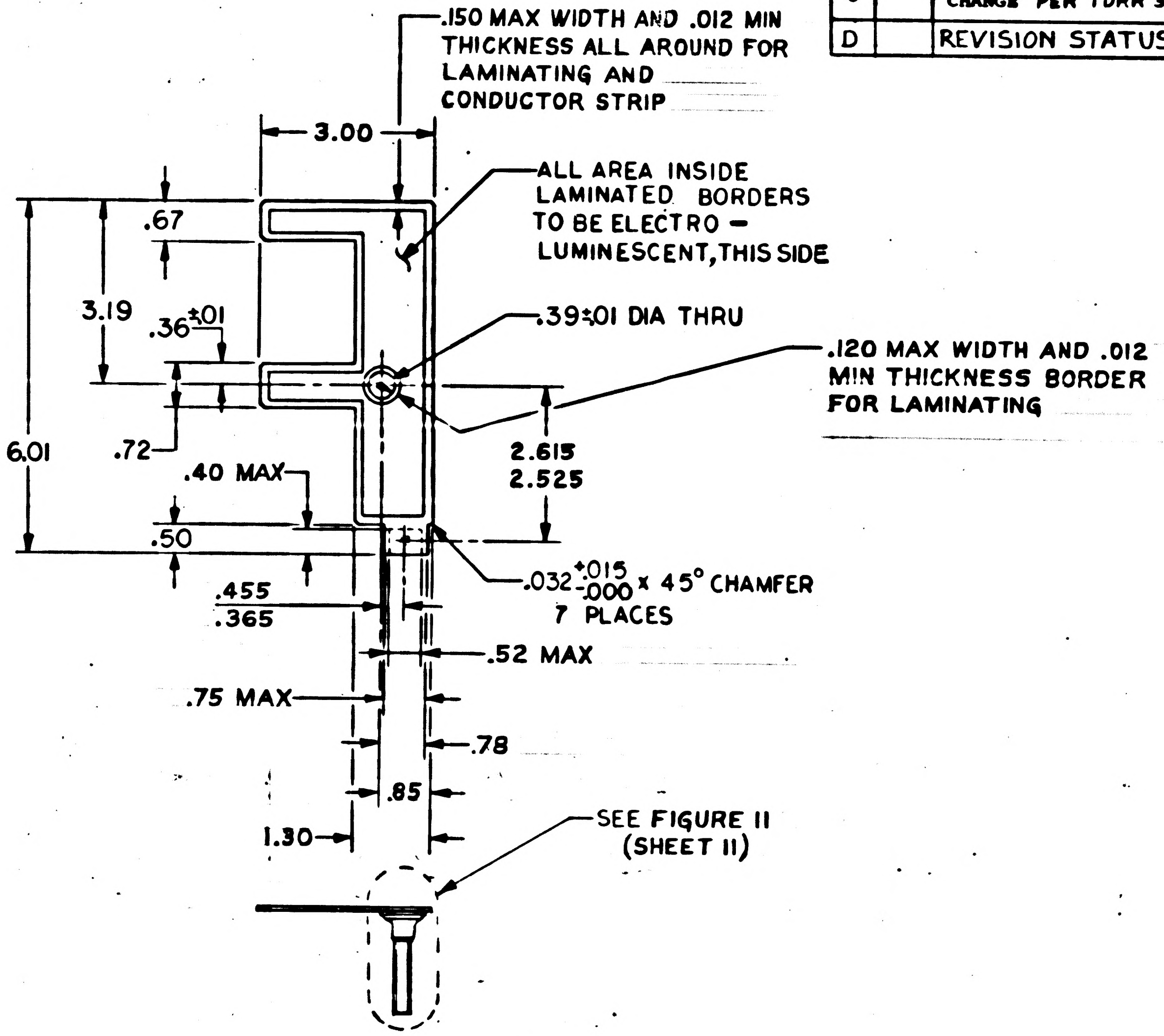
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	22-FEB-68	
D		REVISION STATUS CHANGED	LK	Y.M.	6 MAR 68	



.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
3.00
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO-LUMINESCENT, THIS SIDE
.67
3.19
.36±.01
.39±.01 DIA THRU
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING
6.01
.72
.40 MAX
2.615
2.525
.50
.032 +.015 -.000 x 45° CHAMFER 7 PLACES
.455
.365
.52 MAX
.75 MAX
.78
.85
1.30
SEE FIGURE II (SHEET II)

FIGURE 5

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
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DRAWN W. Knoll 26 JUNE 67
CHECKED Rustogue 27 Jun 67
APPROVED C.R. Crane 27 Jun 67
APPROVED
NAS 9-497
APPROVED MIT Paul Watson Aug. 23 67
APPROVED MSC 9/3/67
DATE

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LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 6 OF

1008944 D

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	22-FEB-68	
D		REVISED PER TDRR 35542	LK	J.W.	5 MAR 68	

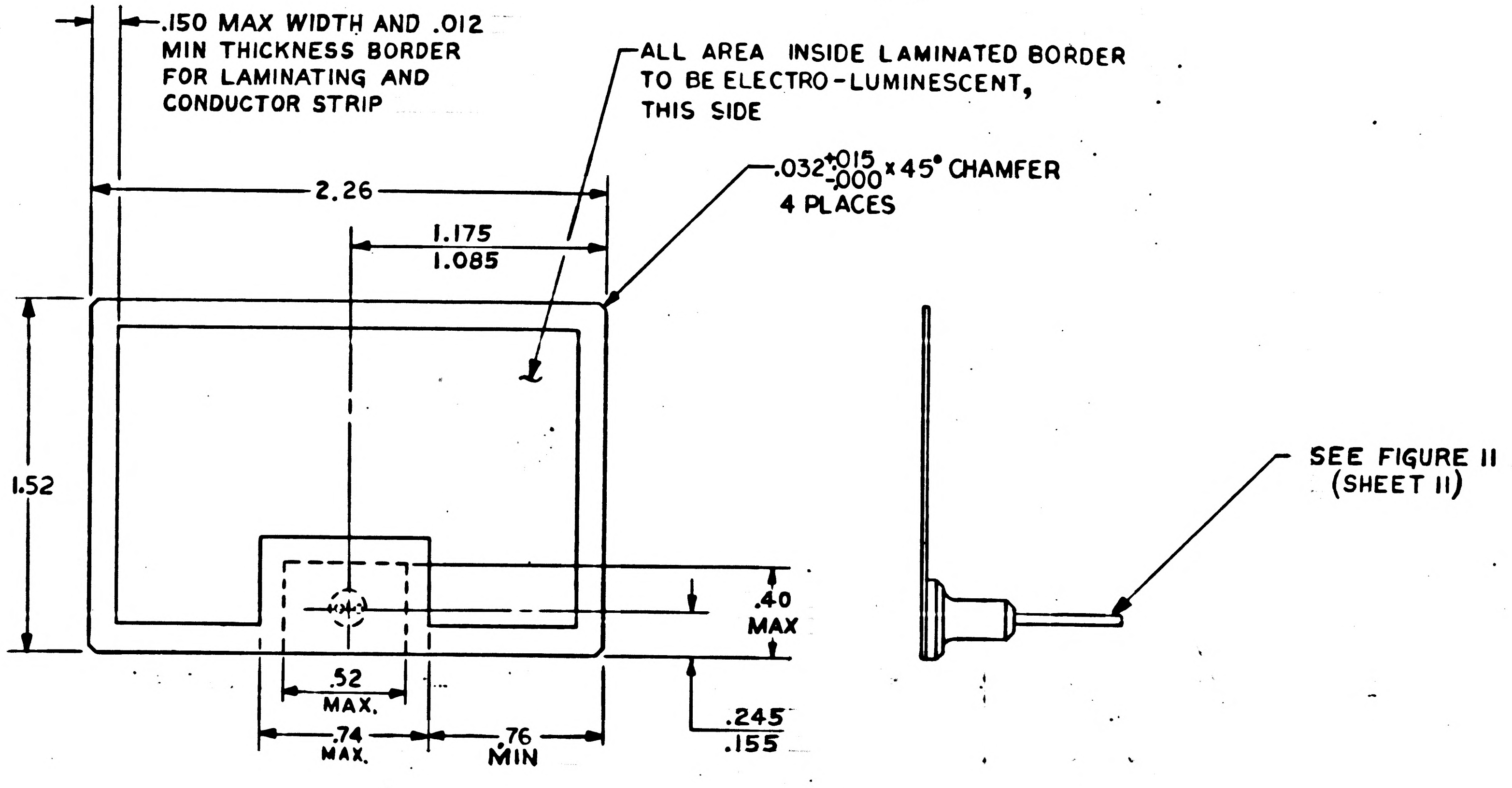
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING AND CONDUCTOR STRIP
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
2.26
1.175
1.085
1.52
.40 MAX
.52 MAX.
.74 MAX.
.76 MIN
.245
.155
SEE FIGURE II (SHEET II)

FIGURE 6

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPROVED CR Crown 27 June 67
APPROVED
NAS 9-497
APPROVED MIT Paul Nelson Aug. 23, 67
APPROVED MSC
DATE

LAMP, ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 7 OF

1008944 D

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	22-FEB-68	
D		REVISION STATUS CHANGED	LK	Y.W	6MAR68	

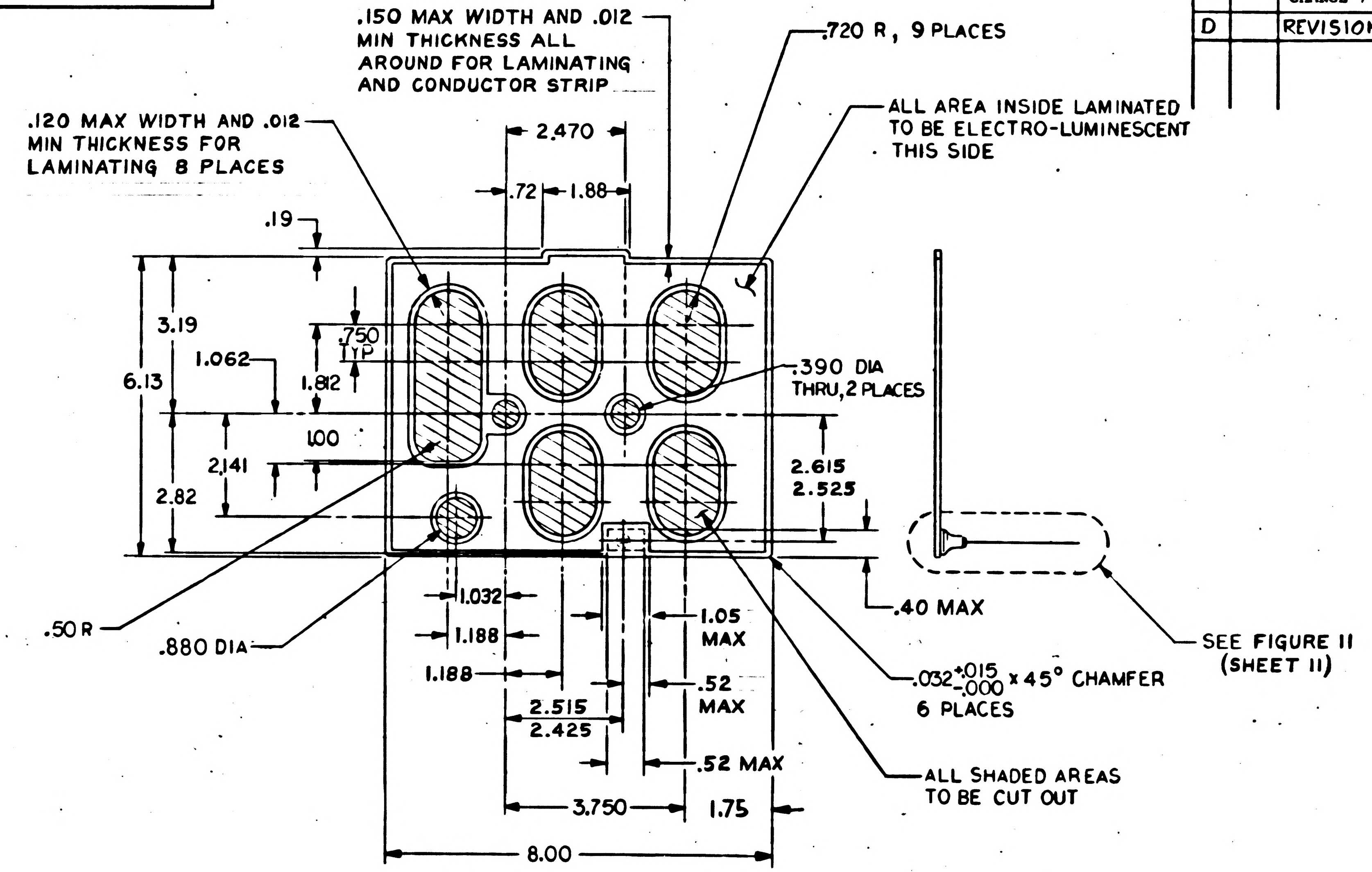
.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.720 R, 9 PLACES
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING 8 PLACES
ALL AREA INSIDE LAMINATED TO BE ELECTRO-LUMINESCENT THIS SIDE
2.470
.72
1.88
.19
3.19
1.062
6.13
.750 TYP
1.812
.390 DIA THRU, 2 PLACES
1.00
2.141
2.82
2.615
2.525
.50 R
.880 DIA
1.032
1.188
1.188
1.05 MAX
.52 MAX
2.515
2.425
.52 MAX
.40 MAX
SEE FIGURE II (SHEET II)
.032 +.015 -.000 x 45° CHAMFER 6 PLACES
ALL SHADED AREAS TO BE CUT OUT
3.750
1.75
8.00

FIGURE 7

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
~~CAPACITOR VALUES ARE IN µf~~
~~RESISTOR VALUES ARE IN OHMS~~
TOLERANCES ON
2 PLC DEC. ±.02 3 PLC DEC. ±.010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL

SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CAMBRIDGE, MASS.

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HOUSTON, TEXAS

DRAWN	W Knoll	26 JUNE 67
CHECKED	RwHogue	27 JUN 67
APPROVED	CR Crona	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul Watson	AUG 23 67
APPROVED MSC		9/1/67
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO	SIZE	DRAWING NO.
80230	C	1008944
SCALE ———		SHEET 8 OF

1008944 C

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	JW	23-FEB-68	
D		REVISION STATUS CHANGED	LK	I.W.	6 MAR 68	

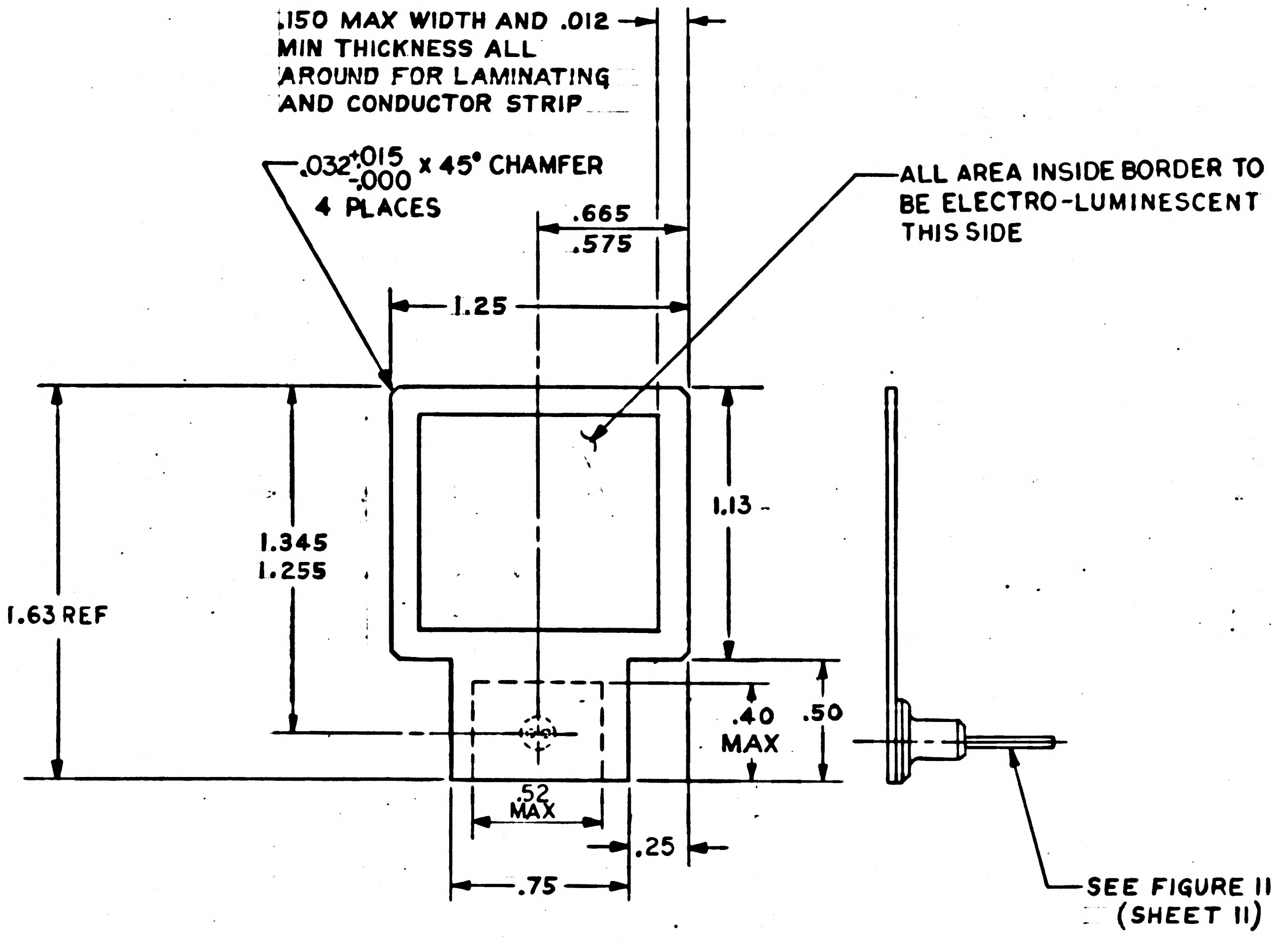
.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.032 +.015 -.000 X 45° CHAMFER 4 PLACES
.665
.575
1.25
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.345
1.255
1.63 REF
1.13
.40 MAX
.50
.52 MAX
.25
.75
SEE FIGURE 11 (SHEET 11)

FIGURE 8

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPROVED C.R. Crumer 27 June 67
APPROVED NAS 9-497
APPROVED MIT Paul Watson AUG. 23, 67
APPROVED MSC 9/3/67
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 9 OF

1008944 D

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	23-FEB-68	
D		REVISION STATUS CHANGED	LK	√	6 MAR 68	

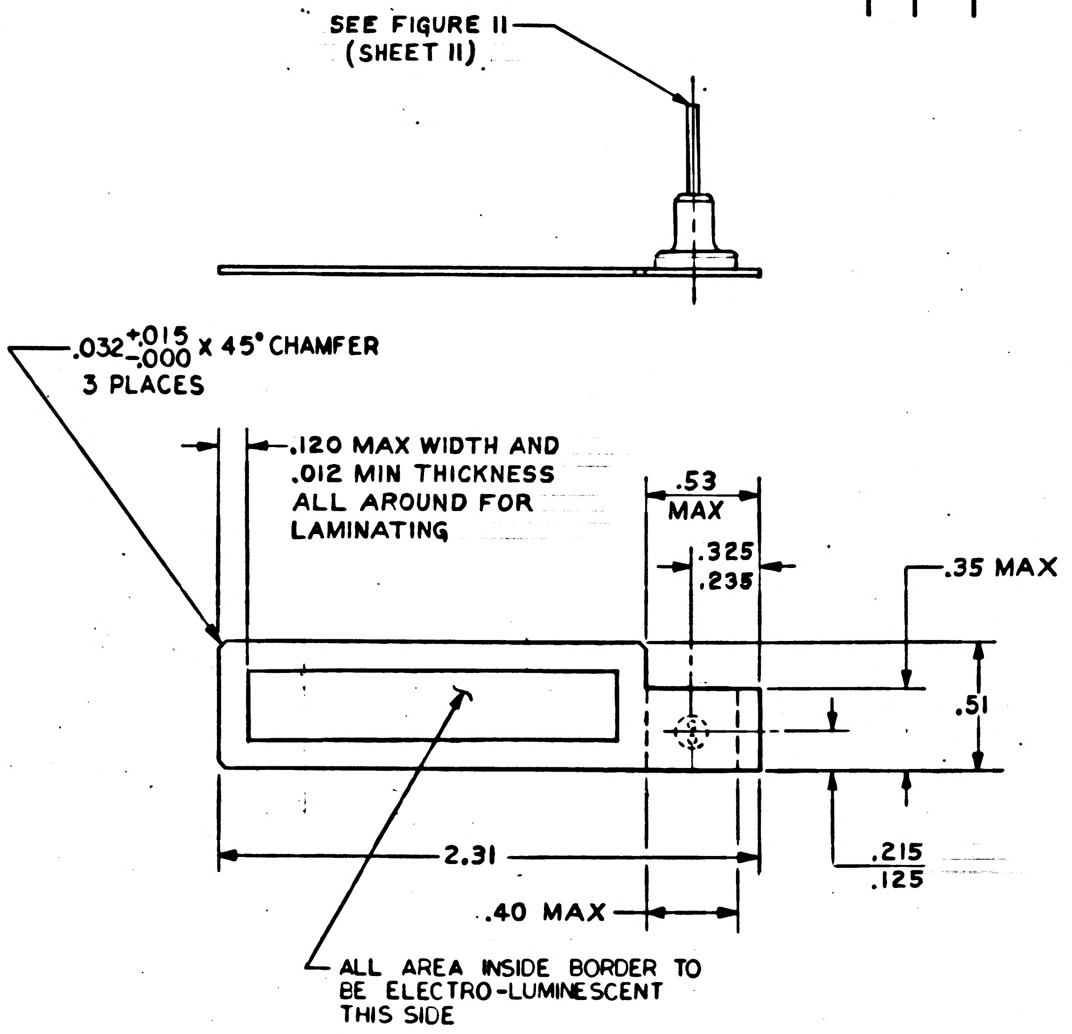
SEE FIGURE II
(SHEET II)
.032 +.015 -.000 X 45° CHAMFER
3 PLACES
.120 MAX WIDTH AND
.012 MIN THICKNESS
ALL AROUND FOR
LAMINATING
.53
MAX
.325
.235
.35 MAX
.51
2.31
.215
.125
.40 MAX
ALL AREA INSIDE BORDER TO
BE ELECTRO-LUMINESCENT
THIS SIDE

FIGURE 9

1008944 D

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

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DRAWN W. Knoll 26 JUN 67
CHECKED RuHogue 27 JUN 67
APPROVED CR [illegible] 27 JUN 67
APPROVED NAS 9-497
APPROVED MIT Paul Watson AUG. 23, 67
APPROVED MSC 9/13/[illegible]
DATE

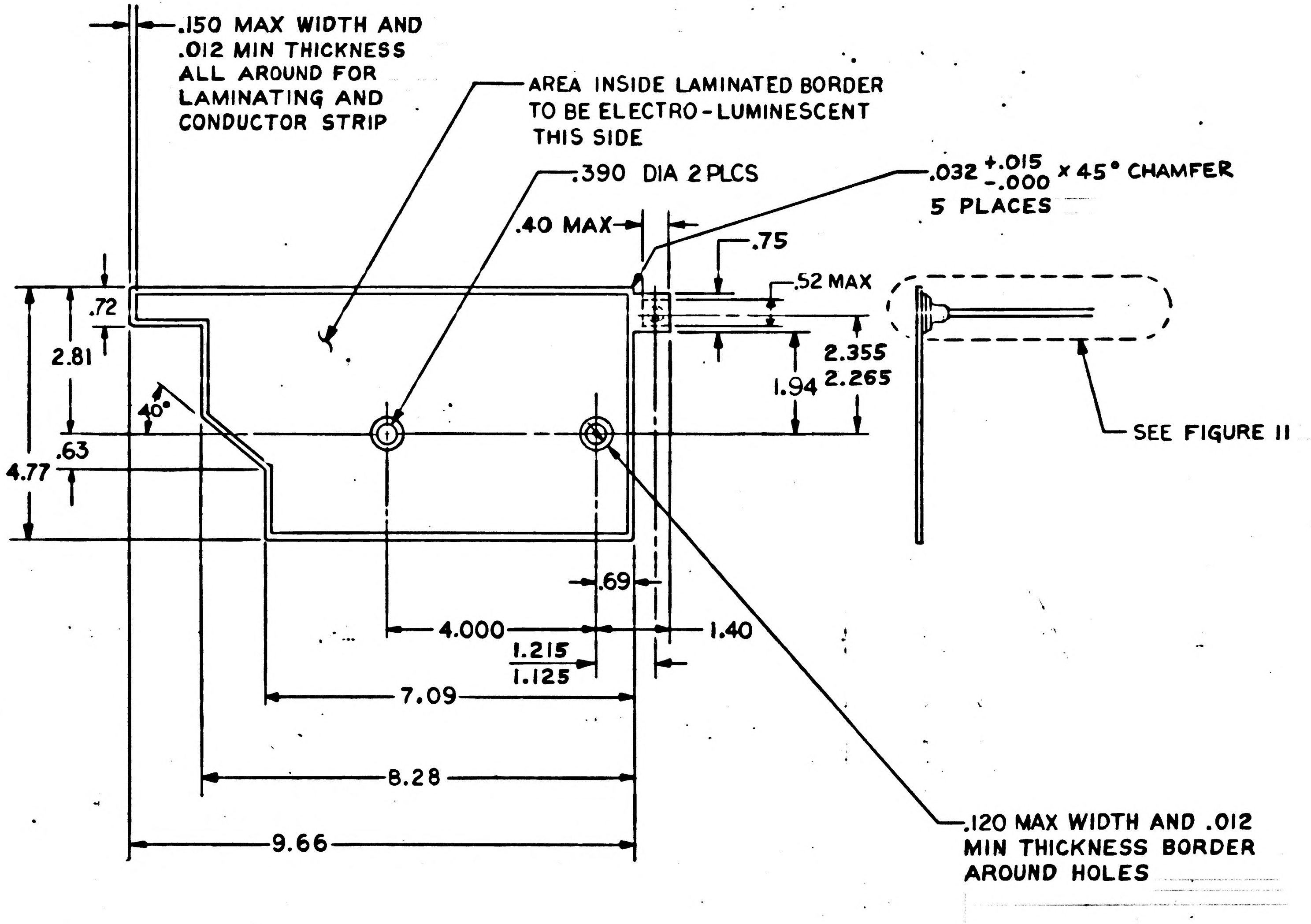
LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO 1008944
SCALE ——
SHEET 10 OF

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

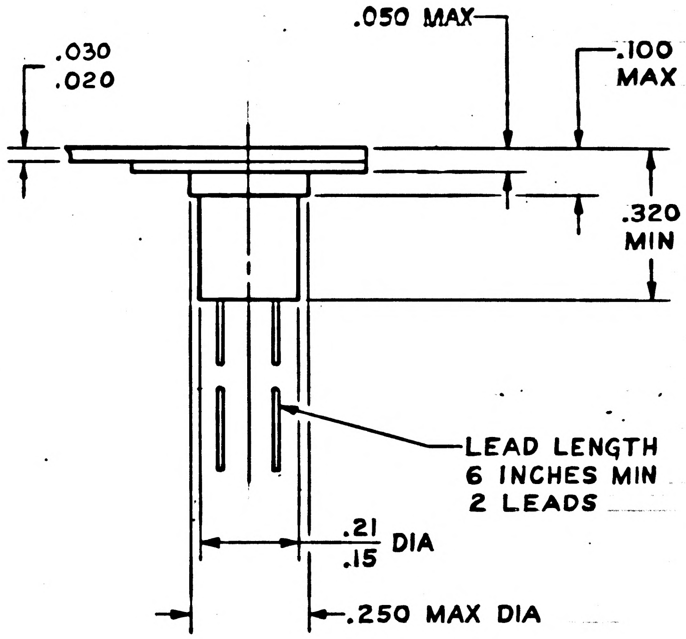
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	23-FEB-68	
D		REVISION STATUS CHANGED	LK	J.W.	6 MAR 69	



.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
.390 DIA 2 PLCS
.032 +.015 -.000 × 45° CHAMFER 5 PLACES
.40 MAX
.75
.52 MAX
.72
2.81
40°
.63
4.77
2.355
2.265
1.94
SEE FIGURE II
.69
4.000
1.40
1.215
1.125
7.09
8.28
9.66
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER AROUND HOLES

FIGURE 10



.030
.020
.050 MAX
.100 MAX
.320 MIN
LEAD LENGTH 6 INCHES MIN 2 LEADS
.21
.15
DIA
.250 MAX DIA

FIGURE II

TOP HAT (LEAD TERMINATION) CONFIGURATION (APPLICABLE TO ALL DASH NUMBER)

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC. ±.02 3 PLC DEC. ±.010 ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
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CAMBRIDGE, MASS.

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HOUSTON, TEXAS

DRAWN	W. Kmall	26 June 67
CHECKED	R. Hogue	27 Jun 67
APPROVED	CR Crane	27 June 67
APPROVED NAS 9-497		
APPROVED MIT	Paul Watson	Aug. 23 67
APPROVED MSC		9/13/67
		DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	DRAWING NO.
80230	C	1008944
SCALE ——		SHEET 11 OF

1008944 D

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B. Lw
	D	REVISED PER TDRR 35542	6 MAR 68	LK T.M.

REQUIREMENTS: (CONTINUED)

B. ELECTRICAL AND PHOTOMETRIC PROPERTIES:

(1) TRANSIENT VOLTAGE: THE LAMP SHALL BE EXCITED WITH 160 ± 5 VOLTS RMS 400 HZ, FOR 5 SECONDS MINIMUM. AFTER APPLICATION OF THIS VOLTAGE THE LAMP MUST BE CAPABLE OF MEETING THE OTHER REQUIREMENTS OF SECTION B.

(2) LIGHT INTENSITY: 1.2 TO 2.0 FOOT-LAMBERTS INITIALLY WHEN EXCITED WITH 75 ± 1.0 VOLTS RMS, 400 ± 10 HZ.

(3) CURRENT: PER TABLE I, WHEN EXCITED PER 2.B.(2).

(4) POWER: PER TABLE I, WHEN EXCITED PER 2.B.(2).

(5) LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE AS SPECIFIED IN 3.F.(1).

(6) DC INSULATION RESISTANCE: THE LEADS OF THE LAMP SHALL BE CONNECTED TOGETHER AND THE LAMP IMMERSED IN A 1% SOLUTION OF SALT WATER. THE DC RESISTANCE MEASURED BETWEEN THE LEADS AND THE WATER SHALL NOT BE LESS THAN 10 MEGOHMS.

3. DESIGN

A. OPERATING LIFE: 2000 HOURS MINIMUM AT 25°C AND A RELATIVE HUMIDITY LESS THAN 70% WITH A LOSS OF NOT MORE THAN 90% OF ORIGINAL LIGHT INTENSITY. MEASUREMENTS ACCOMPLISHED WHEN EXCITED PER 2.B. (2) AT 25°C.

B. STORAGE LIFE: 1 YEAR MINIMUM WITHOUT LOSS OF ELECTRICAL PERFORMANCE AT 0° TO +65°C. LAMP SHALL BE PACKAGED AS SPECIFIED PER PARAGRAPH 1.E. NOTE: STORAGE AT ELEVATED TEMPERATURES WILL CAUSE DIMENSIONAL CHANGES.

C. OPERATING TEMPERATURE RANGE: -55°C TO +65°C. ACCELERATED LIFE DEGRADATION IS NOTED WITH OPERATION ABOVE 25°C.

D. SEAL: THE LAMPS SHALL BE SUBJECTED TO THE IMMERSION TEST (CONDITION B) SPECIFIED IN MIL-STD-202C. THE LIGHT INTENSITY OF PARAGRAPH 2.B.(2) AND THE DC INSULATION RESISTANCE OF PARAGRAPH 2.B.(6) SHALL BE CHECKED AFTER THE IMMERSION AS ACCEPTANCE CRITERIA.

E. MATERIAL:

(1) FLUOROHALOCARBON FILL ENCAPSULATED ELECTRO-LUMINESCENT LAMP.

(2) THE LEAD INSULATION SHALL BE CHEMICALLY TREATED IN A MANNER TO ALLOW ADHESIVE BONDING OR POTTING AND ALLOW THE UNIT TO MEET THE IMMERSION TEST REQUIREMENT OF 3.D.
NOTE: ETCHED TEFLON HAS LIMITED SHELF LIFE WHEN EXPOSED TO LIGHT IN THE PRESENCE OF AIR. THE BONDING STRENGTH OF THE ETCHED TEFLON MATERIAL TO THE NON-ETCHED TEFLON BASE IS THEREBY GREATLY REDUCED.

(3) THE ENCAPSULATED LEADS SHALL BE ALUMINUM FOIL AND SHALL BE ELECTRICALLY CONNECTED TO THE ALUMINUM PLATE AND EXTERNAL LEAD WIRES WITH A CONDUCTIVE CEMENT.

(4) NO MATERIAL SHALL BE USED AS AN OVERCOAT OR PROTECTIVE COVERING TO INSURE AN ADEQUATE SEAL OR PROTECTION.

F. RATING:

(1) LIGHT OUTPUT COLOR: $X = 0.33 \pm 0.02$, $Y = 0.33 \pm 0.02$ PER CIE DIAGRAM.

(2) MAXIMUM CONTINUOUS VOLTAGE: 120 V RMS, 400 HZ.

(3) UNIFORMITY OF LIGHT INTENSITY: THE LIGHT INTENSITY SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN 10%.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN KNOLL DATE 26-JUN-67 CHECKED HOGUE 27-JUN-67 APPROVAL CRAMER 27-JUN-67 CONTRACT NAS9 — 497	LAMP ELECTRO-LUMINESCENT SPECIFICATION CONTROL DRAWING
MATERIAL	AC. MIT NASA APPROVAL 13-SEP-67	SIZE C CODE IDENT NO. 80230 1008944
APPROVAL	WATSON MIT APPROVAL 23-AUG-67	SCALE — SHEET 12

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B.
	D	REVISION STATUS CHANGED	6 MAR 68	LK

REQUIREMENTS: (CONTINUED)

(4) UNIFORMITY OF LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN THE TOLERANCE SPECIFIED IN 3.F.(1).

4. SPECIAL CONDITIONING BY MANUFACTURER:

A. ALL LAMPS SHALL BE BURNED-IN FOR A PERIOD OF 50 TO 100 HOURS PRIOR TO THE ACCEPTANCE AND INSPECTION TESTS IN 2.B. ABOVE. THE BURN-IN CONDITIONS SHALL BE AS FOLLOWS:

(1) TEMPERATURE: 25° ± 5°C AND A RELATIVE HUMIDITY LESS THAN 70%.

(2) OPERATING VOLTAGE: 115 ± 10V RMS, 60 ± 5 HZ FOR THE FIRST 50 HOURS, AND 120 V RMS, 400 ± 10 HZ FOR REMAINDER OF BURN-IN.

TABLE I

DASH NO.	FIGURE	CURRENT-MAX MILLIAMPERES	POWER-MAX WATTS
-001	1	80	1.560
-002	2	5	.096
-003	3	6	.104
-004	4	2	.032
-005	5	17	.268
-006	6	5	.088
-007	7	50	.960
-008	8	2	.032
-009	9	1	.016
-010	10	70	1.400

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS + — − | 3 PLACE DECIMALS + — − | ANGLES + — −
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN KNOLL DATE 26-JUN-67
CHECKED HOGUE 27-JUN-67
APPROVAL CRAMER 27-JUN-67
CONTRACT NAS9-497
A.C. MIT
NASA APPROVAL 13-SEP-67
P. WATSON 23-AUG-67
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP
ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008944
SCALE —
SHEET 13

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B. Lw
	D	REVISION STATUS CHANGED	6 MAR 68	LK V.M.
	E	REVISED PER TDRR 36062	16 APR 68	JJJ EP

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS OF ND 1002056, EXCEPT THAT THE MAXIMUM TEMPERATURE RANGE SHALL BE PER 3.C. (TO BE QUALIFIED BY USER).
   - D. PART MARKING: PARTS SHALL BE PERMANENTLY AND LEGIBLY MARKED, IN ACCORDANCE WITH ND 1002019, WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, LOT CODE OR NUMBER, TERMINAL IDENTIFICATION AND NASA PART NUMBER. THE INK USED SHALL BE PER SCD 1010920 AND MARKINGS SHALL BE COATED WITH A CHLOROTRIFLUOROETHYLENE COPOLYMER SOLUTION.
   - E. PREPARATION FOR DELIVERY SHALL BE IN ACCORDANCE WITH ND 1002215, CLASS 1, CODE 1.
     - (1) MARKING OF SHIPPING CONTAINERS SHALL CONFORM TO THE MARKING OF UNIT AND INTERMEDIATE PACKAGES AND THE METHODS OF MARKING AS SPECIFIED IN ND 1002215, CLASS 1, CODE 2.

2. ACCEPTANCE AND INSPECTION (100%):
   - A. MECHANICAL PROPERTIES:
     - (1) VISUAL INSPECTION: EACH LAMP TERMINATION AREA SHALL BE INSPECTED UNDER MAGNIFICATION AND COMPARED ~~TO~~ CONTAMINATION STANDARDS SELECTED AND APPROVED BY SUPPLIER AND USER FOR THE FOLLOWING:
       - a. PARTICLE CONTAMINATION WITHIN, WHEN VIEWED UNDER 10X MAGNIFICATION. VISIBLE EVIDENCE OF CONDUCTIVE EPOXY SHALL BE ACCEPTABLE.
       - b. SCRATCHES, CHIPS, PITTING AND CRACKS ON THE EXTERNAL SURFACE WHEN VIEWED UNDER 10X MAGNIFICATION.
       - c. THE ENCAPSULATED CONDUCTORS SHALL BE FREE OF BENDS, KINKS AND OTHER PROTRUSIONS WHICH WOULD CAUSE THEM TO BE EXPOSED ON THE SURFACE.
     - (2) DIMENSIONS: SHALL BE AS SHOWN PER APPLICABLE FIGURE IDENTIFIED IN TABLE I.
     - (3) LEAD STRENGTH: EACH LEAD SHALL WITHSTAND A TWO (2) POUND AXIAL PULL. FORCE SHALL BE APPLIED AND REMOVED GRADUALLY.
     - (4) LEAD MATERIAL: SHALL BE PER SCD 1008951. THE LEAD CONNECTED TO THE ELECTRO-LUMINESCENT SIDE SHALL HAVE LIGHT BROWN INSULATION (ETCHED WHITE WIRE) AND THE LEAD CONNECTED TO THE REVERSE SIDE SHALL HAVE BLACK INSULATION (ETCHED). THE COLORS SHALL BE EASILY DISCERNIBLE.
     - (5) DELAMINATION AND/OR SEPARATION: THE EL LAMP SHALL SHOW NO SIGNS OF DELAMINATION. SEPARATION OF THE LAMP ENVELOPE FROM THE LAMP SHALL NOT BE PRESENT IN THE LIGHTED AREA AND SEPARATION IN OTHER AREAS SHALL NOT AFFECT THE PERFORMANCE OF THE LAMP.

REQUIREMENTS CONTINUED ON SHEET 12.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + — − 3 PLACE DECIMALS + — − ANGLES + — −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOLSTON TEXAS
DO NOT SCALE THIS DRAWING	DRAWN KNOLL DATE 26-JUN-67 CHECKED HOGUE 27-JUN-67 APPROVAL CRAMER 27-JUN-67 CONTRACT NAS9 — 497	LAMP ELECTRO-LUMINESCENT SPECIFICATION CONTROL DRAWING
MATERIAL	A.C. MIT 13-SEP-67 NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008944
APPROVAL	WATSON 23-AUG-67 MIT APPROVAL	SCALE —— SHEET 1 OF 13

NOTICE – WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	21-FEB-68	
D		REVISED PER TDRR 35542	LK	V.M.	8 MAR 68	
E		REVISION STATUS CHANGED	JJ	EA	16 APR 68	

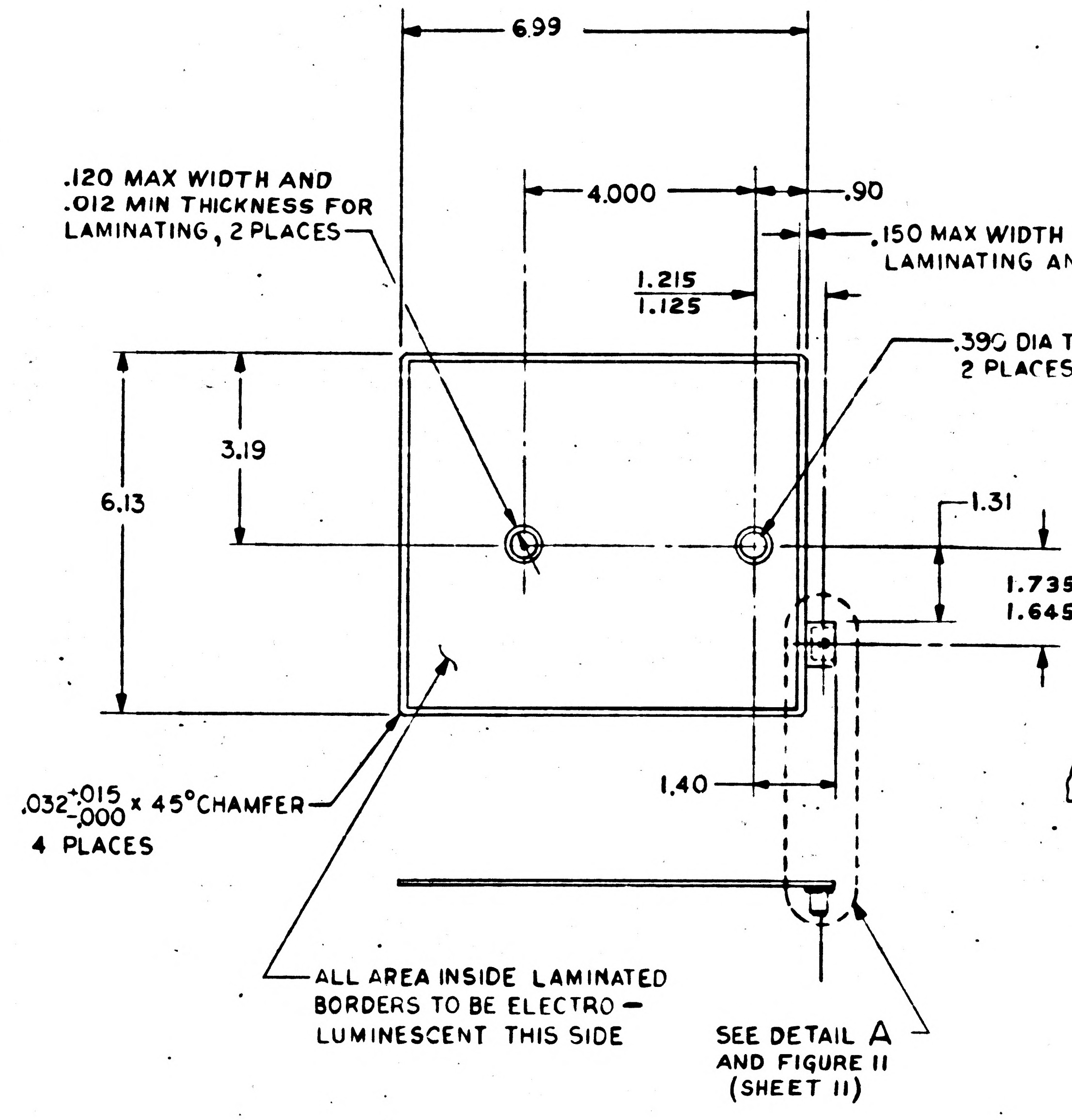
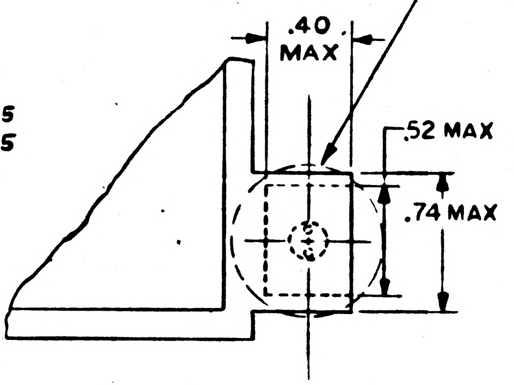
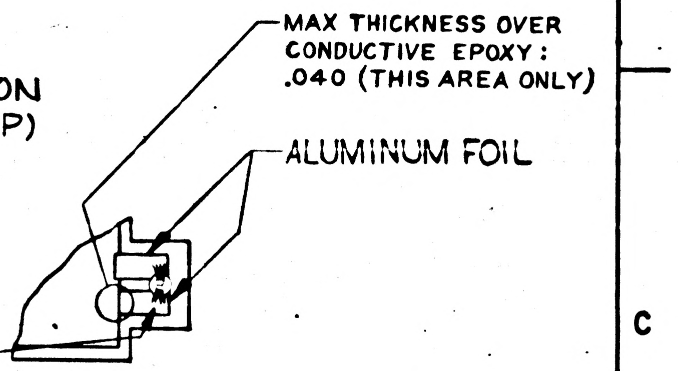

6.99
4.000
.90
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING, 2 PLACES
.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
1.215
1.125
.390 DIA THRU 2 PLACES
3.19
6.13
1.31
1.735
1.645
1.40
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO-LUMINESCENT THIS SIDE
SEE DETAIL A AND FIGURE 11 (SHEET 11)

FIGURE 1

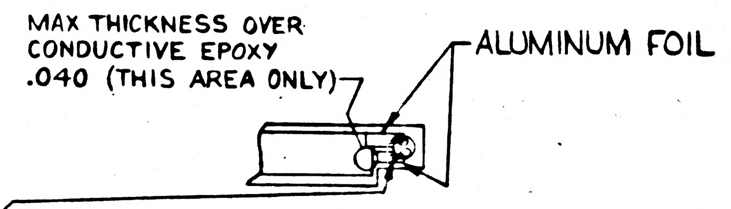

.40 MAX
.52 MAX
.74 MAX

DETAIL A


TERMINATION DETAIL (TYP)
MAX THICKNESS OVER CONDUCTIVE EPOXY: .040 (THIS AREA ONLY)
ALUMINUM FOIL

LEAD SPREAD SHALL NOT EXTEND BEYOND 1/32 INCH PAST THE ALUMINUM FOIL CONDUCTOR EDGE. THERE SHALL BE NO OVERLAPPING OF THE LEAD STRANDS OUTSIDE THE ZONE COVERED BY THE TOP HAT STEM. A MINIMUM OF 5 STRANDS SHALL BE IN CONTACT WITH THE CONDUCTIVE EPOXY AND ALL SEVEN STRANDS SHALL CONTACT THE FOIL.

CONFIGURATION I


MAX THICKNESS OVER CONDUCTIVE EPOXY .040 (THIS AREA ONLY)
ALUMINUM FOIL

LEAD SPREAD SHALL NOT EXTEND BEYOND 1/32 INCH PAST THE ALUMINUM FOIL CONDUCTOR EDGE. THERE SHALL BE NO OVERLAPPING OF THE LEAD STRANDS OUTSIDE THE ZONE COVERED BY THE TOP HAT STEM. A MINIMUM OF 5 STRANDS SHALL BE IN CONTACT WITH THE CONDUCTIVE EPOXY AND ALL SEVEN STRANDS SHALL CONTACT THE FOIL.

CONFIGURATION II

FIGURE 12

LIST OF MATERIALS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON

2 PLC DEC	3 PLC DEC	ANGLES
± .02	± .010	± 5°

DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN	W Knoll	26 JUN 67
CHECKED	Rutlogue	27 JUN 67
APPROVED	CR Cramer	27 June 67
APPROVED	NAS 9-497	
APPROVED MIT	Paul [illegible]	AUG 23, 67
APPROVED MSC		9/13/67
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP, ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO	SIZE	DRAWING NO.
80230	C	1008944

SCALE ——— SHEET 2 OF

E 1008944

NOTICE - WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	21-FEB-68	
D		REVISED PER TDRR 35542	LK	J.M.	6 MAR 68	
E		REVISION STATUS CHANGED	JJ	BP	16 APR 68	

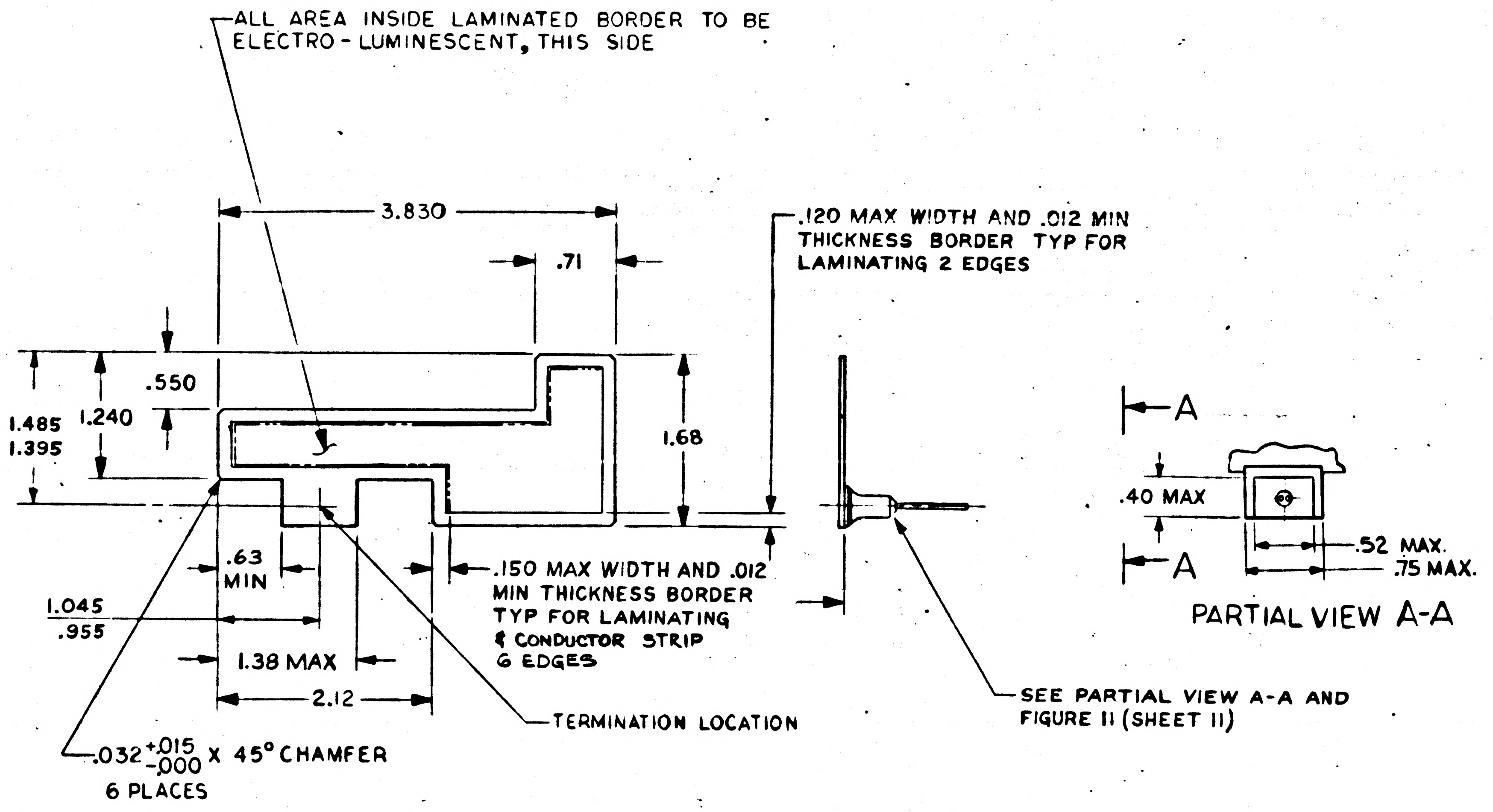

ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
3.830
.71
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATING 2 EDGES
.550
1.485
1.395
1.240
1.68
.63 MIN
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATING ℄ CONDUCTOR STRIP 6 EDGES
1.045
.955
1.38 MAX
2.12
TERMINATION LOCATION
.032 +.015 -.000 X 45° CHAMFER 6 PLACES
SEE PARTIAL VIEW A-A AND FIGURE 11 (SHEET 11)
A
A
.40 MAX
.52 MAX.
.75 MAX.
PARTIAL VIEW A-A

FIGURE 2

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.015 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN W Knoll 26 JUNE 67
CHECKED RwHogue 27 JUN 67
APPROVED CR Cramer 27 June 67
APPROVED Paul Watson Aug. 23, 67
NASA9-497
APPROVED ~~MSC~~ SCD
APPROVED MSC 9/13/67
DATE

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 3 OF

1008944 E

NOTICE - WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	lw	22-FEB-68	
D		REVISED PER TDRR 35542	LK	V.N.	6 MAR 68	
E		REVISION STATUS CHANGED	JJ	BP	16 APR 68	

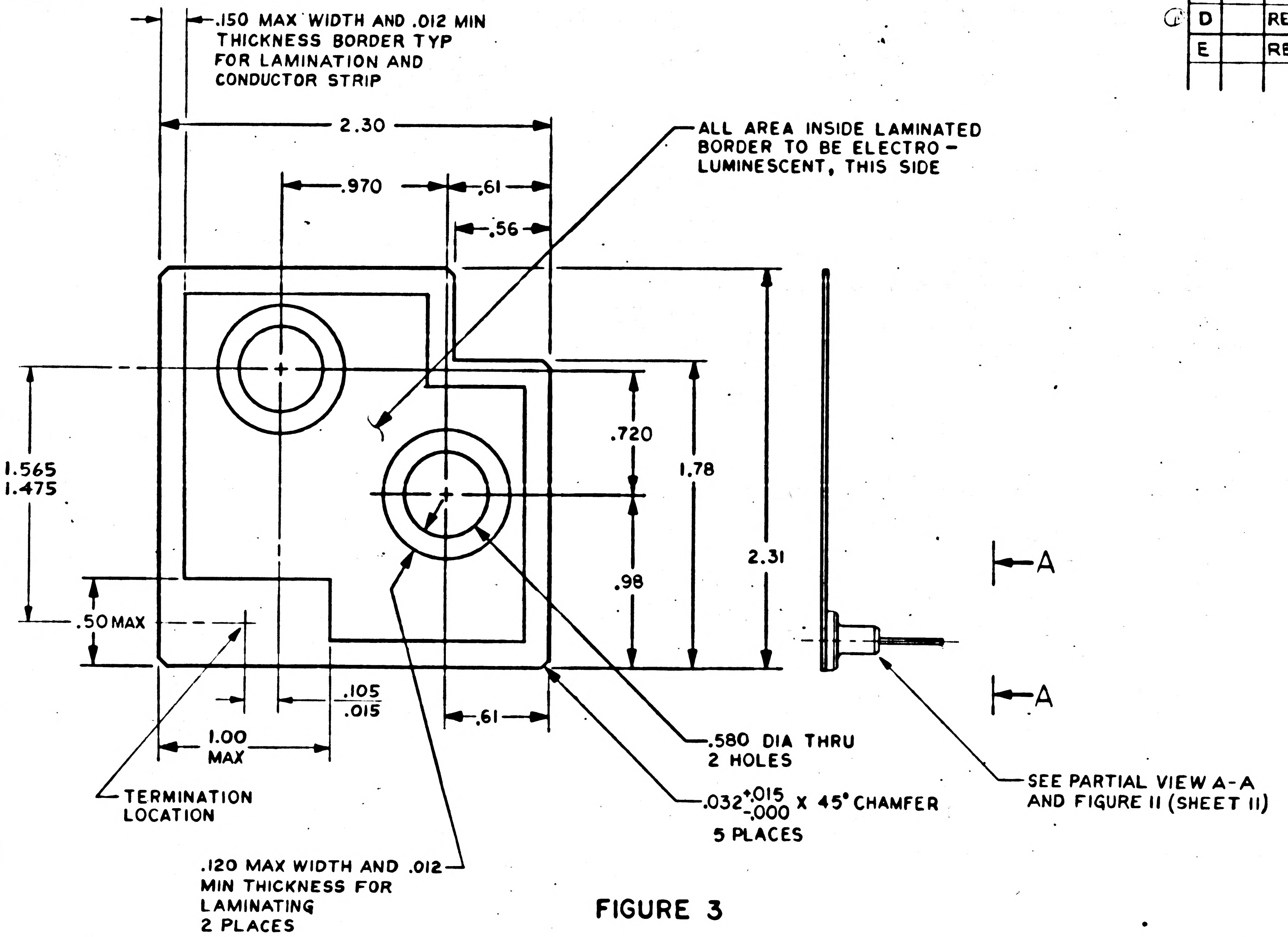
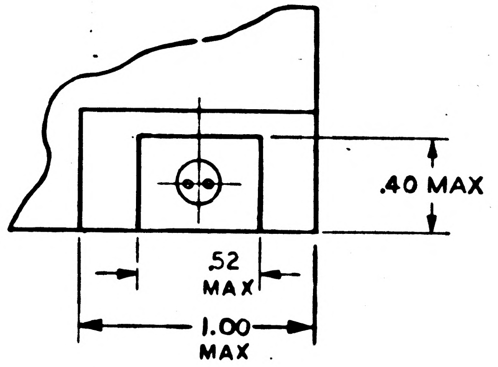

.150 MAX WIDTH AND .012 MIN THICKNESS BORDER TYP FOR LAMINATION AND CONDUCTOR STRIP
2.30
.970
.61
.56
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
1.565
1.475
.720
1.78
.98
2.31
.50 MAX
.105
.015
.61
1.00 MAX
A
A
TERMINATION LOCATION
.580 DIA THRU 2 HOLES
$.032^{+.015}_{-.000}$ X 45° CHAMFER 5 PLACES
SEE PARTIAL VIEW A-A AND FIGURE II (SHEET II)
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING 2 PLACES

FIGURE 3


.40 MAX
.52 MAX
1.00 MAX

PARTIAL VIEW A-A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ± .02 3 PLC DEC ± .010 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS.

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN	W Knell	26 June 67
CHECKED	RuHogue	27 JUN 67
APPROVED	CR Crover	27 June 67
APPROVED		
APPROVED MIT	Paul Watson	Aug 23 67
APPROVED MSC		
		DATE

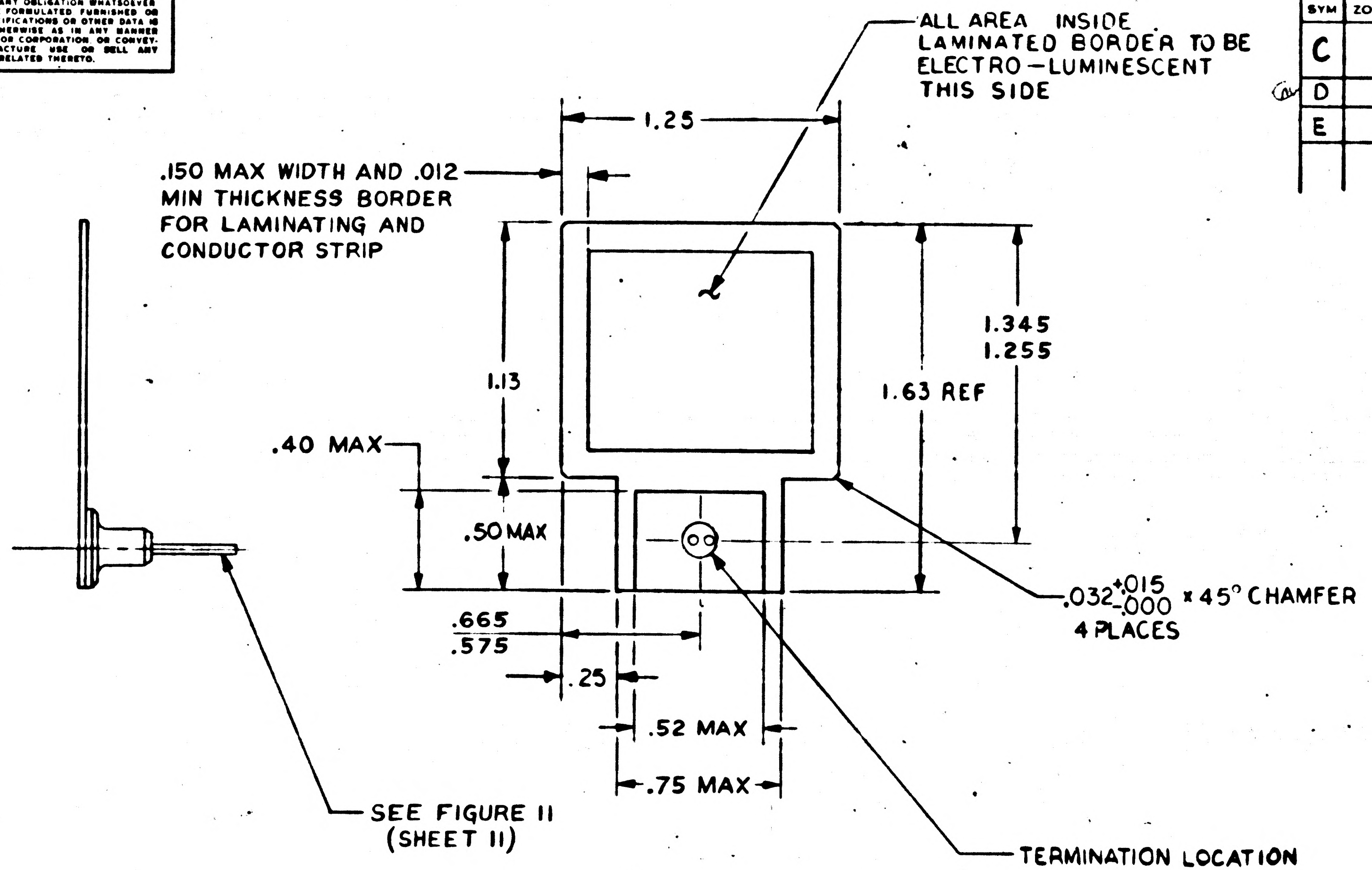
LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO	SIZE	DRAWING NO
80230	C	1008944
SCALE		SHEET 4 OF

1008944 E

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	22-FEB-68	
D		REVISION STATUS CHANGED	LK	V.W.	6 MAR 68	
E		REVISION STATUS CHANGED	JJJ	HP	6 APR 68	



ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING AND CONDUCTOR STRIP
1.345
1.255
1.13
1.63 REF
.40 MAX
.50 MAX
.032 +.015 -.000 × 45° CHAMFER 4 PLACES
.665
.575
.25
.52 MAX
.75 MAX
SEE FIGURE 11 (SHEET 11)
TERMINATION LOCATION

FIGURE 4

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN W. Kroll 26 June 67
CHECKED Ruxtogue 27 JUN 67
APPROVED C.R. Cronen 27 June 67
APPROVED
NAS 9-497
APPROVED MIT Paul Nelson Aug 23, 67
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

LAMP,
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

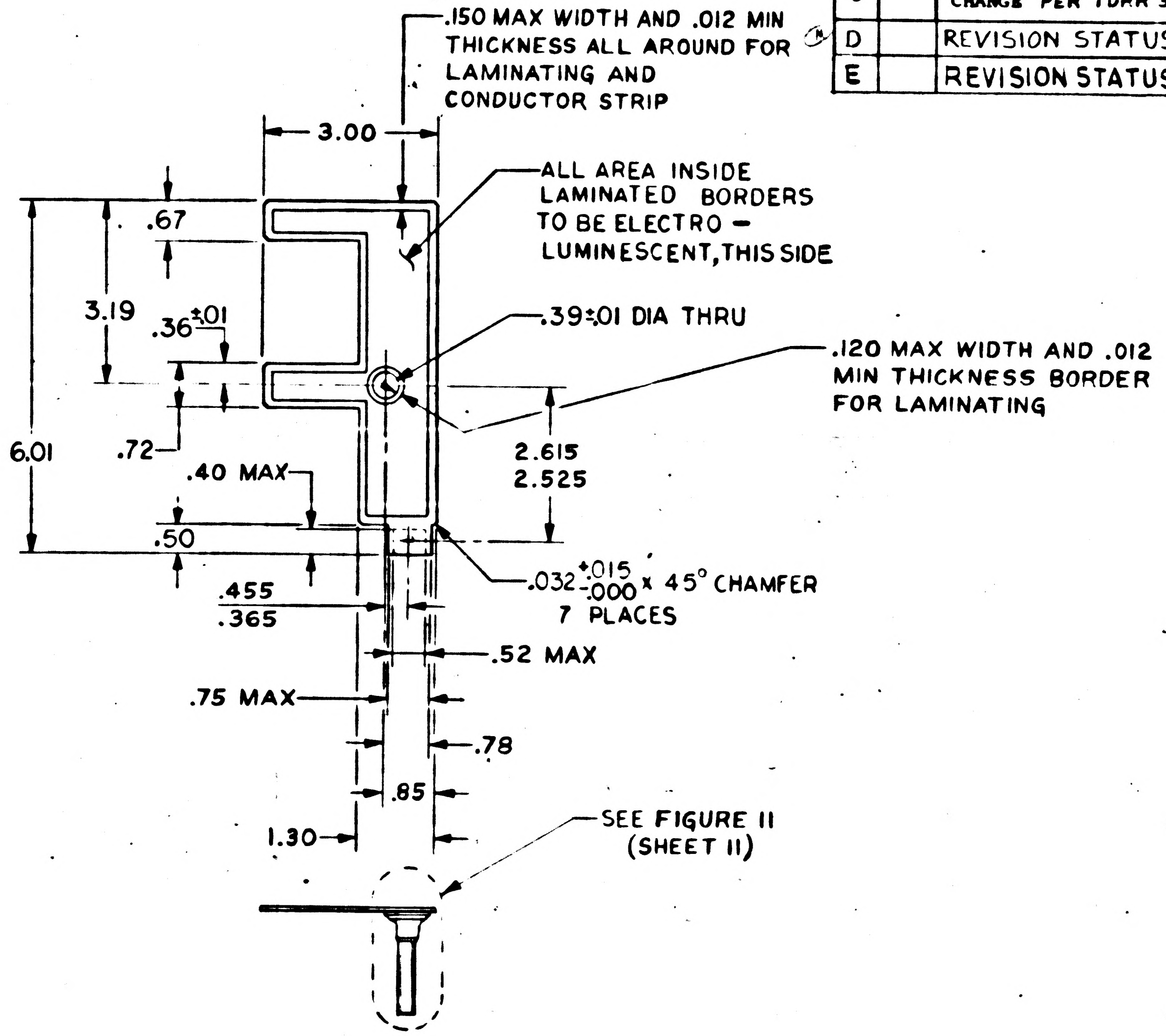
CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 5 OF

1008944 E1

NOTICE – WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	22 FEB 68	
D		REVISION STATUS CHANGED	LK	I.M.	6 MAR 68	
E		REVISION STATUS CHANGED	JJ		16 APR 68	



.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
3.00
ALL AREA INSIDE LAMINATED BORDERS TO BE ELECTRO – LUMINESCENT, THIS SIDE
.67
3.19
.36±.01
.39±.01 DIA THRU
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING
6.01
.72
.40 MAX
2.615
2.525
.50
.032 +.015 -.000 x 45° CHAMFER 7 PLACES
.455
.365
.52 MAX
.75 MAX
.78
.85
1.30
SEE FIGURE II (SHEET II)

FIGURE 5

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ± .02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

NEXT ASSY	USED ON
APPLICATION	

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APPROVED MIT Paul Watson AUG 23 67
APPROVED MSC 9/1
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 6 OF

1008944 E

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REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	22-FEB-68	
D		REVISED PER TDRR 35542	LK		6 MAR 68	
E		REVISION STATUS CHANGED	JJJ		16 APR 68	

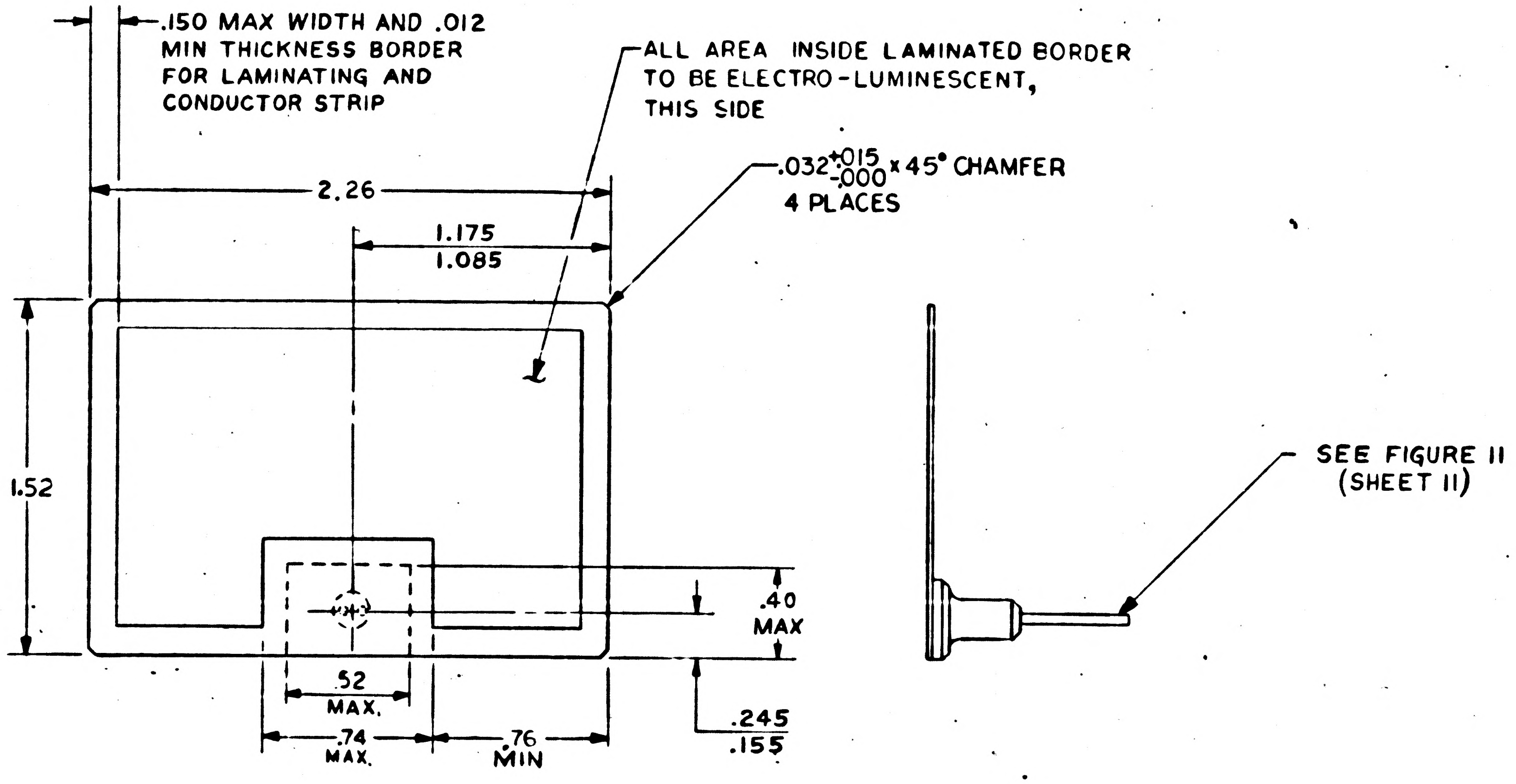
.150 MAX WIDTH AND .012 MIN THICKNESS BORDER FOR LAMINATING AND CONDUCTOR STRIP
ALL AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT, THIS SIDE
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
2.26
1.175
1.085
1.52
.40 MAX
.52 MAX.
.74 MAX.
.76 MIN
.245
.155
SEE FIGURE II (SHEET II)

FIGURE 6

1008944 E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

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CHECKED RusHogue 27 JUN 67
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APPROVED
NAS 9-497
APPROVED MIT
APPROVED MSC
DATE

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SPECIFICATION CONTROL DRAWING

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SIZE C
DRAWING NO 1008944
SCALE ——
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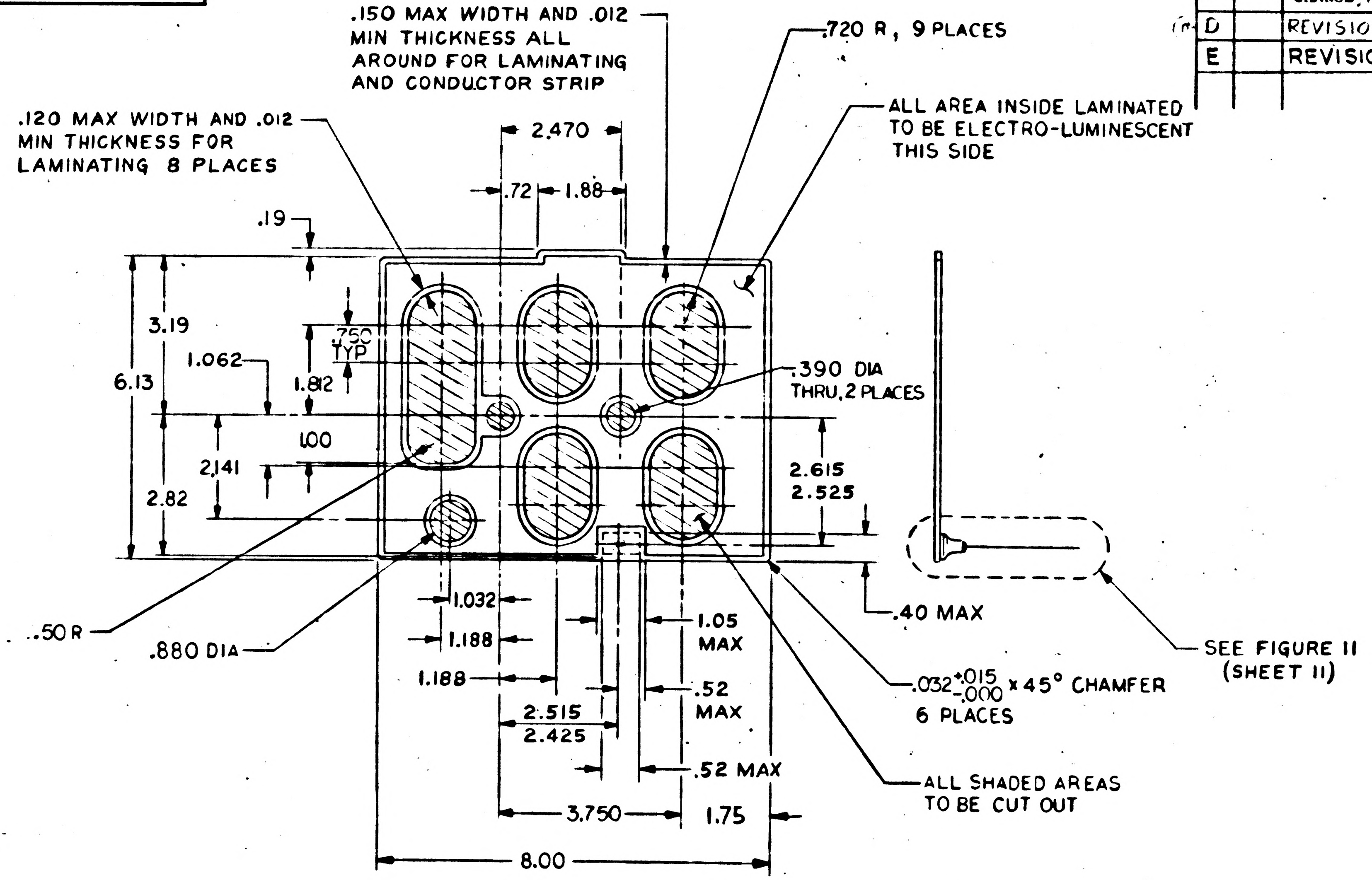
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE, PER TORR 35494	B.	LW	22-FEB-68	
D		REVISION STATUS CHANGED	LK		6 MAR 68	
E		REVISION STATUS CHANGED	JJ		16 APR 68	



.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.720 R, 9 PLACES
.120 MAX WIDTH AND .012 MIN THICKNESS FOR LAMINATING 8 PLACES
ALL AREA INSIDE LAMINATED TO BE ELECTRO-LUMINESCENT THIS SIDE
2.470
.72
1.88
.19
3.19
.750 TYP
1.062
1.812
6.13
.390 DIA THRU, 2 PLACES
1.00
2.141
2.82
2.615
2.525
.50 R
.880 DIA
1.032
1.188
1.188
1.05 MAX
.52 MAX
.40 MAX
2.515
2.425
.52 MAX
.032 +.015 -.000 x 45° CHAMFER 6 PLACES
SEE FIGURE 11 (SHEET 11)
ALL SHADED AREAS TO BE CUT OUT
3.750
1.75
8.00

FIGURE 7

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
~~CAPACITOR VALUES ARE IN µF~~
~~RESISTOR VALUES ARE IN OHMS~~
TOLERANCES ON
2 PLC DEC. ±.02   3 PLC DEC. ±.010   ANGLES ± 5°
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MATERIAL
SEE NOTES

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APPROVED
NAS 9-497
APPROVED MIT Carl Watson AUG 23 67
APPROVED MSC 9/1
DATE

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LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008944
SCALE
SHEET 8 OF

1008944 E

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE, PER TDRR 35494	B.	Jw	23-FEB-68	
D		REVISION STATUS CHANGED	LK	Y.W.	6 MAR 68	
E		REVISION STATUS CHANGED	JJJ		16 APR 68	

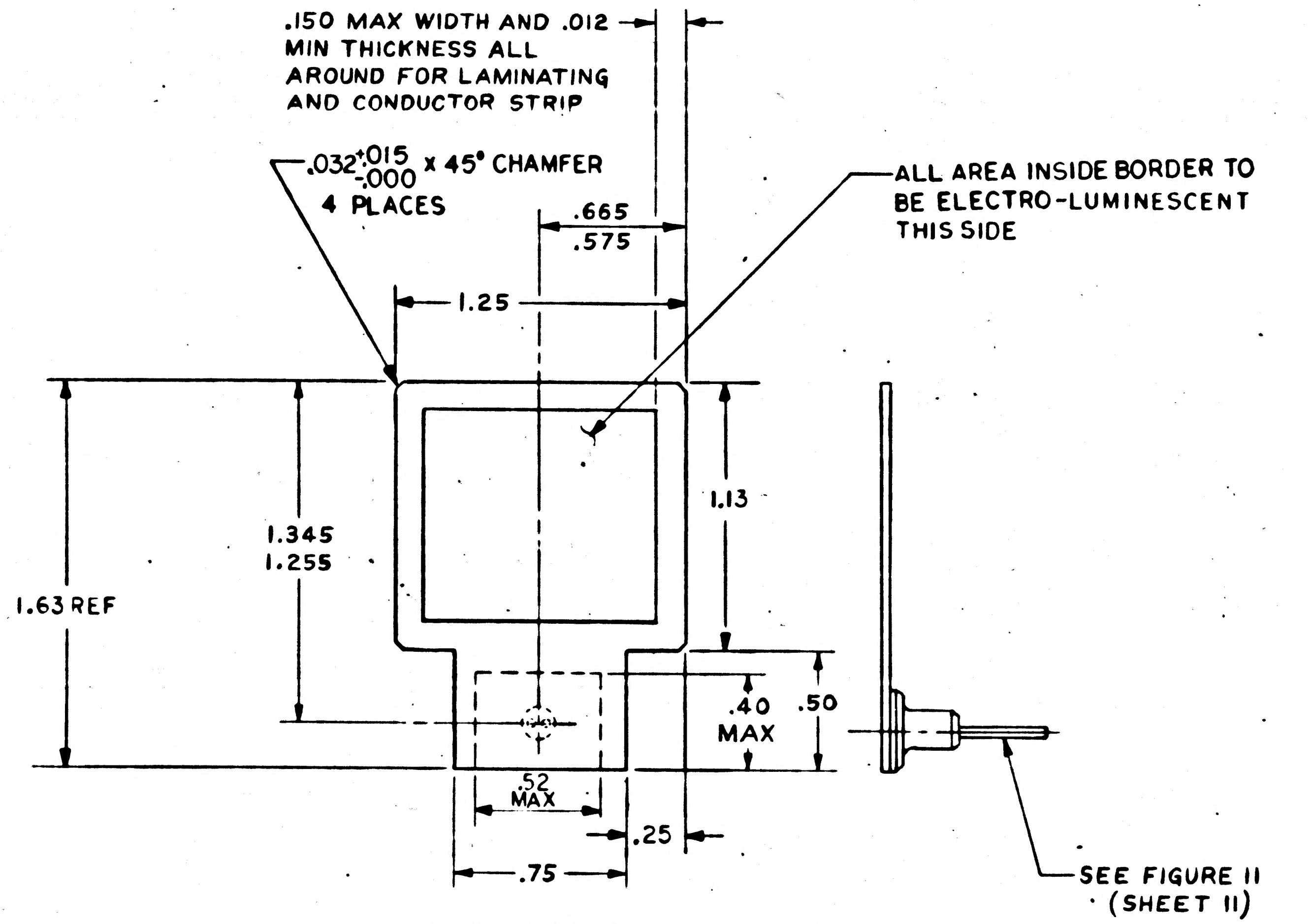
.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
.032 +.015 -.000 x 45° CHAMFER 4 PLACES
.665
.575
ALL AREA INSIDE BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
1.25
1.345
1.255
1.13
1.63 REF
.40 MAX
.50
.52 MAX
.25
.75
SEE FIGURE II (SHEET II)

FIGURE 8

1008944 E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC 3 PLC DEC ANGLES
±.02 ±.005 ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
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APPROVED NAS9-497
APPROVED MIT Paul Nelson JUN 23 67
APPROVED MSC
DATE

LAMP ELECTRO-LUMINESCENT

SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO. 1008944
SCALE —
SHEET 9 OF

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REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	Lw	23-FEB-68	
D		REVISION STATUS CHANGED	LK		6 MAR 68	
E		REVISION STATUS CHANGED	JJ		16 APR 68	

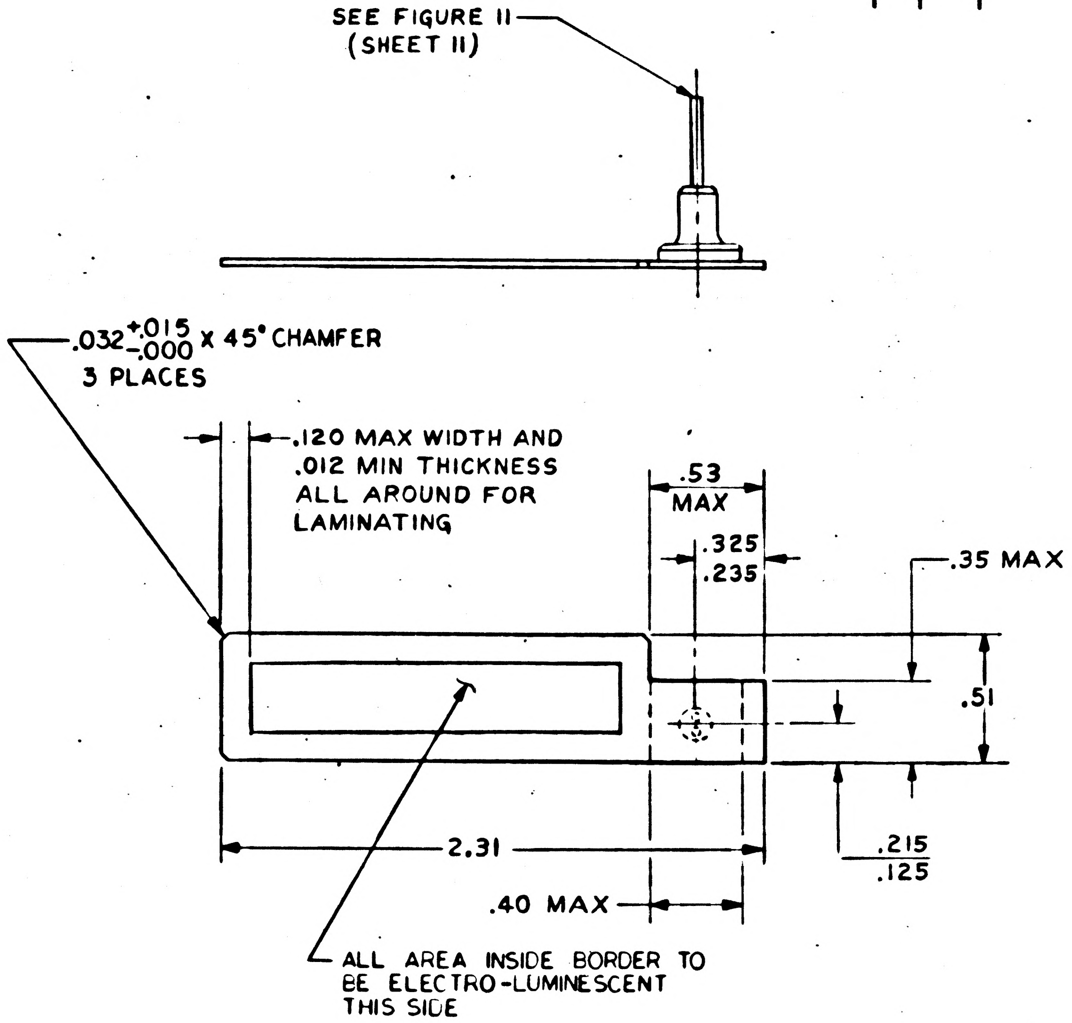
SEE FIGURE 11
(SHEET 11)
.032 +.015 -.000 X 45° CHAMFER
3 PLACES
.120 MAX WIDTH AND
.012 MIN THICKNESS
ALL AROUND FOR
LAMINATING
.53
MAX
.325
.235
.35 MAX
.51
.215
.125
2.31
.40 MAX
ALL AREA INSIDE BORDER TO
BE ELECTRO-LUMINESCENT
THIS SIDE

FIGURE 9

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC ±.02 3 PLC DEC ±.005 ANGLES ± 5°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

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APPROVED C.R. [illegible]
APPROVED
NAS 9-497
APPROVED MIT [illegible] AUG. 23, 67
APPROVED MSC
DATE

LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
DRAWING NO 1008944
SCALE ——
SHEET 10 OF

1008944 E

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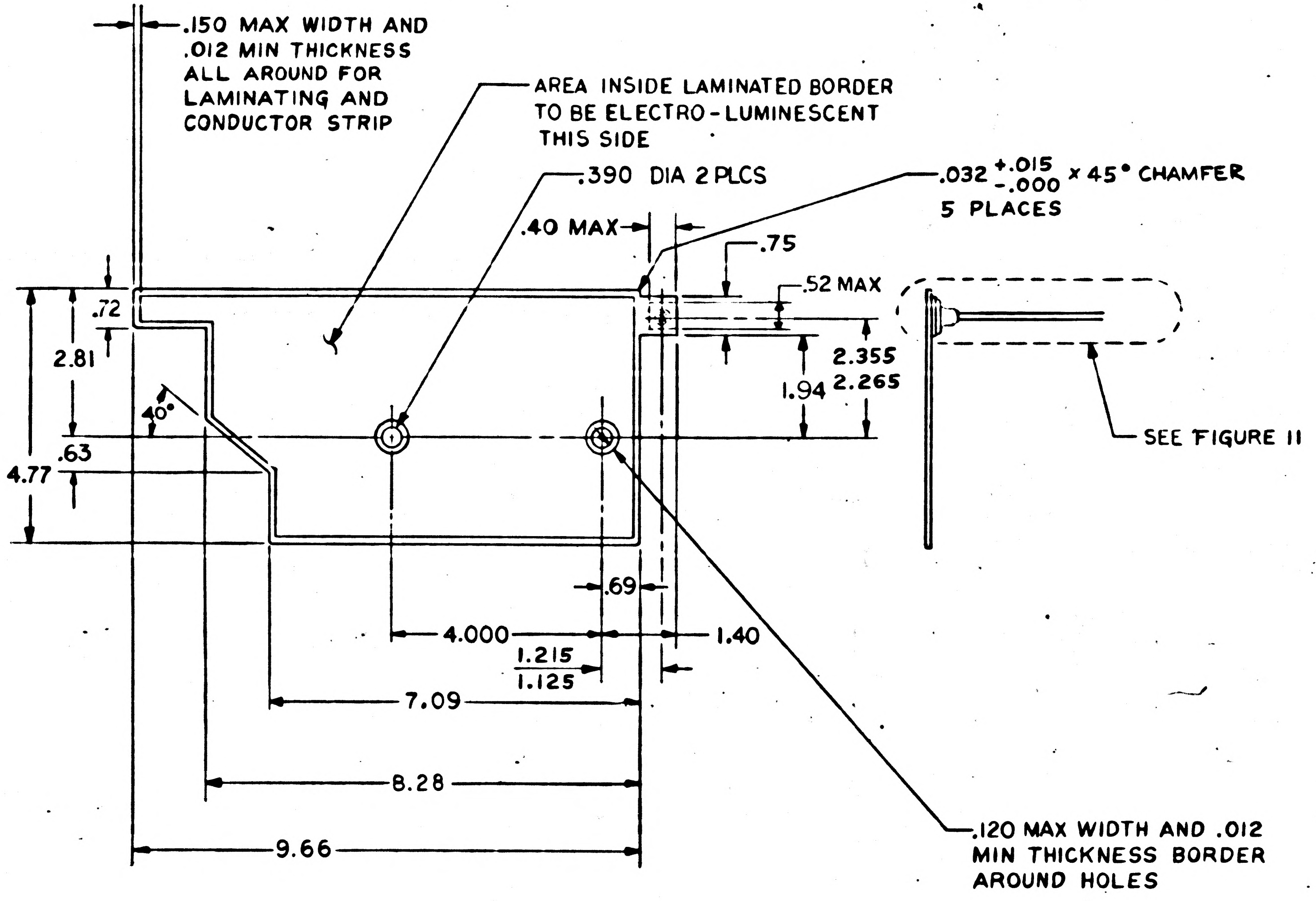
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
C		REPLACES REV B WITH CHANGE PER TDRR 35494	B.	LW	23-FEB-68	
D		REVISION STATUS CHANGED	LK	VH	5 MAR 69	
E		REVISION STATUS CHANGED	JJ	BP	6 APR 69	


.150 MAX WIDTH AND .012 MIN THICKNESS ALL AROUND FOR LAMINATING AND CONDUCTOR STRIP
AREA INSIDE LAMINATED BORDER TO BE ELECTRO-LUMINESCENT THIS SIDE
.390 DIA 2 PLCS
.032 +.015 -.000 x 45° CHAMFER 5 PLACES
.40 MAX
.75
.52 MAX
.72
2.81
2.355
2.265
1.94
40°
.63
4.77
SEE FIGURE II
.69
4.000
1.40
1.215
1.125
7.09
8.28
9.66
.120 MAX WIDTH AND .012 MIN THICKNESS BORDER AROUND HOLES

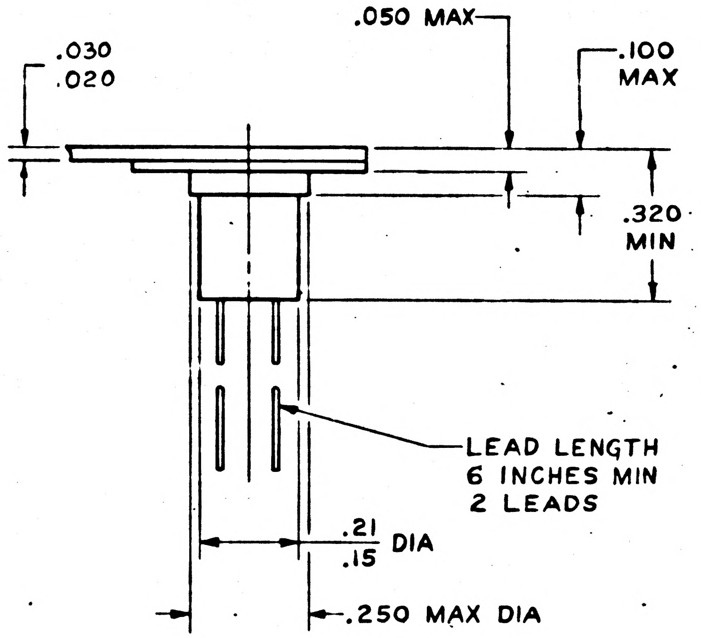

.050 MAX
.030
.020
.100 MAX
.320 MIN
LEAD LENGTH 6 INCHES MIN 2 LEADS
.21
.15
DIA
.250 MAX DIA

FIGURE II

TOP HAT (LEAD TERMINATION) CONFIGURATION (APPLICABLE TO ALL DASH NUMBER)

FIGURE 10

1008944 E

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
2 PLC DEC. ±.02 3 PLC DEC. ±.010 ANGLES ± 2°
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

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CHECKED Ruzhogue 27 Jun 67
APPROVED CR Crown 27 Jun 67
APPROVED
NAS 9-497
APPROVED MIT Paul Watson Aug 23 67
APPROVED MSC 9/12/67
DATE

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LAMP
ELECTRO-LUMINESCENT
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
DRAWING NO. 1008944
SCALE ——
SHEET 11 OF

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B. Lw
	D	REVISED PER TDRR 35542	6 MAR 68	LK
	E	REVISION STATUS CHANGED	16 APR 68	JJJ

REQUIREMENTS: (CONTINUED)

B. ELECTRICAL AND PHOTOMETRIC PROPERTIES:

(1) TRANSIENT VOLTAGE: THE LAMP SHALL BE EXCITED WITH 160 ± 5 VOLTS RMS 400 HZ, FOR 5 SECONDS MINIMUM. AFTER APPLICATION OF THIS VOLTAGE THE LAMP MUST BE CAPABLE OF MEETING THE OTHER REQUIREMENTS OF SECTION B.

(2) LIGHT INTENSITY: 1.2 TO 2.0 FOOT-LAMBERTS INITIALLY WHEN EXCITED WITH 75 ± 1.0 VOLTS RMS, 400 ± 10 HZ.

(3) CURRENT: PER TABLE I, WHEN EXCITED PER 2.B.(2).

(4) POWER: PER TABLE I, WHEN EXCITED PER 2.B.(2).

(5) LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE AS SPECIFIED IN 3.F.(1).

(6) DC INSULATION RESISTANCE: THE LEADS OF THE LAMP SHALL BE CONNECTED TOGETHER AND THE LAMP IMMERSED IN A 1% SOLUTION OF SALT WATER. THE DC RESISTANCE MEASURED BETWEEN THE LEADS AND THE WATER SHALL NOT BE LESS THAN 10 MEGOHMS.

3. DESIGN

A. OPERATING LIFE: 2000 HOURS MINIMUM AT 25°C AND A RELATIVE HUMIDITY LESS THAN 70% WITH A LOSS OF NOT MORE THAN 90% OF ORIGINAL LIGHT INTENSITY. MEASUREMENTS ACCOMPLISHED WHEN EXCITED PER 2.B. (2) AT 25°C.

B. STORAGE LIFE: 1 YEAR MINIMUM WITHOUT LOSS OF ELECTRICAL PERFORMANCE AT 0° TO +65° C. LAMP SHALL BE PACKAGED AS SPECIFIED PER PARAGRAPH I.E. NOTE: STORAGE AT ELEVATED TEMPERATURES WILL CAUSE DIMENSIONAL CHANGES.

C. OPERATING TEMPERATURE RANGE: -55°C TO +65°C. ACCELERATED LIFE DEGRADATION IS NOTED WITH OPERATION ABOVE 25°C.

D. SEAL: THE LAMPS SHALL BE SUBJECTED TO THE IMMERSION TEST (CONDITION B) SPECIFIED IN MIL-STD-202C. THE LIGHT INTENSITY OF PARAGRAPH 2.B.(2) AND THE DC INSULATION RESISTANCE OF PARAGRAPH 2.B.(6) SHALL BE CHECKED AFTER THE IMMERSION AS ACCEPTANCE CRITERIA.

E. MATERIAL:

(1) FLUOROHALOCARBON FILL ENCAPSULATED ELECTRO-LUMINESCENT LAMP.

(2) THE LEAD INSULATION SHALL BE CHEMICALLY TREATED IN A MANNER TO ALLOW ADHESIVE BONDING OR POTTING AND ALLOW THE UNIT TO MEET THE IMMERSION TEST REQUIREMENT OF 3.D.
NOTE: ETCHED TEFLON HAS LIMITED SHELF LIFE WHEN EXPOSED TO LIGHT IN THE PRESENCE OF AIR. THE BONDING STRENGTH OF THE ETCHED TEFLON MATERIAL TO THE NON-ETCHED TEFLON BASE IS THEREBY GREATLY REDUCED.

(3) THE ENCAPSULATED LEADS SHALL BE ALUMINUM FOIL AND SHALL BE ELECTRICALLY CONNECTED TO THE ALUMINUM PLATE AND EXTERNAL LEAD WIRES WITH A CONDUCTIVE CEMENT.

(4) NO MATERIAL SHALL BE USED AS AN OVERCOAT OR PROTECTIVE COVERING TO INSURE AN ADEQUATE SEAL OR PROTECTION.

F. RATING:

(1) LIGHT OUTPUT COLOR: X = 0.33 ± 0.02, Y = 0.33 ± 0.02 PER CIE DIAGRAM.

(2) MAXIMUM CONTINUOUS VOLTAGE: 120 V RMS, 400 HZ.

(3) UNIFORMITY OF LIGHT INTENSITY: THE LIGHT INTENSITY SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN 10%.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± ___ 3 PLACE DECIMALS ± ___ ANGLES ± ___	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN KNOLL DATE 26-JUN-67 CHECKED HOGUE 27-JUN-67 APPROVAL CRAMER 27-JUN-67 CONTRACT NAS9 — 497	LAMP ELECTRO-LUMINESCENT SPECIFICATION CONTROL DRAWING
MATERIAL	AC MIT NASA APPROVAL 13-SEP-67	SIZE C CODE IDENT NO 80230 1008944
APPROVAL	WATSON MIT APPROVAL 23-AUG-67	SCALE —— SHEET 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	C	REPLACES REV B WITH CHANGE PER TDRR 35494	23-FEB-68	B.
	D	REVISION STATUS CHANGED	6 MAR 68	LK
	E	REVISION STATUS CHANGED	16 APR 68	JJJ

REQUIREMENTS: (CONTINUED)

(4) UNIFORMITY OF LIGHT OUTPUT COLOR: THE LIGHT OUTPUT COLOR SHALL BE UNIFORM OVER THE FACE OF THE LAMP WITHIN THE TOLERANCE SPECIFIED IN 3.F.(1).

4. SPECIAL CONDITIONING BY MANUFACTURER:

A. ALL LAMPS SHALL BE BURNED-IN FOR A PERIOD OF 50 TO 100 HOURS PRIOR TO THE ACCEPTANCE AND INSPECTION TESTS IN 2.B. ABOVE. THE BURN-IN CONDITIONS SHALL BE AS FOLLOWS:

(1) TEMPERATURE: 25° ± 5°C AND A RELATIVE HUMIDITY LESS THAN 70%.

(2) OPERATING VOLTAGE: 115 ± 10V RMS, 60 ± 5 HZ FOR THE FIRST 50 HOURS, AND 120 V RMS, 400 ± 10 HZ FOR REMAINDER OF BURN-IN.

TABLE I

DASH NO.	FIGURE	CURRENT-MAX MILLIAMPERES	POWER-MAX WATTS
-001	1	80	1.560
-002	2	5	.096
-003	3	6	.104
-004	4	2	.032
-005	5	17	.268
-006	6	5	.088
-007	7	50	.960
-008	8	2	.032
-009	9	1	.016
-010	10	70	1.400

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± ___ 3 PLACE DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

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APPROVAL CRAMER 27-JUN-67
CONTRACT NAS9-497
A.C. MIT NASA APPROVAL 13-SEP-67
P. WATSON 23-AUG-67 MIT APPROVAL

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SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO 80230
1008944
SCALE —
SHEET 13

APPLICATION		REVISIONS			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED
		A	INITIAL RELEASE CLASS A PER TDRR 34600	14 SEPT 67	JAC

THIS SPECIFICATION SHALL CONSIST OF A SERIES OF PRIMERS AND SINGLE COMPONENT MATERIALS CONFORMING TO THE REQUIREMENTS OF MIL-S-22473.

TABLE I

DASH NO.	GRADE
001	AV
002	C
003	HV

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

REFERENCE: ACSK ONLY

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAFTSMAN 14 AUG 67
DAY MO YR
CHECKER 15 AUG 67
ENGINEER 22 AUG 67
APPROVAL
CONTR NO. NAS 9-497
NASA APPROVAL
~~MIT~~ APPROVAL

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COMPOUND,
SEALING AND RETAINING

SPECIFICATION CONTROL DRAWING

SIZE	CODE IDENT. NO	
A	80230	1008953
SCALE NONE		SHEET 1 OF 1

APPLICATION	
NEXT ASSY	USED ON
	Ⓜ

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE CLASS A PER TDRR 34600	14 SEPT 67	JAC
B	REVISED PER TDRR 35101	30 NOV 67	JRK

THIS SPECIFICATION SHALL CONSIST OF A SERIES OF PRIMERS AND SINGLE COMPONENT MATERIALS CONFORMING TO THE REQUIREMENTS OF MIL-S-22473.

TABLE I

DASH NO.	GRADE
001	AV
002	C
003	HV
004	H

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

REFERENCE: ACSK ONLY

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INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAFTSMAN 14 AUG 67 (DAY MO YR)
CHECKER 16 AUG 67
ENGINEER 22 AUG 67
APPROVAL
CONTR NO. NAS 9-497
NASA APPROVAL
[redacted] APPROVAL

MANNED SPACECRAFT CENTER
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COMPOUND,
SEALING AND RETAINING

SPECIFICATION CONTROL DRAWING

SIZE	CODE IDENT. NO	
A	80230	1008953

SCALE NONE

SHEET 1 OF 1

APPLICATION	
NEXT ASSY	USED ON

REVISIONS

LTR	DESCRIPTION	DATE	APPROVED
Ⓜ A	INITIAL RELEASE CLASS A PER TDRR 34600	14 SEPT 67	JAC
Ⓜ B	REVISED PER TDRR 35101	30 NOV 67	JRK
C	REVISED PER TDRR 36018	3 APR 68	DL

THIS SPECIFICATION SHALL CONSIST OF A SERIES OF PRIMERS AND SINGLE COMPONENT MATERIALS CONFORMING TO THE REQUIREMENTS OF MIL-S-22473.

TABLE I

DASH NO.	GRADE
001	AV
002	C
003	HV
004	H
005	A

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

REFERENCE: ACSK ONLY

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DRAFTSMAN 14 AUG 67 (DAY MO YR)
CHECKER 16 AUG 67
ENGINEER 22 AUG 67
APPROVAL
CONTR NO. NAS 9-497

NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

COMPOUND,
SEALING AND RETAINING

SPECIFICATION CONTROL DRAWING

SIZE A
CODE IDENT. NO 80230
1008953
SCALE NONE
SHEET 1 OF 1

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	REPLACES REV "C" WITH CHANGE PER TDRR 36203	16 MAY 68	JJJ RWH

THIS SPECIFICATION SHALL CONSIST OF A SERIES OF PRIMERS AND SINGLE COMPONENT MATERIALS CONFORMING TO THE REQUIREMENTS OF MIL-S-22473.

TABLE I

DASH NO.	GRADE
001	AV
002	C
003	HV
004	H
005	A
006	AA
007	D
008	AVV
009	B
010	CV
011	CVV
012	E
013	EV
014	HVV

TABLE II

DASH NO.	GRADE	FORM
015	N	C
016	N	R
017	Q	C
018	Q	R

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + — − 3 PLACE DECIMALS + — − ANGLES + — −	M I T INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	DRAWN D. DOBBERT DATE 14 AUG 67 CHECKED C. PIOJDA 15 AUG 67 APPROVAL H. CHRISTENSEN 22 AUG 67	COMPOUND, SEALING AND RETAINING SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING	CONTRACT NAS 9-497	
MATERIAL	NASA APPROVAL A C METZGER	SIZE C CODE IDENT NO. 80230 1008953
APPROVAL	[redacted] APPROVAL E N AUSTIN	SCALE — SHEET 1 OF 1

APPLICATION	
NEXT ASSY	USED ON

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE CLASS A PER TDRR 34749	28 SEPT 67	12 SEP 67

THIS MATERIAL SHALL CONSIST OF SILICONE RUBBER CONFORMING TO THE REQUIREMENTS OF ZZ-R-765 CLASS Ia, GRADE 50.

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
REFERENCE: ACSK ONLY DO 75195	R. PILLAR 23 AUG 67 DRAFTSMAN DAY MO YR C. Pioda 24 AUG 67 CHECKER 25 AUG 67 ENGINEER 25 AUG 67 APPROVAL CONTR NO. 21 Sep 67	GASKET MATERIAL, SILICONE RUBBER SPECIFICATION CONTROL DRAWING
	NASA APPROVAL	SIZE A · CODE IDENT. NO 80230 · 1008965
	MIT APPROVAL 9-21-67	SCALE NONE · SHEET 1 OF 1

APPLICATION	
NEXT ASSY	USED ON

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
Ⓝ A	INITIAL RELEASE CLASS A PER TDRR 34749	28 SEPT 67	12 SEP 67
Ⓝ B	REVISED PER TDRR 36017	3 APR 68	DL
C	REVISED PER TDRR 36201	16 MAY 68	JJJ RWH

THIS MATERIAL SHALL CONSIST OF SILICONE RUBBER CONFORMING TO THE REQUIREMENTS OF ZZ-R-765.

DASH NO.	CLASS	GRADE
-000	Ia	50
-001	II B	40
-002	III	50
-003	III	80
-004	Ib	50

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

REFERENCE: ACSK ONLY
DO 75195

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

R. PILLAR 23 AUG 67
DRAFTSMAN DAY MO YR
C. Pioda 24 AUG 67
CHECKER
25 AUG 67
ENGINEER
25 AUG 67
APPROVAL
CONTR NO. 21 Sept 67
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GASKET MATERIAL,
SILICONE RUBBER

SPECIFICATION CONTROL DRAWING

SIZE	CODE IDENT. NO	
A	80230	1008965

SCALE NONE
SHEET 1 OF 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 34834		21SEP67

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING SHALL BE ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PREPARATION FOR DELIVERY. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING INCLUDING EXPIRATION DATE, PER ND 1002215, CLASS 1, CODE 8.

2. ACCEPTANCE AND INSPECTION:
   - A. MATERIAL: THE MATERIAL SHALL BE A SOLID POLYIMIDE RESIN IN THE FORM OF MACHINED PARTS OR BAR STOCK. THE UNMODIFIED RESIN SHALL BE DESIGNATED AS SCD 1008966-001. THE RESIN WHCIH CONTAINS 15% NOMINALLY BY WEIGHT MOLYBDENUM DISULFIDE SHALL BE DESIGNATED AS SCD 1008966-002.
   - B. PHYSICAL PROPERTIES: THE MATERIAL SHALL MEET THE PHYSICAL PROPERTIES SPECIFIED IN TABLE I. ALL TESTS SHALL BE PERFORMED AT 75° ± 5°F, UNLESS OTHERWISE SPECIFIED ACCORDING TO THE APPLICABLE ASTM TEST METHOD SPECIFIED.

3. DESIGN:
   - A. PROPERTIES: THE MATERIAL SHALL CONFORM TO THE REQUIREMENTS LISTED IN TABLE II. ALL PROPERTY VALUES LISTED IN TABLE II SHALL BE CONSIDERED AS NOMINAL VALUES.

TABLE I

PROPERTY	UNITS	ASTM METHOD	REQUIREMENTS -001	REQUIREMENTS -002
TENSILE STRENGTH	PSI	D-1708	8500 MIN	4500 MIN
ELONGATION	%	D-1708	3 MIN	2 MIN
HARDNESS	ROCKWELL E	D- 785	45-58	38-50
SPECIFIC GRAVITY		D- 792	1.42-1.43	1.57-1.61

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	DRAWN R. PILLAR DATE 30 AUG 67 CHECKED C. Pirjda 5SEP67 APPROVAL G. Erickson 5 SEP 67	POLYIMIDE RESIN
DO NOT SCALE THIS DRAWING	CONTRACT NAS 9-497	SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008966
APPROVAL	APPROVAL	SCALE — SHEET 1 OF 2

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 34834		21SEP67

TABLE II

PROPERTY	UNITS	ASTM METHOD	REQUIREMENTS -001	-002
FLEXURAL MODULUS (73°F)	PSI	D-790	460,000	510,000
FLEXURAL STRENGTH (73°F)	PSI	D-790	14,000	17,000
COMPRESSIVE STRENGTH (73°F)	PSI	D-695	24,000	
IMPACT STRENGTH, IZOD (73°F)	FT-LB/IN	D-256	0.9	
COEFFICIENT OF LINEAR THERMAL EXPANSION (73° - 392°F)	IN/IN/°F x 10^{-6}	D-696	26-30	
THERMAL CONDUCTIVITY	BTU/HR/FT^2/°F/IN		2.6-3.3	
HEAT DISTORTION TEMPERATURE AT 264 PSI	°F	D-648	470	
DIELECTRIC STRENGTH	VOLTS/MIL	D-149	560	
DIELECTRIC CONSTANT (AT 10^5 H_Z, 73°F)		D-150	3.4	
VOLUME RESISTIVITY (73°F)	OHM-CM	D-257	10^{16}-10^{17}	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R. PILLAR DATE 30 AUG 67 CHECKED C. Pizzida 5SEP67 APPROVAL Erickson 5SEP67 CONTRACT NAS 9-497	POLYIMIDE RESIN SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C · CODE IDENT NO. 80230 · 1008966
APPROVAL	APPROVAL	SCALE — · SHEET 2

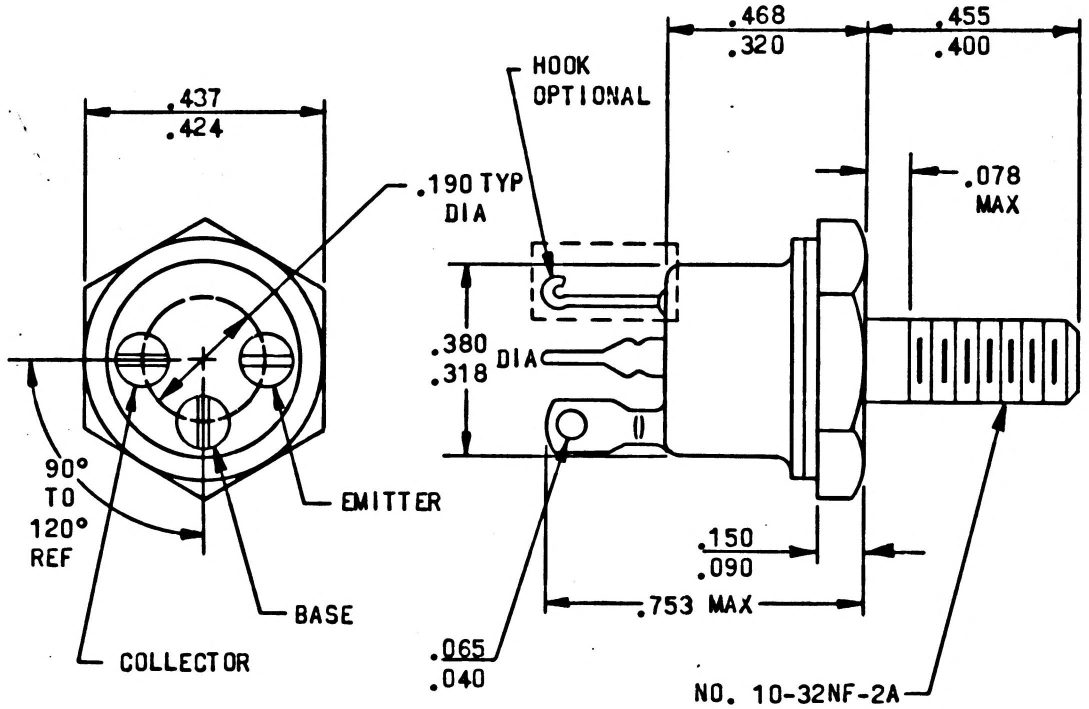
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 35262	21 DEC 67	28 OCT 67

REQUIREMENTS:

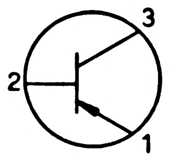
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED); DASH NUMBER; MANUFACTURER'S NAME, TRADEMARK, OR CODE; LOT CODE; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) TERMINAL DATA: KOVAR, GOLD-PLATE OVER NICKEL PLATE
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO})
     - (2) SWITCHBACK VOLTAGE (LV_{CEO})
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE1}, h_{FE2}, h_{FE3})
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$)

3. DESIGN:
   - A. STORAGE TEMPERATURE RANGE: -65°C TO +200°C.
   - B. OPERATING AMBIENT TEMPERATURE RANGE: -65°C TO +200°C
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - E. THERMAL RESISTANCE (JUNCTION TO CASE) θ_{JC}: 3.33°C/WATT MAXIMUM
   - F. STUD TORQUE: UNITS SHALL WITHSTAND 12 IN.-LB TORQUE WITHOUT DAMAGE OR DEGRADATION.



ALL TERMINALS ISOLATED FROM CASE



GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + — − ; 3 PLACE DECIMALS + — − ; ANGLES + — −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R. PILLAR DATE 3 OCT 67 CHECKED C. Pisida 4 OCT 67 APPROVAL 10-10-67 CONTRACT	TRANSISTOR—5 AMP, P-N-P, SILICON, STUD MOUNTING SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C · CODE IDENT NO. 80230 · 1008969
APPROVAL	MIT APPROVAL 12-20-67	SCALE NONE · SHEET 1 OF 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 35262	21 DEC 67	25 OCT 67

REQUIREMENTS: (CONTINUED)

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN.
     - (1) ACCELERATION AT 10,000 "G" MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750, METHOD 2006, OR IMPACT SHOCK AT 28 K "G" MINIMUM IN THE Y_1 ORIENTATION.
     - (2) FINE LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III a OR b, A LEAK RATE OF 1×10^{-8} ATMCC OR GREATER SHALL CONSTITUTE A FAILURE.
     - (3) GROSS LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION A.
     - (4) UNITS SHALL BE SUBJECTED TO VOLTAGE/TEMPERATURE STRESS FOR 100 HOURS MINIMUM AT THE FOLLOWING CONDITIONS:
       - a. T_A = 150°C
       - b. V_{CB} - 70V
   - B. BURN-IN: UNITS SHALL BE BURNED-IN AT FULL RATED POWER FOR 240 HOURS MINIMUM AT THE FOLLOWING CONDITIONS:
     - (1) T_C = 100°C
     - (2) V_{CE} = -10V
     - (3) P = 30 WATTS MAXIMUM
   - C. THE MANUFACTURES SHALL MEASURE AND RECORD THE FOLLOWING CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO-1})
     - (2) SWITCHBACK VOLTAGE (LV_{CEO})
     - (3) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$)
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE2})
   - D. UNITS FAILING TO MEET THE REQUIREMENTS OF TABLE II AND THE FOLLOWING PARAMETRIC DRIFT CRITERIA DURING BURN-IN SHALL NOT BE SHIPPED:
     - (1) h_{FE} SHALL NOT CHANGE MORE THAN ± 10%.
     - (2) I_{CBO1} SHALL NOT INCREASE MORE THAN TWO TIMES (2X) FOR INITIAL VALUES GREATER THAN 10nA.
     - (3) $V_{CE(SAT)}$ SHALL NOT CHANGE MORE THAN ± 15%.
     - (4) LV_{CEO} SHALL NOT DECREASE MORE THAN 10%.
   - E. THE DATA SHALL BE PRESENTED IN A MANNER WHICH PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE TEST READINGS. THE TEST DATA SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	M I T INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R. PILLAR DATE 3 OCT 67 CHECKED C. Pioyda 4 OCT 67 R Johnson APPROVAL K. Gunderson 10-10-67 CONTRACT	TRANSISTOR—5 AMP, P-N-P, SILICON, STUD MOUNTED SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C · CODE IDENT NO. 80230 · 1008969
APPROVAL	MIT APPROVAL MG Morley 10-20-67	SCALE · SHEET 2 OF 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 35262	21 Oct 67	25 Oct 67

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT T_C=25°C UNLESS OTHERWISE SPECIFIED

COLLECTOR VOLTAGE V_{CB}	COLLECTOR VOLTAGE V_{CE}	EMITTER VOLTAGE V_{EB}	COLLECTOR CURRENT I_C	POWER DISSIPATION P	POWER DISSIPATION AT T_C=100°C	MANUFACTURER'S TYPE DESIGNATION (FOR REF ONLY)
VOLTS	VOLTS	VOLTS	AMP	WATTS	WATTS	
-100	-80	-5	-5	52.5	30	TI XP-12

TABLE II

ELECTRICAL CHARACTERISTICS AT T_A=25°C UNLESS OTHERWISE NOTED

PARAMETER	CONDITIONS	SYMBOL	LIMITS		UNITS
			MIN	MAX	
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE}=-5V, I_C=-50mA, NOTE 1	h_{FE1}	50	200	-
	V_{CE}=-5V, I_C=-2A, NOTE 1	h_{FE2}	50	150	-
	V_{CE}=-5V, I_C=-5A, NOTE 1	h_{FE3}	25	-	-
COLLECTOR CUTOFF CURRENT	V_{CB}=-60V, I_E=0	I_{CB01}	-	-100	nA
	V_{CB}=-60V, I_E=0, T_C=150°C	I_{CB02}	-	-50	µA
	V_{CE}=-40V, I_B=0	I_{CEO}	-	-1.0	µA
EMITTER CUTOFF CURRENT	V_{EB}=-4V, I_C=0	I_{EBO}	-	-5.00	µA
EMITTER BREAKDOWN VOLTAGE	I_E=-1mA, I_C=0	BV_{EBO}	5	-	VOLTS
BASE SATURATION VOLTAGE	I_C=-3A, I_B=-200mA, NOTE 1	$V_{BE(SAT)}$	-	-1.65	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C=-3A, I_B=-200mA, NOTE 1	$V_{CE(SAT)}$	-	-1	VOLTS
SWITCHBACK VOLTAGE	I_C=-50mA, I_B=0, NOTE 1	LV_{CEO}	-80	-	VOLTS
COLLECTOR BREAKDOWN VOLTAGE	I_C=-1mA, I_E=0	BV_{CBO}	-100	-	VOLTS

NOTES:

1. PULSE TESTED UTILIZING FAIRCHILD 500 OR EQUIVALENT. PULSE WIDTH = 300 ± 50µSEC AT ≤ 2% DUTY CYCLE.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	DRAWN R. PILLAR DATE 3 OCT 67	TRANSISTOR—5 AMP, P-N-P, SILICON, STUD MOUNTED
	CHECKED C. Piojda 4 OCT 67	
	APPROVAL K. Gunderson 10-10-67	
DO NOT SCALE THIS DRAWING	CONTRACT	SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C · CODE IDENT NO. 80230 · 1008969
APPROVAL	MIT APPROVAL 12-20-67	SCALE · SHEET 3 OF 3

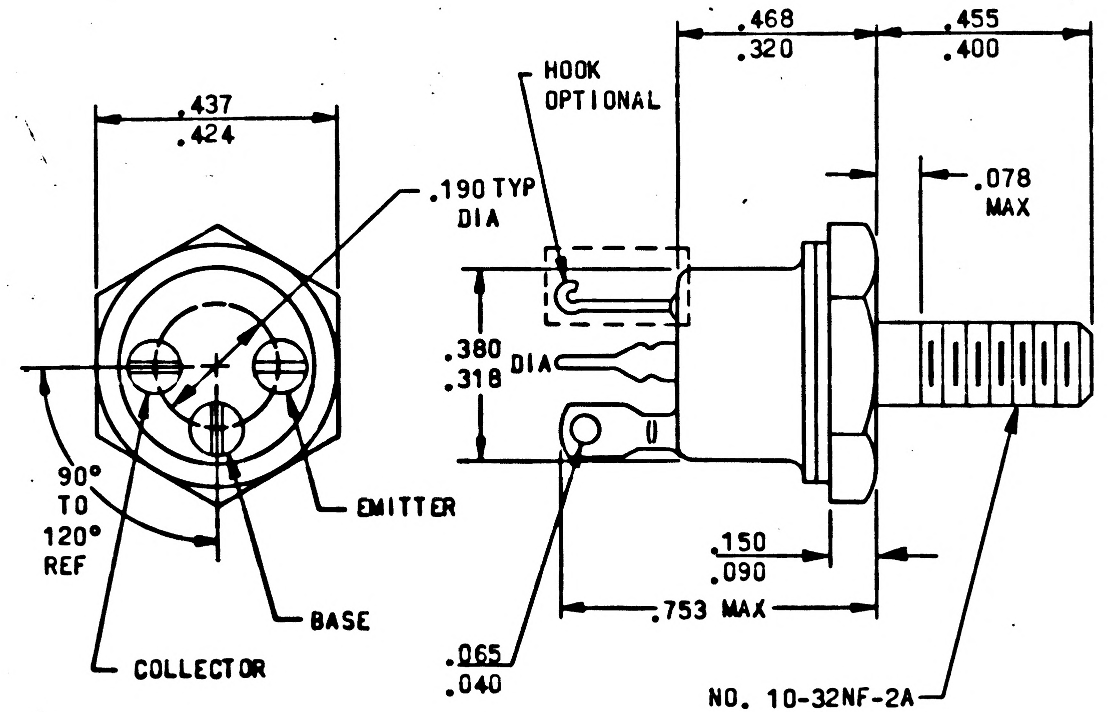
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 35262	21 DEC 67	25 OCT 67
	B	REVISION STATUS CHANGED	13-MAY 68	F.Y.S.

REQUIREMENTS:

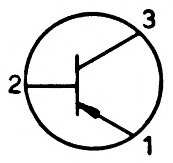
1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND 1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING.
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MARKING: THE NASA DRAWING NUMBER (LAST THREE DIGITS REQUIRED); DASH NUMBER; MANUFACTURER'S NAME, TRADEMARK, OR CODE; LOT CODE; AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART PER ND 1002019.
     - (2) TERMINAL DATA: KOVAR, GOLD-PLATE OVER NICKEL PLATE
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II.
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO})
     - (2) SWITCHBACK VOLTAGE (LV_{CEO})
     - (3) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE1}, h_{FE2}, h_{FE3})
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$)

3. DESIGN:
   - A. STORAGE TEMPERATURE RANGE: -65°C TO +200°C.
   - B. OPERATING AMBIENT TEMPERATURE RANGE: -65°C TO +200°C
   - C. ELECTRICAL RATINGS: PER TABLE I.
   - D. ELECTRICAL SPECIFICATIONS: PER TABLE II.
   - E. THERMAL RESISTANCE (JUNCTION TO CASE) θ_{JC}: 3.33°C/WATT MAXIMUM
   - F. STUD TORQUE: UNITS SHALL WITHSTAND 12 IN.-LB TORQUE WITHOUT DAMAGE OR DEGRADATION.



ALL TERMINALS ISOLATED FROM CASE



GRAPHICAL SYMBOL

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + — − 3 PLACE DECIMALS + — − ANGLES + — −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DRAWN R. PILLAR DATE 3 OCT 67 CHECKED C. Pizzola 4 OCT 67 APPROVAL 10-10-67	MANNED SPACECRAFT CENTER HOUSTON, TEXAS TRANSISTOR—5 AMP, P-N-P, SILICON, STUD MOUNTING SPECIFICATION CONTROL DRAWING
DO NOT SCALE THIS DRAWING	CONTRACT	
MATERIAL	NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008969
APPROVAL	MIT APPROVAL 12-20-67	SCALE NONE SHEET 1 OF 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 35262	21 DEC 67	25 OCT 67
	B	REVISION STATUS CHANGED	13 MAY 68	M. G.

REQUIREMENTS: (CONTINUED)

4. SPECIAL CONDITIONING BY SUPPLIER:
   A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240 HOUR BURN-IN.
      (1) ACCELERATION AT 10,000 "G" MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750, METHOD 2006, OR IMPACT SHOCK AT 28 K "G" MINIMUM IN THE Y_1 ORIENTATION.
      (2) FINE LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III a OR b, A LEAK RATE OF 1×10^{-8} ATMCC OR GREATER SHALL CONSTITUTE A FAILURE.
      (3) GROSS LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION A.
      (4) UNITS SHALL BE SUBJECTED TO VOLTAGE/TEMPERATURE STRESS FOR 100 HOURS MINIMUM AT THE FOLLOWING CONDITIONS:
         a. T_A = 150°C
         b. V_{CB} - 70V
   B. BURN-IN: UNITS SHALL BE BURNED-IN AT FULL RATED POWER FOR 240 HOURS MINIMUM AT THE FOLLOWING CONDITIONS:
      (1) TC = 100°C
      (2) V_{CE} = -10V
      (3) P = 30 WATTS MAXIMUM
   C. THE MANUFACTURES SHALL MEASURE AND RECORD THE FOLLOWING CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
      (1) COLLECTOR CUTOFF CURRENT (I_{CBO-1})
      (2) SWITCHBACK VOLTAGE (LV_{CEO})
      (3) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$)
      (4) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE2})
   D. UNITS FAILING TO MEET THE REQUIREMENTS OF TABLE II AND THE FOLLOWING PARAMETRIC DRIFT CRITERIA DURING BURN-IN SHALL NOT BE SHIPPED:
      (1) h_{FE} SHALL NOT CHANGE MORE THAN ± 10%.
      (2) I_{CB01} SHALL NOT INCREASE MORE THAN TWO TIMES (2X) FOR INITIAL VALUES GREATER THAN 10nA.
      (3) $V_{CE(SAT)}$ SHALL NOT CHANGE MORE THAN ± 15%.
      (4) LV_{CEO} SHALL NOT DECREASE MORE THAN 10%.
   E. THE DATA SHALL BE PRESENTED IN A MANNER WHICH PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE TEST READINGS. THE TEST DATA SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

1008969

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + − 3 PLACE DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R. PILLAR DATE 3 OCT 67 CHECKED E. Pizzida 4 OCT 67 APPROVAL K. Gundersen 10-10-67 CONTRACT	TRANSISTOR—5 AMP, P-N-P, SILICON, STUD MOUNTED SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008969
APPROVAL	MIT APPROVAL M G Morley 12 20 67	SCALE SHEET 2 OF 3

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	REPLACES REVISION "A" WITH CHANGE PER TDRR 36176	13 MAY 68	

TABLE I

MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS AT TC = 25°C UNLESS OTHERWISE SPECIFIED

DASH NO.	COLLECTOR VOLTAGE V_{CB}	COLLECTOR VOLTAGE V_{CE}	EMITTER VOLTAGE V_{EB}	COLLECTOR CURRENT I_C	POWER DISSIPATION P	POWER DISSIPATION AT T_C = 100°C	MANUFACTURER'S TYPE DESIGNATION
	VOLTS	VOLTS	VOLTS	AMP	WATTS	WATTS	
-000	-100	-80	-5	-5	52.5	30	SP 4806
-001	-100	-80	-5	-5	52.5	30	SP4806-1

TABLE II

ELECTRICAL CHARACTERISTICS AT TA = 25°C UNLESS OTHERWISE NOTED

DASH NUMBER	PARAMETER	CONDITIONS	SYMBOL	LIMITS MIN	LIMITS MAX	UNITS
ALL	COLLECTOR CUTOFF CURRENT	V_{CB}=-60V, I_E=0	I_{CBO1}	-	-100	NA
		V_{CB}=-60V, I_E=0, TC=150°C	I_{CBO2}	-	-50	µA
		V_{CE}=-4V, I_C=0	I_{CEO}	-	-1.0	µA
	EMITTER CUTOFF CURRENT	V_{EB}=-4V, I_C=0	I_{EBO}	-	-5.0	µA
	EMITTER BREAK-DOWN VOLTAGE	I_E=-1mA, I_C=0	BV_{EBO}	5	-	VOLTS
	BASE SATURATION VOLTAGE	I_C=-3A, I_B=-200mA, NOTE 1	$V_{BE(SAT)}$	-	-1.65	VOLTS
	COLLECTOR SATURATION VOLTAGE	I_C=-3A, I_B=-200mA, NOTE 1	$V_{CE(SAT)}$	-	-1.0	VOLTS
	SWITCHBACK VOLTAGE	I_C=-50mA, I_B=0, NOTE 1	LV_{CEO}	-80	-	VOLTS
	COLLECTOR BREAK-DOWN VOLTAGE	I_C=-1mA, I_E=0	BV_{CBO}	-100	-	VOLTS
-000	STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE}=-5V, I_C=-50mA, NOTE 1	h_{FE1}	50	200	-
		V_{CE}=-5V, I_C=-2A, NOTE 1	h_{FE2}	50	150	-
		V_{CE}=-5V, I_C=-5A, NOTE 1	h_{FE3}	25	-	-
-001	STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE}=-5V, I_C=-50mA, NOTE 1	h_{FE1}	30	100	-
		V_{CE}=-5V, I_C=-2A, NOTE 1	h_{FE2}	30	75	-
		V_{CE}=-5V, I_C=-5A, NOTE 1	h_{FE3}	20	-	-

NOTES:

1. PULSE TESTED UTILIZING FAIRCHILD 500 OR EQUIVALENT. PULSE WIDTH = 300 ± 50 µSEC AT ≤ 2% DUTY CYCLE.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± · 3 PLACE DECIMALS ± · ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R. PILLAR DATE 3-OCT 67 CHECKED C. PIODJA 4 OCT 67 R L JOHNSON APPROVAL K. GUNDERSEN 10-10-67 CONTRACT	TRANSISTOR—5 AMP, P-N-P, SILICON, STUD MOUNTED SPECIFICATION CONTROL DRAWING
MATERIAL	A.C. METZGER NASA APPROVAL	SIZE C · CODE IDENT NO 80230 · 1008969
APPROVAL	12-20-67 MIT APPROVAL M G MURLEY	SCALE NONE · SHEET 3 OF 3

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE CLASS A PER TDRR 35422	15 JAN 68	21 DEC 67

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER PROCESS AND QUALITY CONTROL, INCLUDING FINAL TESTING SHALL BE IN ACCORDANCE WITH SPECIFICATION ND 1015404, CLASS 3.
   - C. PREPARATION FOR DELIVERY. PRESERVATION, PACKAGING, PACKING, AND CONTAINER MARKING INCLUDING EXPIRATION DATE, PER ND 1002215, CLASS 1, CODE 8.

2. ACCEPTANCE AND INSPECTION:
   - A. MATERIAL: THE MATERIAL SHALL CONSIST OF A TWO PART, ROOM TEMPERATURE CURING SILICONE ENCAPSULANT, CONSISTING OF A TRANSPARENT RESIN DESIGNATED AS SCD 1008973-001 AND A TRANSPARENT CURING AGENT DESIGNATED AS SCD 1008973-002.
   - B. PROPERTIES AS RECEIVED:
     - (1) SPECIFIC GRAVITY OF THE RESIN SHALL BE 1.02 MAXIMUM AS DETERMINED PER ASTM-D-1298 OR AN EQUIVALENT METHOD.
     - (2) VISCOSITY OF THE RESIN SHALL BE 4,000 - 6,500 CENTISTOKES AT 25°C ± 0.1°C AS DETERMINED PER ASTM-D-445 OR AN EQUIVALENT METHOD.
     - (3) POT LIFE OF THE MATERIAL WHEN MIXED IN A RATIO OF 1 ± 0.01 PART BY WEIGHT (PBW) OF CURING AGENT PER SCD 1008973-002 FOR EVERY 10 PBW OF RESIN PER SCD 1008973-001 SHALL BE 2 HOURS MINIMUM. THE POT LIFE SHALL BE DETERMINED BY MEASURING THE VISCOSITY AS SPECIFIED IN 2.B.(2) WHEN THE MATERIAL IS FRESHLY MIXED AND TWO HOURS AFTER MIXING. THE VISCOSITY AT TWO HOURS AFTER MIXING SHALL NOT EXCEED TWO TIMES THE FRESHLY MIXED VISCOSITY.
     - (4) COLOR: BOTH RESIN AND CURING AGENT SHALL BE TRANSPARENT AND COLORLESS TO LIGHT STRAW.

3. DESIGN:
   - A. PROPERTIES OF THE MATERIAL WHEN MIXED AS SPECIFIED IN 2.B.(3) AND CURED FOR 3 DAYS MINIMUM AT 77° ± 5°F.
     - (1) HARDNESS: 30 SHORE A DUROMETER, MINIMUM PER ASTM-D-676.
     - (2) SPECIFIC GRAVITY: 1.02-1.08 PER ASTM-D-792, METHOD A.
     - (3) DIELECTRIC STRENGTH: 500 VOLTS/MIL MINIMUM PER ASTM-D-149.
     - (4) DIELECTRIC CONSTANT: 2.88 MAXIMUM AT 100 H_Z AND 100 KH_Z PER ASTM-D-150.
     - (5) DISSIPATION FACTOR: 0.002 MAXIMUM AT 100 H_Z AND 100 KH_Z PER ASTM-D-150.
     - (6) VOLUME RESISTIVITY: 1.0×10^{13} OHM-CM MINIMUM PER ASTM-D-257.

REQUIREMENTS: (CONTINUED)

- B. PROPERTIES OF THE MATERIAL WHEN MIXED AS SPECIFIED IN 2.B.(3) AND CURED FOR 7 DAYS MINIMUM AT 77° ± 5°F.
  - (1) HARDNESS: 40 SHORE A DUROMETER, MINIMUM PER ASTM-D-676.
  - (2) TENSILE STRENGTH: 600 PSI MINIMUM PER ASTM-D-412 USING DIE C.
  - (3) ELONGATION: 100% MINIMUM PER ASTM-D-412 USING DIE C.
- C. SHELF LIFE: THE MATERIAL SHALL HAVE A USABLE SHELF LIFE OF NOT LESS THAN 6 MONTHS WHEN RECEIVED BY THE PURCHASER AND STORED BELOW 80°F IN UNOPENED CONTAINERS.

PROCURE ONLY FROM APPROVED SOURCE LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN G. W. Lutz DATE 20 DEC 67
CHECKED 21 DEC 67
APPROVAL G. Erickson 21 DEC 67
CONTRACT
NASA APPROVAL 1/10/67
MIT APPROVAL W. McMurley 1 Jan 67

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ENCAPSULATING RESIN, SILICONE

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO. 80230
1008973
SCALE
SHEET 1 OF 1

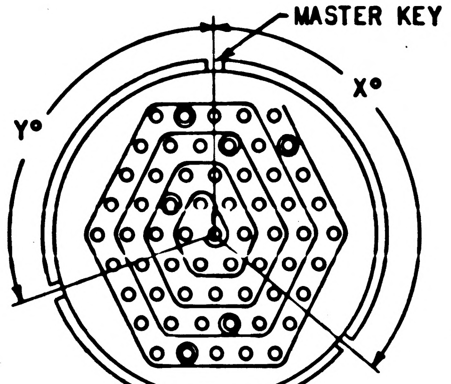
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	INITIAL RELEASE CLASS A PER TDRR 36145	16 MAY 68	18 MAR 68

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. UNITS SHALL BE CAPABLE OF MEETING ALL QUALIFICATION REQUIREMENTS SPECIFIED IN ND 1002052.
   - D. SIZE 22 SOCKET CONTACTS (QUANTITY: 63 MIN) PER 1010781-1 SHALL BE SUPPLIED WITH EACH UNIT. SEALING PLUGS PER 1010984 SHALL BE PROCURED SEPARATELY.
   - E. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND 1002215, CLASS 1, CODE 3.
   - F. UNIT SHALL BE CAPABLE OF MEETING APPLICABLE REQUIREMENTS OF MIL-C-38300 EXCEPT AS AMMENDED OR MODIFIED BY THIS DRAWING.

2. INSPECTION AND ACCEPTANCE:
   - A. PIECEMARKING: UNITS SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE MANUFACTURER'S NAME AND/OR SYMBOL, NASA PART NUMBER, AND DATE OF CODE OR DATE OF MANUFACTURE. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART.
   - B. DIELECTRIC STRENGTH: 1400 VDC OR PEAK AC
   - C. INSULATION RESISTANCE: 5000 MEGOHMS AT 500 VDC.

3. DESIGN:
   - A. MECHANICAL REQUIREMENTS:
     - (1) MATERIAL:
       - a. SHELL, FOLLOWER SUBASSEMBLY, RETAINING NUT: ALUMINUM ALLOY PER QQ-A-351, TEMPER T4.
       - b. INSERT, FRONT AND REAR: DIALLYLPHTHALATE PER MIL-M-14, TYPE SDG.
       - c. "O" RINGS(REAR) AND GROMMET: SILICONE RUBBER, PER ZZ-R-765, CLASS IIa. "O" RING (FRONT): FLUORO SILICONE RUBBER MEETING APPLICABLE REQUIREMENTS OF MIL-R-3065.
       - d. LOCKING DEVICE AND COUPLING RING: ALUMINUM ALLOY PER QQ-A-225/6, TEMPER T4.
       - e. ANNULAR SPRING: BERYLLIUM COPPER PER QQ-C-533, 1/4 HT.
     - (2) FINISHES:
       - a. SHELL, COUPLING RING, RETAINING NUT: ELECTROLESS NICKEL (.0004 MIN) PER MIL-C-26074, CLASS 1.
       - b. FOLLOWER SUBASSEMBLY: ANODIZED PER MIL-C-8625, TYPE II EXCEPT CONVERSION COATING BLEACHED TO RESULT IN CLEAR FINISH. FINISH MEETS PERFORMANCE REQUIREMENTS OF MIL-C-8625 EXCEPT SALT SPRAY PER MIL-C-38300.
       - c. ANNULAR SPRING: SILVER PLATED PER QQ-S-365, TYPE II.


MASTER KEY
X°
Y°

VIEW A-A

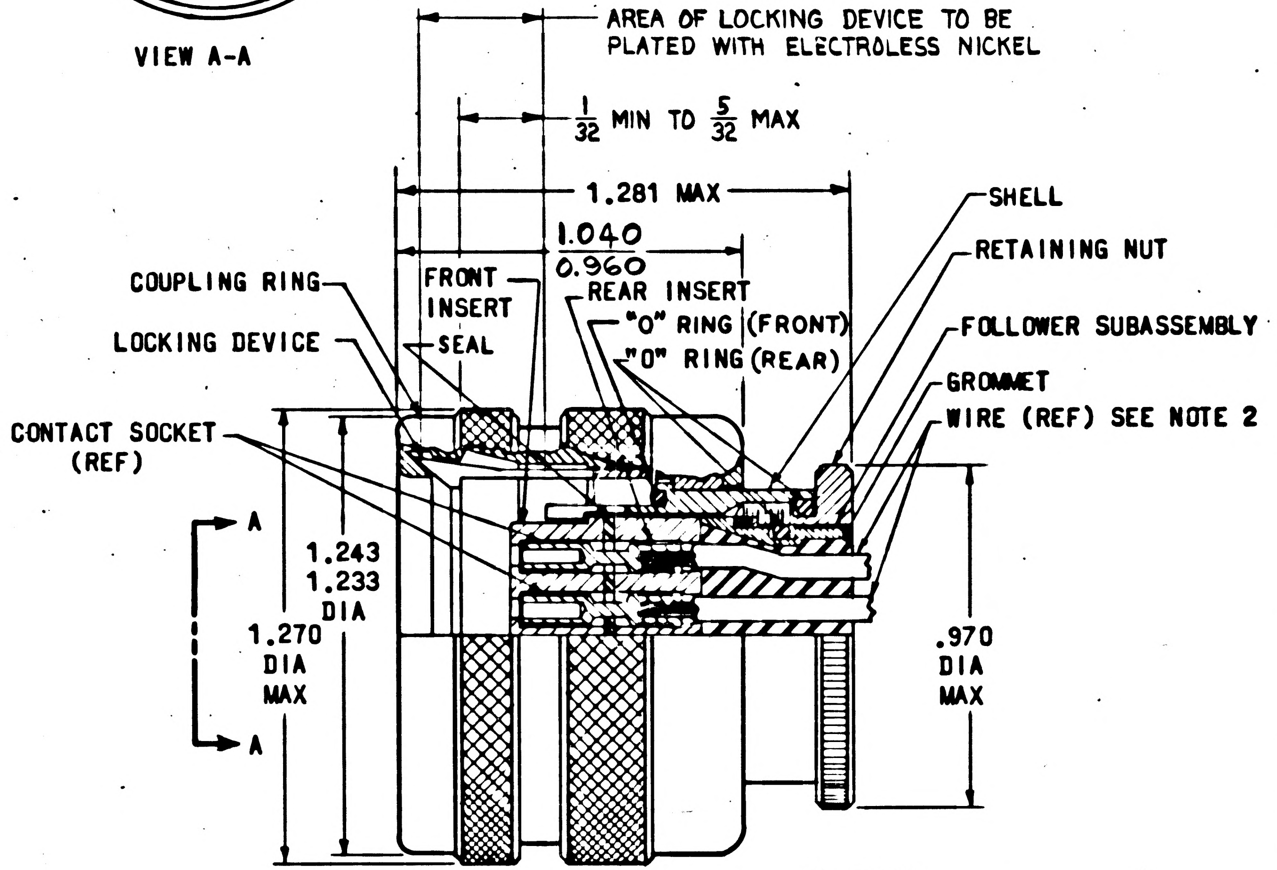

AREA OF LOCKING DEVICE TO BE PLATED WITH ELECTROLESS NICKEL
1/32 MIN TO 5/32 MAX
1.281 MAX
1.040
0.960
SHELL
RETAINING NUT
COUPLING RING
FRONT INSERT
REAR INSERT
LOCKING DEVICE
SEAL
"O" RING (FRONT)
"O" RING (REAR)
FOLLOWER SUBASSEMBLY
GROMMET
CONTACT SOCKET (REF)
WIRE (REF) SEE NOTE 2
A
1.243
1.233
DIA
1.270
DIA
MAX
A
.970
DIA
MAX

FIGURE 1

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± .005 ANGLES ± 2°	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN G.W. Lity DATE 20 FEB 68 CHECKED C. Pisijda 23 FEB 68 APPROVAL F. Schaefer 4 MAR 68 CONTRACT NAS 9-497	CONNECTOR, PLUG, ELECTRICAL — ENVIRONMENTAL RESISTANT, 61 NO. 22 AWG SOCKET CONTACTS SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL	SIZE C CODE IDENT NO. 80230 1008987
APPROVAL	MIT APPROVAL 4.14.68	SCALE — SHEET 1 OF 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
--	B	INITIAL RELEASE CLASS A PER TDRR 36195	10 MAY 61	15 MAR 6

REQUIREMENTS: (CONTINUED)

d. LOCKING DEVICE: GOLD PLATE PER MIL-G-45204, TYPE II .000070 MIN, OVER TYPE I .000050 MIN (TOTAL GOLD .000120/.000180 THICK) OVER COPPER PER MIL-C-14550,.000400/.000500 THICK. ELECTROLESS NICKEL PER MIL-C-26074 CLASS I, .000200/.000300 THICK OVER GOLD ON LOCKING DEVICE TIPS PER FIGURE 1.

(3) CONTACT RETENTION FORCE: WHEN CONTACTS ARE PROPERLY INSTALLED IN THEIR USING CONNECTOR, THEY ARE CAPABLE OF WITHSTANDING (WITHOUT DAMAGE) A TOTAL FORCE OF 15 LBS. WHEN APPLIED TO THE MATING END OF THE CONTACT, AND A TOTAL OF 8 LBS. WHEN APPLIED TO THE REAR END OF THE CONTACT AFTER A MINIMUM OF 10 INSERTIONS AND WITHDRAWALS.

(4) TEMPERATURE RATING: -67°F TO +257°F.

(5) ALTITUDE IMMERSION: PER MIL-C-38300.

(6) COUPLING & UNCOUPLING FORCE: 27 LBS MAX.

a. LIFE: 500 CYCLES, HAND COUPLED AT RATE OF 1 LB/SEC.

(7) COUPLING METHOD: PUSH-PULL, TWIST LOCK.

(8) INSERT RETENTION: 45 LBS MIN EITHER DIRECTION.

(9) CONTACTS: ARE ON 0.080 CENTERS

(10) POLARIZATION: PER TABLE I.

B. ELECTRICAL REQUIREMENTS WITH CONTACTS INSTALLED (500 VDC)

(1) INSULATION RESISTANCE: 1000 MEGOHMS MINIMUM AT +125°C MEASURED BETWEEN ANY TWO ADJACENT CONTACTS AND BETWEEN THE SHELL OR HARDWARE AND ANY ADJACENT CONTACT WHEN TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 302, CONDITION B.

(2) DIELECTRIC STRENGTH: 110,000 FT - NO EVIDENCE OF BREAKDOWN OR FLASHOVER WHEN 640 VRMS APPLIED BETWEEN ANY PAIR OF CONTACTS AND BETWEEN THE HARDWARE AND ANY CONTACT WHEN TESTED IN ACCORDANCE WITH MIL-STD-202, METHOD 301. (MATED CONNECTORS)

(3) VOLTAGE RATINGS: (MATED CONNECTORS)

	VOLTS AC PEAK
SEA LEVEL	750
110,000	300

(4) CURRENT RATING: 3 AMPERES (TOTAL 90 AMPERES, EQUALLY DIVIDED, 22 AWG WIRE, MAX TEMP +100°C).

TABLE I

DASH NO.	POLARIZATION	ALTERNATE POLARIZING POSITIONS X°	Y°
-001	NORMAL	130	110
-002	ALTERNATE	130	90
-003	ALTERNATE	130	150
-004	ALTERNATE	130	170
-005	ALTERNATE	190	110

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

NOTES:

1. FOR MATING RECEPTACLE SEE DRAWING 1010783.
2. INSERTS AND GROMMET DESIGNED TO ACCEPT INSULATED WIRE HAVING OUTSIDE DIAMETER .040 TO .054.
3. FOR SPARE CONTACT SEE 1010781: FOR SPARE SEALING PLUGS SEE 1010984.

APPLICATION DATA:

1. CONNECTOR LOCKING MECHANISM CONTAINS LUBRICANT PER SCD 1008980.
2. IF THE LOCKING MECHANISM FEELS ABRASIVE WHEN ROTATED DURING MATING OR UNMATING OF THE CONNECTOR THE LOCKING MECHANISM SHOULD BE RELUBRICATED WITH LUBRICANT PER SCD 1008980.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ± .005 ANGLES ± 2°	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN G W Lity DATE 20 FEB 68 CHECKED C. Pizzola 23FEB68 APPROVAL F. Schaefer 4 Mar 68 CONTRACT	CONNECTOR, PLUG, ELECTRICAL — ENVIRONMENTAL RESISTANT, 61 NO. 22 AWG SOCKET CONTACTS SPECIFICATION CONTROL DRAWING
MATERIAL SEE REQUIREMENTS	NASA APPROVAL	SIZE C CODE IDENT NO 80230 1008987
APPROVAL	MIT APPROVAL M G Mudey 4-24-68	SCALE — SHEET 2 OF 2

9 8868001

1008988

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	INITIAL RELEASE CLASS A PER TDRR 30045	10 APR 68	

NOTES:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) VISUAL INSPECTION: WORKMANSHIP - PARTS MUST BE FREE FROM BURRS AND ALL SHARP EDGES.
     - (2) MATERIAL:
       - a. CONTACT: COPPER-BERYLLIUM ALLOY CONDITION 1/2 H IN ACCORDANCE WITH QQ-C-530 AND WITH A C3 ✓ FINISH. PARTS MUST BE FREE OF BURRS AND SHARP EDGES.
       - b. WIRE: NO. 30 (7 x 38) POLYTETRAFLUOROETHYLENE COATED WIRE PER SCD 2021522. WIRE INSULATION MAY BE EXPOSED AT MOLDED EXTERNAL SURFACES FOR A LENGTH OF .250 MAX. INSULATION STRIPPED $\genfrac{}{}{0pt}{}{.109}{.078}$ PER ND 1002071. LENGTH OF WIRE PER TABLE II.
       - c. BODY: NYLON PER MIL-P-20693 TYPE IV, .062 MAX MOLDING FLASH BETWEEN WIRES ON $\boxed{\text{-A-}}$
     - (3) HEAT TREATING:
       - a. CONTACT: CLOSE SAW CUTS SLIGHTLY AND SIZE OVER .028 DIA DRILL BLANK. HEAT TREAT BY PRECIPITATION HARDENING PER MIL-H-7199.
     - (4) FINISH:
       - a. CONTACT: GOLD PLATE .000050 MIN PER MIL-G-45204, TYPE II, CLASS 1.
       - b. WIRE (EXTERNAL END): STRIPPED WIRE TINNED WITH 96.5-3.5 SOLDER PER QQ-S-571, SN96 AND SOLDER FLUX PER SCD 2021527.
       - c. BODY: SMALL BUBBLES WHICH DO NOT BREAK THE SURFACE ARE ACCEPTABLE.
     - (5) RETENTION: CONTACT TO HOLD 30 GRAMS MIN TO 200 GRAMS MAX SUSPENDED FROM A $\genfrac{}{}{0pt}{}{.029020}{.029000}$ DIA PIN
     - (6) DIMENSIONS: SEE FIGURE-RESTRAINT IS ALLOWED TO INSPECT DIMENSION OF DRAWING, WHERE NOTED.
     - (7) MARKING:
       - a. PIECEMARKING: PART SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, DASH NUMBER.
       - b. PACKAGE: INTERNAL INDIVIDUAL OR COLLECTIVE PACKAGES AND EXTERNAL PACKAGING SHALL BE MARKED WITH THE FOLLOWING INFORMATION PER MIL-STD-129:
         - SUPPLIER'S NAME
         - NASA DRAWING NUMBER & DASH NUMBER.
         - SUPPLIER'S LOT OR SERIAL NUMBER
         - DATE CODE, OR DATE OF MANUFACTURE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± ___
3 PLACE DECIMALS ± ___
ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN G. W. Lutz DATE 4 MAR 68
CHECKED
APPROVAL 14 MAR
R Booth 4-9-68
CONTRACT
NASA APPROVAL
CCB ~~MSF~~ APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

CONNECTOR

SPECIFICATION CONTROL DRAWING

SIZE C
CODE IDENT NO 80230
1008988
SCALE —
SHEET 1 OF 2

MIL 10826 D

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	INITIAL RELEASE CLASS A PER TDRR 50048	10 APR 68	4 APR 68

NOTES: (CONTINUED)

c. MANUFACTURER'S NAME OR SYMBOL AND PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.

B. ELECTRICAL REQUIREMENTS:

(1) DIELECTRIC STRENGTH: NO BREAK DOWN BETWEEN ADJACENT WIRES AT 500 V RMS, 60 HZ AT 1 MA SENSITIVITY FOR 5 SEC, PER METHOD 301 OF MIL-STD-202.

(2) INSULATION RESISTANCE: 1000 MEGOHMS MIN, PER METHOD 302, TEST CONDITION B, OF MIL-STD-202.

3. DESIGN REQUIREMENTS:

A. WIRE (INTERNAL END): SOLDER TO CONTACT SECURELY WITH 63/37 SOLDER PER QQ-S-571, SN63 AND SOLDER FLUX PER SCD 2021527.

B. LEAD PULL TEST: EACH LEAD MUST WITHSTAND A GRADUALLY APPLIED AXIAL PULL OF 2 LBS. MIN FOR 5 SEC.

TABLE I

NASA DASH NUMBER	ASSEMBLY FIG. NO.	NO. OF RECEPTACLE CONTACTS	TYPE ASSEMBLY	RECEPTACLE DETAIL
-1	FIG. 1	16	COMPLETE ONE PIECE	Z
-2	FIG. 2	8	LEFT HAND SECTION	V
-3	FIG. 3	8	RT. HAND SECTION	V

THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

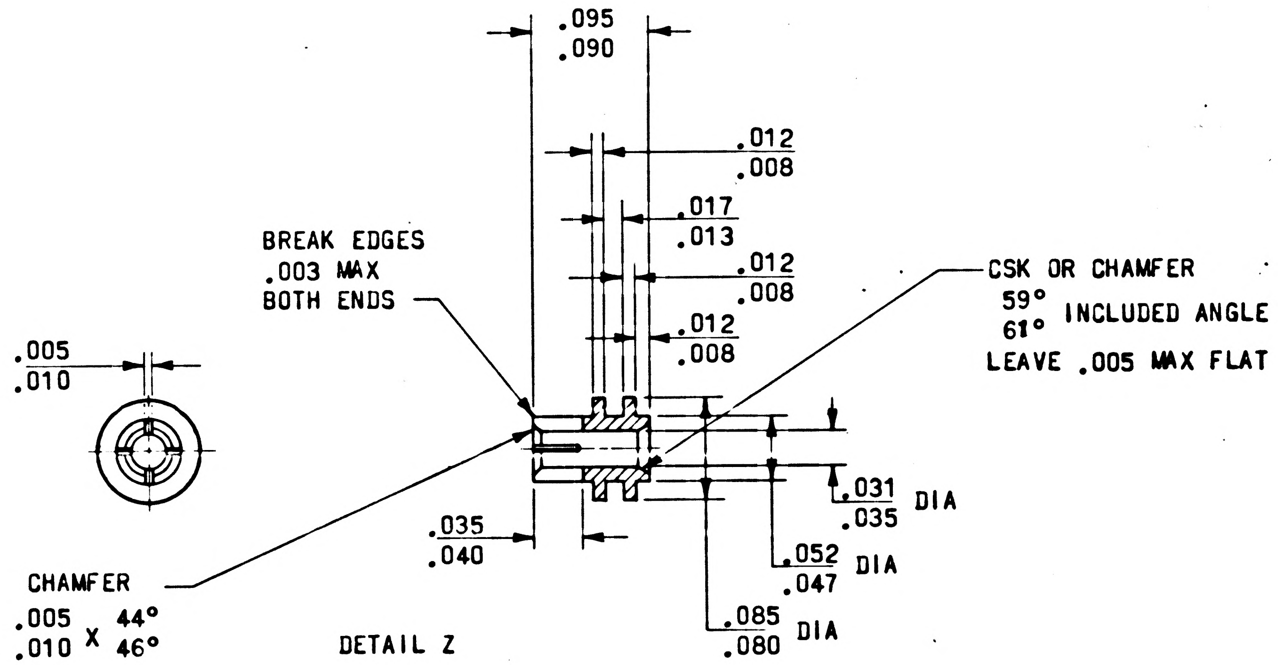
TABLE II

PIN NO.	COLOR OR WIRE	LENGTH OF WIRE FROM SURFACE A
1	RED	1.218 1.156
2	ORANGE	1.406 1.343
3	YELLOW	1.593 1.531
4	BLACK	1.593 1.531
5	WHITE	1.781 1.719
6	GREEN	1.968 1.906
7	BLUE	2.156 2.093
8	GRAY	2.156 2.093
9	VIOLET	2.156 2.093
10	BROWN	2.156 2.093
11	WHT-BLK	1.968 1.906
12	WHT-RED	1.781 1.719
13	WHT-GREEN	1.593 1.531
14	WHT-ORN	1.593 1.531
15	WHT-BLUE	1.406 1.343
16	WHT-GRAY	1.218 1.156

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± ; 3 PLACE DECIMALS ± ; ANGLES ±	M I T INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN J W Lutz DATE 4 MAR 68 CHECKED [illegible] 14 MAR 68 APPROVAL [illegible] 14 MAR 68 R. Booth 4-9-68 CONTRACT	CONNECTOR SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C CODE IDENT NO 80230 1008988
APPROVAL	C&B APPROVAL	SCALE —— SHEET 2 OF 4

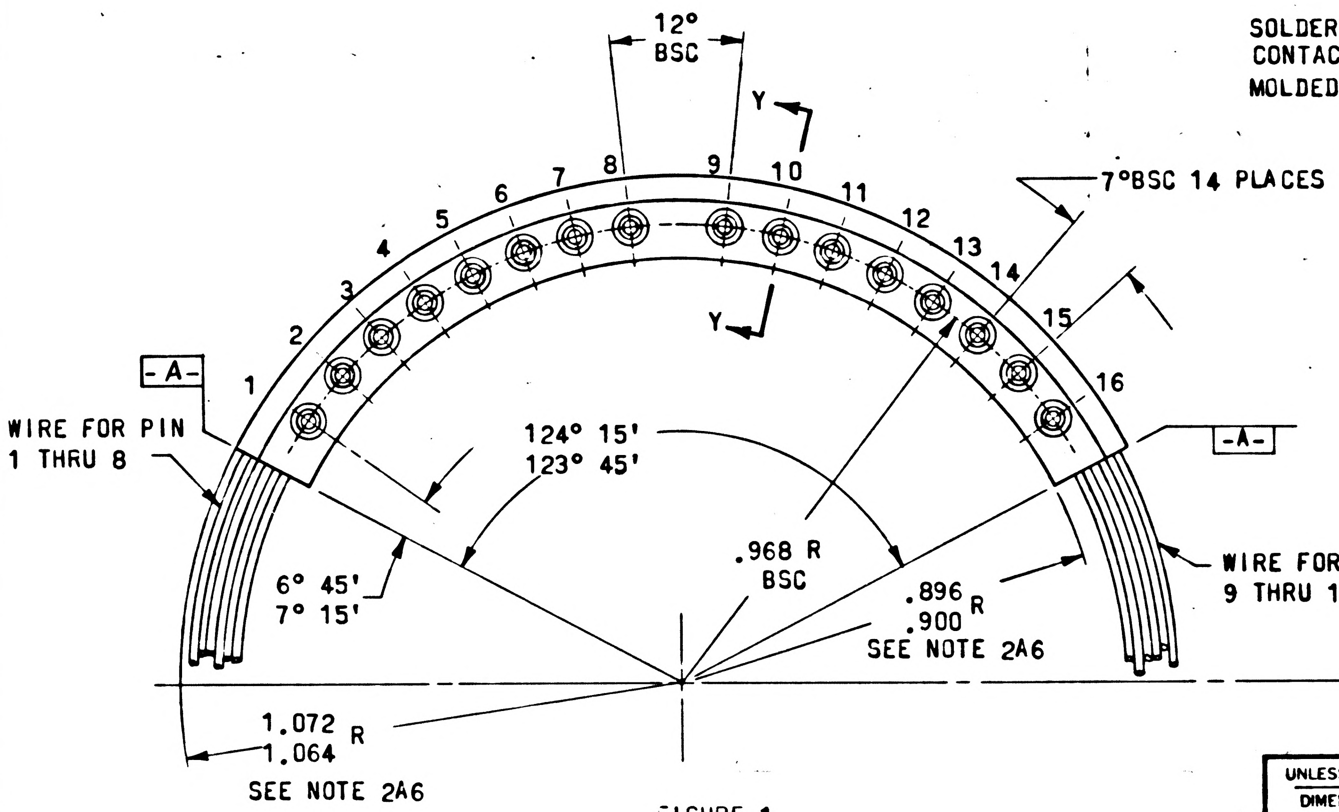
REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	INITIAL RELEASE CLASS A PER TDRR .048	10 APR 68	9 APR CA



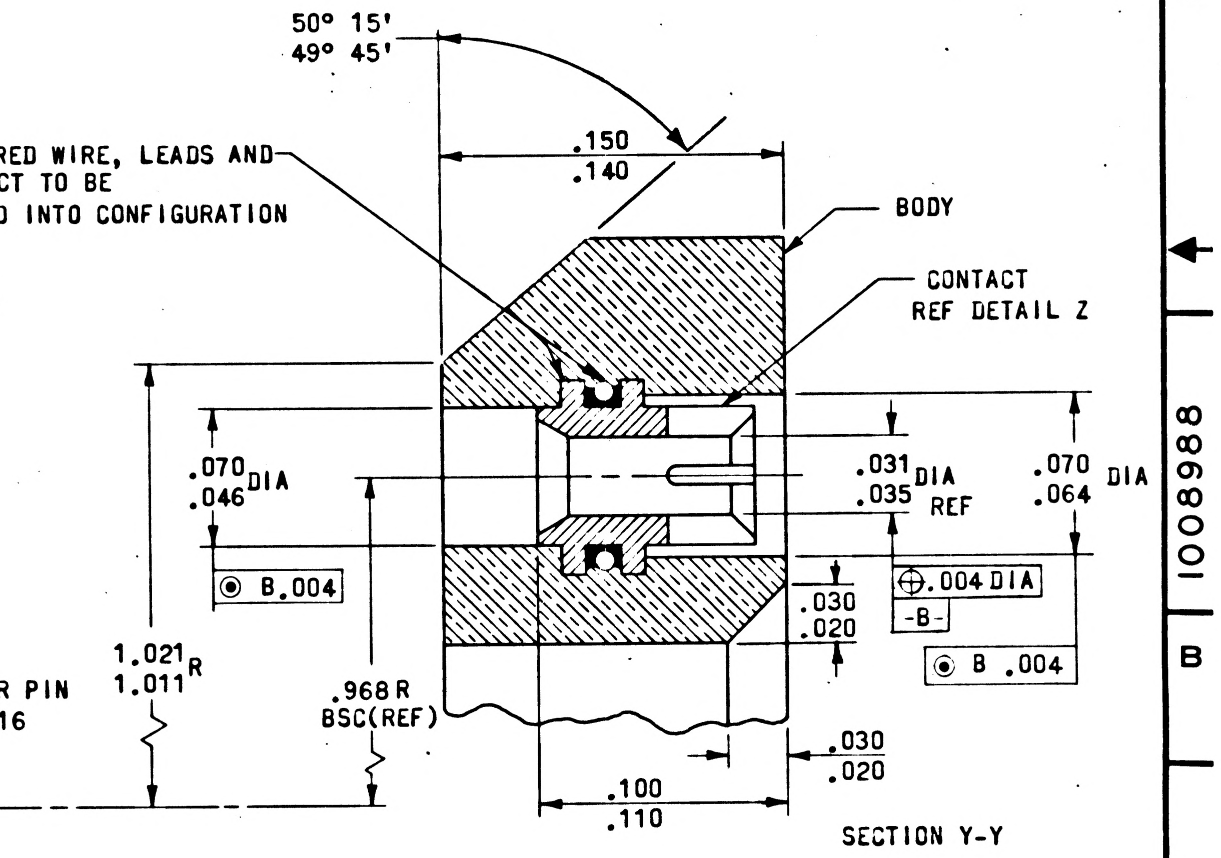
.095
.090
.012
.008
.017
.013
.012
.008
.012
.008
BREAK EDGES
.003 MAX
BOTH ENDS
CSK OR CHAMFER
59°
61° INCLUDED ANGLE
LEAVE .005 MAX FLAT
.005
.010
.031
.035 DIA
.035
.040
.052
.047 DIA
CHAMFER
.005
.010 X 44°
46°
.085
.080 DIA

DETAIL Z



12°
BSC
Y
Y
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
7°BSC 14 PLACES
-A-
-A-
WIRE FOR PIN
1 THRU 8
124° 15'
123° 45'
6° 45'
7° 15'
.968 R
BSC
.896
.900 R
SEE NOTE 2A6
WIRE FOR PIN
9 THRU 16
1.072
1.064 R
SEE NOTE 2A6

FIGURE 1



50° 15'
49° 45'
.150
.140
SOLDERED WIRE, LEADS AND
CONTACT TO BE
MOLDED INTO CONFIGURATION
BODY
CONTACT
REF DETAIL Z
.070
.046 DIA
.031
.035 DIA
REF
.070
.064 DIA
◉ B .004
.030
.020
⊕ .004 DIA
-B-
◉ B .004
1.021
1.011 R
.968 R
BSC(REF)
.030
.020
.100
.110

SECTION Y-Y

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + — − — 3 PLACE DECIMALS + — − — ANGLES + — − —	M I T INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN E W Lutz DATE 4 MAR 68 CHECKED [illegible] 14 MAR 68 APPROVAL [illegible] 14 MAR 68 R Boutz 4-9-68 CONTRACT	CONNECTOR SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C CODE IDENT NO 80230 1008988
APPROVAL	CCB [redacted] APPROVAL	SCALE — SHEET 3 OF 4

1008988

		REVISIONS		
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	INITIAL RELEASE CLASS A PER TDRR 36048	10 APR 68	9 APR 68

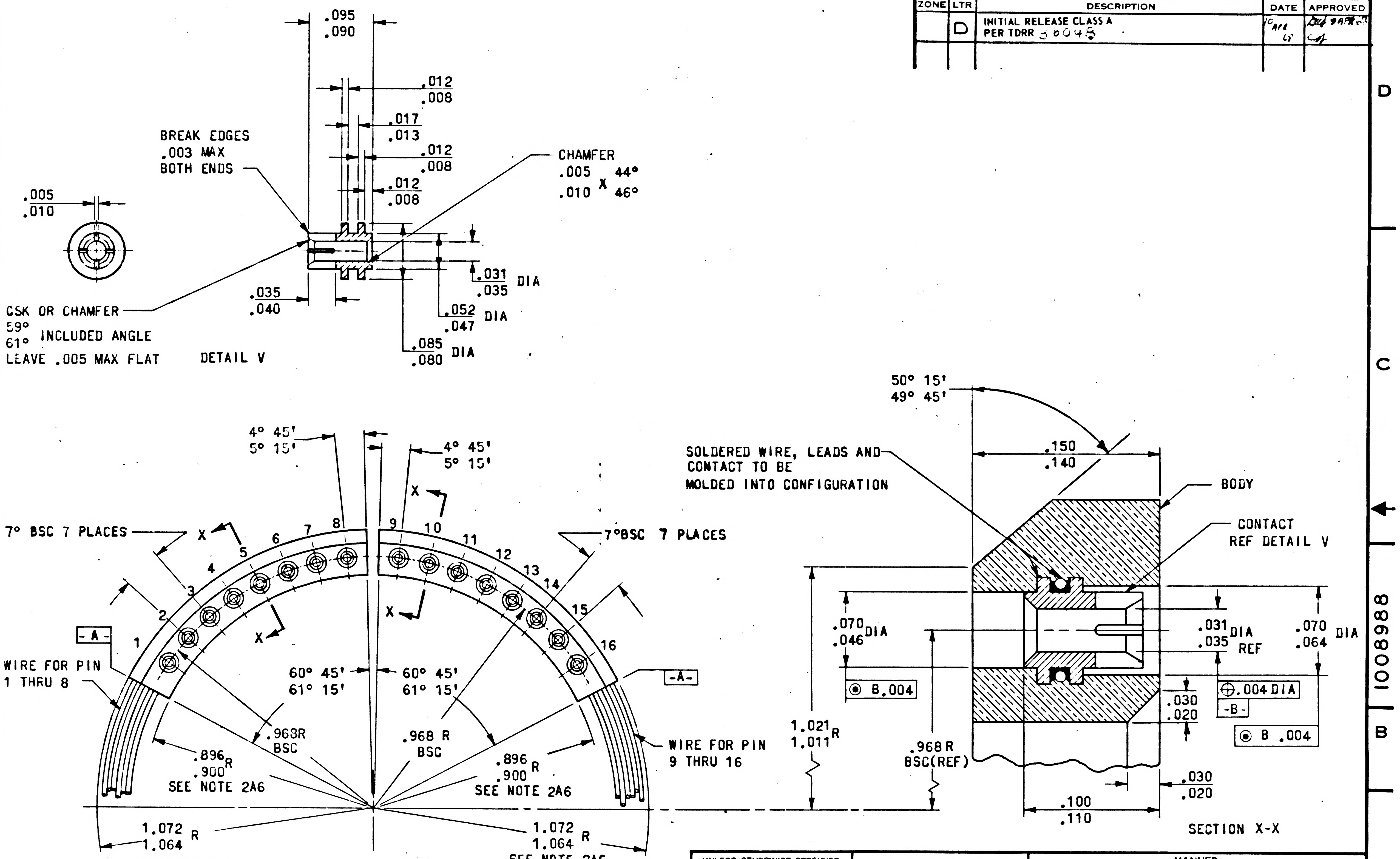

.095
.090
.012
.008
.017
.013
.012
.008
.012
.008
BREAK EDGES
.003 MAX
BOTH ENDS
CHAMFER
.005 X 44°
.010 X 46°
.005
.010
.031 DIA
.035
.035
.040
.052 DIA
.047
.085 DIA
.080
CSK OR CHAMFER
59°
61° INCLUDED ANGLE
LEAVE .005 MAX FLAT
DETAIL V
50° 15'
49° 45'
.150
.140
SOLDERED WIRE, LEADS AND CONTACT TO BE MOLDED INTO CONFIGURATION
BODY
CONTACT
REF DETAIL V
4° 45'
5° 15'
4° 45'
5° 15'
X
7° BSC 7 PLACES
7°BSC 7 PLACES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
-A-
-A-
WIRE FOR PIN
1 THRU 8
WIRE FOR PIN
9 THRU 16
60° 45'
61° 15'
60° 45'
61° 15'
.968R
BSC
.968 R
BSC
.896 R
.900
SEE NOTE 2A6
.896 R
.900
SEE NOTE 2A6
1.072 R
1.064
SEE NOTE 2A6
1.072 R
1.064
SEE NOTE 2A6
.070 DIA
.046
B .004
1.021 R
1.011
.968 R
BSC(REF)
.031 DIA
.035 REF
.070 DIA
.064
.030
.020
.004 DIA
-B-
B .004
.030
.020
.100
.110
SECTION X-X

FIGURE 2
LEFT HAND SECTION

FIGURE 3
RIGHT HAND SECTION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
	DRAWN J W Lutz DATE 13 MAR 68 Nisle Kaiushe 14 MAR 68 CHECKED APPROVAL 14 MAR 68 R Booth 4-9-68	CONNECTOR SPECIFICATION CONTROL DRAWING	
DO NOT SCALE THIS DRAWING	CONTRACT		
MATERIAL	NASA APPROVAL	SIZE C	CODE IDENT NO 80230	1008988
APPROVAL	CCB APPROVAL	SCALE —	SHEET 4 OF 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	E	REPLACES REV. D WITH CHANGE PER TDRR 37033	18-NOV 68	M. G.

NOTES:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. SOLDERING AND WIRE STRIPPING TO BE PERFORMED PER THE REQUIREMENTS OF ND 1002071.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) VISUAL INSPECTION:
       - a. SURFACE DEFECTS WHICH WILL BE PERMITTED PROVIDING THE LEADS ARE HELD FIRMLY AND NO STRAIN CAN BE EXERTED AGAINST THE SOLDER JOINT.
         - 1. LEAD BREAKOUT - WIRE INSULATION MAY BE EXPOSED AT MOLDED EXTERNAL SURFACES BUT THE WIRES MUST BE SECURE AND REMAIN WITHIN THE ENVELOPE OF THE CONNECTOR BODY.
         - 2. BUBBLES - SMALL BUBBLES WHICH DO NOT BREAK THE SURFACE.
       - b. MOLD MARK - A SMALL STEP, NOT EXCEEDING .015 ON A SIDE IS PERMITTED AT THE INTERSECTION OF THE 49° - 51° CHAMFER AND THE OUTER SURFACE OF THE CONNECTOR BODY FORMED BY THE 1.064 - 1.072 RADIUS.
       - c. MOLD FLASH: .062 MAX ALLOWABLE MOLDING BETWEEN WIRES AT SURFACE $\boxed{-A-}$.
       - d. MUST BE FREE FROM BURRS AND SHARP EDGES.
     - (2) MATERIAL:
       - a. CONTACT: COPPER-BERYLLIUM ALLOY CONDITION 1/2 H IN ACCORDANCE WITH QQ-C-530 AND WITH A 63√ FINISH. PARTS MUST BE FREE OF BURRS AND SHARP EDGES.
       - b. WIRE: NO. 30 (7 x 38) POLYTETRAFLUOROETHYLENE COATED WIRE PER SCD 2021522. INSULATION STRIPPED .109/.078 PER ND 1002071. LENGTH OF WIRE PER TABLE II.
       - c. BODY: NYLON PER MIL-P-20693 TYPE IV.
     - (3) HEAT TREATING:
       - a. CONTACT: CLOSE SAW CUTS SLIGHTLY AND SIZE OVER .028 DIA DRILL BLANK. HEAT TREAT BY PRECIPITATION HARDENING PER MIL-H-7199.
     - (4) FINISH:
       - a. CONTACT: GOLD PLATE .000050 MIN PER MIL-G-45204, TYPE II, CLASS 1.
       - b. WIRE (EXTERNAL END): STRIPPED WIRE TINNED WITH 96.5-3.5 SOLDER PER QQ-S-571, SN96 AND SOLDER FLUX PER SCD 2021527.
     - (5) RETENTION: CONTACT TO HOLD 30 GRAMS MIN TO 200 GRAMS MAX SUSPENDED FROM A .029020/.029000 DIA PIN.
     - (6) DIMENSIONS: SEE FIGURE-RESTRAINT IS ALLOWED TO INSPECT DIMENSION OF DRAWING, WHERE NOTED.
     - (7) MARKING:
       - a. PIECEMARKING: PART SHALL BE PERMANENTLY AND LEGIBLY MARKED PER ND 1002019 WITH THE NASA DRAWING NUMBER, DASH NUMBER.
       - b. PACKAGE: INTERNAL INDIVIDUAL OR COLLECTIVE PACKAGES AND EXTERNAL PACKAGING SHALL BE MARKED WITH THE FOLLOWING INFORMATION PER MIL-STD-129:
         SUPPLIER'S NAME, NASA DRAWING NUMBER & DASH NUMBER,
         SUPPLIER'S LOT OR SERIAL NUMBER, DATE CODE, OR
         DATE OF MANUFACTURE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS + — − ; 3 PLACE DECIMALS + — − ; ANGLES + — −	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN J. W. LUTZ DATE 4-MAR 68 CHECKED MALIKOWSKI 14-MAR 68 APPROVAL G. KOSHAREK 14-MAR. 68 R. BOOTH 4-9-68 CONTRACT	CONNECTOR SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL W. SWINGLE	SIZE C · CODE IDENT NO 80230 · 1008988
APPROVAL	CCB [redacted] APPROVAL E. AUSTIN	SCALE — · SHEET 1 OF 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	INITIAL RELEASE CLASS A PER TDRR 36048	10 APR 68	9 APR 68
	E	REVISION STATUS CHANGED	18 NOV. 68	

NOTES: (CONTINUED)

c. MANUFACTURER'S NAME OR SYMBOL AND PART NUMBER MAY APPEAR ON THE PART OR PACKAGE.

B. ELECTRICAL REQUIREMENTS:

(1) DIELECTRIC STRENGTH: NO BREAK DOWN BETWEEN ADJACENT WIRES AT 500 V RMS, 60 HZ AT 1 MA SENSITIVITY FOR 5 SEC, PER METHOD 301 OF MIL-STD-202.

(2) INSULATION RESISTANCE: 1000 MEGOHMS MIN, PER METHOD 302, TEST CONDITION B, OF MIL-STD-202.

3. DESIGN REQUIREMENTS:

A. WIRE (INTERNAL END): SOLDER TO CONTACT SECURELY WITH 63/37 SOLDER PER QQ-S-571, SN63 AND SOLDER FLUX PER SCD 2021527.

B. LEAD PULL TEST: EACH LEAD MUST WITHSTAND A GRADUALLY APPLIED AXIAL PULL OF 2 LBS. MIN FOR 5 SEC.

TABLE I

NASA DASH NUMBER	ASSEMBLY FIG. NO.	NO. OF RECEPTACLE CONTACTS	TYPE ASSEMBLY	RECEPTACLE DETAIL
-1	FIG. 1	16	COMPLETE ONE PIECE	Z
-2	FIG. 2	8	LEFT HAND SECTION	V
-3	FIG. 3	8	RT. HAND SECTION	V

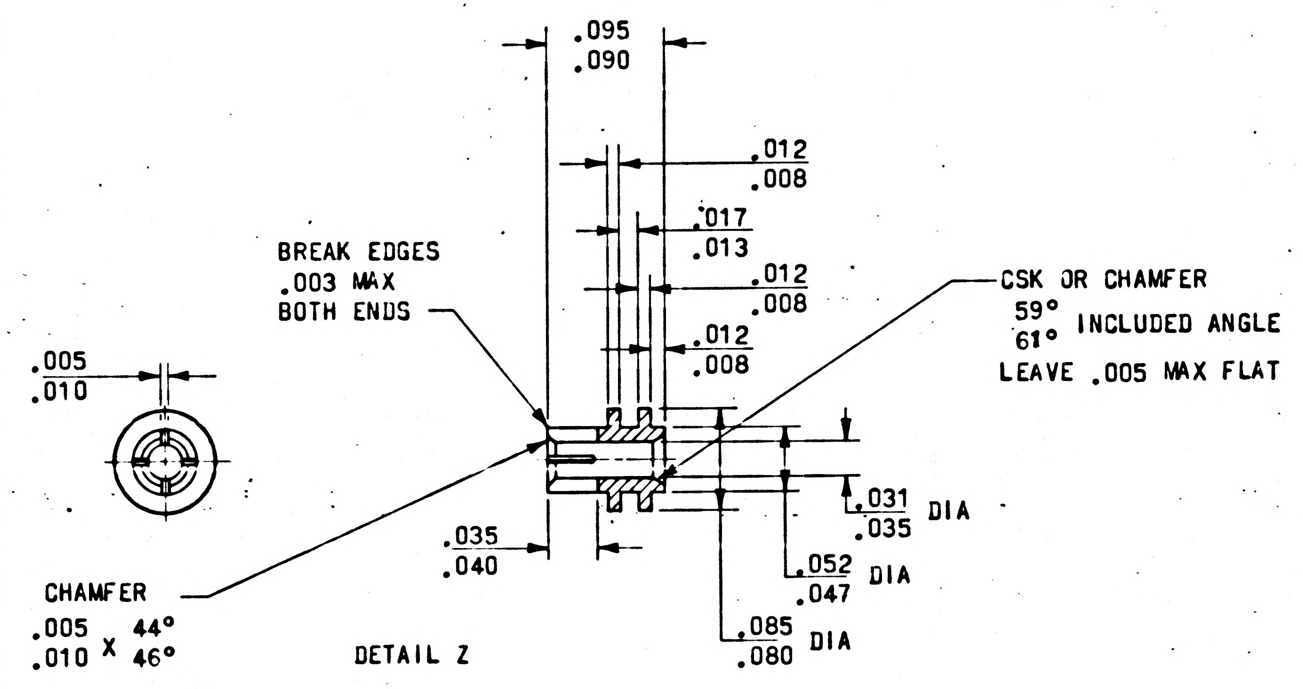
THE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

TABLE II

PIN NO.	COLOR OR WIRE	LENGTH OF WIRE FROM SURFACE A
1	RED	1.218 1.156
2	ORANGE	1.406 1.343
3	YELLOW	1.593 1.531
4	BLACK	1.593 1.531
5	WHITE	1.781 1.719
6	GREEN	1.968 1.906
7	BLUE	2.156 2.093
8	GRAY	2.156 2.093
9	VIOLET	2.156 2.093
10	BROWN	2.156 2.093
11	WHT-BLK	1.968 1.906
12	WHT-RED	1.781 1.719
13	WHT-GREEN	1.593 1.531
14	WHT-ORN	1.593 1.531
15	WHT-BLUE	1.406 1.343
16	WHT-GRAY	1.218 1.156

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± __ 3 PLACE DECIMALS ± __ ANGLES ± __	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON TEXAS
DO NOT SCALE THIS DRAWING	DRAWN J W Lutz DATE 9 MAR 68 CHECKED APPROVAL 14 APR 68 R. Booth 4-9-68 CONTRACT	CONNECTOR SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C CODE IDENT NO 80230 1008988
APPROVAL	C.A APPROVAL	SCALE —— SHEET 2 OF 4

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	INITIAL RELEASE CLASS A PER TDRR 36048	10 APR 68	9 APR
	E	REVISED PER TDRR 37033	NOV 68	


.095
.090
.012
.008
.017
.013
.012
.008
.012
.008
BREAK EDGES
.003 MAX
BOTH ENDS
CSK OR CHAMFER
59°
61° INCLUDED ANGLE
LEAVE .005 MAX FLAT
.005
.010
.031
.035 DIA
.035
.040
.052
.047 DIA
CHAMFER
.005
.010 X 44°
46°
.085
.080 DIA

DETAIL Z

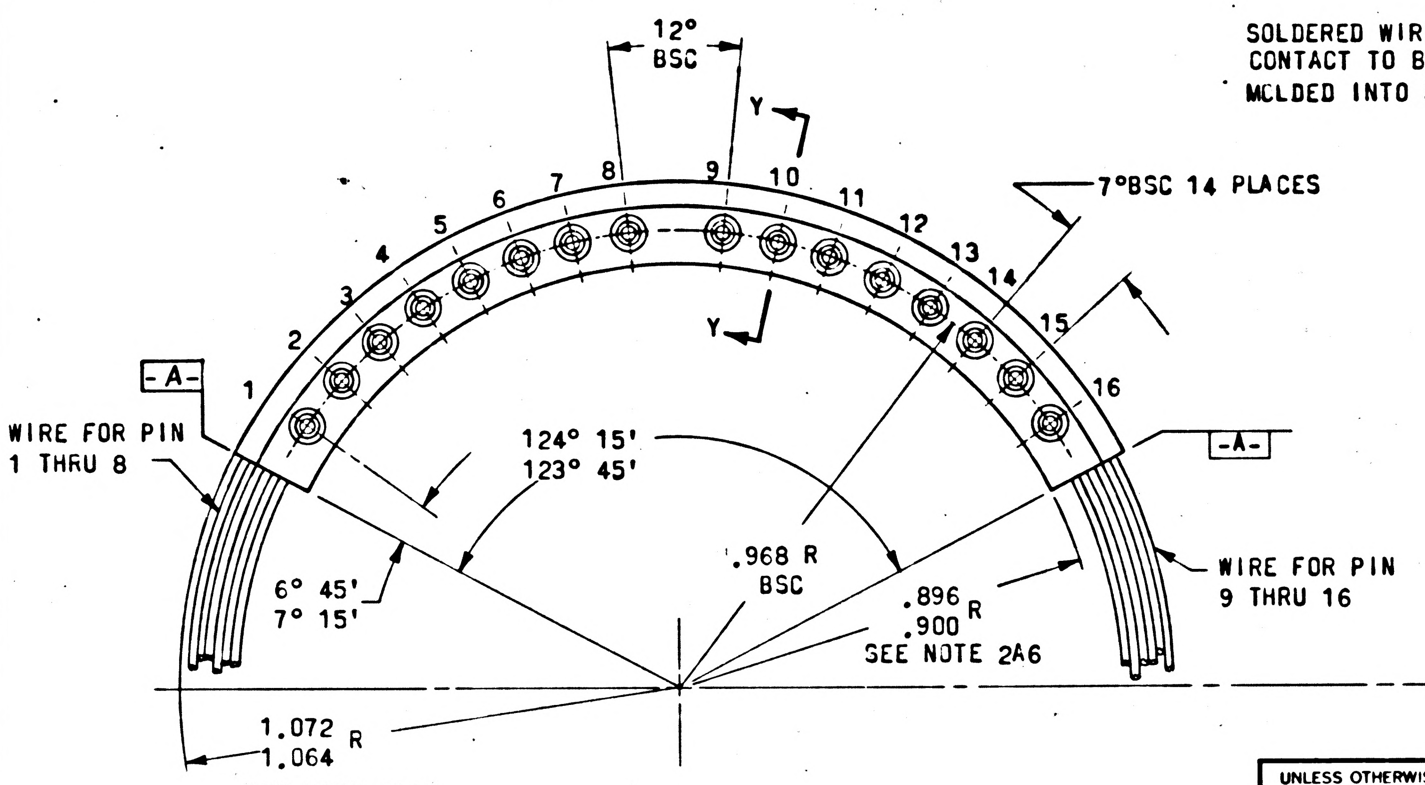
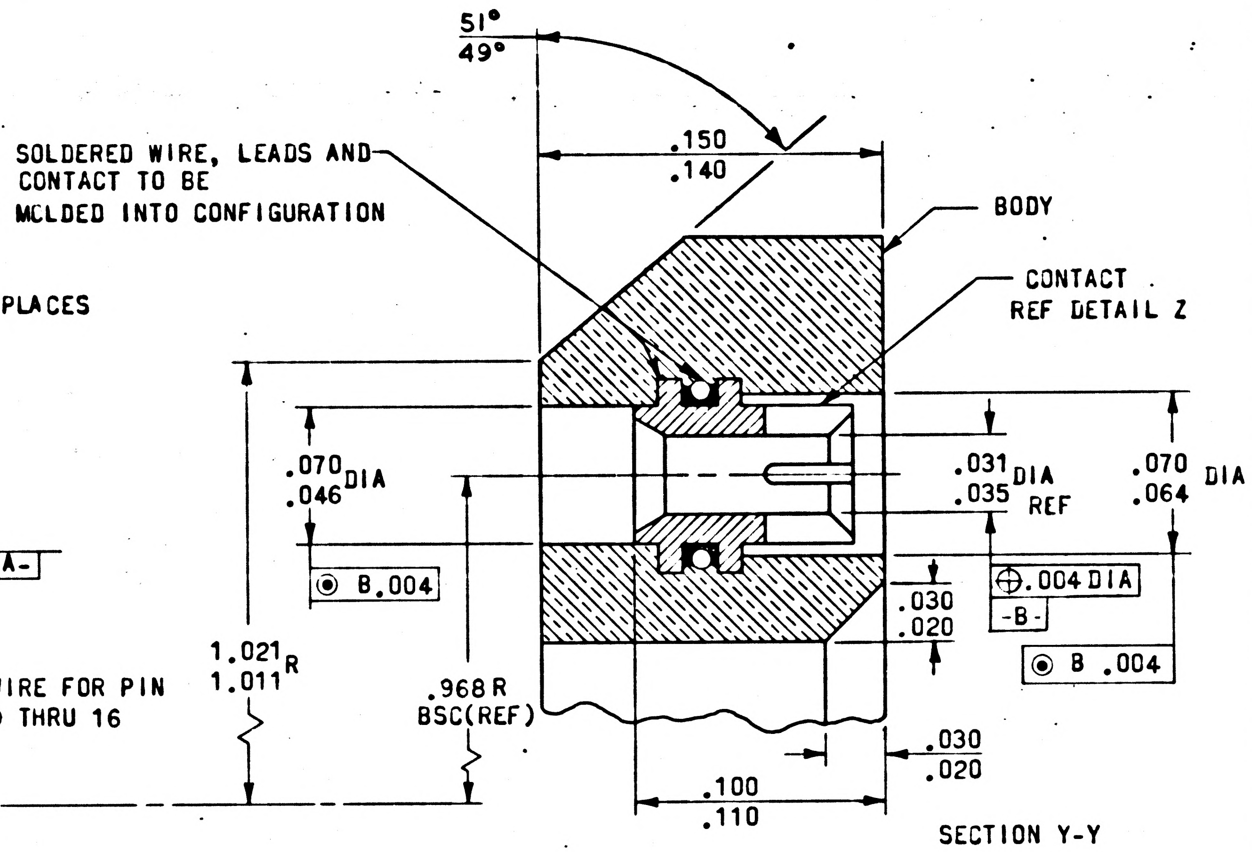

12°
BSC
Y
7°BSC 14 PLACES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Y
-A-
-A-
WIRE FOR PIN
1 THRU 8
124° 15'
123° 45'
6° 45'
7° 15'
.968 R
BSC
.896
.900 R
SEE NOTE 2A6
WIRE FOR PIN
9 THRU 16
1.072
1.064 R
SEE NOTE 2A6

FIGURE 1


51°
49°
.150
.140
SOLDERED WIRE, LEADS AND
CONTACT TO BE
MOLDED INTO CONFIGURATION
BODY
CONTACT
REF DETAIL Z
.070
.046 DIA
B .004
.031
.035 DIA
REF
.070
.064 DIA
.004 DIA A
-B-
.030
.020
B .004
1.021
1.011 R
.968 R
BSC(REF)
.030
.020
.100
.110

SECTION Y-Y

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
APPROVAL

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN J W Lutz DATE 4 MAR 68
CHECKED 14 MAR 68
APPROVAL 14 MAR 68
R Boots 4-9-68
CONTRACT
NASA APPROVAL
CCB APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

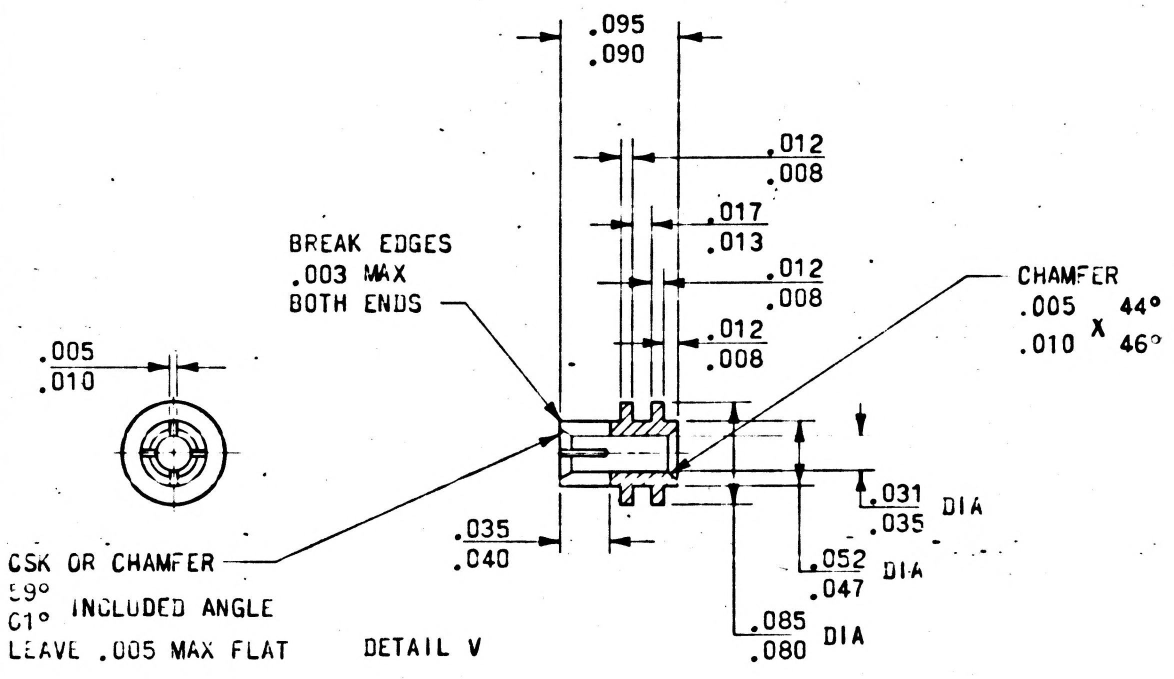
CONNECTOR

SPECIFICATION CONTROL DRAWING

SIZE C | CODE IDENT NO 80230 | 1008988
SCALE — | SHEET 3 OF 4

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	D	INITIAL RELEASE CLASS A PER TDRR 36048	10 APR 68	
	E	REVISED PER TDRR 37033	15 NOV 68	


.095
.090
.012
.008
.017
.013
.012
.008
.012
.008
BREAK EDGES
.003 MAX
BOTH ENDS
CHAMFER
.005 X 44°
.010 46°
.005
.010
.031 DIA
.035
.035
.040
CSK OR CHAMFER
59°
61° INCLUDED ANGLE
LEAVE .005 MAX FLAT
.052 DIA
.047
.085 DIA
.080

DETAIL V

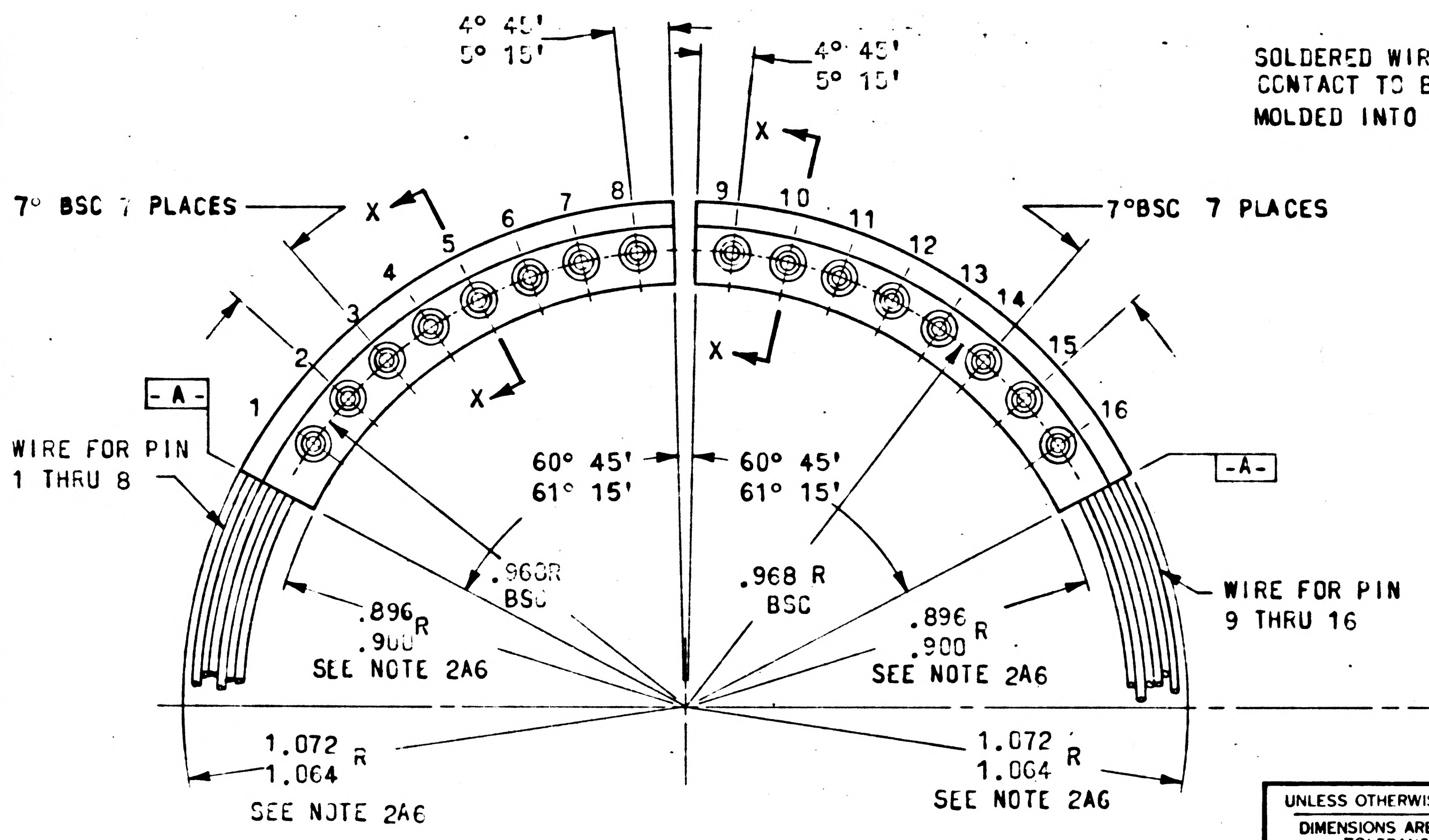
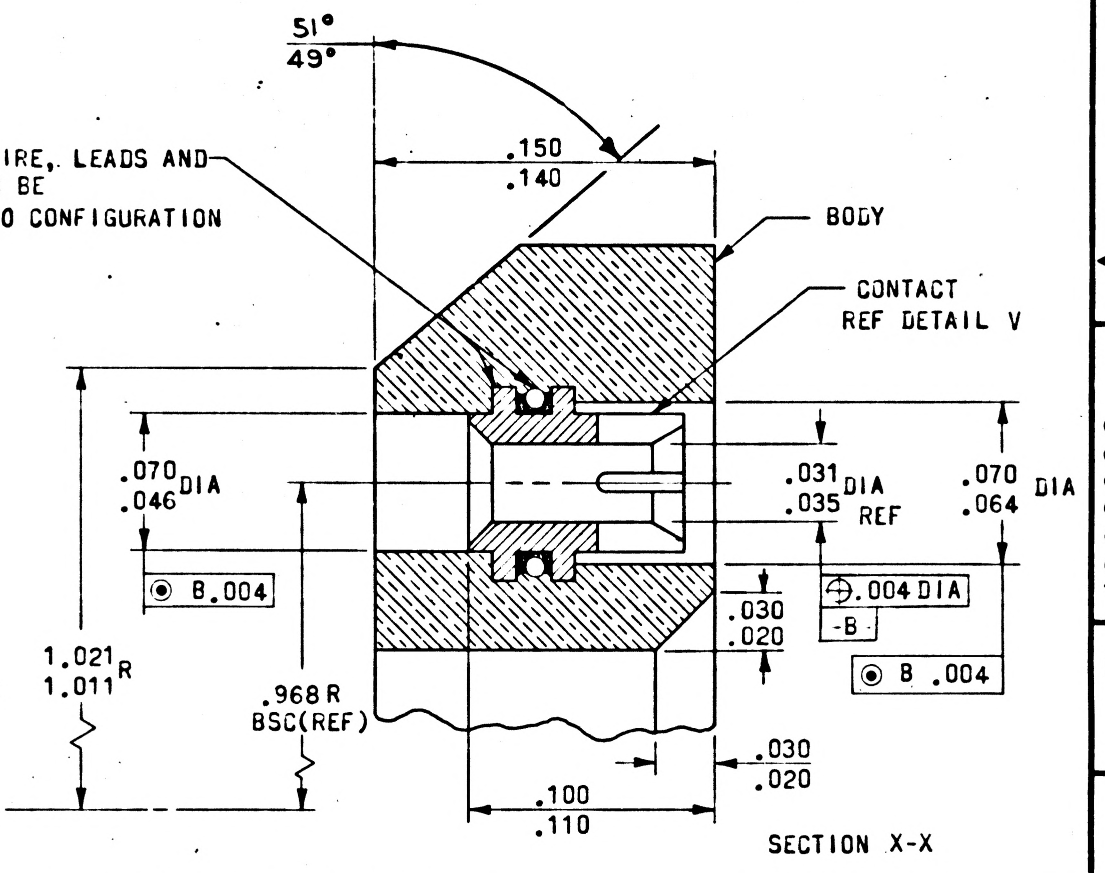

4° 45'
5° 15'
4° 45'
5° 15'
X
X
7° BSC 7 PLACES
7°BSC 7 PLACES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
-A-
-A-
WIRE FOR PIN
1 THRU 8
WIRE FOR PIN
9 THRU 16
X
X
60° 45'
61° 15'
60° 45'
61° 15'
.968R
BSC
.968 R
BSC
.896 R
.900
SEE NOTE 2A6
.896 R
.900
SEE NOTE 2A6
1.072 R
1.064
SEE NOTE 2A6
1.072 R
1.064
SEE NOTE 2A6

FIGURE 2
LEFT HAND SECTION

FIGURE 3
RIGHT HAND SECTION


51°
49°
SOLDERED WIRE, LEADS AND
CONTACT TO BE
MOLDED INTO CONFIGURATION
.150
.140
BODY
CONTACT
REF DETAIL V
.070 DIA
.046
.031 DIA
.035 REF
.070 DIA
.064
B .004
.030
.020
.004 DIA
-B-
B .004
1.021 R
1.011
.968 R
BSC(REF)
.030
.020
.100
.110

SECTION X-X

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON 2 PLACE DECIMALS ± 3 PLACE DECIMALS ± ANGLES ±	M I T INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON TEXAS
DO NOT SCALE THIS DRAWING	DRAWN [illegible] DATE 13 MAR 68 CHECKED [illegible] 14 MAR 68 APPROVAL [illegible] 14 MAR 68 R Booth 14-3-68 CONTRACT	CONNECTOR SPECIFICATION CONTROL DRAWING
MATERIAL	NASA APPROVAL	SIZE C | CODE IDENT NO 80230 | 1008988
APPROVAL	APPROVAL	SCALE — | SHEET 4 OF 4

APPLICATION		REVISIONS			
NEXT ASSY	USED ON	LTR	DESCRIPTION	DATE	APPROVED
		A	INITIAL RELEASE CLASS A PER TDRR 36200	10 MAY 61	29 APR 68

THIS MATERIAL SHALL CONSIST OF MOLDED NYLON PLASTIC CONFORMING TO THE REQUIREMENTS OF MIL-P-17091, TYPE I.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.

REFERENCE: ACSK ONLY
D.O. 75495

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

SALLMANN 15 MAR 68
DRAFTSMAN DAY MO YR
15 MAR 68
CHECKER
ENGINEER Vin Paglioni
APPROVAL
CONTR NO.
NASA APPROVAL
APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

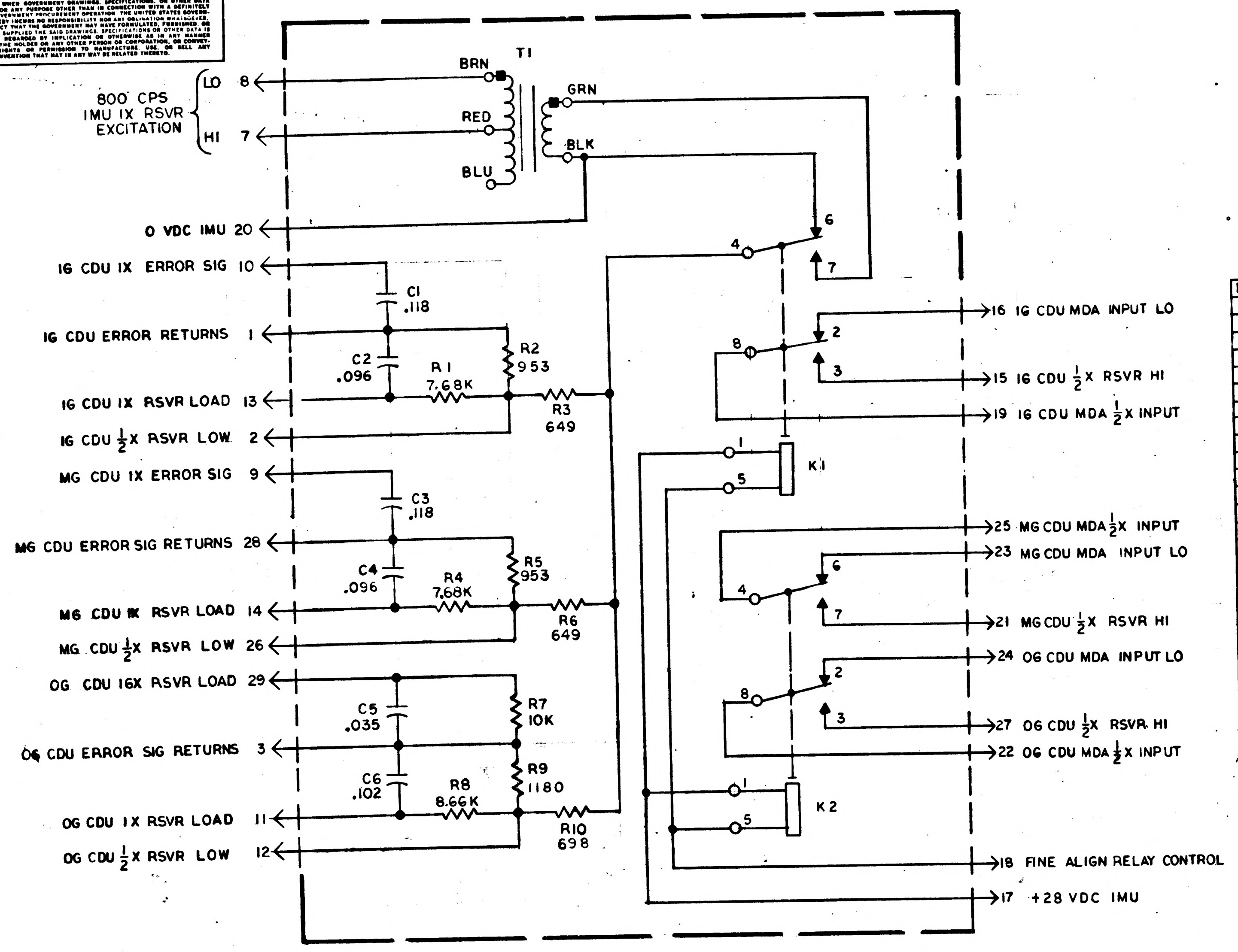
PLASTIC, POLYAMIDE, RIGID

SPECIFICATION CONTROL DRAWING

SIZE A
CODE IDENT. NO 80230
1008992
SCALE NONE
SHEET 1 OF 1

REVISIONS			13094
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED RER TDRR 15473	18 JAN 65	Jac WK.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.



800 CPS IMU IX RSVR EXCITATION
LO 8
HI 7
T1
BRN
RED
BLU
GRN
BLK
0 VDC IMU 20
IG CDU IX ERROR SIG 10
IG CDU ERROR RETURNS 1
IG CDU IX RSVR LOAD 13
IG CDU ½X RSVR LOW 2
MG CDU IX ERROR SIG 9
MG CDU ERROR SIG RETURNS 28
MG CDU IX RSVR LOAD 14
MG CDU ½X RSVR LOW 26
OG CDU 16X RSVR LOAD 29
OG CDU ERROR SIG RETURNS 3
OG CDU IX RSVR LOAD 11
OG CDU ½X RSVR LOW 12
C1 .118
C2 .096
R1 7.68K
R2 953
R3 649
C3 .118
C4 .096
R4 7.68K
R5 953
R6 649
C5 .035
R7 10K
C6 .102
R8 8.66K
R9 1180
R10 698
4
6
7
8
2
3
1
5
K1
K2
16 IG CDU MDA INPUT LO
15 IG CDU ½X RSVR HI
19 IG CDU MDA ½X INPUT
25 MG CDU MDA ½X INPUT
23 MG CDU MDA INPUT LO
21 MG CDU ½X RSVR HI
24 OG CDU MDA INPUT LO
27 OG CDU ½X RSVR HI
22 OG CDU MDA ½X INPUT
18 FINE ALIGN RELAY CONTROL
17 +28 VDC IMU

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010363-421	RESISTOR	7.68K	±1%	1/4 W
R2	↕ -247	↕	953	↕	↕
R3	↕ -215	↕	649	↕	↕
R4	↕ -421	↕	7.68K	↕	↕
R5	↕ -247	↕	953	↕	↕
R6	↕ -215	↕	649	↕	↕
R7	↕ -443	↕	10K	↕	↕
R8	↕ -431	↕	8.66K	↕	↕
R9	↕ -265	↕	1180	↕	↕
R10	1010363-221	RESISTOR	698	±1%	1/4 W
C1	1010316-89	CAPACITOR	.118	±1%	100V
C2	↕ -79	↕	.096	↕	↕
C3	↕ -89	↕	.118	↕	↕
C4	↕ -79	↕	.096	↕	↕
C5	↕ -92	↕	.035	↕	↕
C6	1010316-81	CAPACITOR	.102	±1%	100V
T1	1010467	TRANSFORMER			
K1	1010790-3	RELAY			
K2	1010790-3	RELAY			

REF DWG
CDU RESOLVER LOADS ASSY
DWG NO. 1007510

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN R B Hoguen DATE 19MAY64
CHECKED cc R. P. Kingsbury
APPROVAL E J Gcolik 22 Sept 64
APPROVAL G. Cushman / 9/29/64
NASA APPROVAL W. J. Rhine 10-26-64
MIT APPROVAL W. Cuffy 29 Sept 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

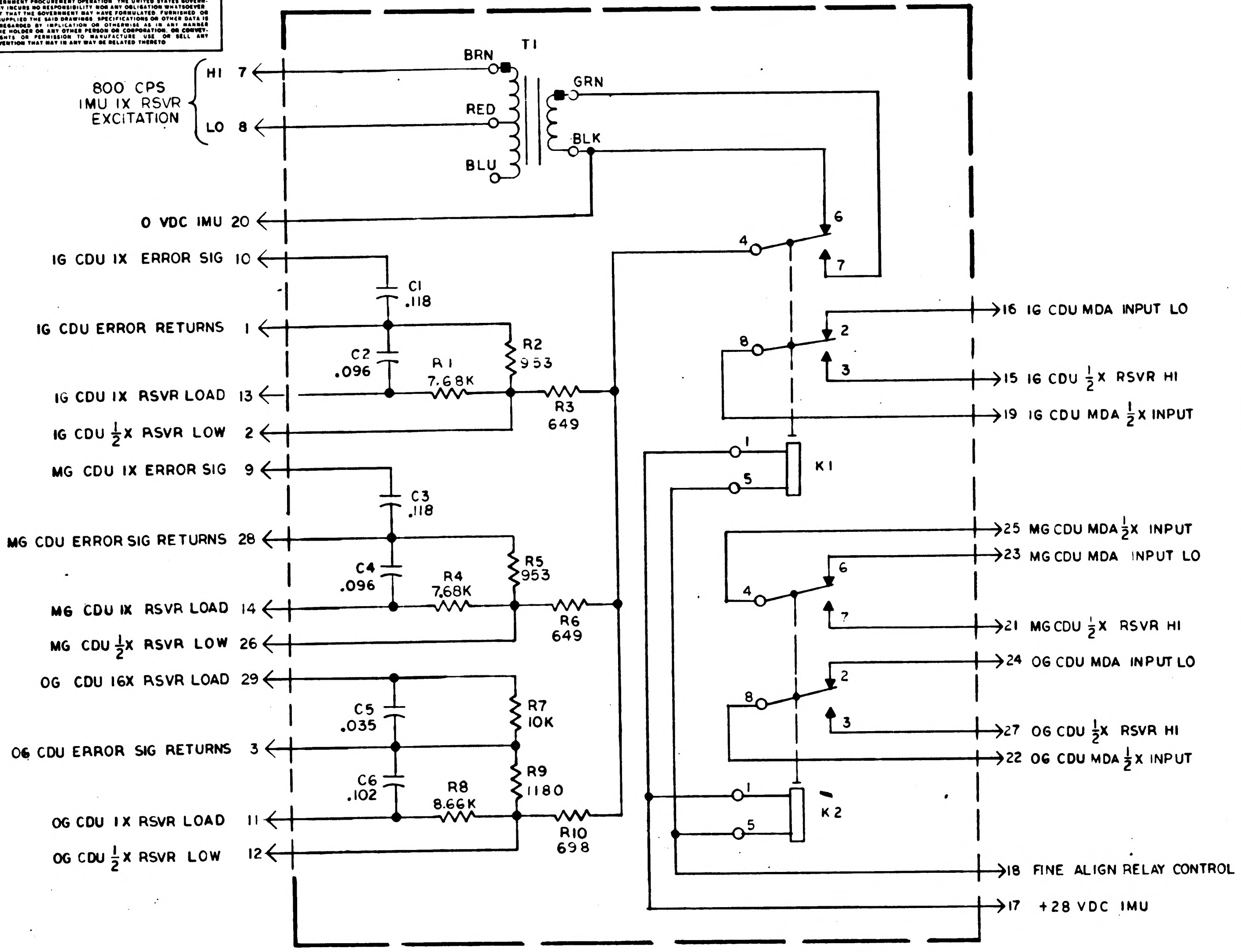
SCHEMATIC, CDU RESOLVER LOADS

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1009501
SCALE —
WT —
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 13094

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED RER TDRR 15473	18 JAN 65	WK
B	REVISED PER TDRR 16626	26 FEB 65	AN


800 CPS IMU IX RSVR EXCITATION
HI 7
LO 8
T1
BRN
RED
BLU
GRN
BLK
0 VDC IMU 20
IG CDU IX ERROR SIG 10
C1 .118
IG CDU ERROR RETURNS 1
C2 .096
R1 7.68K
R2 953
IG CDU IX RSVR LOAD 13
R3 649
IG CDU ½X RSVR LOW 2
MG CDU IX ERROR SIG 9
C3 .118
MG CDU ERROR SIG RETURNS 28
C4 .096
R4 7.68K
R5 953
MG CDU IX RSVR LOAD 14
R6 649
MG CDU ½X RSVR LOW 26
OG CDU 16X RSVR LOAD 29
C5 .035
R7 10K
OG CDU ERROR SIG RETURNS 3
C6 .102
R8 8.66K
R9 1180
OG CDU IX RSVR LOAD 11
R10 698
OG CDU ½X RSVR LOW 12
K1
K2
16 IG CDU MDA INPUT LO
15 IG CDU ½X RSVR HI
19 IG CDU MDA ½X INPUT
25 MG CDU MDA ½X INPUT
23 MG CDU MDA INPUT LO
21 MG CDU ½X RSVR HI
24 OG CDU MDA INPUT LO
27 OG CDU ½X RSVR HI
22 OG CDU MDA ½X INPUT
18 FINE ALIGN RELAY CONTROL
17 +28 VDC IMU

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010363-421	RESISTOR	7.68K	±1%	1/4 W
R2	-247		953		
R3	-215		649		
R4	-421		7.68K		
R5	-247		953		
R6	-215		649		
R7	-443		10K		
R8	-431		8.66K		
R9	-265		1180		
R10	1010363-221	RESISTOR	698	±1%	1/4 W
C1	1010316-89	CAPACITOR	.118	±1%	100V
C2	-79		.096		
C3	-89		.118		
C4	-79		.096		
C5	-92		.035		
C6	1010316-81	CAPACITOR	.102	±1%	100V
T1	1010467	TRANSFORMER			
K1	1010790-3	RELAY			
K2	1010790-3	RELAY			

REF DWG
CDU RESOLVER LOADS ASSY
DWG NO. 1007510

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN R B Hoguen DATE 19MAY64
CHECKED
APPROVAL 22 Sep 64
APPROVAL
NASA APPROVAL 10-29-64
MIT APPROVAL 29 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

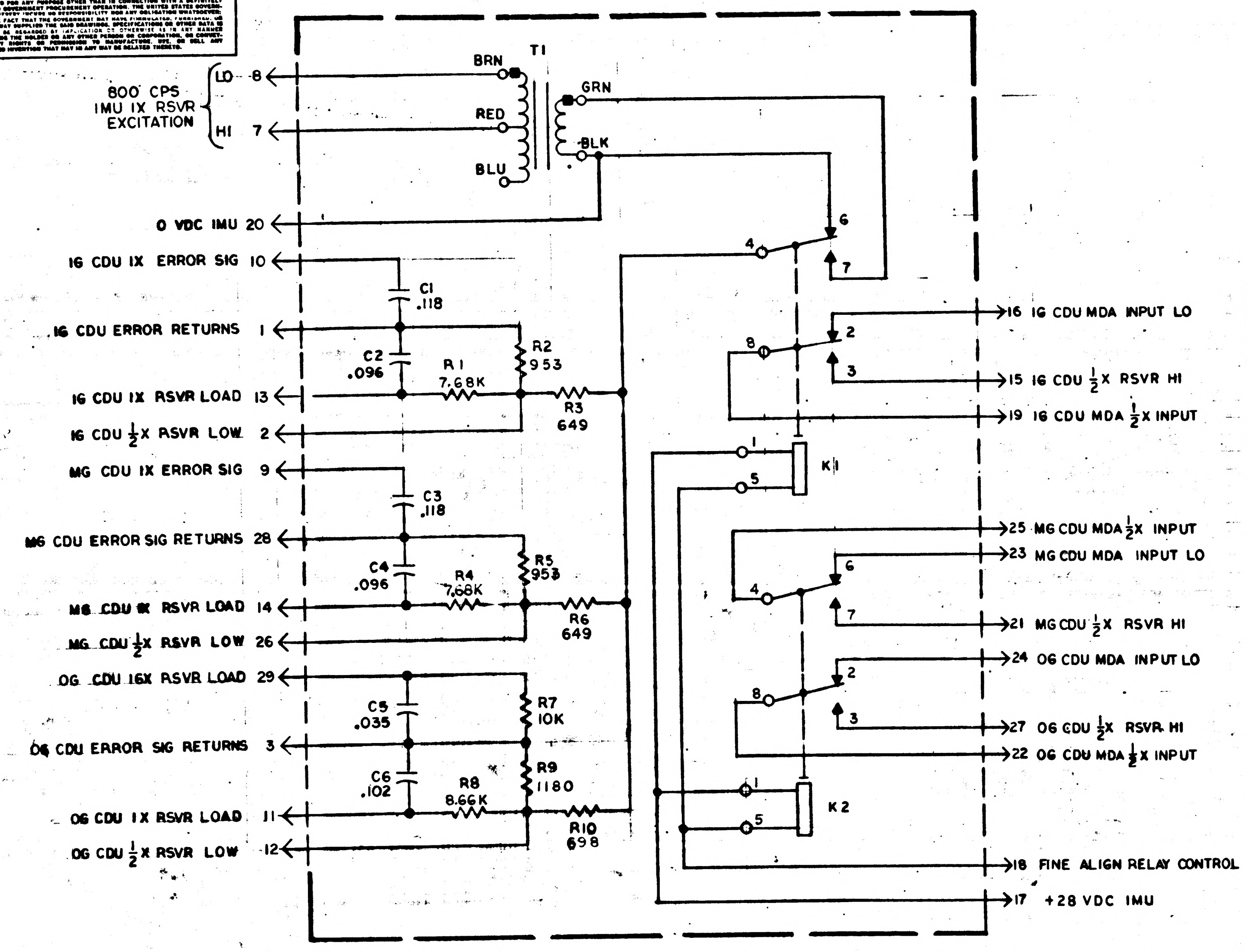
SCHEMATIC,
CDU RESOLVER LOADS

CODE IDENT NO. — SIZE D NASA DRAWING NO. 1009501
SCALE — WT — SHEET 1 OF 1

1009501 B

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

13074


800 CPS
IMU IX RSVR
EXCITATION
LO 8
HI 7
BRN
RED
BLU
T1
GRN
BLK
0 VDC IMU 20
IG CDU IX ERROR SIG 10
C1 .118
IG CDU ERROR RETURNS 1
C2 .096
R1 7.68K
R2 953
IG CDU IX RSVR LOAD 13
R3 649
IG CDU ½X RSVR LOW 2
MG CDU IX ERROR SIG 9
C3 .118
MG CDU ERROR SIG RETURNS 28
C4 .096
R4 7.68K
R5 953
MG CDU IX RSVR LOAD 14
R6 649
MG CDU ½X RSVR LOW 26
OG CDU 16X RSVR LOAD 29
C5 .035
R7 10K
OG CDU ERROR SIG RETURNS 3
C6 .102
R8 8.66K
R9 1180
OG CDU IX RSVR LOAD 11
R10 698
OG CDU ½X RSVR LOW 12
K1
K2
16 IG CDU MDA INPUT LO
15 IG CDU ½X RSVR HI
19 IG CDU MDA ½X INPUT
25 MG CDU MDA ½X INPUT
23 MG CDU MDA INPUT LO
21 MG CDU ½X RSVR HI
24 OG CDU MDA INPUT LO
27 OG CDU ½X RSVR HI
22 OG CDU MDA ½X INPUT
18 FINE ALIGN RELAY CONTROL
17 +28 VDC IMU

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010363-421	RESISTOR	7.68K	±1%	1/4 W
R2	-247	↕	953	↕	↕
R3	-215	↕	649	↕	↕
R4	-421	↕	7.68K	↕	↕
R5	-247	↕	953	↕	↕
R6	-215	↕	649	↕	↕
R7	-443	↕	10K	↕	↕
R8	-431	↕	8.66K	↕	↕
R9	-265	↕	1180	↕	↕
R10	1010363-221	RESISTOR	698	±1%	1/4 W
C1	1010316-89	CAPACITOR	.118	±1%	100V
C2	-79	↕	.096	↕	↕
C3	-89	↕	.118	↕	↕
C4	-79	↕	.096	↕	↕
C5	-92	↕	.035	↕	↕
C6	1010316-81	CAPACITOR	.102	±1%	100V
T1	1010467	TRANSFORMER			
K1	1010790	RELAY			
K2	1010790	RELAY			

REF DWG
CDU RESOLVER LOADS ASSY
DWG NO. 1007510

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN R B Hoguson DATE 19MAY64
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APPROVAL 22 64
APPROVAL
NASA APPROVAL 10-26-64
MIT APPROVAL 29

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
CDU RESOLVER LOADS

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1009501
SCALE —
WT —
SHEET 1 OF 1

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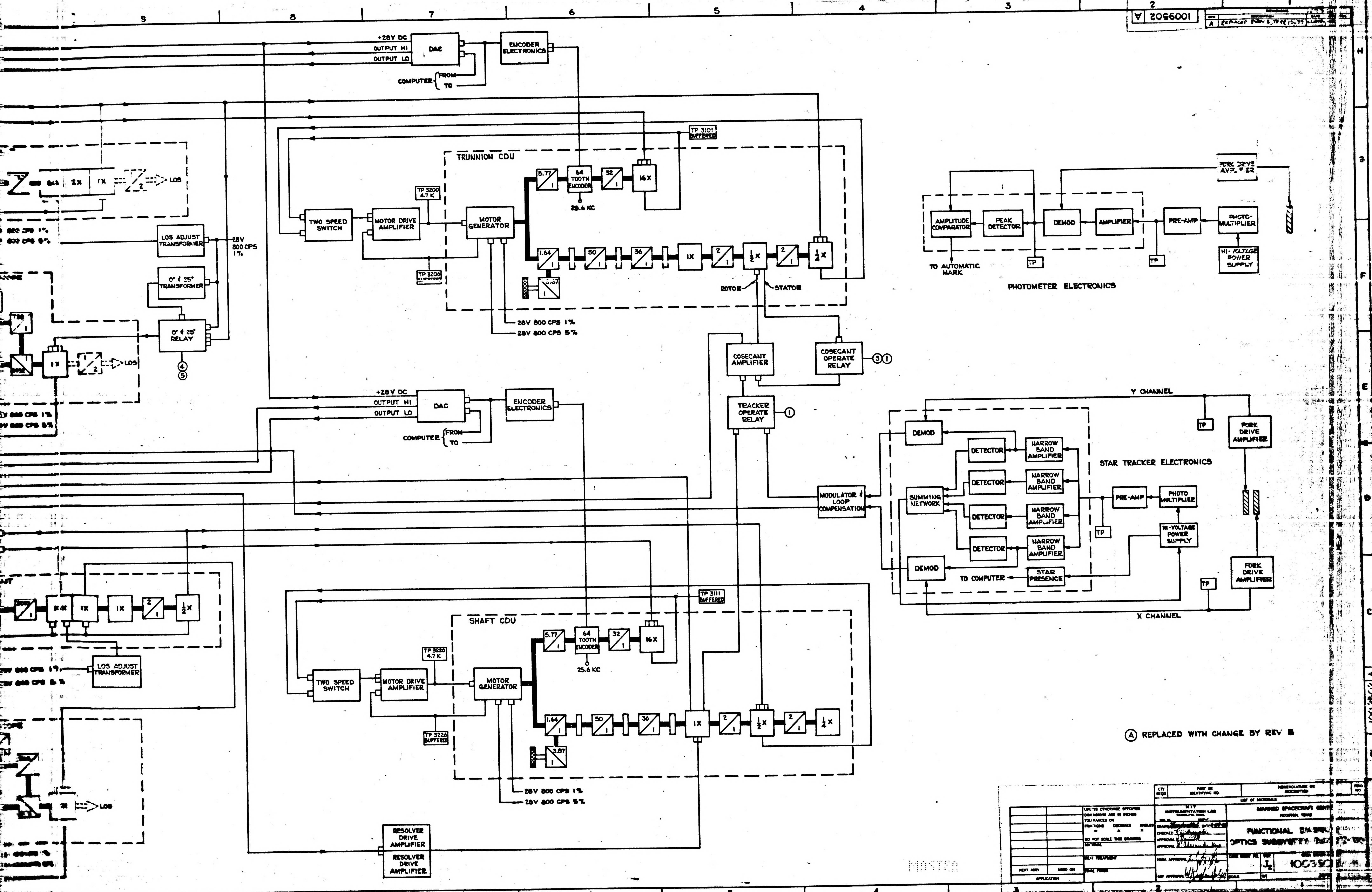
+28V DC
OUTPUT HI
OUTPUT LO
DAC
ENCODER ELECTRONICS
COMPUTER
FROM
TO
TP 3101 BUFFERED
TRUNNION CDU
5.77/1
64 TOOTH ENCODER
25.6 KC
32/1
16X
TP 3200 4.7 K
TWO SPEED SWITCH
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
1.64/1
50/1
36/1
1X
2/1
½X
2/1
¼X
3.57/1
TP 3206 BUFFERED
ROTOR
STATOR
28V 800 CPS 1%
28V 800 CPS 5%
COSECANT AMPLIFIER
COSECANT OPERATE RELAY
③①
TRACKER OPERATE RELAY
①
LOS ADJUST TRANSFORMER
28V 800 CPS 1%
0° & 25° TRANSFORMER
0° & 25° RELAY
④
⑤
2X
1X
LOS
MODULATOR & LOOP COMPENSATION
FORK DRIVE AMPLIFIER
AMPLITUDE COMPARATOR
PEAK DETECTOR
DEMOD
AMPLIFIER
PRE-AMP
PHOTO-MULTIPLIER
HI-VOLTAGE POWER SUPPLY
TP
TO AUTOMATIC MARK
PHOTOMETER ELECTRONICS
Y CHANNEL
X CHANNEL
DEMOD
DETECTOR
NARROW BAND AMPLIFIER
SUMMING NETWORK
STAR TRACKER ELECTRONICS
PRE-AMP
PHOTO MULTIPLIER
HI-VOLTAGE POWER SUPPLY
STAR PRESENCE
TO COMPUTER
FORK DRIVE AMPLIFIER
TP 3111 BUFFERED
SHAFT CDU
TP 3220 4.7 K
TP 3226 BUFFERED
LOS ADJUST TRANSFORMER
RESOLVER DRIVE AMPLIFIER
RESOLVER DRIVE AMPLIFIER
(A) REPLACED WITH CHANGE BY REV B
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1009502 A

REVISIONS

SYM	DESCRIPTION	DATE	APPROVED
A	REPLACES SHEET 3, TP 88 12477	[illegible]	[illegible]

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENT
HOUSTON, TEXAS

FUNCTIONAL DIAGRA
OPTICS SUBSYSTEM
CODE IDENT NO.
SIZE J2
1003SC
SCALE
WT

MASTER

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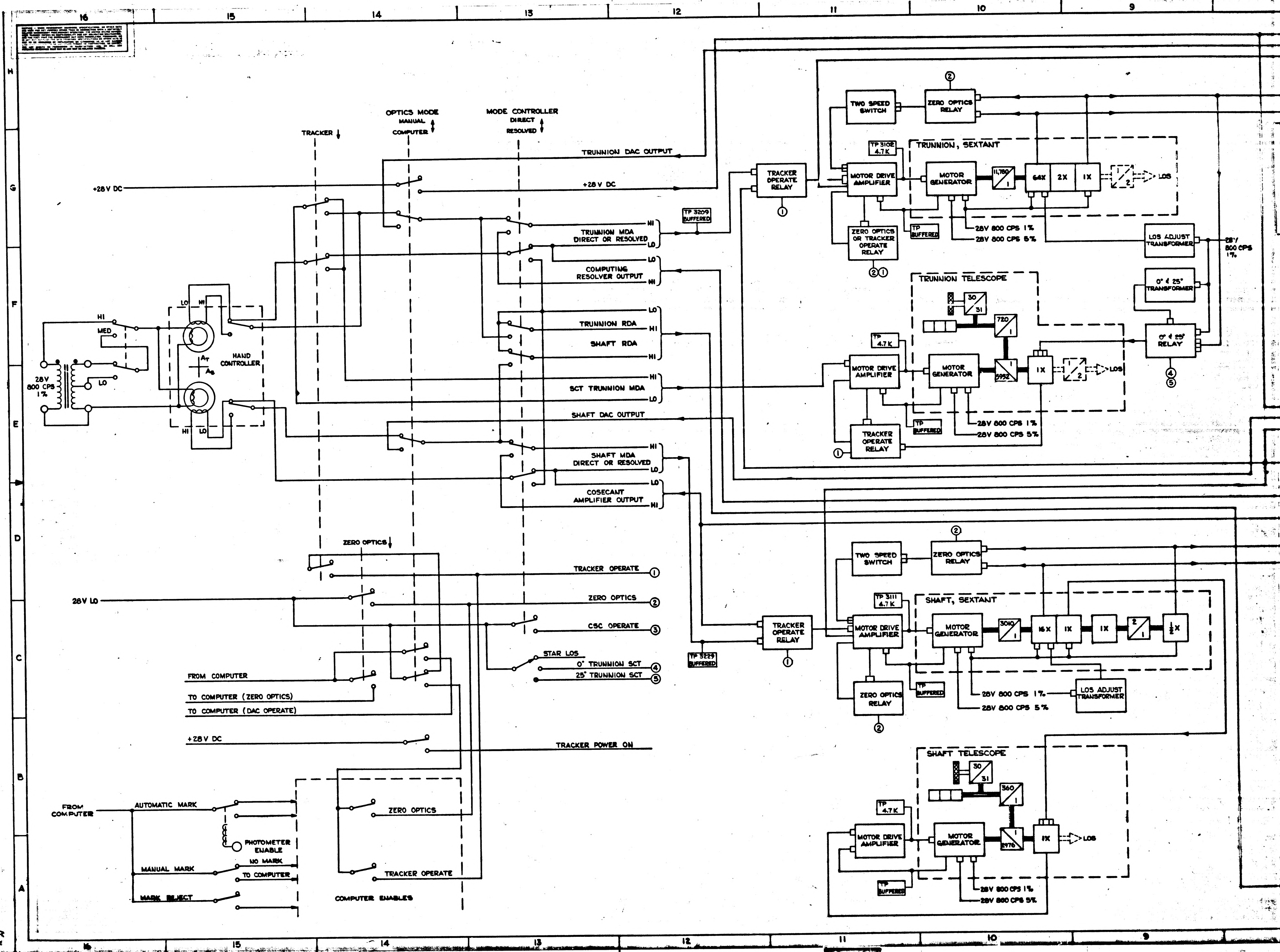

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OPTICS MODE
MANUAL
COMPUTER
MODE CONTROLLER
DIRECT
RESOLVED
TRACKER
+28V DC
TRUNNION DAC OUTPUT
+28 V DC
TRUNNION MDA DIRECT OR RESOLVED
HI
LO
TP 3209 BUFFERED
COMPUTING RESOLVER OUTPUT
TRUNNION RDA
SHAFT RDA
SCT TRUNNION MDA
SHAFT DAC OUTPUT
SHAFT MDA DIRECT OR RESOLVED
COSECANT AMPLIFIER OUTPUT
HI
MED
LO
28V 800 CPS 1%
A_T
A_S
HAND CONTROLLER
ZERO OPTICS
TRACKER OPERATE ①
28V LO
ZERO OPTICS ②
CSC OPERATE ③
STAR LOS
0° TRUNNION SCT ④
25° TRUNNION SCT ⑤
FROM COMPUTER
TO COMPUTER (ZERO OPTICS)
TO COMPUTER (DAC OPERATE)
+28V DC
TRACKER POWER ON
FROM COMPUTER
AUTOMATIC MARK
PHOTOMETER ENABLE
MANUAL MARK
NO MARK
TO COMPUTER
MARK REJECT
ZERO OPTICS
TRACKER OPERATE
COMPUTER ENABLES
TRACKER OPERATE RELAY
①
TWO SPEED SWITCH
ZERO OPTICS RELAY
②
TP 3102 4.7K
TRUNNION, SEXTANT
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
11,780/1
64X
2X
1X
1/2
LOS
TP BUFFERED
ZERO OPTICS OR TRACKER OPERATE RELAY
②①
28V 800 CPS 1%
28V 800 CPS 5%
LOS ADJUST TRANSFORMER
28V 800 CPS 1%
0° & 25° TRANSFORMER
0° & 25° RELAY
④
⑤
TRUNNION TELESCOPE
30/31
720/1
1/5952
1X
1/2
LOS
TP 4.7K
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%
TRACKER OPERATE RELAY
①
TWO SPEED SWITCH
ZERO OPTICS RELAY
②
TP 3111 4.7K
SHAFT, SEXTANT
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
3010/1
16X
1X
1X
2/1
½X
TRACKER OPERATE RELAY
①
TP 3229 BUFFERED
TP BUFFERED
ZERO OPTICS RELAY
②
28V 800 CPS 1%
28V 800 CPS 5%
LOS ADJUST TRANSFORMER
SHAFT TELESCOPE
30/31
360/1
1/2976
1X
LOS
TP 4.7K
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%

APOLLO G&N Specification
ATP 1009502 A
INITIAL REL 19950
JUNE 11, 1965

ASSEMBLY TEST PROCEDURE
FOR
THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM
BLOCK I SERIES 100

Date	Revision Letter	TDRR No.	Pages Revised	Approval	
				MIT	NASA
9-1-65	A	22217	9,10,12-14,25	WK	TM

This specification consists of pages i to iv and 1 to 25 inclusive.

3-3.11 SERVO CHARACTERISTICS.

3-3.11.1 MAXIMUM DRIVE RATES.

3-3.11.1.1 With the Optical Subsystem in the DIRECT mode and the OPTICS HAND CONTROLLER held at its limits, the maximum SXT LOS drive rates shall be as follows:

CONTROLLER SPEED switch position	Shaft Rate	Trunnion Rate
HI	17.0 degrees/sec ±20%	9.0 degrees/sec ±20%
MED	2.0 degrees/sec ±20%	1.0 degrees/sec ±20%
LOW	0.2 degrees/sec ±20%	0.1 degrees/sec ±20%

3-3.11.1.2 With the Optical Subsystem in the TRACKER mode and the OPTICS HAND CONTROLLER held at its limits, the maximum SCT LOS trunnion drive rate shall be as follows:

CONTROLLER SPEED switch position	SCT Trunnion Rate
HI	21 degrees/sec ±20%
MED	2.5 degrees/sec ±20%
LOW	0.25 degrees/sec ±20%

3-3.11.2 MINIMUM DRIVE RATES AND SMOOTHNESS. The minimum LOS drive rates shall be as follows:

SXT Shaft $\leq$ 50 arc seconds/second
SXT Trunnion $\leq$ 25 arc seconds/second
*SCT Trunnion $\leq$ 60 arc seconds/second
* With the Optical Subsystem in the TRACKER mode.

The variation in drive rate at the minimum drive rates shall be within ±25% of the nominal value for a constant command input.

3-3.11.3 DYNAMIC RESPONSE. With a step input of 10 volts the tachometer output of the SXT shaft tachometer and the SXT trunnion tachometer shall reach steady state in less than 0.5 seconds. The SCT shaft 1X resolver error, SCT trunnion 1X resolver error, SHAFT ANGLE CDU 16X resolver error, and 2X TRUNNION CDU 16X resolver error shall reach steady state in less than 2.5 seconds. With the Optical Subsystem in the TRACKER mode and a step input of 10 volts from the HAND CONTROLLER, the tachometer output of the SCT trunnion tachometer shall reach steady state in less than 0.5 seconds.

3-3.11.4 VELOCITY ERROR.

3-3.11.4.1 2X TRUNNION CDU. For a steady state rate command into the SXT trunnion MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.11.4.2 SHAFT ANGLE CDU. For a steady state rate command into the SXT shaft MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.11.4.3 SCT TRUNNION. For a steady state rate command into the SXT trunnion MDA of 3 deg/sec (LOS), the velocity error shall be less than 15 millivolts rms in phase at the SCT 1X resolver output (6.4 seconds of arc LOS).

3-3.11.4.4 SCT SHAFT. For a steady state rate command into the SXT shaft MDA of 3 deg/sec (LOS), the velocity error shall be less than 40 millivolts rms in phase at the SCT 1X resolver output (5.3 seconds of arc LOS).

3-3.12 TIME TO ZERO

3-3.12.1 The SXT shaft 1X resolver shall return to the zero position in 20 seconds or less from the 180° LOS position of the 1X resolver after the zero command is given. The SHAFT ANGLE CDU shall follow to zero in 20 seconds or less. The SCT shaft 1X resolver shall follow to zero in 20 seconds or less.

3-3.12.2 The SXT trunnion 1X resolver shall return to the zero position in 20 seconds or less from the 90° LOS position of the 1X resolver after the zero command is given. The 2X TRUNNION CDU shall follow to zero in 20 seconds or less. The SCT trunnion 1X resolver shall follow to zero in 20 seconds or less.

TABLE II

PULSES/BURST AT 3200 PPS	ENCODER OUTPUT PULSES PER 10 SECONDS	
	TRUNNION	SHAFT
4	120 (±60%)	109 (±40%)
16	546 (±30%)	501 (±30%)
64	2002 (±30%)	1729 (±30%)
256	5461 (±30%)	4369 (±30%)

3-3.16.2 DAC DRIFT. With the Optical Subsystem in the COMPUTER mode, and no input pulses applied to the DAC's, the CDU dial indications shall not change more than 0.04 deg/sec.

3-3.17 RESOLUTION. Resolution for the SXT and SCT on high contrast targets shall be as follows:

APPROXIMATE POSITION IN FIELD	RESOLUTION (SECONDS OF ARC)	
	SXT	SCT
Center	10	60
1/3 Field Radius	15	90
2/3 Field Radius	30	180

3-3.18 STAR TRACKER OPERATION

3-3.18.1 The STAR TRACKER shall be capable of meeting all test requirements while using a simulated star with an S-4 magnitude range of +1.0 to +2.0

3-3.18.2 The Tuning Fork frequencies shall be as follows:

X-axis Tuning Fork	455 (±1) cps
Y-axis Tuning Fork	356 (±1) cps

3-3.18.3 ERROR SIGNAL GRADIENTS

3-3.18.3.1 When a simulated star is moved between 0 and 2.0 arc minutes LOS along the "M" line in the field of view, the gradient of the X-axis error signal shall be 200 (-50%, +40%) volts/radian.

3-3.18.3.2 When a simulated star is moved between 0 and 2.0 arc minutes LOS along the "R" line in the field of view, the gradient of the Y-axis error signal shall be 200 (-50%, +40%) volts/radian.

3-3.18.4 CLOSED LOOP OPERATION

3-3.18.4.1 When a simulated star is offset 1.0 arc minute from the origin in the +M direction and subsequently offset 1.0 arc minute in the +R direction, the SXT trunnion and shaft tachometer outputs shall reach steady state within 0.5 seconds after starting closed-loop operation.

3-3.18.4.2 With a simulated star initially at the extreme edge of the tracker field of view, the SXT trunnion and shaft tachometer outputs shall reach steady state within 1.5 seconds after starting closed-loop operation.

3-3.18.5 The STAR TRACKER shall gate a Star Presence signal to the AGC when a simulated star is within the STAR TRACKER field of view.

3-3.18.5.1 The Star Presence signal pulse amplitude shall be 5 (±1) volts with respect to the amplitude reference. The pulses shall have the characteristics of paragraphs 3-3.13.1.2 through 3-3.13.1.6.

3-3.19 HORIZON PHOTOMETER OPERATION

3-3.19.1 The Tuning Fork frequency of the HORIZON PHOTOMETER shall be 550 (±1) cps.

3-3.19.2 The HORIZON PHOTOMETER shall supply a Horizon Half Peak signal to the AGC when the brightness of the simulated horizon is 50 (±10)% of its initial brightness. This requirement shall be demonstrated for values of initial light intensities between 4.75×10^{-4} and 9.5×10^{-4} watts/cm^2/steradian distributed between 3400 and 3600A°. The light intensity shall be decreased from its maximum value to 30% of its maximum value in less than 10 seconds.

4 TEST PROCEDURES

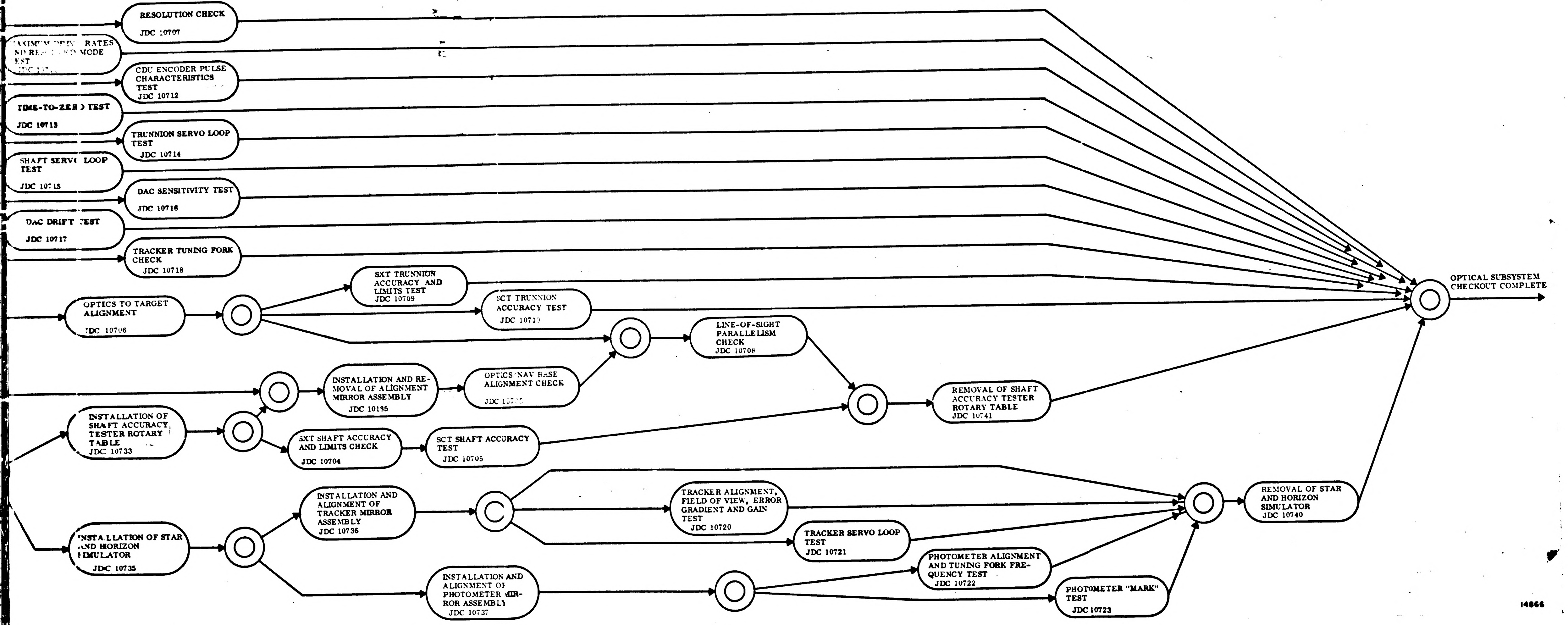
4-1 GENERAL. The examinations and test contained in this section are intended for execution on the Optical Subsystem.

4-2 TEST FAILURE. The failure of a subassembly to pass any examination or test of this section will automatically classify the unit as nonconforming.

4-3 JOB DESCRIPTION CARDS

4-3.1 REQUIRED JDC's. The following JDC's form a part of this Assembly Test Procedure (See Figure 4).

JDC 10701	Prefunctional Check
JDC 10702	Power Check
JDC 10703	Optics Nav Base Alignment Check
JDC 10704	SXT Shaft Accuracy and Limits Test
JDC 10705	SCT Shaft Accuracy Test
JDC 10706	Optics to Target Alignment
JDC 10707	Resolution Check
JDC 10708	Line-of-Sight Parallelism Check
JDC 10709	SXT Trunnion Accuracy and Limits Test
JDC 10710	SCT Trunnion Accuracy Test
JDC 10711	Maximum Drive Rates and Resolved Mode Test
JDC 10712	CDU Encoder Pulse Characteristics Test
JDC 10713	Time-to-Zero Test
JDC 10714	Trunnion Servo Loop Test
JDC 10715	Shaft Servo Loop Test
JDC 10716	DAC Sensitivity Test
JDC 10717	DAC Drift Test
JDC 10718	Tracker Tuning Fork Check
JDC 10720	Tracker Alignment, Field of View, Error Gradient and Gain Control Test


RESOLUTION CHECK
JDC 10707
AXIMUM DRIV RATES
ND RES MODE
EST
CDU ENCODER PULSE CHARACTERISTICS TEST
JDC 10712
TIME-TO-ZERO TEST
JDC 10713
TRUNNION SERVO LOOP TEST
JDC 10714
SHAFT SERVO LOOP TEST
JDC 10715
DAC SENSITIVITY TEST
JDC 10716
DAC DRIFT TEST
JDC 10717
TRACKER TUNING FORK CHECK
JDC 10718
SXT TRUNNION ACCURACY AND LIMITS TEST
JDC 10709
SCT TRUNNION ACCURACY TEST
JDC 1071
OPTICS TO TARGET ALIGNMENT
JDC 10706
LINE-OF-SIGHT PARALLELISM CHECK
JDC 10708
INSTALLATION AND REMOVAL OF ALIGNMENT MIRROR ASSEMBLY
JDC 10185
OPTICS/NAV BASE ALIGNMENT CHECK
JDC 107
INSTALLATION OF SHAFT ACCURACY, TESTER ROTARY TABLE
JDC 10733
SXT SHAFT ACCURACY AND LIMITS CHECK
JDC 10704
SCT SHAFT ACCURACY TEST
JDC 10705
REMOVAL OF SHAFT ACCURACY TESTER ROTARY TABLE
JDC 10741
OPTICAL SUBSYSTEM CHECKOUT COMPLETE
INSTALLATION AND ALIGNMENT OF TRACKER MIRROR ASSEMBLY
JDC 10736
TRACKER ALIGNMENT, FIELD OF VIEW, ERROR GRADIENT AND GAIN TEST
JDC 10720
TRACKER SERVO LOOP TEST
JDC 10721
REMOVAL OF STAR AND HORIZON SIMULATOR
JDC 10740
INSTALLATION OF STAR AND HORIZON SIMULATOR
JDC 10735
INSTALLATION AND ALIGNMENT OF PHOTOMETER MIRROR ASSEMBLY
JDC 10737
PHOTOMETER ALIGNMENT AND TUNING FORK FREQUENCY TEST
JDC 10722
PHOTOMETER "MARK" TEST
JDC 10723

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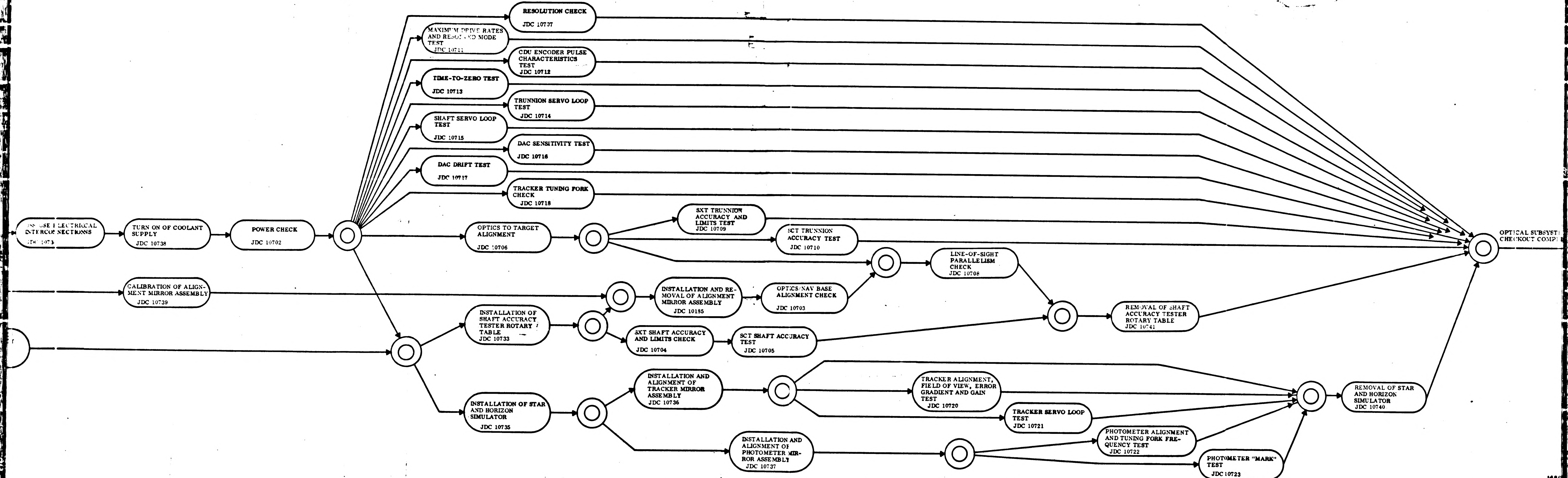
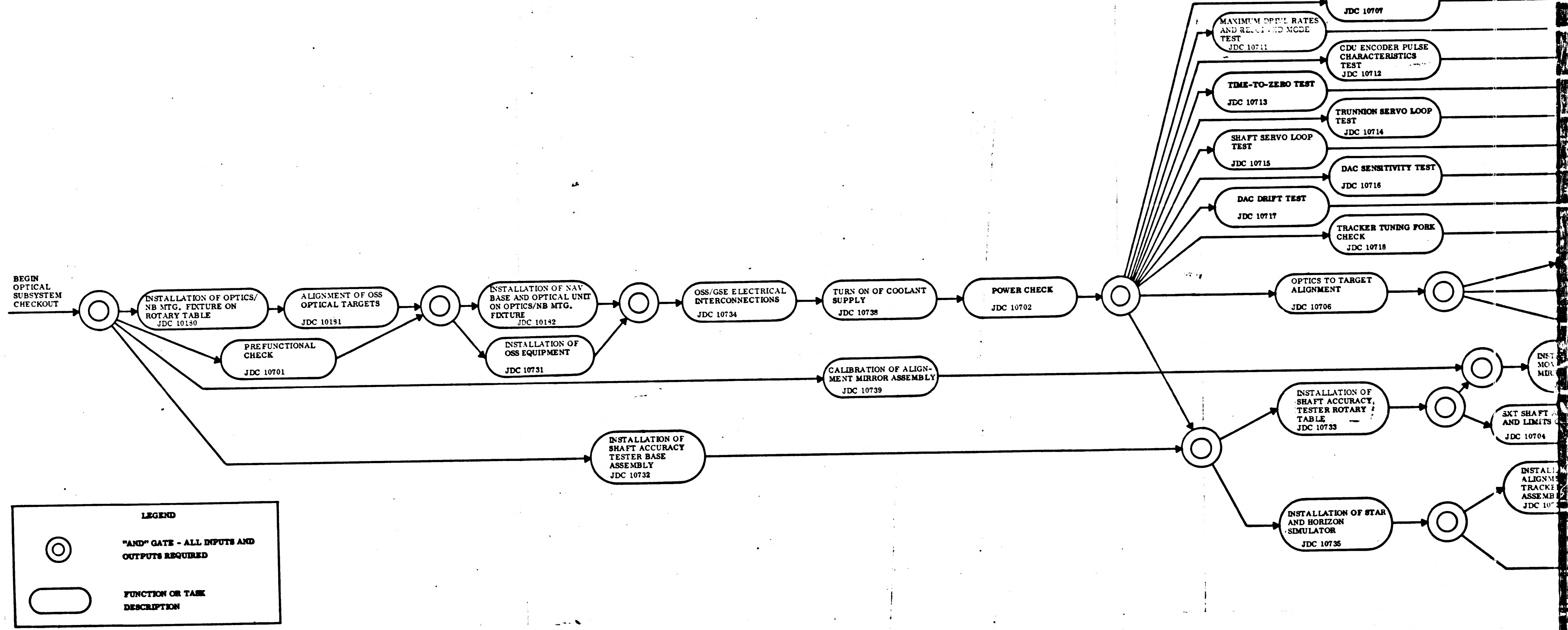
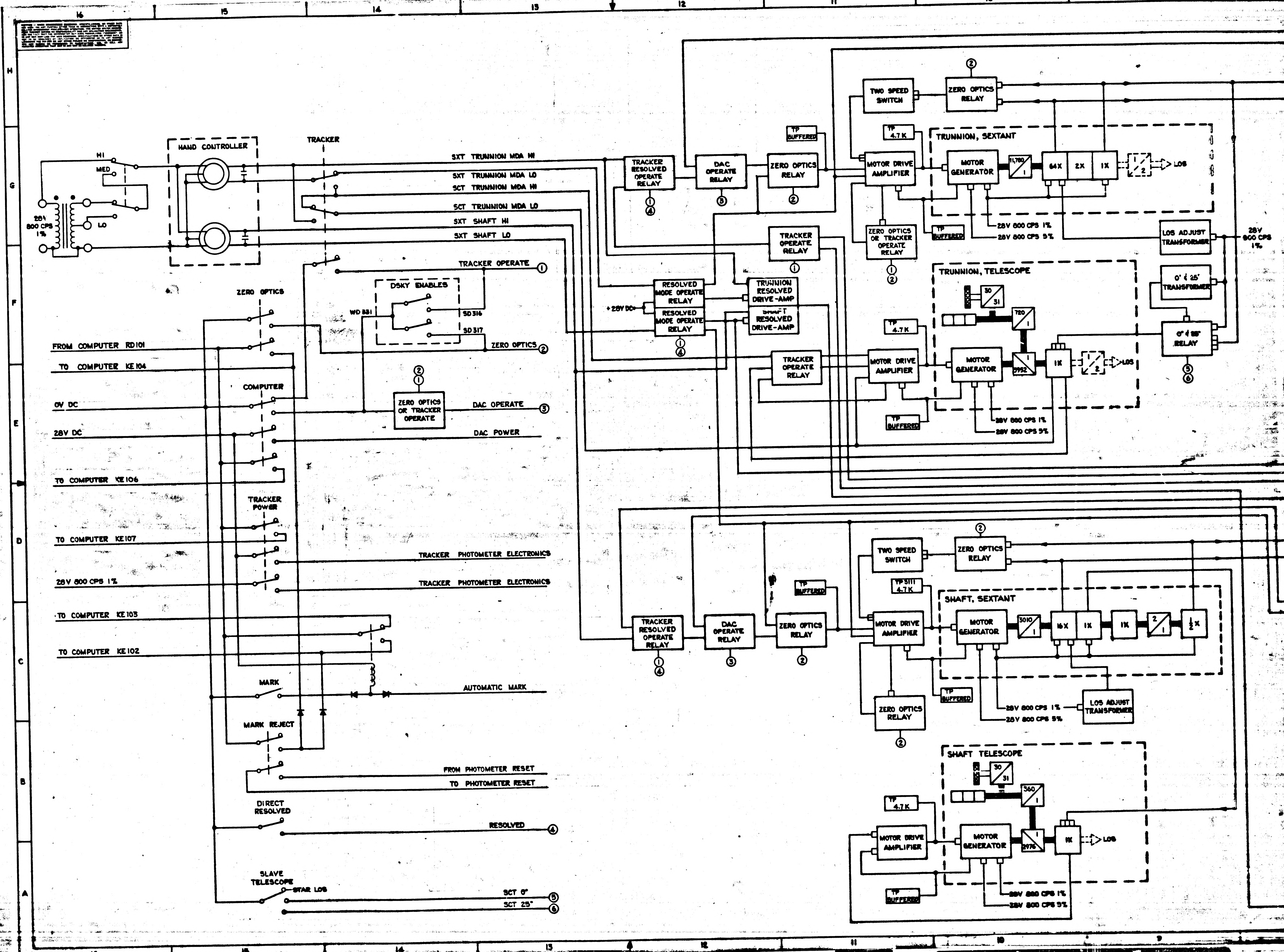

USE ELECTRICAL INTERCONNECTIONS
JDC 1073
TURN ON OF COOLANT SUPPLY
JDC 10738
POWER CHECK
JDC 10702
RESOLUTION CHECK
JDC 10737
MAXIMUM DRIVE RATES AND RESOLVED MODE TEST
JDC 10711
CDU ENCODER PULSE CHARACTERISTICS TEST
JDC 10712
TIME-TO-ZERO TEST
JDC 10713
TRUNNION SERVO LOOP TEST
JDC 10714
SHAFT SERVO LOOP TEST
JDC 10715
DAC SENSITIVITY TEST
JDC 10716
DAC DRIFT TEST
JDC 10717
TRACKER TUNING FORK CHECK
JDC 10718
OPTICS TO TARGET ALIGNMENT
JDC 10706
SXT TRUNNION ACCURACY AND LIMITS TEST
JDC 10709
SCT TRUNNION ACCURACY TEST
JDC 10710
LINE-OF-SIGHT PARALLELISM CHECK
JDC 10708
CALIBRATION OF ALIGNMENT MIRROR ASSEMBLY
JDC 10739
INSTALLATION AND REMOVAL OF ALIGNMENT MIRROR ASSEMBLY
JDC 10185
OPTICS/NAV BASE ALIGNMENT CHECK
JDC 10703
INSTALLATION OF SHAFT ACCURACY TESTER ROTARY TABLE
JDC 10733
SXT SHAFT ACCURACY AND LIMITS CHECK
JDC 10704
SCT SHAFT ACCURACY TEST
JDC 10705
REMOVAL OF SHAFT ACCURACY TESTER ROTARY TABLE
JDC 10741
INSTALLATION OF STAR AND HORIZON SIMULATOR
JDC 10735
INSTALLATION AND ALIGNMENT OF TRACKER MIRROR ASSEMBLY
JDC 10736
TRACKER ALIGNMENT, FIELD OF VIEW, ERROR GRADIENT AND GAIN TEST
JDC 10720
TRACKER SERVO LOOP TEST
JDC 10721
INSTALLATION AND ALIGNMENT OF PHOTOMETER MIRROR ASSEMBLY
JDC 10737
PHOTOMETER ALIGNMENT AND TUNING FORK FREQUENCY TEST
JDC 10722
PHOTOMETER "MARK" TEST
JDC 10723
REMOVAL OF STAR AND HORIZON SIMULATOR
JDC 10740
OPTICAL SUBSYST
CHECKOUT COMP

2/ATP100950 2

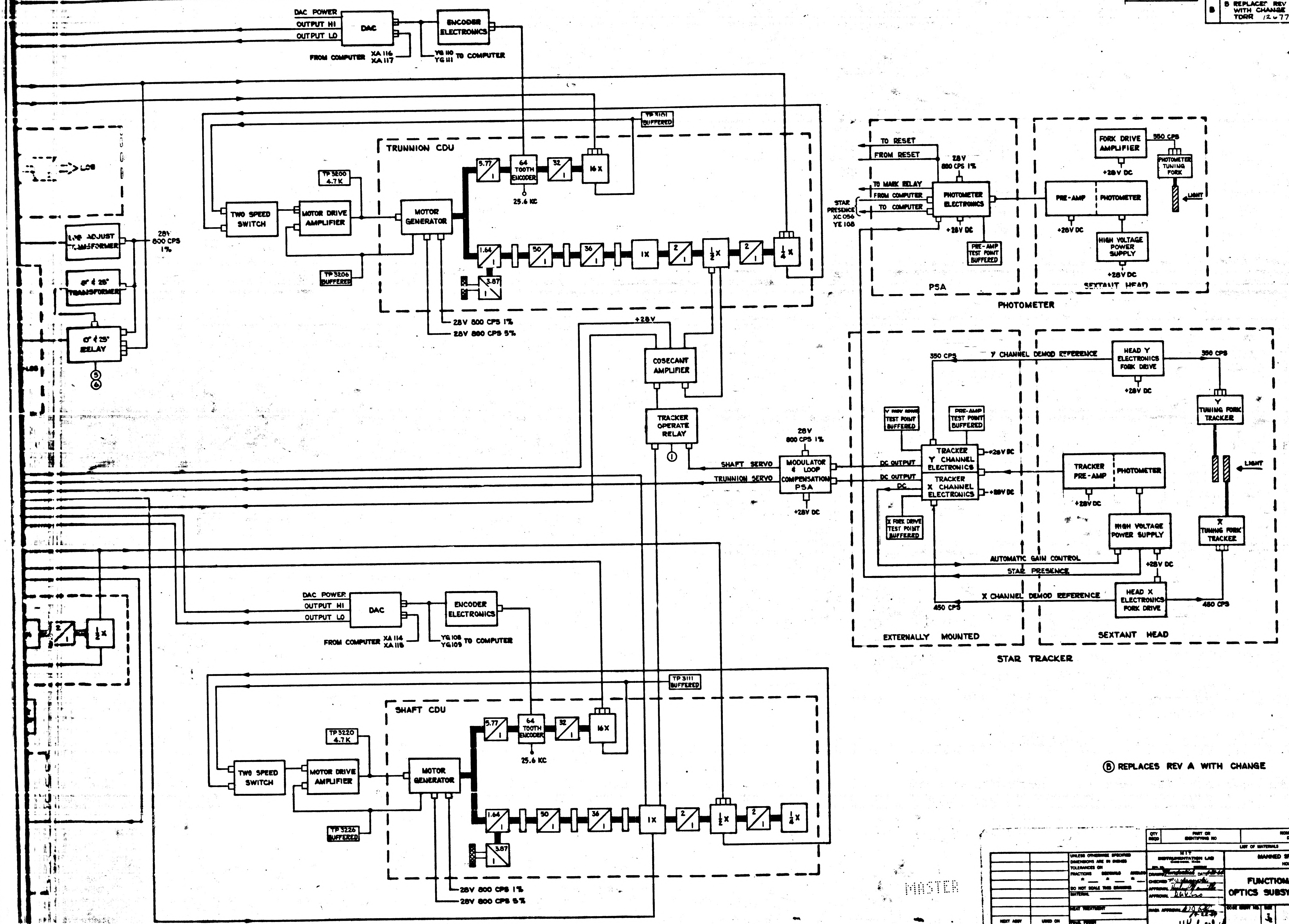

BEGIN OPTICAL SUBSYSTEM CHECKOUT
INSTALLATION OF OPTICS/NB MTG. FIXTURE ON ROTARY TABLE JDC 10130
ALIGNMENT OF OSS OPTICAL TARGETS JDC 10131
PREFUNCTIONAL CHECK JDC 10701
INSTALLATION OF NAV BASE AND OPTICAL UNIT ON OPTICS/NB MTG. FIXTURE JDC 10132
INSTALLATION OF OSS EQUIPMENT JDC 10731
OSS/GSE ELECTRICAL INTERCONNECTIONS JDC 10734
TURN ON OF COOLANT SUPPLY JDC 10738
POWER CHECK JDC 10702
RESOLUTION CHECK JDC 10707
MAXIMUM DRIVE RATES AND RE[illegible] MODE TEST JDC 10711
CDU ENCODER PULSE CHARACTERISTICS TEST JDC 10712
TIME-TO-ZERO TEST JDC 10713
TRUNNION SERVO LOOP TEST JDC 10714
SHAFT SERVO LOOP TEST JDC 10715
DAC SENSITIVITY TEST JDC 10716
DAC DRIFT TEST JDC 10717
TRACKER TUNING FORK CHECK JDC 10718
OPTICS TO TARGET ALIGNMENT JDC 10706
CALIBRATION OF ALIGNMENT MIRROR ASSEMBLY JDC 10739
INST MOV MIR
INSTALLATION OF SHAFT ACCURACY TESTER BASE ASSEMBLY JDC 10732
INSTALLATION OF SHAFT ACCURACY TESTER ROTARY TABLE JDC 10733
SXT SHAFT AND LIMITS JDC 10704
INSTALLATION OF STAR AND HORIZON SIMULATOR JDC 10735
INSTALL ALIGNM TRACKE ASSEMB JDC 10
LEGEND
"AND" GATE - ALL INPUTS AND OUTPUTS REQUIRED
FUNCTION OR TASK DESCRIPTION

1/ATP1009502


16
15
14
13
12
11
10
9
H
G
F
E
D
C
B
A
HI
MED
LO
28V
800 CPS
1%
HAND CONTROLLER
TRACKER
SXT TRUNNION MDA HI
SXT TRUNNION MDA LO
SCT TRUNNION MDA HI
SCT TRUNNION MDA LO
SXT SHAFT HI
SXT SHAFT LO
TRACKER OPERATE ①
DSKY ENABLES
WD 331
SD 316
SD 317
ZERO OPTICS
FROM COMPUTER RD101
TO COMPUTER KE104
ZERO OPTICS ②
COMPUTER
② ①
ZERO OPTICS OR TRACKER OPERATE
0V DC
DAC OPERATE ③
28V DC
DAC POWER
TO COMPUTER KE106
TRACKER POWER
TO COMPUTER KE107
TRACKER PHOTOMETER ELECTRONICS
28V 800 CPS 1%
TRACKER PHOTOMETER ELECTRONICS
TO COMPUTER KE103
TO COMPUTER KE102
MARK
AUTOMATIC MARK
MARK REJECT
FROM PHOTOMETER RESET
TO PHOTOMETER RESET
DIRECT RESOLVED
RESOLVED ④
SLAVE TELESCOPE
STAR LOS
SCT 0° ⑤
SCT 25° ⑥
TRACKER RESOLVED OPERATE RELAY
① ④
DAC OPERATE RELAY
③
ZERO OPTICS RELAY
②
TP BUFFERED
TP 4.7 K
TWO SPEED SWITCH
② ZERO OPTICS RELAY
MOTOR DRIVE AMPLIFIER
TRUNNION, SEXTANT
MOTOR GENERATOR
11,760 / 1
64X
2X
1X
1 / 2
LOS
ZERO OPTICS OR TRACKER OPERATE RELAY
① ②
28V 800 CPS 1%
28V 800 CPS 5%
LOS ADJUST TRANSFORMER
28V 800 CPS 1%
TRACKER OPERATE RELAY
①
+28V DC
RESOLVED MODE OPERATE RELAY
RESOLVED MODE OPERATE RELAY
① ④
TRUNNION RESOLVED DRIVE-AMP
SHAFT RESOLVED DRIVE-AMP
TRUNNION, TELESCOPE
30 / 31
720 / 1
1 / 3952
1X
2
LOS
0° & 25° TRANSFORMER
0° & 25° RELAY
⑤ ⑥
TRACKER OPERATE RELAY
TP 4.7 K
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%
TRACKER RESOLVED OPERATE RELAY
① ④
DAC OPERATE RELAY
③
ZERO OPTICS RELAY
②
TP BUFFERED
TP 5111 4.7 K
TWO SPEED SWITCH
② ZERO OPTICS RELAY
MOTOR DRIVE AMPLIFIER
SHAFT, SEXTANT
MOTOR GENERATOR
3010 / 1
16X
1X
1X
2 / 1
½X
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%
LOS ADJUST TRANSFORMER
ZERO OPTICS RELAY
②
SHAFT TELESCOPE
30 / 31
360 / 1
TP 4.7 K
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
1 / 2976
1X
LOS
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
B	B REPLACES REV A WITH CHANGE PER TDRR 12677	18 SEPT 64	

1009502 B



DAC POWER
OUTPUT HI
OUTPUT LO
DAC
ENCODER ELECTRONICS
FROM COMPUTER XA 116 XA 117
YG 110 YG 111 TO COMPUTER
TP 3101 BUFFERED
TRUNNION CDU
5.77/1
64 TOOTH ENCODER
32/1
16 X
25.6 KC
TP 3200 4.7 K
TWO SPEED SWITCH
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
1.64/1
50/1
36/1
1X
2/1
½X
2/1
¼X
3.87/1
TP 3206 BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%
LOS
LOS ADJUST TRANSFORMER
28V 800 CPS 1%
0° & 25° TRANSFORMER
0° & 25° RELAY
⑤
⑥
LOS
+28V
COSECANT AMPLIFIER
TRACKER OPERATE RELAY
①
SHAFT SERVO
TRUNNION SERVO
28V 800 CPS 1%
MODULATOR & LOOP COMPENSATION PSA
+28V DC
TO RESET
FROM RESET
28V 800 CPS 1%
TO MARK RELAY
FROM COMPUTER
TO COMPUTER
STAR PRESENCE XC 056 YE 108
PHOTOMETER ELECTRONICS
+28V DC
PRE-AMP TEST POINT BUFFERED
PSA
FORK DRIVE AMPLIFIER
350 CPS
PHOTOMETER TUNING FORK
+28V DC
PRE-AMP
PHOTOMETER
LIGHT
+28V DC
HIGH VOLTAGE POWER SUPPLY
+28V DC
SEXTANT HEAD
PHOTOMETER
350 CPS
Y CHANNEL DEMOD REFERENCE
HEAD Y ELECTRONICS FORK DRIVE
350 CPS
+28V DC
Y TUNING FORK TRACKER
Y FORK DRIVE TEST POINT BUFFERED
PRE-AMP TEST POINT BUFFERED
TRACKER Y CHANNEL ELECTRONICS
+28V DC
DC OUTPUT
DC OUTPUT
DC
TRACKER X CHANNEL ELECTRONICS
+28V DC
TRACKER PRE-AMP
PHOTOMETER
LIGHT
+28V DC
X FORK DRIVE TEST POINT BUFFERED
HIGH VOLTAGE POWER SUPPLY
X TUNING FORK TRACKER
AUTOMATIC GAIN CONTROL
STAR PRESENCE
+28V DC
X CHANNEL DEMOD REFERENCE
HEAD X ELECTRONICS FORK DRIVE
450 CPS
450 CPS
EXTERNALLY MOUNTED
SEXTANT HEAD
STAR TRACKER
2/1
½X
DAC POWER
OUTPUT HI
OUTPUT LO
DAC
ENCODER ELECTRONICS
FROM COMPUTER XA 114 XA 115
YG 108 YG 109 TO COMPUTER
TP 3111 BUFFERED
SHAFT CDU
5.77/1
64 TOOTH ENCODER
32/1
16X
25.6 KC
TP 3220 4.7 K
TWO SPEED SWITCH
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
1.64/1
50/1
36/1
1X
2/1
½X
2/1
¼X
3.87/1
TP 3226 BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%

Ⓑ REPLACES REV A WITH CHANGE

MASTER

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FUNCTIONAL DIAGRAM
OPTICS SUBSYSTEM BLOCK I-100

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1009502
SCALE | WT

APOLLO G&N Specification
ATP 1009502 B
INITIAL REL 19950
JUNE 11, 1965

ASSEMBLY TEST PROCEDURE

FOR

THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM

BLOCK I SERIES 100

Date	Revision Letter	TDRR No.	Pages Revised	Approval	
				MIT	NASA
9-1-65	A	22217	9, 10, 12-14, 25	WK	TM
9-16-65	B	22528	3, 4, 6, 10	MGM	TM

This specification consists of pages i to iv and 1 to 25 inclusive.

3-2 TEST CONDITIONS

3-2.1 ENVIRONMENTAL. The Optical Subsystem shall be tested under clean room conditions as defined in paragraph 5-5.

3-2.2 ELECTRICAL. The electrical power listed below shall be provided to the Optical Subsystem.

3-2.2.1 28 (+2, -3) VDC 140 watts

3-2.2.2 115 (±11.5) volts, 400 cps (±10%), 30 watts

3-2.3 DETAILED TEST EQUIPMENT. The test equipment listed below is required to test the Optical Subsystem.

3-2.3.1	One (1) Optical-Inertial Test Set	1902300-011
3-2.3.2	One (1) Rotary Table	1900926-011
3-2.3.3	One (1) Optics/N.B. Mtg. Fixture	1902301-011
3-2.3.4	One (1) G&N Mounting Fixture	1902204-011
3-2.3.5	One (1) GSE-PSA Junction Box	1902195-011
3-2.3.6	One (1) Drawer Assembly Apollo Computer Simulator	1014061
3-2.3.7	One (1) Alignment Mirror Assembly	1016951
3-2.3.8	One (1) Shaft Accuracy Tester	1019769
3-2.3.9	One (1) 0° Autocollimator Assembly	1017380
3-2.3.10	One (1) Remote Optics Controller Assembly	1902046-011
3-2.3.11	One (1) Filling and Purging Fixture	1902371-011
3-2.3.12	One (1) Hose, Coolant, Interconnect Male-Female	1900866-031
3-2.3.13	One (1) Hose, Coolant, Interconnect Male-Female	1900866-041
3-2.3.14	One (1) Retroreflecting Prism	1019840
3-2.3.15	One (1) Vertical Leveling Mirror	1017445
3-2.3.16	One (1) Portable Light Assembly	1019837
3-2.3.17	One (1) Star and Horizon Simulator	1019977
3-2.3.18	One (1) Electronic Level	1901328
3-2.3.19	One (1) Theodolite	1017444
3-2.3.20	One (1) Alignment Certification Fixture	1017387

3-2.3.21	One (1) Star and Horizon Simulator Certification Fixture	1019970
3-2.3.22	One (1) G & N Fixture Stand	1019926
3-2.3.23	One (1) Theodolite Base Assembly	1022831
3-2.3.24	One (1) Alignment Tool	1900155

3-2.4 TEST EQUIPMENT CALIBRATION. Commercial test equipment shall be calibrated according to the applicable calibration specification. Special test equipment shall be calibrated according to applicable design or manufacturing specifications. The Rotary Table shall be calibrated per JDC 19727 or JDC 19729.

3-2.5 TEST SET-UP. See paragraphs 5-1 through 5-4.

3-2.6 INTERFACE

3-2.6.1 LOADING. The AGC inputs listed below must be provided with either Computer Simulator loads or the simulated loads as listed herein.

AGC INPUT	SIMULATOR LOAD CHARACTERISTICS
Trunnion Encoder +	200 ± 20 OHMS, 1 Watt resistive
Trunnion Encoder -	200 ± 20 OHMS, 1 Watt resistive
Shaft Encoder +	200 ± 20 OHMS, 1 Watt resistive
Shaft Encoder -	200 ± 20 OHMS, 1 Watt resistive

3-2.6.2 GUIDANCE REFERENCE CLOCK SIMULATION. Each of the Optical Subsystem power supplies shall be supplied by simulations of the Guidance Reference Clock synchronized pulses as specified below.

3-2.6.2.1 Output Impedance - 200 ± 10 OHMS

3-2.6.2.2 Pulse Amplitude - 5.0 ± 0.5 volts p-p

3-2.6.2.3 Rise Time - (10% - 90%) - 0.2 μ secs. max.

3-2.6.2.4 Frequency -
25.6 KCPS ± 2PPM - Encoder Excitation supply only
800 cps ± 2 PPM - 28 volts 1% and 5% supplies only

3-2.6.2.5 Pulse Width -
25.6 KCPS - 3.0 ± 0.5 μ sec.
800 cps - 3.0 ± 0.5 μ sec.

3-2.8.4 To round off a number to n decimal places, discard all digits to the right of the nth place, and if this discarded number is

(a) greater than half a unit in the nth place, increase the digit in that place by 1;

(b) less than or equal to half a unit in the nth place, leave the digit in that place unaltered.

3-2.8.5 All data generated while performing the requirements of this document shall be recorded and forwarded with the tested subsystem to the next receiving agency.

3-3 OPERATING CHARACTERISTICS

3-3.1 POWER. The following power shall be available within the Optical Subsystem.

VOLTS	FREQ (cps)	SYNC (%)
2.5 (±0.125) rms	25.6 K	±0.1
28 (±0.28)	800	±0.1
28 (±1.40)	800	±0.1
28 (+2, -3)	dc	
5.15 (±0.45)	400	±10

The phase shift of the 28 (±1.40) - volt supply shall be -90 (±5)° with respect to the 28 (±0.28) - volt supply.

The Optical Subsystem shall be capable of meeting all test requirements within the range of operation indicated above.

3-3.2 ZERO OPTICS

3-3.2.1 With the Optical Subsystem set to the ZERO OPTICS mode, the 2X TRUNNION CDU dials shall indicate 000.000 (±.006).

3-3.2.2 With the Optical Subsystem set to the ZERO OPTICS mode, the SHAFT ANGLE CDU dials shall indicate 000.000 (±.003).

3-3.11.3 DYNAMIC RESPONSE. With a step input of 10 volts the tachometer output of the SXT shaft tachometer and the SXT trunnion tachometer shall reach steady state in less than 0.5 seconds. The SCT shaft 1X resolver error, SCT trunnion 1X resolver error, SHAFT ANGLE CDU 16X resolver error, and 2X TRUNNION CDU 16X resolver error shall reach steady state in less than 2.5 seconds. With the Optical Subsystem in the TRACKER mode and a step input of 10 volts from the HAND CONTROLLER, the tachometer output of the SCT trunnion tachometer shall reach steady state in less than 0.5 seconds.

3-3.11.4 VELOCITY ERROR.

3-3.11.4.1 2X TRUNNION CDU. For a steady state rate command into the SXT trunnion MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.11.4.2 SHAFT ANGLE CDU. For a steady state rate command into the SXT shaft MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.11.4.3 SCT TRUNNION. For a steady state rate command into the SXT trunnion MDA of 3 deg/sec (LOS), the velocity error shall be less than 15 millivolts rms in phase at the SCT 1X resolver output (6.4 minutes of arc LOS).

3-3.11.4.4 SCT SHAFT. For a steady state rate command into the SXT shaft MDA of 3 deg/sec (LOS), the velocity error shall be less than 40 millivolts rms in phase at the SCT 1X resolver output (5.3 minutes of arc LOS).

3-3.12 TIME TO ZERO

3-3.12.1 The SXT shaft 1X resolver shall return to the zero position in 20 seconds or less from the 180° LOS position of the 1X resolver after the zero command is given. The SHAFT ANGLE CDU shall follow to zero in 20 seconds or less. The SCT shaft 1X resolver shall follow to zero in 20 seconds or less.

3-3.12.2 The SXT trunnion 1X resolver shall return to the zero position in 20 seconds or less from the 90° LOS position of the 1X resolver after the zero command is given. The 2X TRUNNION CDU shall follow to zero in 20 seconds or less. The SCT trunnion 1X resolver shall follow to zero in 20 seconds or less.

APOLLO G&N Specification
ATP 1009502 C
INITIAL REL 19950
JUNE 11, 1965

ASSEMBLY TEST PROCEDURE
FOR
THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM
BLOCK I SERIES 100

Date	Revision Letter	TDRR No.	Pages Revised	Approval	
				MIT	NASA
9-1-65	A	22217	9, 10, 12-14, 25	WK	TM
9-16-65	B	22528	3, 4, 6, 10	MGM	TM
11-30-65	C	24401	1, 12	WK	--

This specification consists of pages i to iv and 1 to 25 inclusive.

TABLE II

PULSES/BURST AT 3200 PPS	ENCODER OUTPUT PULSES PER 10 SECONDS	
	TRUNNION	SHAFT
4	120 (±60%)	109 (±40%)
16	546 (±30%)	501 (±30%)
64	2002 (±30%)	1729 (±30%)
256	5461 (±30%)	4369 (±30%)

3-3.16.2 DAC DRIFT. With the Optical Subsystem in the COMPUTER mode, and no input pulses applied to the DAC's, the 2X TRUNNION CDU dial indication shall not change more than 0.064 deg/sec, and the SHAFT ANGLE CDU dial indication shall not change more than 0.105 deg/sec.

3-3.17 RESOLUTION. Resolution for the SXT and SCT on high contrast targets shall be as follows:

APPROXIMATE POSITION IN FIELD	RESOLUTION (SECONDS OF ARC)	
	SXT	SCT
Center	10	60
1/3 Field Radius	15	90
2/3 Field Radius	30	180

3-3.18 STAR TRACKER OPERATION

3-3.18.1 The STAR TRACKER shall be capable of meeting all test requirements while using a simulated star with an S-4 magnitude range of +1.0 to +2.0

3-3.18.2 The Tuning Fork frequencies shall be as follows:

X-axis Tuning Fork	455 (±1) cps
Y-axis Tuning Fork	356 (±1) cps

3-3.18.3 ERROR SIGNAL GRADIENTS

3-3.18.3.1 When a simulated star is moved between 0 and 2.0 arc minutes LOS along the "M" line in the field of view, the gradient of the X-axis error signal shall be 200 (-50%, +40%) volts/radian.

APOLLO G&N Specification
ATP 1009502 D
INITIAL REL 19950
JUNE 11, 1965

ASSEMBLY TEST PROCEDURE

FOR

THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM

BLOCK I SERIES 100

Date	Revision Letter	TDRR No.	Pages Revised	Approval	
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9-16-65	B	22528	3, 4, 6, 10	MGM	TM
11-30-65	C	24401	1, 12	WK	--
3-10-66	D	27032	1-25 Now 18 pages was 25 pages	WK	TM

This specification consists of pages i to iv and 1 to 18 inclusive.

APOLLO G&N Specification
ATP 1009502

ASSEMBLY TEST PROCEDURE FOR
THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM
BLOCK I SERIES 100

This document has been prepared for the purpose of presenting the assembly testing requirements of the Optical Subsystem of the APOLLO Guidance and Navigation System.

M.G. Murley 11 June '65
MIT/IL DATE

W J Rhine 6-11-65
NASA/MSC DATE

APOLLO G&N Specification
ATP 1009502

ASSEMBLY TEST PROCEDURES
FOR
THE APOLLO G&N SYSTEM BLOCK I SERIES 100 OPTICAL SUBSYSTEM

TABLE OF CONTENTS

SECTION	TITLE	PAGE
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2	Assembly Requirements	2
3	Test Requirements	2
4	Test Procedures	14
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ASSEMBLY TEST PROCEDURE

FOR

APOLLO G&N SYSTEM BLOCK I SERIES 100 OPTICAL SUBSYSTEM

1 INTRODUCTION

1-1 SCOPE. This specification establishes the requirements and procedures for the assembly test of the Block I Series 100 Optical Subsystem. The Optical Subsystem will be used in the Apollo G&N System (ND1015000)..

1-2 COMPONENTS. The Block I Series 100 Optical Subsystem shall consist of each of the following assemblies:

1-2.1	One (1) Navigation Base and Optical Unit Assembly (P/N per NASA Dwg 1015000, G&N Spacecraft Equipment, Command Module Block I Series 100)	
1-2.2	Two (2) CDU Assembly	1015500-031
1-2.3	One (1) G&N Indicator Control Panel Assembly	1014664-011
1-2.4	One (1) Power Supply Electronics Assembly Tray 2	1007572-011
1-2.5	One (1) CDU & Power Supply Electronics Assembly Tray 6	1007576-011
1-2.6	One (1) Miscellaneous Electronics Assembly Tray 7	1007577-011
1-2.7	One (1) Optical Electronics Assembly Tray 8	1007578-011
1-2.8	One (1) Optical Electronics Assembly Tray 9	1007579-011
1-2.9	One (1) Pwr. Diodes & Signal Cond. Electronics Assembly Tray 10	1007580-011
1-2.10	One (1) AGE Harness and PSA End Connector Assembly (or substitute GSE equipment for test purposes)	1015086-011
1-2.11	One (1) D and C Electronics Assembly	1015065-021
1-2.12	One (1) Control Electronics Assembly	1015064-021

1-3 PRECAUTIONS.

Damage may be done to the STAR TRACKER photomultiplier tube if it is exposed to ambient light. Assure that the LIGHT EXPOSURE PLUG is removed only as directed during testing.

1-4 APPLICABLE DOCUMENTS. The following documents are for reference only.

1-4.1	Functional Diagram - Optical Subsystem Block I Series 100	1009502
1-4.2	Optical Inertial Analyzer	1901976-011
1-4.3	Zero Optics Mode	1009513
1-4.4	Shaft Manual Mode	1009514
1-4.5	Trunnion Manual Mode	1009515
1-4.6	Sextant Optics Resolved Mode	1009516
1-4.7	Optical Subsystem Power Distribution	1009517
1-4.8	Interface Control Document	MH01-01249-416

2 ASSEMBLY REQUIREMENTS. Not Applicable.

3 TEST REQUIREMENTS

3-1 PRIOR COMPLIANCE. Components listed in paragraph 1-2 shall have successfully completed assembly level testing prior to subjecting the Optical Subsystem to the requirements of this document.

3-2 TEST CONDITIONS

3-2.1 ENVIRONMENTAL. The Optical Subsystem shall be tested under clean room conditions as defined in paragraph 5-5.

3-2.2 ELECTRICAL. The electrical power listed below shall be provided to the Optical Subsystem.

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3-2.5 TEST SET-UP. See paragraphs 5-1 through 5-4.

3-2.6 INTERFACE

3-2.6.1 LOADING. The AGC inputs listed below must be provided with either Computer Simulator loads or the simulated loads as listed herein.

AGC INPUT	SIMULATOR LOAD CHARACTERISTICS
Trunnion Encoder +	200±20 OHMS, 1 Watt resistive
Trunnion Encoder -	200±20 OHMS, 1 Watt resistive
Shaft Encoder +	200±20 OHMS, 1 Watt resistive
Shaft Encoder -	200±20 OHMS, 1 Watt resistive

3-2.6.2 GUIDANCE REFERENCE CLOCK SIMULATION. Each of the Optical Subsystem power supplies shall be supplied by simulations of the Guidance Reference Clock synchronized pulses as specified below.

3-2.6.2.1 Output Impedance - 200±10 ohms

3-2.6.2.2 Pulse Amplitude - 5.0±0.5 volts p-p

3-2.6.2.3 Rise Time - (10% - 90%) - 0.2 μsec. max.

3-2.6.2.4 Frequency -
25.6 kc ±2ppm - Encoder Excitation supply only
800 cps ±2 ppm - 28 volts 1% and 5% supplies only

3-2.6.2.5 Pulse Width -
25.6 kc - 3.0±0.5μsec.
800 cps - 3.0±0.5 μsec.

3-2.6.3 THERMAL INTERFACE. No Coolant shall be used in the Optical Unit Assembly during Optical Subsystem testing. The coolant to the Power and Servo Assembly Coldplate shall have an inlet temperature of 64 (±5)°F and a flow rate of 120 (±10) lb/hr. The coolant composition shall be as specified in Interface Control Document MH01-01249-416.

3-2.7 TEST VALUES. All magnitudues and tolerances given in Section 3 herein are maximum and do not include instrumentation tolerances.

3-3 OPERATING CHARACTERISTICS

3-3.1 POWER. The following power shall be available within the Optical Subsystem.

VOLTS	FREQ(cps)	SYNC (%)
2.5 (±0.125) rms	25.6K	±0.1
28 (±0.28)	800	±0.1
28 (±1.40)	800	±0.1
28 (+2, -3)	dc	
5.15 (±0.45)	400	±10

The phase shift of the 28 (±1.40) - volt supply shall be -90 (±5)° with respect to the 28 (±0.28) - volt supply.

The Optical Subsystem shall be capable of meeting all test requirements within the range of operation indicated above.

3-3.2 ZERO OPTICS

3-3.2.1 With the Optical Subsystem set to the ZERO OPTICS mode, the 2X TRUNNION CDU dials shall indicate 000.000 (±.006).

3-3.2.2 With the Optical Subsystem set to the ZERO OPTICS mode, the SHAFT ANGLE CDU dials shall indicate 000.000 (±.003).

3-3.3 SXT LOS PARALLELISM. With the Optical Subsystem set to the ZERO OPTICS mode, the SXT StLOS and LLOS shall be parallel about the Y_{nb} axis within 10 arc seconds and parallel about the X_{nb} axis within 20 arc seconds.

3-3.4 SXT AND SCT LIMITS. The SXT and SCT trunnion and shaft lines of sight shall move freely within the following limits:

SXT Trunnion LOS 0 (+0, -10) to +90 (+10, -0) degrees
SXT Shaft LOS +270 (-0, +10) to -270 (-10, +0) degrees
SCT Trunnion LOS 0 (+0, -10) to +90 (+10, -0) degrees (SCT follows SXT)
SCT Shaft LOS +270 (-0, +10) to -270 (-10, +0) degrees (SCT follows SXT)

3-3.5 SXT-SCT LOS PARALLELISM. With the Optical Subsystem set to the ZERO OPTICS mode, the SXT StLOS and SCT LOS shall be parallel about the Y_{nb} axis within 6 arc minutes and parallel about the X_{nb} axis within 3 arc minutes.

3-3.6 OPTICAL UNIT TO IMU MOUNTING PAD ALIGNMENT. With the Optical Subsystem set to the ZERO OPTICS mode, the 2X TRUNNION CDU and SHAFT ANGLE CDU 16X Resolver error signals shall be less than 4 mv rms in phase and the SXT lines of sight shall be aligned to the axes defined by the IMU mounting pads and alignment pins as follows:

3-3.6.1 With the shaft and trunnion angles at zero:

(1) The SXT StLOS shall be parallel to the Z_{nb} axis within 36 arc seconds measured about the X_{nb} axis and 27 arc seconds measured about the Y_{nb} axis.

(2) The SXT LLOS shall be parallel to the Z_{nb} axis within 26 arc seconds, measured about the X_{nb} and Y_{nb} axes.

3-3.6.2 With the shaft angle at zero, and the trunnion angle at 57° LOS, the SXT St. LOS shall be perpendicular to the Y_{nb} axis within 40 arc seconds.

3-3.7 OPTICS HAND CONTROLLER OPERATION.

3-3.7.1 With the CONTROLLER SPEED switch in the HI position and the OPTICS HAND CONTROLLER in its neutral position, the output voltage of the OPTICS HAND CONTROLLER shall be less than 200 mv rms.

3-3.7.2 In the DIRECT mode, Up and Down OPTICS HAND CONTROLLER motion shall result in increasing and decreasing trunnion angles respectively and Right and Left OPTICS HAND CONTROLLER motion shall result in increasing and decreasing shaft angles respectively.

3-3.7.3 In the RESOLVED mode, the Up-Down or Left-Right OPTICS HAND CONTROLLER motion shall result in Up-Down or Left-Right image motion respectively to within a ±10 degree range for trunnion angles of 5 degrees or greater.

3-3.8 POSITIONAL ACCURACY. Errors between true angles and the CDU dial indications, Encoder pulses and Telescope Panel Angle Counter indications shall not exceed the tolerances listed in Table I for any true angle within the range of operation listed in paragraph 3-3.4. For IMU Alignment and Landmark Track modes, the true angle is defined as the angle between the SXT StLos (or SCT LOS) and the Z_{nb} axis for trunnion angles and the SXT StLOS (or SCT LOS) and the X_{nb} axis for shaft angles. For the Midcourse Navigation mode, the true angle is defined as the angle between the SXT StLOS and the SXT LLOS.

TABLE I - POSITION TOLERANCE

FUNCTION	CDU (DEG)	ENCODER PULSES	TPAC (DEG)
IMU Alignment			
SXT Shaft	±0.024	±3	±0.19
SXT Trunnion	±0.027	±5	±0.35
Landmark Track			
SCT Shaft	±0.183	±16	±0.08
SCT Trunnion	±0.742	±133	±0.15
Midcourse Navigation			
SXT Trunnion	±0.016	±3	±0.34

3-3.9 SERVO CHARACTERISTICS.

3-3.9.1 MAXIMUM DRIVE RATES.

3-3.9.1.1 With the Optical Subsystem in the DIRECT mode and the OPTICS HAND CONTROLLER held at its limits, the maximum SXT LOS drive rates shall be as follows:

CONTROLLER SPEED switch position	Shaft Rate	Trunnion Rate
HI	17.0 degrees/sec ±20%	9.0 degrees/sec ±20%
MED	2.0 degrees/sec ±20%	1.0 degrees/sec ±20%
LOW	0.2 degrees/sec ±20%	0.1 degrees/sec ±20%

3-3.9.2 MINIMUM DRIVE RATES AND SMOOTHNESS. The minimum LOS drive rates shall be as follows:

SXT Shaft	≤50 arc seconds/second
SXT Trunnion	≤25 arc seconds/ second

The variation in drive rate at the minimum drive rates shall be within ±25% of the nominal value for a constant command input.

3-3.9.3 DYNAMIC RESPONSE. With a step input of 10 volts the tachometer output of the SXT shaft tachometer and SXT trunnion tachometer shall reach steady state in less than 0.5 seconds. The SCT shaft 1X resolver error, SCT trunnion 1X resolver error, and 2X trunnion CDU 16X resolver error shall reach the first zero crossover in less than 2.5 seconds and steady state in less than 6.0 seconds. The shaft angle CDU 16X resolver error shall reach first crossover in less than 3.0 seconds and steady state in less than 6.0 seconds.

3-3.9.4 VELOCITY ERROR.

3-3.9.4.1 2X TRUNNION CDU. For a steady state rate command into the SXT trunnion MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.9.4.2 SHAFT ANGLE CDU. For a steady state rate command into the SXT shaft MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.9.4.3 SCT TRUNNION. For a steady state rate command into the SXT trunnion MDA of 3 deg/sec (LOS), the velocity error shall be less than 15 millivolts rms in phase at the SCT 1X resolver output (6.4 minutes of arc LOS).

3-3.9.4.4 SCT SHAFT. For a steady state rate command into the SXT shaft MDA of 3 deg/sec (LOS), the velocity error shall be less than 40 millivolts rms in phase at the SCT 1X resolver output (5.3 minutes of arc LOS).

3-2.4 TEST EQUIPMENT CALIBRATION. Commercial test equipment shall be calibrated according to the applicable calibration specification. Special test equipment shall be calibrated according to applicable design or manufacturing specifications. The Rotary Table shall be calibrated per JDC 19729.

3-2.5 TEST SET-UP. See paragraphs 5-1 through 5-4.

3-2.6 INTERFACE

3-2.6.1 LOADING. The AGC inputs listed below must be provided with either Computer Simulator loads or the simulated loads as listed herein.

AGC INPUT	SIMULATOR LOAD CHARACTERISTICS
Trunnion Encoder +	200±20 OHMS, 1 Watt resistive
Trunnion Encoder -	200±20 OHMS, 1 Watt resistive
Shaft Encoder +	200±20 OHMS, 1 Watt resistive
Shaft Encoder -	200±20 OHMS, 1 Watt resistive

3-2.6.2 GUIDANCE REFERENCE CLOCK SIMULATION. Each of the Optical Subsystem power supplies shall be supplied by simulations of the Guidance Reference Clock synchronized pulses as specified below.

3-2.6.2.1 Output Impedance - 200±10 ohms

3-2.6.2.2 Pulse Amplitude - 5.0±0.5 volts p-p

3-2.6.2.3 Rise Time - (10% - 90%) - 0.2 μsec. max.

3-2.6.2.4 Frequency -
25.6 kc ±2ppm - Encoder Excitation supply only
800 cps ±2 ppm - 28 volts 1% and 5% supplies only

3-2.6.2.5 Pulse Width -
25.6 kc - 3.0±0.5μsec.
800 cps - 3.0±0.5 μsec.

3-2.6.3 THERMAL INTERFACE. No Coolant shall be used in the Optical Unit Assembly during Optical Subsystem testing. The coolant to the Power and Servo Assembly Coldplate shall have an inlet temperature of 64 (±5)°F and a flow rate of 120 (±10) lb/hr. The coolant composition shall be as specified in Interface Control Document MH01-01249-416.

3-2.7 TEST VALUES. All magnitudues and tolerances given in Section 3 herein are maximum and do not include instrumentation tolerances.

APOLLO G&N Specification
ATP 1009502 F
INITIAL REL 19950
JUNE 11, 1965

ASSEMBLY TEST PROCEDURE

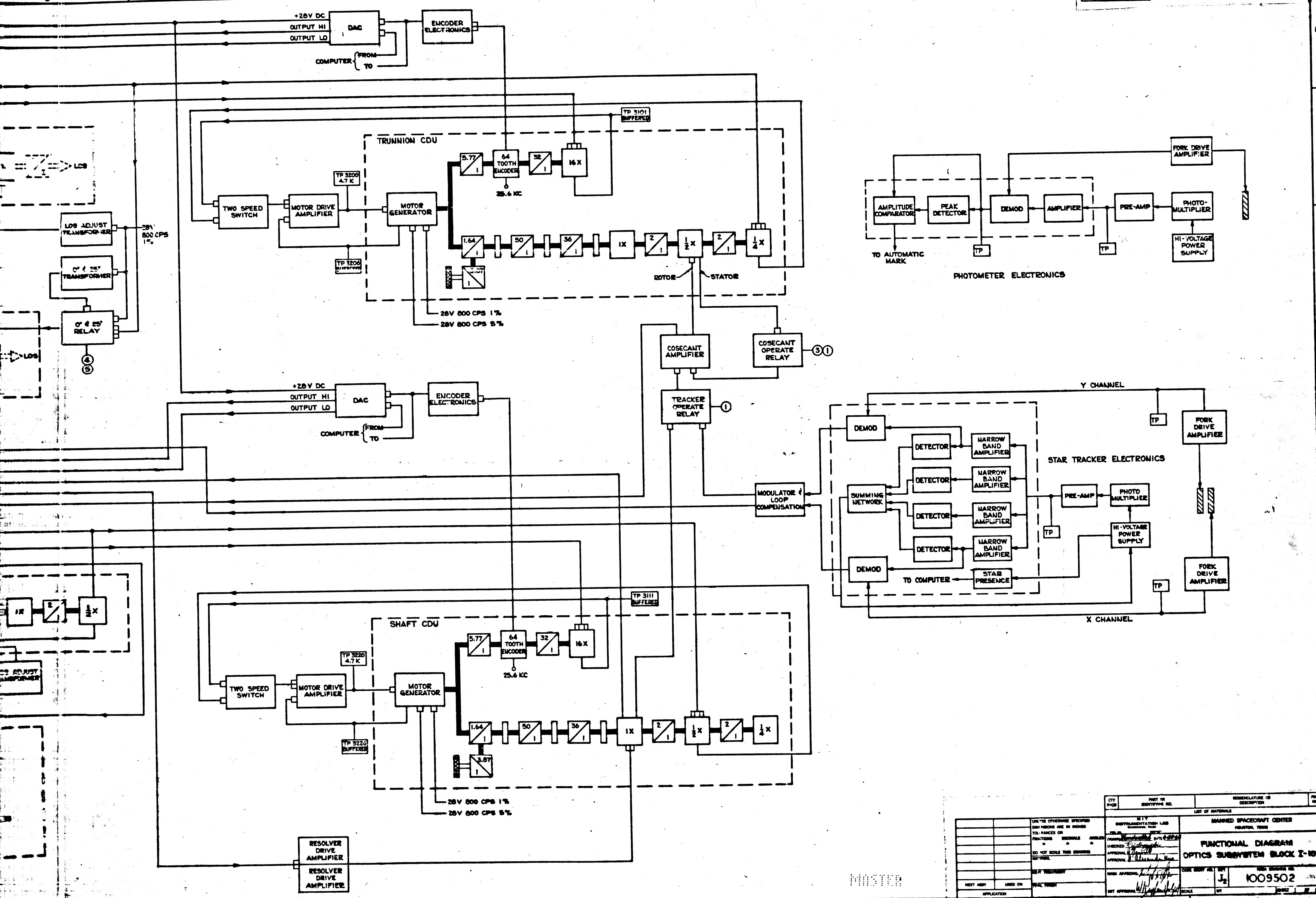
FOR

THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM

BLOCK I SERIES 100

Date	Revision Letter	TDRR No.	Pages Revised	Approval	
				MIT	NASA
9-1-65	A	22217	9, 10, 12-14, 25	WK	TM
9-16-65	B	22528	3, 4, 6, 10	MGM	TM
11-30-65	C	24401	1, 12	WK	--
3-10-66	D	27032	1-25 Now 18 pages was 25 pages	WK	TM
7/21/66	E	30257	4, 18	EA	—
9/15/66	F	31056	iv, 2, 4, 5, 7, 8, 10 11	EA	--

This specification consists of pages i to iv and 1 to 18 inclusive.


+28V DC
OUTPUT HI
OUTPUT LO
DAC
ENCODER ELECTRONICS
COMPUTER
FROM
TO
TP 3101 BUFFERED
TRUNNION CDU
5.77/1
64 TOOTH ENCODER
32/1
16X
25.6 KC
TP 3200 4.7 K
TWO SPEED SWITCH
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
TP 3200 BUFFERED
1.64/1
50/1
36/1
1X
2/1
½X
2/1
¼X
3.57/1
ROTOR
STATOR
28V 800 CPS 1%
28V 800 CPS 5%
LOS ADJUST TRANSFORMER
28V 800 CPS 1%
0° & 25° TRANSFORMER
0° & 25° RELAY
④
⑤
LOS
LOS
COSECANT AMPLIFIER
COSECANT OPERATE RELAY
㉛
TRACKER OPERATE RELAY
①
FORK DRIVE AMPLIFIER
AMPLITUDE COMPARATOR
PEAK DETECTOR
DEMOD
AMPLIFIER
PRE-AMP
PHOTO-MULTIPLIER
HI-VOLTAGE POWER SUPPLY
TP
TP
TO AUTOMATIC MARK
PHOTOMETER ELECTRONICS
Y CHANNEL
TP
FORK DRIVE AMPLIFIER
DEMOD
DETECTOR
NARROW BAND AMPLIFIER
DETECTOR
NARROW BAND AMPLIFIER
DETECTOR
NARROW BAND AMPLIFIER
DETECTOR
NARROW BAND AMPLIFIER
STAR TRACKER ELECTRONICS
SUMMING NETWORK
PRE-AMP
PHOTO MULTIPLIER
HI-VOLTAGE POWER SUPPLY
TP
DEMOD
STAR PRESENCE
TO COMPUTER
TP
FORK DRIVE AMPLIFIER
X CHANNEL
MODULATOR & LOOP COMPENSATION
TP 3111 BUFFERED
SHAFT CDU
5.77/1
64 TOOTH ENCODER
32/1
16X
25.6 KC
TP 3220 4.7 K
TWO SPEED SWITCH
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
TP 3220 BUFFERED
1.64/1
50/1
36/1
1X
2/1
½X
2/1
¼X
3.57/1
28V 800 CPS 1%
28V 800 CPS 5%
1X
2/1
½X
LOS ADJUST TRANSFORMER
RESOLVER DRIVE AMPLIFIER
RESOLVER DRIVE AMPLIFIER
9
8
7
6
5
4
3
2
1
H
G
F
E
D
C
B
A
MASTER

QTY RQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

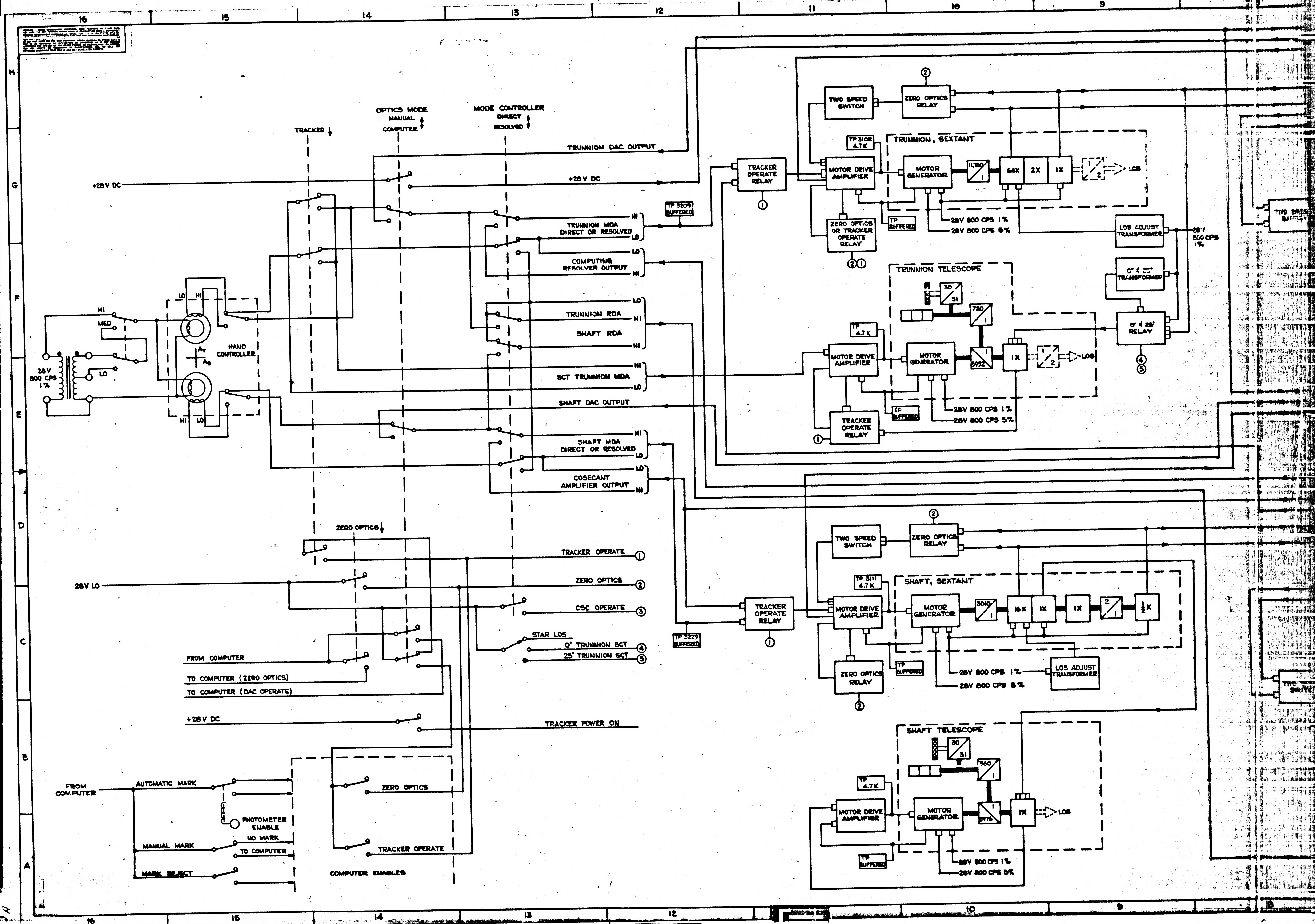
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE
CHECKED R. Wolrzyjnski
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FUNCTIONAL DIAGRAM
OPTICS SUBSYSTEM BLOCK I-100

CODE IDENT NO. | SIZE J2 | NASA DRAWING NO. 1009502
SCALE | WT | SHEET OF

INCHES


16
15
14
13
12
11
10
9
H
G
F
E
D
C
B
A
TRACKER
OPTICS MODE
MANUAL
COMPUTER
MODE CONTROLLER
DIRECT
RESOLVED
TRUNNION DAC OUTPUT
+28 V DC
+28 V DC
TP 3209 BUFFERED
TRUNNION MDA DIRECT OR RESOLVED
HI
LO
COMPUTING RESOLVER OUTPUT
LO
HI
TRUNNION RDA
SHAFT RDA
LO
HI
HI
SCT TRUNNION MDA
HI
LO
SHAFT DAC OUTPUT
SHAFT MDA DIRECT OR RESOLVED
HI
LO
COSECANT AMPLIFIER OUTPUT
LO
HI
HI
MED
LO
28 V 800 CPS 1%
LO
HI
LO
HI
A_T
A_S
HAND CONTROLLER
ZERO OPTICS
28V LO
TRACKER OPERATE ①
ZERO OPTICS ②
CSC OPERATE ③
STAR LOS
0° TRUNNION SCT ④
25° TRUNNION SCT ⑤
FROM COMPUTER
TO COMPUTER (ZERO OPTICS)
TO COMPUTER (DAC OPERATE)
+28 V DC
TRACKER POWER ON
FROM COMPUTER
AUTOMATIC MARK
PHOTOMETER ENABLE
MANUAL MARK
NO MARK
TO COMPUTER
MARK REJECT
ZERO OPTICS
TRACKER OPERATE
COMPUTER ENABLES
TWO SPEED SWITCH
② ZERO OPTICS RELAY
TP 3108 4.7 K
TRUNNION, SEXTANT
TRACKER OPERATE RELAY ①
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
11,180 / 1
64X
2X
1X
1 / 2
LOS
TP BUFFERED
ZERO OPTICS OR TRACKER OPERATE RELAY ② ①
28V 800 CPS 1%
28V 800 CPS 5%
LOS ADJUST TRANSFORMER
28 V 800 CPS 1%
0° & 25° TRANSFORMER
TRUNNION TELESCOPE
30 / 31
720 / 1
1 / 5952
1X
2
LOS
TP 4.7 K
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
0° & 25° RELAY ④ ⑤
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%
TRACKER OPERATE RELAY ①
TP 3229 BUFFERED
TWO SPEED SWITCH
② ZERO OPTICS RELAY
TP 3111 4.7 K
SHAFT, SEXTANT
TRACKER OPERATE RELAY ①
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
3010 / 1
16X
1X
1X
2 / 1
1/2 X
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%
LOS ADJUST TRANSFORMER
ZERO OPTICS RELAY ②
SHAFT TELESCOPE
30 / 31
360 / 1
1 / 2976
TP 4.7 K
MOTOR DRIVE AMPLIFIER
MOTOR GENERATOR
1X
LOS
TP BUFFERED
28V 800 CPS 1%
28V 800 CPS 5%
TWO SPEED SWITCH
INCHES

APOLLO G&N Specification
ATP 1009502
INITIAL REL 19950
JUNE 11, 1965

ASSEMBLY TEST PROCEDURE

FOR

THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM

BLOCK I SERIES 100

Date	Revision Letter	TDRR No.	Pages Revised	Approval	
				MIT	NASA

This specification consists of pages i to iv and 1 to 25 inclusive.

APOLLO G&N Specification
ATP 1009502

ASSEMBLY TEST PROCEDURE FOR THE APOLLO G&N SYSTEM OPTICAL SUBSYSTEM

BLOCK I SERIES 100

This document has been prepared for the purpose of presenting the assembly testing requirements of the Optical Subsystem of the APOLLO Guidance and Navigation System.

M. C. Murley 11 June '65
MIT/IL DATE

W. J. Rhine 6-11-65
NASA/MSC DATE

PREPARED BY **TITLE** **DATE**
Thomas E. Postma PROJ. ENGINEER 5/27/65
AC SPARK PLUG

EXAMINED BY **TITLE** **DATE**
L. H. Gerhardt SR. PROJ ENGINEER 6/1/65
AC SPARK PLUG

APPROVED BY **TITLE** **DATE**
Koso Asst. Dir 6/10/65
MIT/IL

APPROVED BY **TITLE** **DATE**
L. R. Eng. 6/11/65
MIT/IL

APPROVED BY
M. C. Morley CCB 6/11/65
MIT/IL

ASSEMBLY TEST PROCEDURES

FOR

THE APOLLO G&N SYSTEM BLOCK I SERIES 100 OPTICAL SUBSYSTEM

TABLE OF CONTENTS

SECTION	TITLE	PAGE
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2	Assembly Requirements	2
3	Test Requirements	2
4	Test Procedures	14
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ASSEMBLY TEST PROCEDURE

FOR

APOLLO G&N SYSTEM BLOCK I SERIES 100 OPTICAL SUBSYSTEM

1 INTRODUCTION

1-1 SCOPE. This specification establishes the requirements and procedures for the assembly test of the Block I Series 100 Optical Subsystem. The Optical Subsystem will be used in the Apollo G&N System (ND 1015000).

1-2 COMPONENTS. The Block I Series 100 Optical Subsystem shall consist of each of the following assemblies:

1-2.1	One (1) Navigation Base and Optical Unit Assembly	1899950-041
1-2.2	Two (2) CDU Assembly	1015500-031
1-2.3	One (1) G&N Indicator Control Panel Assembly	1014664-011
1-2.4	One (1) Power Supply Electronics Assembly Tray 2	1007572-011
1-2.5	One (1) CDU & Power Supply Electronics Assembly Tray 6	1007576-011
1-2.6	One (1) Miscellaneous Electronics Assembly Tray 7	1007577-011
1-2.7	One (1) Optical Electronics Assembly Tray 8	1007578-011
1-2.8	One (1) Optical Electronics Assembly Tray 9	1007579-011
1-2.9	One (1) Pwr. Diodes & Signal Cond. Electronics Assembly Tray 10	1007580-011
1-2.10	One (1) AGE Harness and PSA End Connector Assembly (or substitute GSE equipment for test purposes)	1015086-011
1-2.11	One (1) D and C Electronics Assembly	1015065-021
1-2.12	One (1) Control Electronics Assembly	1015064-021
1-2.13	One (1) Tracker X and Y Assembly	1007585-011

1-3 PRECAUTIONS.

Damage may be done to the STAR TRACKER photomultiplier tube if it is exposed to ambient light. Assure that the LIGHT EXPOSURE PLUG is removed only as directed during testing.

1-4 APPLICABLE DOCUMENTS.

The following documents are for reference only.

1-4.1	Functional Diagram - Optical Subsystem Block I Series 100	1009502
1-4.2	Optical Inertial Analyzer	1901976-011
1-4.3	Zero Optics Mode	1009513
1-4.4	Shaft Manual Mode	1009514
1-4.5	Trunnion Manual Mode	1009515
1-4.6	Sextant Optics Resolved Mode	1009516
1-4.7	Optical Subsystem Power Distribution	1009517
1-4.8	Tracker Mode	1009518
1-4.9	Interface Control Document	MH01-01249-416

2 ASSEMBLY REQUIREMENTS.

Not Applicable.

3 TEST REQUIREMENTS

3-1 PRIOR COMPLIANCE.

Components listed in paragraph 1-2 shall have successfully completed assembly level testing prior to subjecting the Optical Subsystem to the requirements of this document.

3-2 TEST CONDITIONS

3-2.1 ENVIRONMENTAL. The Optical Subsystem shall be tested under clean room conditions as defined in paragraph 5-5.

3-2.2 ELECTRICAL. The electrical power listed below shall be provided to the Optical Subsystem.

3-2.2.1 28 (+2, -3) VDC 140 watts

3-2.2.2 115 (±11.5) volts, 400 cps (±10%), 30 watts

3-2.3 DETAILED TEST EQUIPMENT. The test equipment listed below is required to test the Optical Subsystem.

3-2.3.1	One (1) Optical-Inertial Test Set	1902300-011
3-2.3.2	One (1) Rotary Table	1900926-011
3-2.3.3	One (1) Optics/N.B. Mtg. Fixture	1902301-011
3-2.3.4	One (1) G&N Mounting Fixture	1902204-011
3-2.3.5	One (1) GSE-PSA Junction Box	1902195-011
3-2.3.6	One (1) Drawer Assembly Apollo Computer Simulator	1014061
3-2.3.7	One (1) Alignment Mirror Assembly	1016951
3-2.3.8	One (1) Shaft Accuracy Tester	1019769
3-2.3.9	One (1) 0° Autocollimator Assembly	1017380
3-2.3.10	One (1) Remote Optics Controller Assembly	1902046-011
3-2.3.11	One (1) Filling and Purging Fixture	1902371-011
3-2.3.12	One (1) Hose, Coolant, Interconnect Male-Female	1900866-031
3-2.3.13	One (1) Hose, Coolant, Interconnect Male-Female	1900866-041
3-2.3.14	One (1) Retroreflecting Prism	1019840
3-2.3.15	One (1) Vertical Leveling Mirror	1017445
3-2.3.16	One (1) Portable Light Assembly	1019837
3-2.3.17	One (1) Star and Horizon Simulator	1019900
3-2.3.18	One (1) Electronic Level	1901328
3-2.3.19	One (1) Theodolite	1017444
3-2.3.20	One (1) Alignment Certification Fixture	1017387

3-2.3.21	One (1) Star and Horizon Simulator Calibration Equipment	1019883
3-2.3.22	One (1) G & N Fixture Stand	1019899
3-2.3.23	One (1) Theodolite Base Assembly	1022831
3-2.3.24	One (1) Alignment Tool	1900155

3-2.4 TEST EQUIPMENT CALIBRATION. Commercial test equipment shall be calibrated according to the applicable calibration specification. Special test equipment shall be calibrated according to applicable design or manufacturing specifications. The Rotary Table shall be calibrated per JDC 19727 or JDC 19729.

3-2.5 TEST SET-UP. See paragraphs 5-1 through 5-4.

3-2.6 INTERFACE

3-2.6.1 LOADING. The AGC inputs listed below must be provided with either Computer Simulator loads or the simulated loads as listed herein.

AGC INPUT	SIMULATOR LOAD CHARACTERISTICS
Trunnion Encoder +	200 ± 20 OHMS, 1 Watt resistive
Trunnion Encoder -	200 ± 20 OHMS, 1 Watt resistive
Shaft Encoder +	200 ± 20 OHMS, 1 Watt resistive
Shaft Encoder -	200 ± 20 OHMS, 1 Watt resistive

3-2.6.2 GUIDANCE REFERENCE CLOCK SIMULATION. Each of the Optical Subsystem power supplies shall be supplied by simulations of the Guidance Reference Clock synchronized pulses as specified below.

3-2.6.2.1 Output Impedance - 200 ± 10 OHMS

3-2.6.2.2 Pulse Amplitude - 5.0 ± 0.5 volts p-p

3-2.6.2.3 Rise Time - (10% - 90%) - 0.2 µ secs. max.

3-2.6.2.4 Frequency -
25.6 KCPS ± 2PPM - Encoder Excitation supply only
800 cps ± 2 PPM - 28 volts 1% and 5% supplies only

3-2.6.2.5 Pulse Width -
25.6 KCPS - 3.0 ± 0.5 µ sec.
800 cps - 3.0 ± 0.5 µ sec.

3-2.6.3 THERMAL INTERFACE. No coolant shall be used in the Optical Unit Assembly during Optical Subsystem testing. The coolant to the Power and Servo Assembly Coldplate shall have an inlet temperature of 64 (±5)° F. and a flow rate of 120 (±10) lb./hr. The coolant composition shall be as specified in Interface Control Document MH01-01249-416.

3-2.7 TEST VALUES. All magnitudes and tolerances given in Section 3 herein are maximum and do not include instrumentation tolerances.

3-2.8 TEST DATA

3-2.8.1 Data shall be obtained to the least-count of the measuring instruments and shall be recorded as follows:

3-2.8.1.1 Values with tolerances shall be rounded off as specified in paragraph 3-2.8.4 to as many decimal places as the minimum and/or maximum value listed on the data sheets.

3-2.8.1.2 Values without tolerances shall be recorded to the least-count of the measuring instrument.

3-2.8.2 CALCULATIONS. Final calculated values shall be recorded as follows:

3-2.8.2.1 Values with tolerances shall be rounded off as specified in paragraph 3-2.8.4 to as many decimal places as the minimum and/or maximum value listed on the data sheets.

3-2.8.2.2 Values without tolerances shall be rounded off as specified in paragraph 3-2.8.4 to as many decimal places as the number with the fewest decimal places used in the calculations.

3-2.8.3 ANGULAR UNITS. Angular Units obtained in degrees, minutes, and/or seconds shall be recorded as follows:

3-2.8.3.1 Values with angular tolerances of seconds shall be rounded off to seconds as specified in paragraph 3-2.8.4.

3-2.8.3.2 Values with angular tolerances of minutes shall be rounded off to minutes as specified in paragraph 3-2.8.4.

3-2.8.3.3 Values without tolerances shall be recorded to the least-count of the measuring instrument.

3-2.8.4 To round off a number to n decimal places, discard all digits to the right of the nth place, and if this discarded number is

(a) greater than half a unit in the nth place, increase the digit in that place by 1;
(b) less than or equal to half a unit in the nth place, leave the digit in that place unaltered.

3-2.8.5 All data generated while performing the requirements of this document shall be recorded and forwarded with the test subsystem to the next receiving agency.

3-3 OPERATING CHARACTERISTICS

3-3.1 POWER. The following power shall be available within the Optical Subsystem.

VOLTS	FREQ (cps)	SYNC (%)
2.5 (±0.125) rms	25.6 K	±0.1
28 (±0.28)	800	±0.1
28 (±1.40)	800	±0.1
28 (+2, -3)	dc	
5.15 (±0.45)	400	±10

The phase shift of the 28 (±1.40) - volt supply shall be -90 (±5)° with respect to the 28 (±0.28) - volt supply.
The Optical Subsystem shall be capable of meeting all test requirements within the range of operation indicated above.

3-3.2 ZERO OPTICS

3-3.2.1 With the Optical Subsystem set to the ZERO OPTICS mode, the 2X TRUNNION CDU dials shall indicate 000.000 (±.006).

3-3.2.2 With the Optical Subsystem set to the ZERO OPTICS mode, the SHAFT ANGLE CDU dials shall indicate 000.000 (±.003).

3-3.3 SXT LOS PARALLELISM. With the Optical Subsystem set to the ZERO OPTICS mode, the SXT StLOS and LLOS shall be parallel about the Y_{sb} axis within 10 arc seconds and parallel about the X_{sb} axis within 20 arc seconds.

3-3.4 SXT AND SCT LIMITS. The SXT and SCT trunnion and shaft lines of sight shall move freely within the following limits:

SXT Trunnion LOS 0 (+0, -10) to +90 (+10, -0) degrees
SXT Shaft LOS +270 (-0, +10) to -270 (-10, +0) degrees
SCT Trunnion LOS 0 (+0, -10) to +90 (+10, -0) degrees (SCT follows SXT)
SCT Shaft LOS +270 (-0, +10) to -270 (-10, +0) degrees (SCT follows SXT)
SCT Trunnion LOS - Continuous (with the Optical Subsystem in the TRACKER mode).

3-3.5 SXT-SCT LOS PARALLELISM. With the Optical Subsystem set to the ZERO OPTICS mode, the SXT StLOS and SCT LOS shall be parallel about the Y_{sb} axis within 6 arc minutes and parallel about the X_{sb} axis within 3 arc minutes.

3-3.6 STAR TRACKER LOS - SXT StLOS PARALLELISM. With the Optical Subsystem set to the ZERO OPTICS mode, the TkLOS shall be parallel to the SXT StLOS within 180 arc seconds measured about the X_{sb} axis and 20 arc seconds measured about the Y_{sb} axis, and shall be known within 10 arc seconds about both X_{sb} and Y_{sb} axes.

3-3.7 HORIZON PHOTOMETER LOS - SXT LLOS PARALLELISM. With the Optical Subsystem set to the ZERO OPTICS mode, the HPLOS shall be parallel to the SXT LLOS within 180 arc seconds measured about the X_{sb} and Y_{sb} axes, and shall be known within 10 arc seconds about both X_{sb} and Y_{sb} axes.

3-3.8 OPTICAL UNIT TO IMU MOUNTING PAD ALIGNMENT. With the Optical Subsystem set to the ZERO OPTICS mode, the 2X TRUNNION CDU and SHAFT ANGLE CDU 16X Resolver error signals shall be less than 4 mv rms in phase and the SXT lines of sight shall be aligned to the axes defined by the IMU mounting pads and alignment pins as follows:

3-3.8.1 With the shaft and trunnion angles at zero:

(1) The SXT StLOS shall be parallel to the Z_{sb} axis within 36 arc seconds measured about the X_{sb} axis and 27 arc seconds measured about the Y_{sb} axis.

(2) The SXT LLOS shall be parallel to the Z_{sb} axis within 26 arc seconds, measured about the X_{sb} and Y_{sb} axes.

3-3.8.2 With the shaft angle at zero, and the trunnion angle at 57° LOS, the SXT StLOS shall be perpendicular to the Y_{sb} axis within 40 arc seconds.

3-3.9 OPTICS HAND CONTROLLER OPERATION.

3-3.9.1 With the CONTROLLER SPEED switch in the HI position and the OPTICS HAND CONTROLLER in its neutral position, the output voltage of the OPTICS HAND CONTROLLER shall be less than 200 mv rms.

3-3.9.2 In the DIRECT mode, Up and Down OPTICS HAND CONTROLLER motion shall result in increasing and decreasing trunnion angles respectively and Right and Left OPTICS HAND CONTROLLER motion shall result in increasing and decreasing shaft angles respectively.

3-3.9.3 In the RESOLVED mode, the Up-Down or Left-Right OPTICS HAND CONTROLLER motion shall result in Up-Down or Left-Right image motion respectively to within a ±10 degree range for trunnion angles of 5 degrees or greater.

3-3.10 POSITIONAL ACCURACY. Errors between true angles and the CDU dial indications, Encoder pulses and Telescope Panel Angle Counter indications shall not exceed the tolerances listed in Table I for any true angle within the range of operation listed in paragraph 3-3.4. For IMU Alignment and Landmark Track modes, the true angle is defined as the angle between the SXT StLOS (or SCT LOS) and the Z_{sb} axis for trunnion angles and the SXT StLOS (or SCT LOS) and the X_{sb} axis for shaft angles. For the Midcourse Navigation mode, the true angle is defined as the angle between the SXT StLOS and the SXT LLOS.

TABLE I - POSITION TOLERANCE

FUNCTION	CDU (DEG)	ENCODER PULSES	TPAC (DEG)
IMU Alignment			
SXT Shaft	±0.024	±3	±0.19
SXT Trunnion	±0.027	±5	±0.35
Landmark Track			
SCT Shaft	±0.183	±16	±0.08
SCT Trunnion	±0.742	±133	±0.15
Midcourse Navigation			
SXT Trunnion	±0.016	±3	±0.34

3-3.11 SERVO CHARACTERISTICS.

3-3.11.1 MAXIMUM DRIVE RATES.

3-3.11.1.1 With the Optical Subsystem in the DIRECT mode and the OPTICS HAND CONTROLLER held at its limits, the maximum SXT LOS drive rates shall be as follows:

CONTROLLER SPEED switch position	Shaft Rate	Trunnion Rate
HI	17.0 degrees/sec ±20%	9.0 degrees/sec ±20%
MED	2.0 degrees/sec ±20%	1.0 degrees/sec ±20%
LOW	0.2 degrees/sec ±20%	0.1 degrees/sec ±20%

3-3.11.1.2 With the Optical Subsystem in the TRACKER mode and the OPTICS HAND CONTROLLER held at its limits, the maximum SCT LOS trunnion drive rate shall be as follows:

CONTROLLER SPEED switch position	SCT Trunnion Rate
HI	20 degrees/sec ±20%
MED	2.2 degrees/sec ±20%
LOW	0.22 degrees/sec ±20%

3-3.11.2 MINIMUM DRIVE RATES AND SMOOTHNESS. The minimum LOS drive rates shall be as follows:

SXT Shaft $\leq$ 50 arc seconds/second
SXT Trunnion $\leq$ 25 arc seconds/second
*SCT Trunnion $\leq$ 60 arc seconds/second
* With the Optical Subsystem in the TRACKER mode.

The variation in drive rate at the minimum drive rates shall be within ±25% of the nominal value for a constant command input.

3-3.11.3 DYNAMIC RESPONSE. With a step input of 10 volts the tachometer output of the SXT shaft tachometer and the SXT trunnion tachometer shall reach steady state in less than 0.5 seconds. The SCT shaft 1X resolver error, SCT trunnion 1X resolver error, SHAFT ANGLE CDU 16X resolver error, and 2X TRUNNION CDU 16X resolver error shall reach steady state in less than 2.5 seconds. With the Optical Subsystem in the TRACKER mode and a step input of 10 volts from the HAND CONTROLLER, the tachometer output of the SCT trunnion tachometer shall reach steady state in less than 0.5 seconds.

3-3.11.4 VELOCITY ERROR.

3-3.11.4.1 2X TRUNNION CDU. For a steady state rate command into the SXT trunnion MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.11.4.2 SHAFT ANGLE CDU. For a steady state rate command into the SXT shaft MDA of 1.0 deg/sec (LOS), the velocity error shall be less than 4 millivolts rms in phase at the 16X resolver output (5.6 seconds of arc LOS).

3-3.11.4.3 SCT TRUNNION. For a steady state rate command into the SXT trunnion MDA of 3 deg/sec (LOS), the velocity error shall be less than 15 millivolts rms in phase at the SCT 1X resolver output (6.4 seconds of arc LOS).

3-3.11.4.4 SCT SHAFT. For a steady state rate command into the SXT shaft MDA of 3 deg/sec (LOS), the velocity error shall be less than 40 millivolts rms in phase at the SCT 1X resolver output (5.3 seconds of arc LOS).

3-3.12 TIME TO ZERO

3-3.12.1 The SXT shaft 1X resolver shall return to the zero position in 15 seconds or less from the 180° LOS position of the 1X resolver after the zero command is given. The SHAFT ANGLE CDU shall follow to zero in 15 seconds or less. The SCT shaft 1X resolver shall follow to zero in 15 seconds or less.

3-3.12.2 The SXT trunnion 1X resolver shall return to the zero position in 15 seconds or less from the 90° LOS position of the 1X resolver after the zero command is given. The 2X TRUNNION CDU shall follow to zero in 15 seconds or less. The SCT trunnion 1X resolver shall follow to zero in 15 seconds or less.

3-3.13 ENCODER CHARACTERISTICS

3-3.13.1 ENCODER PULSES. The output pulses of the shaft and trunnion encoders to the AGC shall have the following characteristics:

3-3.13.1.1 The amplitude shall be 7 (±3) volts with respect to the amplitude reference.

3-3.13.1.2 The droop shall be less than 20% of the pulse amplitude at 2 μ sec.

3-3.13.1.3 The pulse width shall be 2 to 6 μ sec at 50% amplitude.

3-3.13.1.4 The noise level during absence of the pulse shall be 0 (+0.4, -4.0) volts with respect to the amplitude reference.

3-3.13.1.5 The rise time (10% - 90%) shall be less than 0.5 μ sec.

3-3.13.1.6 The backswing shall be less than 4 volts with respect to the amplitude reference.

3-3.14 OFFSET 25°. With the SLAVE TELESCOPE switch in the OFFSET 25° position, the SCT shall be offset to a LOS trunnion angle of 25° (±12') with respect to the SXT LLOS. The LOS angular separation between the 0 degree and 25 degree lines on the SCT reticle shall be 25° (±15').

3-3.15 LANDMARK LOS 0°. With the SLAVE TELESCOPE switch in the LANDMARK LOS 0° position, the SCT shall be set to a LOS trunnion angle of 0° (±7') with respect to the SXT LLOS.

3-3.16 COMPUTER INPUT CHARACTERISTICS

3-3.16.1 DAC SENSITIVITY. When applying pulse bursts at the rate of 4 bursts per second to the DAC's, the encoder outputs specified in Table II shall be met:

TABLE II

PULSES/BURST AT 3200 PPS	ENCODER OUTPUT PULSES PER 10 SECONDS	
	TRUNNION	SHAFT
1	29 (±30%)	25 (±30%)
16	546 (±30%)	501 (±30%)
64	2002 (±30%)	1729 (±30%)
256	5461 (±30%)	4369 (±30%)

3-3.16.2 DAC DRIFT. With the Optical Subsystem in the COMPUTER mode, and no input pulses applied to the DAC's, the CDU dial indications shall not change more than 0.04 deg/sec.

3-3.17 RESOLUTION. Resolution for the SXT and SCT on high contrast targets shall be as follows:

APPROXIMATE POSITION IN FIELD	RESOLUTION (SECONDS OF ARC)	
	SXT	SCT
Center	10	60
1/3 Field Radius	15	90
2/3 Field Radius	30	180

3-3.18 STAR TRACKER OPERATION

3-3.18.1 The STAR TRACKER shall be capable of meeting all test requirements while using a simulated star with an S-4 magnitude range of +1.0 to +2.0

3-3.18.2 The Tuning Fork frequencies shall be as follows:

X-axis Tuning Fork	455 (±1) cps
Y-axis Tuning Fork	356 (±1) cps

3-3.18.3 ERROR SIGNAL GRADIENTS

3-3.18.3.1 When a simulated star is moved between 0 and 2.0 arc minutes LOS along the "M" line in the field of view, the gradient of the X-axis error signal shall be 200 (±40) volts/radian.

3-3.18.3.2 When a simulated star is moved between 0 and 2.0 arc minutes LOS along the "R" line in the field of view, the gradient of the Y-axis error signal shall be 200 (±40) volts/radian.

3-3.18.4 CLOSED LOOP OPERATION

3-3.18.4.1 When a simulated star is offset 1.0 arc minute from the origin in the +M direction and subsequently offset 1.0 arc minute in the +R direction, the SXT trunnion and shaft tachometer outputs shall reach steady state within 0.5 seconds after starting closed-loop operation.

3-3.18.4.2 With a simulated star initially at the extreme edge of the tracker field of view, the SXT trunnion and shaft tachometer outputs shall reach steady state within 1.5 seconds after starting closed-loop operation.

3-3.18.5 The STAR TRACKER shall gate a Star Presence signal to the AGC when a simulated star is within the STAR TRACKER field of view.

3-3.18.5.1 The Star Presence signal pulse amplitude shall be 5 (±1) volts with respect to the amplitude reference. The pulses shall have the characteristics of paragraphs 3-3.13.1.2 through 3-3.13.1.6.

3-3.19 HORIZON PHOTOMETER OPERATION

3-3.19.1 The Tuning Fork frequency of the HORIZON PHOTOMETER shall be 550 (±1) cps.

3-3.19.2 The HORIZON PHOTOMETER shall supply a Horizon Half Peak signal to the AGC when the brightness of the simulated horizon is 50 (±10)% of its initial brightness. This requirement shall be demonstrated for values of initial light intensities between 4.75×10^{-4} and 9.5×10^{-4} watts/cm^2/steradian distributed between 3400 and 3600A°. The light intensity shall be decreased from its maximum value to 30% of its maximum value in less than 10 seconds.

4 TEST PROCEDURES

4-1 GENERAL. The examinations and test contained in this section are intended for execution on the Optical Subsystem.

4-2 TEST FAILURE. The failure of a subassembly to pass any examination or test of this section will automatically classify the unit as nonconforming.

4-3 JOB DESCRIPTION CARDS

4-3.1 REQUIRED JDC's. The following JDC's form a part of this Assembly Test Procedure (See Figure 4).

JDC 10701	Prefunctional Check
JDC 10702	Power Check
JDC 10703	Optics Nav Base Alignment Check
JDC 10704	SXT Shaft Accuracy and Limits Test
JDC 10705	SCT Shaft Accuracy Test
JDC 10706	Optics to Target Alignment
JDC 10707	Resolution Check
JDC 10708	Line-of-Sight Parallelism Check
JDC 10709	SXT Trunnion Accuracy and Limits Test
JDC 10710	SCT Trunnion Accuracy Test
JDC 10711	Maximum Drive Rates and Resolved Mode Test
JDC 10712	CDU Encoder Pulse Characteristics Test
JDC 10713	Time-to-Zero Test
JDC 10714	Trunnion Servo Loop Test
JDC 10715	Shaft Servo Loop Test
JDC 10716	DAC Sensitivity Test
JDC 10717	DAC Drift Test
JDC 10718	Tracker Tuning Fork Check
JDC 10719	Star Presence Signal Pulse Characteristics Test
JDC 10720	Tracker Alignment, Field of View, Error Gradient and Gain Control Test

JDC 10721	Tracker Servo Loop Test
JDC 10722	Photometer Alignment and Tuning Fork Frequency Test
JDC 10723	Photometer "MARK" Test

4-3.2 EQUIPMENT INSTALLATION AND PREPARATION JDC's. The following JDC's are to be used in installation and preparation of test equipment. (See Figure 4).

JDC 10180	Installation of Optics/NB Mtg. Fixture on Rotary Table
JDC 10181	Alignment of OSS Optical Targets
JDC 10182	Installation of Nav. Base and Optical Unit on Optics/NB Mtg. Fixture
JDC 10185	Installation and Removal of Alignment Mirror Assembly
JDC 10731	Installation of OSS Equipment
JDC 10732	Installation of Shaft Accuracy Tester Base Assembly
JDC 10733	Installation of Shaft Accuracy Tester Rotary Table
JDC 10734	OSS/GSE Electrical Interconnections
JDC 10735	Installation of Star and Horizon Simulator
JDC 10736	Installation and Alignment of Tracker Mirror Assembly
JDC 10737	Installation and Alignment of Photometer Mirror Assembly
JDC 10738	Turn On of Coolant Supply
JDC 10739	Calibration of Alignment Mirror Assembly
JDC 10740	Removal of Star and Horizon Simulator
JDC 10741	Removal of Shaft Accuracy Tester Rotary Table

4-3.3 GSE OPERATION JDC's. JDC's 18000 through 18046 are to be used as required for operation of GSE instruments.

5 NOTES

5-1 TEST CONFIGURATION. Figures 1, 2, and 3 illustrate the test configurations required for the tests of the Optical Subsystem. The configuration of Figure 1 is used to check the alignment of the SXT to the IMU mounting pads and alignment pins and the SXT shaft accuracy and linearity. The configuration of Figure 2 is used to check the SXT and SCT trunnion accuracy and linearity. The configuration of Figure 3 is used to check the STAR TRACKER and HORIZON PHOTOMETER alignments and operation.

5-2 ALIGNMENT REQUIREMENTS - OPTICAL SUBSYSTEM TEST TARGETS

5-2.1 TARGET NO. 1 (5 inch autocollimator 1017410)

5-2.1.1 The optical centerline of Target No. 1 shall be aligned to a nominally North-South azimuth.

5-2.1.2 The optical centerline of Target No. 1 shall be aligned to be perpendicular to within ±3 arc seconds of local vertical.

5-2.1.3 Target No. 1 shall be positioned laterally so that the target optical centerline is 1.20 ± 0.10 inches to the west of the mechanical axis of the sextant shaft measured horizontally in the plane of the fixture navigation base mounting pads.

5-2.1.4 Target No. 1 shall be positioned in elevation so that the target optical centerline is within ± 0.10 inch of the mechanical axis of the sextant shaft measured vertically in the plane of the fixture navigation base mounting pads.

5-2.2 TARGET No. 2 (2-1/2 inch autocollimator 1017435)

5-2.2.1 The optical centerline of Target No. 2 shall be aligned in azimuth to within ± 10 arc seconds of the optical centerline of Target No. 1.

5-2.2.2 The optical centerline of Target No. 2 shall be aligned to be perpendicular to within ± 10 arc seconds of local vertical.

5-2.2.3 Target No. 2 shall be positioned laterally so that the target optical centerline is 7.05 ± 0.05 inches to the west of the optical centerline of Target No. 1 measured horizontally in the plane of the fixture navigation base mounting pads.

5-3 ALIGNMENT REQUIREMENTS - STAR AND HORIZON SIMULATOR

5-3.1 The Star and Horizon Simulator shall be mounted on the Shaft Accuracy Tester Base Assembly with the center of the Shaft Accuracy Tester Base Assembly positioned 37 ± 1/8 inches south and 1.6 ± 0.12 inches east of the rotary axis of the Rotary Table when the Rotary Table tilt axis is set to 0 degrees.

5-3.2 The top surface of the G&N Fixture Stand Jig Plate shall be 25 9/16 ± 1/16 inches below the top surface of the Rotary Table when the Rotary Table tilt axis is set to 0 degrees.

5-3.3 With the Tracker Mirror Assembly installed, the G&N Fixture Stand sliding platform set to the 0° (S&T) position, and the Rotary Table tilt axis set to 90 degrees, the following alignments are required.

5-3.3.1 The centerline of the Star and Horizon Simulator Tk LOS aperature shall be aligned to within ± 1/32 inch of the optical centerline of the Star Tracker.

5-3.3.2 The centerline of the Star and Horizon Simulator St LOS aperature shall be aligned to within ± 1/32 inch of the optical centerline of the SXT St LOS aperature.

5-3.4 With the Photometer Mirror Assembly installed, the G&N Fixture Stand sliding platform set to the 0° (L&P) position, and the Rotary Table tilt axis set to 90 degrees, the following alignments are required.

5-3.4.1 The centerline of the Star and Horizon Simulator HP LOS aperature shall be aligned to within ± 1/32 inch of the optical centerline of the Horizon Photometer.

5-3.4.2 The centerline of the Star and Horizon Simulator LLOS aperature shall be aligned to within ± 1/32 inch of the optical centerline of the SXT LLOS aperature.

5-4 ALIGNMENT REQUIREMENTS - SHAFT ACCURACY TESTER ROTARY TABLE

5-4.1 The rotary axis of the Shaft Accuracy Tester Rotary Table shall be positioned 37 ± 1/8 inch south and 1.6 ± 0.12 inch east of the rotary axis of the Rotary Table when the Rotary Table tilt axis is set to 0 degrees.

5-4.2 The top surface of the Shaft Accuracy Tester Rotary Table Turntable Base shall be 17 7/8 ± 1/8 inches below the top surface of the Rotary Table when the Rotary Table tilt axis is set to 0 degrees.

5-4.3 The rotary axis of the Shaft Accuracy Tester Rotary Table shall be aligned parallel to local vertical within ± 10 arc seconds.

5-5 TEST ENVIRONMENT

Particle Size and Count Adjacent to Optical Unit - Particle count not to exceed a total of 100,000 particles per cubic foot 0.5 microns and larger, or 700 particles per cubic foot 5.0 microns and larger.

NOTE: This requirement applies only to periods when Sextant and Scanning Telescope Optics heads are uncovered.

Room Particle Size and Count - Particle count not to exceed a total of 200,000 particles per cubic foot 0.5 microns and larger, or 1400 particles per cubic foot 10 microns and larger.

Temperature - 75° ± 4° F.

Relative Humidity - 50% or less.

Cover Garments - Caps, gowns, and boots.

5-6 SIGNAL IDENTIFICATION

BUFFER TEST POINTS	SIGNAL
1	SXT Trunnion Tachometer Output
2	SXT Trunnion Input
3	SXT Shaft Tachometer Output
4	SXT Shaft Input
5	SCT Trunnion Tachometer Output
6	SCT Trunnion Input
7	SCT Shaft Tachometer Output
8	SCT Shaft Input
9	2X TRUNNION CDU Tachometer Output
10	2X TRUNNION CDU 16X Resolver Error Signal
11	SHAFT ANGLE CDU Tachometer Output
12	SHAFT ANGLE CDU 16X Resolver Error Signal
13	STAR TRACKER Preamp Signal
14	STAR TRACKER X Drive Signal
15	STAR TRACKER Y Drive Signal
16	HORIZON PHOTOMETER Signal

MONITOR TEST POINTS	SIGNAL
1	SXT Trunnion MDA Output
2	SXT Shaft MDA Output
3	SCT Trunnion MDA Output
4	SCT Shaft MDA Output
5	2X TRUNNION CDU MDA Output
6	SHAFT ANGLE CDU MDA Output

5-7 DEFINITION OF SYMBOLS AND ABBREVIATIONS.

5-7.1 CDU; Coupling Display Unit

5-7.2 DAC; Digital to Analog Converter

5-7.3 AGC; Apollo Guidance Computer

5-7.4 IMU; Inertial Measurement Unit

5-7.5 SXT; Sextant

5-7.6 SCT; Scanning Telescope

5-7.7 LOS; line-of-sight

5-7.7.1 StLOS; star line-of-sight

5-7.7.2 LLOS; landmark line-of-sight

5-7.7.3 TkLOS; Star Tracker line-of-sight

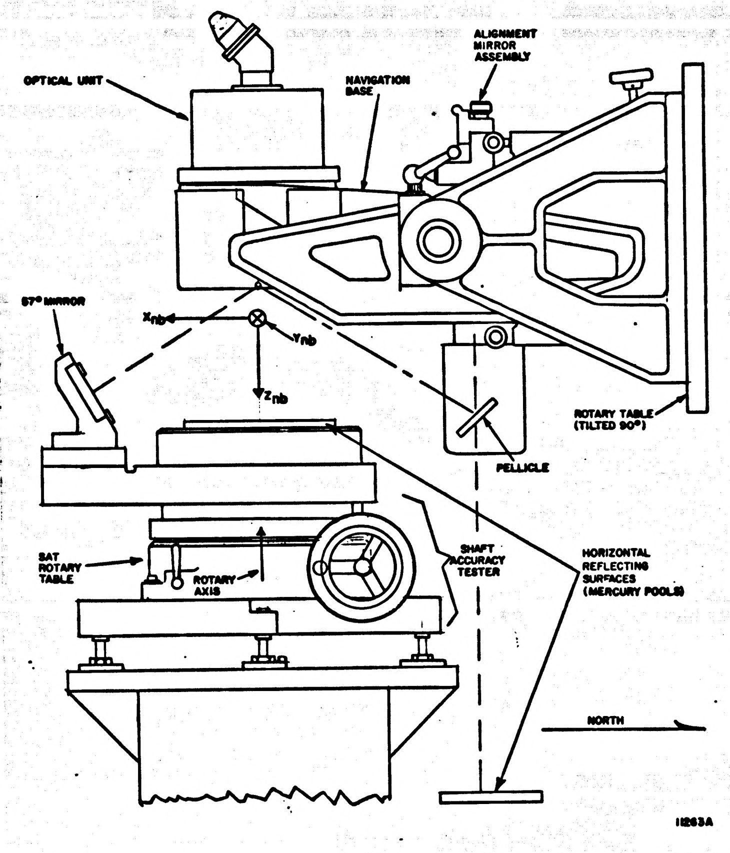
5-7.7.4 HPLOS; Horizon Photometer line-of-sight

5-7.8 MDA; Motor Drive Amplifier

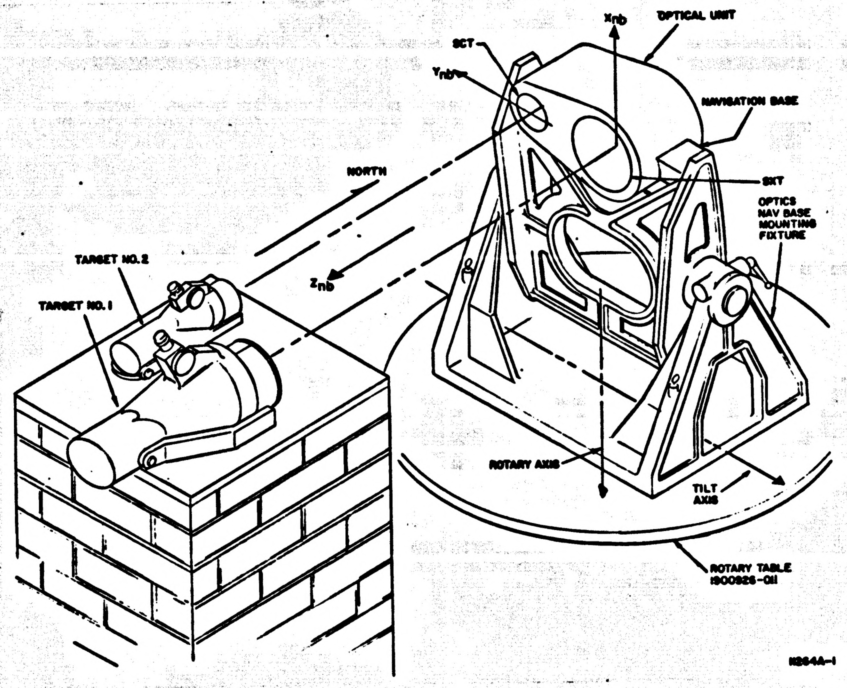
5-7.9 X_{nb}, Y_{nb}, Z_{nb}; Axes defined by the IMU mounting pads and alignment pins.

5-7.10 TPAC; Telescope Panel Angle Counter

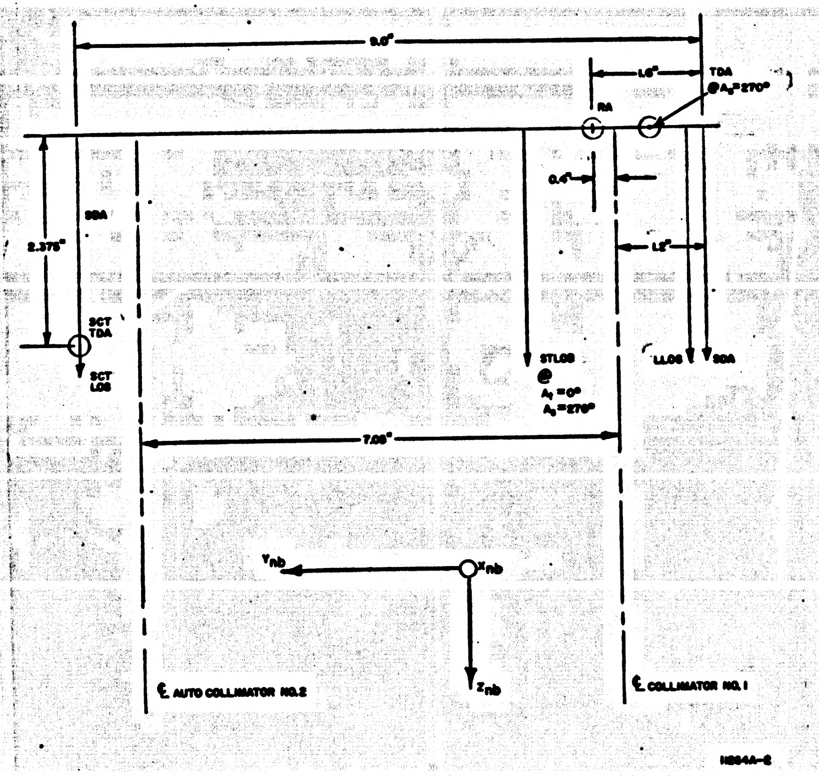
Notice: When NASA drawings, specifications, or other data are used for any purpose other than in connection with a definitely related NASA procurement operation, the National Aeronautics and Space Administration thereby incurs no responsibility nor any obligation whatsoever; and the fact that NASA may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.


ALIGNMENT MIRROR ASSEMBLY
OPTICAL UNIT
NAVIGATION BASE
57° MIRROR
X_{nb}
Y_{nb}
Z_{nb}
ROTARY TABLE (TILTED 90°)
PELLICLE
SAT ROTARY TABLE
ROTARY AXIS
SHAFT ACCURACY TESTER
HORIZONTAL REFLECTING SURFACES (MERCURY POOLS)
NORTH
11263A

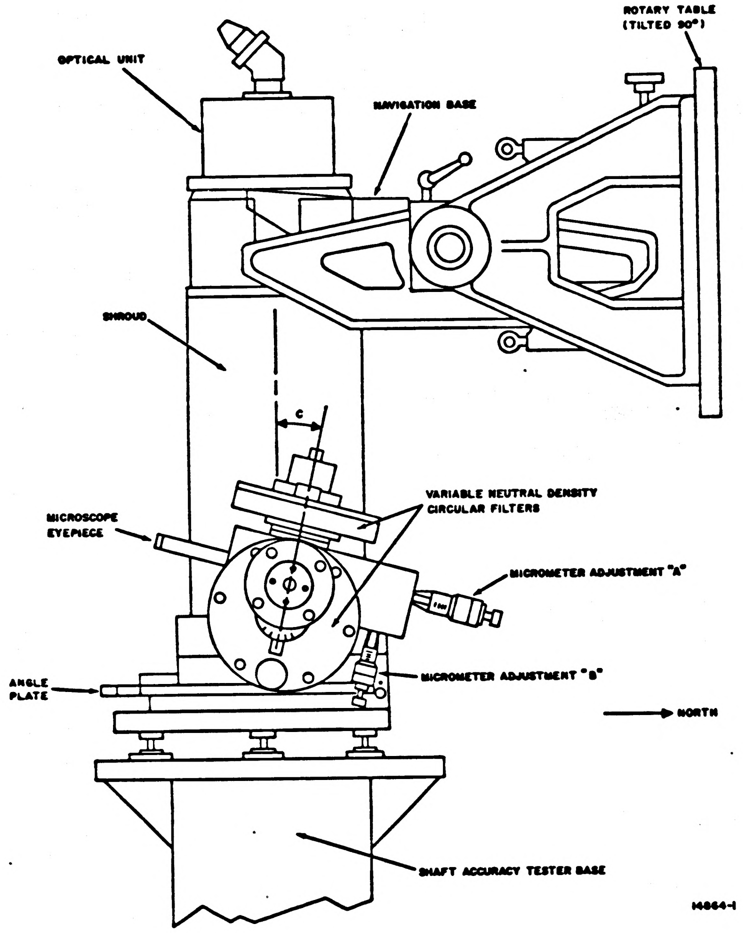
ALIGNMENT AND SHAFT ACCURACY TEST CONFIGURATION
FIGURE 1


X_{nb}
OPTICAL UNIT
SCT
Y_{nb}
NAVIGATION BASE
NORTH
SXT
OPTICS
NAV BASE
MOUNTING
FIXTURE
TARGET NO. 2
Z_{nb}
TARGET NO. 1
ROTARY AXIS
TILT
AXIS
ROTARY TABLE
1900926-011
H264A-1

TRUNNION ACCURACY TEST CONFIGURATION
FIGURE 2 (Sheet 1 of 2)


9.0"
1.6"
TDA
@ A_s=270°
RA
0.4"
SDA
2.375"
1.2"
SCT
TDA
SCT
LOS
STLOS
@
A_t =0°
A_s =270°
LLOS
SDA
7.09"
Y_{nb}
X_{nb}
Z_{nb}
℄ AUTO COLLIMATOR NO.2
℄ COLLIMATOR NO.1
H264A-2

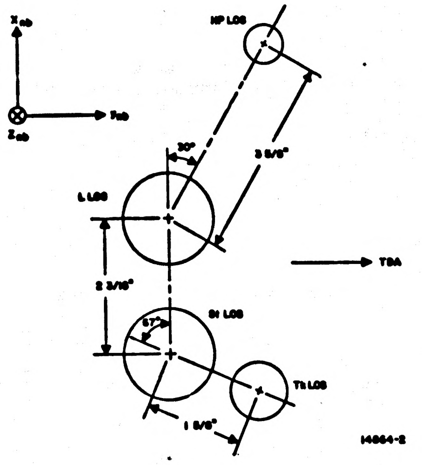
TRUNNION ACCURACY TEST CONFIGURATION
FIGURE 2 (Sheet 2 of 2)


ROTARY TABLE
(TILTED 90°)
OPTICAL UNIT
NAVIGATION BASE
SHROUD
C
VARIABLE NEUTRAL DENSITY
CIRCULAR FILTERS
MICROSCOPE
EYEPIECE
MICROMETER ADJUSTMENT "A"
MICROMETER ADJUSTMENT "B"
ANGLE
PLATE
NORTH
SHAFT ACCURACY TESTER BASE
14864-1

STAR TRACKER AND HORIZON PHOTOMETER
TEST CONFIGURATION
FIGURE 3 (Sheet 1 of 2)

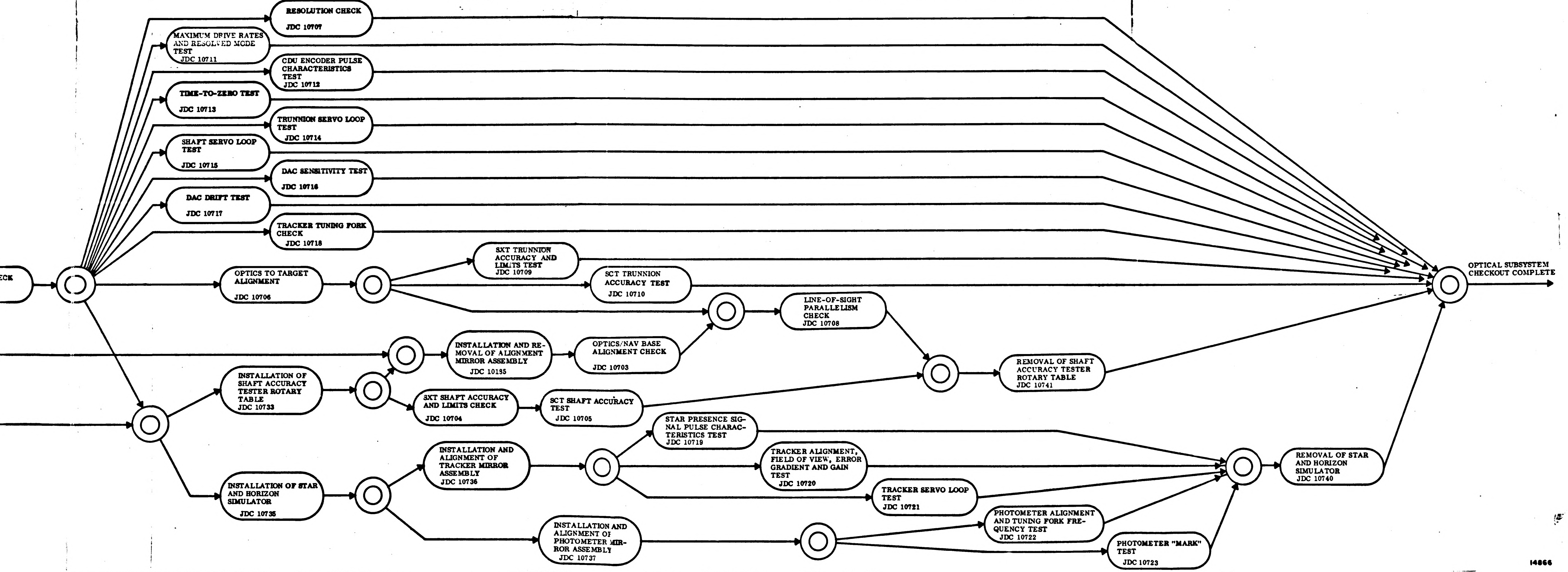
Aperature Diameters (inches):

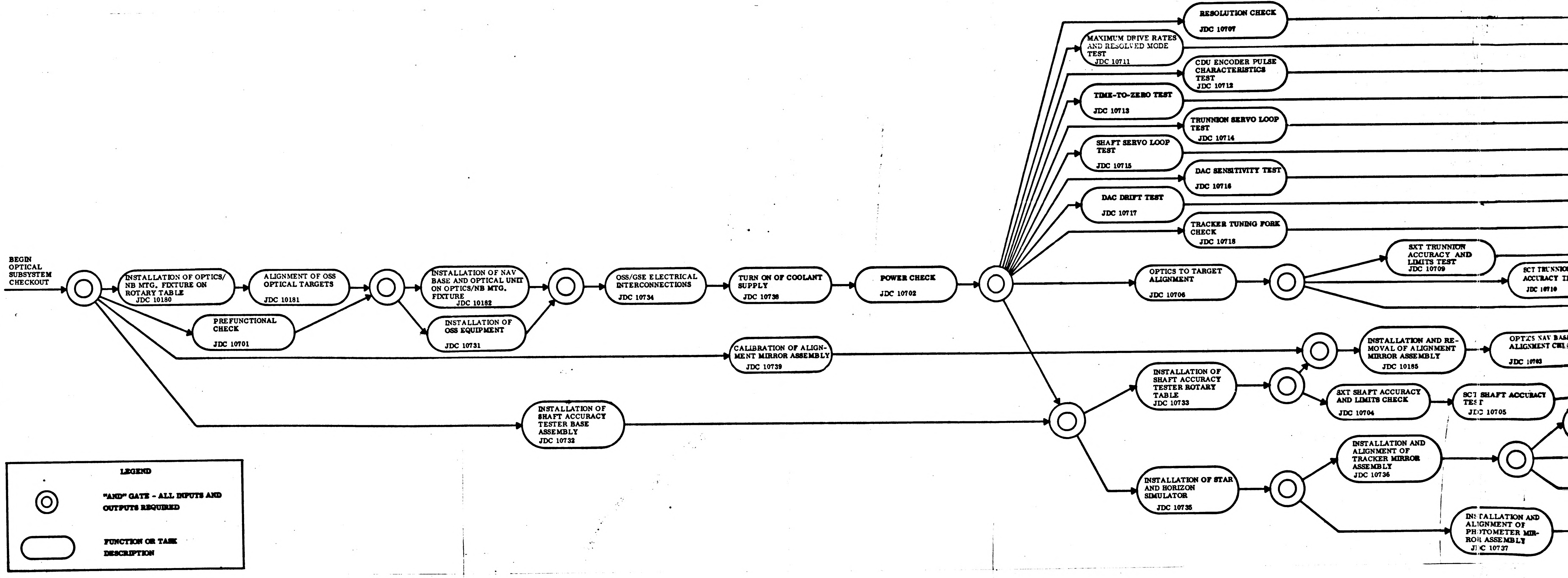
HPLOS---0.594
TkLOS---0.875
StLOS--- 1.46
LLOS--- 1.46


X_{nb}
Y_{nb}
Z_{nb}
HP LOS
30°
3 5/8"
L LOS
TSA
2 3/16"
St LOS
57°
Tk LOS
1 5/8"
14864-2

SXT LINES OF SIGHT WHEN $A_s = 0°$, $A_t = 0°$,
AND ROTARY TABLE TILT AXIS = 90°.

STAR TRACKER AND HORIZON PHOTOMETER
TEST CONFIGURATION
FIGURE 3 (Sheet 2 of 2)


ECK
RESOLUTION CHECK JDC 10707
MAXIMUM DRIVE RATES AND RESOLVED MODE TEST JDC 10711
CDU ENCODER PULSE CHARACTERISTICS TEST JDC 10712
TIME-TO-ZERO TEST JDC 10713
TRUNNION SERVO LOOP TEST JDC 10714
SHAFT SERVO LOOP TEST JDC 10715
DAC SENSITIVITY TEST JDC 10716
DAC DRIFT TEST JDC 10717
TRACKER TUNING FORK CHECK JDC 10718
OPTICS TO TARGET ALIGNMENT JDC 10706
SXT TRUNNION ACCURACY AND LIMITS TEST JDC 10709
SCT TRUNNION ACCURACY TEST JDC 10710
LINE-OF-SIGHT PARALLELISM CHECK JDC 10708
INSTALLATION AND REMOVAL OF ALIGNMENT MIRROR ASSEMBLY JDC 10135
OPTICS/NAV BASE ALIGNMENT CHECK JDC 10703
INSTALLATION OF SHAFT ACCURACY TESTER ROTARY TABLE JDC 10733
SXT SHAFT ACCURACY AND LIMITS CHECK JDC 10704
SCT SHAFT ACCURACY TEST JDC 10705
REMOVAL OF SHAFT ACCURACY TESTER ROTARY TABLE JDC 10741
STAR PRESENCE SIGNAL PULSE CHARACTERISTICS TEST JDC 10719
INSTALLATION AND ALIGNMENT OF TRACKER MIRROR ASSEMBLY JDC 10736
TRACKER ALIGNMENT, FIELD OF VIEW, ERROR GRADIENT AND GAIN TEST JDC 10720
INSTALLATION OF STAR AND HORIZON SIMULATOR JDC 10735
TRACKER SERVO LOOP TEST JDC 10721
PHOTOMETER ALIGNMENT AND TUNING FORK FREQUENCY TEST JDC 10722
INSTALLATION AND ALIGNMENT OF PHOTOMETER MIRROR ASSEMBLY JDC 10737
PHOTOMETER "MARK" TEST JDC 10723
REMOVAL OF STAR AND HORIZON SIMULATOR JDC 10740
OPTICAL SUBSYSTEM CHECKOUT COMPLETE
14866


BEGIN OPTICAL SUBSYSTEM CHECKOUT
INSTALLATION OF OPTICS/NB MTG. FIXTURE ON ROTARY TABLE JDC 10180
ALIGNMENT OF OSS OPTICAL TARGETS JDC 10181
PREFUNCTIONAL CHECK JDC 10701
INSTALLATION OF NAV BASE AND OPTICAL UNIT ON OPTICS/NB MTG. FIXTURE JDC 10182
INSTALLATION OF OSS EQUIPMENT JDC 10731
OSS/GSE ELECTRICAL INTERCONNECTIONS JDC 10734
TURN ON OF COOLANT SUPPLY JDC 10738
POWER CHECK JDC 10702
CALIBRATION OF ALIGNMENT MIRROR ASSEMBLY JDC 10739
INSTALLATION OF SHAFT ACCURACY TESTER BASE ASSEMBLY JDC 10732
RESOLUTION CHECK JDC 10707
MAXIMUM DRIVE RATES AND RESOLVED MODE TEST JDC 10711
CDU ENCODER PULSE CHARACTERISTICS TEST JDC 10712
TIME-TO-ZERO TEST JDC 10713
TRUNNION SERVO LOOP TEST JDC 10714
SHAFT SERVO LOOP TEST JDC 10715
DAC SENSITIVITY TEST JDC 10716
DAC DRIFT TEST JDC 10717
TRACKER TUNING FORK CHECK JDC 10718
OPTICS TO TARGET ALIGNMENT JDC 10706
SXT TRUNNION ACCURACY AND LIMITS TEST JDC 10709
SCT TRUNNIO ACCURACY I JDC 10710
INSTALLATION AND REMOVAL OF ALIGNMENT MIRROR ASSEMBLY JDC 10185
OPTICS NAV BAS ALIGNMENT CHE JDC 10703
INSTALLATION OF SHAFT ACCURACY TESTER ROTARY TABLE JDC 10733
SXT SHAFT ACCURACY AND LIMITS CHECK JDC 10704
SCT SHAFT ACCURACY TEST JDC 10705
INSTALLATION OF STAR AND HORIZON SIMULATOR JDC 10735
INSTALLATION AND ALIGNMENT OF TRACKER MIRROR ASSEMBLY JDC 10736
INSTALLATION AND ALIGNMENT OF PHOTOMETER MIRROR ASSEMBLY JDC 10737
LEGEND
"AND" GATE - ALL INPUTS AND OUTPUTS REQUIRED
FUNCTION OR TASK DESCRIPTION

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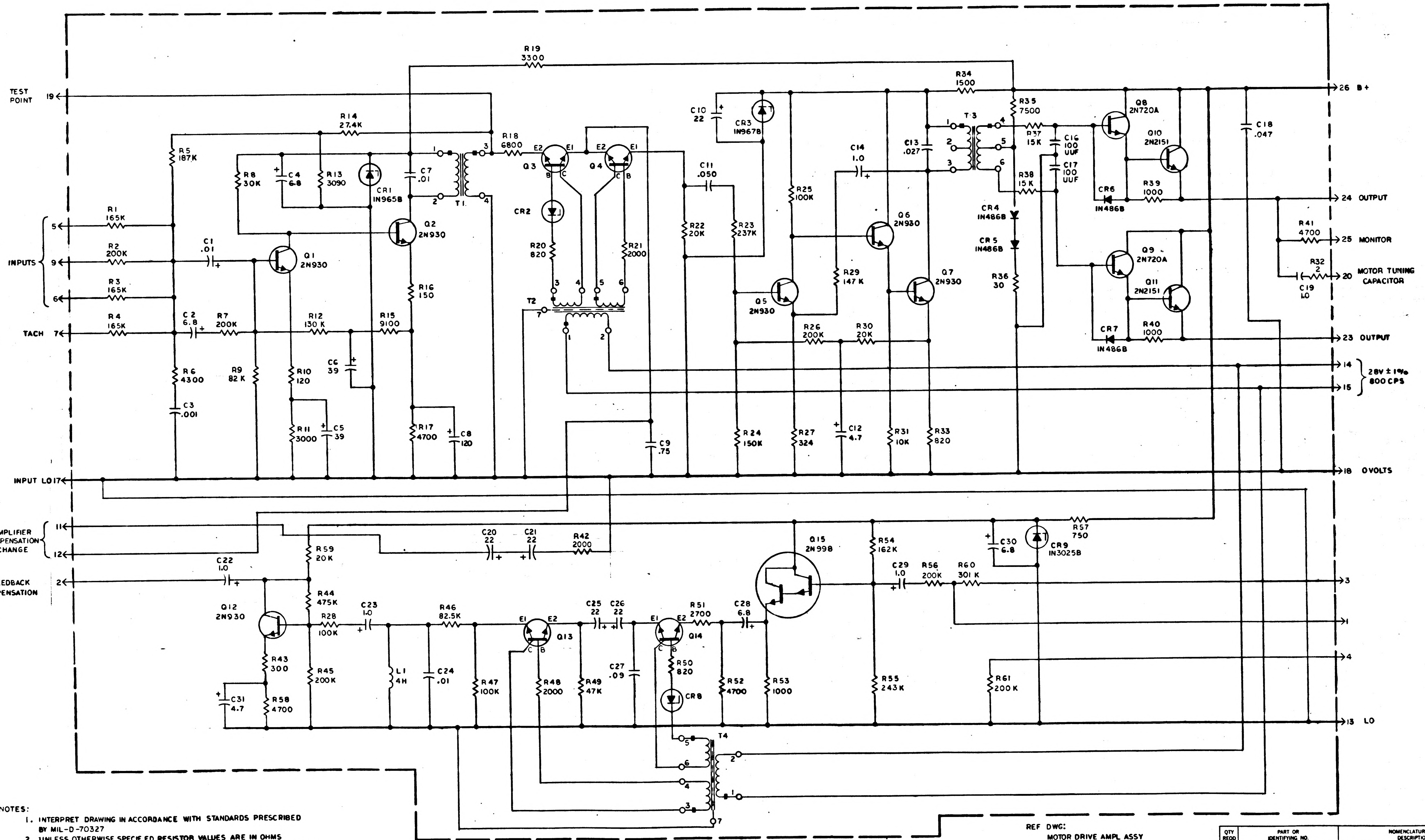
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	[illegible]	[illegible]



TEST POINT 19
R19 3300
R14 27.4K
R18 6800
R5 187K
R8 30K
C4 6.8
R13 3090
CR1 1N965B
C7 .01
T1
1 2 3 4
E2 E1 Q3 B C
E2 E1 Q4 C B
CR2
R20 820
R21 2000
3 4 5 6
T2 7
1 2
Q2 2N930
INPUTS
5 R1 165K
9 R2 200K
6 R3 165K
C1 .01
Q1 2N930
TACH 7 R4 165K
C2 6.8
R7 200K
R12 130 K
R15 9100
R16 150
C6 39
R6 4300
R9 82 K
R10 120
C3 .001
R11 3000
C5 39
R17 4700
C8 120
C9 .75
INPUT LO 17
C10 22
CR3 1N967B
C11 .050
R22 20K
R23 237K
R25 100K
C14 1.0
R34 1500
C13 .027
T3
1 2 3 4 5 6
R35 7500
R37 15K
C16 100 UUF
C17 100 UUF
R38 15 K
CR4 1N486B
CR5 1N486B
R36 30
Q6 2N930
Q5 2N930
Q7 2N930
R29 147 K
R26 200K
R30 20K
R24 150K
R27 324
C12 4.7
R31 10K
R33 820
Q8 2N720A
Q10 2N2151
CR6 1N486B
R39 1000
C18 .047
26 B+
24 OUTPUT
R41 4700
25 MONITOR
R32 2
C19 1.0
20 MOTOR TUNING CAPACITOR
Q9 2N720A
Q11 2N2151
CR7 1N486B
R40 1000
23 OUTPUT
14
15
28V ± 1% 800 CPS
18 0 VOLTS
AMPLIFIER COMPENSATION CHANGE
11
12
C20 22
C21 22
R42 2000
R59 20K
FEEDBACK COMPENSATION 2
C22 1.0
Q12 2N930
R44 475K
R28 100K
C23 1.0
R46 82.5K
E1 E2 Q13 C B
C25 22
C26 22
E1 E2 Q14 C B
R51 2700
C28 6.8
Q15 2N998
R54 162K
C29 1.0
R56 200K
R60 301 K
C30 6.8
CR9 1N3025B
R57 750
3
1
4
R43 300
C31 4.7
R58 4700
R45 200K
L1 4H
C24 .01
R47 100K
R48 2000
R49 47K
C27 .09
R50 820
CR8
R52 4700
R53 1000
R55 243K
R61 200 K
13 LO
T4
5 6 4 3 7
2 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DWG:
MOTOR DRIVE AMPL ASSY
DWG NO. 1007581

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CONTRACT
DRAWN A. D. Lee DATE 25 JUN 64
CHECKED [illegible]
APPROVAL R.C. [illegible] 9-30-64
APPROVAL [illegible] 2-8-64
NASA APPROVAL W. J. [illegible] 10-14-64
MIT APPROVAL [illegible]

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HOUSTON, TEXAS

SCHEMATIC,
MOTOR DRIVE AMPLIFIER

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009503
SCALE —
WT —
SHEET 1 OF 2

MASTER

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REVISIONS / 3732			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	[illegible]	WJC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364-677	RESISTOR	165K	± 1%	1/8 W
R 2	-693		200K		
R 3	-677		165K		
R 4	-677		165K		
R 5	↓ -687		187 K	↓	↓
R 6	1006750-47		4300	± 2%	1/4 W
R 7	1010369-88		200K	± 5%	1/8 W
R 8	1006750-67		30K	± 2%	1/4 W
R 9	-78		82K		
R 10	-10		120		
R 11	-43		3000		
R 12	↓ -83		130K	↓	↓
R 13	1010364-345		3090	± 1%	1/8 W
R 14	1010364-527		27.4K	± 1%	1/8 W
R 15	1006750-55		9100	± 2%	1/4 W
R 16	-12		150		
R 17	-48		4700		
R 18	-52		6800		
R 19	-44		3300		
R 20	-30		820		
R 21	-39		2000		
R 22	↓ -63		20K	↓	↓
R 23	1010364-707		237K	± 1%	1/8 W
R 24	1010364-669		150K	± 1%	1/8 W
R 25	1006750-80		100K	± 2%	1/4 W
R 26	1010364-693		200K	± 1%	1/8 W
R 27	-157		324		
R 28	-635		100K		
R 29	↓ -667		147 K	↓	↓
R 30	1006750-63		20 K	± 2%	1/4 W
R 31	1006750-56		10 K	±2%	1/4W
R 32	1006788-22		2	±1%	1/4W
R 33	1006750-30		820	±2%	1/4W
R 34	-36		1500		
R 35	↓ -53		7500	↓	↓
R 36	1010369-138		30	± 5%	1/8 W
R 37	1006750-60		15K	± 2%	1/4 W
R 38	-60		15K		
R 39	-32		1000		
R 40	-32		1000		
R 41	-48		4700		
R 42	-39		2000		
R 43	↓ -19		300	↓	↓
R 44	1010364-765		475K	± 1%	1/8 W
R 45	-693		200K		
R 46	↓ -619		82.5K	↓	↓
R 47	1006750-80		100K	± 2%	1/4 W
R 48	-39		2000		
R 49	-72		47K		
R 50	-30		820		
R 51	-42		2700		
R 52	-48		4700		
R 53	↓ -32		1000	↓	↓
R 54	1010364-675		162K	± 1%	1/8 W
R 55	-709		243K		
R 56	↓ -693		200K		↓
R 57	1010604-16		750	↓	1 W
R 58	1006750-48		4700	2%	1/4 W
R 59	1006750-63		20K	2%	1/4 W
R 60	1010364-727	↓	301K	1%	1/8 W
R 61	1010364-693	RESISTOR	200K	1%	1/8 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010264-13	CAPACITOR	.01	± 5%	200VDC
C 2	1006755-2		6.8	± 10%	6
C 3	1010264-1		.001	± 5%	200
C 4	1006755-2		6.8	± 10%	6
C 5	-13		39		10
C 6	↓ -13		39	↓	10
C 7	1010264-13		.01	± 5%	200
C 8	1006755-15		120	± 10%	10
C 9	1010279-110		.75		15
C 10	1006755-21		22		15
C 11	1010279-216		.050		35
C 12	1006755-10		4.7	↓	10
C 13	1010264-18		.027	± 5%	200
C 14	1006755-69		1.0	± 10%	35
C 16	1010359-5		100UUF	± 10%	200
C 17	1010359-5		100UUF	± 10%	200
C 18	1010264-21		.047	± 5%	200
C 19	1010264-37		1.0	± 5%	200
C 20	1006755-21		22	±10%	15
C 21	-21		22		15
C 22	-69		1.0		35
C 23	↓ -69		1.0	↓	35
C 24	1010264-13		.01	± 5%	200
C 25	1006755-21		22	± 10%	15
C 26	1006755-21		22		15
C 27	1010279-219		.09		35
C 28	1006755-79		6.8		35
C 29	-69		1.0		35
C 30	-79		6.8		35 ↓
C 31	↓ -10	↓	4.7	↓	10 VDC
L 1	1010277-6	INDUCTOR	4 H		
CR1	1010286-9	DIODE	IN965B		
CR2	1010372-11				
CR3	1010286-11		IN967B		
CR4	1010392-1		IN486B		
CR5	-1				
CR6	↓ -1		↓		
CR7	1010392-1		IN486B		
CR8	1010372-11				
CR9	1010265-10	↓	IN3025B		
Q 1	1010397-1	TRANSISTOR	2N930		
Q 2	1010397-1	TRANSISTOR	2N930		
Q 3	1010367	CHOPPER			
Q 4	1010367	CHOPPER			
Q 5	1010397-1	TRANSISTOR	2N930		
Q 6	1010397-1		2N930		
Q 7	1010397-1		2N930		
Q 8	1010357-1		2N720A		
Q 9	1010357-1		2N720A		
Q10	1010269-2		2N2151	MATCHED PAIR	
Q11					
Q12	1010397-1	↓	2N930		
Q13	1010367	CHOPPER			
Q14	1010367	CHOPPER			
Q15	1010342	TRANSISTOR	2N998		
T 1	1010759	TRANSFORMER			
T 2	1010753				
T 3	1010752				
T 4	1010753	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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FINAL FINISH —

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DRAWN A. DiLeo DATE 25 JUN 64
CHECKED [illegible]
APPROVAL R.C. [illegible] 9-30-64
APPROVAL D.A. Koso 10-8-64
NASA APPROVAL W. J. [illegible] 10-14-64
MIT APPROVAL [illegible]

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SCHEMATIC,
MOTOR DRIVE AMPLIFIER

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009503
SCALE —
WT —
SHEET 2 OF 2

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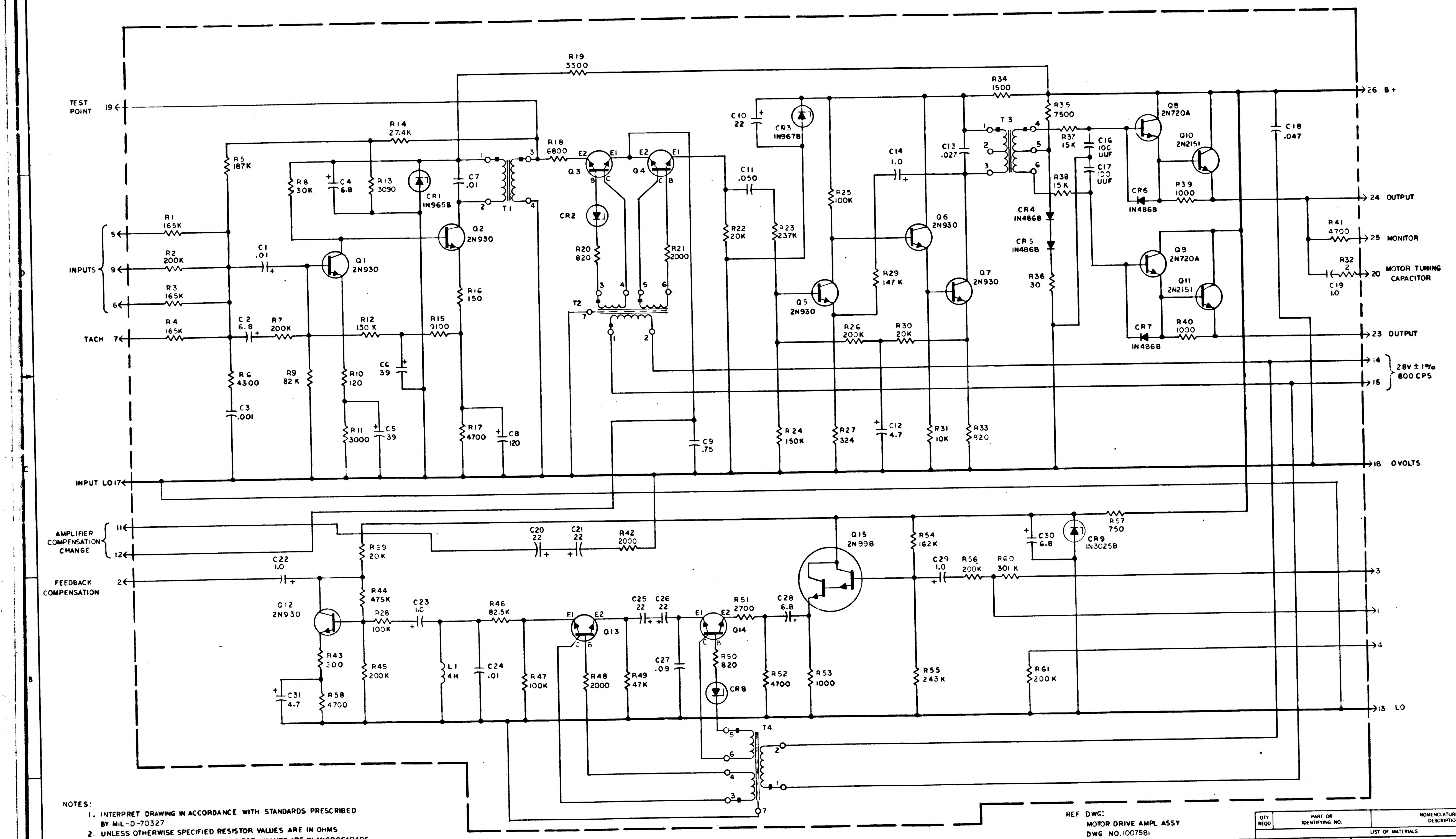
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	28 DEC 64	
B	REVISED PER TDRR-16839	4-MAR-65	


TEST POINT
19
INPUTS
5
9
6
TACH
7
INPUT LO 17
AMPLIFIER COMPENSATION CHANGE
11
12
FEEDBACK COMPENSATION
2
R1 165K
R2 200K
R3 165K
R4 165K
R5 187K
R6 4300
C3 .001
C1 .01
C2 6.8
R7 200K
R8 30K
C4 6.8
R13 3090
R14 27.4K
CR1 1N965B
C7 .01
T1
1
2
3
4
Q1 2N930
Q2 2N930
R9 82 K
R10 120
R11 3000
C5 39
R12 130 K
C6 39
R15 9100
R16 150
R17 4700
C8 120
R19 3300
R18 6800
E2
E1
B
C
Q3
Q4
CR2
R20 820
R21 2000
T2
3
4
5
6
7
1
2
C9 .75
C10 22
CR3 1N967B
C11 .050
R22 20K
R23 237K
R24 150K
Q5 2N930
R25 100K
R26 200K
R27 324
C12 4.7
C14 1.0
Q6 2N930
R29 147 K
R30 20K
Q7 2N930
R31 10K
R33 820
C13 .027
R34 1500
T3
1
2
3
4
5
6
R35 7500
R37 15K
R38 15 K
CR4 1N486B
CR5 1N486B
R36 30
C16 100 UUF
C17 100 UUF
Q8 2N720A
Q10 2N2151
CR6 1N486B
R39 1000
Q9 2N720A
Q11 2N2151
CR7 1N486B
R40 1000
C18 .047
R41 4700
R32 2
C19 1.0
26 B+
24 OUTPUT
25 MONITOR
20 MOTOR TUNING CAPACITOR
23 OUTPUT
14
15
28V ± 1% 800 CPS
18 0 VOLTS
C20 22
C21 22
R42 2000
C22 1.0
R59 20K
R44 475K
Q12 2N930
R28 100K
R43 300
R58 4700
C31 4.7
R45 200K
C23 1.0
L1 4H
C24 .01
R46 82.5K
R47 100K
E1
E2
Q13
C
B
R48 2000
R49 47K
C25 22
C26 22
C27 .09
E1
E2
Q14
C
B
R50 820
CR8
R51 2700
R52 4700
C28 6.8
R53 1000
T4
5
6
4
3
7
2
1
Q15 2N998
R54 162K
R55 243K
C29 1.0
R56 200K
R60 301 K
C30 6.8
CR9 1N3025B
R57 750
R61 200 K
3
1
4
13 LO

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DWG:
MOTOR DRIVE AMPL ASSY
DWG NO. 1007581

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
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NASA APPROVAL W. J. Rhine 10-14-64
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CODE IDENT NO —
SIZE E
NASA DRAWING NO 1009503
SCALE —
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SHEET 1 OF 2

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REVISIONS 3793

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	28 DEC 64	WK
B	REVISED PER TDRR-16835	4-MAR-65	JB

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364-677	RESISTOR	165K	± 1 %	1/8 W
R 2	-693		200K		
R 3	-677		165K		
R 4	-677		165K		
R 5	↓ -687		187 K	↓	↓
R 6	1006750-47		4300	± 2 %	1/4 W
R 7	1010369-88		200K	± 5 %	1/8 W
R 8	1006750-67		30K	± 2 %	1/4 W
R 9	-78		82K		
R 10	-10		120		
R 11	-43		3000		
R 12	↓ -83		130K	↓	↓
R 13	1010364-345		3090	± 1 %	1/8 W
R 14	1010364-527		27.4K	± 1 %	1/8 W
R 15	1006750-55		9100	± 2 %	1/4 W
R 16	-12		150		
R 17	-48		4700		
R 18	-52		6800		
R 19	-44		3300		
R 20	-30		820		
R 21	-39		2000		
R 22	↓ -63		20K	↓	↓
R 23	1010364-707		237K	± 1 %	1/8 W
R 24	1010364-669		150K	± 1 %	1/8 W
R 25	1006750-80		100K	± 2 %	1/4 W
R 26	1010364-693		200K	± 1 %	1/8 W
R 27	-157		324		
R 28	-633		100K		
R 29	↓ -667		147K	↓	↓
R 30	1006750-63		20K	± 2 %	1/4 W
R 31	1006750-56		10K	±2%	1/4 W
R 32	1006788-22		2	± 1%	1/4W
R 33	1006750-30		820	±2%	1/4W
R 34	-36		1500		
R 35	↓ -53		7500	↓	↓
R 36	1010369-138		30	± 5 %	1/8 W
R 37	1006750-60		15K	± 2 %	1/4 W
R 38	-60		15K		
R 39	-32		1000		
R 40	-32		1000		
R 41	-48		4700		
R 42	-39		2000		
R 43	↓ -19		300	↓	↓
R 44	1010364-765		475K	± 1 %	1/8 W
R 45	-693		200K		
R 46	↓ -619		82.5K	↓	↓
R 47	1006750-80		100K	± 2 %	1/4 W
R 48	-39		2000		
R 49	-72		47K		
R 50	-30		820		
R 51	-42		2700		
R 52	-48		4700		
R 53	↓ -32		1000	↓	↓
R 54	1010364-675		162K	± 1 %	1/8 W
R 55	-709		243K		
R 56	↓ -693		200K		↓
R 57	1010604 -16		750	↓	1 W
R 58	1006750-48		4700	2 %	1/4 W
R 59	1006750-63		20K	2 %	1/4 W
R 60	1010364-727	↓	301K	1 %	1/8 W
R 61	1010364-693	RESISTOR	200K	1 %	1/8 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010264-13	CAPACITOR	.01	± 5 %	200VDC
C 2	1006755-2		6.8	± 10 %	6
C 3	1010264-1		.001	± 5 %	200
C 4	1006755-2		6.8	± 10 %	6
C 5	-13		39		10
C 6	↓ -13		39	↓	10
C 7	1010264-13		.01	± 5 %	200
C 8	1006755-15		120	± 10 %	10
C 9	1010279-110		.75		15
C 10	1006755-21		22		15
C 11	1010279-216		.050		35
C 12	1006755-10		4.7	↓	10
C 13	1010264-18		.027	± 5 %	200
C 14	1006755-69		1.0	± 10 %	35
C 16	1010359-5		100UUF	± 10%	200
C 17	1010359-5		100UUF	± 10%	200
C 18	1010264-21		.047	± 5 %	200
C 19	1010264-37		1.0	± 5%	200
C 20	1006755-21		22	±10%	15
C 21	-21		22		15
C 22	-69		1.0		35
C 23	↓ -69		1.0	↓	35
C 24	1010264-13		.01	± 5 %	200
C 25	1006755-21		22	± 10%	15
C 26	1006755-21		22		15
C 27	1010279-219		.09		35
C 28	1006755-79		6.8		35
C 29	-69		1.0		35
C 30	-79		6.8		35 ↓
C 31	↓ -10	↓	4.7	↓	10 VDC
L 1	1010277-6	INDUCTOR	4 H		
CR1	1010830-9	DIODE	IN965B		
CR2	1010372-11				
CR3	1010830-11		IN967B		
CR4	1010392-1		IN486B		
CR5	-1				
CR6	↓ -1		↓		
CR7	1010392-1		IN486B		
CR8	1010372-11				
CR9	1010265-10	↓	IN3025B		
Q 1	1010397-1	TRANSISTOR	2N930		
Q 2	1010397-1	TRANSISTOR	2N930		
Q 3	1010367	CHOPPER			
Q 4	1010367	CHOPPER			
Q 5	1010397-1	TRANSISTOR	2N 930		
Q 6	1010397-1		2N 930		
Q 7	1010397-1		2N 930		
Q 8	1010357-1		2N 720A		
Q 9	1010357-1		2N 720A		
Q10 Q11	1010269-2		2N2151	MATCHED PAIR	
Q12	1010397-1	↓	2N930		
Q13	1010367	CHOPPER			
Q14	1010 367	CHOPPER			
Q15	1010 342	TRANSISTOR	2N998		
T 1	1010759	TRANSFORMER			
T 2	1010753				
T 3	1010752				
T 4	1010753	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN A. Di Leo DATE 23 JUN 64
CHECKED
APPROVAL R.C. 9-30-64
APPROVAL 10-8-64
NASA APPROVAL 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

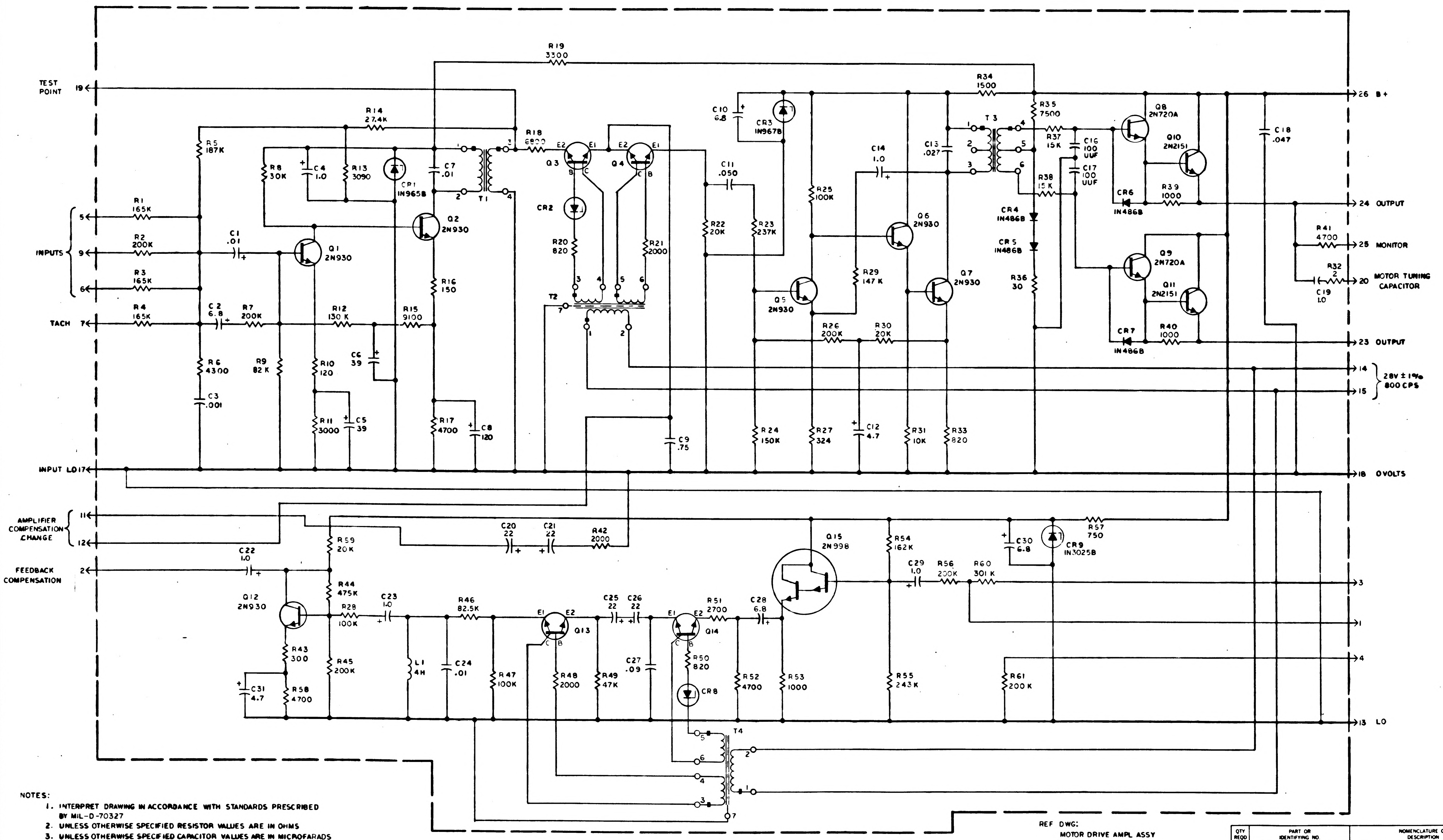
SCHEMATIC,
MOTOR DRIVE AMPLIFIER

CODE IDENT NO —
SIZE E
NASA DRAWING NO 1009503
SCALE —
WT —
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	28DEC.64	WR
B	REVISED PER TDRR-16839	4-MAR-65	
C	REVISED PER TDRR 18122	9-APR-65	MEM



TEST POINT 19
INPUTS 5 9 6
TACH 7
INPUT LO 17
AMPLIFIER COMPENSATION CHANGE 11 12
FEEDBACK COMPENSATION 2
R1 165K
R2 200K
R3 165K
R4 165K
R5 187K
R6 4300
R7 200K
R8 30K
R9 82K
R10 120
R11 3000
R12 130K
R13 3090
R14 27.4K
R15 9100
R16 150
R17 4700
R18 6800
R19 3300
R20 820
R21 2000
R22 20K
R23 237K
R24 150K
R25 100K
R26 200K
R27 324
R28 100K
R29 147K
R30 20K
R31 10K
R32 2
R33 820
R34 1500
R35 7500
R36 30
R37 15K
R38 15K
R39 1000
R40 1000
R41 4700
R42 2000
R43 300
R44 475K
R45 200K
R46 82.5K
R47 100K
R48 2000
R49 47K
R50 820
R51 2700
R52 4700
R53 1000
R54 162K
R55 243K
R56 200K
R57 750
R58 4700
R59 20K
R60 301K
R61 200K
C1 .01
C2 6.8
C3 .001
C4 1.0
C5 39
C6 39
C7 .01
C8 120
C9 .75
C10 6.8
C11 .050
C12 4.7
C13 .027
C14 1.0
C16 100 UUF
C17 100 UUF
C18 .047
C19 1.0
C20 22
C21 22
C22 1.0
C23 1.0
C24 .01
C25 22
C26 22
C27 .09
C28 6.8
C29 1.0
C30 6.8
C31 4.7
L1 4H
CR1 1N965B
CR2
CR3 1N967B
CR4 1N486B
CR5 1N486B
CR6 1N486B
CR7 1N486B
CR8
CR9 1N3025B
Q1 2N930
Q2 2N930
Q3
Q4
Q5 2N930
Q6 2N930
Q7 2N930
Q8 2N720A
Q9 2N720A
Q10 2N2151
Q11 2N2151
Q12 2N930
Q13
Q14
Q15 2N998
T1
T2
T3
T4
E1 E2 B C
26 B+
24 OUTPUT
25 MONITOR
20 MOTOR TUNING CAPACITOR
23 OUTPUT
14
15
28V ± 1% 800 CPS
18 0 VOLTS
3
1
4
13 LO

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DWG:
MOTOR DRIVE AMPL ASSY
DWG NO.1007581

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. D. Lee DATE 25 JUN 64
CHECKED [illegible] 15 Jul 64
APPROVAL R.C. [illegible] 9-30-64
APPROVAL [illegible] 2-8-64
NASA APPROVAL W J R[illegible] 10-14-64
MIT APPROVAL [illegible] 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, MOTOR DRIVE AMPLIFIER

CODE IDENT NO —
SIZE E
NASA DRAWING NO 1009503
SCALE —
WT —
SHEET 1 OF 2

1009503 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	28 DEC 64	
B	REVISED PER TDRR-16835	4-MAR-65	JR
C	REVISED PER TDRR 18122	9-APR-65	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364-677	RESISTOR	165K	± 1%	1/8 W
R 2	-693		200K		
R 3	-677		165K		
R 4	-677		165K		
R 5	↓ -687		187K	↓	↓
R 6	1006750-47		4300	± 2%	1/4 W
R 7	1010369-88		200K	± 5%	1/8 W
R 8	1006750-67		30K	± 2%	1/4 W
R 9	-78		82K		
R 10	-10		120		
R 11	-43		3000		
R 12	↓ -83		130K	↓	↓
R 13	1010364-345		3090	± 1%	1/8 W
R 14	1010364-527		27.4K	± 1%	1/8 W
R 15	1006750-55		9100	± 2%	1/4 W
R 16	-12		150		
R 17	-48		4700		
R 18	-52		6800		
R 19	-44		3300		
R 20	-30		820		
R 21	-39		2000		
R 22	↓ -63		20K	↓	↓
R 23	1010364-707		237K	± 1%	1/8 W
R 24	1010364-669		150K	± 1%	1/8 W
R 25	1006750-80		100K	± 2%	1/4 W
R 26	1010364-693		200K	± 1%	1/8 W
R 27	-157		324		
R 28	-635		100K		
R 29	↓ -667		147K	↓	↓
R 30	1006750-63		20K	± 2%	1/4 W
R 31	1006750-56		10K	±2%	1/4W
R 32	1006788-22		2	±1%	1/4W
R 33	1006750-30		820	±2%	1/4W
R 34	-36		1500		
R 35	↓ -53		7500	↓	↓
R 36	1010369-138		30	± 5%	1/8 W
R 37	1006750-60		15K	± 2%	1/4 W
R 38	-60		15K		
R 39	-32		1000		
R 40	-32		1000		
R 41	-48		4700		
R 42	-39		2000		
R 43	↓ -19		300	↓	↓
R 44	1010364-765		475K	± 1%	1/8 W
R 45	-693		200K		
R 46	↓ -619		82.5K	↓	↓
R 47	1006750-80		100K	± 2%	1/4 W
R 48	-39		2000		
R 49	-72		47K		
R 50	-30		820		
R 51	-42		2700		
R 52	-48		4700		
R 53	↓ -32		1000	↓	↓
R 54	1010364-675		162K	± 1%	1/8 W
R 55	-709		243K		
R 56	↓ -693		200K		↓
R 57	1010604-16		750	↓	1 W
R 58	1006750-48		4700	2%	1/4 W
R 59	1006750-63		20K	2%	1/4 W
R 60	1010364-727	↓	301K	1%	1/8 W
R 61	1010364-693	RESISTOR	200K	1%	1/8 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010264-13	CAPACITOR	.01	± 5%	200VDC
C 2	1006755-2		6.8	± 10%	6
C 3	1010264-1		.001	± 5%	200
C 4	1006755-69		1.0	± 10%	35
C 5	-13		39		10
C 6	↓ -13		39	↓	10
C 7	1010264-13		.01	± 5%	200
C 8	1006755-15		120	± 10%	10
C 9	1010279-110		.75		15
C 10	1006755-79		6.8		35
C 11	1010279-216		.050		35
C 12	1006755-10		4.7	↓	10
C 13	1010264-18		.027	± 5%	200
C 14	1006755-69		1.0	± 10%	35
C 16	1010359-5		100UUF	± 10%	200
C 17	1010359-5		100UUF	± 10%	200
C 18	1010264-21		.047	± 5%	200
C 19	1010264-37		1.0	± 5%	200
C 20	1006755-21		22	±10%	15
C 21	-21		22		15
C 22	-69		1.0		35
C 23	↓ -69		1.0	↓	35
C 24	1010264-13		.01	± 5%	200
C 25	1006755-21		22	± 10%	15
C 26	1006755-21		22		15
C 27	1010279-219		.09		35
C 28	1006755-79		6.8		35
C 29	-69		1.0		35
C 30	-79		6.8		35 ↓
C 31	↓ -10	↓	4.7	↓	10 VDC
L 1	1010277-6	INDUCTOR	4 H		
CR1	1010830-9	DIODE	1N965B		
CR2	1010372-11				
CR3	1010830-11		1N967B		
CR4	1010392-1		1N486B		
CR5	-1				
CR6	↓ -1		↓		
CR7	1010392-1		1N486B		
CR8	1010372-11				
CR9	1010265-10	↓	1N3025B		
Q 1	1010397-1	TRANSISTOR	2N930		
Q 2	1010397-1	TRANSISTOR	2N930		
Q 3	1010367	CHOPPER			
Q 4	1010367	CHOPPER			
Q 5	1010397-1	TRANSISTOR	2N930		
Q 6	1010397-1		2N930		
Q 7	1010397-1		2N930		
Q 8	1010357-1		2N720A		
Q 9	1010357-1		2N720A		
Q10	1010269-2		2N2151	MATCHED PAIR	
Q11					
Q12	1010397-1	↓	2N930		
Q13	1010367	CHOPPER			
Q14	1010367	CHOPPER			
Q15	1010342	TRANSISTOR	2N998		
T 1	1010759	TRANSFORMER			
T 2	1010753				
T 3	1010752				
T 4	1010753	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN A. DiLeo DATE 23 JUN 64
CHECKED
APPROVAL R.C. 9-30-64
APPROVAL 10-2-64
NASA APPROVAL W. J. 10-14-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
MOTOR DRIVE AMPLIFIER

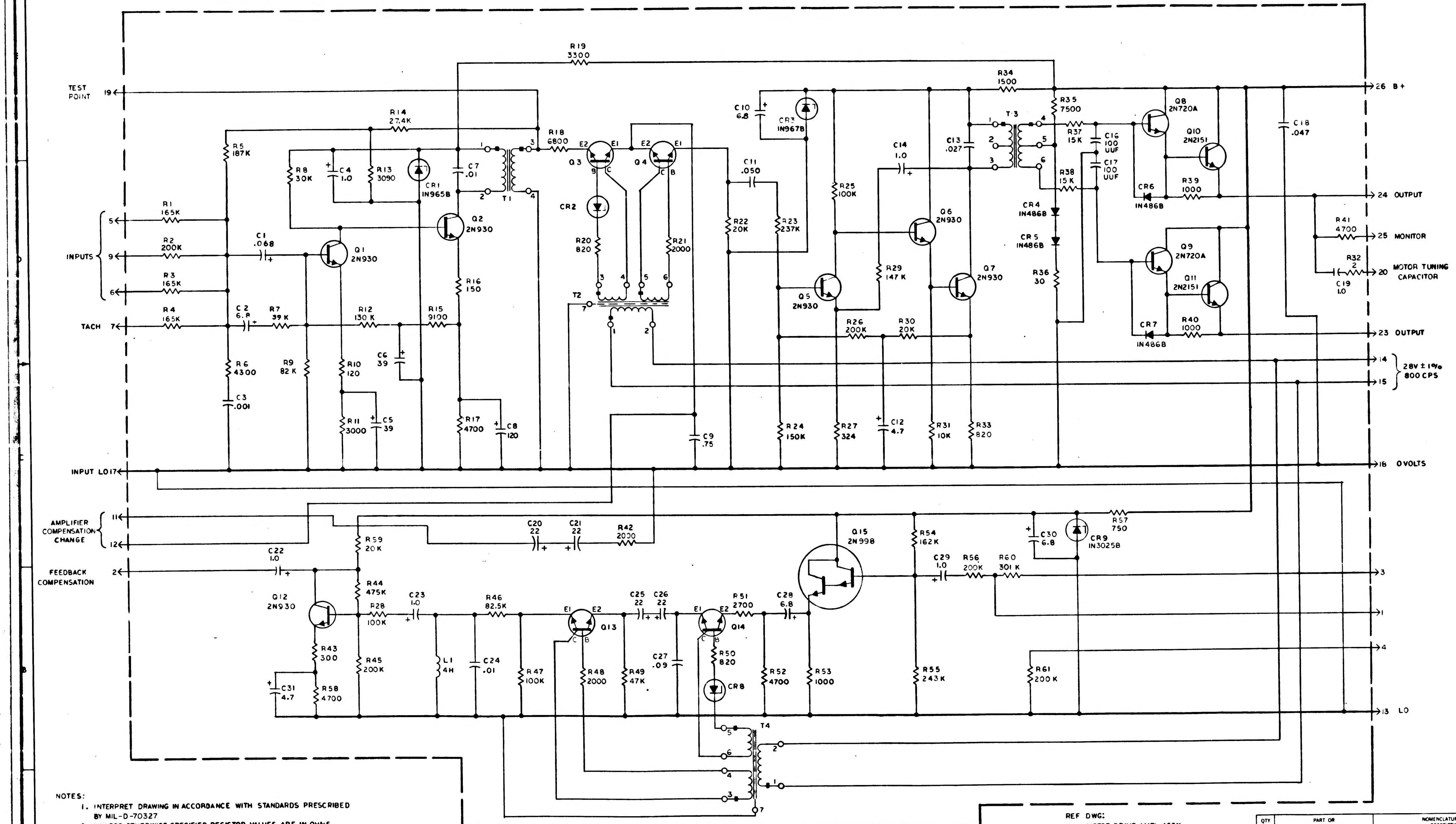
CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1009503
SCALE —
WT —
SHEET 2 OF 2

1009503 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	28 DEC 64	
B	REVISED PER TDRR-16839	4-MAR-65	
C	REVISED PER TDRR 18122	9-APR-65	
D	REVISED PER TDRR 21272	31 JUL 65	W.R. RWH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R19 3300
R14 27.4K
R18 6800
R5 187K
R8 30K
C4 1.0
R13 3090
CR1 1N965B
C7 .01
T1
Q3
Q4
E2 E1
CR2
R20 820
R21 2000
T2
C10 6.8
CR3 1N967B
C11 .050
R22 20K
R23 237K
R34 1500
R35 7500
T3
C13 .027
C14 1.0
R25 100K
Q6 2N930
R29 147K
Q5 2N930
Q7 2N930
R26 200K
R30 20K
R37 15K
R38 15K
C16 100 UUF
C17 100 UUF
CR4 1N486B
CR5 1N486B
R36 30
Q8 2N720A
Q10 2N2151
CR6 1N486B
R39 1000
Q9 2N720A
Q11 2N2151
CR7 1N486B
R40 1000
C18 .047
26 B+
24 OUTPUT
R41 4700
25 MONITOR
R32 2
C19 1.0
20 MOTOR TUNING CAPACITOR
23 OUTPUT
14
15
28V ± 1% 800 CPS
INPUTS
5
9
6
R1 165K
R2 200K
R3 165K
C1 .068
Q1 2N930
Q2 2N930
R16 150
TACH 7
R4 165K
C2 6.8
R7 39K
R12 130K
R15 9100
R6 4300
C3 .001
R9 82K
R10 120
C6 39
R11 3000
C5 39
R17 4700
C8 120
C9 .75
R24 150K
R27 324
C12 4.7
R31 10K
R33 820
INPUT LO 17
18 0 VOLTS
AMPLIFIER COMPENSATION CHANGE
11
12
FEEDBACK COMPENSATION 2
C20 22
C21 22
R42 2000
R59 20K
C22 1.0
Q12 2N930
R44 475K
R28 100K
C23 1.0
R46 82.5K
Q13
C25 22
C26 22
Q14
R51 2700
C28 6.8
Q15 2N998
R54 162K
C29 1.0
R56 200K
R60 301K
C30 6.8
CR9 1N3025B
R57 750
3
1
4
R43 300
C31 4.7
R58 4700
R45 200K
L1 4H
C24 .01
R47 100K
R48 2000
R49 47K
C27 .09
R50 820
CR8
R52 4700
R53 1000
R55 243K
R61 200K
13 LO
T4

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DWG:
MOTOR DRIVE AMPL ASSY
DWG NO. 1007581

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN J. D. Lee DATE 23 JUN 64
CHECKED [illegible]
APPROVAL R.C. [illegible] 9-30-64
APPROVAL [illegible] 9-8-64
NASA APPROVAL W. J. [illegible] 10-14-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
MOTOR DRIVE AMPLIFIER

CODE IDENT NO —
SIZE E
NASA DRAWING NO 1009503
SCALE —
WT —
SHEET 1 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15225	29 DEC 64	
B	REVISED PER TDRR-16835	4-MAR-65	
C	REVISED PER TDRR 18122	2-APR-65	
D	REVISED PER TDRR 21272	31 JUL 65	RWH

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-677	RESISTOR	165K	±1%	1/8 W
R2	-693		200K		
R3	-677		165K		
R4	-677		165K		
R5	↓ -687		187K	↓	↓
R6	1006750-47		4300	±2%	1/4 W
R7	1006750-70		39K	±2%	1/8 W
R8	1006750-67		30K	±2%	1/4 W
R9	-78		82K		
R10	-10		120		
R11	-43		3000		
R12	↓ -83		130K	↓	↓
R13	1010364-345		3090	±1%	1/8 W
R14	1010364-527		27.4K	±1%	1/8 W
R15	1006750-55		9100	±2%	1/4 W
R16	-12		150		
R17	-48		4700		
R18	-52		6800		
R19	-44		3300		
R20	-30		820		
R21	-39		2000		
R22	↓ -63		20K	↓	↓
R23	1010364-707		237K	±1%	1/8 W
R24	1010364-669		150K	±1%	1/8 W
R25	1006750-80		100K	±2%	1/4 W
R26	1010364-693		200K	±1%	1/8 W
R27	-157		324		
R28	-63[illegible]		100K		
R29	↓ -667		147K	↓	↓
R30	1006750-63		20K	±2%	1/4 W
R31	1006750-56		10K	±2%	1/4 W
R32	1006788-22		2	±1%	1/4W
R33	1006750-30		820	±2%	1/4W
R34	-36		1500		
R35	↓ -53		7500	↓	↓
R36	1010369-138		30	±5%	1/8 W
R37	1006750-60		15K	±2%	1/4 W
R38	-60		15K		
R39	-32		1000		
R40	-32		1000		
R41	-48		4700		
R42	-39		2000		
R43	↓ -19		300	↓	↓
R44	1010364-765		475K	±1%	1/8 W
R45	-693		200K		
R46	↓ -619		82.5K	↓	↓
R47	1006750-80		100K	±2%	1/4 W
R48	-39		2000		
R49	-72		47K		
R50	-30		820		
R51	-42		2700		
R52	-48		4700		
R53	↓ -32		1000	↓	↓
R54	1010364-675		162K	±1%	1/8 W
R55	-709		243K		
R56	↓ -693		200K		↓
R57	1010604-16		750	↓	1 W
R58	1006750-48		4700	2%	1/4 W
R59	1006750-63		20K	2%	1/4 W
R60	1010364-727	↓	301K	1%	1/8 W
R61	1010364-693	RESISTOR	200K	1%	1/8 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-55	CAPACITOR	.068	±10%	35 VDC
C2	1006755-2		6.8	±10%	6
C3	1010264-1		.001	±5%	200
C4	1006755-69		1.0	±10%	35
C5	-13		39		10
C6	↓ -13		39	↓	10
C7	1010264-13		.01	±5%	200
C8	1006755-15		120	±10%	10
C9	1010279-110		.75		15
C10	1006755-79		6.8		35
C11	1010279-216		.050		35
C12	1006755-10		4.7	↓	10
C13	1010264-18		.027	±5%	200
C14	1006755-69		1.0	±10%	35
C16	1010359-5		100UUF	±10%	200
C17	1010359-5		100UUF	±10%	200
C18	1010264-21		.047	±5%	200
C19	1010264-37		1.0	±5%	200
C20	1006755-21		22	±10%	15
C21	-21		22		15
C22	-69		1.0		35
C23	↓ -69		1.0	↓	35
C24	1010264-13		.01	±5%	200
C25	1006755-21		22	±10%	15
C26	1006755-21		22		15
C27	1010279-219		.09		35
C28	1006755-79		6.8		35
C29	-69		1.0		35
C30	-79		6.8		35 ↓
C31	↓ -10	↓	4.7	↓	10 VDC
L1	1010277-6	INDUCTOR	4H		
CR1	1010830-9	DIODE	IN965B		
CR2	1010372-11				
CR3	1010830-11		IN967B		
CR4	1010392-1		IN486B		
CR5	-1				
CR6	↓ -1		↓		
CR7	1010392-1		IN486B		
CR8	1010372-11				
CR9	1010265-10	↓	IN3025B		
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER			
Q4	1010367	CHOPPER			
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1		2N930		
Q7	1010397-1		2N930		
Q8	1010357-1		2N720A		
Q9	1010357-1		2N720A		
Q10 Q11	1010269-2		2N2151	MATCHED PAIR	
Q12	1010397-1	↓	2N930		
Q13	1010367	CHOPPER			
Q14	1010367	CHOPPER			
Q15	1010342	TRANSISTOR	2N998		
T1	1010759	TRANSFORMER			
T2	1010753				
T3	1010752				
T4	1010753	↓			

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN a. Di Leo DATE 23 JUN 64
CHECKED
APPROVAL R.C. Greenwood 9-30-64
APPROVAL 10-8-64
NASA APPROVAL 10-14-64
MIT APPROVAL

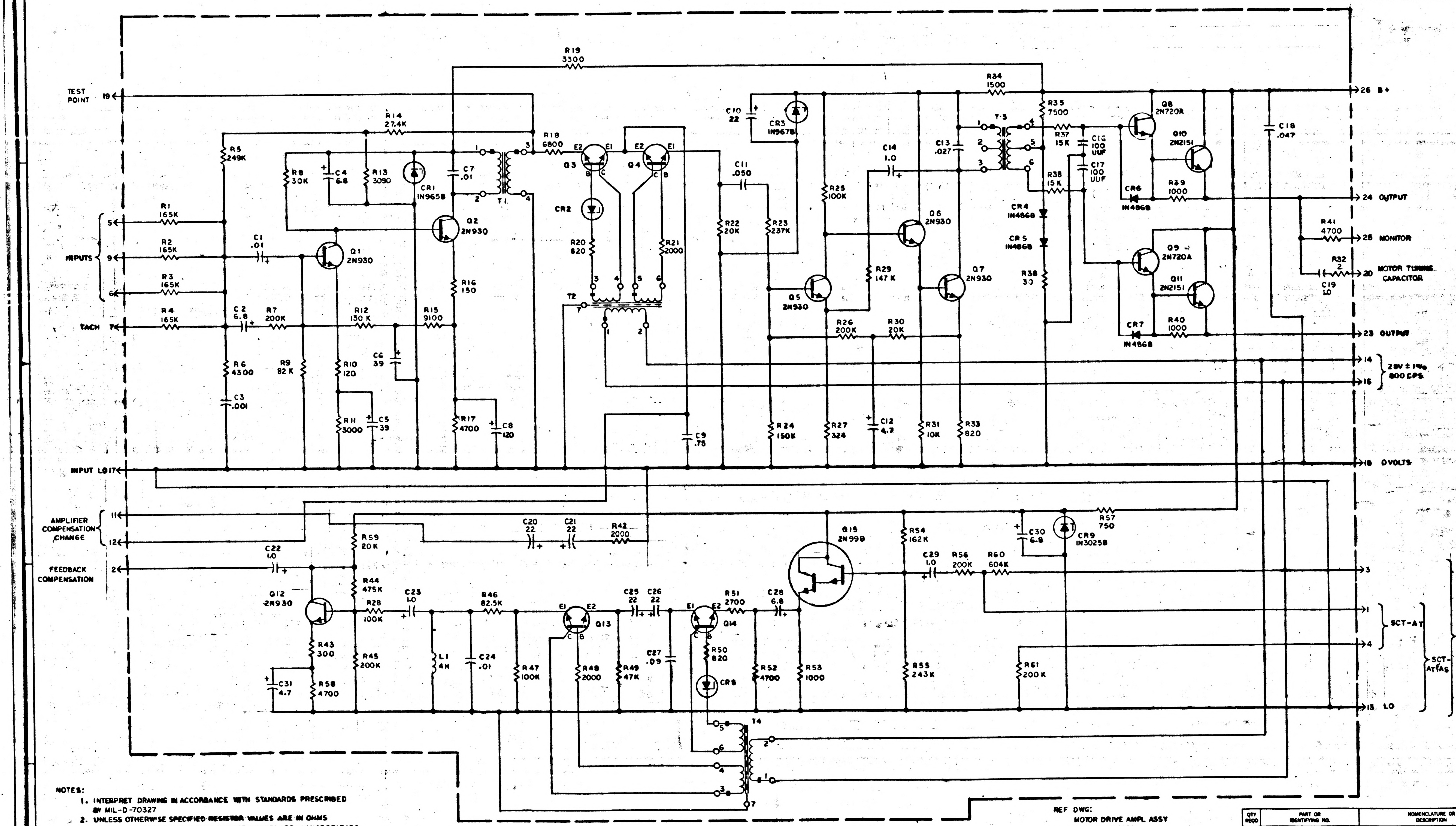
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
MOTOR DRIVE AMPLIFIER

CODE IDENT NO —
SIZE E
NASA DRAWING NO 1009503
SCALE —
WT —
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 73993			
SYM	DESCRIPTION	DATE	APPROVAL


TEST POINT
19
R19
3300
R14
27.4K
R5
249K
R8
30K
C4
6.8
R13
3090
CR1
1N965B
C7
.01
T1
R18
6800
E2
E1
Q3
Q4
B
C
CR2
R20
820
R21
2000
T2
INPUTS
5
9
6
R1
165K
R2
165K
R3
165K
C1
.01
Q1
2N930
Q2
2N930
TACH
7
R4
165K
C2
6.8
R7
200K
R12
130 K
R15
9100
R16
150
R6
4300
R9
82 K
R10
120
C6
39
C3
.001
R11
3000
C5
39
R17
4700
C8
120
C9
.75
INPUT LO 17
C10
22
CR3
1N967B
C11
.050
R22
20K
R23
237K
R25
100K
C14
1.0
C13
.027
T·3
R34
1500
R35
7500
R37
15K
C16
100
UUF
C17
100
UUF
R38
15 K
Q5
2N930
Q6
2N930
Q7
2N930
R29
147 K
R26
200K
R30
20K
CR4
1N486B
CR5
1N486B
R36
30
Q8
2N720A
Q10
2N2151
CR6
1N486B
R39
1000
Q9
2N720A
Q11
2N2151
CR7
1N486B
R40
1000
C18
.047
R41
4700
R32
2
C19
1.0
26 B+
24 OUTPUT
25 MONITOR
20 MOTOR TUNING CAPACITOR
23 OUTPUT
14
15
28V ± 1% 800 CPS
R24
150K
R27
324
C12
4.7
R31
10K
R33
820
18 0 VOLTS
AMPLIFIER COMPENSATION CHANGE
11
12
FEEDBACK COMPENSATION
2
C20
22
C21
22
R42
2000
C22
1.0
R59
20K
R44
475K
Q12
2N930
R28
100K
C23
1.0
R46
82.5K
Q13
C25
22
C26
22
Q14
R51
2700
C28
6.8
Q15
2N998
R54
162K
C29
1.0
R56
200K
R60
604K
C30
6.8
CR9
1N3025B
R57
750
R43
300
C31
4.7
R58
4700
R45
200K
L1
4H
C24
.01
R47
100K
R48
2000
R49
47K
C27
.09
R50
820
CR8
R52
4700
R53
1000
R55
243K
R61
200 K
T4
3
1
4
13 LO
SCT-AT
SCT-AT & AS
TACH INPUT SCT-AS & AT

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DWG:
MOTOR DRIVE AMPL ASSY
DWG NO. 1007581

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
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HEAT TREATMENT —
FINAL FINISH —

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN A. D. Lee DATE 25-JUN-64
CHECKED
APPROVAL R.C. 9-30-64
APPROVAL 10-8-64
NASA APPROVAL W. J. 10-14-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
MOTOR DRIVE AMPLIFIER

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009503
SCALE —
WT —
SHEET 1 OF 2

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS /3373			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-677	RESISTOR	165K	±1%	1/8 W
R2	-677		165K		
R3	-677		165K		
R4	-677		165K		
R5	↓ -711		249K	↓	↓
R6	1006750-47		4300	±2%	1/4 W
R7	1010369-88		200K	±5%	1/8 W
R8	1006750-67		30K	±2%	1/4 W
R9	-78		82K		
R10	-10		120		
R11	-43		3000		
R12	↓ -83		130K	↓	↓
R13	1010364-345		3090	±1%	1/8 W
R14	1010364-527		27.4K	±1%	1/8 W
R15	1006750-55		9100	±2%	1/4 W
R16	-12		150		
R17	-48		4700		
R18	-52		6800		
R19	-44		3300		
R20	-30		820		
R21	-39		2000		
R22	↓ -63		20K	↓	↓
R23	1010364-707		237K	±1%	1/8 W
R24	1010364-669		150K	±1%	1/8 W
R25	1006750-80		100K	±2%	1/4 W
R26	1010364-693		200K	±1%	1/8 W
R27	-157		324		
R28	-635		100K		
R29	↓ -667		147K	↓	↓
R30	1006750-63		20K	±2%	1/4 W
R31	1006750-56		10K	±2%	1/4W
R32	1006788-22		2	±1%	1/4W
R33	1006750-30		820	±2%	1/4W
R34	-36		1500		
R35	↓ -53		7500	↓	↓
R36	1010369-138		30	±5%	1/8 W
R37	1006750-60		15K	±2%	1/4 W
R38	-60		15K		
R39	-32		1000		
R40	-32		1000		
R41	-48		4700		
R42	-39		2000		
R43	↓ -19		300	↓	↓
R44	1010364-765		475K	±1%	1/8 W
R45	-693		200K		
R46	↓ -619		82.5K	↓	↓
R47	1006750-80		100K	±2%	1/4 W
R48	-39		2000		
R49	-72		47K		
R50	-30		820		
R51	-42		2700		
R52	-48		4700		
R53	↓ -32		1000	↓	↓
R54	1010364-675		162K	±1%	1/8 W
R55	-[illegible]		243K		
R56	↓ -693		200K		↓
R57	1010604-16		750	↓	1 W
R58	1006750-48		4700	2%	1/4 W
R59	1006750-63		20K	2%	1/4 W
R60	1010374-8	↓	604K	1%	1/8 W
R61	1010364-693	RESISTOR	200K	1%	1/8 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-13	CAPACITOR	.01	±5%	200VDC
C2	1006755-2		6.8	±10%	6
C3	1010264-1		.001	±5%	200
C4	1006755-2		6.8	±10%	6
C5	-13		39		10
C6	↓ -13		39	↓	10
C7	1010264-13		.01	±5%	200
C8	1006755-15		120	±10%	10
C9	1010279-110		.75		15
C10	1006755-21		22		15
C11	1010279-216		.050		35
C12	1006755-10		4.7	↓	10
C13	1010264-18		.027	±5%	200
C14	1006755-69		1.0	±10%	35
C16	1010359-5		100UUF	±10%	200
C17	1010359-5		100UUF	±10%	200
C18	1010264-21		.047	±5%	200
C19	1010264-37		1.0	±5%	200
C20	1006755-21		22	±10%	15
C21	-21		22		15
C22	-69		1.0		35
C23	↓ -69		1.0	↓	35
C24	1010264-13		.01	±5%	200
C25	1006755-21		22	±10%	15
C26	1006755-21		22		15
C27	1010279-219		.09		35
C28	1006755-79		6.8		35
C29	-69		1.0		35
C30	-79		6.8		35 ↓
C31	↓ -10	↓	4.7	↓	10 VDC
L1	1010277-6	INDUCTOR	4H		
CR1	1010286-9	DIODE	IN965B		
CR2	1010372-11				
CR3	1010286-11		IN967B		
CR4	1010392-1		IN486B		
CR5	-1				
CR6	↓ -1		↓		
CR7	1010392-1		IN486B		
CR8	1010372-11				
CR9	1010265-10	↓	IN3025B		
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER			
Q4	1010367	CHOPPER			
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1		2N930		
Q7	1010397-1		2N930		
Q8	1010357-1		2N720A		
Q9	1010357-1		2N720A		
Q10	1010269-2		2N2151	MATCHED PAIR	
Q11					
Q12	1010397-1	↓	2N930		
Q13	1010367	CHOPPER			
Q14	1010367	CHOPPER			
Q15	1010342	TRANSISTOR	2N998		
T1	1010759	TRANSFORMER			
T2	1010753				
T3	1010752				
T4	1010753	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN A. DiLeo DATE 25 JUN 64
CHECKED CC
APPROVAL R.C. 9-30-64
APPROVAL 10-8-64
NASA APPROVAL W. J. 10-14-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

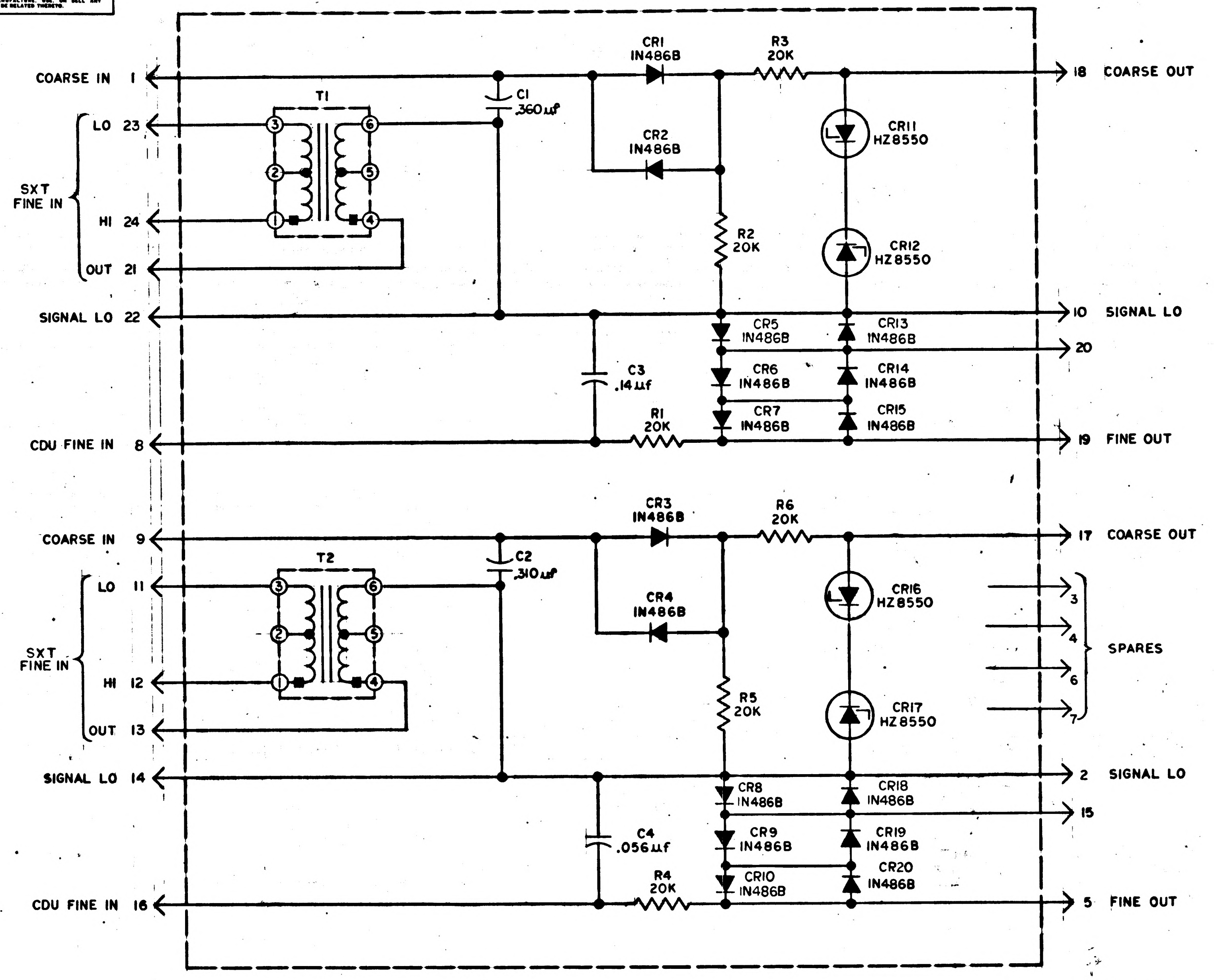
SCHEMATIC, MOTOR DRIVE AMPLIFIER

CODE IDENT NO. — SIZE E NASA DRAWING NO. 1009503
SCALE — WT — SHEET 2 OF 2

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13086			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16331	3/9/65	WK



COARSE IN 1
LO 23
SXT FINE IN
HI 24
OUT 21
SIGNAL LO 22
CDU FINE IN 8
T1
3
6
2
5
1
4
C1 .360µf
CR1 IN486B
CR2 IN486B
R3 20K
R2 20K
CR11 HZ8550
CR12 HZ8550
C3 .14µf
R1 20K
CR5 IN486B
CR6 IN486B
CR7 IN486B
CR13 IN486B
CR14 IN486B
CR15 IN486B
18 COARSE OUT
10 SIGNAL LO
20
19 FINE OUT
COARSE IN 9
LO 11
SXT FINE IN
HI 12
OUT 13
SIGNAL LO 14
CDU FINE IN 16
T2
C2 .310µf
CR3 IN486B
CR4 IN486B
R6 20K
R5 20K
CR16 HZ8550
CR17 HZ8550
C4 .056µf
R4 20K
CR8 IN486B
CR9 IN486B
CR10 IN486B
CR18 IN486B
CR19 IN486B
CR20 IN486B
17 COARSE OUT
3
4
6
7
SPARES
2 SIGNAL LO
15
5 FINE OUT

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS

REF DWG:
TWO SPEED SWITCH ASSY
DWG NO.: 1007522

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-119	CAPACITOR	.360µf	±5%	200V
C2	1010264-121	CAPACITOR	.310µf	±5%	200V
C3	1010264-120	CAPACITOR	.140 µf	±5%	200V
C4	1010264-22	CAPACITOR	.056µf	±5%	200V
CR1	1010392-1	DIODE	IN486B		
CR2	1010392-1		IN486B		
CR3	1010392-1		IN486B		
CR4	1010372-21				
CR5	1010372-21				
CR6	1010392-1		IN486B		
CR7	1010392-1		IN486B		
CR8	1010392-1		IN486B		
CR9	1010392-1		IN486B		
CR10	1010372-21				
CR11	1010372-21				
CR12	1010392-1		IN486B		
CR13	-1				
CR14	-1				
CR15	-1				
CR16	-1				
CR17	-1				
CR18	-1				
CR19	-1				
CR20	1010392-1	DIODE	IN486B		
R1	1006750-63	RESISTOR	20K	±2%	1/4W
R2	-63				
R3	-63				
R4	-63				
R5	-63				
R6	1006750-63	RESISTOR	20K	±2%	1/4 W
T1	1010329-1	TRANSFORMER			
T2	1010329-1	TRANSFORMER			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN Ken Kealy DATE 22 Jul 64
CHECKED CC P.P. Kupelian 4 Aug 64
APPROVAL R.W. Dragoon
APPROVAL DA Koso
NASA APPROVAL W. J. Rhine 9-29-64
MIT APPROVAL

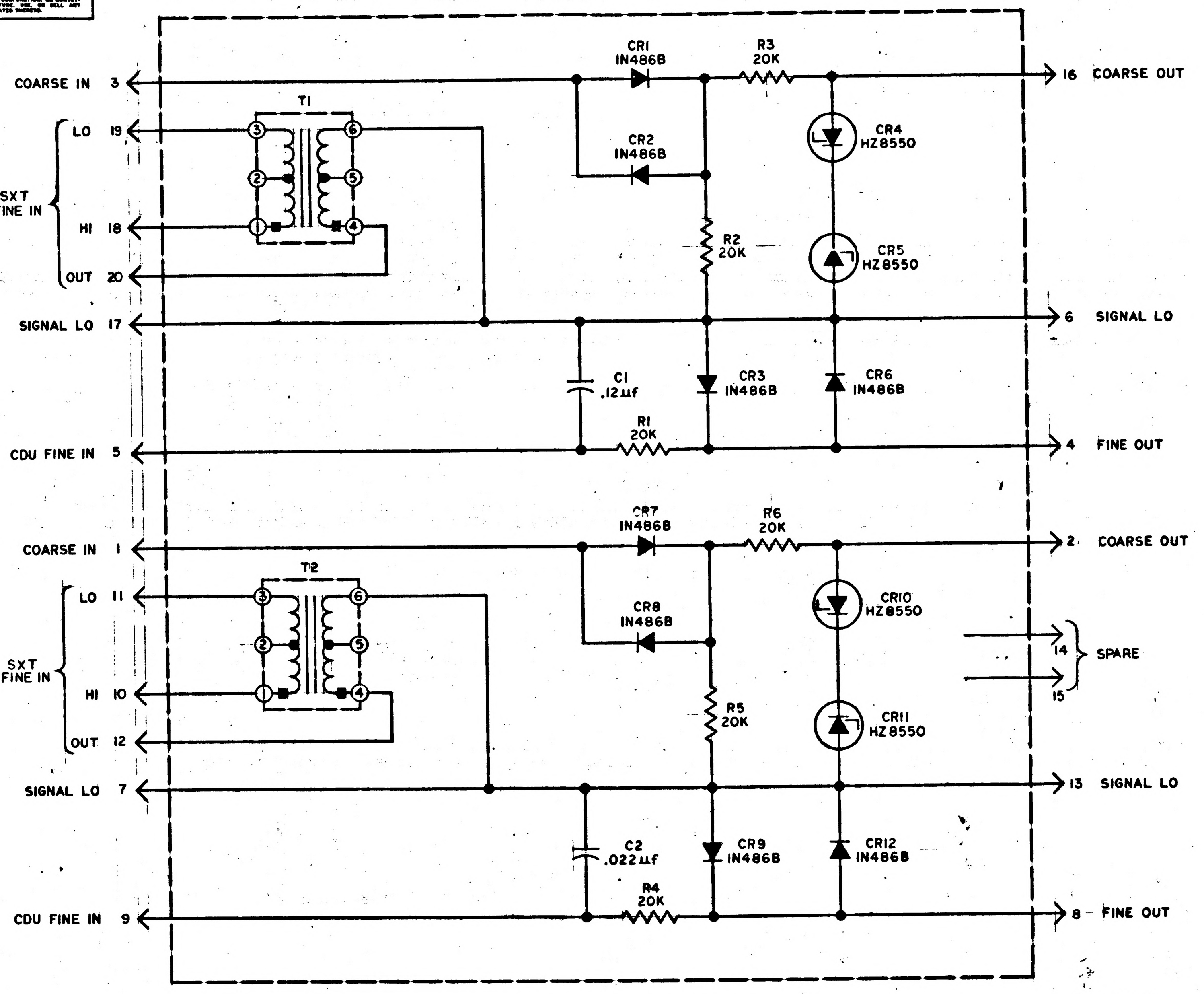
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
TWO SPEED SWITCH

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1009505
SCALE —
WT —
SHEET 1 OF 1

REVISIONS 12086

SYM	DESCRIPTION	DATE	APPROVAL


COARSE IN 3
T1
CR1 IN486B
R3 20K
16 COARSE OUT
LO 19
SXT FINE IN
HI 18
OUT 20
CR2 IN486B
CR4 HZ8550
R2 20K
CR5 HZ8550
SIGNAL LO 17
6 SIGNAL LO
C1 .12µf
CR3 IN486B
CR6 IN486B
R1 20K
CDU FINE IN 5
4 FINE OUT
CR7 IN486B
R6 20K
COARSE IN 1
2 COARSE OUT
T2
LO 11
CR8 IN486B
CR10 HZ8550
14
SPARE
15
SXT FINE IN
HI 10
R5 20K
CR11 HZ8550
OUT 12
SIGNAL LO 7
13 SIGNAL LO
C2 .022µf
CR9 IN486B
CR12 IN486B
R4 20K
CDU FINE IN 9
8 FINE OUT

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-26	CAPACITOR	.12µf	±5%	200V
C2	1010264-17	CAPACITOR	.022µf	±5%	200V
CR1	1010392-1	DIODE	IN486B		
CR2	1010392-1	DIODE	IN486B		
CR3	1010392-1	DIODE	IN486B		
CR4	1010372-21	DIODE			
CR5	1010372-21	DIODE			
CR6	1010392-1	DIODE	IN486B		
CR7	1010392-1	DIODE	IN486B		
CR8	1010392-1	DIODE	IN486B		
CR9	1010392-1	DIODE	IN486B		
CR10	1010372-21	DIODE			
CR11	1010372-21	DIODE			
CR12	1010392-1	DIODE	IN486B		
R1	1006750-63	RESISTOR	20K	±2%	1/4 W
R2	1006750-63	RESISTOR	20K	±2%	1/4 W
R3	1006750-63	RESISTOR	20K	±2%	1/4 W
R4	1006750-63	RESISTOR	20K	±2%	1/4 W
R5	1006750-63	RESISTOR	20K	±2%	1/4 W
R6	1006750-63	RESISTOR	20K	±2%	1/4 W
T1	1010329-1	TRANSFORMER			
T2	1010329-1	TRANSFORMER			

REF DWG:
TWO SPEED SWITCH ASSY
DWG NO.: 1007522

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
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DWG. NO. CONTRACT
DRAWN Ken Kealy DATE 22 Jul 64
CHECKED CC
APPROVAL
APPROVAL DA Koso
NASA APPROVAL W J Rhine 8-24-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
TWO SPEED SWITCH

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1009505
SCALE — WT — SHEET 1 OF 1

1009505

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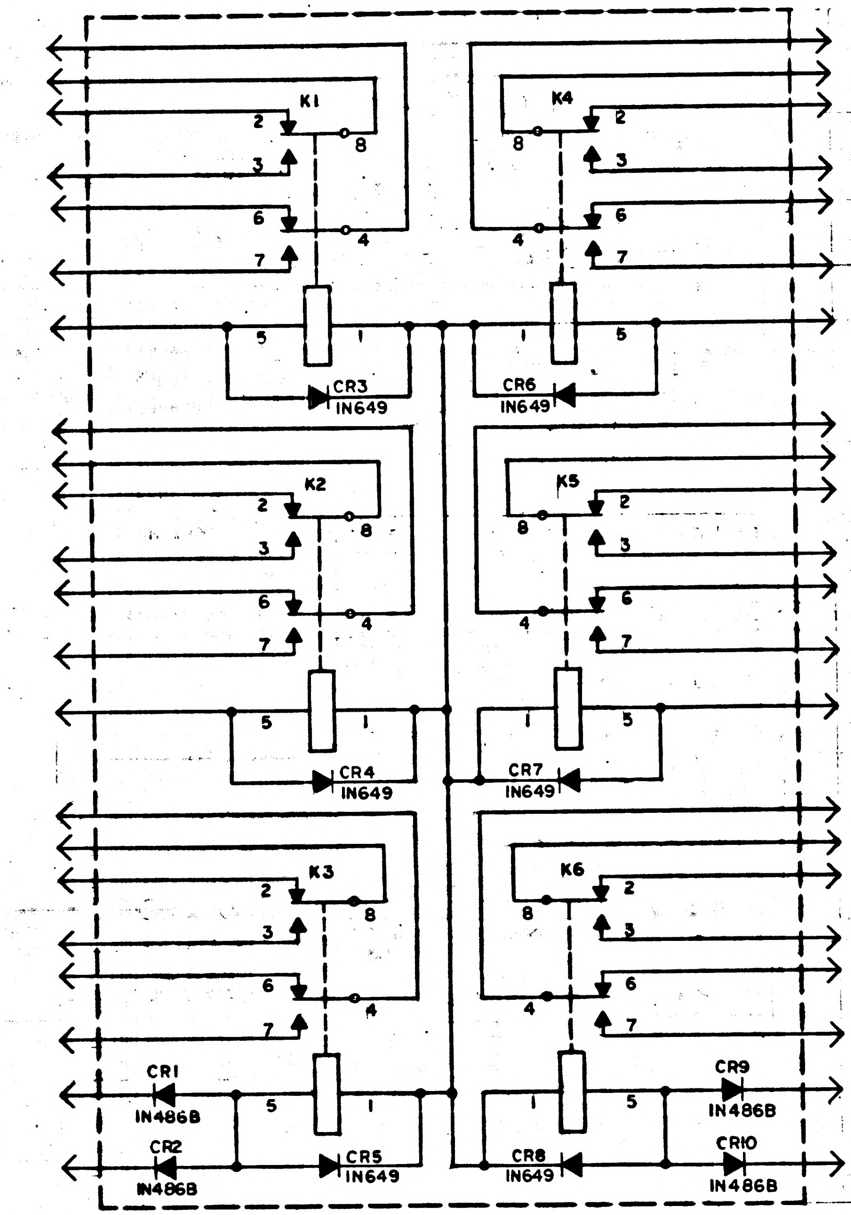
REVISIONS 1306			
SYM	DESCRIPTION	DATE	APPROVAL



REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
CR1	1010392-1	DIODE	IN486B		
CR2	1010392-1	DIODE	IN486B		
CR3	1010362-3	DIODE	IN649		
CR4	1010362-[illegible]	DIODE	IN649		
CR5	1010362-3	DIODE	IN649		
CR6	1010362-3	DIODE	IN649		
CR7	1010362-3	DIODE	IN649		
CR8	1010362-3	DIODE	IN649		
CR9	1010392-1	DIODE	IN486B		
CR10	1010392-1	DIODE	IN486B		
K1	1010353-4	RELAY			
K2	1010353-4	RELAY			
K3	1010353-4	RELAY			
K4	1010353-4	RELAY			
K5	1010353-4	RELAY			
K6	1010353-4	RELAY			

1009506

REF DWG:
RELAY ASSY
DWG NO. 1007567

NOTE:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

1007567	
NEXT ASSY	USED ON
APPLICATION	

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FRACTIONS ± — DECIMALS ± — ANGLES ± —
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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Ken Healy DATE JUL 64
CHECKED [illegible]
APPROVAL R.W. [illegible]
APPROVAL [illegible]
NASA APPROVAL W J [illegible] 9-29-64
MIT APPROVAL [illegible] 29 Sep 64

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SCHEMATIC
RELAY ASSY

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1009506
SCALE —
WT —
SHEET 1 OF 1

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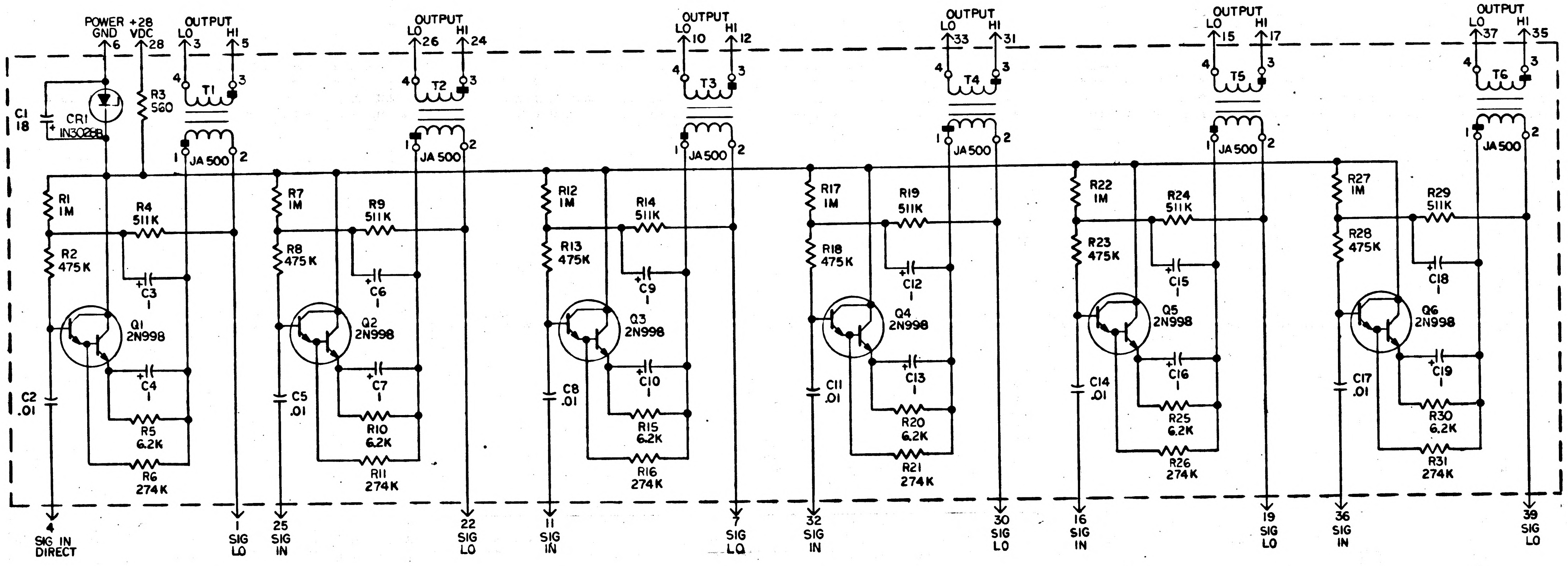
REVISIONS 13086			
SYM	DESCRIPTION	DATE	APPROVAL


POWER GND 6
+28 VDC 28
OUTPUT LO 3 HI 5
OUTPUT LO 26 HI 24
OUTPUT LO 10 HI 12
OUTPUT LO 33 HI 31
OUTPUT LO 15 HI 17
OUTPUT LO 37 HI 35
T1
T2
T3
T4
T5
T6
JA 500
C1 18
CR1 IN3028B
R3 560
R1 1M
R2 475K
R4 511K
C3 1
Q1 2N998
C4 1
R5 6.2K
R6 274K
C2 .01
R7 1M
R8 475K
R9 511K
C6 1
Q2 2N998
C7 1
R10 6.2K
R11 274K
C5 .01
R12 1M
R13 475K
R14 511K
C9 1
Q3 2N998
C10 1
R15 6.2K
R16 274K
C8 .01
R17 1M
R18 475K
R19 511K
C12 1
Q4 2N998
C13 1
R20 6.2K
R21 274K
C11 .01
R22 1M
R23 475K
R24 511K
C15 1
Q5 2N998
C16 1
R25 6.2K
R26 274K
C14 .01
R27 1M
R28 475K
R29 511K
C18 1
Q6 2N998
C19 1
R30 6.2K
R31 274K
C17 .01
4 SIG IN DIRECT
1 SIG LO
25 SIG IN
22 SIG LO
11 SIG IN
7 SIG LO
32 SIG IN
30 SIG LO
16 SIG IN
19 SIG LO
36 SIG IN
39 SIG LO

REFERENCE DWG:

MODULE ASSEMBLY BUFFER CIRCUIT 1007526

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS
3. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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DRAWN Tom Hillman DATE 6 AUG 64
CHECKED R. Lizdenis 11 AUG 64
APPROVAL R.W. Sroguski
APPROVAL D Kosso
NASA APPROVAL W J Rhine 9-29-64
MIT APPROVAL 9/29/64

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SCHEMATIC DIAGRAM
BUFFER CIRCUIT

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1009507
SCALE — WT — SHEET 1 OF 2

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REVISIONS 1 3 OF 6

SYM	DESCRIPTION	DATE	APPROVAL

REF DEF	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-84	CAPACITOR	18	±10%	35 V
C2	1010359-29		.01	±10%	200V
C3	1006755-69		1	±10%	35 V
C4	1006755-69		1	±10%	35 V
C5	1010359-29		.01	±10%	200V
C6	1006755-69		1	±10%	35V
C7	1006755-69		1	±10%	35V
C8	1010359-29		.01	±10%	200V
C9	1006755-69		1	±10%	35V
C10	1006755-69		1	±10%	35V
C11	1010359-29		.01	±10%	200V
C12	1006755-69		1	±10%	35V
C13	1006755-69		1	±10%	35V
C14	1010359-29		.01	±10%	200V
C15	1006755-69		1	±10%	35V
C16	1006755-69		1	±10%	35V
C17	1010359-29		.01	±10%	200V
C18	1006755-69		1	±10%	35V
C19	1006755-69	CAPACITOR	1	±10%	35V
CR1	1010265-13	DIODE	IN3028B		22V
R1	1010374-29	RESISTOR	1M	1%	1/8W
R2	1010364-765		475K	1%	1/8W
R3	1006750-26		560	2%	1/4W
R4	1010374-1		511K	1%	1/8W
R5	1006750-51		6.2K	2%	1/4W
R6	1010364-719		274K	1%	1/8W
R7	1010374-29		1M	1%	1/8W
R8	1010364-765		475K	1%	1/8W
R9	1010374-1		511K	1%	1/8W
R10	1006750-51		6.2K	2%	1/4W
R11	1010364-719		274K	1%	1/8W
R12	1010374-29		1M	1%	1/8W
R13	1010364-765		475K	1%	1/8W
R14	1010374-1		511K	1%	1/8W
R15	1006750-51		6.2K	2%	1/4W
R16	1010364-719		274K	1%	1/8W
R17	1010374-29		1M	1%	1/8W
R18	1010364-765		475K	1%	1/8W
R19	1010374-1		511K	1%	1/8W
R20	1006750-51		6.2K	2%	1/4W
R21	1010364-719		274K	1%	1/8W
R22	1010374-29		1M	1%	1/8W
R23	1010364-765		475K	1%	1/8W
R24	1010374-1		511K	1%	1/8W
R25	1006750-51		6.2K	2%	1/4W
R26	1010364-719		274K	1%	1/8W
R27	1010374-29		1M	1%	1/8W
R28	1010364-765		475K	1%	1/8W
R29	1010374-1		511K	1%	1/8W
R30	1006750-51		6.2K	2%	1/4W
R31	1010364-719	RESISTOR	274K	1%	1/8W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010342	TRANSISTOR	2N998		
Q2					
Q3					
Q4					
Q5					
Q6	1010342	TRANSISTOR	2N998		
T1	1010759	TRANSFORMER	JA500		
T2					
T3					
T4					
T5					
T6	1010759	TRANSFORMER	JA500		

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
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FRACTIONS ± DECIMALS ± ANGLES ±
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DWG. NO. CONTRACT
DRAWN Tom Dillon DATE 6 AUG 64
CHECKED R. [illegible] 11 AUG 64
APPROVAL R.W. [illegible]
APPROVAL [illegible]
NASA APPROVAL W J [illegible] 9-29-64
MIT APPROVAL [illegible] 2 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM
BUFFER CIRCUIT

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1009507
SCALE —
WT —
SHEET 2 OF 2

1009507

INCHES
0 1 2

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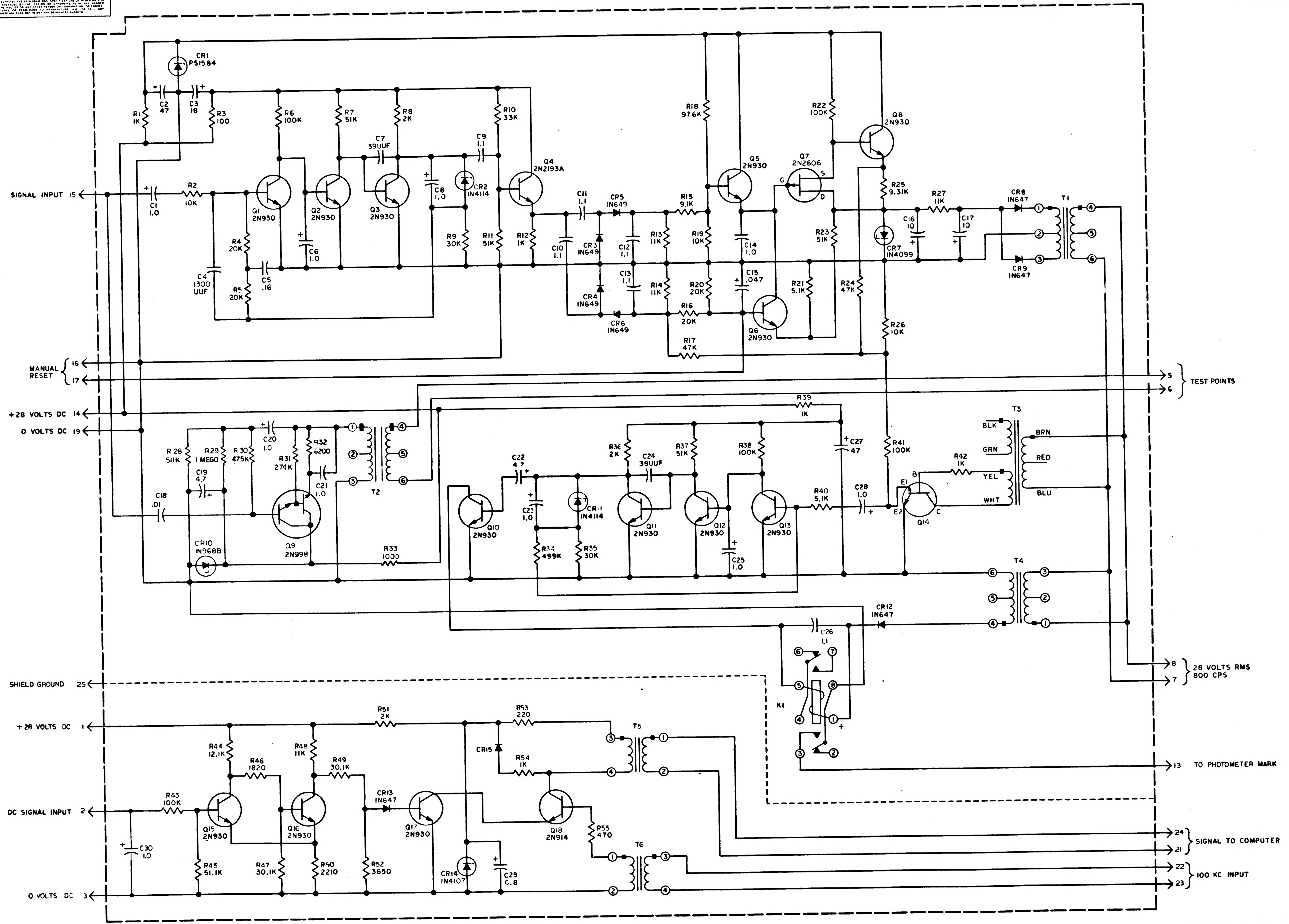
REVISIONS 14796

SYM	DESCRIPTION	DATE	APPROVAL
A	REPLACED WITH CHANGE BY REV. B PER TDRR 9777	10 [illegible] 65	4.N.


CR1
PS1584
R1
1K
C2
47
C3
18
R3
100
R6
100K
R7
51K
R8
2K
C7
39UUF
C9
1.1
R10
33K
Q4
2N2193A
SIGNAL INPUT 15
C1
1.0
R2
10K
Q1
2N930
Q2
2N930
Q3
2N930
C8
1.0
CR2
1N4114
R4
20K
R5
20K
C4
1300
UUF
C5
.16
C6
1.0
R9
30K
R11
51K
R12
1K
C11
.1
CR5
1N649
C10
.1
CR3
1N649
C12
.1
C13
.1
CR4
1N649
CR6
1N649
R13
11K
R14
11K
R15
9.1K
R16
20K
R17
47K
R18
97.6K
R19
10K
R20
20K
Q5
2N930
C14
1.0
C15
.047
Q6
2N930
Q7
2N2606
G
S
D
R21
5.1K
R22
100K
R23
51K
R24
47K
Q8
2N930
R25
9.1K
CR7
1N4099
R26
10K
R27
11K
C16
10
C17
10
CR8
1N647
CR9
1N647
T1
1
2
3
4
5
6
MANUAL RESET
16
17
+28 VOLTS DC 14
0 VOLTS DC 19
TEST POINTS
5
6
R39
1K
R 28
511K
R29
1 MEGO
R 30
475K
C20
1.0
R31
274K
R32
6200
C21
1.0
C19
4.7
C18
.01
Q9
2N998
CR10
1N968B
T2
R33
1000
C22
4.7
C23
1.0
CR11
1N4114
R34
499K
R35
30K
Q10
2N930
R36
2K
C24
39UUF
R37
51K
Q11
2N930
Q12
2N930
R38
100K
Q13
2N930
C25
1.0
C27
47
R40
5.1K
C28
1.0
R41
100K
E1
E2
B
C
Q14
R42
1K
T3
BLK
GRN
YEL
WHT
BRN
RED
BLU
T4
CR12
1N647
C26
.1
K1
28 VOLTS RMS
800 CPS
8
7
SHIELD GROUND 25
+28 VOLTS DC 1
R51
2K
R53
220
CR15
R54
1K
T5
13 TO PHOTOMETER MARK
R44
12.1K
R46
1820
R48
11K
R49
30.1K
DC SIGNAL INPUT 2
R43
100K
Q15
2N930
Q16
2N930
CR13
1N647
Q17
2N930
Q18
2N914
R55
470
SIGNAL TO COMPUTER
24
21
T6
100 KC INPUT
22
23
C30
1.0
R45
51.1K
R47
30.1K
R50
2210
R52
3650
CR14
1N4107
C29
6.8
0 VOLTS DC 3

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG:
PHOTOMETER ELECTRONICS ASSY
DWG NO. 1007559

Ⓐ REPLACED WITH CHANGE BY REV B

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
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DIMENSIONS ARE IN INCHES
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FRACTIONS ± — DECIMALS ± — ANGLES ± —
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MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN Ken Healy DATE 5-4-64
CHECKED
APPROVAL M
APPROVAL
NASA APPROVAL W. J. Rhine 12-15-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009508
SCALE —
WT —
SHEET 1 OF 2

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14796			
SYM	DESCRIPTION	DATE	APPROVAL
A	REPLACED WITH CHANGE BY REV. B PER TDRR 19777	10 JUN 65	

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 — 32	RESISTOR	1K	± 2%	1/4 W
R2	1006750 — 56		10K	± 2%	1/4 W
R3	1006750 — 8		100	± 2%	1/4 W
R4	1010364 — 502		20K	± 1%	1/8 W
R5	1010364 — 502		20K	± 1%	1/8 W
R6	1006750 — 80		100K	± 2%	1/4 W
R7	— 73		51K		
R8	— 39		2K		
R9	— 67		30K		
R10	— 68		33K		
R11	— 73		51K		
R12	— 32		1K		
R13	— 57		11K		
R14	— 57		11K		
R15	— 55		9.1K		
R16	— 63		20K		
R17	1006750 — 72		47K	± 2%	1/4 W
R18	1010364 — 634		97.6K	± 1%	1/8 W
R19	1006750 — 56		10K	± 2%	1/4 W
R20	— 63		20K		
R21	— 49		5.1K		
R22	— 80		100K		
R23	— 73		51K		
R24	1006750 — 72		47K	± 2%	1/4 W
R25	1010364 — 438		9.31K	± 1%	1/8 W
R26	1006750 — 56		10K	± 2%	1/4 W
R27	1006750 — 57		11K	± 2%	1/4 W
R28	1010374 — 1		511K	± 1%	1/8 W
R29	1010374 — 29		1 MEG	± 1%	1/8 W
R30	1010364 — 765		475K	± 1%	1/8 W
R31	1010364 — 719		274K	± 1%	1/8 W
R32	1006750 — 51		6200	± 2%	1/4 W
R33	1010364 — 251		1000	± 1%	1/8 W
R34	1010364 — 770		499K		1/8 W
R35	1006750 — 67		30K	± 2%	1/4 W
R36	— 39		2K		
R37	— 73		51K		
R38	— 80		100K		
R39	— 32		1K		
R40	— 49		5.1K		
R41	— 80		100K		
R42	1006750 — 32		1K	± 2%	1/4 W
R43	1010364 — 635		100K	± 1%	1/8 W
R44	— 459		12.1K		
R45	— 579		51.1K		
R46	— 301		1820		
R47	— 535		30.1K		
R48	— 451		11K		
R49	— 535		30.1K		
R50	— 317		2210		
R51	— 309		2K		
R52	1010364 — 359		3650	± 1%	1/8 W
R53	1006750 — 16		220	± 2%	1/4 W
R54	1006750 — 32		1K	± 2%	1/4 W
R55	1006750 — 24	RESISTOR	470	± 2%	1/4 W
C1	1006755 — 69	CAPACITOR	1.0	± 10%	35VDC
C2	1006755 — 89		47	± 10%	35VDC
C3	1006755 — 133		18	± 10%	50VDC
C4	1006793 — 10		1300UUF	± 2%	500VDC
C5	1010317 — 6		.16	± 1%	30 VDC
C6	1006755 — 69		1.0	± 10%	35 VDC
C7	1006793 — 51		39 UUF	± 2%	500VDC
C8	1006755 — 69		1.0	± 10%	35 VDC
C9	1010279 — 232		1.1	± 10%	35 VDC
C10	— 232				
C11	— 232				
C12	— 232				
C13	1010279 — 232		1.1	± 10%	35 VDC
C14	1012501 — 1		1.0	± 1%	40 VDC
C15	1006755 — 53		.047	± 10%	35 VDC
C16	1006755 — 130		10	± 10%	50 VDC
C17	1006755 — 130		10	± 10%	50 VDC
C18	1010359 — 29		.01	± 10%	200VDC
C19	1010333 — 037		4.7	± 10%	50 VDC
C20	1006755 — 69		1.0	± 10%	35 VDC
C21	— 69		1.0	± 10%	35 VDC
C22	— 77		4.7	± 10%	35 VDC
C23	1006755 — 69		1.0	± 10%	35 VDC
C24	1006793 — 51		39 UUF	± 2%	500VDC
C25	1006755 — 69		1.0	± 10%	35 VDC
C26	1010279 — 232		1.1	± 10%	35VDC
C27	1006755 — 89		47	± 10%	35VDC
C28	1006755 — 69		1.0	± 10%	35VDC
C29	1006755 — 79		6.8	± 10%	35VDC
C30	1006755 — 69	CAPACITOR	1.0	± 10%	35VDC

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR1	1010346	DIODE	PS1584		
CR2	1012056 — 16		1N4114		
CR3	1010837 — 003		1N649		
CR4	1010837 — 003		1N649		
CR5	1010837 — 003		1N649		
CR6	1010837 — 003		1N649		
CR7	1012056 — 1		1N4099		
CR8	1010837 — 002		1N647		
CR9	1010837 — 002		1N647		
CR10	1010830 — 12		1N968B		
CR11	1012056 — 16		1N4114		
CR12	1010837 — 002		1N647		
CR13	1010837 — 002		1N647		
CR14	1012056 — 9		1N4107		
CR15	1006751	DIODE			
Q1	1010397 — 1	TRANSISTOR	2N930		
Q2	1010397 — 1		2N930		
Q3	1010397 — 1		2N930		
Q4	1010398 — 1		2N2193A		
Q5	1010397 — 1		2N930		
Q6	1010397 — 1		2N930		
Q7	1012048		2N2606		
Q8	1010397 — 1		2N930		
Q9	1010342		2N998		
Q10	1010397 — 1		2N930		
Q11	1010397 — 1		2N930		
Q12	1010397 — 1		2N930		
Q13	1010397 — 1		2N930		
Q14	1010367				
Q15	1010397 — 1		2N930		
Q16	1010397 — 1		2N930		
Q17	1010397 — 1		2N930		
Q18	1006752	TRANSISTOR	2N914		
K1	1010353 — 7	RELAY			
T1	1010276	TRANSFORMER			
T2	1010329 — 1				
T3	1010315 — 1				
T4	1010276				
T5	1006762 — 3				
T6	1006762 — 3	TRANSFORMER			

Ⓐ REPLACED WITH CHANGE BY REV B

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

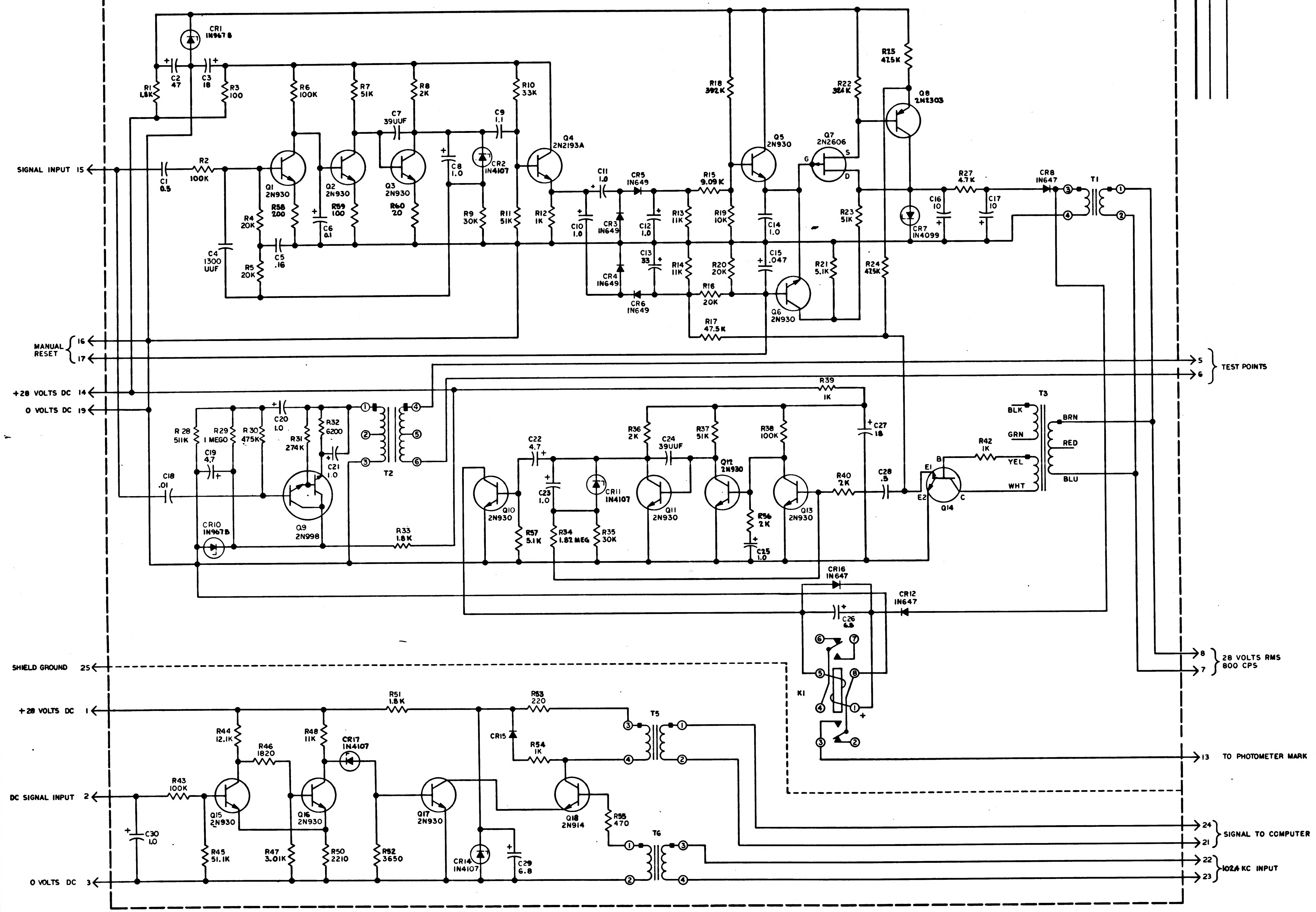
M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN F. Wehl DATE 11 Aug 64
CHECKED
APPROVAL M. Gostin
APPROVAL
NASA APPROVAL 12-15-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1009508
SCALE —
WT —
SHEET 2 OF 2

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
B		REPLACES REV A WITH CHANGE PER TORR 19777	—	23 APR 65	


CR1
1N967B
C2
47
C3
18
R1
1.8K
R3
100
R6
100K
R7
51K
R8
2K
R10
33K
C7
39UUF
C9
1.1
Q4
2N2193A
SIGNAL INPUT 15
C1
0.5
R2
100K
Q1
2N930
Q2
2N930
Q3
2N930
C8
1.0
CR2
1N4107
R4
20K
R58
200
R59
100
R60
20
C6
0.1
R9
30K
R11
51K
R12
1K
C4
1300
UUF
C5
.16
R5
20K
C11
1.0
CR5
1N649
R15
9.09 K
C10
1.0
CR3
1N649
C12
1.0
R13
11K
R19
10K
C13
33
R14
11K
R20
20K
CR4
1N649
CR6
1N649
R16
20K
R17
47.5 K
R18
392 K
Q5
2N930
C14
1.0
C15
.047
Q6
2N930
R21
5.1K
Q7
2N2606
G
S
D
R22
324 K
R23
51K
R24
47.5K
R25
47.5K
Q8
2N2303
CR7
1N4099
C16
10
R27
4.7 K
C17
10
CR8
1N647
T1
MANUAL RESET 16
17
+28 VOLTS DC 14
0 VOLTS DC 19
TEST POINTS 5
6
R 28
511K
R29
1 MEGO
R 30
475K
C20
1.0
R31
274K
R32
6200
C21
1.0
C19
4.7
C18
.01
T2
CR10
1N967B
Q9
2N998
R33
1.8 K
R39
1K
C22
4.7
C23
1.0
CR11
1N4107
R36
2K
C24
39UUF
R37
51K
R38
100K
C27
18
Q10
2N930
R57
5.1K
R34
1.82 MEG
R35
30K
Q11
2N930
Q12
2N930
R56
2K
C25
1.0
Q13
2N930
R40
2K
C28
.5
E1
E2
B
C
Q14
R42
1K
T3
BLK
GRN
YEL
WHT
BRN
RED
BLU
CR16
1N647
CR12
1N647
C26
6.8
K1
28 VOLTS RMS 800 CPS 8
7
SHIELD GROUND 25
+28 VOLTS DC 1
R51
1.8 K
R53
220
CR15
R54
1K
T5
R44
12.1K
R46
1820
R48
11K
CR17
1N4107
DC SIGNAL INPUT 2
R43
100K
Q15
2N930
Q16
2N930
Q17
2N930
Q18
2N914
R55
470
T6
C30
1.0
R45
51.1K
R47
3.01K
R50
2210
R52
3650
CR14
1N4107
C29
6.8
0 VOLTS DC 3
TO PHOTOMETER MARK 13
SIGNAL TO COMPUTER 24
21
102.4 KC INPUT 22
23

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG:
PHOTOMETER ELECTRONICS ASSY
DWG NO. 1007559

Ⓑ REPLACES REV A WITH CHANGE

1A

1007559-011 NEXT ASSY	1007559-011 USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + − DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN 6 AUG 64 CHECKED Claire Wilson DATE 4 SEP 64 APPROVAL APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL —	NASA APPROVAL 6-2-65	SCHEMATIC PHOTOMETER ELECTRONICS
		CONTRACT NAS-9-497	MIT APPROVAL 6-2-65	CODE IDENT NO. 80230 SIZE E 1009508 SCALE NONE SHEET 1 of 2

1009508 B

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
B		REPLACES REV A WITH CHANGE PER TDRR 19777	—	23 APR 65	JJJ

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOLERANCE AND RATING
C1	1010279-228	CAPACITOR	0.5 ±10% 35 VDC
C2	1006755-89	CAPACITOR	47 ±10% 35 VDC
C3	1006755-133	CAPACITOR	18 ±10% 50 VDC
C4	1006793-10	CAPACITOR	1300UUF ±2% 500 VDC
C5	1010317-6	CAPACITOR	.16 ±1% 30 VDC
C6	1006755-57	CAPACITOR	.1 ±10% 35 VDC
C7	1006793-51	CAPACITOR	39UUF ±2% 500 VDC
C8	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C9	1010279-232	CAPACITOR	1.1 ±10% 35 VDC
C10	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C11	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C12	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C13	1006755-34	CAPACITOR	33 ±10% 20 VDC
C14	1012501	CAPACITOR	1.0 ±1% 40 VDC
C15	1006755-53	CAPACITOR	.047 ±10% 35 VDC
C16	1006755-130	CAPACITOR	10 ±10% 50 VDC
C17	1006755-130	CAPACITOR	10 ±10% 50 VDC
C18	1010359-29	CAPACITOR	.01 ±10% 200 VDC
C19	1010393-037	CAPACITOR	4.7 ±10% 50 VDC
C20	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C21	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C22	1006755-77	CAPACITOR	4.7 ±10% 35 VDC
C23	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C24	1006793-51	CAPACITOR	39UUF ±2% 500 VDC
C25	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C26	1006755-79	CAPACITOR	6.8 ±10% 35 VDC
C27	1006755-133	CAPACITOR	18 ±10% 50 VDC
C28	1010279-228	CAPACITOR	.5 ±10% 35 VDC
C29	1006755-79	CAPACITOR	6.8 ±10% 35 VDC
C30	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
CR1	1010830-11	DIODE	1N967B
CR2	1012056-9	DIODE	1N4107
CR3	1010362-003	DIODE	1N649
CR4	1010362-003	DIODE	1N649
CR5	1010362-003	DIODE	1N649
CR6	1010362-003	DIODE	1N649
CR7	1012056-1	DIODE	1N4099
CR8	1010362-002	DIODE	1N647
CR9		DELETED	
CR10	1010830-11	DIODE	1N967B
CR11	1012056-9	DIODE	1N4107
CR12	1010362-002	DIODE	1N647
CR13		DELETED	
CR14	1012056-9	DIODE	1N4107
CR15	1006751-001	DIODE	
CR16	1010362-002	DIODE	1N647
CR17	1012056-9	DIODE	1N4107
K1	1010353-7	RELAY	
Q1	1010397-1	TRANSISTOR	2N930
Q2	1010397-1	TRANSISTOR	2N930
Q3	1010397-1	TRANSISTOR	2N930
Q4	1010398-1	TRANSISTOR	2N2193A
Q5	1010397-1	TRANSISTOR	2N930
Q6	1010397-1	TRANSISTOR	2N930
Q7	1012048	TRANSISTOR	2N2606
Q8	1010633-1	TRANSISTOR	2N2303
Q9	1010342	TRANSISTOR	2N988
Q10	1010397-1	TRANSISTOR	2N930
Q11	1010397-1	TRANSISTOR	2N930
Q12	1010397-1	TRANSISTOR	2N930
Q13	1010397-1	TRANSISTOR	2N930
Q14	1010367	TRANSISTOR	
Q15	1010397-1	TRANSISTOR	2N930
Q16	1010397-1	TRANSISTOR	2N930
Q17	1010397-1	TRANSISTOR	2N930
Q18	1006752	TRANSISTOR	2N914

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOLERANCE AND RATING
R1	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R2	1006750-80	RESISTOR	100K ±2% 1/4 W
R3	1006750-8	RESISTOR	100 ±2% 1/4 W
R4	1010364-502	RESISTOR	20K ±1% 1/8 W
R5	1010364-502	RESISTOR	20K ±1% 1/8 W
R6	1006750-80	RESISTOR	100K ±2% 1/4 W
R7	1006750-73	RESISTOR	51K ±2% 1/4 W
R8	1006750-39	RESISTOR	2K ±2% 1/4 W
R9	1006750-67	RESISTOR	30K ±2% 1/4 W
R10	1006750-68	RESISTOR	33K ±2% 1/4 W
R11	1006750-73	RESISTOR	51K ±2% 1/4 W
R12	1006760-32	RESISTOR	1K ±2% 1/2 W
R13	1010364-452	RESISTOR	11K ±1% 1/8 W
R14	1006750-57	RESISTOR	11K ±2% 1/4 W
R15	1010364-435	RESISTOR	9.09K ±1% 1/8 W
R16	1006750-63	RESISTOR	20K ±2% 1/4 W
R17	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R18	1010364-749	RESISTOR	392K ±1% 1/8 W
R19	1010364-444	RESISTOR	10K ±1% 1/8 W
R20	1006750-63	RESISTOR	20K ±2% 1/4 W
R21	1006750-49	RESISTOR	5.1K ±2% 1/4 W
R22	1010364-733	RESISTOR	324K ±1% 1/8 W
R23	1006750-73	RESISTOR	51K ±2% 1/4 W
R24	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R25	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R26		DELETED	
R27	1006750-48	RESISTOR	4.7K ±2% 1/4 W
R28	1010374-1	RESISTOR	511K ±1% 1/8 W
R29	1010374-29	RESISTOR	1 MEG ±1% 1/8 W
R30	1010364-765	RESISTOR	475K ±1% 1/8 W
R31	1010364-719	RESISTOR	274K ±1% 1/8 W
R32	1006750-51	RESISTOR	6200 ±2% 1/4 W
R33	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R34	1010374-54	RESISTOR	1.82 MEG ±1% 1/8 W
R35	1006750-67	RESISTOR	30K ±2% 1/4 W
R36	1006750-39	RESISTOR	2K ±2% 1/4 W
R37	1006750-73	RESISTOR	51K ±2% 1/4 W
R38	1006750-80	RESISTOR	100K ±2% 1/4 W
R39	1006750-32	RESISTOR	1K ±2% 1/4 W
R40	1006750-39	RESISTOR	2K ±2% 1/4 W
R41		DELETED	
R42	1006750-32	RESISTOR	1K ±2% 1/4 W
R43	1010364-635	RESISTOR	100K ±1% 1/8 W
R44	1010364-459	RESISTOR	12.1K ±1% 1/8 W
R45	1010364-579	RESISTOR	51.1K ±1% 1/8 W
R46	1010364-301	RESISTOR	1820 ±1% 1/8 W
R47	1010364-343	RESISTOR	3.01K ±1% 1/8 W
R48	1010364-451	RESISTOR	11K ±1% 1/8 W
R49		DELETED	
R50	1010364-317	RESISTOR	2210 ±1% 1/8 W
R51	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R52	1010364-359	RESISTOR	3650 ±1% 1/8 W
R53	1006750-16	RESISTOR	220 ±2% 1/4 W
R54	1006750-32	RESISTOR	1K ±2% 1/4 W
R55	1006750-24	RESISTOR	470 ±2% 1/4 W
R56	1006750-39	RESISTOR	2K ±2% 1/4 W
R57	1006750-49	RESISTOR	5.1K ±2% 1/4 W
R58	1006750-15	RESISTOR	200 ±2% 1/4 W
R59	1006750-8	RESISTOR	100 ±2% 1/4 W
R60	1010369-148	RESISTOR	20 ±5% 1/8 W
T1	1010759	TRANSFORMER	
T2	1010329-1	TRANSFORMER	
T3	1010315-1	TRANSFORMER	
T4		DELETED	
T5	1006762-2	TRANSFORMER	
T6	1006762-2	TRANSFORMER	

Ⓑ REPLACES REV A WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ + +
− − −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS-9-497

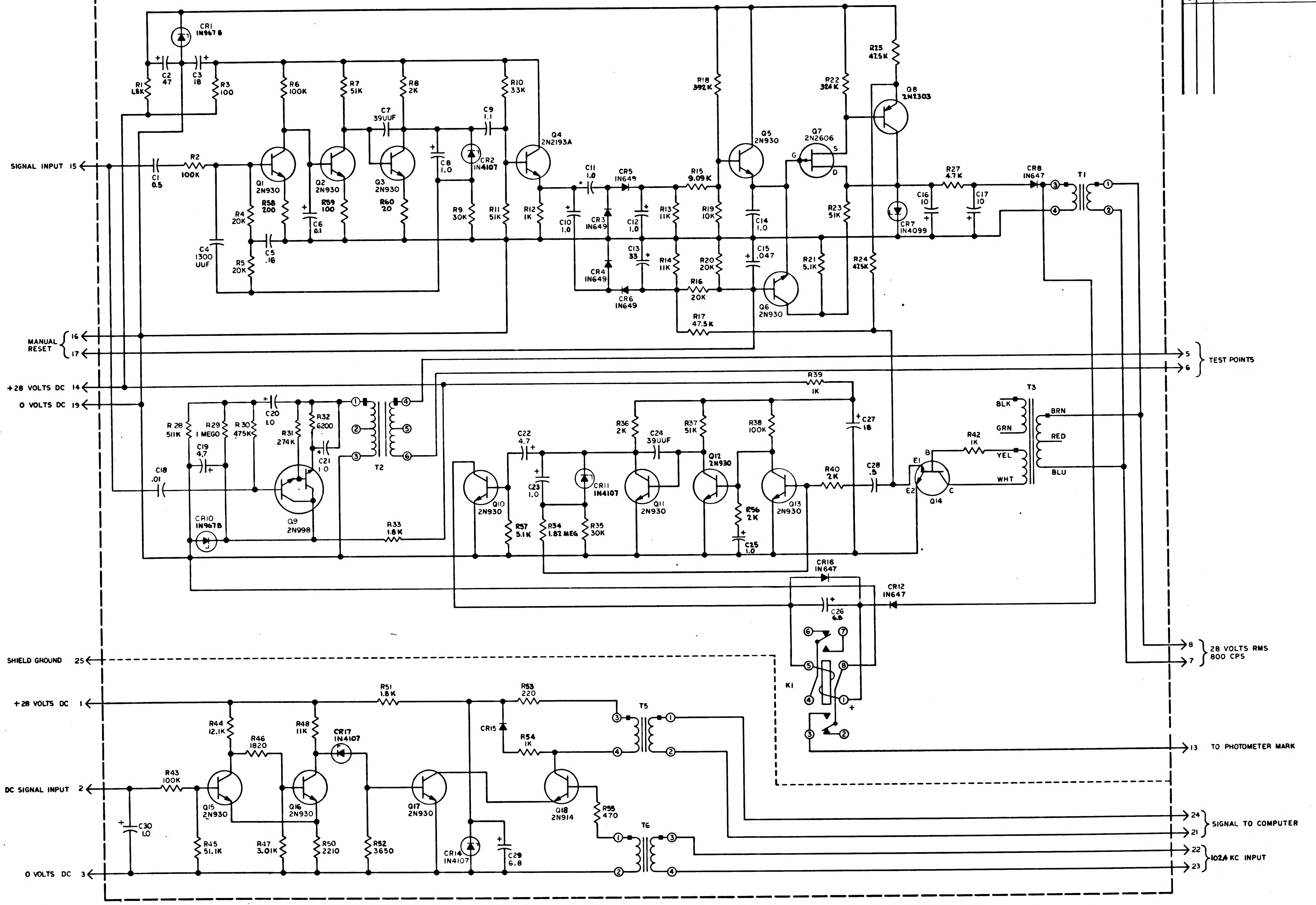
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE 11 AUG 64
CHECKED Wilson 4 SEP 64
APPROVAL
APPROVAL
NASA APPROVAL 6-2-65
MIT APPROVAL 6-2-65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO. 80230
SIZE E
1009508
SCALE —
SHEET 2 OF 2

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
B		REPLACES REV A WITH CHANGE PER TORR 19777	—	23 APR 65	
C		REVISION STATUS CHANGED		31 JUL 65	



CR1 1N967B
R1 1.8K
C2 47
C3 18
R3 100
R6 100K
R7 51K
R8 2K
R10 33K
C7 39UUF
C9 1.1
Q4 2N2193A
SIGNAL INPUT 15
C1 0.5
R2 100K
Q1 2N930
Q2 2N930
Q3 2N930
C8 1.0
CR2 1N4107
R4 20K
R58 200
C6 0.1
R59 100
R60 20
R9 30K
R11 51K
R12 1K
C4 1300 UUF
C5 .16
R5 20K
C11 1.0
CR5 1N649
R15 9.09K
R18 392K
Q5 2N930
Q7 2N2606
R22 324K
R25 47.5K
Q8 2N2303
C10 1.0
CR3 1N649
C12 1.0
R13 11K
R19 10K
C14 1.0
R23 51K
CR7 1N4099
C16 10
R27 4.7K
C17 10
CR8 1N647
T1
C13 33
CR4 1N649
R14 11K
R20 20K
C15 .047
R21 5.1K
R24 47.5K
R16 20K
CR6 1N649
Q6 2N930
R17 47.5K
MANUAL RESET
16
17
+28 VOLTS DC 14
0 VOLTS DC 19
TEST POINTS
5
6
R39 1K
T3
BLK
GRN
YEL
WHT
BRN
RED
BLU
R42 1K
R28 511K
R29 1 MEGO
R30 475K
C20 1.0
R31 274K
R32 6200
C21 1.0
C19 4.7
C18 .01
Q9 2N998
T2
CR10 1N967B
R33 1.8K
C22 4.7
C23 1.0
CR11 1N4107
R36 2K
C24 39UUF
R37 51K
R38 100K
C27 18
Q10 2N930
Q11 2N930
Q12 2N930
Q13 2N930
R40 2K
C28 .5
E1
E2
B
C
Q14
R57 5.1K
R34 1.82 MEG
R35 30K
R56 2K
C25 1.0
CR16 1N647
CR12 1N647
C26 6.8
K1
28 VOLTS RMS 800 CPS
8
7
SHIELD GROUND 25
+28 VOLTS DC 1
R51 1.8K
R53 220
T5
CR15
R54 1K
TO PHOTOMETER MARK 13
R44 12.1K
R46 1820
R48 11K
CR17 1N4107
R43 100K
DC SIGNAL INPUT 2
Q15 2N930
Q16 2N930
Q17 2N930
Q18 2N914
R55 470
C30 1.0
R45 51.1K
R47 3.01K
R50 2210
R52 3650
CR14 1N4107
C29 6.8
T6
0 VOLTS DC 3
SIGNAL TO COMPUTER
24
21
22
23
102.4 KC INPUT

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG:
PHOTOMETER ELECTRONICS ASSY
DWG NO. 1007559

Ⓑ **REPLACES REV A WITH CHANGE**

1007559-011	1007559-011
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS-9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN Jacquin DATE 3 AUG 64
CHECKED 4 SEP 64
APPROVAL
APPROVAL
NASA APPROVAL 6-2-65
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO. 80230
SIZE E
1009508
SCALE NONE
SHEET 1 OF 2

1009508

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD
B		REPLACES REV A WITH CHANGE PER TDRR 19777	—	23 APR 65	
C		REVISED PER TDRR 21278		31 JUL 65	

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOLERANCE AND RATING
C1	1010279-228	CAPACITOR	0.5 ±10% 35 VDC
C2	1006755-89	CAPACITOR	47 ±10% 35 VDC
C3	1006755-133	CAPACITOR	18 ±10% 50 VDC
C4	1006793-10	CAPACITOR	1300UUF ±2% 500 VDC
C5	1010317-6	CAPACITOR	.16 ±1% 30 VDC
C6	1006755-57	CAPACITOR	.1 ±10% 35 VDC
C7	1006793-51	CAPACITOR	39UUF ±2% 500 VDC
C8	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C9	1010279-232	CAPACITOR	1.1 ±10% 35 VDC
C10	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C11	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C12	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C13	1006755-34	CAPACITOR	33 ±10% 20 VDC
C14	1012501	CAPACITOR	1.0 ±1% 40 VDC
C15	1006755-53	CAPACITOR	.047 ±10% 35 VDC
C16	1006755-130	CAPACITOR	10 ±10% 50 VDC
C17	1006755-130	CAPACITOR	10 ±10% 50 VDC
C18	1010359-29	CAPACITOR	.01 ±10% 200 VDC
C19	1010393-037	CAPACITOR	4.7 ±10% 50 VDC
C20	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C21	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C22	1006755-77	CAPACITOR	4.7 ±10% 35 VDC
C23	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C24	1006793-51	CAPACITOR	39UUF ±2% 500 VDC
C25	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C26	1006755-79	CAPACITOR	6.8 ±10% 35 VDC
C27	1006755-133	CAPACITOR	18 ±10% 50 VDC
C28	1010279-228	CAPACITOR	.5 ±10% 35 VDC
C29	1006755-79	CAPACITOR	6.8 ±10% 35 VDC
C30	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
CR1	1010830-11	DIODE	1N967B
CR2	1012056-9	DIODE	1N4107
CR3	1010362-003	DIODE	1N649
CR4	1010362-003	DIODE	1N649
CR5	1010362-003	DIODE	1N649
CR6	1010362-003	DIODE	1N649
CR7	1012056-1	DIODE	1N4099
CR8	1010362-002	DIODE	1N647
CR9		DELETED	
CR10	1010830-11	DIODE	1N967B
CR11	1012056-9	DIODE	1N4107
CR12	1010362-002	DIODE	1N647
CR13		DELETED	
CR14	1012056-9	DIODE	1N4107
CR15	1006751-001	DIODE	
CR16	1010362-002	DIODE	1N647
CR17	1012056-9	DIODE	1N4107
K1	1010353-7	RELAY	
Q1	1010397-1	TRANSISTOR	2N930
Q2	1010397-1	TRANSISTOR	2N930
Q3	1010397-1	TRANSISTOR	2N930
Q4	1010398-1	TRANSISTOR	2N2193A
Q5	1010397-1	TRANSISTOR	2N930
Q6	1010397-1	TRANSISTOR	2N930
Q7	1012048	TRANSISTOR	2N2606
Q8	1010633-1	TRANSISTOR	2N2303
Q9	1010342	TRANSISTOR	2N988
Q10	1010397-1	TRANSISTOR	2N930
Q11	1010397-1	TRANSISTOR	2N930
Q12	1010397-1	TRANSISTOR	2N930
Q13	1010397-1	TRANSISTOR	2N930
Q14	1010367	TRANSISTOR	
Q15	1010397-1	TRANSISTOR	2N930
Q16	1010397-1	TRANSISTOR	2N930
Q17	1010397-1	TRANSISTOR	2N930
Q18	1010966-1	TRANSISTOR	2N914

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOLERANCE AND RATING
R1	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R2	1006750-80	RESISTOR	100K ±2% 1/4 W
R3	1006750-8	RESISTOR	100 ±2% 1/4 W
R4	1010364-502	RESISTOR	20K ±1% 1/8 W
R5	1010364-502	RESISTOR	20K ±1% 1/8 W
R6	1006750-80	RESISTOR	100K ±2% 1/4 W
R7	1006750-73	RESISTOR	51K ±2% 1/4 W
R8	1006750-39	RESISTOR	2K ±2% 1/4 W
R9	1006750-67	RESISTOR	30K ±2% 1/4 W
R10	1006750-68	RESISTOR	33K ±2% 1/4 W
R11	1006750-73	RESISTOR	51K ±2% 1/4 W
R12	1006760-32	RESISTOR	1K ±2% 1/2 W
R13	1010364-452	RESISTOR	11K ±1% 1/8 W
R14	1006750-57	RESISTOR	11K ±2% 1/4 W
R15	1010364-435	RESISTOR	9.09K ±1% 1/8 W
R16	1006750-63	RESISTOR	20K ±2% 1/4 W
R17	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R18	1010364-749	RESISTOR	392K ±1% 1/8 W
R19	1010364-444	RESISTOR	10K ±1% 1/8 W
R20	1006750-63	RESISTOR	20K ±2% 1/4 W
R21	1006750-49	RESISTOR	5.1K ±2% 1/4 W
R22	1010364-733	RESISTOR	324K ±1% 1/8 W
R23	1006750-73	RESISTOR	51K ±2% 1/4 W
R24	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R25	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R26		DELETED	
R27	1006750-48	RESISTOR	4.7K ±2% 1/4 W
R28	1010374-1	RESISTOR	511K ±1% 1/8 W
R29	1010374-29	RESISTOR	1 MEG ±1% 1/8 W
R30	1010364-765	RESISTOR	475K ±1% 1/8 W
R31	1010364-719	RESISTOR	274K ±1% 1/8 W
R32	1006750-51	RESISTOR	6200 ±2% 1/4 W
R33	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R34	1010374-54	RESISTOR	1.82 MEG ±1% 1/8 W
R35	1006750-67	RESISTOR	30K ±2% 1/4 W
R36	1006750-39	RESISTOR	2K ±2% 1/4 W
R37	1006750-73	RESISTOR	51K ±2% 1/4 W
R38	1006750-80	RESISTOR	100K ±2% 1/4 W
R39	1006750-32	RESISTOR	1K ±2% 1/4 W
R40	1006750-39	RESISTOR	2K ±2% 1/4 W
R41		DELETED	
R42	1006750-32	RESISTOR	1K ±2% 1/4 W
R43	1010364-635	RESISTOR	100K ±1% 1/8 W
R44	1010364-459	RESISTOR	12.1K ±1% 1/8 W
R45	1010364-579	RESISTOR	51.1K ±1% 1/8 W
R46	1010364-301	RESISTOR	1820 ±1% 1/8 W
R47	1010364-343	RESISTOR	3.01K ±1% 1/8 W
R48	1010364-451	RESISTOR	11K ±1% 1/8 W
R49		DELETED	
R50	1010364-317	RESISTOR	2210 ±1% 1/8 W
R51	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R52	1010364-359	RESISTOR	3650 ±1% 1/8 W
R53	1006750-16	RESISTOR	220 ±2% 1/4 W
R54	1006750-32	RESISTOR	1K ±2% 1/4 W
R55	1006750-24	RESISTOR	470 ±2% 1/4 W
R56	1006750-39	RESISTOR	2K ±2% 1/4 W
R57	1006750-49	RESISTOR	5.1K ±2% 1/4 W
R58	1006750-15	RESISTOR	200 ±2% 1/4 W
R59	1006750-8	RESISTOR	100 ±2% 1/4 W
R60	1010369-148	RESISTOR	20 ±5% 1/8 W
T1	1010759	TRANSFORMER	
T2	1010329-1	TRANSFORMER	
T3	1010315-1	TRANSFORMER	
T4		DELETED	
T5	1006762-2	TRANSFORMER	
T6	1006762-2	TRANSFORMER	

Ⓑ REPLACES REV A WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS-9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE 11 AUG 64
CHECKED 4 SEP 64
APPROVAL
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NASA APPROVAL
MIT APPROVAL

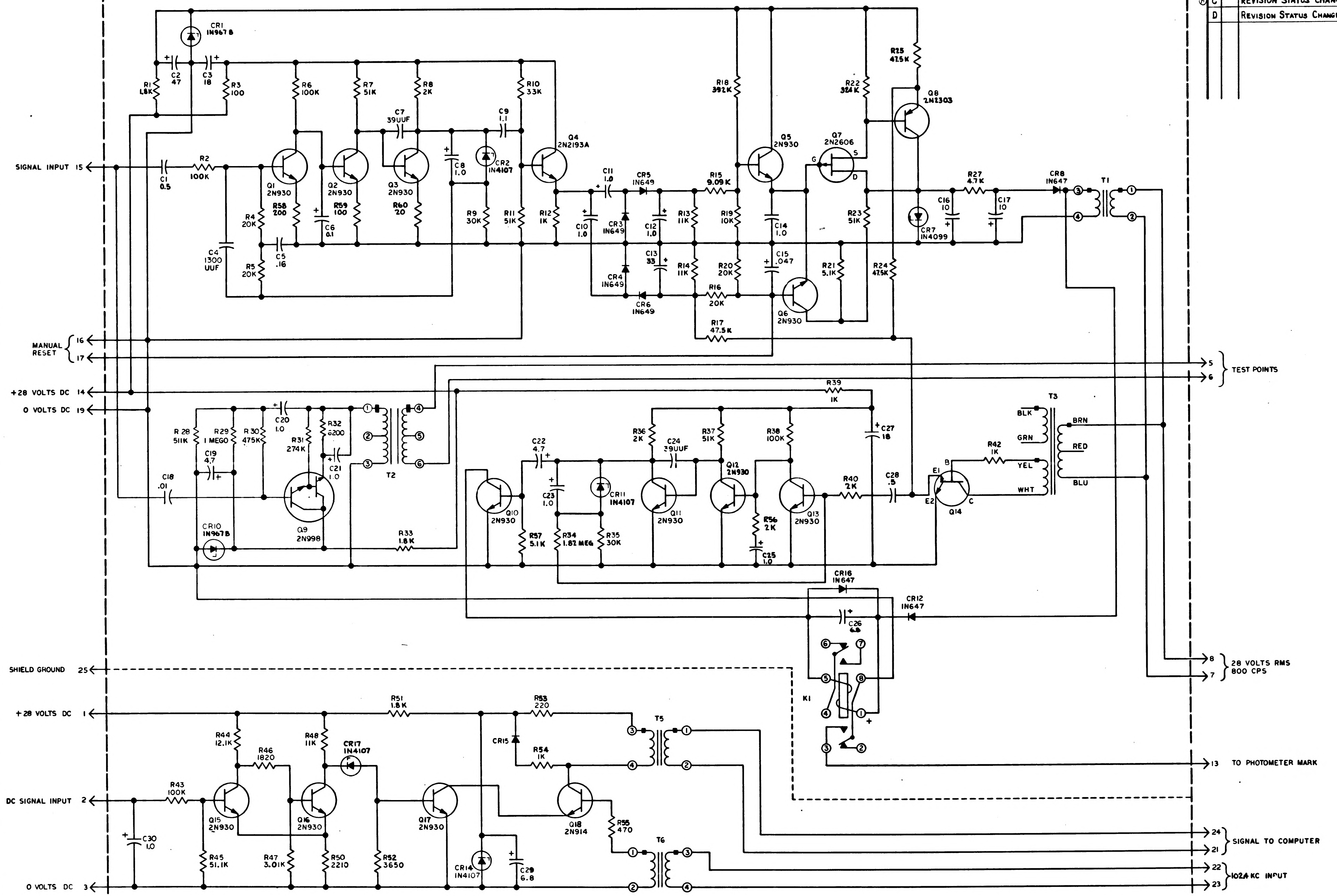
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO. 80230
SIZE E
1009508
SCALE —
SHEET 2 OF 2

1009508 C

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD.
B		REPLACES REV A WITH CHANGE PER TORR 19777	—	23 APR 65	
C		REVISION STATUS CHANGED		31 JUL 65	RLP
D		REVISION STATUS CHANGED		14 DEC 65	JMP



SIGNAL INPUT 15
MANUAL RESET 16
17
+28 VOLTS DC 14
0 VOLTS DC 19
SHIELD GROUND 25
+28 VOLTS DC 1
DC SIGNAL INPUT 2
0 VOLTS DC 3
5
6
TEST POINTS
8
7
28 VOLTS RMS 800 CPS
13
TO PHOTOMETER MARK
24
21
SIGNAL TO COMPUTER
22
23
1024 KC INPUT
CR1 1N967B
C2 47
C3 18
R1 1.8K
R3 100
R6 100K
R7 51K
R8 2K
R10 33K
C7 39UUF
C9 1.1
Q4 2N2193A
C1 0.5
R2 100K
Q1 2N930
Q2 2N930
Q3 2N930
R58 200
R59 100
R60 20
C6 0.1
C8 1.0
CR2 1N4107
R9 30K
R11 51K
R12 1K
R4 20K
R5 20K
C4 1300 UUF
C5 .16
C11 1.0
CR5 1N649
C10 1.0
CR3 1N649
C12 1.0
C13 33
CR4 1N649
CR6 1N649
R13 11K
R14 11K
R15 9.09K
R19 10K
R20 20K
R16 20K
R17 47.5K
R18 392K
Q5 2N930
C14 1.0
C15 .047
Q6 2N930
R22 324K
Q7 2N2606
G
S
D
R23 51K
R21 5.1K
R24 475K
R25 47.5K
Q8 2N2303
CR7 1N4099
C16 10
R27 4.7K
C17 10
CR8 1N647
T1
R28 511K
R29 1 MEGO
R30 475K
C20 1.0
R31 274K
R32 6200
C21 1.0
C19 4.7
C18 .01
CR10 1N967B
Q9 2N998
T2
R33 1.8K
R39 1K
C22 4.7
C23 1.0
CR11 1N4107
R36 2K
C24 39UUF
R37 51K
R38 100K
C27 18
Q10 2N930
Q11 2N930
Q12 2N930
Q13 2N930
R57 5.1K
R34 1.82 MEG
R35 30K
R56 2K
C25 1.0
R40 2K
C28 .5
E1
E2
B
C
Q14
R42 1K
T3
BLK
GRN
YEL
WHT
BRN
RED
BLU
CR16 1N647
CR12 1N647
C26 6.8
K1
R51 1.8K
R53 220
CR15
R54 1K
T5
R44 12.1K
R46 1820
R48 11K
CR17 1N4107
R43 100K
Q15 2N930
Q16 2N930
Q17 2N930
Q18 2N914
R55 470
T6
C30 1.0
R45 51.1K
R47 3.01K
R50 2210
R52 3650
CR14 1N4107
C29 6.8

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG:
PHOTOMETER ELECTRONICS ASSY
DWG NO. 1007559

Ⓑ REPLACES REV A WITH CHANGE

1007559-011	1007559-011
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS-9-497

MIT
INSTRUMENTATION LAB
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DRAWN 5 AUG 64
CHECKED Wilson 4 SEP 64
APPROVAL
APPROVAL
NASA APPROVAL 6-2-65
MIT APPROVAL

MANNED
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HOUSTON, TEXAS

SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO. 80230 SIZE E 1009508
SCALE NONE SHEET 1 OF 2

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD
B		REPLACES REV A WITH CHANGE PER TDRR 19777	—	23 APR 65	JJJ
C		REVISED PER TDRR 21278		31 JUL 65	RLP
D		REVISED PER TDRR 24560		14 DEC 65	JHP

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOLERANCE AND RATING
C1	1010279-228	CAPACITOR	0.5 ±10% 35 VDC
C2	1006755-89	CAPACITOR	47 ±10% 35 VDC
C3	1006755-133	CAPACITOR	18 ±10% 50 VDC
C4	1006793-10	CAPACITOR	1300UUF ±2% 500 VDC
C5	1010317-6	CAPACITOR	.16 ±1% 30 VDC
C6	1006755-57	CAPACITOR	.1 ±10% 35 VDC
C7	1006793-51	CAPACITOR	39UUF ±2% 500 VDC
C8	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C9	1010279-232	CAPACITOR	1.1 ±10% 35 VDC
C10	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C11	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C12	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C13	1006755-34	CAPACITOR	33 ±10% 20 VDC
C14	1012501	CAPACITOR	1.0 ±1% 40 VDC
C15	1006755-53	CAPACITOR	.047 ±10% 35 VDC
C16	1006755-130	CAPACITOR	10 ±10% 50 VDC
C17	1006755-130	CAPACITOR	10 ±10% 50 VDC
C18	1010359-29	CAPACITOR	.01 ±10% 200 VDC
C19	1010393-037	CAPACITOR	4.7 ±10% 50 VDC
C20	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C21	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C22	1006755-77	CAPACITOR	4.7 ±10% 35 VDC
C23	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C24	1006793-51	CAPACITOR	39UUF ±2% 500 VDC
C25	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
C26	1006755-79	CAPACITOR	6.8 ±10% 35 VDC
C27	1006755-133	CAPACITOR	18 ±10% 50 VDC
C28	1010279-228	CAPACITOR	.5 ±10% 35 VDC
C29	1006755-79	CAPACITOR	6.8 ±10% 35 VDC
C30	1006755-69	CAPACITOR	1.0 ±10% 35 VDC
CR1	1010830-11	DIODE	1N967B
CR2	1012056-9	DIODE	1N4107
CR3	1010362-003	DIODE	1N649
CR4	1010362-003	DIODE	1N649
CR5	1010362-003	DIODE	1N649
CR6	1010362-003	DIODE	1N649
CR7	1012056-1	DIODE	1N4099
CR8	1010362-002	DIODE	1N647
CR9		DELETED	
CR10	1010830-11	DIODE	1N967B
CR11	1012056-9	DIODE	1N4107
CR12	1010362-002	DIODE	1N647
CR13		DELETED	
CR14	1012056-9	DIODE	1N4107
CR15	1006751-000	DIODE	
CR16	1010362-002	DIODE	1N647
CR17	1012056-9	DIODE	1N4107
K1	1010353-7	RELAY	
Q1	1010397-1	TRANSISTOR	2N930
Q2	1010397-1	TRANSISTOR	2N930
Q3	1010397-1	TRANSISTOR	2N930
Q4	1010398-1	TRANSISTOR	2N2193A
Q5	1010397-1	TRANSISTOR	2N930
Q6	1010397-1	TRANSISTOR	2N930
Q7	1012048	TRANSISTOR	2N2606
Q8	1010633-1	TRANSISTOR	2N2303
Q9	1010342	TRANSISTOR	2N988
Q10	1010397-1	TRANSISTOR	2N930
Q11	1010397-1	TRANSISTOR	2N930
Q12	1010397-1	TRANSISTOR	2N930
Q13	1010397-1	TRANSISTOR	2N930
Q14	1010367	TRANSISTOR	
Q15	1010397-1	TRANSISTOR	2N930
Q16	1010397-1	TRANSISTOR	2N930
Q17	1010397-1	TRANSISTOR	2N930
Q18	1010966-1	TRANSISTOR	2N914

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOLERANCE AND RATING
R1	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R2	1006750-80	RESISTOR	100K ±2% 1/4 W
R3	1006750-8	RESISTOR	100 ±2% 1/4 W
R4	1010364-502	RESISTOR	20K ±1% 1/8 W
R5	1010364-502	RESISTOR	20K ±1% 1/8 W
R6	1006750-80	RESISTOR	100K ±2% 1/4 W
R7	1006750-73	RESISTOR	51K ±2% 1/4 W
R8	1006750-39	RESISTOR	2K ±2% 1/4 W
R9	1006750-67	RESISTOR	30K ±2% 1/4 W
R10	1006750-68	RESISTOR	33K ±2% 1/4 W
R11	1006750-73	RESISTOR	51K ±2% 1/4 W
R12	1006760-32	RESISTOR	1K ±2% 1/2 W
R13	1010364-452	RESISTOR	11K ±1% 1/8 W
R14	1006750-57	RESISTOR	11K ±2% 1/4 W
R15	1010364-435	RESISTOR	9.09K ±1% 1/8 W
R16	1006750-63	RESISTOR	20K ±2% 1/4 W
R17	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R18	1010364-749	RESISTOR	392K ±1% 1/8 W
R19	1010364-444	RESISTOR	10K ±1% 1/8 W
R20	1006750-63	RESISTOR	20K ±2% 1/4 W
R21	1006750-49	RESISTOR	5.1K ±2% 1/4 W
R22	1010364-733	RESISTOR	324K ±1% 1/8 W
R23	1006750-73	RESISTOR	51K ±2% 1/4 W
R24	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R25	1010364-573	RESISTOR	47.5K ±1% 1/8 W
R26		DELETED	
R27	1006750-48	RESISTOR	4.7K ±2% 1/4 W
R28	1010374-1	RESISTOR	511K ±1% 1/8 W
R29	1010374-29	RESISTOR	1 MEG ±1% 1/8 W
R30	1010364-765	RESISTOR	475K ±1% 1/8 W
R31	1010364-719	RESISTOR	274K ±1% 1/8 W
R32	1006750-51	RESISTOR	6200 ±2% 1/4 W
R33	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R34	1010374-54	RESISTOR	1.82 MEG ±1% 1/8 W
R35	1006750-67	RESISTOR	30K ±2% 1/4 W
R36	1006750-39	RESISTOR	2K ±2% 1/4 W
R37	1006750-73	RESISTOR	51K ±2% 1/4 W
R38	1006750-80	RESISTOR	100K ±2% 1/4 W
R39	1006750-32	RESISTOR	1K ±2% 1/4 W
R40	1006750-39	RESISTOR	2K ±2% 1/4 W
R41		DELETED	
R42	1006750-32	RESISTOR	1K ±2% 1/4 W
R43	1010364-635	RESISTOR	100K ±1% 1/8 W
R44	1010364-459	RESISTOR	12.1K ±1% 1/8 W
R45	1010364-579	RESISTOR	51.1K ±1% 1/8 W
R46	1010364-301	RESISTOR	1820 ±1% 1/8 W
R47	1010364-343	RESISTOR	3.01K ±1% 1/8 W
R48	1010364-451	RESISTOR	11K ±1% 1/8 W
R49		DELETED	
R50	1010364-317	RESISTOR	2210 ±1% 1/8 W
R51	1006760-38	RESISTOR	1.8K ±2% 1/2 W
R52	1010364-359	RESISTOR	3650 ±1% 1/8 W
R53	1006750-16	RESISTOR	220 ±2% 1/4 W
R54	1006750-32	RESISTOR	1K ±2% 1/4 W
R55	1006750-24	RESISTOR	470 ±2% 1/4 W
R56	1006750-39	RESISTOR	2K ±2% 1/4 W
R57	1006750-49	RESISTOR	5.1K ±2% 1/4 W
R58	1006750-15	RESISTOR	200 ±2% 1/4 W
R59	1006750-8	RESISTOR	100 ±2% 1/4 W
R60	1010369-148	RESISTOR	20 ±5% 1/8 W
T1	1010759	TRANSFORMER	
T2	1010329-1	TRANSFORMER	
T3	1010315-1	TRANSFORMER	
T4		DELETED	
T5	1006762-2	TRANSFORMER	
T6	1006762-2	TRANSFORMER	

Ⓑ **REPLACES REV A WITH CHANGE**

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
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DRAWN DATE 11 AUG 64
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APPROVAL
NASA APPROVAL 6-2-65
MIT APPROVAL

MANNED
SPACECRAFT CENTER
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SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO. 80230
SIZE E
1009508
SCALE —
SHEET 2 OF 2

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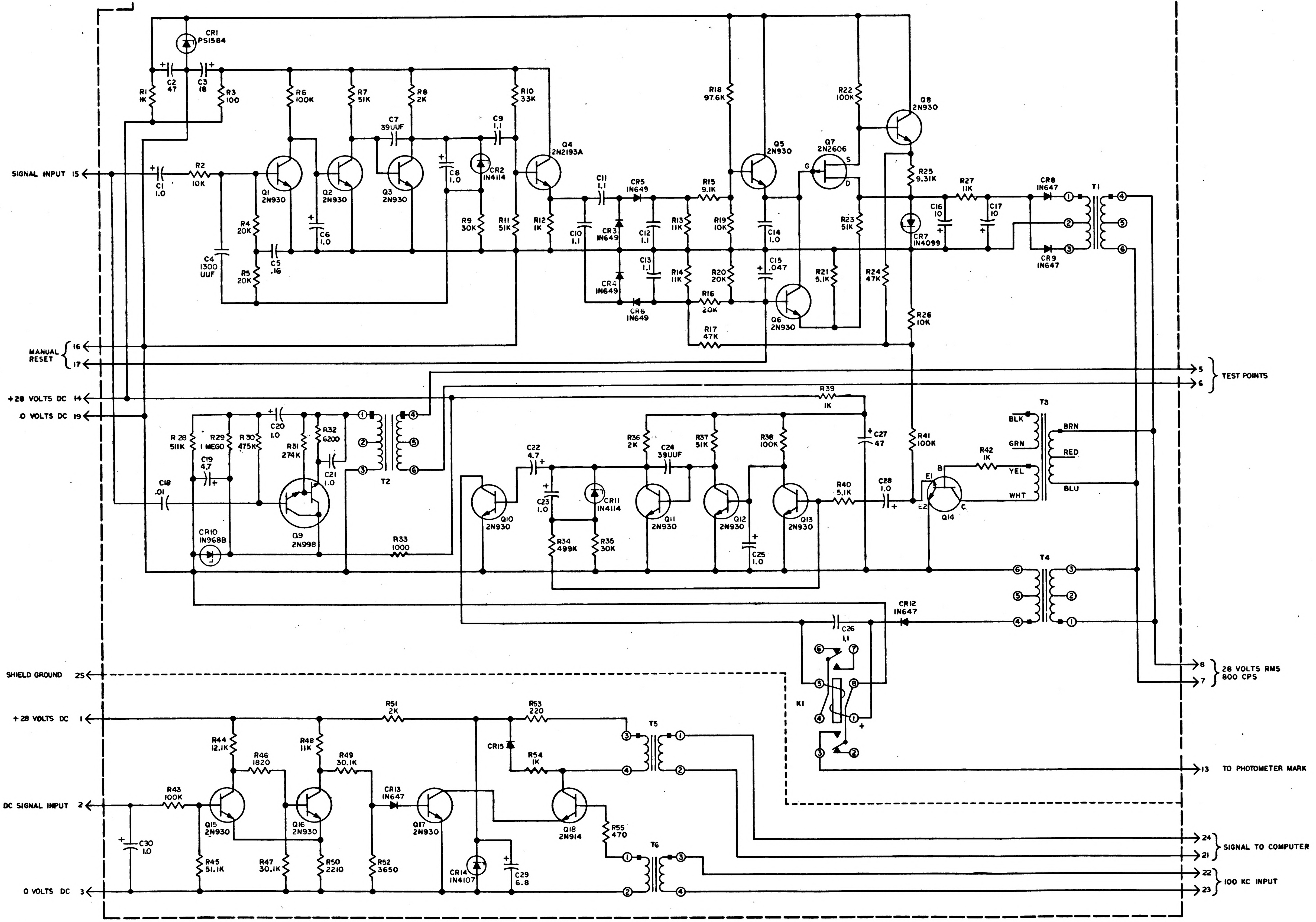
SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS		



CR1 PS1584
C2 47
C3 18
R1 1K
R3 100
R6 100K
R7 51K
R8 2K
R10 33K
C7 39UUF
C9 1.1
C8 1.0
CR2 1N4114
Q4 2N2193A
SIGNAL INPUT 15
C1 1.0
R2 10K
Q1 2N930
Q2 2N930
Q3 2N930
C6 1.0
R4 20K
R5 20K
C4 1300 UUF
C5 .16
R9 30K
R11 51K
R12 1K
C11 1.1
CR5 1N649
C10 1.1
CR3 1N649
C12 1.1
C13 1.1
CR4 1N649
CR6 1N649
R13 11K
R14 11K
R15 9.1K
R16 20K
R17 47K
R18 97.6K
R19 10K
R20 20K
Q5 2N930
C14 1.0
C15 .047
Q6 2N930
R21 5.1K
Q7 2N2606
G
S
D
R22 100K
R23 51K
R24 47K
Q8 2N930
R25 9.31K
CR7 1N4099
R26 10K
C16 10
R27 11K
C17 10
CR8 1N647
CR9 1N647
T1
MANUAL RESET 16 17
TEST POINTS 5 6
+28 VOLTS DC 14
0 VOLTS DC 19
R 28 511K
R29 1 MEGO
R 30 475K
C20 1.0
R32 6200
R31 274K
C21 1.0
C19 4.7
C18 .01
Q9 2N998
T2
CR10 1N968B
R33 1000
R39 1K
C27 47
C22 4.7
C23 1.0
CR11 1N4114
R34 499K
R35 30K
R36 2K
C24 39UUF
R37 51K
R38 100K
Q10 2N930
Q11 2N930
Q12 2N930
Q13 2N930
C25 1.0
R40 5.1K
C28 1.0
R41 100K
E1 B E2 C
Q14
R42 1K
T3
BLK GRN YEL WHT
BRN RED BLU
T4
CR12 1N647
C26
L1
K1
28 VOLTS RMS 800 CPS 8 7
SHIELD GROUND 25
+28 VOLTS DC 1
R51 2K
R53 220
T5
CR15
R54 1K
R44 12.1K
R46 1820
R48 11K
R49 30.1K
CR13 1N647
DC SIGNAL INPUT 2
R43 100K
Q15 2N930
Q16 2N930
Q17 2N930
Q18 2N914
C30 1.0
R45 51.1K
R47 30.1K
R50 2210
R52 3650
CR14 1N4107
C29 6.8
R55 470
T6
0 VOLTS DC 3
TO PHOTOMETER MARK 13
SIGNAL TO COMPUTER 24 21
100 KC INPUT 22 23

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG:
PHOTOMETER ELECTRONICS ASSY
DWG NO. 1007559

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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DRAWN Ken Healy DATE 5 Aug 64
CHECKED
APPROVAL M. Hasted
APPROVAL
NASA APPROVAL W. J. Rhine 12-15-64
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MANNED SPACECRAFT CENTER
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SCHEMATIC
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CODE IDENT NO. | SIZE E | NASA DRAWING NO 1009508
SCALE — | WT — | SHEET 1 OF 2

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REVISIONS 147			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 — 32	RESISTOR	1K	± 2%	1/4 W
R2	1006750 — 56	↓	10K	± 2%	1/4 W
R3	1006750 — 8	↓	100	± 2%	1/4 W
R4	1010364 — 502	↓	20K	± 1%	1/8 W
R5	1010364 — 502	↓	20K	± 1%	1/8 W
R6	1006750 — 80	↓	100K	± 2%	1/4 W
R7	↓ — 73	↓	51K	↓	↓
R8	↓ — 39	↓	2K	↓	↓
R9	↓ — 67	↓	30K	↓	↓
R10	↓ — 68	↓	33K	↓	↓
R11	↓ — 73	↓	51K	↓	↓
R12	↓ — 32	↓	1K	↓	↓
R13	↓ — 57	↓	11K	↓	↓
R14	↓ — 57	↓	11K	↓	↓
R15	↓ — 55	↓	9.1K	↓	↓
R16	↓ — 63	↓	20K	↓	↓
R17	1006750 — 72	↓	47K	± 2%	1/4 W
R18	1010364 — 634	↓	97.6K	± 1%	1/8 W
R19	1006750 — 56	↓	10K	± 2%	1/4 W
R20	↓ — 63	↓	20K	↓	↓
R21	↓ — 49	↓	5.1K	↓	↓
R22	↓ — 80	↓	100K	↓	↓
R23	↓ — 73	↓	51K	↓	↓
R24	1006750 — 72	↓	47K	± 2%	1/4 W
R25	1010364 — 438	↓	9.31K	± 1%	1/8 W
R26	1006750 — 56	↓	10K	± 2%	1/4 W
R27	1006750 — 57	↓	11K	± 2%	1/4 W
R28	1010374 — 1	↓	511K	± 1%	1/8 W
R29	1010374 — 29	↓	1 MEG	± 1%	1/8 W
R30	1010364 — 765	↓	475K	± 1%	1/8 W
R31	1010364 — 719	↓	274K	± 1%	1/8 W
R32	1006750 — 51	↓	6200	± 2%	1/4 W
R33	1010364 — 251	↓	1000	± 1%	1/8 W
R34	1010364 — 770	↓	499K		1/8 W
R35	1006750 — 67	↓	30K	± 2%	1/4 W
R36	↓ — 39	↓	2K	↓	↓
R37	↓ — 73	↓	51K	↓	↓
R38	↓ — 80	↓	100K	↓	↓
R39	↓ — 32	↓	1K	↓	↓
R40	↓ — 49	↓	5.1K	↓	↓
R41	↓ — 80	↓	100K	↓	↓
R42	1006750 — 32	↓	1K	± 2%	1/4 W
R43	1010364 — 635	↓	100K	± 1%	1/8 W
R44	↓ — 459	↓	12.1K	↓	↓
R45	↓ — 579	↓	51.1K	↓	↓
R46	↓ — 301	↓	1820	↓	↓
R47	↓ — 535	↓	30.1K	↓	↓
R48	↓ — 451	↓	11K	↓	↓
R49	↓ — 535	↓	30.1K	↓	↓
R50	↓ — 317	↓	2210	↓	↓
R51	↓ — 309	↓	2K	↓	↓
R52	1010364 — 359	↓	3650	± 1%	1/8 W
R53	1006750 — 16	↓	220	± 2%	1/4 W
R54	1006750 — 32	↓	1K	± 2%	1/4 W
R55	1006750 — 24	RESISTOR	470	± 2%	1/4 W
C1	1006755 — 69	CAPACITOR	1.0	± 10%	35VDC
C2	1006755 — 89	↓	47	± 10%	35VDC
C3	1006755 — 133	↓	18	± 10%	50VDC
C4	1006793 — 10	↓	1300UUF	± 2%	500VDC
C5	1010317 — 6	↓	.16	± 1%	30 VDC
C6	1006755 — 69	↓	1.0	± 10%	35 VDC
C7	1006793 — 51	↓	39 UUF	± 2%	500VDC
C8	1006755 — 69	↓	1.0	± 10%	35 VDC
C9	1010279 — 232	↓	1.1	± 10%	35 VDC
C10	↓ — 232	↓	↓	↓	↓
C11	↓ — 232	↓	↓	↓	↓
C12	↓ — 232	↓	↓	↓	↓
C13	1010279 — 232	↓	1.1	± 10%	35 VDC
C14	1012501 — 1	↓	1.0	± 1%	40 VDC
C15	1006755 — 53	↓	.047	± 10%	35 VDC
C16	1006755 — 130	↓	10	± 10%	50 VDC
C17	1006755 — 130	↓	10	± 10%	50 VDC
C18	1010359 — 29	↓	.01	± 10%	200VDC
C19	1010393 — 037	↓	4.7	± 10%	50 VDC
C20	1006755 — 69	↓	1.0	± 10%	35 VDC
C21	↓ — 69	↓	1.0	± 10%	35 VDC
C22	↓ — 77	↓	4.7	± 10%	35 VDC
C23	1006755 — 69	↓	1.0	± 10%	35 VDC
C24	1006793 — 51	↓	39 UUF	± 2%	500VDC
C25	1006755 — 69	↓	1.0	± 10%	35VDC
C26	1010279 — 232	↓	1.1	± 10%	35VDC
C27	1006755 — 89	↓	47	± 10%	35VDC
C28	1006755 — 69	↓	1.0	± 10%	35VDC
C29	1006755 — 79	↓	6.8	± 10%	35VDC
C30	1006755 — 69	CAPACITOR	1.0	± 10%	35VDC

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR1	1010346	DIODE	PS1584		
CR2	1012056 — 16	↓	IN4114		
CR3	1010837 — 003	↓	IN649		
CR4	1010837 — 003	↓	IN 649		
CR5	1010837 — 003	↓	IN649		
CR6	1010837 — 003	↓	IN 649		
CR7	1012056 — 1	↓	IN4099		
CR8	1010837 — 002	↓	IN647		
CR9	1010837 — 002	↓	IN647		
CR10	1010830 — 12	↓	IN968B		
CR11	1012056 — 16	↓	IN4114		
CR12	1010837 — 002	↓	IN647		
CR13	1010837 — 002	↓	IN647		
CR14	1012056 — 9	↓	IN4107		
CR15	1006751	DIODE			
Q1	1010397 — 1	TRANSISTOR	2N930		
Q2	1010397 — 1	↓	2N930		
Q3	1010397 — 1	↓	2N930		
Q4	1010398 — 1	↓	2N2193A		
Q5	1010397 — 1	↓	2N930		
Q6	1010397 — 1	↓	2N930		
Q7	1012048	↓	2N2606		
Q8	1010397 — 1	↓	2N930		
Q9	1010342	↓	2N998		
Q10	1010397 — 1	↓	2N930		
Q11	1010397 — 1	↓	2N930		
Q12	1010397 — 1	↓	2N930		
Q13	1010397 — 1	↓	2N930		
Q14	1010367	↓			
Q15	1010397 — 1	↓	2N930		
Q16	1010397 — 1	↓	2N930		
Q17	1010397 — 1	↓	2N930		
Q18	1006752	TRANSISTOR	2N914		
K1	1010353 — 7	RELAY			
T1	1010276	TRANSFORMER			
T2	1010329 — 1	↓			
T3	1010315 — 1	↓			
T4	1010276	↓			
T5	1006762 — 3	↓			
T6	1006762 — 3	TRANSFORMER			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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DWG NO. CONTRACT
DRAWN F. Walsh DATE 11 Aug 69
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 12-15-69
MIT APPROVAL 15 Dec 69

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HOUSTON, TEXAS

SCHEMATIC
PHOTOMETER ELECTRONICS

CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1009508
SCALE —
WT —
SHEET 2 OF 2

MASTER

1009508

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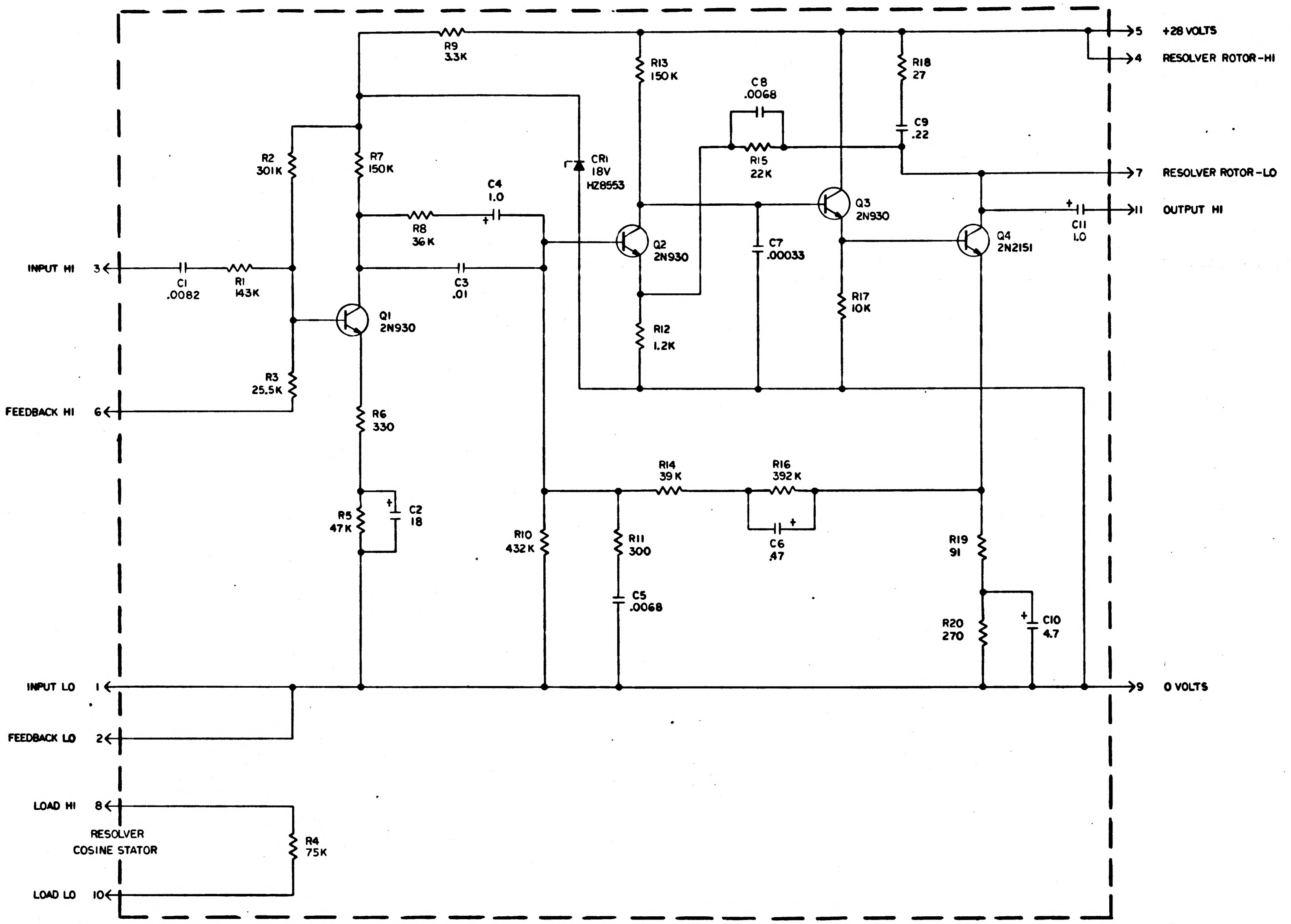
REVISIONS 13086

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 13648	10/24/64	


+28 VOLTS
RESOLVER ROTOR-HI
RESOLVER ROTOR-LO
OUTPUT HI
0 VOLTS
INPUT HI
FEEDBACK HI
INPUT LO
FEEDBACK LO
LOAD HI
LOAD LO
RESOLVER
COSINE STATOR
1
2
3
4
5
6
7
8
9
10
11
R9 3.3K
R13 150K
C8 .0068
R15 22K
R18 27
C9 .22
R2 301K
R7 150K
CR1 18V HZ8553
C4 1.0
R8 36K
Q3 2N930
Q2 2N930
Q4 2N2151
C7 .00033
C11 1.0
C1 .0082
R1 143K
C3 .01
Q1 2N930
R17 10K
R12 1.2K
R3 25.5K
R6 330
R14 39K
R16 392K
R5 47K
C2 18
R10 432K
R11 300
C6 .47
R19 91
C5 .0068
R20 270
C10 4.7
R4 75K

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-666	RESISTOR	143 K	1 %	1/8W
R2	1010364-727	↑	301 K	1 %	1/8W
R3	1010364-521		25.5K	1 %	1/8W
R4	1006750-77		75K	2 %	1/4W
R5	↑ 72		47K	↑	↑
R6	20		330		
R7	84		150K		
R8	↓ 69		36K	↓	↓
R9	1006750-44		3.3K	2 %	1/4W
R10	1010364-757		432K	1 %	1/8W
R11	1006750-19		300	2 %	1/4 W
R12	↑ 34		1.2K	↑	↑
R13	84		150K		
R14	↓ 70		39K	↓	↓
R15	1006750-64		22K	2 %	1/4W
R16	1010364-749		392K	1 %	1/8W
R17	1006750-56		10K	2 %	1/4W
R18	1010368-11		27	5 %	1/4W
R19	1006750-7	↓	91	2 %	1/4W
R20	1006750-18	RESISTOR	270	2 %	1/4W
C1	1010375-12	CAPACITOR	.0082	5%	50 V
C2	1006755-20	↑	18	↑	15 V
C3	1010375-124		.01		300V
C4	1006755-69		1.0		35V
C5	1010359-27		.0068		200V
C6	1006755-65		.47		35V
C7	1010359-11		.00033		200V
C8	1010359-27		.0068		200V
C9	1010375-66		.22		100V
C10	1006755-77	↓	4.7	↓	35V
C11	1006755-69	CAPACITOR	1.0	10 %	35V
CR1	1010372-24	DIODE	HZ8553		18V
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	↑	2N930		
Q3	1010397-1	↓	2N930		
Q4	1010269-1	TRANSISTOR	2N2151		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS K INDICATES THOUSANDS OF OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG:
COSECANT GENERATOR ASSY
DWG NO. 1007524

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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DWG NO. CONTRACT
DRAWN Tom Williams DATE 10 AUG 64
CHECKED 11 AUG 64
APPROVAL R.W.
APPROVAL
NASA APPROVAL W. J. 9-24-64
MIT APPROVAL 24 Sept

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HOUSTON, TEXAS

SCHEMATIC,
COSECANT GENERATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009509
SCALE
WT
SHEET 1 OF 1

1009509 A

MASTER

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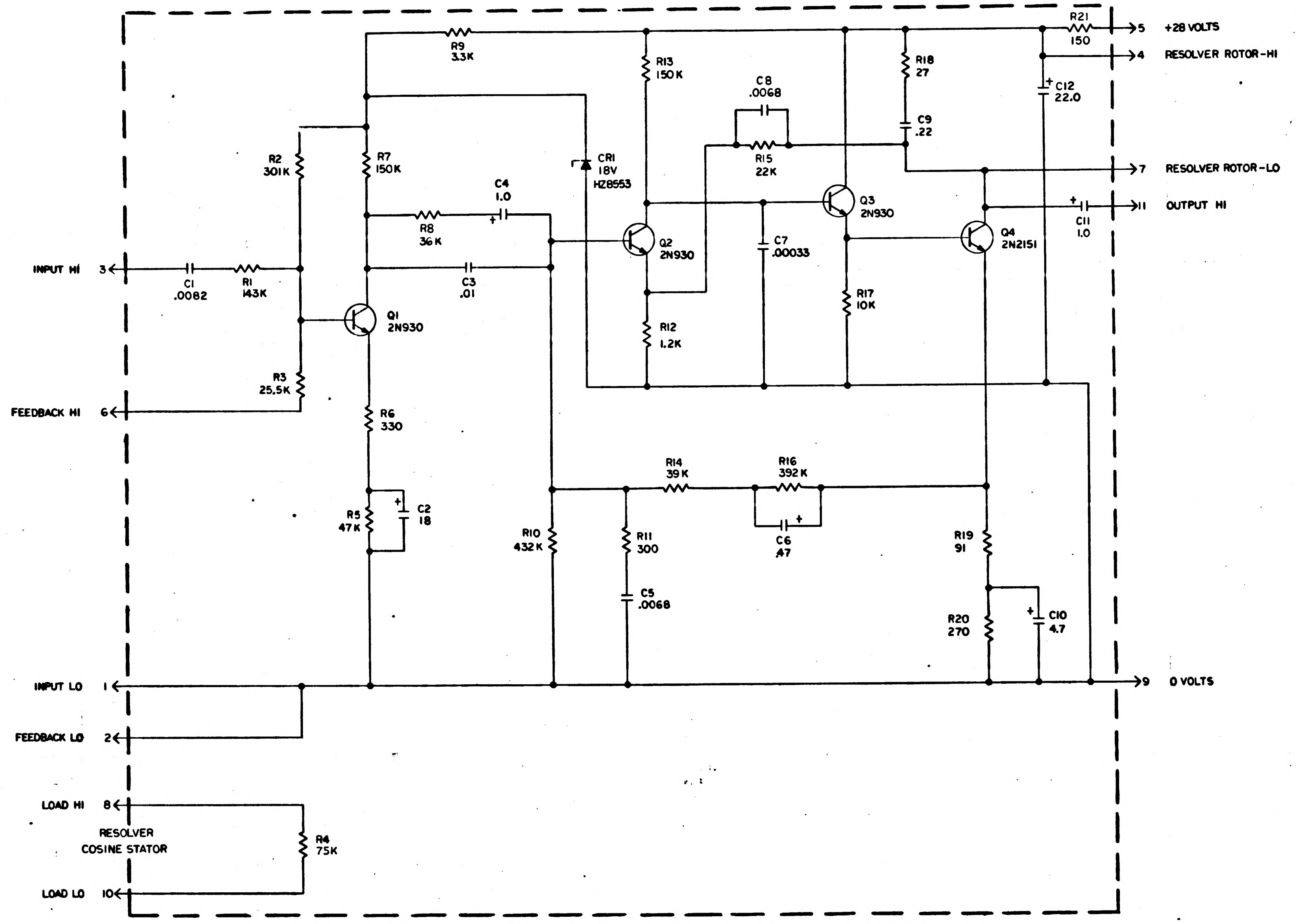
REVISIONS 13886

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 13649	9/24/64	
B	REVISED PER TDRR 16330	1 FEB 65	


R9
3.3K
R13
150K
R21
150
5 +28 VOLTS
4 RESOLVER ROTOR-HI
R18
27
C8
.0068
C12
22.0
C9
.22
R2
301K
R7
150K
CR1
18V
HZ8553
R15
22K
7 RESOLVER ROTOR-LO
C4
1.0
Q3
2N930
11 OUTPUT HI
C11
1.0
R8
36K
Q2
2N930
C7
.00033
Q4
2N2151
INPUT HI 3
C1
.0082
R1
143K
C3
.01
R17
10K
Q1
2N930
R12
1.2K
R3
25.5K
FEEDBACK HI 6
R6
330
R14
39K
R16
392K
C2
18
R5
47K
C6
.47
R10
432K
R11
300
R19
91
C5
.0068
R20
270
C10
4.7
INPUT LO 1
9 0 VOLTS
FEEDBACK LO 2
LOAD HI 8
RESOLVER
COSINE STATOR
R4
75K
LOAD LO 10

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-666	RESISTOR	143 K	1 %	1/8W
R2	1010364-727		301 K	1 %	1/8W
R3	1010364-521		25.5K	1 %	1/8W
R4	1006750-77		75K	2 %	1/4W
R5	72		47K		
R6	20		330		
R7	84		150K		
R8	69		36K		
R9	1006750-44		3.3K	2 %	1/4W
R10	1010364-757		432K	1 %	1/8W
R11	1006750-19		300	2 %	1/4W
R12	34		1.2K		
R13	84		150K		
R14	70		39K		
R15	1006750-64		22K	2 %	1/4W
R16	1010364-749		392K	1 %	1/8W
R17	1006750-56		10K	2 %	1/4W
R18	1010368-11		27	5 %	1/4W
R19	1006750-7		91	2 %	1/4W
R20	1006750-18		270	2 %	1/4W
R21	1010364-93	RESISTOR	150	1 %	1/8W
C1	1010375-12	CAPACITOR	.0082	10%	50 V
C2	1006755-20		18		15 V
C3	1006755-45		.01		35 V
C4	1006755-69		1.0		35V
C5	1010359-27		.0068		200V
C6	1006755-65		.47		35V
C7	1010359-11		.00033		200V
C8	1010359-27		.0068		200V
C9	1010375-66		.22		100V
C10	1006755-77		4.7		35V
C11	1006755-69		1.0		35V
C12	1006755-134	CAPACITOR	22.0	10 %	50 V
CR1	1010372-24	DIODE	HZ8553		18V
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010397-1	TRANSISTOR	2N930		
Q4	1010269-1	TRANSISTOR	2N2151		

REF DWG:
COSECANT GENERATOR ASSY
DWG NO. 1007524

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS. K INDICATES THOUSANDS OF OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DATE 10 AUG 64
CHECKED 11 AUG 64
APPROVAL R W
APPROVAL
NASA APPROVAL 8-26-64
MIT APPROVAL 8/24/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, COSECANT GENERATOR

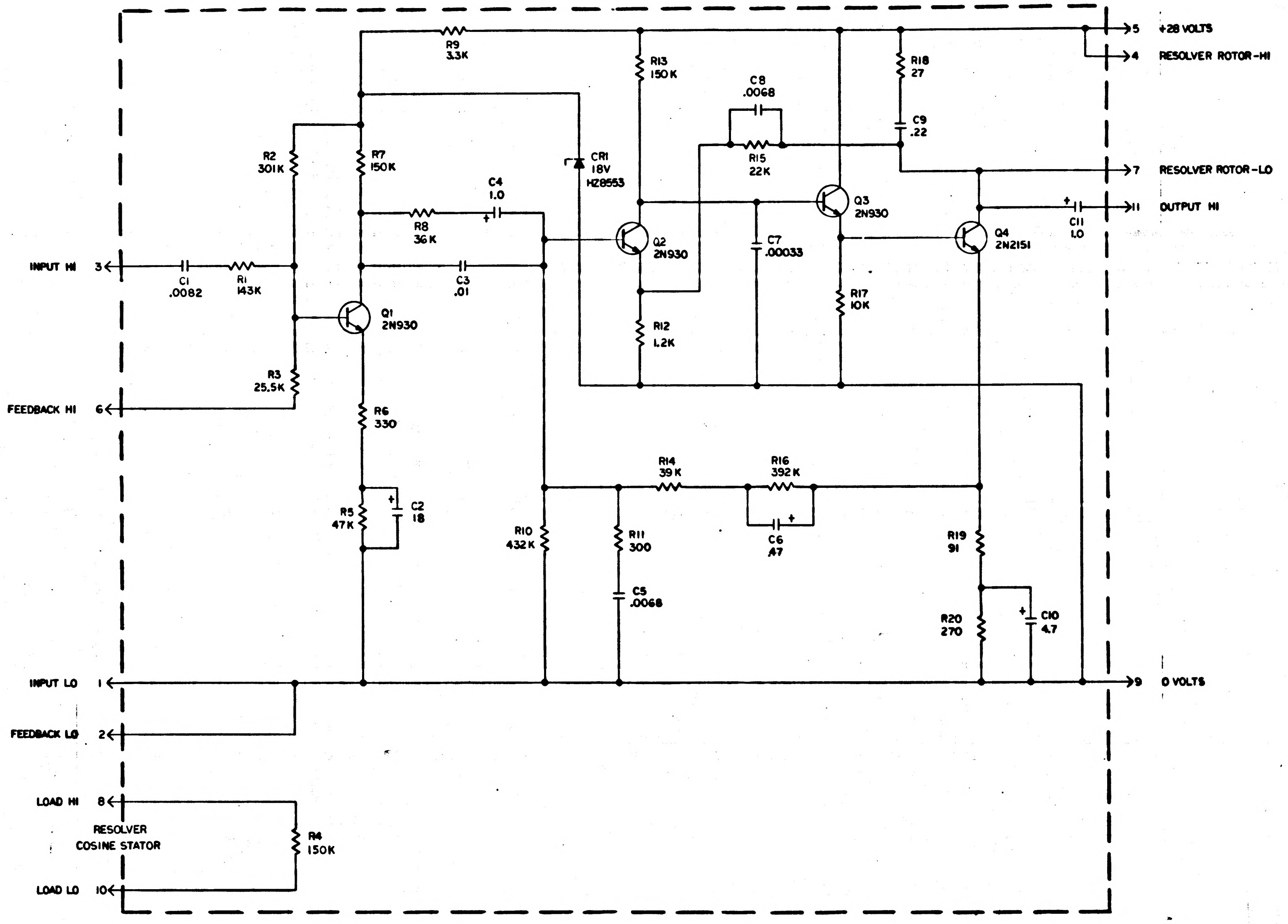
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009509
SCALE —— WT —— SHEET 1 OF 1

1009509 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13086

SYM	DESCRIPTION	DATE	APPROVAL


+28 VOLTS 5
RESOLVER ROTOR-HI 4
RESOLVER ROTOR-LO 7
OUTPUT HI 11
0 VOLTS 9
INPUT HI 3
FEEDBACK HI 6
INPUT LO 1
FEEDBACK LO 2
LOAD HI 8
LOAD LO 10
RESOLVER COSINE STATOR
R9 3.3K
R13 150K
C8 .0068
R15 22K
R18 27
C9 .22
R2 301K
R7 150K
CR1 18V HZ8553
C4 1.0
R8 36K
C3 .01
C1 .0082
R1 143K
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N2151
C7 .00033
R17 10K
C11 1.0
R3 25.5K
R12 1.2K
R6 330
R14 39K
R16 392K
C6 .47
R5 47K
C2 18
R10 432K
R11 300
C5 .0068
R19 91
R20 270
C10 4.7
R4 150K

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-666	RESISTOR	143 K	1 %	1/8W
R2	1010364-727	↑	301 K	1 %	1/8W
R3	1010364-521	│	25.5K	1 %	1/8W
R4	1006750-84	│	150K	2 %	1/4W
R5	↑ 72	│	47K	↑	↑
R6	│ 20	│	330	│	│
R7	│ 84	│	150K	│	│
R8	↓ 69	│	36K	↓	↓
R9	1006750-44	│	3.3K	2 %	1/4W
R10	1010364-757	│	432K	1 %	1/8W
R11	1006750-19	│	300	2 %	1/4W
R12	↑ 34	│	1.2K	↑	↑
R13	│ 84	│	150K	│	│
R14	↓ 70	│	39K	↓	↓
R15	1006750-64	│	22K	2 %	1/4W
R16	1010364-749	│	392K	1 %	1/8W
R17	1006750-56	│	10K	2 %	1/4W
R18	1010368-11	│	27	5 %	1/4W
R19	1006750-7	↓	91	2 %	1/4W
R20	1006750-18	RESISTOR	270	2 %	1/4W
C1	1010375-12	CAPACITOR	.0082	5%	50 V
C2	1006755-20	↑	18	↑	15 V
C3	1010375-124	│	.01	│	300V
C4	1006755-69	│	1.0	│	35V
C5	1010359-27	│	.0068	│	200V
C6	1006755-65	│	.47	│	35V
C7	1010359-11	│	.00033	│	200V
C8	1010359-27	│	.0068	│	200V
C9	1010375-66	│	.22	│	100V
C10	1006755-77	↓	4.7	↓	35V
C11	1006755-69	CAPACITOR	1.0	10 %	35V
CR1	1010372-24	DIODE	HZ8553		18V
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	↑	2N930		
Q3	1010397-1	↓	2N930		
Q4	1010269-1	TRANSISTOR	2N2151		

REF DWG:
COSECANT GENERATOR ASSY
DWG NO. 1007524

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS. K INDICATES THOUSANDS OF OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ___
HEAT TREATMENT ___
FINAL FINISH ___

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Tom Gibbons DATE 10 AUG 64
CHECKED R. Lishan 11 AUG 64
APPROVAL R.W. Grozwski
APPROVAL D.W. Roso
NASA APPROVAL W. J. Rhine 9-24-64
MIT APPROVAL 9/24/64

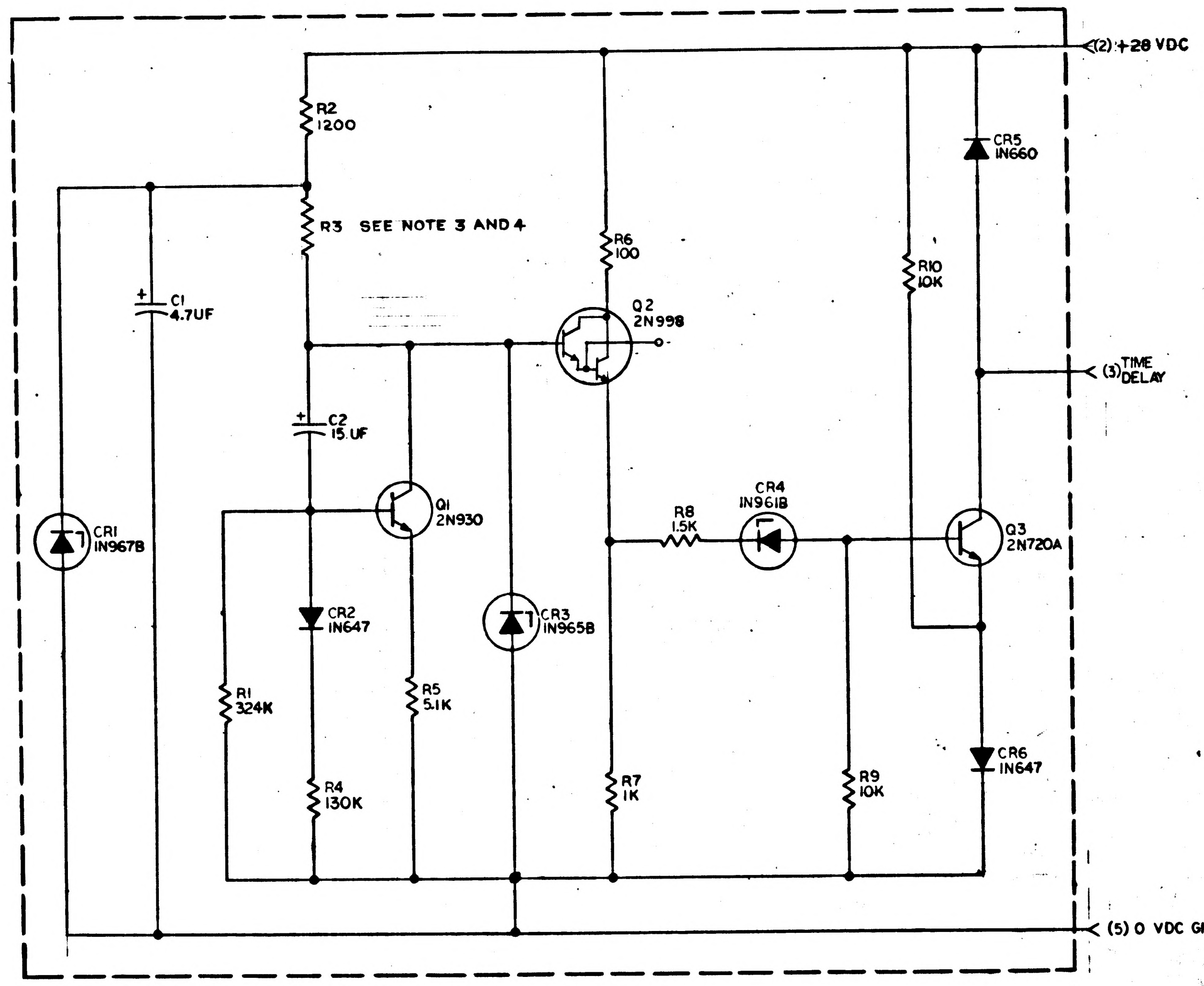
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, COSECANT GENERATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009509
SCALE ___ WT ___ SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 12225			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 12680	22 Sep 64	WK



REF DES	PART NO.	DESCRIPTION	VALUE	TOL ±	RATING
R1	1010364-733	RESISTOR	324 K	1 %	1/8 W
R2	1006750-34		1200	2 %	1/4 W
R3	SEE NOTES 3&4				
R4	1006750-83		130 K	2 %	1/4 W
R5	1006750-49		5.1K	2 %	1/4 W
R6	1006750-8		100	2 %	1/4 W
R7	1006750-32		1K	2 %	1/4 W
R8	1006750-36		1.5K	2 %	1/4 W
R9	1006750-56		10K	2 %	1/4 W
R10	1006750-56		10K	2 %	1/4 W
C1	1006755-77	CAPACITOR	4.7UF	10 %	35 V
C2	1010393-043	CAPACITOR	15UF	10 %	50 V
CR1	1010286-11	DIODE	1N967B	5 %	400MW
CR2	1010362-002		1N647		
CR3	1010286-9		1N965B	5 %	400MW
CR4	1010286-5		1N961B	5 %	400MW
CR5	1010385		1N660		250MW
CR6	1010362-002		1N647		
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010342		2N998		
Q3	1010357-1		2N720A		

CHART A	
R3 ±1%	1/8W
PART NO	VALUE
1010364-652	121K
-654	124K
-656	127K
-658	130K
-660	133K
-662	137K
-664	140K
-666	143K
-668	147K
-670	150K
-672	154K
-674	158K
-676	162K
-678	165K
-680	169K
-682	174K
-684	178K
-686	182K
-688	187K
1010364-690	191K

CHART A (CONT)	
R3 ±1%	1/8W
PART NO	VALUE
1010364-692	196K
-694	200K
-696	205K
-698	210K
-700	215K
-702	221K
-704	226K
-706	232K
-708	237K
-710	243K
-712	249K
-714	255K
-716	261K
-718	267K
-720	274K
-722	280K
-724	287K
-726	294K
-728	301K
1010364-730	309K

CHART A (CONT)	
R3 ±1%	1/8W.
PART NO	VALUE
1010364-732	316K
-734	324K
-736	332K
-738	340K
-740	348K
-742	357K
-744	365K
-746	374K
-748	383K
-750	392K
-752	402K
-754	412K
-756	422K
-758	432K
-760	442K
-762	453K
-764	464K
1010364-766	475K

REF
40 SECOND TIME DELAY ASSY
DWG NO. 1015038

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. SELECT TO GIVE 40 ±5% SECOND TIME DELAY
4. VALUE OF R3 TO BE SELECTED AT FINAL TEST FROM CHART A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 30 JUL 64
CHECKED 13 AUG 64
APPROVAL 1 Sep '64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

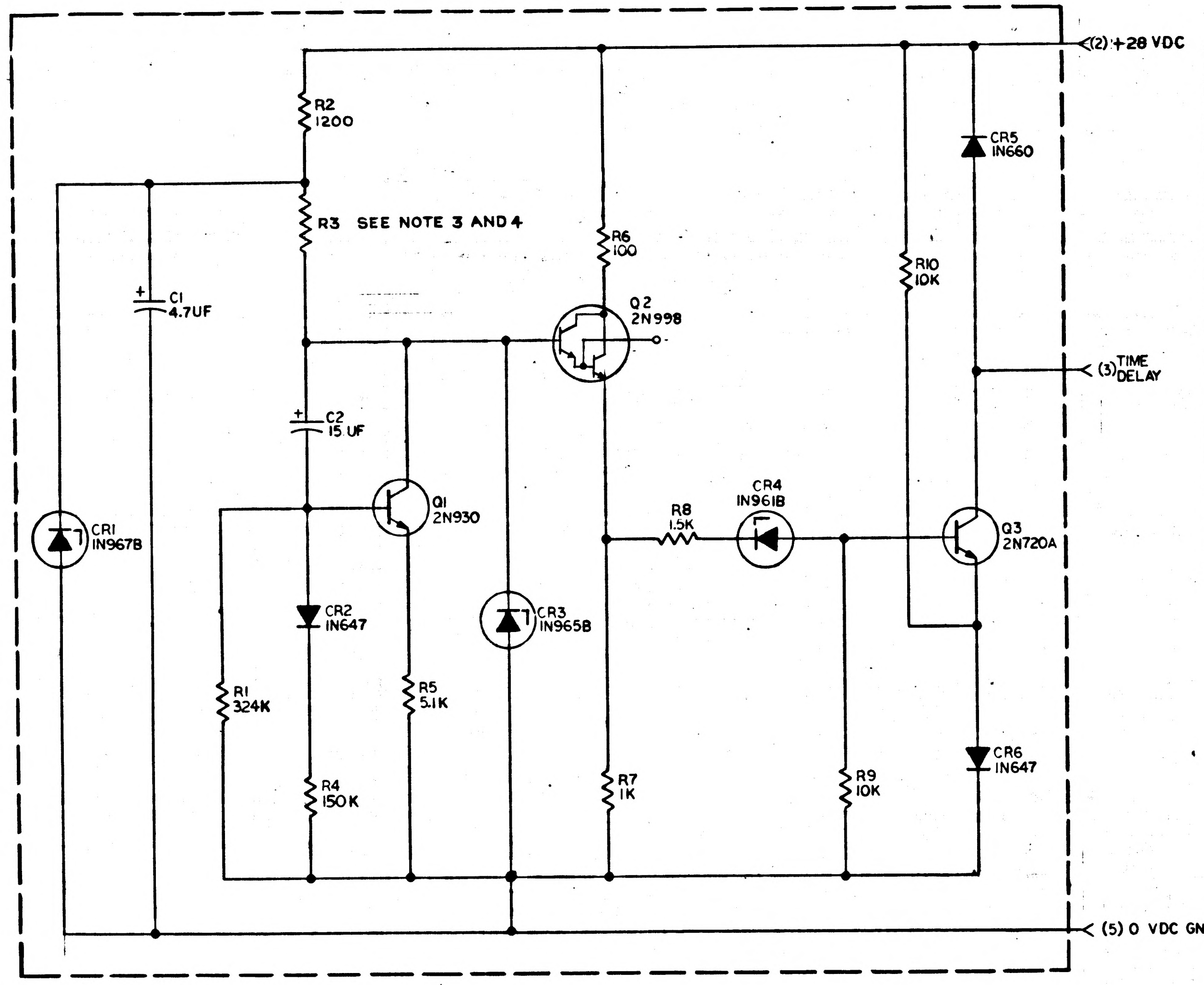
CODE IDENT NO. — SIZE D NASA DRAWING NO. 1009510
SCALE — WT — SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 12225			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 12680	22 Sep 64	TD WK
B	REVISED PER TDRR 14683	11/4/64	WK



REF DES	PART NO.	DESCRIPTION	VALUE	TOL ±	RATING
R1	1010364-734	RESISTOR	324 K	1 %	1/8 W
R2	1006750-34		1200	2 %	1/4 W
R3	SEE NOTES 3&4				
R4	1006750-84		150K	2 %	1/4 W
R5	1006750-49		5.1K	2 %	1/4 W
R6	1006750-8		100	2 %	1/4 W
R7	1006750-32		1K	2 %	1/4 W
R8	1006750-36		1.5K	2 %	1/4 W
R9	1006750-56		10K	2 %	1/4 W
R10	1006750-56		10K	2 %	1/4 W
C1	1006755-77	CAPACITOR	4.7UF	10 %	35 V
C2	1010393-043	CAPACITOR	15UF	10 %	50 V
CR1	1010286-11	DIODE	IN967B	5 %	400MW
CR2	1010362-002		IN647		
CR3	1010286-9		IN965B	5 %	400MW
CR4	1010286-5		IN961B	5 %	400MW
CR5	1010385		IN660		250MW
CR6	1010362-002		IN647		
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010342		2N998		
Q3	1010357-1		2N720A		

CHART A

R3 ±1% 1/8W	
PART NO	VALUE
1010364-652	121K
-654	124K
-656	127K
-658	130K
-660	133K
-662	137K
-664	140K
-666	143K
-668	147K
-670	150K
-672	154K
-674	158K
-676	162K
-678	165K
-680	169K
-682	174K
-684	178K
-686	182K
-688	187K
1010364-690	191K

CHART A (CONT)

R3 ±1% 1/8W	
PART NO	VALUE
1010364-692	196K
-694	200K
-696	205K
-698	210K
-700	215K
-702	221K
-704	226K
-706	232K
-708	237K
-710	243K
-712	249K
-714	255K
-716	261K
-718	267K
-720	274K
-722	280K
-724	287K
-726	294K
-728	301K
1010364-730	309K

CHART A (CONT)

R3 ±1% 1/8W.	
PART NO	VALUE
1010364-732	316K
-734	324K
-736	332K
-738	340K
-740	348K
-742	357K
-744	365K
-746	374K
-748	383K
-750	392K
-752	402K
-754	412K
-756	422K
-758	432K
-760	442K
-762	453K
-764	464K
1010364-766	475K

REF
40 SECOND TIME DELAY ASSY
DWG NO. 1015038

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. SELECT TO GIVE 40 ±5% SECOND TIME DELAY
4. VALUE OF R3 TO BE SELECTED AT FINAL TEST FROM CHART A

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT

DRAWN W. Munson DATE 30 JUL 64
CHECKED R. Lindemann 13 AUG 64
APPROVAL D. Cushman 1 Sep '64
APPROVAL
NASA APPROVAL
MIT APPROVAL W. Graff 1 Sep 64

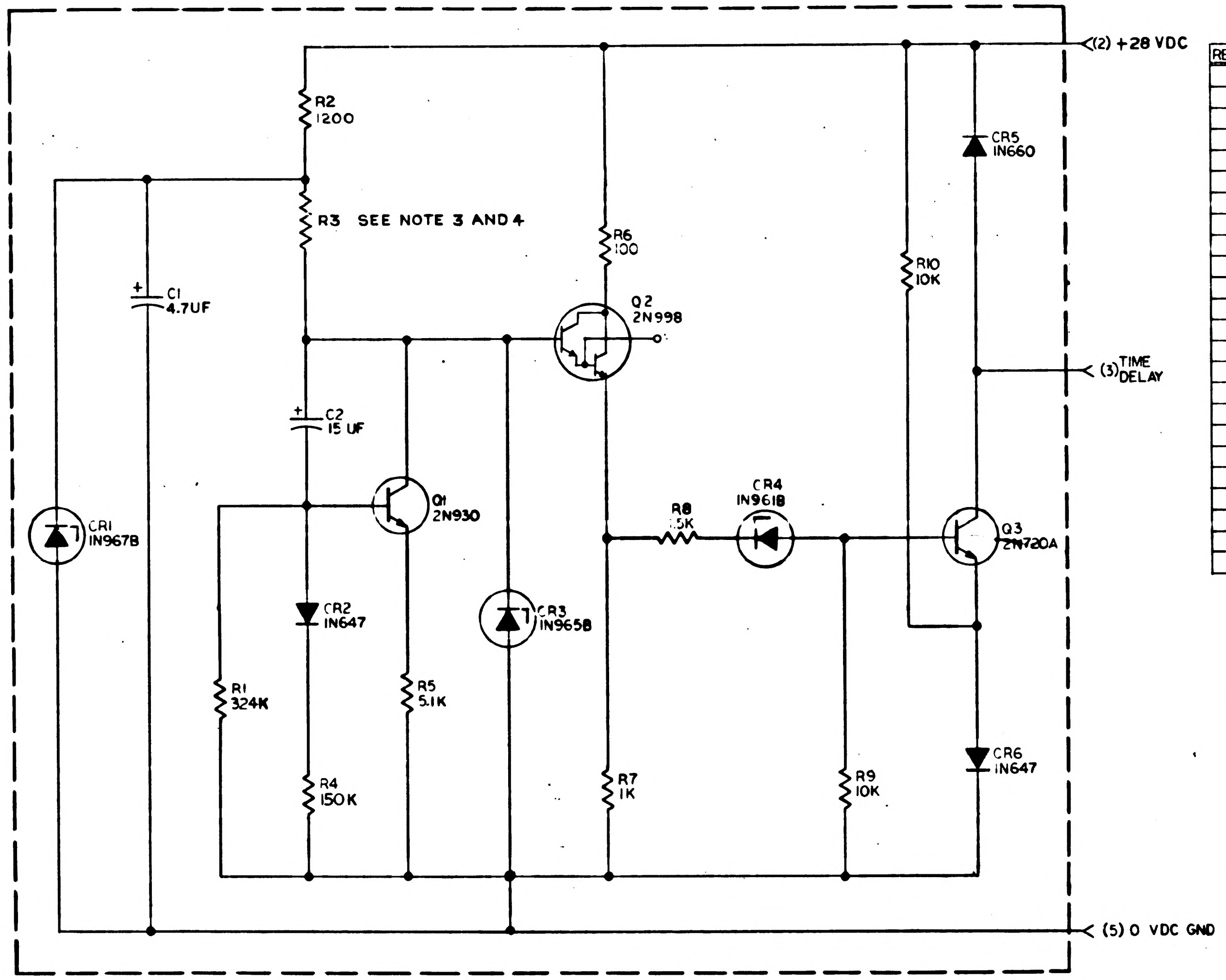
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1009510
SCALE —
WT —
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 12225			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 12680	22Sep64	TD Eng WK
B	REVISED PER TDRR 14683	12/4/64	WK
C	REVISED PER TDRR 16973	8 MAR 65	RWT/ PJ



REF DES	PART NO.	DESCRIPTION	VALUE	TOL ±	RATING
R1	1010364-734	RESISTOR	324 K	1 %	1/8 W
R2	1006750-34		1200	2 %	1/4 W
R3	SEE NOTES 3&4				
R4	1006750-84		150K	2 %	1/4 W
R5	1006750-49		5.1K	2 %	1/4 W
R6	1006750-8		100	2 %	1/4 W
R7	1006750-32		1K	2 %	1/4 W
R8	1006750-36		1.5K	2 %	1/4 W
R9	1006750-56		10K	2 %	1/4 W
R10	1006750-56		10K	2 %	1/4 W
C1	1006755-77	CAPACITOR	4.7UF	10 %	35 V
C2	1010393-043	CAPACITOR	15UF	10 %	50 V
CR1	1010830-11	DIODE	1N967B	5 %	400MW
CR2	1010362-002		1N647		
CR3	1010830-9		1N965B	5 %	400MW
CR4	1010830-5		1N961B	5 %	400MW
CR5	1010385		1N660		250MW
CR6	1010362-002		1N647		
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010342		2N998		
Q3	1010357-1		2N720A		

CHART A	
R3 ±1% 1/8W	
PART NO	VALUE
1010364-652	121K
-654	124K
-656	127K
-658	130K
-660	133K
-662	137K
-664	140K
-666	143K
-668	147K
-670	150K
-672	154K
-674	158K
-676	162K
-678	165K
-680	169K
-682	174K
-684	178K
-686	182K
-688	187K
1010364-690	191K

CHART A (CONT)	
R3 ±1% 1/8W	
PART NO	VALUE
1010364-692	196K
-694	200K
-696	205K
-698	210K
-700	215K
-702	221K
-704	226K
-706	232K
-708	237K
-710	243K
-712	249K
-714	255K
-716	261K
-718	267K
-720	274K
-722	280K
-724	287K
-726	294K
-728	301K
1010364-730	309K

CHART A (CONT)	
R3 ±1% 1/8W.	
PART NO	VALUE
1010364-732	316K
-734	324K
-736	332K
-738	340K
-740	348K
-742	357K
-744	365K
-746	374K
-748	383K
-750	392K
-752	402K
-754	412K
-756	422K
-758	432K
-760	442K
-762	453K
-764	464K
1010364-766	475K

REF
40 SECOND TIME DELAY ASSY
DWG NO. 1015038

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. SELECT TO GIVE 40 ±5% SECOND TIME DELAY
4. VALUE OF R3 TO BE SELECTED AT FINAL TEST FROM CHART A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —/— DECIMALS ± —/— ANGLES ± —/—
DO NOT SCALE THIS DRAWING
MATERIAL —/—
HEAT TREATMENT —/—
FINAL FINISH —/—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN W. Munger DATE 30 JUL 64
CHECKED R. [illegible] 13 AUG 64
APPROVAL G. Cushman 1 Sep '64
APPROVAL
NASA APPROVAL
MIT APPROVAL W. Kupfer 1 Sep 64

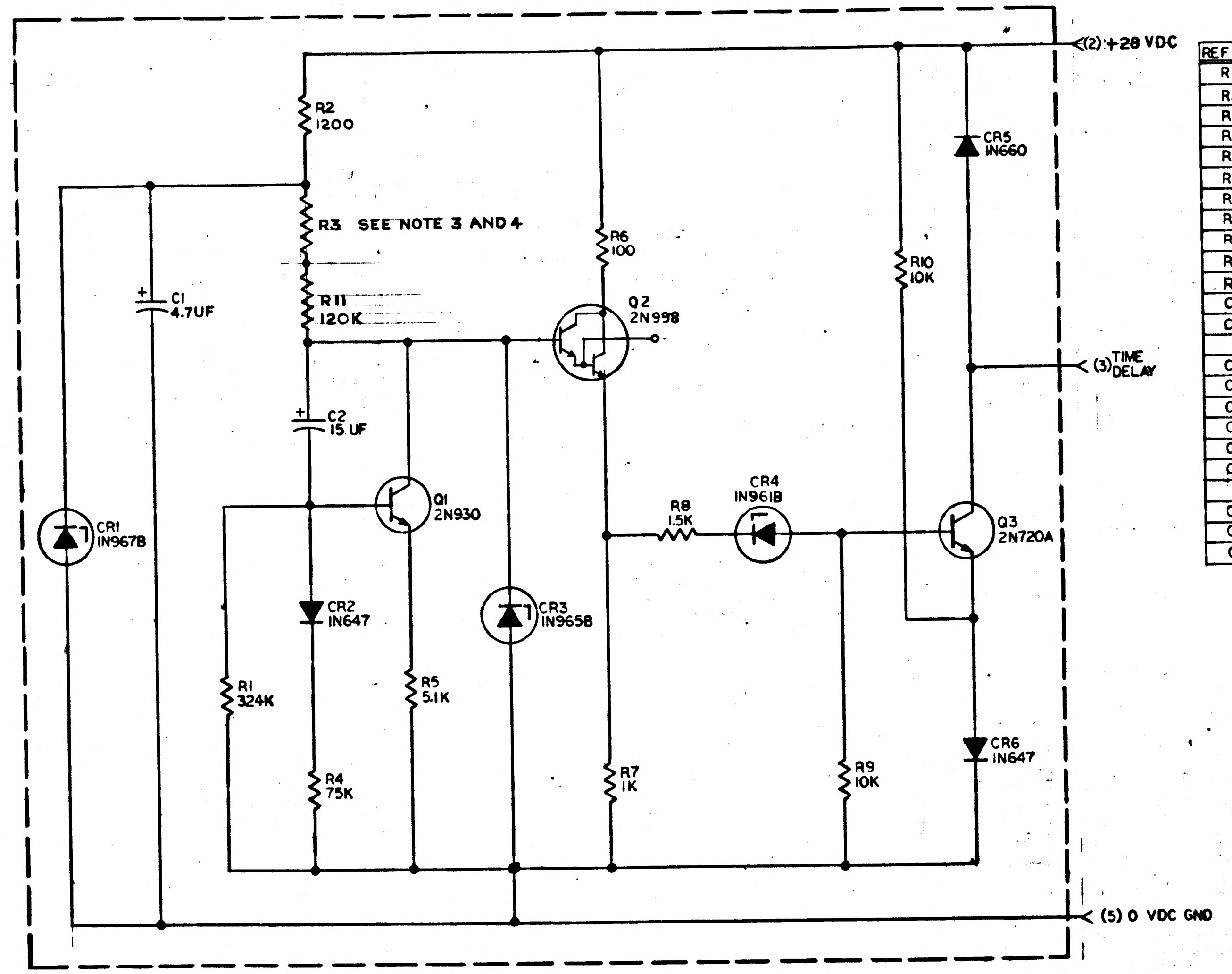
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO. —/—
SIZE D
NASA DRAWING NO. 1009510
SCALE —/— WT —/— SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			



REF DES	PART NO.	DESCRIPTION	VALUE	TOL ±	RATING
R1	1010364-733	RESISTOR	324 K	1 %	1/8 W
R2	1006750-34		1200	2 %	1/4 W
R3	SEE NOTES 3&4				
R4	1006750-77		75K	2 %	1/4 W
R5	1006750-49		5.1K	2 %	1/4 W
R6	1006750-8		100	2 %	1/4 W
R7	1006750-32		1K	2 %	1/4 W
R8	1006750-36		1.5K	2 %	1/4 W
R9	1006750-56		10K	2 %	1/4 W
R10	1006750-56		10K	2 %	1/4 W
R11	1006750-58		120K	2 %	1/4 W
C1	1006755-77	CAPACITOR	4.7UF	10 %	35 V
C2	1010393-043	CAPACITOR	15UF	10 %	50 V
CR1	1010286-11	DIODE	IN967B	5 %	400MW
CR2	1010362-002		IN647		
CR3	1010286-9		IN965B	5 %	400MW
CR4	1010286-5		IN961B	5 %	400MW
CR5	1010385		IN660		250MW
CR6	1010362-002		IN647		
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010342		2N998		
Q3	1010357-1		2N720A		

CHART A	
R3 ±1%	1/8W
PART NO	VALUE
1010364-651	121K
-653	124K
-655	127K
-657	130K
-659	133K
-661	137K
-663	140K
-665	143K
-667	147K
-669	150K
-671	154K
-673	158K
-675	162K
-677	165K
-679	169K
-681	174K
-683	178K
-685	182K
-687	187K
1010364-689	191K

CHART A (CONT)	
R3 ±1%	1/8W
PART NO	VALUE
1010364-691	196K
-693	200K
-695	205K
-697	210K
-699	215K
-701	221K
-703	226K
-705	232K
-707	237K
-709	243K
-711	249K
-713	255K
-715	261K
-717	267K
-719	274K
-721	280K
-723	287K
-725	294K
-727	301K
1010364-729	309K

CHART A (CONT)	
R3 ±1%	1/8W.
PART NO	VALUE
1010364-731	316K
-733	324K
-735	332K
-737	340K
-739	348K
-741	357K
-743	365K
-745	374K
-747	383K
-749	392K
-751	402K
-753	412K
-755	422K
-757	432K
-759	442K
-761	453K
-763	464K
1010364-765	475K

REF
40 SECOND TIME DELAY ASSY
DWG NO 1015038

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. SELECT TO GIVE 40 ±5% SECOND TIME DELAY
4. VALUE OF R3 TO BE SELECTED AT FINAL TEST FROM CHART A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± -/- DECIMALS ± -/- ANGLES ± -/-
DO NOT SCALE THIS DRAWING
MATERIAL -/-
HEAT TREATMENT -/-
FINAL FINISH -/-

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN W. Munroe DATE 30 JUL 64
CHECKED R. Lukens 13 AUG 64
APPROVAL D. Cushman 1 Sep '64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Crafford 1 Sep 64

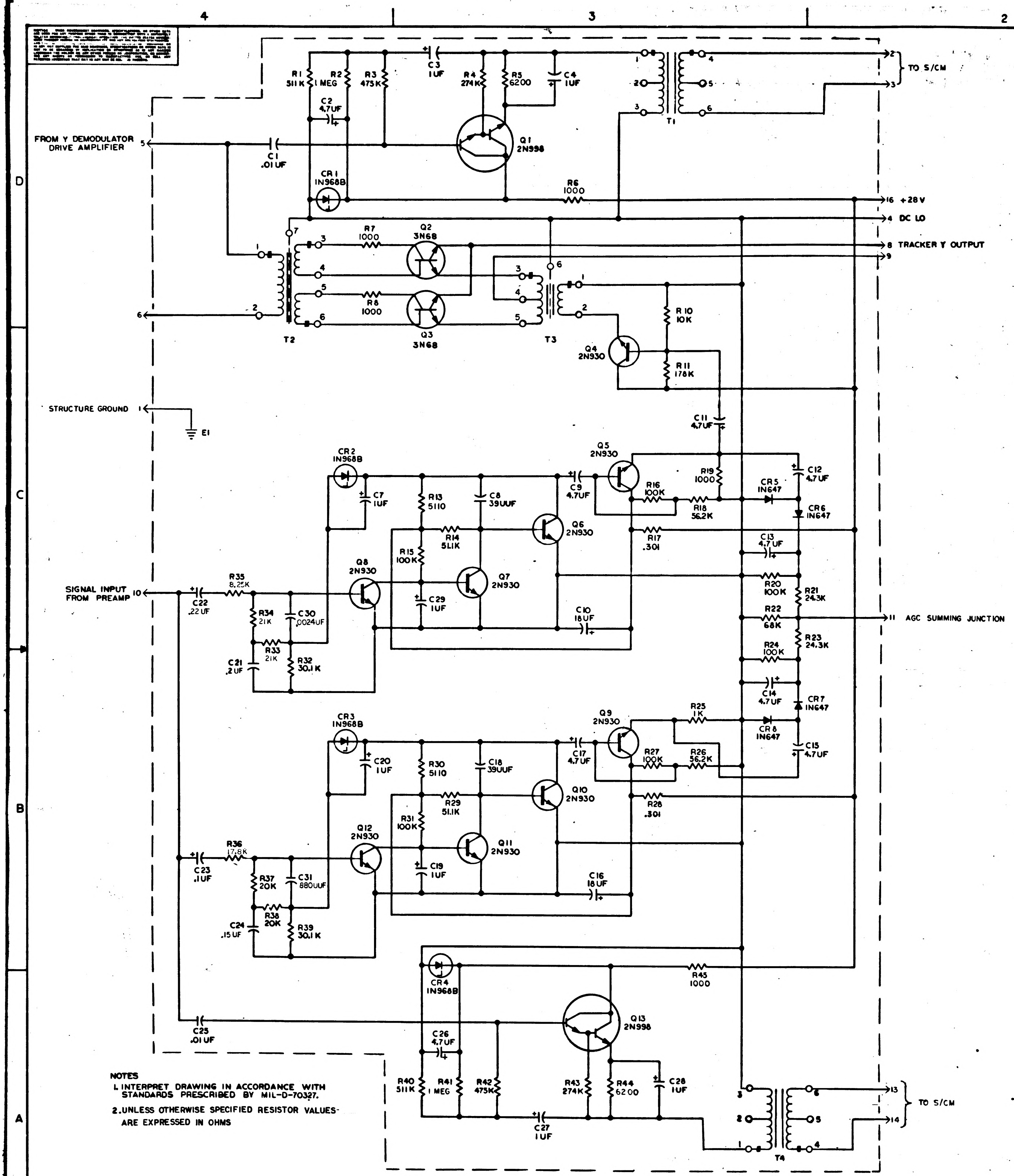
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO. -/- SIZE D NASA DRAWING NO. 1009510
SCALE -/- WT -/- SHEET 1 OF 1

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY


TO S/CM
FROM Y DEMODULATOR DRIVE AMPLIFIER
R1 511K
R2 1 MEG
R3 475K
C2 4.7UF
C1 .01UF
CR1 1N968B
C3 1UF
R4 274K
R5 6200
C4 1UF
Q1 2N998
R6 1000
T1
16 +28V
4 DC LO
8 TRACKER Y OUTPUT
9
R7 1000
Q2 3N68
R8 1000
Q3 3N68
T2
T3
R10 10K
Q4 2N930
R11 178K
STRUCTURE GROUND
E1
C11 4.7UF
CR2 1N968B
C7 1UF
R13 5110
C8 39UUF
C9 4.7UF
Q5 2N930
R16 100K
R19 1000
R18 56.2K
CR5 1N647
C12 4.7UF
CR6 1N647
Q6 2N930
R14 51.1K
R15 100K
Q7 2N930
R17 .301
C13 4.7UF
SIGNAL INPUT FROM PREAMP
R35 8.25K
C22 .22UF
R34 21K
C30 .0024UF
Q8 2N930
C29 1UF
R20 100K
R21 24.3K
R22 68K
11 AGC SUMMING JUNCTION
C10 18UF
R23 24.3K
R24 100K
R33 21K
R32 30.1K
C21 .2UF
C14 4.7UF
CR7 1N647
CR3 1N968B
C20 1UF
R30 5110
C18 39UUF
C17 4.7UF
Q9 2N930
R25 1K
CR8 1N647
R27 100K
R26 56.2K
C15 4.7UF
Q10 2N930
R29 51.1K
R28 .301
R31 100K
Q11 2N930
Q12 2N930
R36 17.8K
C23 .1UF
R37 20K
C31 880UUF
C19 1UF
C16 18UF
C24 .15UF
R38 20K
R39 30.1K
CR4 1N968B
R45 1000
C25 .01UF
Q13 2N998
C26 4.7UF
R40 511K
R41 1 MEG
R42 475K
R43 274K
R44 6200
C28 1UF
C27 1UF
T4
TO S/CM

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS

A 1009511

REVISIONS 13086			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14337	17 Nov 64	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010359-29	CAPACITOR	.01 UF	±10%	200VDC
C2	1010393-037		4.7 UF	±10%	50VDC
C3	1006755-69		1UF	±10%	35VDC
C4	1006755-69		1UF	±10%	35VDC
C7	1006755-69		1UF	±10%	35VDC
C8	1010409-15		39 UUF	±2%	500VDC
C9	1006755-77		4.7UF	±10%	35VDC
C10	1010393-044		18 UF	±10%	50VDC
C11	1006755-77		4.7UF	±10%	35VDC
C12			4.7UF	±10%	35VDC
C13			4.7 UF	±10%	35VDC
C14			4.7 UF	±10%	35VDC
C15	1006755-77		4.7 UF	±10%	35VDC
C16	1010393-044		18UF	±10%	50VDC
C17	1006755-77		4.7UF	±10%	35VDC
C18	1010409-15		39UUF	±2%	500VDC
C19	1006755-69		1UF	±10%	35VDC
C20	1006755-69		1UF	±10%	35VDC
C21	1010317-5		.2UF	±1%	30VDC
C22	1006755-61		.22UF	±10%	35VDC
C23	1006755-57		.1UF	±10%	35VDC
C24	1010317-7		.15UF	±1%	30VDC
C25	1010359-29		.01 UF	±10%	200VDC
C26	1010393-037		4.7 UF	±10%	50VDC
C27	1006755-69		1UF	±10%	35VDC
C28	1006755-69		1UF	±10%	35VDC
C29	1006755-69		1UF	±10%	35VDC
C30	1010316-106		.0024UF	±1%	100VDC
C31	1006793-90	CAPACITOR	880UUF	±2%	300VDC
CR1	1010286-12	DIODE	1N968B		
CR2			1N968B		
CR3			1N968B		
CR4	1010286-12		1N968B		
CR5	1010362-002		1N647		
CR6			1N647		
CR7			1N647		
CR8	1010362-002	DIODE	1N647		
Q1	1010342	TRANSISTOR	2N998		
Q2	1010367		3N68		
Q3	1010367		3N68		
Q4	1010397-001		2N930		
Q5					
Q6					
Q7					
Q8					
Q9					
Q10					
Q11					
Q12	1010397-001		2N930		
Q13	1010342	TRANSISTOR	2N998		
R1	1010374-1	RESISTOR	511K	±1%	1/8 W
R2	1010374-29		1 MEG	±1%	
R3	1010364-765		475K	±1%	
R4	1010364-719		274K	±1%	1/8 W
R5	1006750-51		6200	±2%	1/4 W
R6	1010364-251		1000	±1%	1/8 W
R7	-251		1000		
R8	-251		1000		
R10	-443		10K		
R11	-683		178K		
R13	-388		5110		
R14	-580		51.1K		
R15	-635		100K		
R16	-635		100K		
R17	-151		301		
R18	-587		56.2K		
R19	-251		1000		
R20	-635		100K		
R21	-518		24K		
R22	-604		68K		
R23	-518		24K		
R24	-635		100K		
R25	-251		1000		
R26	-587		56.2K		
R27	-635		100K		
R28	-151		301		
R29	-580		51.1K		
R30	-388		5110		
R31	-635		100K		
R32	-535		30.1K		
R33	-506		21K		
R34	-506		21K		
R35	-428		8.25K		
R36	-492		17.8K		
R37	-502		20K		
R38	-502		20K		
R39	1010364-535		30.1K		
R40	1010374-1		511K		
R41	1010374-29		1 MEG		
R42	1010364-765		475K		
R43	1010364-719		274K	±1%	1/8 W
R44	1006750-51		6200	±2%	1/4 W
R45	1010364-251	RESISTOR	1000	±1%	1/8 W
T1	1010329-1	TRANSFORMER			
T2	1012054				
T3	1012053				
T4	1010329-1	TRANSFORMER			

REF DWG.
TRACKER Y CHANNEL
ELECTRONICS ASSY
DWG NO. 1007512

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN Vanderlinde DATE 3-30-64
CHECKED 12-10-64
APPROVAL
APPROVAL
NASA APPROVAL 9-29-64
MIT APPROVAL 29 Sept 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

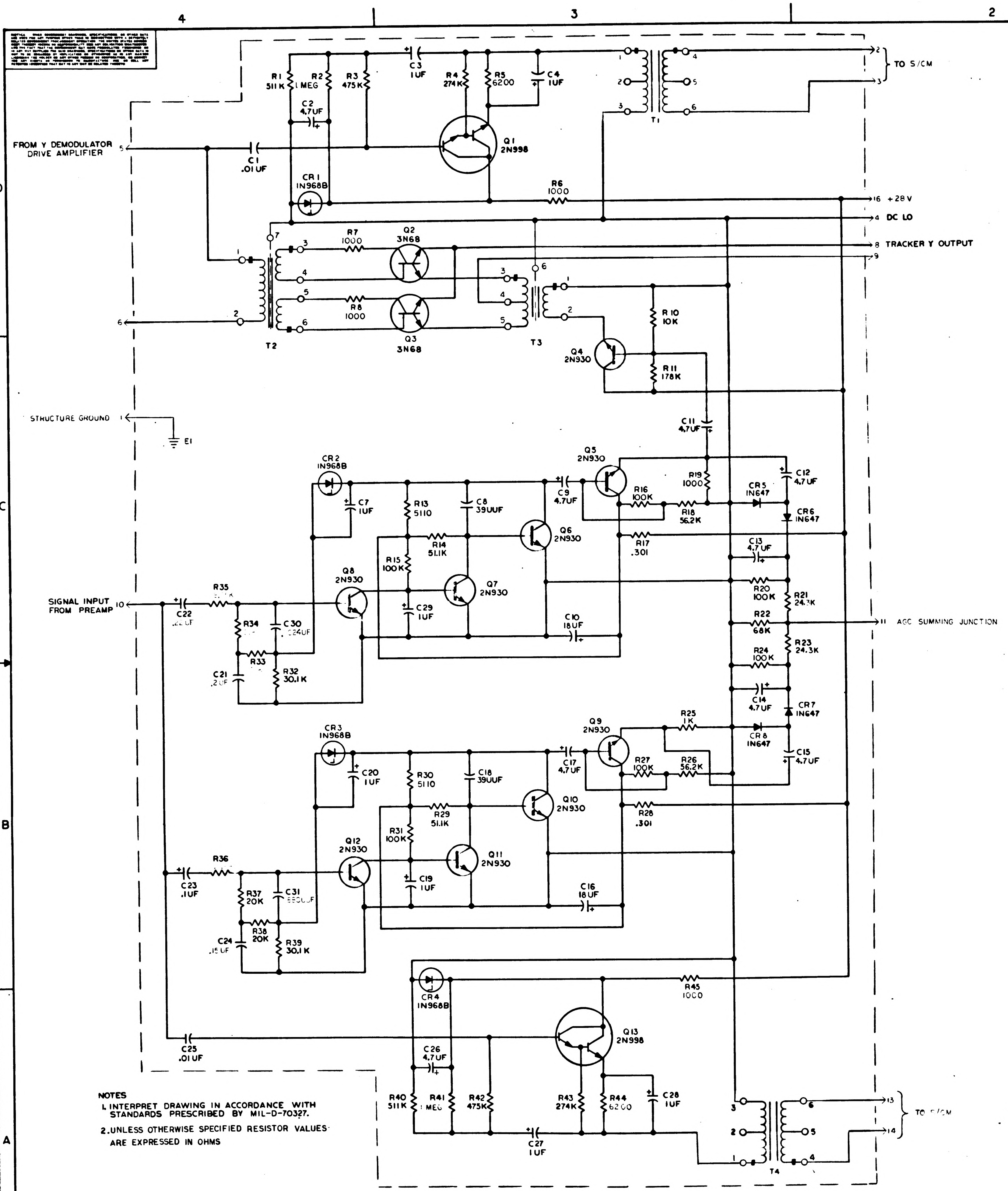
SCHEMATIC TRACKER Y CHANNEL ELECTRONICS

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009511
SCALE NONE
WT —
SHEET 1 OF 1

MASTER

B	1009511

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14337	17 Nov 64	
B	REPLACED WITH CHANGE BY REV. C PER TDRR 20120	23 JUN 65	



FROM Y DEMODULATOR DRIVE AMPLIFIER
TO S/CM
+28 V
DC LO
TRACKER Y OUTPUT
STRUCTURE GROUND
E1
SIGNAL INPUT FROM PREAMP
AGC SUMMING JUNCTION
TO S/CM
R1 511K
R2 1 MEG
R3 475K
C2 4.7UF
C3 1UF
R4 274K
R5 6200
C4 1UF
C1 .01UF
CR1 1N968B
Q1 2N998
R6 1000
T1
T2
T3
R7 1000
R8 1000
Q2 3N68
Q3 3N68
R10 10K
R11 178K
Q4 2N930
C11 4.7UF
CR2 1N968B
C7 1UF
R13 5110
C8 39UUF
R14 51.1K
R15 100K
Q5 2N930
C9 4.7UF
R16 100K
R18 56.2K
R19 1000
CR5 1N647
C12 4.7UF
CR6 1N647
Q6 2N930
R17 .301
C13 4.7UF
Q7 2N930
Q8 2N930
C29 1UF
C10 18UF
R20 100K
R21 24.3K
R22 68K
R23 24.3K
R24 100K
C14 4.7UF
CR7 1N647
CR8 1N647
C15 4.7UF
R35
C22
R34
C30
R33
C21 .2UF
R32 30.1K
CR3 1N968B
C20 1UF
R30 5110
C18 39UUF
Q9 2N930
C17 4.7UF
R25 1K
R27 100K
R26 56.2K
Q10 2N930
R29 51.1K
R31 100K
R28 .301
Q12 2N930
Q11 2N930
C19 1UF
C16 18UF
R36
C23 .1UF
R37 20K
C31
R38 20K
C24 .15UF
R39 30.1K
CR4 1N968B
R45 1000
Q13 2N998
C26 4.7UF
C25 .01UF
R40 511K
R41 1 MEG
R42 475K
R43 274K
R44 6200
C28 1UF
C27 1UF
T4

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010359-29	CAPACITOR	.01 UF	± 10%	200VDC
C2	1010393-037		4.7 UF	± 10%	50VDC
C3	1006755-69		1 UF	± 10%	35VDC
C4	1006755-69		1 UF	± 10%	35VDC
C7	1006755-69		1 UF	± 10%	35VDC
C8	1010409-15		39 UUF	± 2%	500VDC
C9	1006755-77		4.7 UF	± 10%	35VDC
C10	1010393-044		18 UF	± 10%	50VDC
C11	1006755-77		4.7 UF	± 10%	35VDC
C12			4.7 UF	± 10%	35VDC
C13			4.7 UF	± 10%	35VDC
C14			4.7 UF	± 10%	35VDC
C15	1006755-77		4.7 UF	± 10%	35VDC
C16	1010393-044		18 UF	± 10%	50VDC
C17	1006755-77		4.7 UF	± 10%	35VDC
C18	1010409-15		39 UUF	± 2%	500VDC
C19	1006755-69		1 UF	± 10%	35VDC
C20	1006755-69		1 UF	± 10%	35VDC
C21	1010317-[illegible]		.2UF	± 1%	30VDC
C22	1006755-[illegible]		[illegible]	± 10%	35VDC
C23	1006755-[illegible]		[illegible]	± 10%	35VDC
C24	1010317-[illegible]		[illegible]	± 1%	30VDC
C25	1010359-29		.01 UF	± 10%	200VDC
C26	1010393-037		4.7 UF	± 10%	50VDC
C27	1006755-69		1 UF	± 10%	35VDC
C28	1006755-69		1 UF	± 10%	35VDC
C29	1006755-69		1 UF	± 10%	35VDC
C30	1010316-[illegible]		[illegible]	± 1%	100VDC
C31	[illegible]	CAPACITOR	[illegible]	[illegible]	500VDC
CR1	1010286-12	DIODE	1N968B		
CR2			1N968B		
CR3			1N968B		
CR4	1010286-12		1N968B		
CR5	1010362-002		1N647		
CR6			1N647		
CR7			1N647		
CR8	1010362-002	DIODE	1N647		
Q1	1010342	TRANSISTOR	2N998		
Q2	1010367		3N68		
Q3	1010367		3N68		
Q4	1010397-001		2N930		
Q5					
Q6					
Q7					
Q8					
Q9					
Q10					
Q11					
Q12	1010397-001		2N930		
Q13	1010342	TRANSISTOR	2N998		
R1	1010374-1	RESISTOR	511 K	± 1%	1/8 W
R2	1010374-29		1 MEG	± 1%	
R3	1010364-765		475K	± 1%	
R4	1010364-719		274K	± 1%	1/8 W
R5	1006750-51		6200	± 2%	1/4 W
R6	1010364-251		1000	± 1%	1/8 W
R7	-251		1000		
R8	-251		1000		
R10	-443		10K		
R11	-683		178K		
R13	-388		5110		
R14	-580		51.1K		
R15	-635		100K		
R16	-635		100K		
R17	-151		301		
R18	-587		56.2K		
R19	-251		1000		
R20	-635		100K		
R21	-518		24K		
R22	-604		68K		
R23	-518		24K		
R24	-635		100K		
R25	-251		1000		
R26	-587		56.2K		
R27	-635		100K		
R28	-151		301		
R29	-580		51.1K		
R30	-388		5110		
R31	-635		100K		
R32	-535				
R33	-[illegible]				
R34	-[illegible]				
R35	-[illegible]				
R36	-[illegible]				
R37	-502		20K		
R38	-502		20K		
R39	1010364-535		30.1K		
R40	1010374-1		511K		
R41	1010374-29		1 MEG		
R42	1010364-765		475K		
R43	1010364-719		274K	± 1%	1/8 W
R44	1006750-51		6200	± 2%	1/4 W
R45	1010364-251	RESISTOR	1000	± 1%	1/8 W
T1	1010329-1	TRANSFORMER			
T2	1012054				
T3	1012053				
T4	1010329-1	TRANSFORMER			

Ⓑ REPLACED WITH CHANGE BY REV C

REF DWG.
TRACKER Y CHANNEL
ELECTRONICS ASSY
DWG NO. 1007512

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN Wunderlich DATE 3-20-64
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
TRACKER Y CHANNEL
ELECTRONICS

CODE IDENT NO	SIZE	NASA DRAWING NO.
80230	E	1009511
SCALE NONE	WT	SHEET 1 OF 1

→ S/C A

→6 +28 V

→4 DC LO

→7 TRACKER Y OUTPUT
→9

→11

→8

→5 →TO S/C

→4

REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE, RATING
C1	1010359-29	CAPACITOR	.01 UF, ±10%, 200 VDC
C2	1010393-037		4.7 UF, ±10%, 50 VDC
C3	1006755-69		1 UF, ±10%, 35 VDC
C4	1006755-69	CAPACITOR	1 UF, ±10%, 35 VDC
	DELETED		
	DELETED		
C7	1006755-69	CAPACITOR	1 UF, ±10%, 35 VDC
C8	1010409-15		39 UUF, ±2%, 500 VDC
C9	1006755-77		4.7 UF, ±10%, 35 VDC
C10	1010393-044		18 UF, ±10%, 50 VDC
C11	1006755-77	CAPACITOR	4.7 UF, ±10%, 35 VDC
	DELETED		
	DELETED		
C16	1010393-044	CAPACITOR	18 UF, ±10%, 50 VDC
C17	1006755-77		4.7 UF, ±10%, 35 VDC
C18	1010409-15		39 UUF, ±2%, 500 VDC
C19	1006755-57		0.1 UF, ±10%, 35 VDC
C20	1006755-69		1 UF, ±10%, 35 VDC
C21	1010317-5		.2 UF ±1%, 30 VDC
C22	1006755-61		.22 UF, ±10%, 35 VDC
C23	1006755-57		.1 UF, ±10%, 35 VDC
C24	1010317-7		.15 UF, ±1%, 30 VDC
C25	1010359-29		.01 UF, ±10%, 200 VDC
C26	1010393-037		4.7 UF, ±10%, 50 VDC
C27	1006755-69		1 UF, ±10%, 35 VDC
C28	1006755-69		1 UF, ±10%, 35 VDC
C29	1006755-57		0.1 UF, ±10%, 35 VDC
C30	1010316-1		.001 UF, ±1%, 100 VDC
C31	1006793-84		750 UUF, ±2%, 300 VDC
C32	1010393-044		18 UF, ±10%, 50 VDC
C33	1010393-044		18 UF, ±10%, 50 VDC
C34	1010393-044	CAPACITOR	18 UF, ±10%, 50 VDC
CR1	1010830-11	SEMICONDUCTOR DEVICE	1N967B
CR2	-9		1N965B
CR3	-9		1N965B
CR4	1010830-11	SEMICONDUCTOR DEVICE	1N967B
Q1	1010342	TRANSISTOR	2N998
Q2	1010367		3N68
Q3	1010367		3N68
Q4	1010397-1		2N930
Q5			
Q6			
Q7			
Q8			
Q9			
Q10			
Q11			
Q12	1010397-1		2N930
Q13	1010342	TRANSISTOR	2N998
R1	1010374-1	RESISTOR	511K, ±1%, 1/8 W
R2	1010374-29		1M, ±1%, 1/8 W
R3	1010364-765		475K, ±1%, 1/8 W
R4	1010364-719		274K, ±1%, 1/8 W
R5	1006750-51		62K, ±2%, 1/4 W
R6	1006750-39		2K, ±2%, 1/4 W
R7	1010364-251		1K, ±1%, 1/8 W
R8	1010364-251	RESISTOR	1K, ±1%, 1/8 W
	DELETED		
R10	1010364-477	RESISTOR	15K, ±1%, 1/8 W
R11	1010364-683	RESISTOR	178K, ±1%, 1/8 W
	DELETED		
R13	1010364-387	RESISTOR	5110, ±1%, 1/8 W
R14	-579		51.1K, ±1%, 1/8 W
R15	-635		100K, ±1%, 1/8 W
R16	-719		274 K, ±1%, 1/8 W
R17	1010364-151		301, ±1%, 1/8 W
R18	1006750-60	RESISTOR	15K, ±2%, 1/4 W
	DELETED		
	DELETED		
R26	1006750-60	RESISTOR	15K, ±2%, 1/4 W
R27	1010364-719		274K, ±1%, 1/8 W
R28	-151		301, ±1%, 1/8 W
R29	-579		51.1K, ±1%, 1/8 W
R30	-387		5.11K, ±1%, 1/8 W
R31	-635		100K, ±1%, 1/8 W
R32	-535		30.1K, ±1%, 1/8 W
R33	-539		31.6K, ±1%, 1/8 W
R34	1010364-539	RESISTOR	31.6K, ±1%, 1/8 W

REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE, RATING
R35	1010364-732	RESISTOR	316 K, ±1%, 1/8 W
R36	-697		210K, ±1%, 1/8 W
R37	-505		21 K, ±1%, 1/8 W
R38	-505		21 K, ±1%, 1/8 W
R39	1010364-535		30.1 K, ±1%, 1/8 W
R40	1010374-1		511K, ±1%, 1/8 W
R41	1010374-29		1 M, ±1%, 1/8 W
R42	1010364-765		475K, ±1%, 1/8 W
R43	1010364-719		274K, ±1%, 1/8 W
R44	1006750-51		62 K, ±2%, 1/4 W
R45	1006750-39		2 K, ±2%, 1/4 W
R46	1006750-108		490, ±2%, 1/4 W
R47	-108		490, ±2%, 1/4 W
R48	-108		490, ±2%, 1/4 W
R49	-15		200, ±2%, 1/4 W
R50	1006750-8		100, ±2%, 1/4 W
R51	1010369-148		20, ±5%, 1/8 W
R52	1006750-15		200, ±2%, 1/4 W
R53	1006750-8		100, ±2%, 1/4 W
R54	1010369-148	RESISTOR	20, ±5%, 1/8 W
T1	1010329-1	TRANSFORMER	
T2	1012054		
T3	1012053		
T4	1010329-1		
T5	1010329-1		
T6	1010329-1	TRANSFORMER	

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	—	14 MAY 65	DKD WK

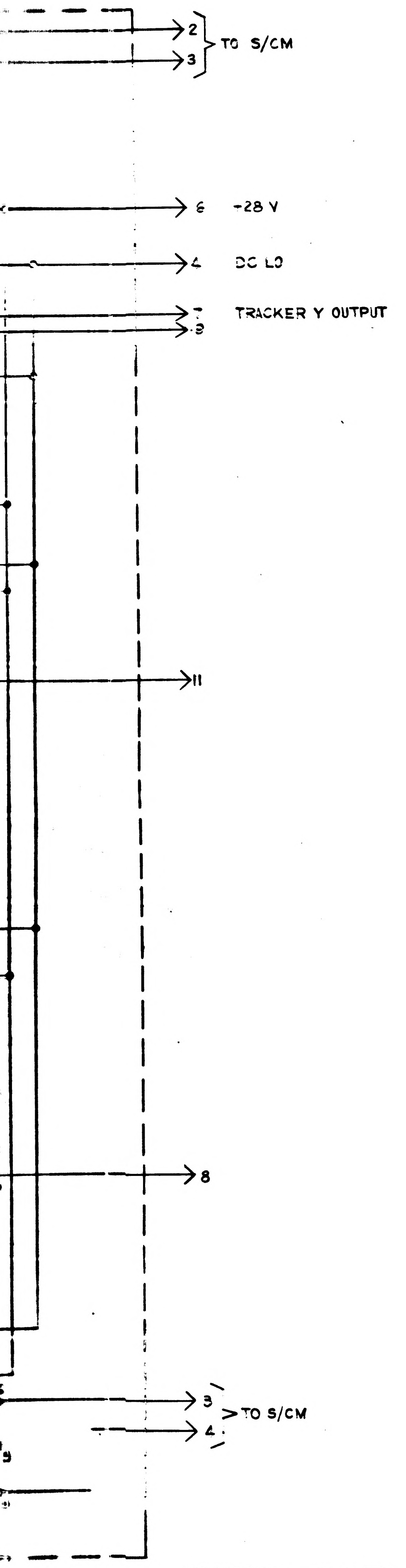
Ⓒ REPLACES REV B WITH CHANGE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN M. Gaston DATE 7-APR-65 CHECKED Udovich 19 APR 65 APPROVAL APR 65 APPROVAL Mark Gersten	SCHEMATIC DIAGRAM ELECTRICAL TRACKER Y CHANNEL ELECTRONICS
MATERIAL	Roso NASA APPROVAL	CODE IDENT NO. SIZE 1009511
CONTRACT NAS 9-497	MIT APPROVAL 15 Apr 65	SCALE NONE SHEET OF

1009511 C

3H

1009511	REV LTR C	SH 1



REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE, RATING
C1	1010359-29	CAPACITOR	.01 UF, ±10%, 200 VDC
C2	1010393-037	↕	4.7 UF, ±10%, 50 VDC
C3	1006755-69	↕	1 UF, ±10%, 35 VDC
C4	1006755-69	CAPACITOR	1 UF, ±10%, 35 VDC
	DELETED		
	DELETED		
C7	1006755-69	CAPACITOR	1 UF, ±10%, 35 VDC
C8	1010409-15	↕	39 UUF, ±2%, 500 VDC
C9	1006755-77	↕	4.7 UF, ±10%, 35 VDC
C10	1010393-044	↕	18 UF, ±10%, 50 VDC
C11	1006755-77	CAPACITOR	4.7 UF, ±10%, 35 VDC
	DELETED		
	↕		
	↕		
	DELETED		
C16	1010393-044	CAPACITOR	18 UF, ±10%, 50 VDC
C17	1006755-77	↕	4.7 UF, ±10%, 35 VDC
C18	1010409-15	↕	39 UUF, ±2%, 500 VDC
C19	1006755-57	↕	0.1 UF, ±10%, 35 VDC
C20	1006755-69	↕	1 UF, ±10%, 35 VDC
C21	1010317-5	↕	.2 UF, ±1%, 30 VDC
C22	1006755-61	↕	.22 UF, ±10%, 35 VDC
C23	1006755-57	↕	.1 UF, ±10%, 35 VDC
C24	1010317-7	↕	.15 UF, ±1%, 30 VDC
C25	1010359-29	↕	.01 UF, ±10%, 200 VDC
C26	1010393-037	↕	4.7 UF, ±10%, 50 VDC
C27	1006755-69	↕	1 UF, ±10%, 35 VDC
C28	1006755-69	↕	1 UF, ±10%, 35 VDC
C29	1006755-57	↕	0.1 UF, ±10%, 35 VDC
C30	1010316-1	↕	.001 UF, ±1%, 100 VDC
C31	1006793-84	↕	750 UUF, ±2%, 300 VDC
C32	1010393-044	↕	18 UF, ±10%, 50 VDC
C33	1010393-044	↕	18 UF, ±10%, 50 VDC
C34	1010393-044	CAPACITOR	18 UF, ±10%, 50 VDC
CR1	1010830-11	SEMICONDUCTOR DEVICE	IN967B
CR2	-9	↕	IN965B
CR3	-9	↕	IN965B
CR4	1010830-11	SEMICONDUCTOR DEVICE	IN967B
Q1	1010342	TRANSISTOR	2N998
Q2	1010367	↕	3N68
Q3	1010367	↕	3N68
Q4	1010397-1	↕	2N930
Q5	↕	↕	↕
Q6	↕	↕	↕
Q7	↕	↕	↕
Q8	↕	↕	↕
Q9	↕	↕	↕
Q10	↕	↕	↕
Q11	↕	↕	↕
Q12	1010397-1	↕	2N930
Q13	1010342	TRANSISTOR	2N998
R1	1010374-1	RESISTOR	511K, ±1%, 1/8 W
R2	1010374-29	↕	1 M, ±1%, 1/8 W
R3	1010364-765	↕	475K, ±1%, 1/8 W
R4	1010364-719	↕	274K, ±1%, 1/8 W
R5	1006750-51	↕	62K, ±2%, 1/4 W
R6	1006750-39	↕	2 K, ±2%, 1/4 W
R7	1010364-251	↕	1 K, ±1%, 1/8 W
R8	1010364-251	RESISTOR	1 K, ±1%, 1/8 W
	DELETED		
R10	1010364-477	RESISTOR	15K, ±1%, 1/8 W
R11	1010364-683	RESISTOR	178K, ±1%, 1/8 W
	DELETED		
R13	1010364-387	RESISTOR	5110, ±1%, 1/8 W
R14	-579	↕	51.1K, ±1%, 1/8 W
R15	-635	↕	100K, ±1%, 1/8 W
R16	-719	↕	274 K, ±1%, 1/8 W
R17	1010364-151	↕	301, ±1%, 1/8 W
R18	1006750-60	RESISTOR	15K, ±2%, 1/4 W
	DELETED		
	↕		
	↕		
	↕		
	↕		
	↕		
	DELETED		
R26	1006750-60	RESISTOR	15K, ±2%, 1/4 W
R27	1010364-719	↕	274K, ±1%, 1/8 W
R28	-151	↕	301, ±1%, 1/8 W
R29	-579	↕	51.1K, ±1%, 1/8 W
R30	-387	↕	5.11K, ±1%, 1/8 W
R31	-635	↕	100K, ±1%, 1/8 W
R32	-535	↕	30.1K, ±1%, 1/8 W
R33	-539	↕	31.6K, ±1%, 1/8 W
R34	1010364-539	RESISTOR	31.6K, ±1%, 1/8 W

REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE, RATING
R35	1010364-732	RESISTOR	316 K, ±1%, 1/8 W
R36	-697	↕	210K, ±1%, 1/8 W
R37	-505	↕	21 K, ±1%, 1/8 W
R38	-505	↕	21 K, ±1%, 1/8 W
R39	1010364-535	↕	30.1 K, ±1%, 1/8 W
R40	1010374-1	↕	511K, ±1%, 1/8 W
R41	1010374-29	↕	1 M, ±1%, 1/8 W
R42	1010364-765	↕	475K, ±1%, 1/8 W
R43	1010364-719	↕	274K, ±1%, 1/8 W
R44	1006750-51	↕	62 K, ±2%, 1/4 W
R45	1006750-39	↕	2 K, ±2%, 1/4 W
R46	1006750-108	↕	490, ±2%, 1/4 W
R47	-108	↕	490, ±2%, 1/4 W
R48	-108	↕	490, ±2%, 1/4 W
R49	-15	↕	200, ±2%, 1/4 W
R50	1006750-8	↕	100, ±2%, 1/4 W
R51	1010369-148	↕	20, ±5%, 1/8 W
R52	1006750-15	↕	200, ±2%, 1/4 W
R53	1006750-8	↕	100, ±2%, 1/4 W
R54	1010369-148	RESISTOR	20, ±5%, 1/8 W
T1	1010329-1	TRANSFORMER	
T2	1012054	↕	
T3	1012053	↕	
T4	1010329-1	↕	
T5	1010329-1	↕	
T6	1010329-1	TRANSFORMER	

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20120	—	14 MAY 65	DKD WK

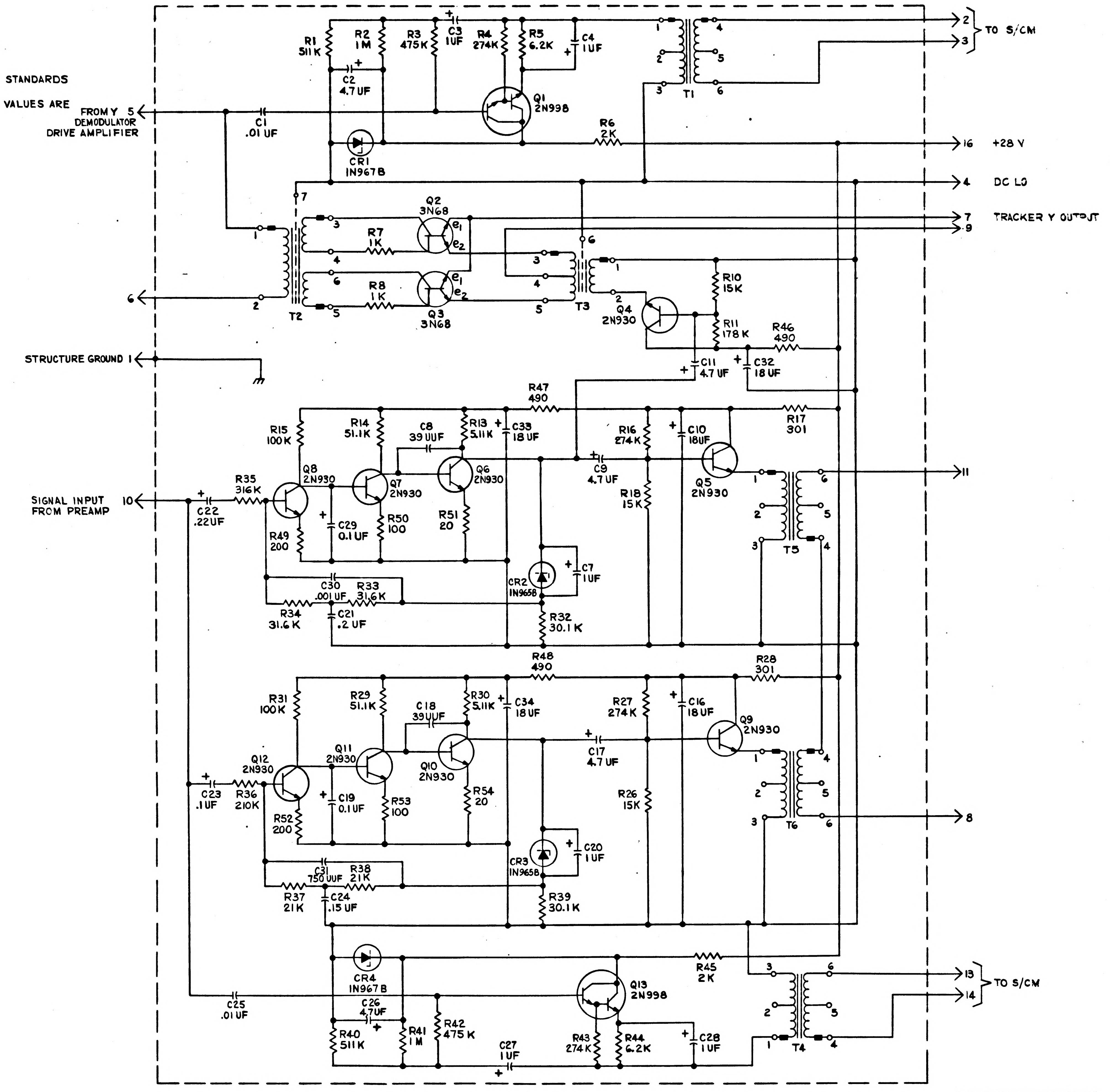
Ⓒ REPLACES REV B WITH CHANGE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES + + + - - -	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	ACSP PN	SCHEMATIC DIAGRAM ELECTRICAL TRACKER Y CHANNEL ELECTRONICS
MATERIAL	DRAWN M. Gaalan DATE 7-APR-65 CHECKED Ukrock 12 APR 65 APPROVAL APPROVAL Mark Gordon ROSO NASA APPROVAL MIT APPROVAL	CODE IDENT NO / SIZE / 1009511
CONTRACT NAS 9-497		SCALE NONE / SHEET / OF 1

1009511 REV LTR C SH 1

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS.
3. DRAWINGS FOR REFERENCE:
   1007512 TRACKER Y CHANNEL MODULE ASSEMBLY



FROM Y 5 DEMODULATOR DRIVE AMPLIFIER
C1 .01 UF
R1 511K
R2 1M
C2 4.7 UF
R3 475K
C3 1UF
R4 274K
R5 6.2K
C4 1UF
Q1 2N998
CR1 1N967B
R6 2K
T1
TO S/CM 2 3
16 +28 V
4 DC LO
7 9 TRACKER Y OUTPUT
Q2 3N68
Q3 3N68
R7 1K
R8 1K
T2
T3
Q4 2N930
R10 15K
R11 178K
R46 490
C11 4.7 UF
C32 18 UF
STRUCTURE GROUND 1
R47 490
R15 100K
R14 51.1K
C8 39 UUF
R13 5.11K
C33 18 UF
R16 274K
C10 18UF
R17 301
Q8 2N930
Q7 2N930
Q6 2N930
C9 4.7 UF
Q5 2N930
SIGNAL INPUT FROM PREAMP 10
C22 .22UF
R35 316K
C29 0.1 UF
R50 100
R51 20
R18 15K
R49 200
C7 1UF
CR2 1N965B
T5
11
C30 .001 UF
R33 31.6K
R34 31.6K
C21 .2 UF
R32 30.1K
R48 490
R28 301
R31 100K
R29 51.1K
C18 39UUF
R30 5.11K
C34 18 UF
R27 274K
C16 18 UF
Q9 2N930
Q12 2N930
Q11 2N930
Q10 2N930
C17 4.7 UF
C23 .1UF
R36 210K
C19 0.1 UF
R53 100
R54 20
R26 15K
R52 200
C20 1UF
CR3 1N965B
T6
8
C31 750 UUF
R38 21K
R37 21K
C24 .15 UF
R39 30.1K
CR4 1N967B
R45 2K
Q13 2N998
C25 .01 UF
C26 4.7UF
R40 511K
R41 1M
R42 475K
C27 1UF
R43 274K
R44 6.2K
C28 1UF
T4
TO S/CM 13 14

1009511	REV LTR C	SH 1

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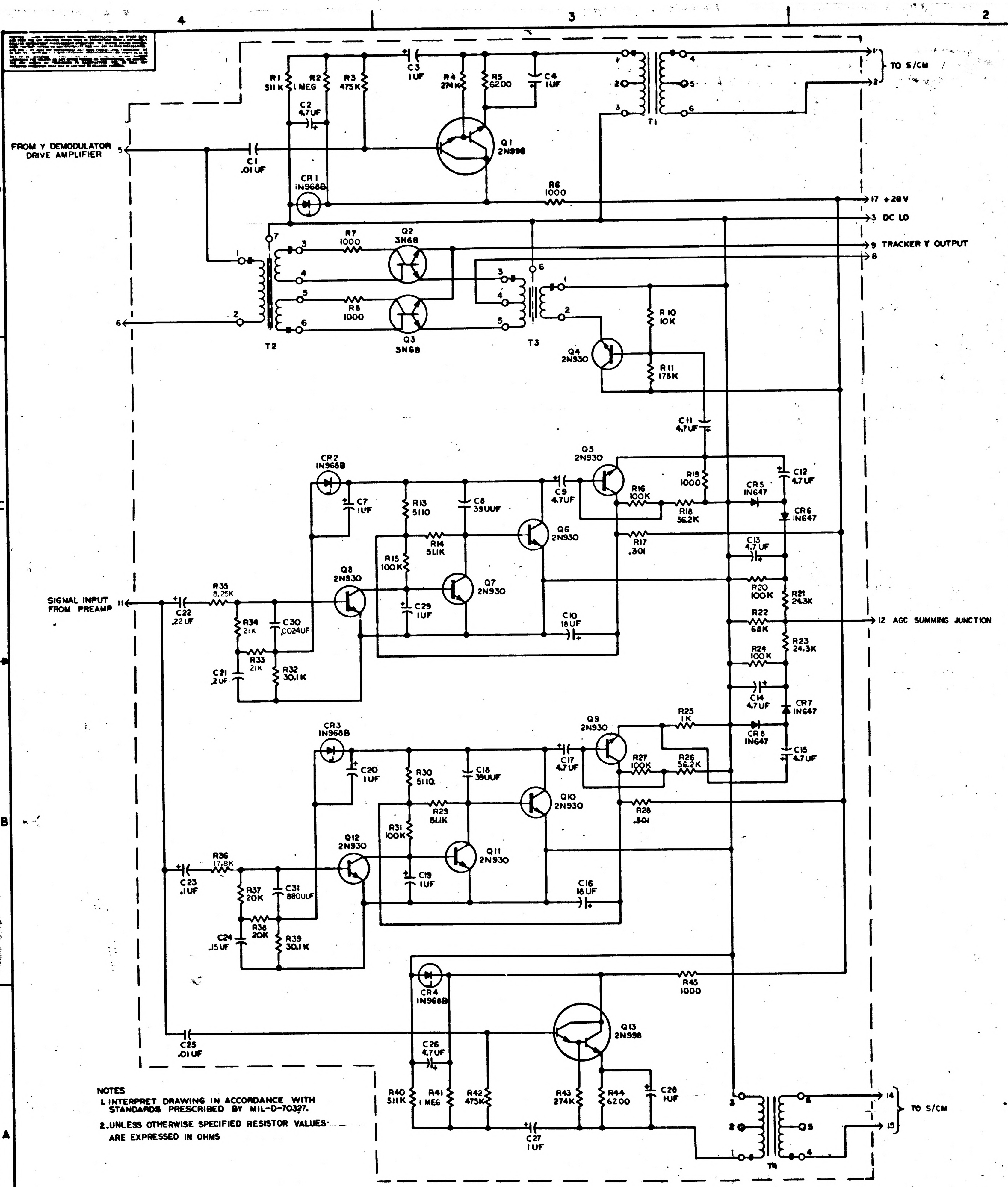

FROM Y DEMODULATOR DRIVE AMPLIFIER
TO S/CM
17 +28V
3 DC LO
9 TRACKER Y OUTPUT
8
SIGNAL INPUT FROM PREAMP
12 AGC SUMMING JUNCTION
14
15
TO S/CM
Q1 2N998
Q2 3N68
Q3 3N68
Q4 2N930
Q5 2N930
Q6 2N930
Q7 2N930
Q8 2N930
Q9 2N930
Q10 2N930
Q11 2N930
Q12 2N930
Q13 2N998
T1
T2
T3
T4
CR1 IN968B
CR2 IN968B
CR3 IN968B
CR4 IN968B
CR5 IN647
CR6 IN647
CR7 IN647
CR8 IN647
C1 .01UF
C2 4.7UF
C3 1UF
C4 1UF
C7 1UF
C8 39UUF
C9 4.7UF
C10 18UF
C11 4.7UF
C12 4.7UF
C13 4.7UF
C14 4.7UF
C15 4.7UF
C16 18UF
C17 4.7UF
C18 39UUF
C19 1UF
C20 1UF
C21 .2UF
C22 .22UF
C23 .1UF
C24 .15UF
C25 .01UF
C26 4.7UF
C27 1UF
C28 1UF
C29 1UF
C30 .0024UF
C31 880UUF
R1 511K
R2 1MEG
R3 475K
R4 274K
R5 6200
R6 1000
R7 1000
R8 1000
R10 10K
R11 178K
R13 5110
R14 51.1K
R15 100K
R16 100K
R17 .301
R18 56.2K
R19 1000
R20 100K
R21 24.3K
R22 68K
R23 24.3K
R24 100K
R25 1K
R26 56.2K
R27 100K
R28 .301
R29 51.1K
R30 5110.
R31 100K
R33 21K
R34 21K
R35 8.25K
R36 17.8K
R37 20K
R38 20K
R39 30.1K
R32 30.1K
R40 511K
R41 1MEG
R42 475K
R43 274K
R44 6200
R45 1000

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010359-29	CAPACITOR	.01 UF	±10%	200VDC
C 2	1010393-037		4.7 UF	±10%	50VDC
C 3	1006755-69		1 UF	±10%	35VDC
C 4	1006755-69		1 UF	±10%	35VDC
C 7	1006755-69		1 UF	±10%	35VDC
C 8	1010409-15		39 UUF	± 2%	500VDC
C 9	1006755-77		4.7 UF	±10%	35VDC
C 10	1010393-044		18 UF	±10%	50VDC
C 11	1006755-77		4.7 UF	±10%	35VDC
C 12			4.7 UF	±10%	35VDC
C 13			4.7 UF	±10%	35VDC
C 14			4.7 UF	±10%	35VDC
C 15	1006755-77		4.7 UF	±10%	35VDC
C 16	1010393-044		18UF	±10%	50VDC
C 17	1006755-77		4.7 UF	±10%	35VDC
C 18	1010409-15		39UUF	± 2%	500VDC
C 19	1006755-69		1UF	±10%	35VDC
C 20	1006755-69		1UF	±10%	35VDC
C 21	1010317- 5		.2UF	± 1%	30VDC
C 22	1006755- 61		.22UF	±10%	35VDC
C 23	1006755- 57		.1 UF	±10%	35VDC
C 24	1010317- 7		.15UF	± 1%	30VDC
C 25	1010359-29		.01 UF	±10%	200VDC
C 26	1010393-037		4.7 UF	±10%	50VDC
C 27	1006755-69		1UF	±10%	35VDC
C 28	1006755-69		1 UF	±10%	35VDC
C 29	1006755-69		1UF	±10%	35VDC
C 30	1010316-106		.0024UF	± 1%	100VDC
C 31	1006793-90	CAPACITOR	880UUF	± 2%	300VDC
CR 1	1010286-12	DIODE	IN968B		
CR 2			IN968B		
CR 3			IN968B		
CR 4	1010286-12		IN968B		
CR 5	1010362-002		IN647		
CR 6			IN647		
CR 7			IN647		
CR 8	1010362-002	DIODE	IN647		
Q 1	1010342	TRANSISTOR	2N998		
Q 2	1010367		3N68		
Q 3	1010367		3N68		
Q 4	1010397-001		2N930		
Q 5					
Q 6					
Q 7					
Q 8					
Q 9					
Q 10					
Q 11					
Q 12	1010397-001		2N930		
Q 13	1010342	TRANSISTOR	2N998		
R 1	1010374-1	RESISTOR	511K	±1%	1/8 W
R 2	1010374-29		1 MEG	±1%	
R 3	1010364-765		475K	±1%	
R 4	1010364-719		274K	±1%	1/8 W
R 5	1006750-51		6200	±2%	1/4 W
R 6	1010364-251		1000	±1%	1/8 W
R 7	-251		1000		
R 8	-251		1000		
R 10	-443		10K		
R 11	-683		178K		
R 13	-388		511 Ω		
R 14	-580		51.1K		
R 15	-635		100K		
R 16	-635		100K		
R 17	-151		301		
R 18	-587		56.2K		
R 19	-251		1000		
R 20	-635		100K		
R 21	-518		24K		
R 22	-604		68K		
R 23	-518		24K		
R 24	-635		100K		
R 25	-251		1000		
R 26	-587		56.2K		
R 27	-635		100K		
R 28	-151		301		
R 29	-580		51.1K		
R 30	-388		5110		
R 31	-635		100K		
R 32	-535		30.1K		
R 33	-506		21K		
R 34	-506		21K		
R 35	-428		8.25K		
R 36	-492		17.8K		
R 37	-502		20K		
R 38	-502		20K		
R 39	1010364-535		30.1K		
R 40	1010374-1		511K		
R 41	1010374-29		1 MEG		
R 42	1010364-765		475K		
R 43	1010364-719		274K	± 1%	1/8 W
R 44	1006750-51		6200	± 2%	1/4 W
R 45	1010364-251	RESISTOR	1000	± 1%	1/8 W
T 1	1010329-1	TRANSFORMER			
T 2	1012054				
T 3	1012053				
T 4	1010329-1	TRANSFORMER			

REF DWG.
TRACKER Y CHANNEL
ELECTRONICS ASSY
DWG NO. 1007512

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 9-29-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

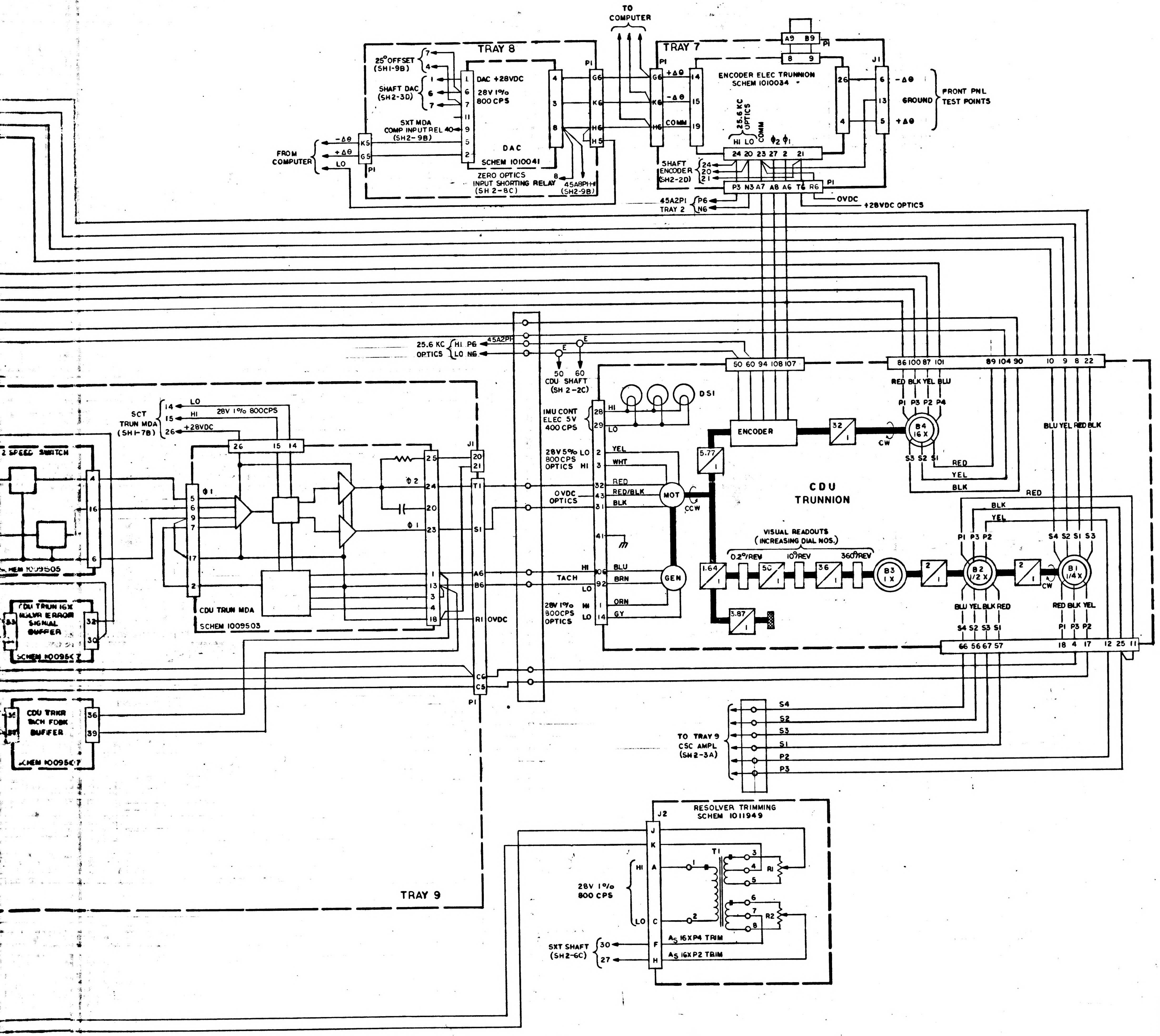
SCHEMATIC
TRACKER Y CHANNEL
ELECTRONICS

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009511
SCALE NONE
WT —
SHEET 1 OF 1

MASTER

1009511

1009512


TO COMPUTER
TRAY 8
TRAY 7
25° OFFSET (SH1-9B)
SHAFT DAC (SH2-3D)
SXT MDA COMP INPUT REL (SH2-9B)
DAC +28VDC
28V 1% 800 CPS
DAC
SCHEM 1010041
ZERO OPTICS INPUT SHORTING RELAY (SH 2-8C)
45A8P1 H (SH2-9B)
FROM COMPUTER
-Δθ
+Δθ
LO
P1
J1
ENCODER ELEC TRUNNION SCHEM 1010034
25.6 KC OPTICS
COMM
HI LO
φ2 φ1
SHAFT ENCODER (SH2-2D)
45A2P1 TRAY 2
OVDC
+28VDC OPTICS
FRONT PNL TEST POINTS
GROUND
25.6 KC OPTICS
HI P6
LO N6
45A2P1
50 60
CDU SHAFT (SH 2-2C)
IMU CONT ELEC 5V 400 CPS
28V 5% 800CPS OPTICS
OVDC OPTICS
TACH
28V 1% 800CPS OPTICS
DS1
ENCODER
MOT
GEN
CCW
CW
CDU TRUNNION
VISUAL READOUTS (INCREASING DIAL NOS.)
0.2°/REV
10°/REV
360°/REV
B4 16X
B3 1X
B2 1/2X
B1 1/4X
5.77
1.64
3.87
RED BLK YEL BLU
SCT TRUN MDA (SH1-7B)
28V 1% 800CPS
+28VDC
2 SPEED SWITCH
CDU TRUN MDA
SCHEM 1009503
SCHEM 1009505
CDU TRUN 16X NULL ERROR SIGNAL BUFFER
SCHEM 1009507
CDU TRKR TACH FDBK BUFFER
SCHEM 1009507
TO TRAY 9 CSC AMPL (SH2-3A)
S4
S2
S3
S1
P2
P3
TRAY 9
RESOLVER TRIMMING SCHEM 1011949
J2
T1
R1
R2
28V 1% 800 CPS
HI
LO
A5 16XP4 TRIM
A5 16XP2 TRIM
SXT SHAFT (SH2-6C)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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CAMBRIDGE, MASS

DRAWN A.D. Lee DATE
CHECKED
APPROVAL John Green
APPROVAL
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D. Hoag

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

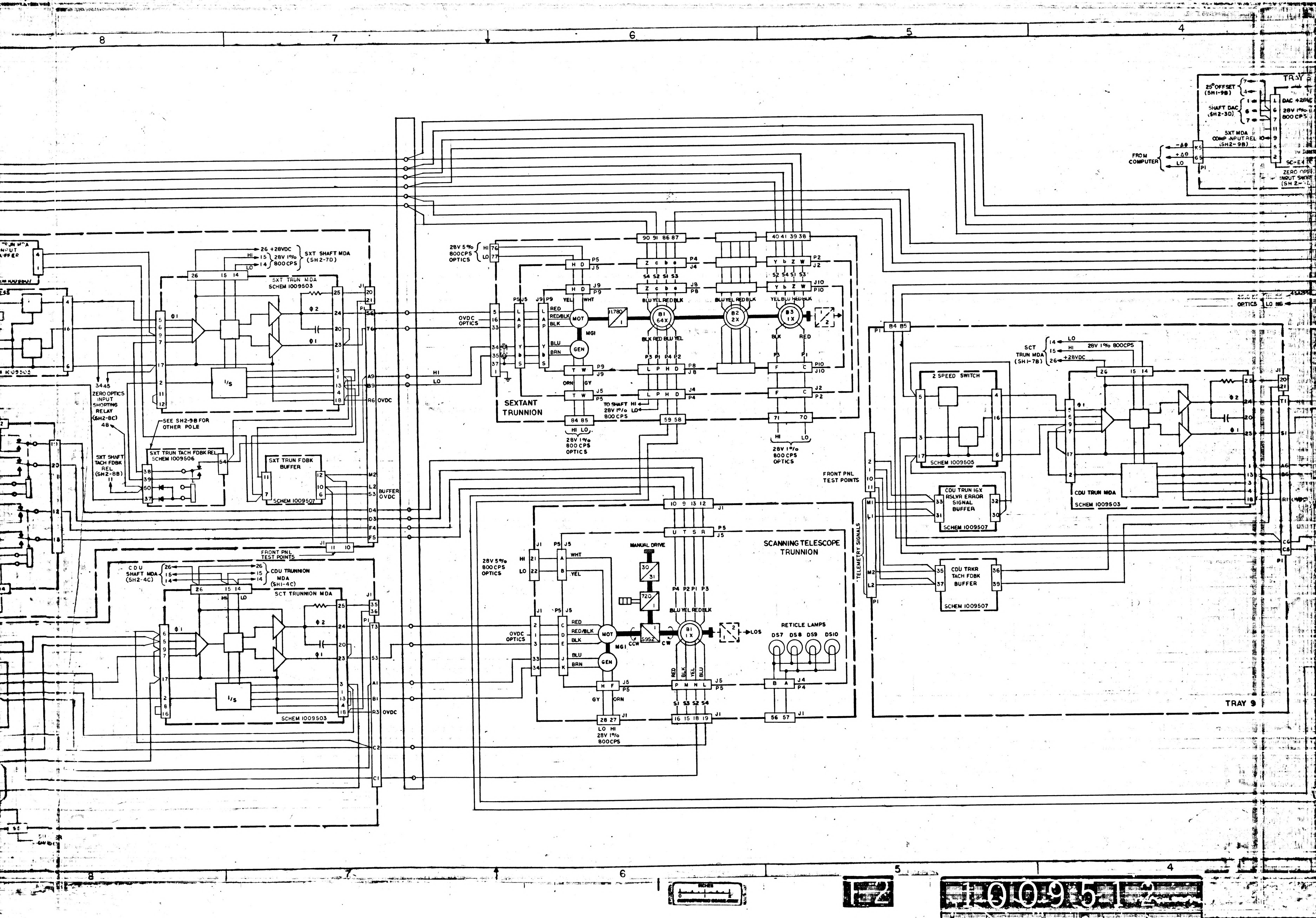
TWO WIRE MECHANIZATION
OPTICS BLOCK 1-100

CODE IDENT NO. —
SIZE J
NASA DRAWING NO. 1009512
SCALE —
WT —
SHEET 1 OF 3

MASTER

F3

1009512


8
7
6
5
4
TRAY 9
25° OFFSET (SH1-9B)
SHAFT DAC (SH2-3D)
DAC +28V
28V 1% 800 CPS
SXT MDA COMP INPUT REL (SH2-9B)
FROM COMPUTER
-Δθ
+Δθ
LO
ZERO OPT INPUT SHORT (SH 2-
SC-E4
26 +28VDC
28V 1% 800CPS
SXT SHAFT MDA (SH 2-7D)
SXT TRUN MDA
SCHEM 1009503
OVDC
1/s
ZERO OPTICS INPUT SHORTING RELAY (SH2-8C)
SEE SH2-9B FOR OTHER POLE
SXT TRUN TACH FDBK REL SCHEM 1009506
SXT SHAFT TACH FDBK REL (SH2-8B)
SXT TRUN FDBK BUFFER
SCHEM 1009507
BUFFER OVDC
FRONT PNL TEST POINTS
CDU SHAFT MDA (SH2-4C)
CDU TRUNNION MDA (SH1-4C)
SCT TRUNNION MDA
SCHEM 1009503
28V 5% 800CPS OPTICS
OVDC OPTICS
HI
LO
SEXTANT TRUNNION
MOT
GEN
MG1
RED
RED/BLK
BLK
BLU
BRN
YEL
WHT
ORN
GY
11,780 : 1
B1 64X
B2 2X
B3 1X
BLU YEL RED BLK
BLK RED BLU YEL
TO SHAFT HI LO
28V 1% 800 CPS
28V 1% 800 CPS OPTICS
SCANNING TELESCOPE TRUNNION
MANUAL DRIVE
30 : 31
720 : 1
1 : 5952
CCW
CW
B1 1X
LOS
RETICLE LAMPS
DS7
DS8
DS9
DS10
28V 1% 800CPS
TELEMETRY SIGNALS
FRONT PNL TEST POINTS
28.0 E 1% 800CPS OPTICS
SCT TRUN MDA (SH1-7B)
2 SPEED SWITCH
SCHEM 1009505
CDU TRUN 16X RSLVR ERROR SIGNAL BUFFER
SCHEM 1009507
CDU TRUN MDA
SCHEM 1009503
CDU TRKR TACH FDBK BUFFER
SCHEM 1009507
F2
1009512

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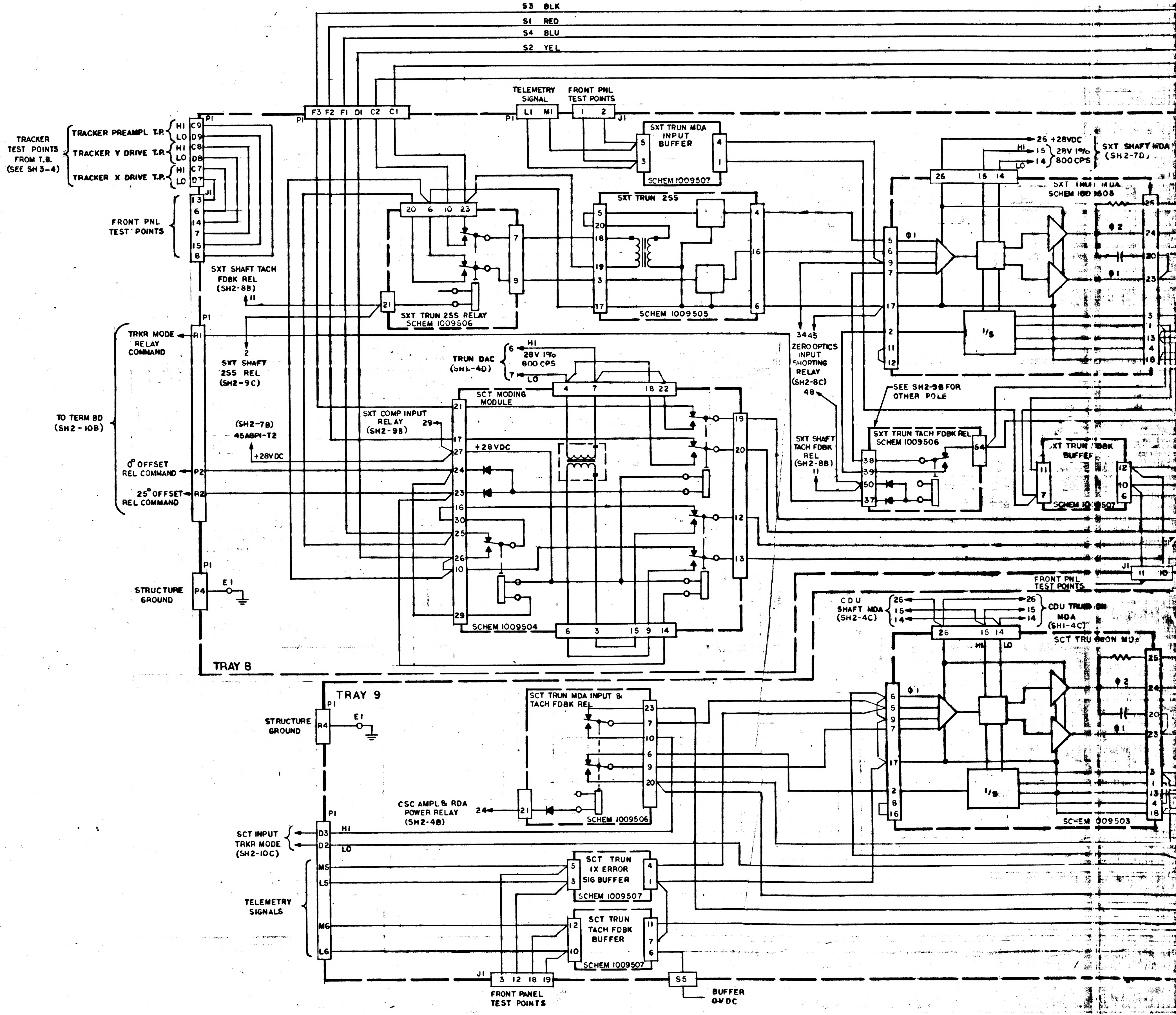
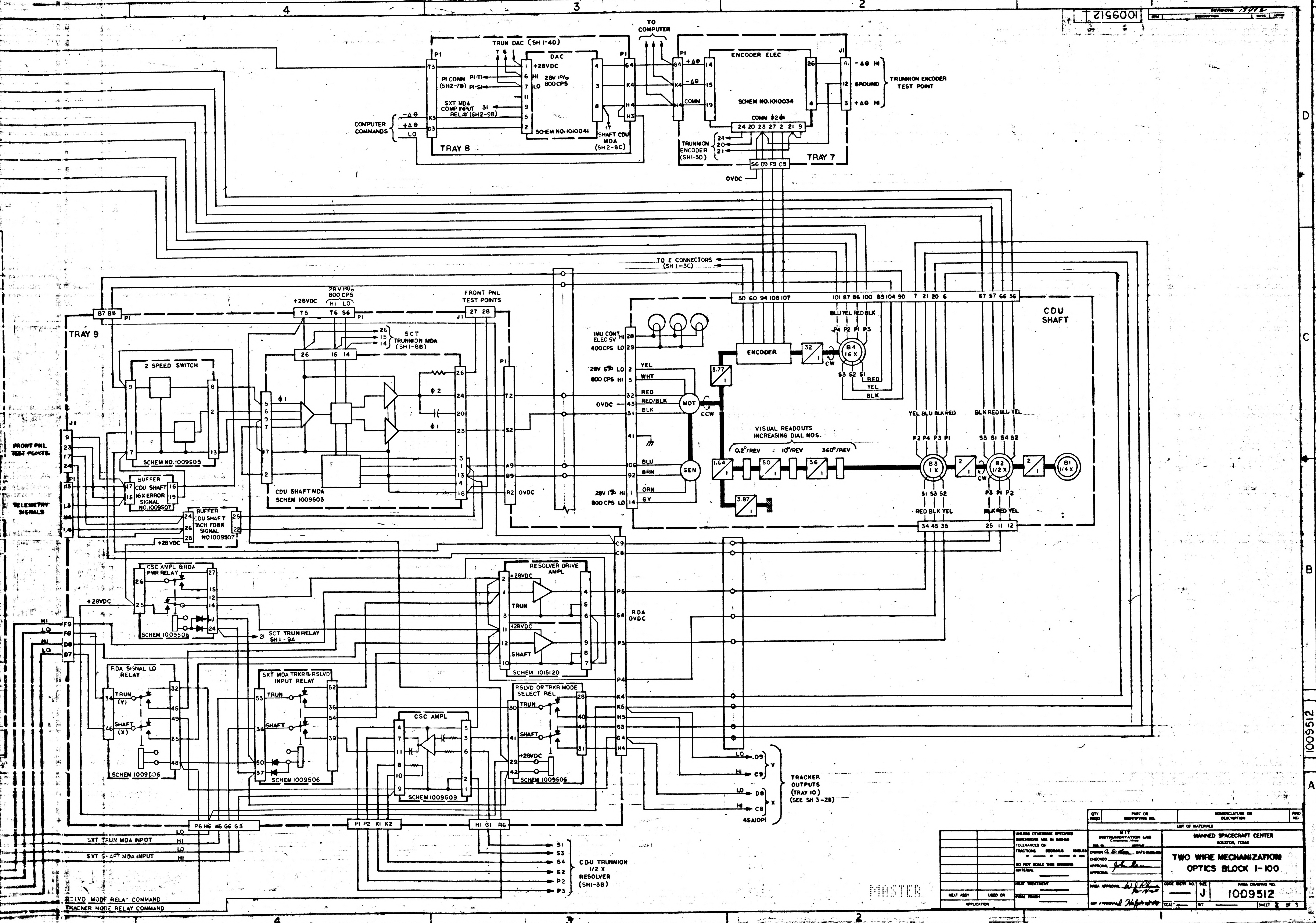

S3 BLK
S1 RED
S4 BLU
S2 YEL
F3 F2 F1 D1 C2 C1
TELEMETRY SIGNAL
L1 M1
FRONT PNL TEST POINTS
1 2
J1
P1
TRACKER TEST POINTS FROM T.B. (SEE SH 3-4)
TRACKER PREAMPL T.P.
TRACKER Y DRIVE T.P.
TRACKER X DRIVE T.P.
HI C9
LO D9
HI C8
LO D8
HI C7
LO D7
FRONT PNL TEST POINTS
13 6 14 7 15 8
SXT TRUN MDA INPUT BUFFER
SCHEM 1009507
26 +28VDC
HI 15
LO 14
28V 1% 800 CPS
SXT SHAFT MDA (SH2-7D)
SXT TRUN MDA SCHEM 1009503
Φ1
Φ2
1/S
SXT TRUN 25S
SCHEM 1009505
20 6 10 23
SXT TRUN 25S RELAY SCHEM 1009506
SXT SHAFT TACH FDBK REL (SH2-8B)
SXT SHAFT 25S REL (SH2-9C)
TRKR MODE RELAY COMMAND
R1
TO TERM BD (SH2-10B)
0° OFFSET REL COMMAND
P2
25° OFFSET REL COMMAND
R2
TRUN DAC (SH1-4D)
HI
28V 1% 800 CPS
LO
SCT MODING MODULE
SCHEM 1009504
SXT COMP INPUT RELAY (SH2-9B)
(SH2-7B) 45A8P1-T2
+28VDC
3445
ZERO OPTICS INPUT SHORTING RELAY (SH2-8C)
48
SEE SH2-9B FOR OTHER POLE
SXT TRUN TACH FDBK REL SCHEM 1009506
SXT SHAFT TACH FDBK REL (SH2-8B)
SXT TRUN FDBK BUFFER
SCHEM 1009507
STRUCTURE GROUND
P4
E1
TRAY 8
FRONT PNL TEST POINTS
CDU SHAFT MDA (SH2-4C)
CDU TRUN MDA (SH1-4C)
26 15 14
SCT TRUNNION MDA
SCHEM 1009503
TRAY 9
STRUCTURE GROUND
R4
E1
SCT TRUN MDA INPUT & TACH FDBK REL
SCHEM 1009506
CSC AMPL & RDA POWER RELAY (SH2-4B)
SCT INPUT TRKR MODE (SH2-10C)
D3 HI
D2 LO
TELEMETRY SIGNALS
M5 L5 M6 L6
SCT TRUN 1X ERROR SIG BUFFER
SCHEM 1009507
SCT TRUN TACH FDBK BUFFER
SCHEM 1009507
J1 3 12 18 19
FRONT PANEL TEST POINTS
S5
BUFFER 0VDC


4
3
2
1
D
C
B
A
1009512
TRUN DAC (SH 1-4D)
DAC
+28VDC
HI
LO
28V 1%
800CPS
P1 CONN (SH2-7B)
P1-T1
P1-S1
SXT MDA COMP INPUT RELAY (SH2-9B)
SCHEM NO.1010041
SHAFT CDU MDA (SH 2-8C)
COMPUTER COMMANDS
-Δθ
+Δθ
LO
TRAY 8
TO COMPUTER
ENCODER ELEC
+Δθ
-Δθ
COMM
SCHEM NO.1010034
COMM φ2 φ1
TRUNNION ENCODER (SH1-3D)
TRAY 7
-Δθ HI
GROUND
+Δθ HI
TRUNNION ENCODER TEST POINT
OVDC
TO E CONNECTORS (SH 1-3C)
CDU SHAFT
TRAY 9
2 SPEED SWITCH
SCHEM NO.1009505
28V 1% 800 CPS
HI LO
+28VDC
SCT TRUNNION MDA (SH1-8B)
FRONT PNL TEST POINTS
φ1
φ2
CDU SHAFT MDA
SCHEM 1009503
OVDC
IMU CONT ELEC 5V 400CPS
28V 5% 800 CPS
YEL
WHT
RED
RED/BLK
BLK
BLU
BRN
ORN
GY
MOT
GEN
CCW
CW
ENCODER
BLU YEL RED BLK
B4 16X
VISUAL READOUTS INCREASING DIAL NOS.
0.2°/REV
10°/REV
360°/REV
B3 1X
B2 1/2X
B1 1/4X
FRONT PNL TEST POINTS
TELEMETRY SIGNALS
BUFFER CDU SHAFT 16X ERROR SIGNAL NO.1009507
BUFFER CDU SHAFT TACH FDBK SIGNAL NO.1009507
CSC AMPL & RDA PWR RELAY
SCHEM 1009506
SCT TRUN RELAY SH1-9A
RESOLVER DRIVE AMPL
TRUN
SHAFT
SCHEM 1015120
RDA OVDC
RDA SIGNAL LO RELAY
TRUN (Y)
SHAFT (X)
SXT MDA TRKR & RSLVD INPUT RELAY
CSC AMPL
SCHEM 1009509
RSLVD OR TRKR MODE SELECT REL
TRACKER OUTPUTS (TRAY 10) (SEE SH 3-2B)
45A10P1
SXT TRUN MDA INPUT
SXT SHAFT MDA INPUT
CDU TRUNNION 1/2 X RESOLVER (SH1-3B)
RSLVD MODE RELAY COMMAND
TRACKER MODE RELAY COMMAND
MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN A. D. Lee DATE
CHECKED
APPROVAL John Lee
APPROVAL
NASA APPROVAL W. J. Rhine
MIT APPROVAL

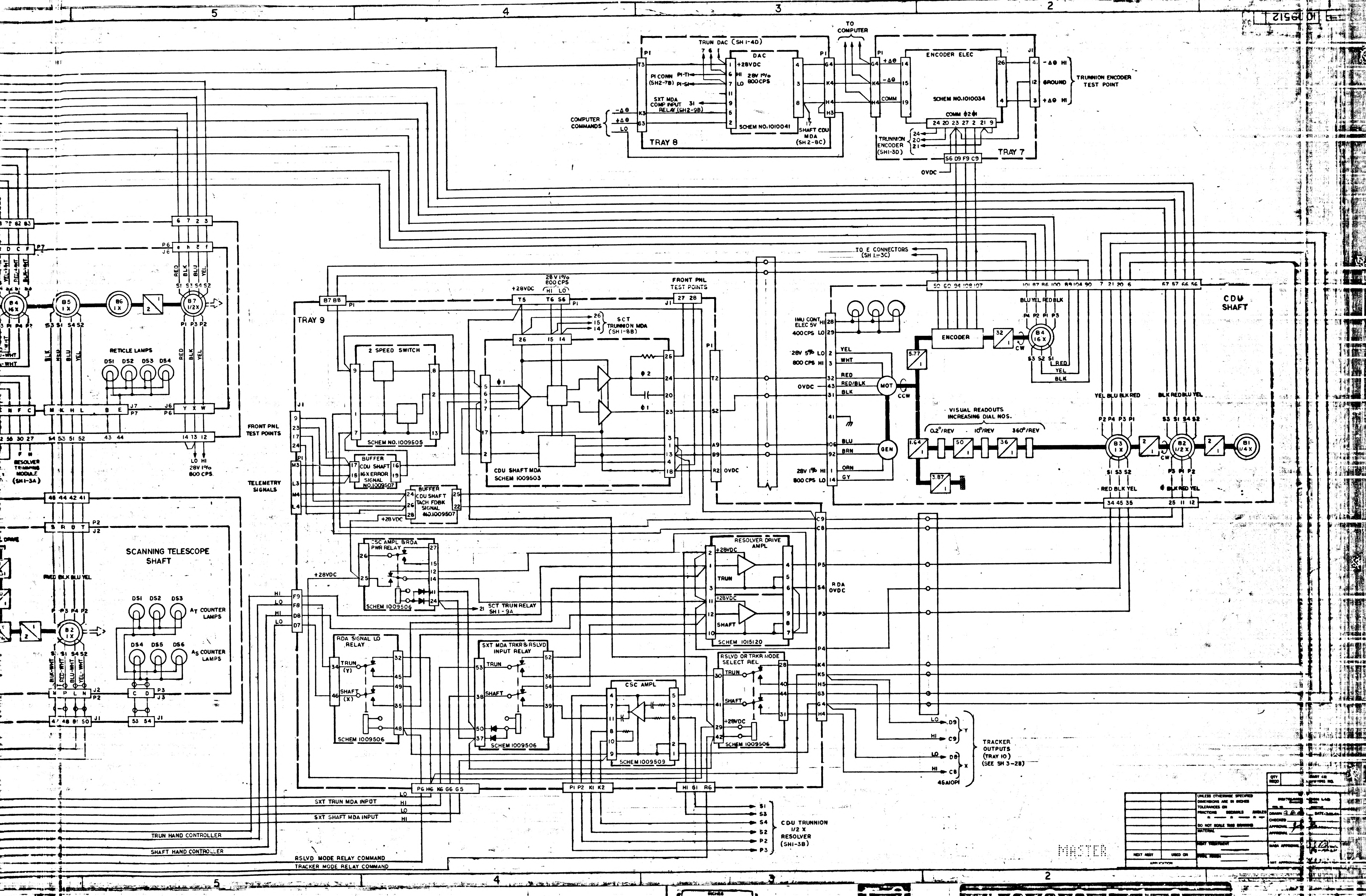
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

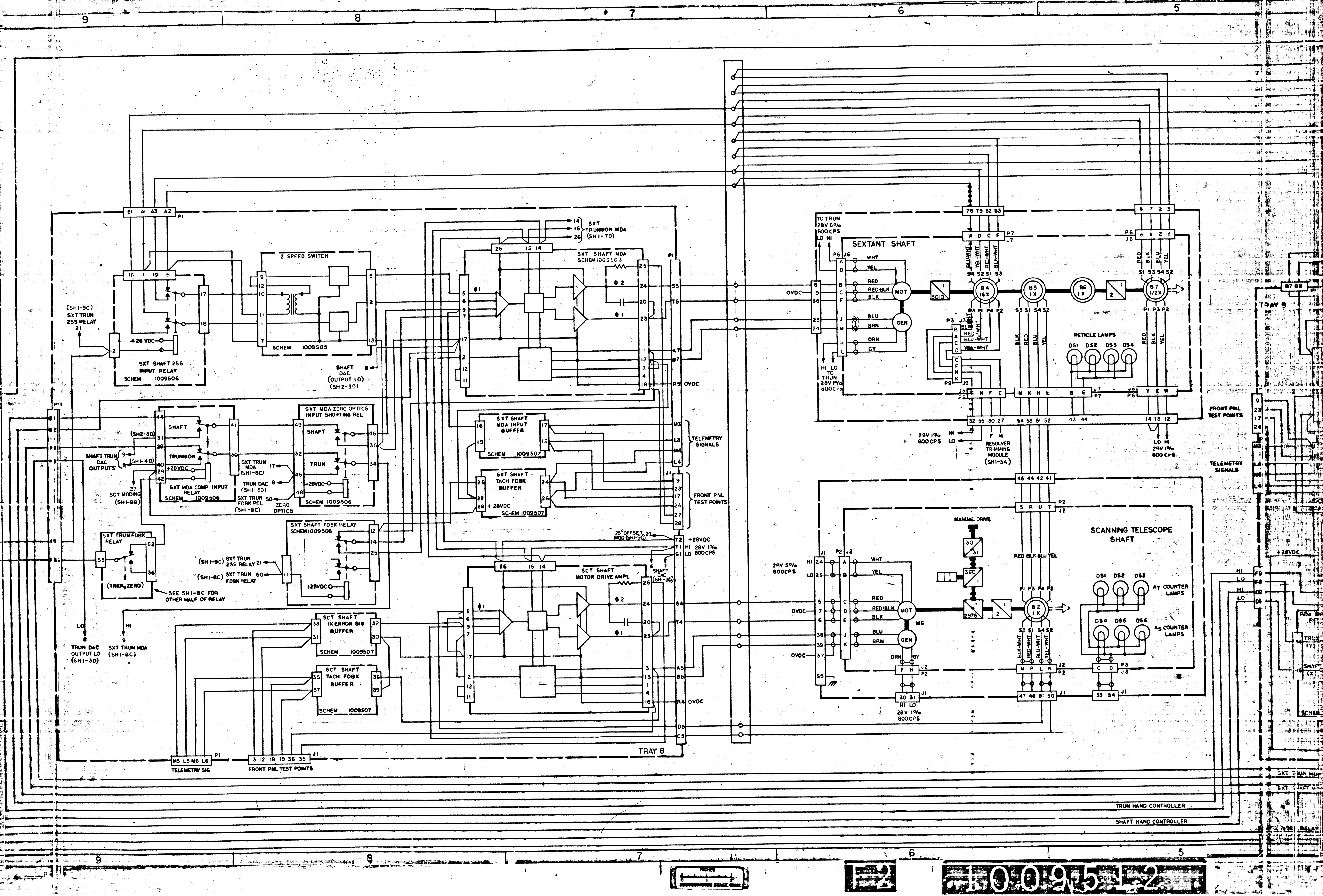
TWO WIRE MECHANIZATION
OPTICS BLOCK I-100

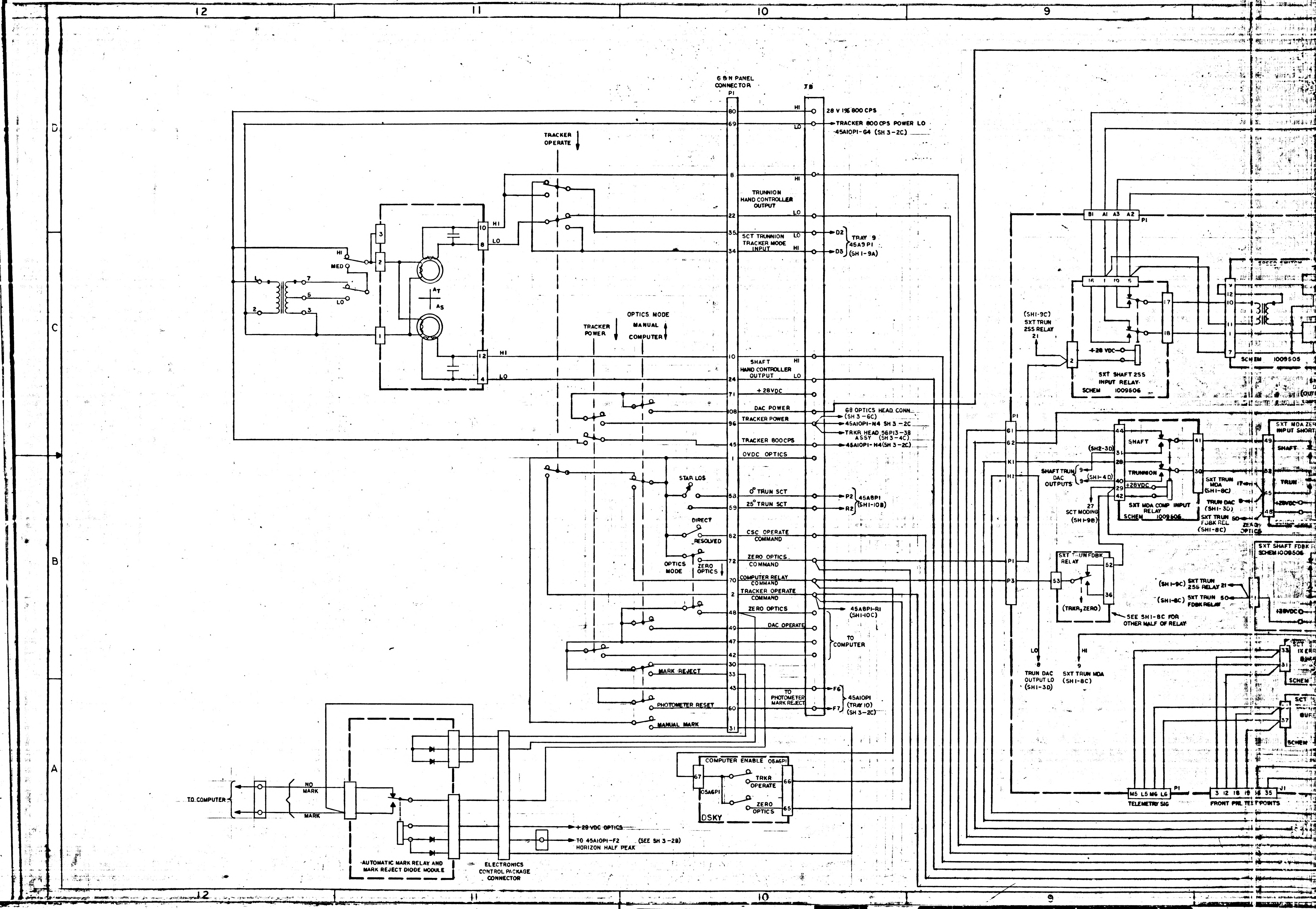
CODE IDENT NO. —
SIZE J
NASA DRAWING NO. 1009512
SCALE —
WT —
SHEET 2 OF 3

E4

1009512


TRUN DAC (SH 1-4D)
DAC
+28VDC
28V 1%
800CPS
PI CONN (SH2-7B)
PI-TI
PI-SI
SXT MDA COMP INPUT RELAY (SH2-9B)
SCHEM NO.1010041
COMPUTER COMMANDS
+Δθ
-Δθ
LO
TRAY 8
SHAFT CDU MDA (SH 2-8C)
TO COMPUTER
ENCODER ELEC
SCHEM NO.1010034
COMM
TRUNNION ENCODER (SH1-3D)
TRAY 7
OVDC
-Δθ HI
GROUND
+Δθ HI
TRUNNION ENCODER TEST POINT
TO E CONNECTORS (SH 1-3C)
CDU SHAFT
IMU CONT ELEC 5V
400CPS
28V 5% LO
800 CPS HI
ENCODER
MOT
GEN
CW
CCW
VISUAL READOUTS INCREASING DIAL NOS.
0.2°/REV
10°/REV
360°/REV
B1 1/4 X
B2 1/2 X
B3 1 X
B4 16 X
YEL
WHT
RED
RED/BLK
BLK
BLU
BRN
ORN
GY
TRAY 9
FRONT PNL TEST POINTS
28 V 1% 800 CPS HI LO
+28VDC
SCT TRUNNION MDA (SH1-8B)
2 SPEED SWITCH
SCHEM NO. 1009505
CDU SHAFT MDA SCHEM 1009503
BUFFER CDU SHAFT 16X ERROR SIGNAL NO.1009507
BUFFER CDU SHAFT TACH FDBK SIGNAL NO.1009507
TELEMETRY SIGNALS
CSC AMPL &RDA PWR RELAY
SCHEM 1009506
SCT TRUN RELAY SH1-9A
RESOLVER DRIVE AMPL
TRUN
SHAFT
SCHEM 1015120
RDA OVDC
RDA SIGNAL LO RELAY
TRUN (Y)
SHAFT (X)
SXT MDA TRKR & RSLVD INPUT RELAY
CSC AMPL
SCHEM 1009509
RSLVD OR TRKR MODE SELECT REL
TRACKER OUTPUTS (TRAY 10) (SEE SH 3-2B)
45A10PI
SXT TRUN MDA INPUT
SXT SHAFT MDA INPUT
TRUN HAND CONTROLLER
SHAFT HAND CONTROLLER
RSLVD MODE RELAY COMMAND
TRACKER MODE RELAY COMMAND
CDU TRUNNION 1/2 X RESOLVER (SH1-3B)
RETICLE LAMPS
DS1 DS2 DS3 DS4
B5 1X
B6 1X
B7 1/2X
LO HI 28V 1% 800 CPS.
RESOLVER TRIMMING MODULE (SH1-3A)
SCANNING TELESCOPE SHAFT
AT COUNTER LAMPS
AS COUNTER LAMPS
DS5 DS6
B2 1X
MASTER
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH
NEXT ASSY
USED ON
APPLICATION
QTY REQD
DRAWN
CHECKED
APPROVAL
NASA APPROVAL
INCHES 0 1 2
5 4 3 2
F 3
1009512

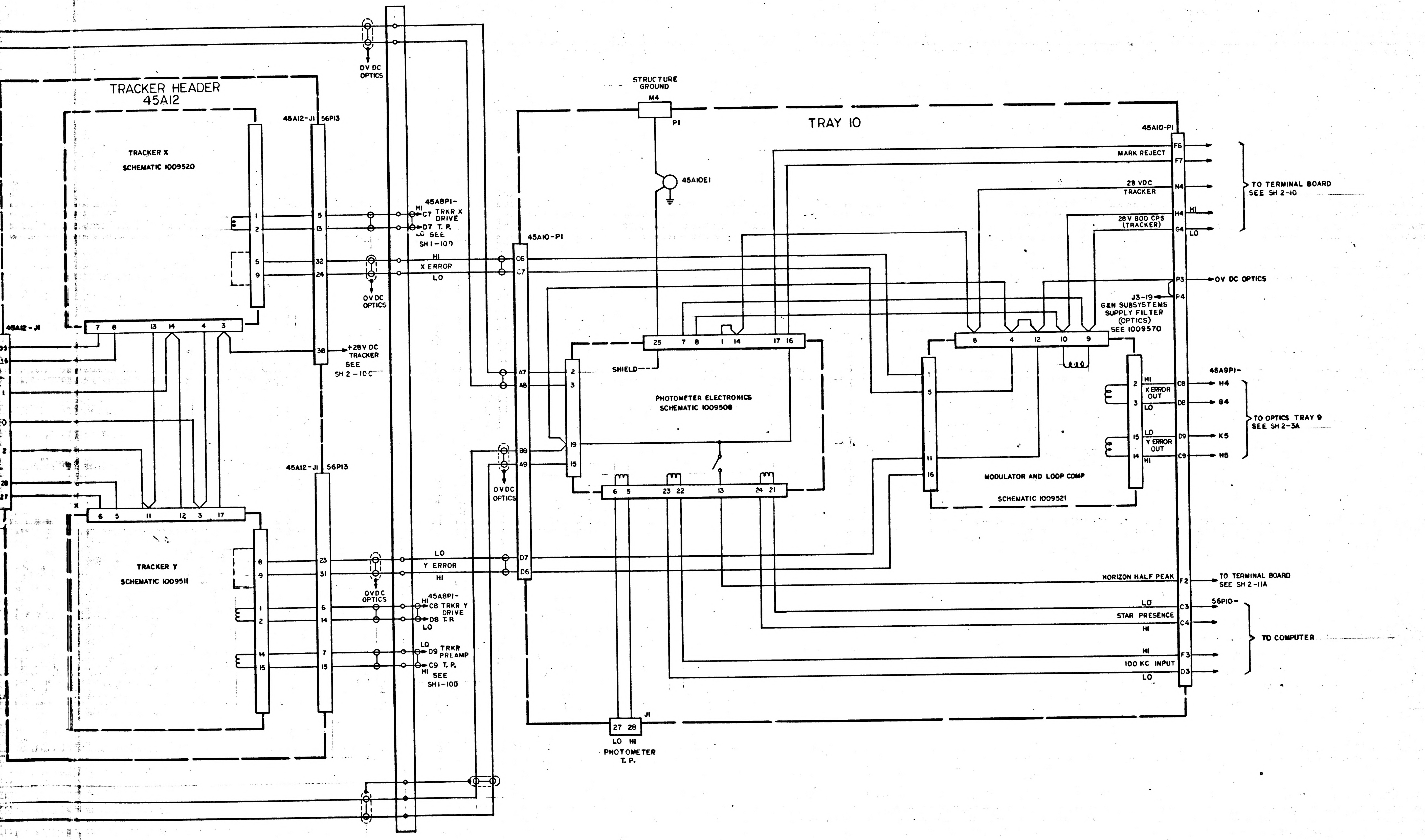
9
8
7
6
5
B1 A1 A3 A2 P1
16 1 19 5
(SH1-9C) SXT TRUN 2SS RELAY 21
+28 VDC
SXT SHAFT 2SS INPUT RELAY
SCHEM 1009506
2 SPEED SWITCH
SCHEM 1009505
SHAFT DAC (OUTPUT LO) (SH 2-3D)
14 15 26 SXT TRUNNION MDA (SH 1-7D)
SXT SHAFT MDA SCHEM 1009503
SXT MDA ZERO OPTICS INPUT SHORTING REL
SHAFT
TRUN
SCHEM 1009506
SXT MDA COMP INPUT RELAY
SCHEM 1009506
SHAFT TRUN DAC OUTPUTS
(SH2-3D)
(SH1-4D)
27 SCT MODING (SH1-9B)
SXT TRUN MDA (SH1-8C)
TRUN DAC (SH1-3D)
SXT TRUN FDBK REL (SH1-8C)
ZERO OPTICS
SXT SHAFT MDA INPUT BUFFER
SCHEM 1009507
SXT SHAFT TACH FDBK BUFFER
SCHEM 1009507
+28VDC
TELEMETRY SIGNALS
FRONT PNL TEST POINTS
SXT SHAFT FDBK RELAY SCHEM 1009506
SXT TRUN FDBK RELAY
(TRKR, ZERO)
SEE SH1-8C FOR OTHER HALF OF RELAY
(SH1-9C) SXT TRUN 2SS RELAY 21
(SH1-8C) SXT TRUN FDBK RELAY 50
25° OFFSET MOD (SH1-9C)
+28VDC
28V 1% 800CPS
SHAFT DAC (SH1-3D)
SCT SHAFT MOTOR DRIVE AMPL
SCT SHAFT IX ERROR SIG BUFFER
SCHEM 1009507
SCT SHAFT TACH FDBK BUFFER
SCHEM 1009507
TRUN DAC OUTPUT LO (SH1-3D)
SXT TRUN MDA (SH1-8C)
M5 L5 M6 L6 P1
TELEMETRY SIG
3 12 18 19 36 35 J1
FRONT PNL TEST POINTS
TRAY 8
OVDC
TO TRUN 28V 5% 800 CPS
SEXTANT SHAFT
WHT
YEL
RED
RED-BLK
BLK
BLU
BRN
ORN
GY
MOT
GEN
3010
B4 16X
B5 1X
B6 1X
B7 1/2X
RETICLE LAMPS
DS1 DS2 DS3 DS4
HI LO TO TRUN 28V 1% 800CPS
28V 1% 800CPS
RESOLVER TRIMMING MODULE (SH1-3A)
FRONT PNL TEST POINTS
TELEMETRY SIGNALS
TRAY 9
+28VDC
MANUAL DRIVE
SCANNING TELESCOPE SHAFT
28V 5% 800CPS
RED BLK BLU YEL
2976
B2 1X
MG
AT COUNTER LAMPS
AS COUNTER LAMPS
DS1 DS2 DS3 DS4 DS5 DS6
28V 1% 800CPS
TRUN HAND CONTROLLER
SHAFT HAND CONTROLLER
E2
1009512

12
11
10
9
D
C
B
A
G & N PANEL CONNECTOR
P1
TB
80
69
HI
LO
28 V 1% 800 CPS
TRACKER 800 CPS POWER LO
45A10P1-G4 (SH 3-2C)
TRACKER OPERATE
8
22
35
34
TRUNNION HAND CONTROLLER OUTPUT
SCT TRUNNION TRACKER MODE INPUT
D2
D3
TRAY 9
45A9 P1
(SH 1-9A)
HI
MED
LO
3
2
1
7
5
3
L
2
A_T
A_S
10
8
12
4
TRACKER POWER
OPTICS MODE
MANUAL
COMPUTER
10
24
71
108
96
45
1
SHAFT HAND CONTROLLER OUTPUT
+28VDC
DAC POWER
TRACKER POWER
TRACKER 800CPS
OVDC OPTICS
68 OPTICS HEAD CONN. (SH 3-6C)
45A10P1-N4 SH 3-2C
TRKR HEAD ASSY 56P13-38 (SH 3-4C)
45A10P1-H4 (SH 3-2C)
STAR LOS
53
59
0° TRUN SCT
25° TRUN SCT
P2
R2
45A8P1
(SH1-10B)
DIRECT
RESOLVED
OPTICS MODE
ZERO OPTICS
82
72
70
2
48
49
47
42
30
33
43
60
31
CSC OPERATE COMMAND
ZERO OPTICS COMMAND
COMPUTER RELAY COMMAND
TRACKER OPERATE COMMAND
ZERO OPTICS
DAC OPERATE
45A8P1-R1
(SH1-10C)
TO COMPUTER
MARK REJECT
PHOTOMETER RESET
MANUAL MARK
TO PHOTOMETER MARK REJECT
F6
F7
45A10P1
(TRAY 10)
(SH 3-2C)
COMPUTER ENABLE 05A6P1
67
05A6P1
TRKR OPERATE
ZERO OPTICS
66
65
DSKY
TO COMPUTER
NO MARK
MARK
+28 VDC OPTICS
TO 45A10P1-F2 HORIZON HALF PEAK
(SEE SH 3-2B)
AUTOMATIC MARK RELAY AND MARK REJECT DIODE MODULE
ELECTRONICS CONTROL PACKAGE CONNECTOR
B1 A1 A3 A2
P1
16 1 19 5
17
18
(SH1-9C)
SXT TRUN 2SS RELAY
21
2
+28 VDC
SXT SHAFT 2SS INPUT RELAY
SCHEM 1009506
SPEED SWITCH
9
12
10
11
1
7
SCHEM 1009505
P1
61
62
K1
H1
P1
P3
44
31
28
40
29
42
SHAFT
TRUNNION
+28VDC
(SH2-3D)
SHAFT TRUN DAC OUTPUTS
9
9
(SH1-4D)
27
SCT MODING
(SH1-9B)
SXT MDA COMP INPUT RELAY
SCHEM 1009506
41
30
SXT TRUN MDA (SH1-8C)
17
TRUN DAC (SH1-3D)
8
SXT TRUN FDBK REL (SH1-8C)
50
ZERO OPTICS
SXT MDA ZER INPUT SHORT
49
SHAFT
32
TRUN
45
+28VDC
48
SXT TRUN FDBK RELAY
52
53
36
(TRKR, ZERO)
SEE SH1-8C FOR OTHER HALF OF RELAY
SXT SHAFT FDBK
SCHEM 1009506
(SH1-9C) SXT TRUN 2SS RELAY 21
(SH1-8C) SXT TRUN FDBK RELAY 50
+28VDC
LO
8
TRUN DAC OUTPUT LO
(SH1-3D)
HI
9
SXT TRUN MDA
(SH1-8C)
SCT
1X ERR
33
31
SCHEM
SCT
37
SCHEM
M5 L5 M6 L6
P1
TELEMETRY SIG
3 12 18 19 36 35
J1
FRONT PNL TEST POINTS
12
11
10
9
INCHES
0
1
2

E1

1009512

REVISIONS 13402


TRACKER HEADER
45A12
TRACKER X
SCHEMATIC 1009520
45A12-J1 56P13
45A12-J1
45A8P1-
HI C7 TRKR X DRIVE
D7 T.P.
LO SEE SH 1-10D
HI
X ERROR
LO
0V DC OPTICS
+28V DC TRACKER SEE SH 2-10C
45A12-J1 56P13
TRACKER Y
SCHEMATIC 1009511
LO
Y ERROR
HI
0V DC OPTICS
45A8P1-
HI C8 TRKR Y DRIVE
D8 T.R.
LO
LO D9 TRKR PREAMP
C9 T.P.
HI SEE SH1-10D
0V DC OPTICS
STRUCTURE GROUND
M4
P1
TRAY 10
45A10E1
45A10-P1
C6 C7 A7 A8 B9 A9 D7 D6
SHIELD
PHOTOMETER ELECTRONICS
SCHEMATIC 1009508
25 7 8 1 14 17 16
6 5 23 22 13 24 21
J1
27 28
LO HI
PHOTOMETER T.P.
MODULATOR AND LOOP COMP
SCHEMATIC 1009521
8 4 12 10 9
HI
X ERROR OUT
LO
LO
Y ERROR OUT
HI
45A10-P1
MARK REJECT F6 F7
28 VDC TRACKER N4
28V 800 CPS (TRACKER) H4 HI G4 LO
TO TERMINAL BOARD SEE SH 2-10
P3 0V DC OPTICS
P4
J3-19
G&N SUBSYSTEMS SUPPLY FILTER (OPTICS) SEE 1009570
45A9P1-
C8 H4
D8 G4
D9 K5
C9 H5
TO OPTICS TRAY 9 SEE SH 2-3A
HORIZON HALF PEAK F2
TO TERMINAL BOARD SEE SH 2-11A
56P10-
LO
STAR PRESENCE C3 C4
HI
HI
100 KC INPUT F3 D3
LO
TO COMPUTER
D C B A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

MIT INSTRUMENTATION LAB
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DRAWN W. Horgan DATE
CHECKED
APPROVAL John
APPROVAL
NASA APPROVAL W.J. Rhine 10-14-68
MIT APPROVAL R. Hafed 10/14/68

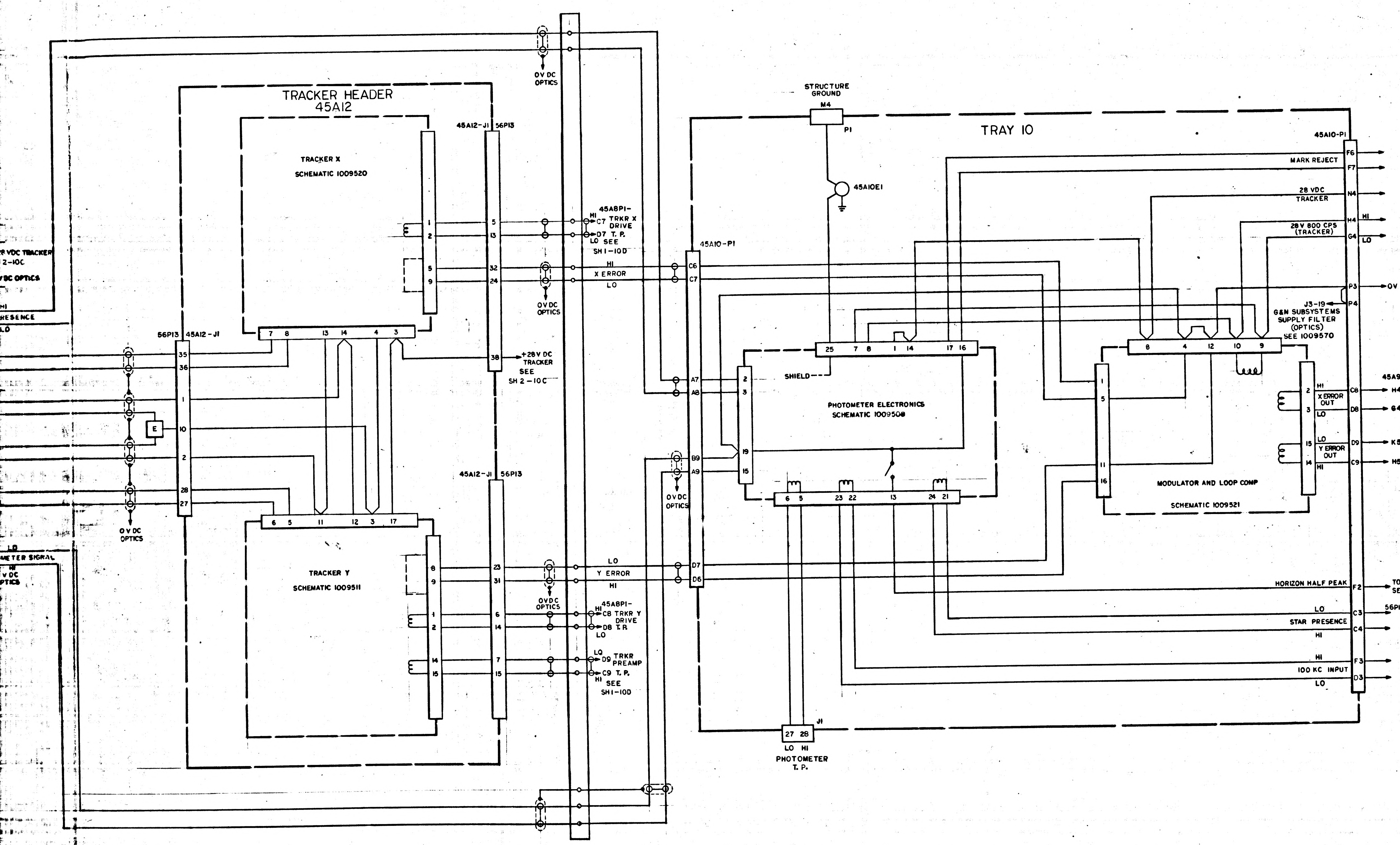
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TWO WIRE MECHANIZATION OPTICS BLOCK I-100 TRACKER AND PHOTOMETER

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1009512
SCALE | WT | SHEET 3 OF 3

MASTER

37



TRACKER HEADER
45A12
TRACKER X
SCHEMATIC 1009520
TRACKER Y
SCHEMATIC 1009511
45A12-J1
56P13
56P13
45A12-J1
O V DC OPTICS
HI
C7 TRKR X DRIVE
D7 T. P.
LO
SEE SH 1-10D
45A8P1-
X ERROR
HI
LO
+28 V DC TRACKER SEE SH 2-10C
Y ERROR
C8 TRKR Y DRIVE
D8 T.P.
D9 TRKR PREAMP
C9 T. P.
SEE SH1-10D
E
STRUCTURE GROUND
M4
P1
TRAY 10
45A10E1
45A10-P1
SHIELD
PHOTOMETER ELECTRONICS
SCHEMATIC 1009508
MODULATOR AND LOOP COMP
SCHEMATIC 1009521
MARK REJECT
28 VDC TRACKER
28 V 800 CPS (TRACKER)
TO TERMINAL BOARD SEE SH 2-10
OV DC OPTICS
J3-19
G&N SUBSYSTEMS SUPPLY FILTER (OPTICS) SEE 1009570
X ERROR OUT
Y ERROR OUT
45A9P1-
TO OPTICS TRAY 9 SEE SH 2-3A
HORIZON HALF PEAK
TO TERMINAL BOARD SEE SH 2-11A
56P10-
STAR PRESENCE
100 KC INPUT
TO COMPUTER
J1
LO HI
PHOTOMETER T. P.
R VDC TRACKER
2-10C
VDC OPTICS
HI
RESENCE
LO
LO
METER SIGNAL
HI
V DC
PTICS

MASTER

1009512

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN W. Horgan DATE
CHECKED
APPROVAL John
APPROVAL
NASA APPROVAL W.G. 12-14-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TWO WIRE MECHANIZATION
OPTICS BLOCK 1-100
TRACKER AND PHOTOMETER

CODE IDENT NO. SIZE J
NASA DRAWING 0095
SCALE

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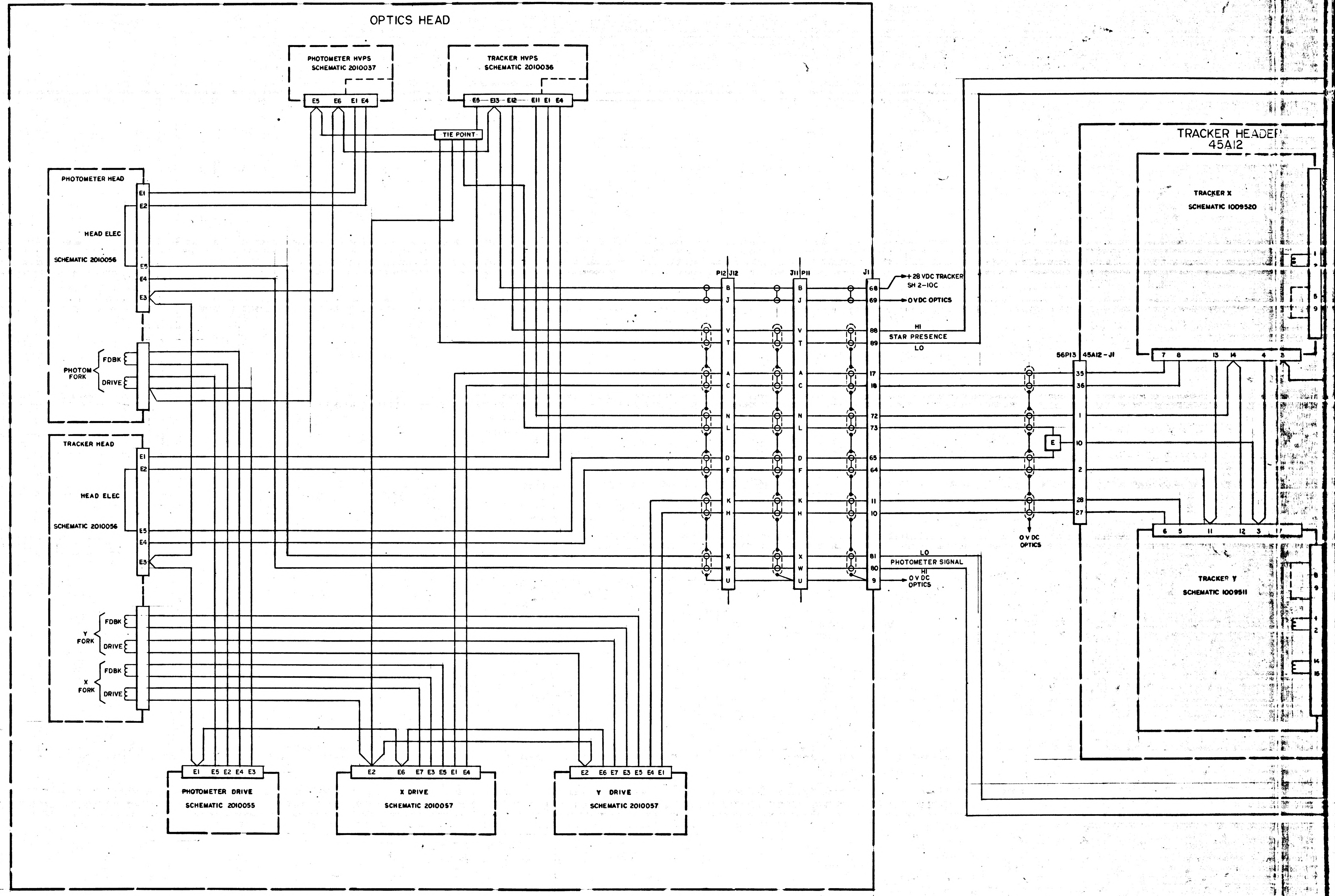
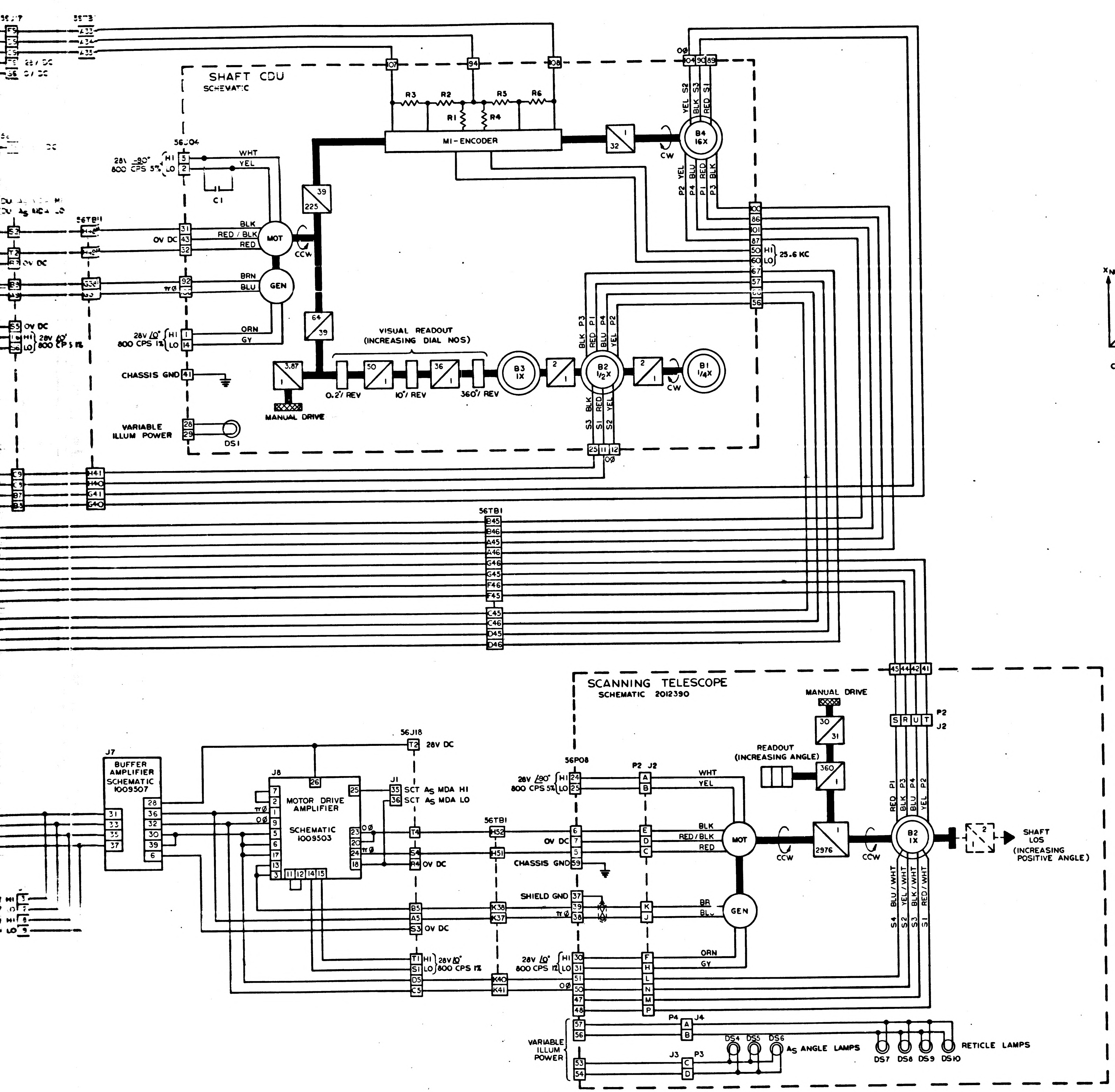

OPTICS HEAD
PHOTOMETER HVPS
SCHEMATIC 2010037
E5 E6 E1 E4
TRACKER HVPS
SCHEMATIC 2010036
E5 E13 E12 E11 E1 E4
TIE POINT
PHOTOMETER HEAD
HEAD ELEC
SCHEMATIC 2010056
E1 E2 E5 E4 E3
PHOTOM FORK
FDBK
DRIVE
TRACKER HEAD
HEAD ELEC
SCHEMATIC 2010056
E1 E2 E5 E4 E3
Y FORK
FDBK
DRIVE
X FORK
FDBK
DRIVE
P12 J12
J11 P11
J1
B J V T A C N L D F K H X W U
68 69 88 89 17 18 72 73 65 64 11 10 81 80 9
+28 VDC TRACKER
SH 2-10C
0 VDC OPTICS
HI
STAR PRESENCE
LO
LO
PHOTOMETER SIGNAL
HI
0 V DC
OPTICS
56P13
45A12-J1
35 36 1 10 2 28 27
E
0 V DC
OPTICS
TRACKER HEADER
45A12
TRACKER X
SCHEMATIC 1009520
7 8 13 14 4 3
1 2 5 9
TRACKER Y
SCHEMATIC 1009511
6 5 11 12 3 7
8 9 4 2 14 15
PHOTOMETER DRIVE
SCHEMATIC 2010055
E1 E5 E2 E4 E3
X DRIVE
SCHEMATIC 2010057
E2 E6 E7 E3 E5 E1 E4
Y DRIVE
SCHEMATIC 2010057
E2 E6 E7 E3 E5 E4 E1
8 7 6 5
D C B A

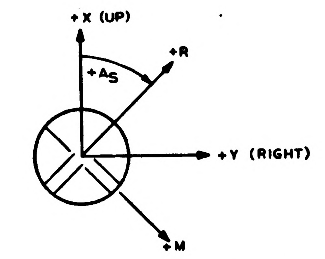
1009512

1009514

15904 REVISIONS

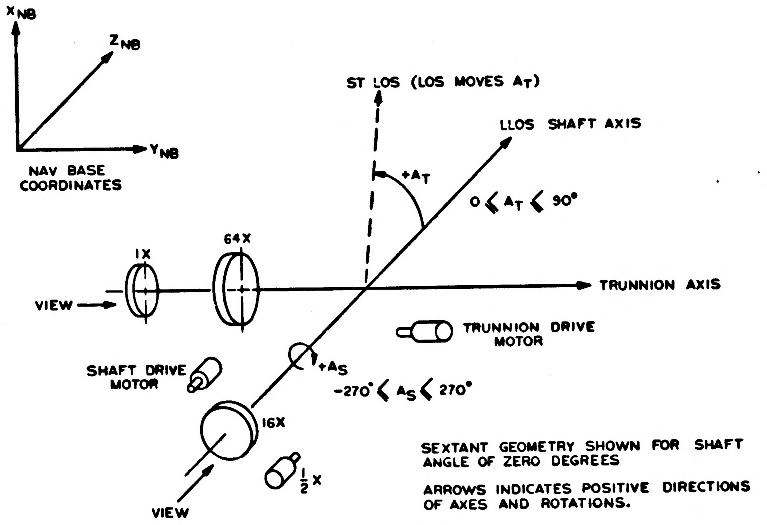
SYM	DESCRIPTION	DATE	APPROVAL


SHAFT CDU
SCHEMATIC
MI-ENCODER
R1
R2
R3
R4
R5
R6
107
94
108
56J04
28V -90° 800 CPS 5%
HI
LO
WHT
YEL
C1
56TB11
OV DC
BLK
RED / BLK
RED
MOT
CCW
BRN
BLU
GEN
28V 0° 800 CPS 1%
ORN
GY
CHASSIS GND
VARIABLE ILLUM POWER
DS1
39
225
64
39
3.87
1
MANUAL DRIVE
VISUAL READOUT (INCREASING DIAL NOS)
0.2°/ REV
50
10°/ REV
36
360°/ REV
B3 1X
2
1
B2 1/2X
B1 1/4X
CW
32
B4 16X
YEL S2
BLK S3
RED S1
P2 YEL
P4 BLU
P1 RED
P3 BLK
BLK P3
RED P1
BLU P4
YEL P2
S3 BLK
S1 RED
S2 YEL
0Ø
25.6 KC
56TB1
B45
B46
A45
A46
G46
G45
F46
F45
C45
C46
D45
D46
J7
BUFFER AMPLIFIER SCHEMATIC 1009507
J8
MOTOR DRIVE AMPLIFIER
SCHEMATIC 1009503
πØ
56J18
28V DC
J1
SCT A_S MDA HI
SCT A_S MDA LO
SCANNING TELESCOPE
SCHEMATIC 2012390
56P08
P2 J2
MANUAL DRIVE
READOUT (INCREASING ANGLE)
30
31
360
2976
B2 1X
SHAFT LOS (INCREASING POSITIVE ANGLE)
SHIELD GND
BR
BLU
RED P1
BLK P3
BLU P4
YEL P2
S4 BLU / WHT
S2 YEL / WHT
S3 BLK / WHT
S1 RED / WHT
P4 J4
J3 P3
DS4
DS5
DS6
A_S ANGLE LAMPS
DS7
DS8
DS9
DS10
RETICLE LAMPS


+X (UP)
+A_S
+R
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	SHAFT CDU READOUT	SEXTANT SHAFT ANGLE	DIRECT MODE APPARENT IMAGE MOTION
UP	INCREASE	INCREASE	- M
DOWN	DECREASE	DECREASE	+ M


X_NB
Z_NB
Y_NB
NAV BASE COORDINATES
ST LOS (LOS MOVES A_T)
LLOS SHAFT AXIS
+A_T
0 < A_T < 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
+A_S
-270° < A_S < 270°
16X
1/2 X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES

ARROWS INDICATES POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

SXT SHAFT FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION

1. MOTOR-TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 1/2 X RESOLVER ROTATES CCW WHEN LOOKING AT SHAFT END.
3. 16X RESOLVER ROTATES CW WHEN LOOKING IN DIRECTION OF ARROW.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
CONTRACT
DRAWN Wunderlich DATE 10-8-64
CHECKED R. W. Brozewski
APPROVAL 1-27-65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

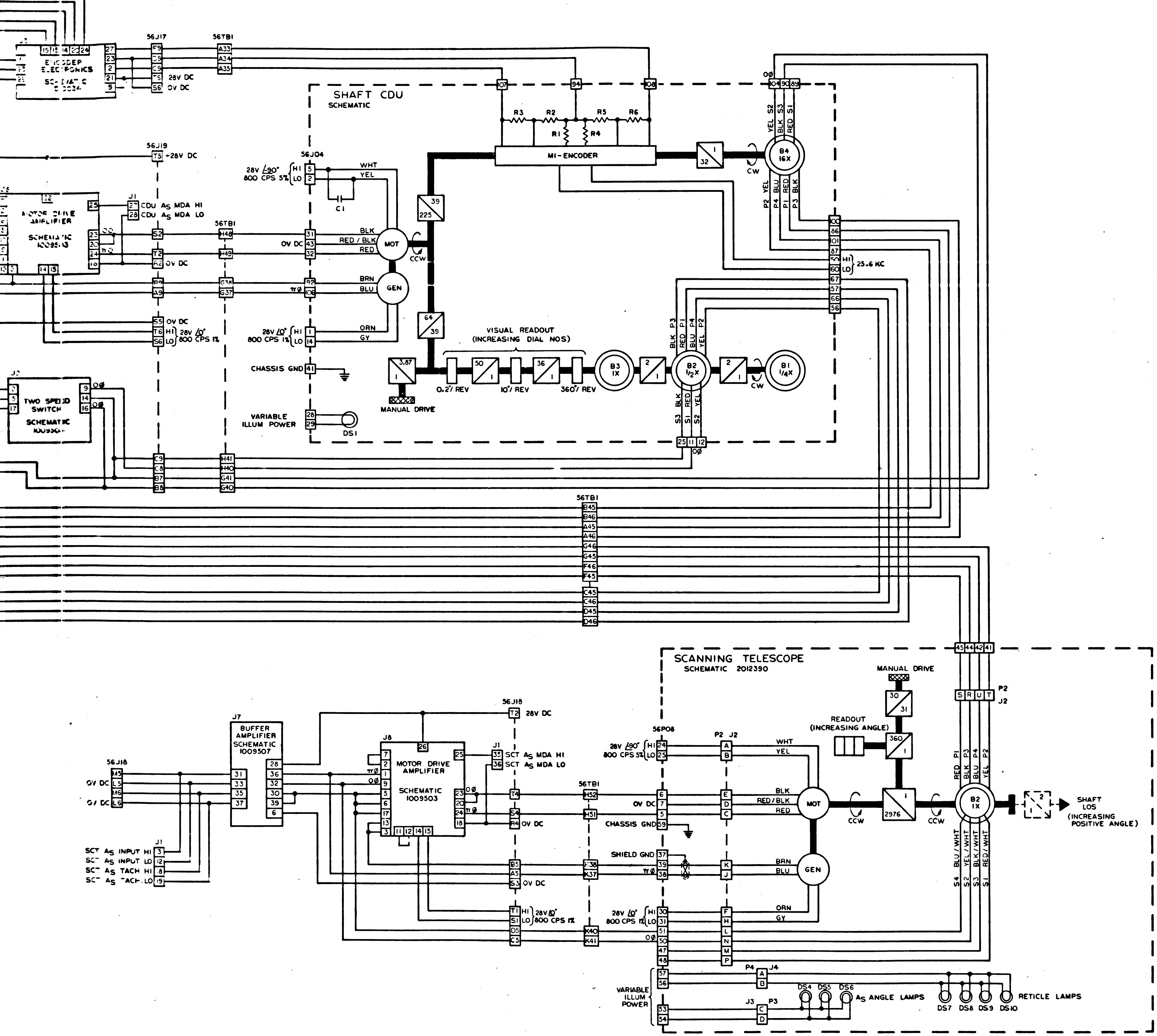
SHAFT MANUAL MODE
BLOCK I-100

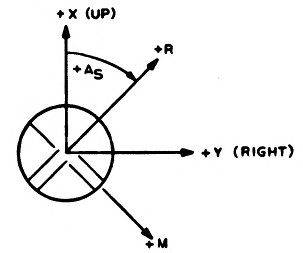
CODE IDENT NO. | SIZE | NASA DRAWING NO. 1009514
SCALE | WT | SHEET 1 OF 1

1009514

E3

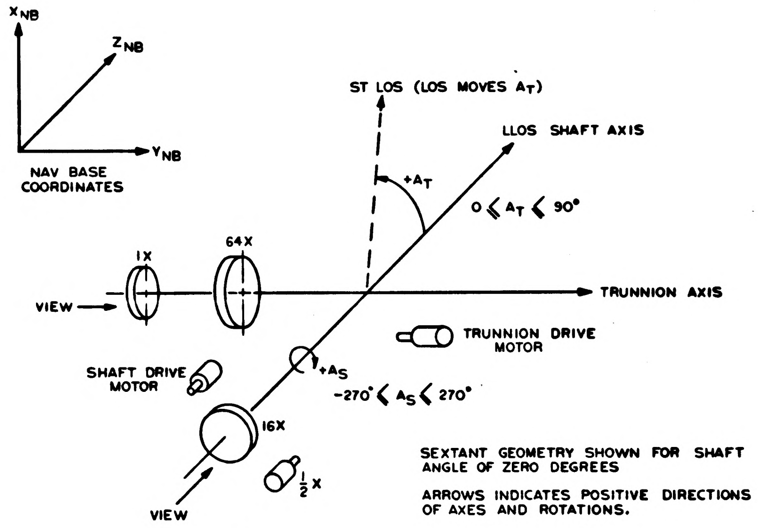
1009514


ENCODER ELECTRONICS SCHEMATIC
56J17
56TB1
28V DC
0V DC
SHAFT CDU
SCHEMATIC
56J19
+28V DC
56J04
28V ∠90° 800 CPS 5%
HI
LO
WHT
YEL
C1
MOTOR DRIVE AMPLIFIER SCHEMATIC
J1
CDU A_S MDA HI
CDU A_S MDA LO
BLK
RED / BLK
RED
MOT
CCW
BRN
BLU
GEN
πØ
0Ø
28V ∠0° 800 CPS 1%
ORN
GY
CHASSIS GND
VARIABLE ILLUM POWER
DS1
TWO SPEED SWITCH SCHEMATIC
R3
R2
R1
R4
R5
R6
MI-ENCODER
YEL S2
BLK S3
RED S1
B4 16X
CW
YEL P2
BLU P4
RED P1
BLK P3
25.6 KC
VISUAL READOUT (INCREASING DIAL NOS)
MANUAL DRIVE
0.2°/ REV
10°/ REV
360°/ REV
B3 1X
B2 1/2X
B1 1/4X
SCANNING TELESCOPE
SCHEMATIC 2012390
J7
BUFFER AMPLIFIER SCHEMATIC 1009507
J8
MOTOR DRIVE AMPLIFIER
SCHEMATIC 1009503
56J18
28V DC
SCT A_S MDA HI
SCT A_S MDA LO
SCT A_S INPUT HI
SCT A_S INPUT LO
SCT A_S TACH HI
SCT A_S TACH LO
56P08
P2 J2
SHIELD GND
MANUAL DRIVE
READOUT (INCREASING ANGLE)
B2 1X
P2
J2
SHAFT LOS (INCREASING POSITIVE ANGLE)
RED P1
BLK P3
BLU P4
YEL P2
S4 BLU/WHT
S2 YEL/WHT
S3 BLK/WHT
S1 RED/WHT
P4 J4
J3 P3
DS4 DS5 DS6
A_S ANGLE LAMPS
DS7 DS8 DS9 DS10
RETICLE LAMPS


+X (UP)
+R
$+A_S$
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	SHAFT CDU READOUT	SEXTANT SHAFT ANGLE	DIRECT MODE APPARENT IMAGE MOTION
UP	INCREASE	INCREASE	- M
DOWN	DECREASE	DECREASE	+ M


X_{NB}
Z_{NB}
Y_{NB}
NAV BASE COORDINATES
ST LOS (LOS MOVES A_T)
LLOS SHAFT AXIS
$+A_T$
$0 \leqslant A_T \leqslant 90°$
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
$+A_S$
$-270° \leqslant A_S \leqslant 270°$
16X
$\frac{1}{2}$X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES

ARROWS INDICATES POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

SXT SHAFT FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION

1. MOTOR—TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 1/2 X RESOLVER ROTATES CCW WHEN LOOKING AT SHAFT END.
3. 16X RESOLVER ROTATES CW WHEN LOOKING IN DIRECTION OF ARROW.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
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MATERIAL ___
HEAT TREATMENT ___
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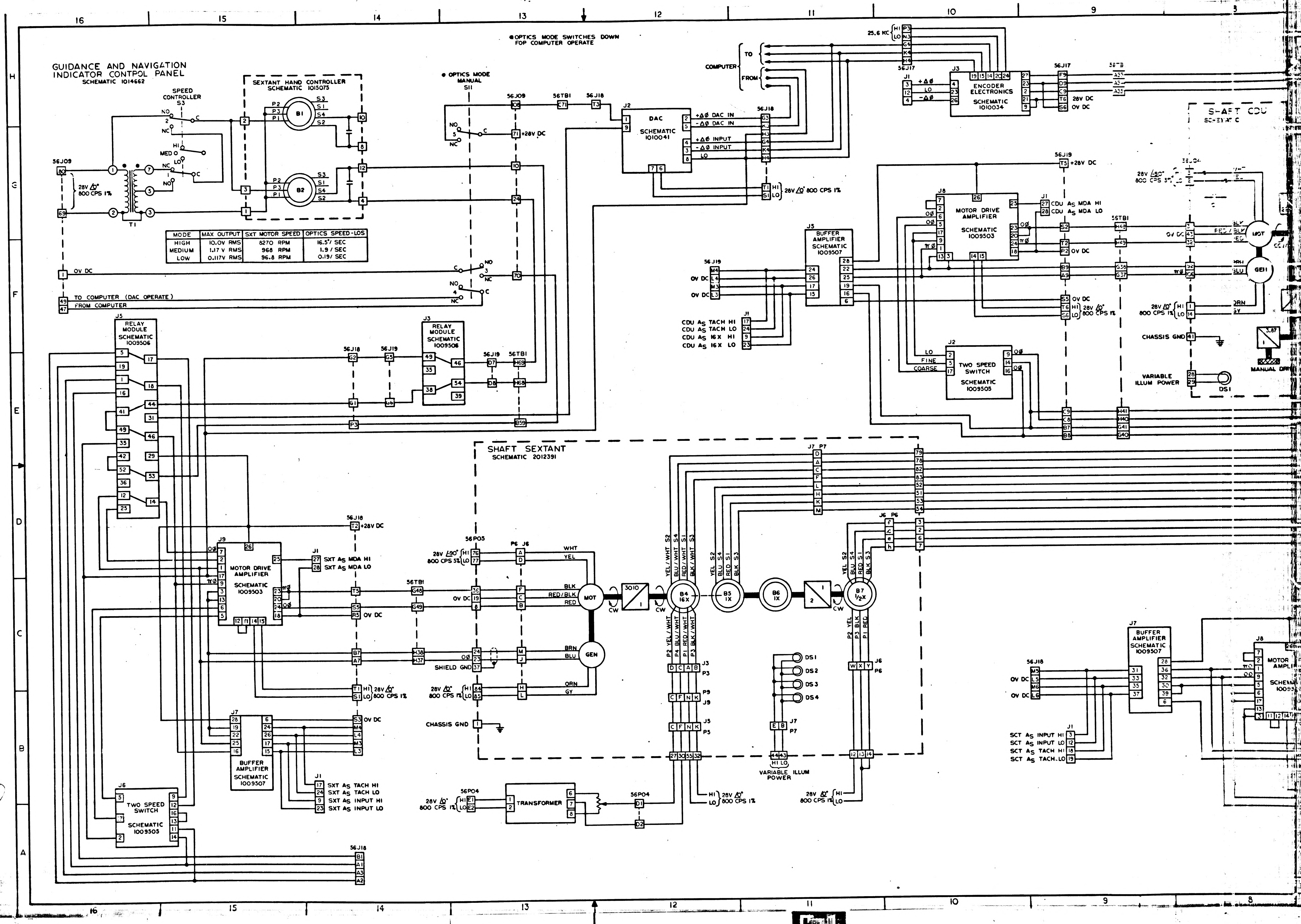
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN Wunderlich DATE 10-8-64
CHECKED
APPROVAL 1-27-65
APPROVAL
NASA APPROVAL
MIT APPROVAL

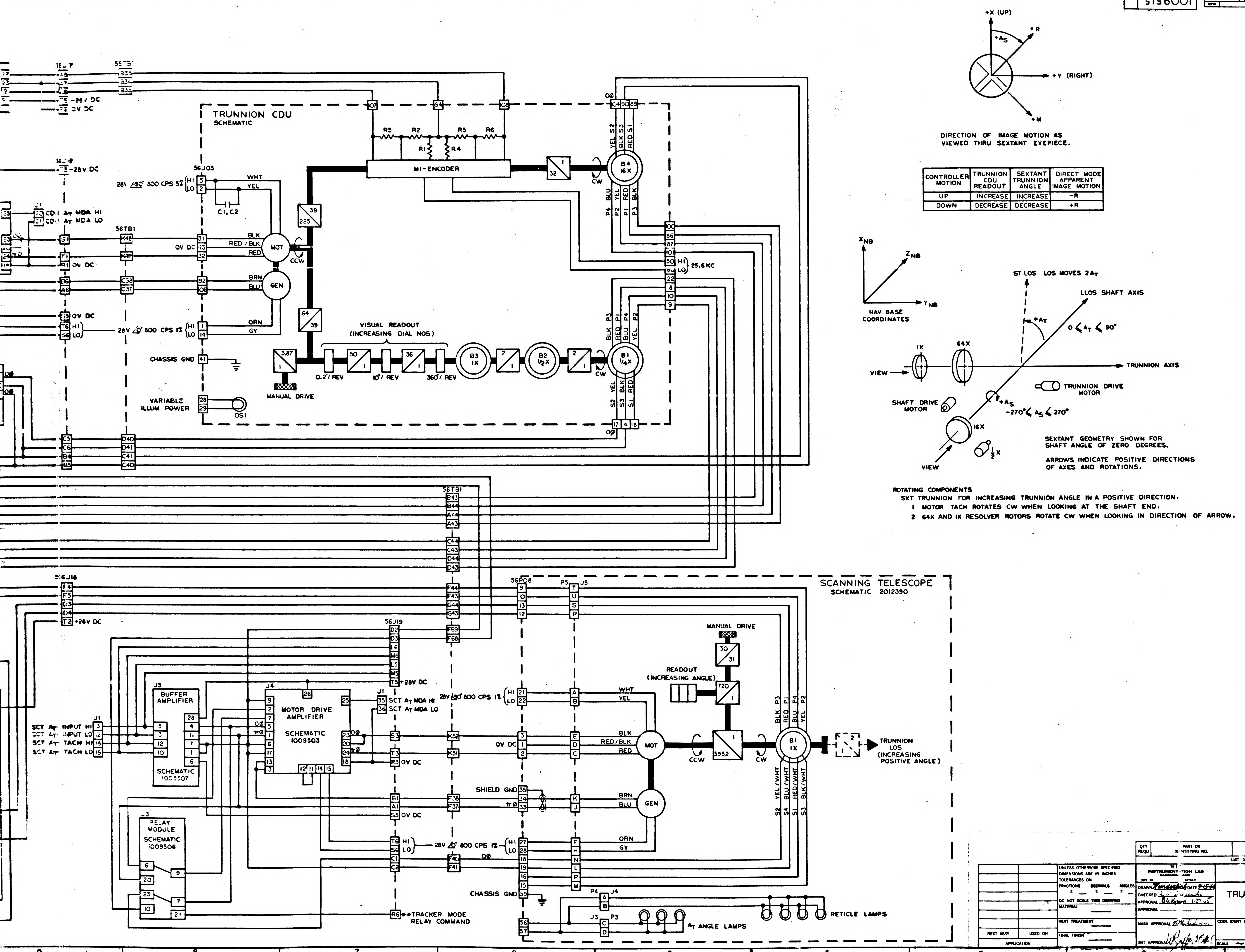
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SHAFT MANUAL MODE
BLOCK I-100

CODE IDENT NO. SIZE NASA DRAWING NO. 10095
SCALE WT SHEET 1 OF 1


GUIDANCE AND NAVIGATION INDICATOR CONTROL PANEL
SCHEMATIC 1014662
●OPTICS MODE SWITCHES DOWN FOR COMPUTER OPERATE
SPEED CONTROLLER S3
SEXTANT HAND CONTROLLER SCHEMATIC 1015075
● OPTICS MODE MANUAL S11
DAC SCHEMATIC 1010041
COMPUTER TO FROM
25.6 KC
ENCODER ELECTRONICS SCHEMATIC 1010034
SHAFT CDU SCHEMATIC
MOTOR DRIVE AMPLIFIER SCHEMATIC 1009503
BUFFER AMPLIFIER SCHEMATIC 1009507
TWO SPEED SWITCH SCHEMATIC 1009505
RELAY MODULE SCHEMATIC 1009506
28V /0° 800 CPS 1%
TO COMPUTER (DAC OPERATE)
FROM COMPUTER
CDU AS TACH HI
CDU AS TACH LO
CDU AS 16X HI
CDU AS 16X LO
CDU AS MDA HI
CDU AS MDA LO
CHASSIS GND
VARIABLE ILLUM POWER
MANUAL DRIVE
SHAFT SEXTANT SCHEMATIC 2012391
SXT AS MDA HI
SXT AS MDA LO
SXT AS TACH HI
SXT AS TACH LO
SXT AS INPUT HI
SXT AS INPUT LO
SCT AS INPUT HI
SCT AS INPUT LO
SCT AS TACH HI
SCT AS TACH LO
28V /-90° 800 CPS 5%
SHIELD GND
MOT
GEN
B4 16X
B5 1X
B6 1X
B7 1/2X
TRANSFORMER
DS1 DS2 DS3 DS4
VARIABLE ILLUM POWER
16 15 14 13 12 11 10 9 8
H G F E D C B A

MODE	MAX OUTPUT	SXT MOTOR SPEED	OPTICS SPEED-LOS
HIGH	10.0V RMS	8270 RPM	16.5°/ SEC
MEDIUM	1.17 V RMS	968 RPM	1.9 / SEC
LOW	0.117V RMS	96.8 RPM	0.19/ SEC


TRUNNION CDU
SCHEMATIC
MI-ENCODER
R5 R2 R5 R6 R1 R4
B4 16X
B1 1/4X
B3 1X
B2 1/2X
VISUAL READOUT (INCREASING DIAL NOS)
0.2°/ REV
10°/ REV
360°/ REV
MANUAL DRIVE
MOT
GEN
CW
CCW
28V /-90° 800 CPS 5%
28V /0° 800 CPS 1%
25.6 KC
CHASSIS GND
VARIABLE ILLUM POWER
DS1
C1, C2
56J05
56TB1
56J18
56J19
56P08
OV DC
+28V DC
SCANNING TELESCOPE
SCHEMATIC 2012390
MANUAL DRIVE
READOUT (INCREASING ANGLE)
B1 1X
TRUNNION LOS (INCREASING POSITIVE ANGLE)
SHIELD GND
CHASSIS GND
RETICLE LAMPS
AT ANGLE LAMPS
BUFFER AMPLIFIER
SCHEMATIC 1009507
MOTOR DRIVE AMPLIFIER
SCHEMATIC 1009503
RELAY MODULE
SCHEMATIC 1009506
SCT AT INPUT HI
SCT AT INPUT LO
SCT AT TACH HI
SCT AT TACH LO
SCT AT MDA HI
SCT AT MDA LO
TRACKER MODE RELAY COMMAND
+X (UP)
+R
+AS
+Y (RIGHT)
+M
XNB
ZNB
YNB
NAV BASE COORDINATES
ST LOS LOS MOVES 2AT
LLOS SHAFT AXIS
+AT
0 < AT < 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
+AS
-270° < AS < 270°
16X
1/2X
VIEW

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	TRUNNION CDU READOUT	SEXTANT TRUNNION ANGLE	DIRECT MODE APPARENT IMAGE MOTION
UP	INCREASE	INCREASE	-R
DOWN	DECREASE	DECREASE	+R

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

SXT TRUNNION FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION.

1 MOTOR TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.

2 64X AND 1X RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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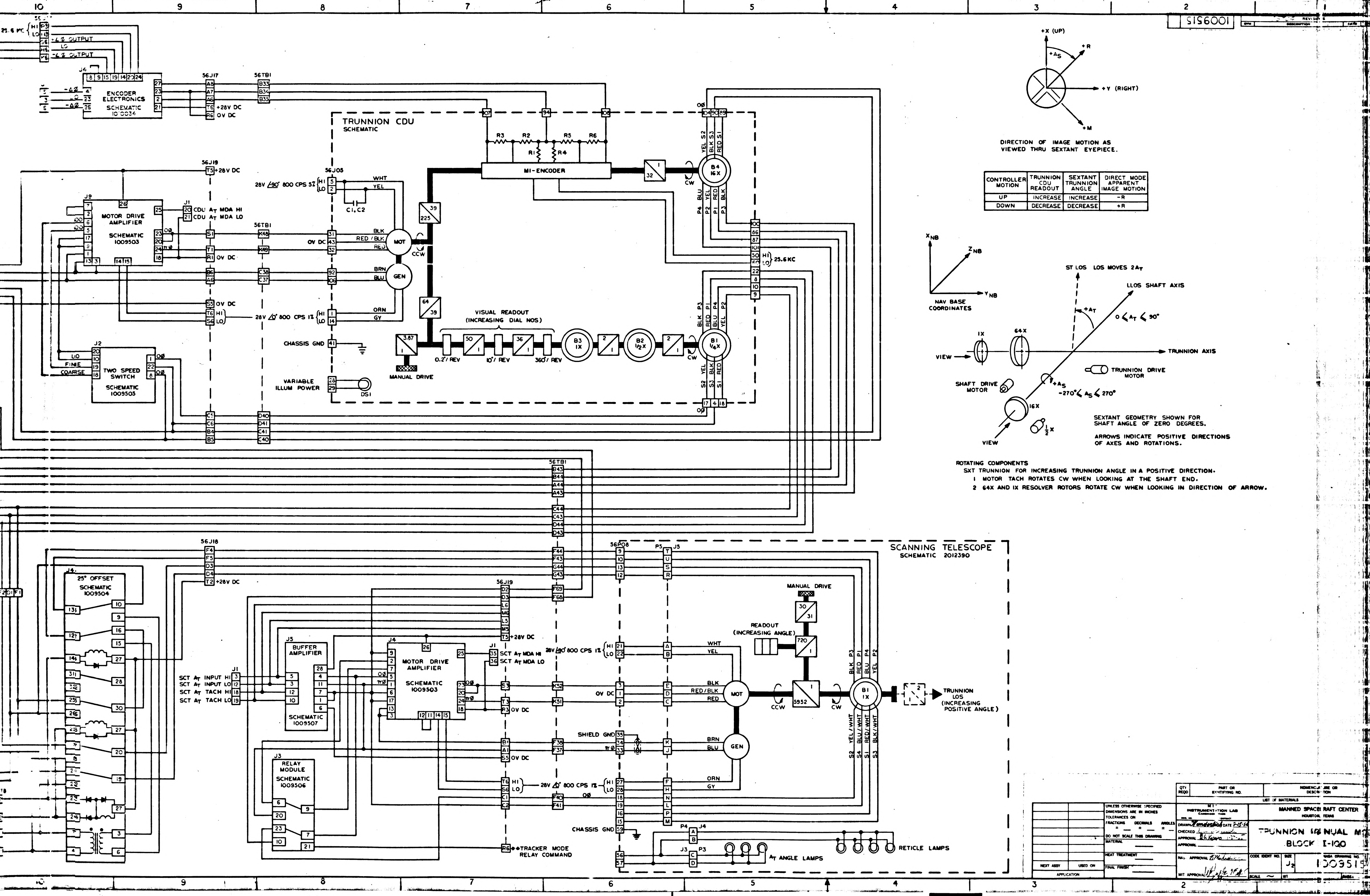
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN Wunderlich DATE 9-15-64
CHECKED
APPROVAL 1-27-65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

TRUNNION MANUAL MODE
BLOCK I-100

CODE IDENT NO. | SIZE J2 | NASA DRAWING NO. 1009515
SCALE ~ | WT | SHEET 1 OF 1


ENCODER ELECTRONICS SCHEMATIC 1010034
-Δ2 OUTPUT
25.6 KC
56J17
56TB1
+28V DC
0V DC
TRUNNION CDU SCHEMATIC
MI-ENCODER
R1 R2 R3 R4 R5 R6
B4 16X
B3 1X
B2 1/2X
B1 1/4X
MOT
GEN
CW
CCW
VISUAL READOUT (INCREASING DIAL NOS)
0.2°/REV
10°/REV
360°/REV
MANUAL DRIVE
C1, C2
28V /90° 800 CPS 5%
28V /0° 800 CPS 1%
CHASSIS GND
VARIABLE ILLUM POWER
DS1
MOTOR DRIVE AMPLIFIER SCHEMATIC 1009503
CDU AT MDA HI
CDU AT MDA LO
TWO SPEED SWITCH SCHEMATIC 1009505
LIO
FINE
COARSE
25° OFFSET SCHEMATIC 1009504
BUFFER AMPLIFIER SCHEMATIC 1009507
RELAY MODULE SCHEMATIC 1009506
SCT AT INPUT HI
SCT AT INPUT LO
SCT AT TACH HI
SCT AT TACH LO
SCT AT MDA HI
SCT AT MDA LO
SHIELD GND
TRACKER MODE RELAY COMMAND
SCANNING TELESCOPE SCHEMATIC 2012390
READOUT (INCREASING ANGLE)
TRUNNION LOS (INCREASING POSITIVE ANGLE)
AT ANGLE LAMPS
RETICLE LAMPS
+X (UP)
+R
+AS
+Y (RIGHT)
+M
XNB
ZNB
YNB
NAV BASE COORDINATES
ST LOS LOS MOVES 2AT
LLOS SHAFT AXIS
+AT
0 < AT < 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
+AS
-270° < AS < 270°
16X
1/2 X

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	TRUNNION CDU READOUT	SEXTANT TRUNNION ANGLE	DIRECT MODE APPARENT IMAGE MOTION
UP	INCREASE	INCREASE	-R
DOWN	DECREASE	DECREASE	+R

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS
SXT TRUNNION FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION.
1 MOTOR TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2 64X AND 1X RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

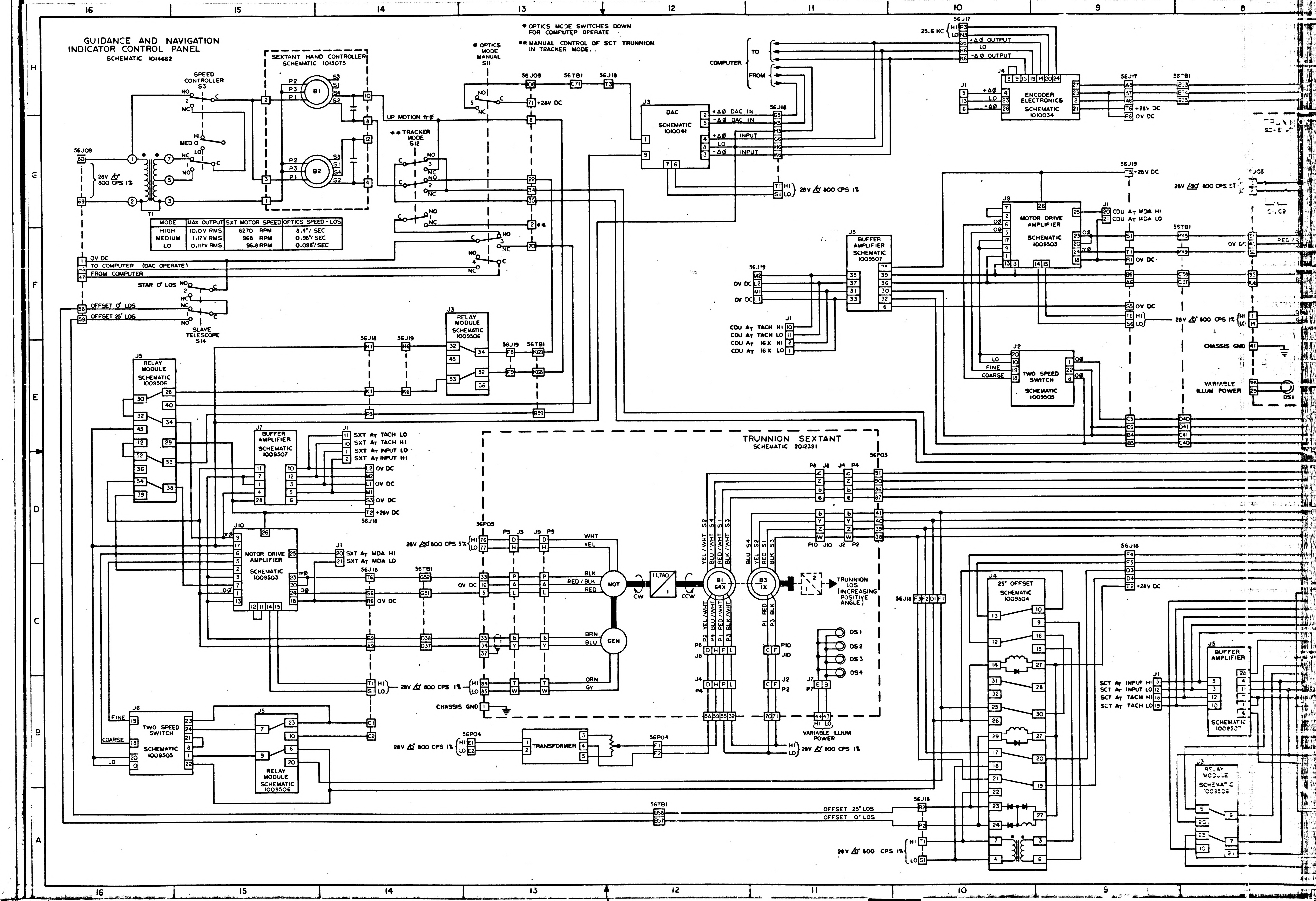
MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN Wunderlich DATE 2-15-64
CHECKED
APPROVAL DhKosmo
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRUNNION MANUAL M
BLOCK I-100

CODE IDENT NO.
SIZE J2
NASA DRAWING NO. 1009515
SCALE ~
WT



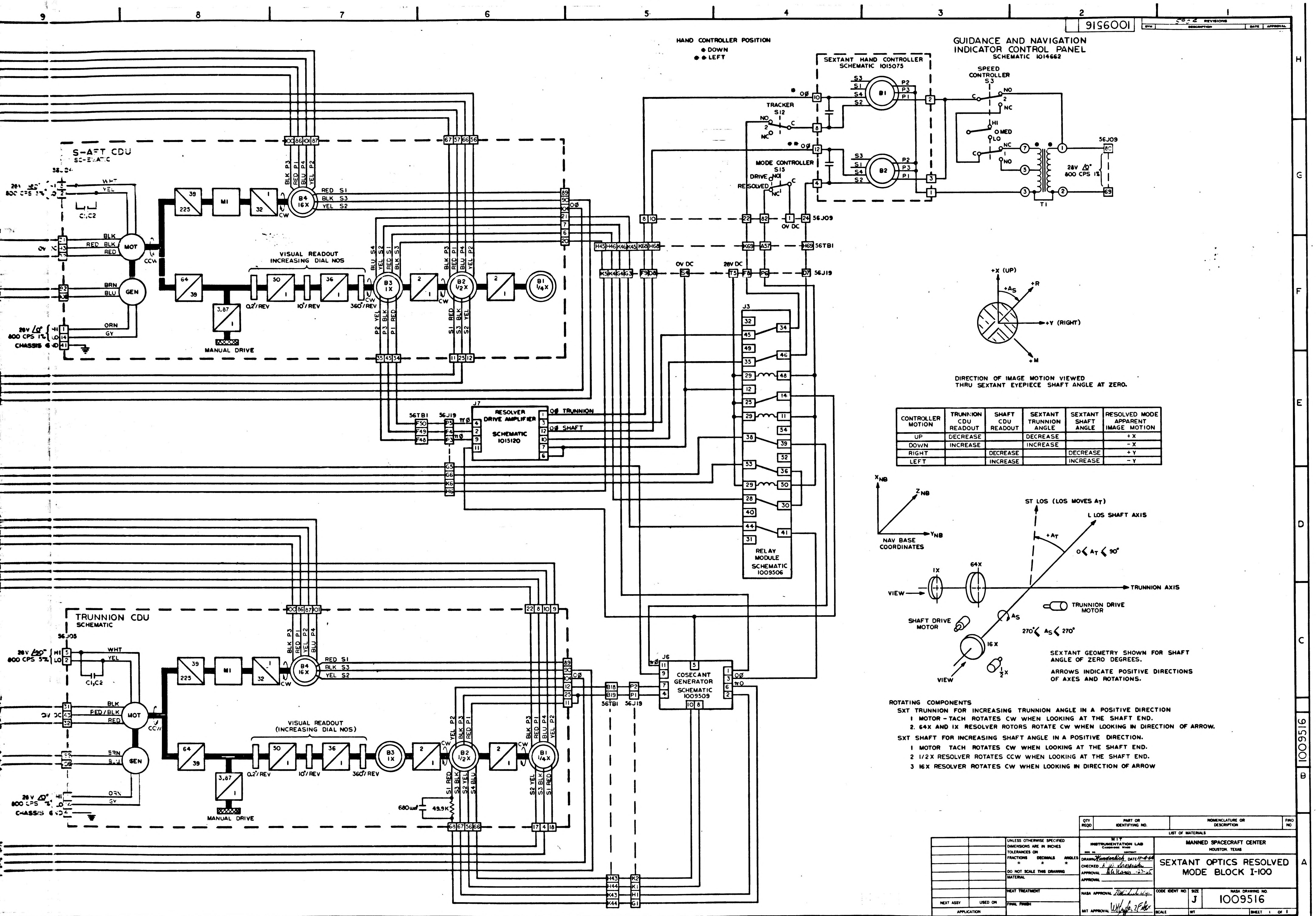
GUIDANCE AND NAVIGATION INDICATOR CONTROL PANEL

SCHEMATIC 1014662

- ✱ OPTICS MODE SWITCHES DOWN FOR COMPUTER OPERATE
- ✱✱ MANUAL CONTROL OF SCT TRUNNION IN TRACKER MODE.

MODE	MAX OUTPUT	SXT MOTOR SPEED	OPTICS SPEED - LOS
HIGH	10.0V RMS	8270 RPM	8.4°/SEC
MEDIUM	1.17V RMS	968 RPM	0.98°/SEC
LO	0.117V RMS	96.8 RPM	0.098°/SEC

16
15
14
13
12
11
10
9
8
H
G
F
E
D
C
B
A
SPEED CONTROLLER S3
SEXTANT HAND CONTROLLER SCHEMATIC 1015075
B1
B2
T1
28V ∠0° 800 CPS 1%
HI
MED
LO
UP MOTION
✱✱ TRACKER MODE S12
✱ OPTICS MODE MANUAL S11
+28V DC
DAC SCHEMATIC 1010041
+Δ0 DAC IN
-Δ0 DAC IN
INPUT
COMPUTER
TO
FROM
25.6 KC
+Δ0 OUTPUT
-Δ0 OUTPUT
ENCODER ELECTRONICS SCHEMATIC 1010034
MOTOR DRIVE AMPLIFIER SCHEMATIC 1009503
CDU AT MDA HI
CDU AT MDA LO
BUFFER AMPLIFIER SCHEMATIC 1009507
CDU AT TACH HI
CDU AT TACH LO
CDU AT 16X HI
CDU AT 16X LO
TWO SPEED SWITCH SCHEMATIC 1009505
FINE
COARSE
CHASSIS GND
VARIABLE ILLUM POWER
DS1
OV DC
TO COMPUTER (DAC OPERATE)
FROM COMPUTER
STAR 0° LOS
OFFSET 0° LOS
OFFSET 25° LOS
SLAVE TELESCOPE S14
RELAY MODULE SCHEMATIC 1009506
SXT AT TACH LO
SXT AT TACH HI
SXT AT INPUT LO
SXT AT INPUT HI
SXT AT MDA HI
SXT AT MDA LO
TRUNNION SEXTANT SCHEMATIC 2012391
MOT
GEN
11,780 : 1
CW
CCW
B1 64X
B3 1X
TRUNNION LOS (INCREASING POSITIVE ANGLE)
DS1
DS2
DS3
DS4
VARIABLE ILLUM POWER
TRANSFORMER
WHT
YEL
BLK
RED/BLK
RED
BRN
BLU
ORN
GY
28V ∠90° 800 CPS 5%
28V ∠0° 800 CPS 1%
25° OFFSET SCHEMATIC 1009504
SCT AT INPUT HI
SCT AT INPUT LO
SCT AT TACH HI
SCT AT TACH LO
56J09
56J17
56J18
56J19
56TB1
56P05
56P04


1009516
REVISIONS
HAND CONTROLLER POSITION
● DOWN
●● LEFT
GUIDANCE AND NAVIGATION INDICATOR CONTROL PANEL
SCHEMATIC 1014662
SPEED CONTROLLER S3
HI
MED
LO
NO
NC
28V /0° 800 CPS 1%
56J09
T1
SEXTANT HAND CONTROLLER SCHEMATIC 1015075
B1
B2
S3 S1 S4 S2
P2 P3 P1
TRACKER S12
MODE CONTROLLER S15
DRIVE
RESOLVED
0V DC
28V DC
56J09
56TB1
56J19
S-AFT CDU SCHEMATIC
56J04
WHT
YEL
C1,C2
BLK
RED BLK
RED
MOT
GEN
BRN
BLU
ORN
GY
28V /0° 800 CPS 1%
CHASSIS GND
0V DC
39
225
M1
32
B4 16X
RED S1
BLK S3
YEL S2
CW
CCW
VISUAL READOUT INCREASING DIAL NOS
64
39
50
36
0.2°/REV
10°/REV
360°/REV
3.87
MANUAL DRIVE
B3 1X
B2 1/2X
B1 1/4X
J7
RESOLVER DRIVE AMPLIFIER SCHEMATIC 1015120
0Ø TRUNNION
0Ø SHAFT
J3
RELAY MODULE SCHEMATIC 1009506
TRUNNION CDU SCHEMATIC
56J05
28V /90° 800 CPS 5%
(INCREASING DIAL NOS)
680µµf
49.9K
J6
COSECANT GENERATOR SCHEMATIC 1009509
+X (UP)
+R
+AS
+Y (RIGHT)
+M
XNB
ZNB
YNB
NAV BASE COORDINATES
ST LOS (LOS MOVES AT)
L LOS SHAFT AXIS
+AT
0 < AT < 90°
IX
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
AS
270° < AS < 270°
16X
1/2X

DIRECTION OF IMAGE MOTION VIEWED THRU SEXTANT EYEPIECE SHAFT ANGLE AT ZERO.

CONTROLLER MOTION	TRUNNION CDU READOUT	SHAFT CDU READOUT	SEXTANT TRUNNION ANGLE	SEXTANT SHAFT ANGLE	RESOLVED MODE APPARENT IMAGE MOTION
UP	DECREASE		DECREASE		+ X
DOWN	INCREASE		INCREASE		- X
RIGHT		DECREASE		DECREASE	+ Y
LEFT		INCREASE		INCREASE	- Y

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

SXT TRUNNION FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION

1 MOTOR - TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.

2. 64X AND IX RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

SXT SHAFT FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION.

1 MOTOR TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.

2 1/2X RESOLVER ROTATES CCW WHEN LOOKING AT THE SHAFT END.

3 16X RESOLVER ROTATES CW WHEN LOOKING IN DIRECTION OF ARROW

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

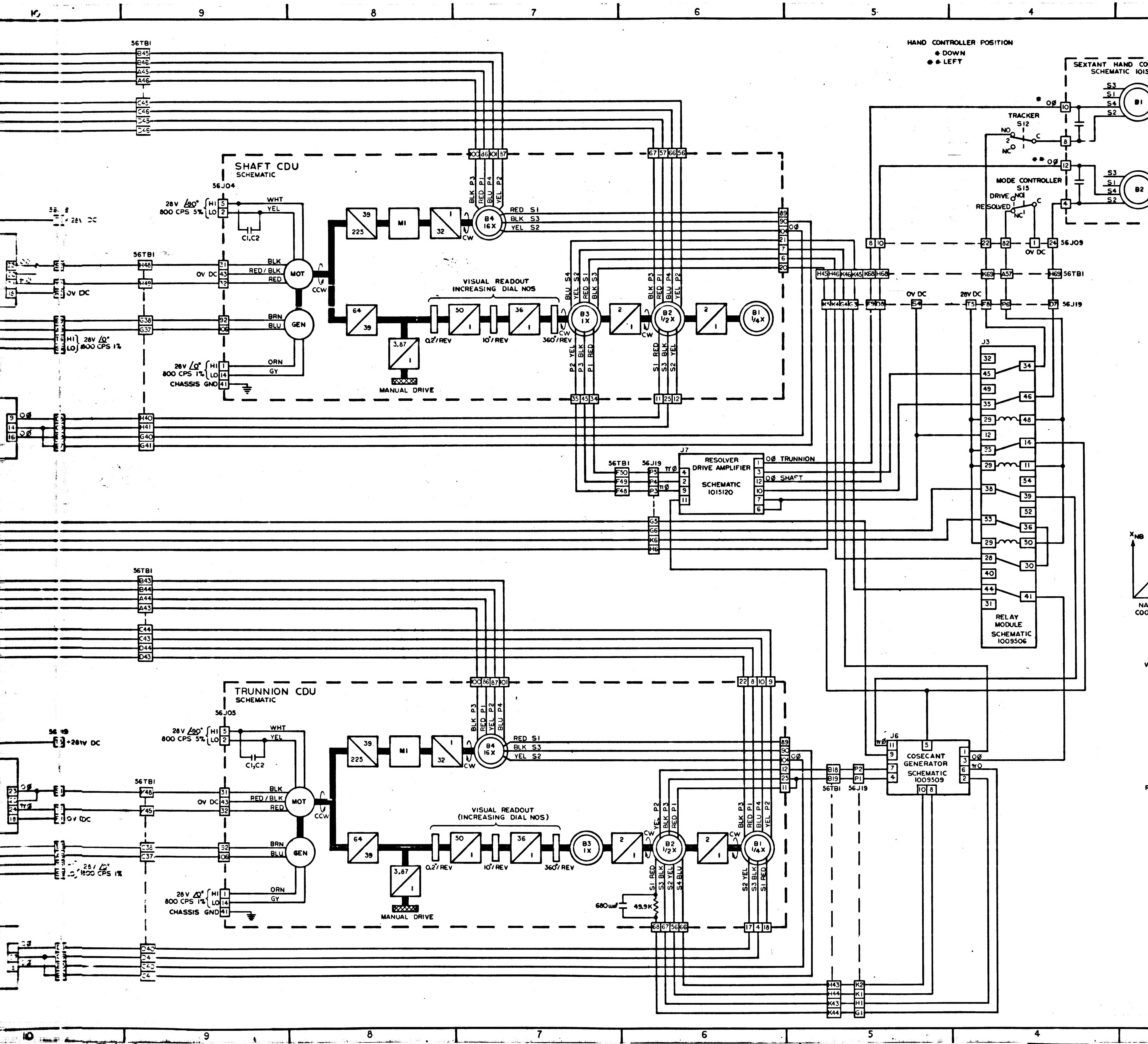
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN Wunderlich DATE 11-4-64
CHECKED R. W. Arozewski
APPROVAL DA Koso 1-27-65
APPROVAL
NASA APPROVAL [illegible] 2/4/
MIT APPROVAL W. Kupfer 2 Feb

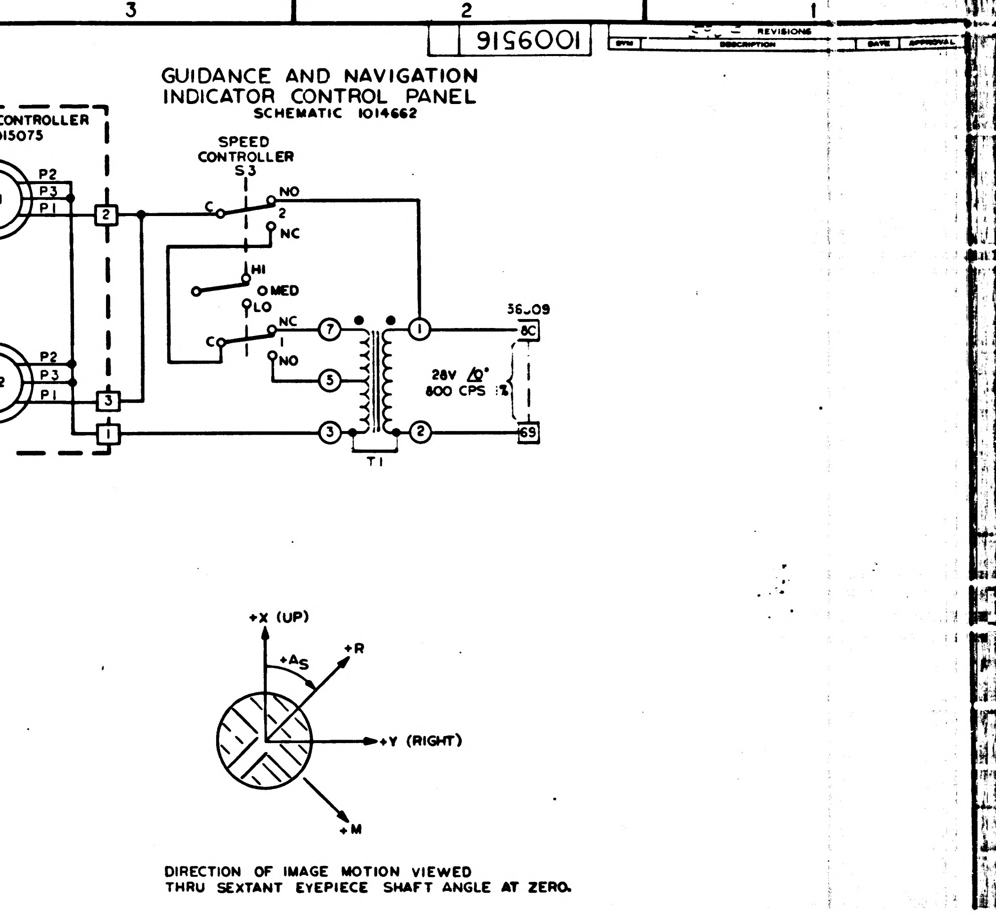
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEXTANT OPTICS RESOLVED
MODE BLOCK I-100

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1009516
SCALE | WT | SHEET 1 OF 1



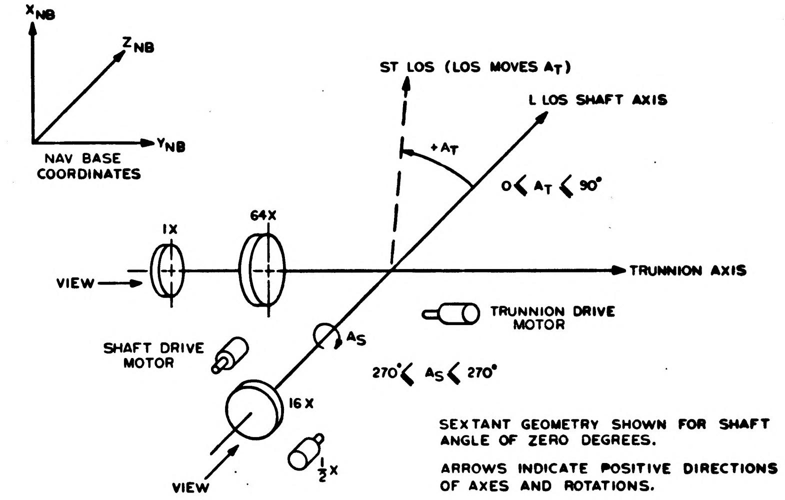
1009516
SHAFT CDU
SCHEMATIC
56J04
28V /90° 800 CPS 5%
HI
LO
WHT
YEL
C1,C2
BLK
RED/BLK
RED
MOT
0V DC
BRN
BLU
GEN
28V /0° 800 CPS 1%
ORN
GY
CHASSIS GND
39
225
M1
32
B4 16X
RED S1
BLK S3
YEL S2
CW
CCW
64
39
3.87
MANUAL DRIVE
VISUAL READOUT
INCREASING DIAL NOS
50
36
0.2°/REV
10°/REV
360°/REV
B3 1X
B2 1/2X
B1 1/4X
56TB1
RESOLVER DRIVE AMPLIFIER
SCHEMATIC 1015120
J7
0Ø TRUNNION
0Ø SHAFT
56J19
TRUNNION CDU
SCHEMATIC
56J05
680 µf
49.9K
COSECANT GENERATOR
SCHEMATIC 1009509
J6
RELAY MODULE
SCHEMATIC 1009506
J3
0V DC
28V DC
56J09
HAND CONTROLLER POSITION
● DOWN
●● LEFT



GUIDANCE AND NAVIGATION
INDICATOR CONTROL PANEL
SCHEMATIC 1014662
SEXTANT HAND CONTROLLER
SCHEMATIC 1015073
SPEED CONTROLLER
S3
NO
NC
HI
MED
LO
TRACKER
S12
MODE CONTROLLER
S13
DRIVE
RESOLVED
B1
B2
T1
28V /0° 800 CPS 1%
56J09
+X (UP)
+R
+A_S
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION VIEWED
THRU SEXTANT EYEPIECE SHAFT ANGLE AT ZERO.

CONTROLLER MOTION	TRUNNION CDU READOUT	SHAFT CDU READOUT	SEXTANT TRUNNION ANGLE	SEXTANT SHAFT ANGLE	RESOLVED MODE APPARENT IMAGE MOTION
UP	DECREASE		DECREASE		+ X
DOWN	INCREASE		INCREASE		- X
RIGHT		DECREASE		DECREASE	+ Y
LEFT		INCREASE		INCREASE	- Y



X_NB
Z_NB
Y_NB
NAV BASE COORDINATES
ST LOS (LOS MOVES A_T)
L LOS SHAFT AXIS
+A_T
0 < A_T < 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
A_S
270° < A_S < 270°
16X
1/2X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

SXT TRUNNION FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION
1 MOTOR - TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 64X AND 1X RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

SXT SHAFT FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION.
1 MOTOR TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2 1/2X RESOLVER ROTATES CCW WHEN LOOKING AT THE SHAFT END.
3 16X RESOLVER ROTATES CW WHEN LOOKING IN DIRECTION OF ARROW

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

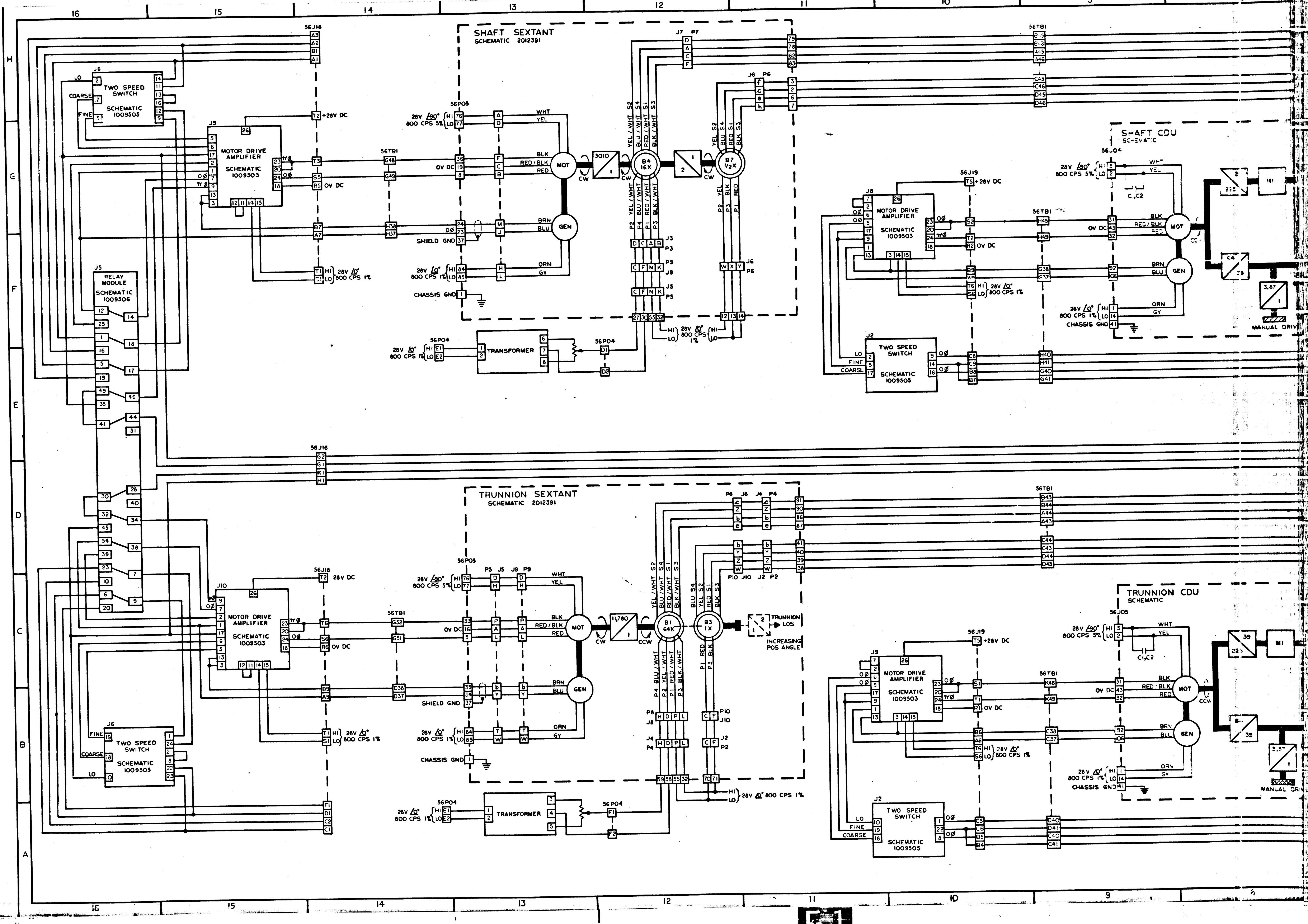
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN Wunderlich DATE 11-4-64
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEXTANT OPTICS RESOLVED
MODE BLOCK I-100

CODE IDENT NO.
SIZE J
NAS. DRAWING NO. 1009516
SCALE
WT
SHEET 1



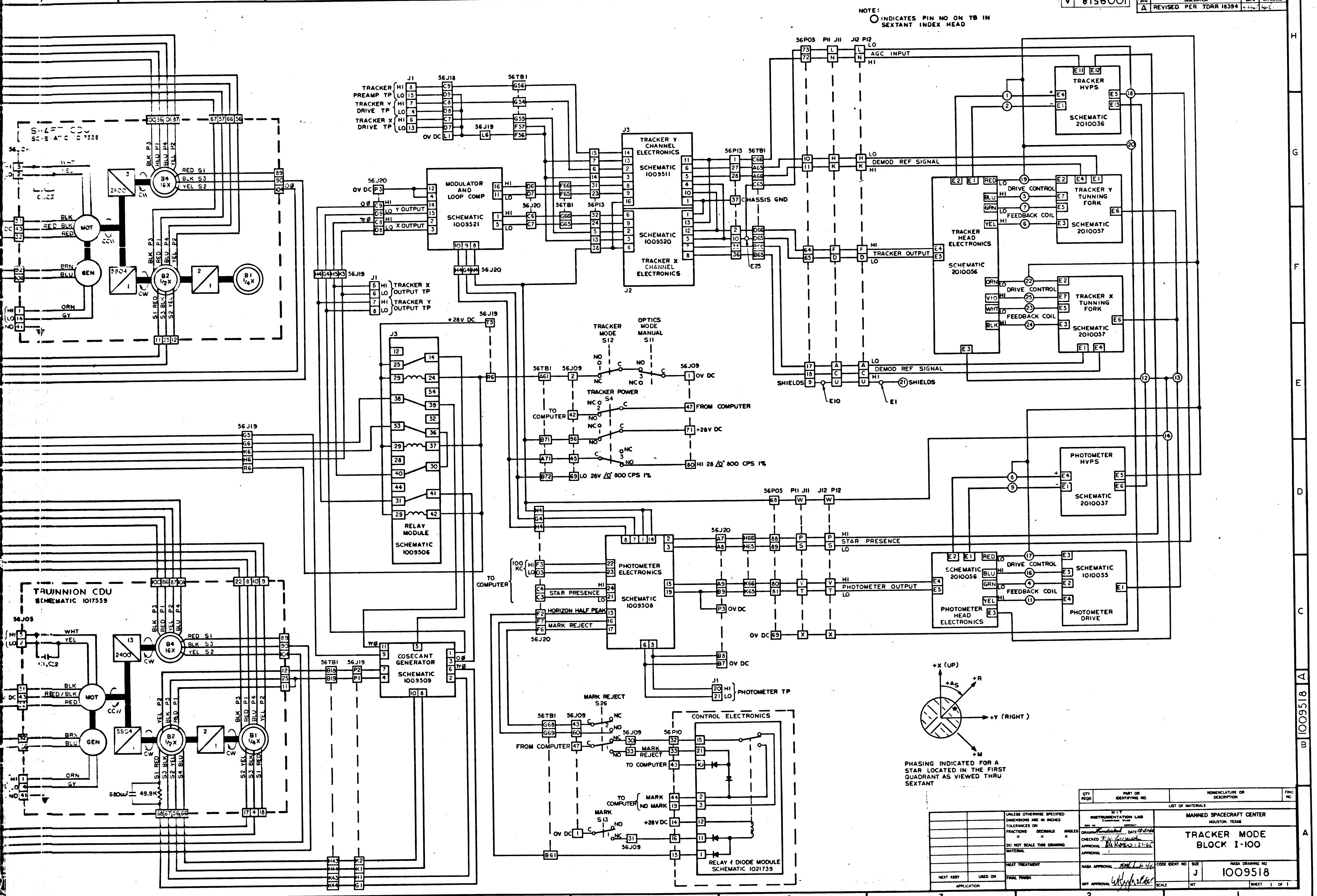
SHAFT SEXTANT
SCHEMATIC 2012391
TRUNNION SEXTANT
SCHEMATIC 2012391
SHAFT CDU
SCHEMATIC
TRUNNION CDU
SCHEMATIC
TWO SPEED SWITCH
SCHEMATIC 1009503
MOTOR DRIVE AMPLIFIER
SCHEMATIC 1009503
RELAY MODULE
SCHEMATIC 1009506
TRANSFORMER
MOT
GEN
B4 16X
B7 1/2X
B1 64X
B3 1X
3010
11,780
TRUNNION LOS
INCREASING POS ANGLE
MANUAL DRIVE
56J18
56P05
56P04
56TB1
56J19
56J04
56J05
+28V DC
0V DC
28V /90° 800 CPS 5%
28V /0° 800 CPS 1%
SHIELD GND
CHASSIS GND
CW
CCW
LO
FINE
COARSE
WHT
YEL
BLK
RED/BLK
RED
BRN
BLU
ORN
GY
YEL / WHT S2
BLU / WHT S4
RED / WHT S1
BLK / WHT S3
C1,C2
16
15
14
13
12
11
10
9
8
H
G
F
E
D
C
B
A

1009518	A		

15902 REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 18394	9-22-65	W.C.

NOTE:
○ INDICATES PIN NO ON TB IN SEXTANT INDEX HEAD



SHAFT CDU
SCHEMATIC 1017338
TRACKER PREAMP TP
TRACKER Y DRIVE TP
TRACKER X DRIVE TP
MODULATOR AND LOOP COMP
SCHEMATIC 1009521
Y OUTPUT
X OUTPUT
TRACKER Y CHANNEL ELECTRONICS
SCHEMATIC 1009511
SCHEMATIC 1009520
TRACKER X CHANNEL ELECTRONICS
AGC INPUT
DEMOD REF SIGNAL
CHASSIS GND
TRACKER OUTPUT
SHIELDS
TRACKER HVPS
SCHEMATIC 2010036
TRACKER HEAD ELECTRONICS
SCHEMATIC 2010056
DRIVE CONTROL
FEEDBACK COIL
TRACKER Y TUNING FORK
SCHEMATIC 2010057
TRACKER X TUNING FORK
SCHEMATIC 2010057
TRACKER X OUTPUT TP
TRACKER Y OUTPUT TP
+28V DC
RELAY MODULE
SCHEMATIC 1009506
TRACKER MODE S12
OPTICS MODE MANUAL S11
TRACKER POWER S4
TO COMPUTER
FROM COMPUTER
HI 28 /0° 800 CPS 1%
LO 28V /0° 800 CPS 1%
PHOTOMETER HVPS
SCHEMATIC 2010037
STAR PRESENCE
PHOTOMETER OUTPUT
PHOTOMETER ELECTRONICS
SCHEMATIC 1009508
HORIZON HALF PEAK
MARK REJECT
100 KC
PHOTOMETER HEAD ELECTRONICS
SCHEMATIC 2010056
SCHEMATIC 1010055
PHOTOMETER DRIVE
PHOTOMETER TP
TRUNNION CDU
SCHEMATIC 1017339
COSECANT GENERATOR
SCHEMATIC 1009509
MARK REJECT S26
MARK S13
CONTROL ELECTRONICS
RELAY & DIODE MODULE
SCHEMATIC 1021739
MARK
NO MARK
+X (UP)
+As
+R
+Y (RIGHT)
+M

PHASING INDICATED FOR A STAR LOCATED IN THE FIRST QUADRANT AS VIEWED THRU SEXTANT

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN Wunderlich DATE 12-21-64
CHECKED R.W. Arczynski
APPROVAL DG Hoag 1-27-65
APPROVAL
NASA APPROVAL
MIT APPROVAL

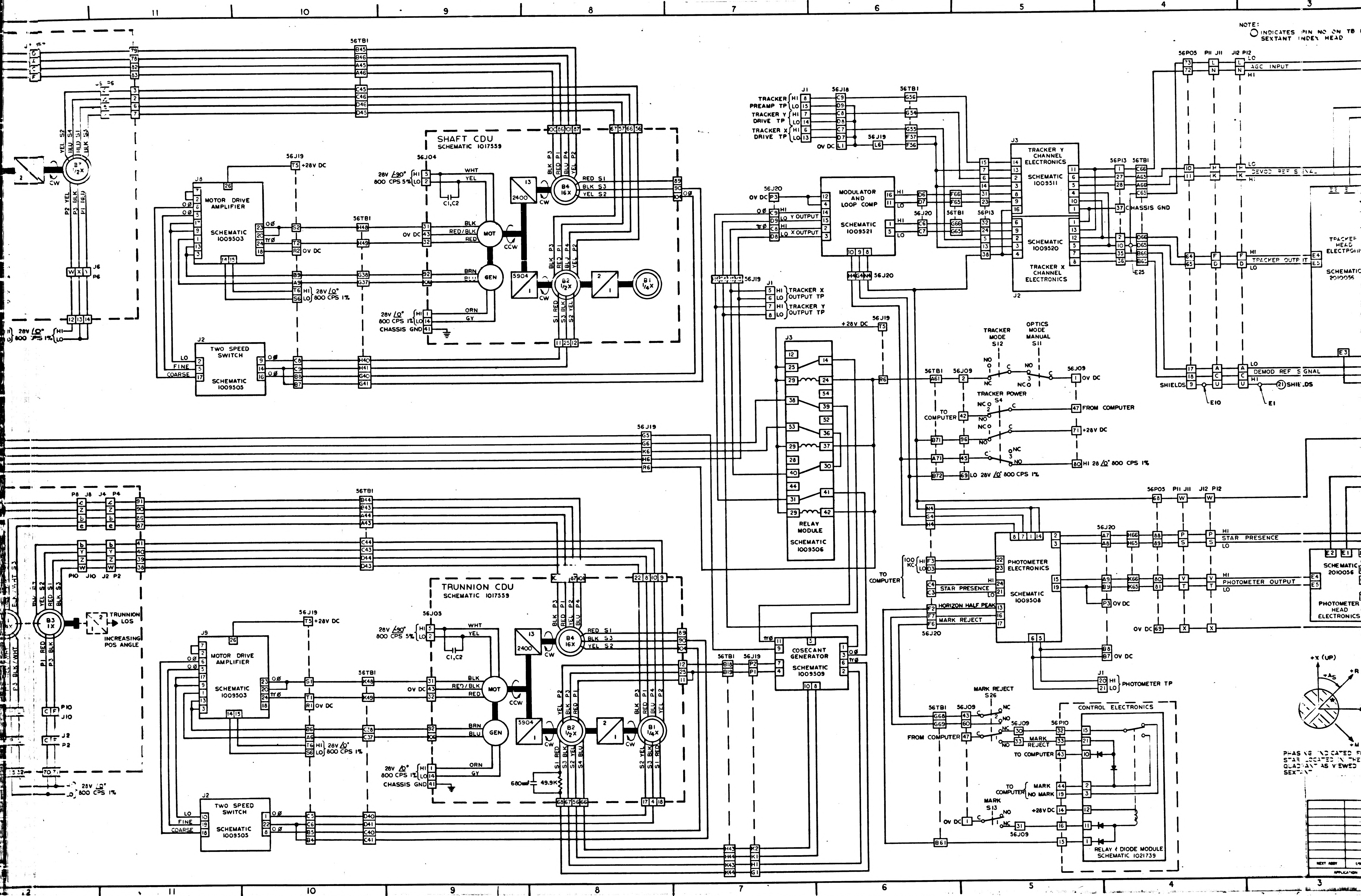
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRACKER MODE
BLOCK I-100

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1009518
SCALE
WT
SHEET 1 OF 1

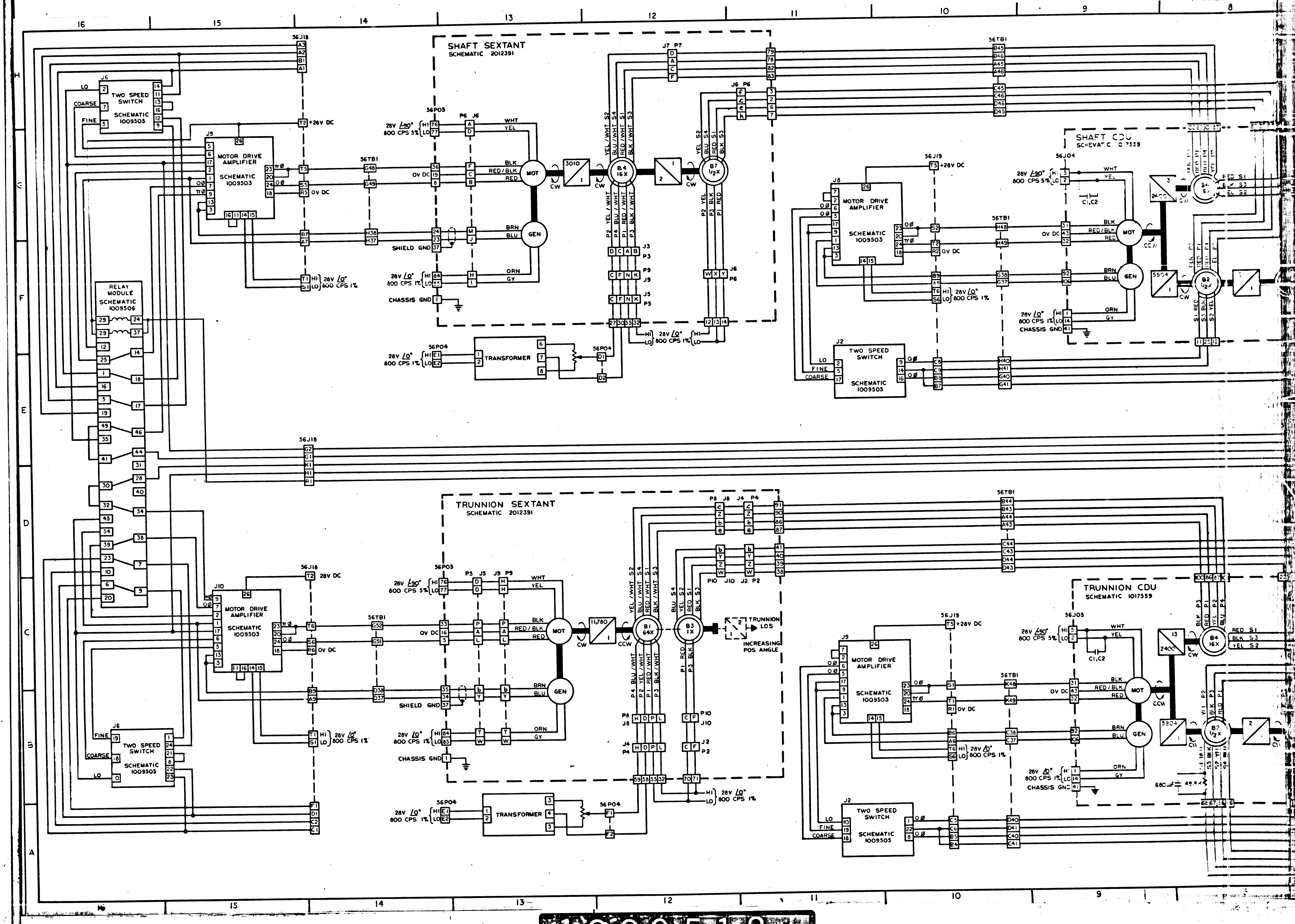
1009518 A

1009518


NOTE:
○ INDICATES PIN NO ON TB
SEXTANT INDEX HEAD
SHAFT CDU
SCHEMATIC 1017559
TRUNNION CDU
SCHEMATIC 1017559
MOTOR DRIVE AMPLIFIER
SCHEMATIC 1009503
TWO SPEED SWITCH
SCHEMATIC 1009505
56TB1
56J19
56J04
56J05
+28V DC
28V /-90° 800 CPS 5%
28V /0° 800 CPS 1%
CHASSIS GND
OV DC
MOT
GEN
CCW
CW
B4 16X
B2 1/2X
B1 1/4X
B7 1/2X
B3 1X
RED S1
BLK S3
YEL S2
WHT
YEL
BLK
RED/BLK
RED
BRN
BLU
ORN
GY
C1,C2
2400
5904
LO
FINE
COARSE
TRUNNION LOS
INCREASING POS ANGLE
680
49.9K
TRACKER PREAMP TP
TRACKER Y DRIVE TP
TRACKER X DRIVE TP
MODULATOR AND LOOP COMP
SCHEMATIC 1009521
Y OUTPUT
X OUTPUT
TRACKER X OUTPUT TP
TRACKER Y OUTPUT TP
TRACKER Y CHANNEL ELECTRONICS
SCHEMATIC 1009511
SCHEMATIC 1009520
TRACKER X CHANNEL ELECTRONICS
CHASSIS GND
AGC INPUT
DEMOD REF SIGNAL
TRACKER OUTPUT
TRACKER HEAD ELECTRONICS
SCHEMATIC 2010056
SHIELDS
RELAY MODULE
SCHEMATIC 1009506
TRACKER MODE S12
OPTICS MODE MANUAL S11
TRACKER POWER S4
TO COMPUTER
FROM COMPUTER
HI 28 /0° 800 CPS 1%
LO 28V /0° 800 CPS 1%
PHOTOMETER ELECTRONICS
SCHEMATIC 1009508
STAR PRESENCE
PHOTOMETER OUTPUT
HORIZON HALF PEAK
MARK REJECT
PHOTOMETER HEAD ELECTRONICS
PHOTOMETER TP
COSECANT GENERATOR
SCHEMATIC 1009509
MARK REJECT S26
MARK S13
MARK
NO MARK
CONTROL ELECTRONICS
RELAY & DIODE MODULE
SCHEMATIC 1021739
+X (UP)
PHASING INDICATED
STAR LOCATED IN THE
QUADRANT AS VIEWED
SEXTANT
NEXT ASSY
APPLICATION
11
10
9
8
7
6
5
4
3

E2

1009518



SHAFT SEXTANT
SCHEMATIC 2012391
TRUNNION SEXTANT
SCHEMATIC 2012391
SHAFT CDU
TRUNNION CDU
SCHEMATIC 1017559
TWO SPEED SWITCH
SCHEMATIC 1009505
MOTOR DRIVE AMPLIFIER
SCHEMATIC 1009503
RELAY MODULE
SCHEMATIC 1009506
TRANSFORMER
56J18
56P05
56P04
56TB1
56J19
56J04
56J05
MOT
GEN
B4 16X
B7 1/2X
B1 64X
B3 1X
B2 1/2X
3010
11,780
2400
5904
CW
CCW
28V DC
+28V DC
OV DC
SHIELD GND
CHASSIS GND
28V /-90° 800 CPS 5%
28V /0° 800 CPS 1%
TRUNNION LOS
INCREASING POS ANGLE
C1,C2
LO
FINE
COARSE
WHT
YEL
BLK
RED/BLK
RED
BRN
BLU
ORN
GY
16
15
14
13
12
11
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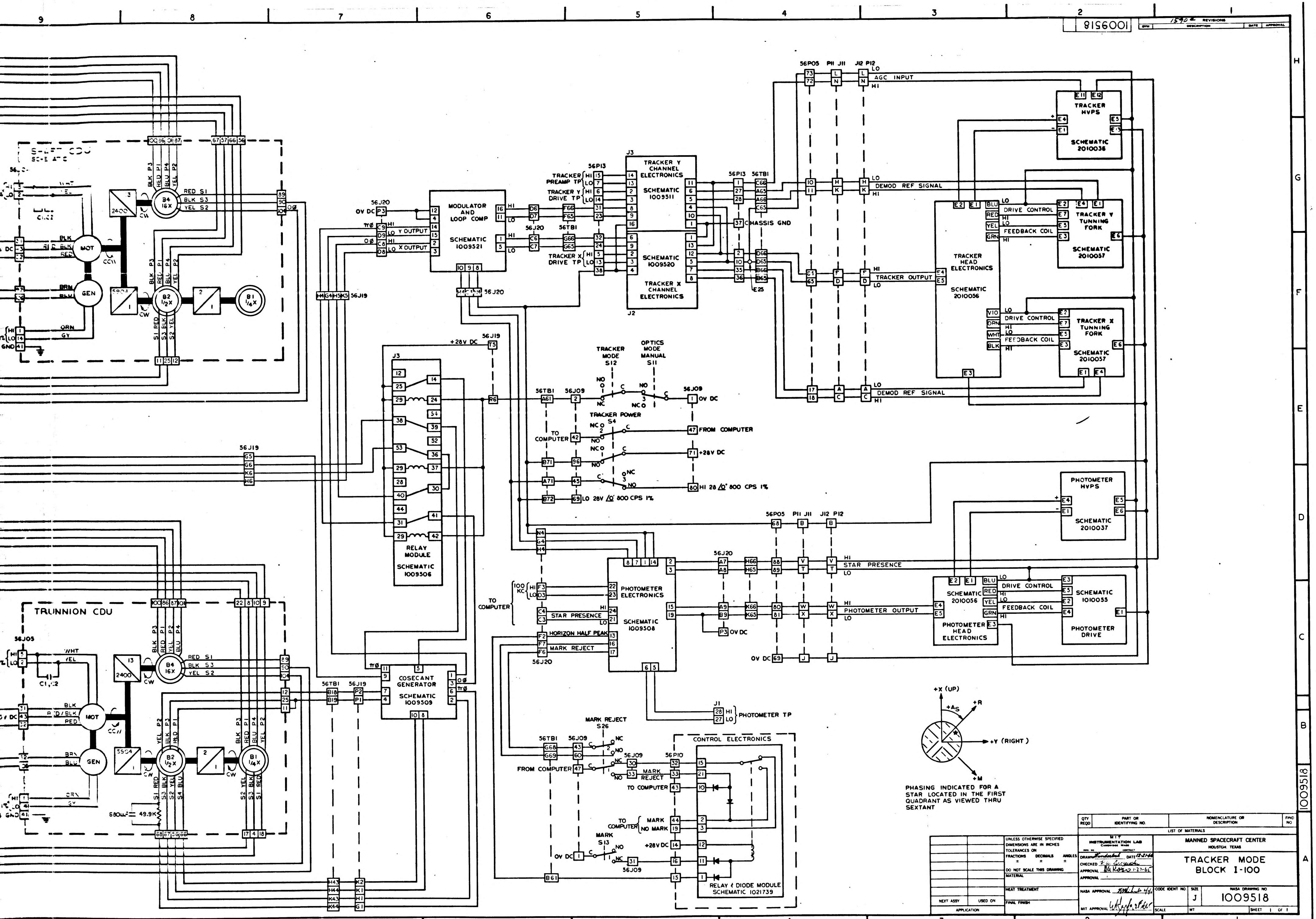
9
8
H
G
F
E
D
C
B
A

E1

1009518



1009518
SHAFT CDU SCHEMATIC
TRUNNION CDU
MOT
GEN
B4 16X
B2 1/2X
B1 1/4X
2400
5504
CW
CCW
RED S1
BLK S3
YEL S2
C1, C2
680μμf
49.9K
56J05
56J20
56J19
56TB1
56P13
56J09
56P05
P11 J11
J12 P12
56P10
MODULATOR AND LOOP COMP SCHEMATIC 1009521
Y OUTPUT
X OUTPUT
TRACKER PREAMP TP
TRACKER Y DRIVE TP
TRACKER X DRIVE TP
TRACKER Y CHANNEL ELECTRONICS SCHEMATIC 1009511
TRACKER X CHANNEL ELECTRONICS SCHEMATIC 1009520
CHASSIS GND
E25
AGC INPUT
DEMOD REF SIGNAL
TRACKER OUTPUT
TRACKER HVPS SCHEMATIC 2010036
TRACKER HEAD ELECTRONICS SCHEMATIC 2010056
TRACKER Y TUNNING FORK SCHEMATIC 2010057
TRACKER X TUNNING FORK SCHEMATIC 2010057
DRIVE CONTROL
FEEDBACK COIL
+28V DC
RELAY MODULE SCHEMATIC 1009506
TRACKER MODE S12
OPTICS MODE MANUAL S11
TRACKER POWER S4
TO COMPUTER
FROM COMPUTER
0V DC
HI 28 /0° 800 CPS 1%
LO 28V /0° 800 CPS 1%
PHOTOMETER HVPS SCHEMATIC 2010037
PHOTOMETER ELECTRONICS SCHEMATIC 1009508
STAR PRESENCE
HORIZON HALF PEAK
MARK REJECT
100 KC
PHOTOMETER OUTPUT
PHOTOMETER HEAD ELECTRONICS SCHEMATIC 2010056
PHOTOMETER DRIVE SCHEMATIC 1010055
COSECANT GENERATOR SCHEMATIC 1009509
PHOTOMETER TP
MARK REJECT S26
MARK S13
MARK
NO MARK
CONTROL ELECTRONICS
RELAY & DIODE MODULE SCHEMATIC 1021739
+X (UP)
+As
+R
+Y (RIGHT)
+M

PHASING INDICATED FOR A STAR LOCATED IN THE FIRST QUADRANT AS VIEWED THRU SEXTANT

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN Hunderlich DATE 12-21-64
CHECKED F. W. Grzywacz
APPROVAL DG Hoag 1-27-65
APPROVAL
NASA APPROVAL
MIT APPROVAL

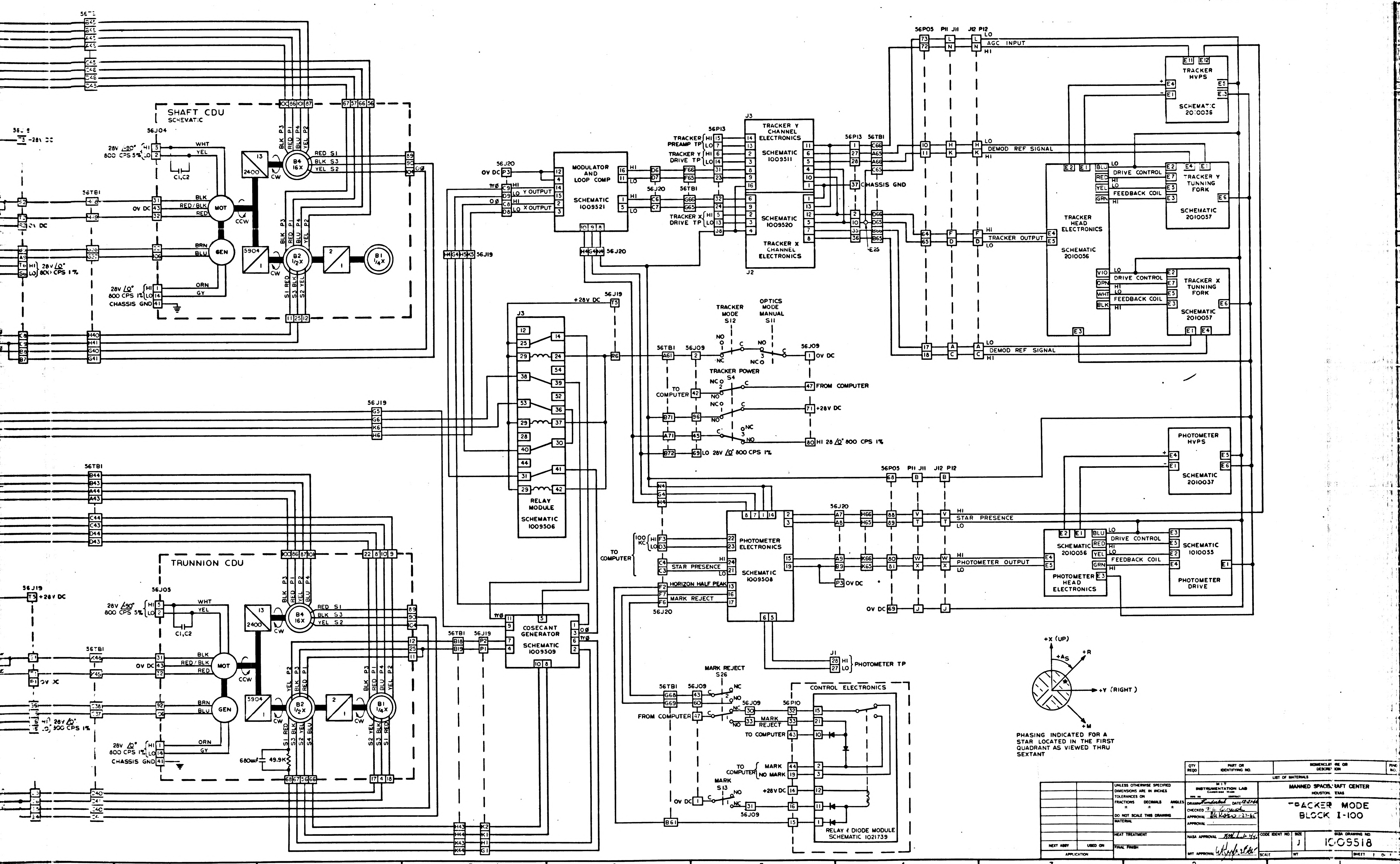
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRACKER MODE
BLOCK I-100

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1009518
SCALE | WT | SHEET 1 OF 1

1590 REVISIONS
SYM | DESCRIPTION | DATE | APPROVAL

F-3


SHAFT CDU
SCHEMATIC
56J04
28V /-90° 800 CPS 5%
WHT
YEL
C1,C2
BLK
RED/BLK
RED
MOT
CCW
BRN
BLU
GEN
ORN
GY
28V /0° 800 CPS 1%
CHASSIS GND
2400
5904
B4 16X
B2 1/2X
B1 1/4X
RED S1
BLK S3
YEL S2
CW
S1 RED
S3 BLK
S2 YEL
56TB1
56J19
-28V DC
OV DC
TRUNNION CDU
56J05
+28V DC
680mmf
49.9K
MODULATOR AND LOOP COMP
SCHEMATIC 1009521
Y OUTPUT
X OUTPUT
56J20
TRACKER PREAMP TP
TRACKER Y DRIVE TP
TRACKER X DRIVE TP
56P13
J3
TRACKER Y CHANNEL ELECTRONICS
SCHEMATIC 1009511
SCHEMATIC 1009520
TRACKER X CHANNEL ELECTRONICS
J2
CHASSIS GND
E25
56P05
P11 J11
J12 P12
AGC INPUT
DEMOD REF SIGNAL
TRACKER OUTPUT
TRACKER HVPS
SCHEMATIC 2010036
TRACKER HEAD ELECTRONICS
SCHEMATIC 2010056
DRIVE CONTROL
FEEDBACK COIL
TRACKER Y TUNNING FORK
SCHEMATIC 2010057
TRACKER X TUNNING FORK
SCHEMATIC 2010057
RELAY MODULE
SCHEMATIC 1009506
TRACKER MODE S12
OPTICS MODE MANUAL S11
TRACKER POWER S4
NO
NC
TO COMPUTER
FROM COMPUTER
+28V DC
HI 28 /0° 800 CPS 1%
LO 28V /0° 800 CPS 1%
PHOTOMETER HVPS
SCHEMATIC 2010037
STAR PRESENCE
PHOTOMETER OUTPUT
PHOTOMETER ELECTRONICS
SCHEMATIC 1009508
100 KC
HORIZON HALF PEAK
MARK REJECT
PHOTOMETER HEAD ELECTRONICS
SCHEMATIC 1010055
PHOTOMETER DRIVE
PHOTOMETER TP
COSECANT GENERATOR
SCHEMATIC 1009509
MARK REJECT S26
56J09
56P10
CONTROL ELECTRONICS
MARK
NO MARK
MARK S13
RELAY & DIODE MODULE
SCHEMATIC 1021739
+X (UP)
+R
+A_S
+Y (RIGHT)
+M

PHASING INDICATED FOR A STAR LOCATED IN THE FIRST QUADRANT AS VIEWED THRU SEXTANT

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

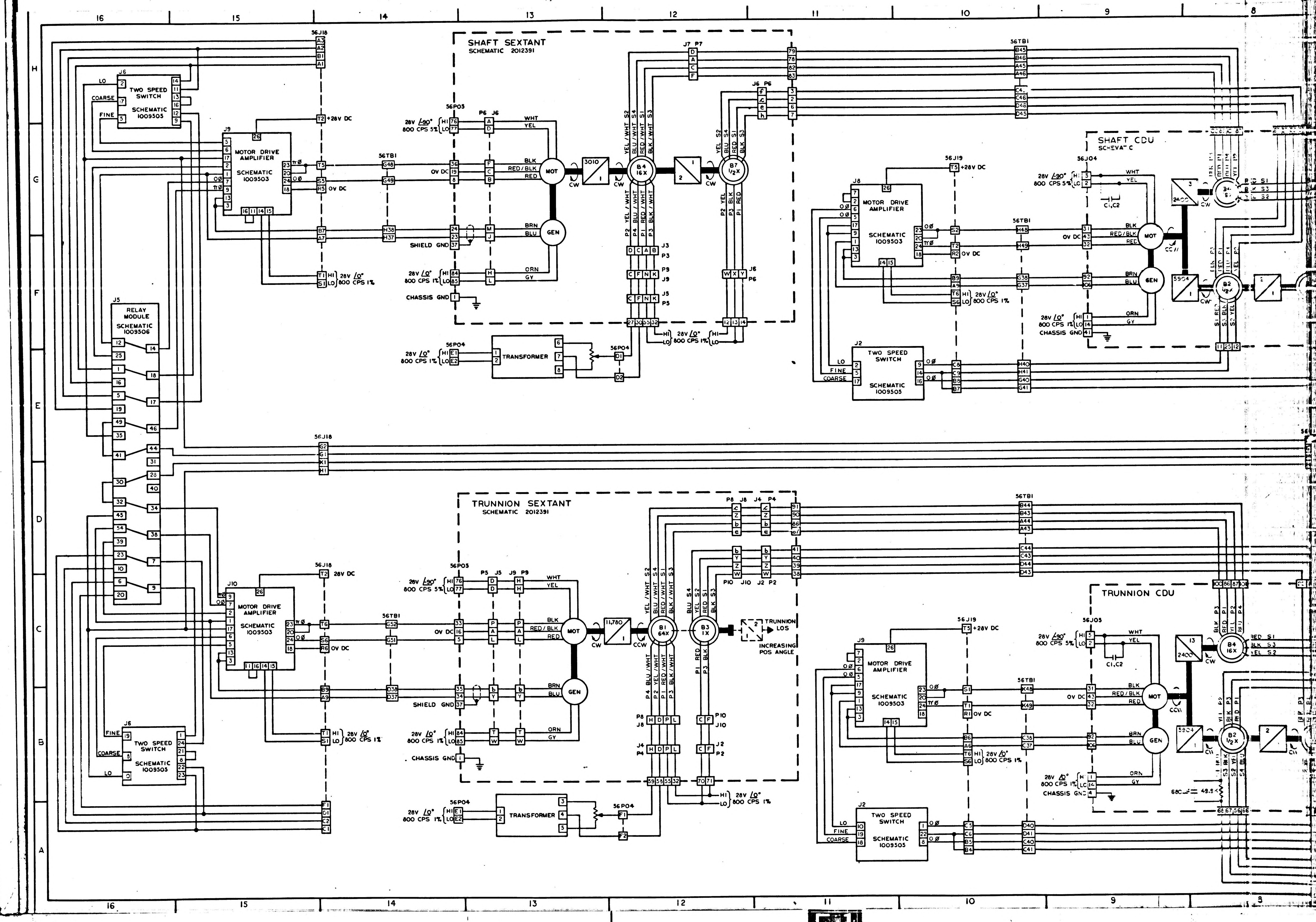
MIT INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN Hundertmark DATE 12-21-64
CHECKED R.W. Grzesiak
APPROVAL DH Koso 1-27-65
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

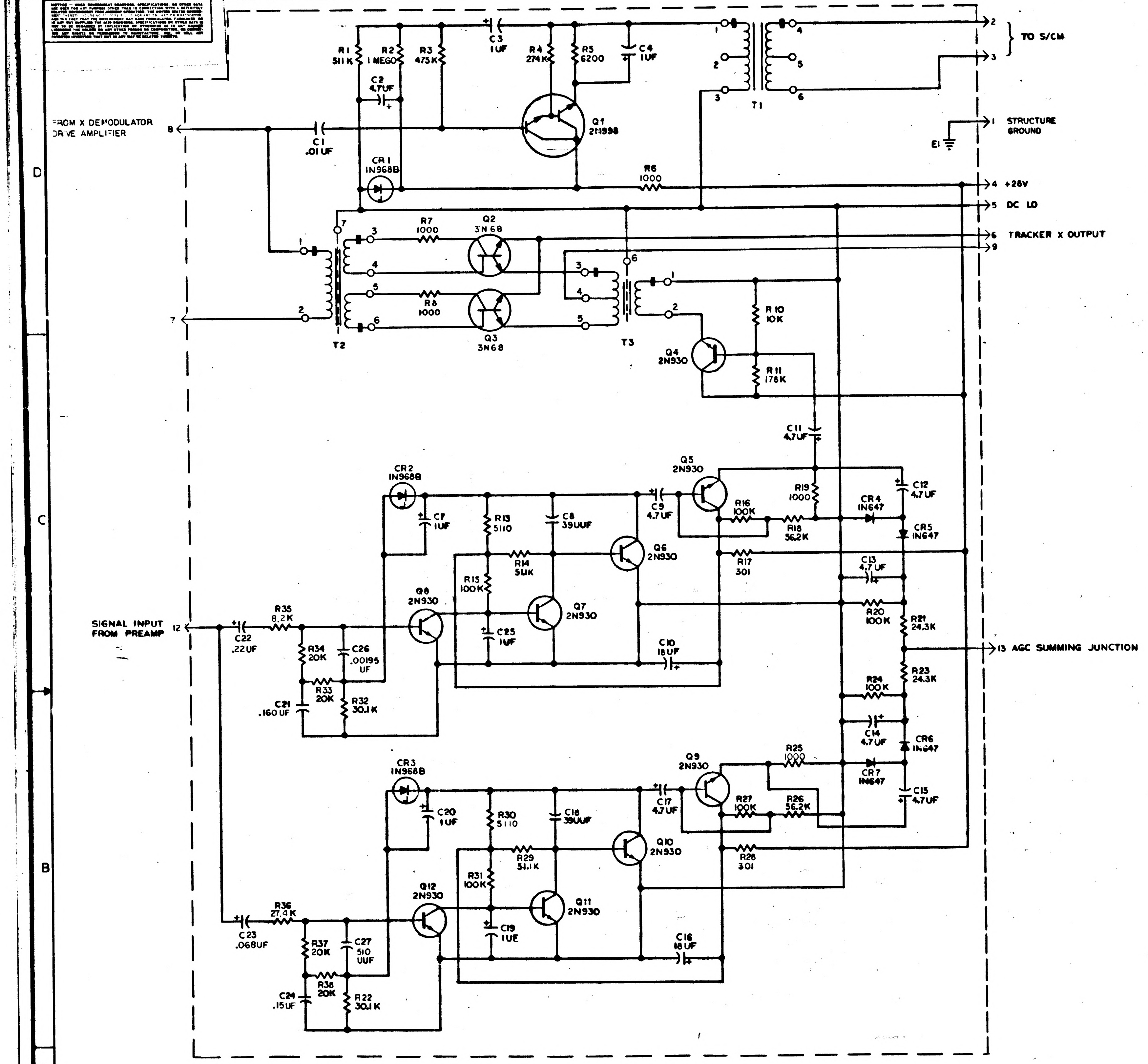
TRACKER MODE
BLOCK I-100

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1009518
SCALE | WT | SHEET 1 OF 1



16
15
14
13
12
11
10
9
8
H
G
F
E
D
C
B
A
SHAFT SEXTANT
SCHEMATIC 2012391
TRUNNION SEXTANT
SCHEMATIC 2012391
SHAFT CDU
TRUNNION CDU
TWO SPEED SWITCH
SCHEMATIC 1009505
MOTOR DRIVE AMPLIFIER
SCHEMATIC 1009503
RELAY MODULE
SCHEMATIC 1009506
TRANSFORMER
56J18
56P05
56P04
56TB1
56J19
56J04
56J05
J5
J6
J9
J10
J8
J2
MOT
GEN
B4 16X
B7 1/2X
B1 64X
B3 1X
B2 1/2X
3010
11,780
2400
5904
LO
COARSE
FINE
+28V DC
28V DC
OV DC
28V /-90° 800 CPS 5%
28V /0° 800 CPS 1%
SHIELD GND
CHASSIS GND
WHT
YEL
BLK
RED/BLK
RED
BRN
BLU
ORN
GY
CW
CCW
C1,C2
TRUNNION LOS
INCREASING POS ANGLE

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


FROM X DEMODULATOR DRIVE AMPLIFIER
8
7
C1 .01UF
R1 511K
R2 1 MEGO
C2 4.7UF
R3 475K
C3 1UF
R4 274K
R5 6200
C4 1UF
Q1 2N998
CR1 IN968B
R6 1000
T1
1 2 3 4 5 6
2 3 TO S/CM
1 STRUCTURE GROUND
E1
4 +28V
5 DC LO
6 TRACKER X OUTPUT
9
T2
R7 1000
Q2 3N68
R8 1000
Q3 3N68
T3
R10 10K
R11 178K
Q4 2N930
C11 4.7UF
SIGNAL INPUT FROM PREAMP
12
C22 .22UF
R35 8.2K
R34 20K
C26 .00195 UF
C21 .160UF
R33 20K
R32 30.1K
Q8 2N930
CR2 IN968B
C7 1UF
R13 5110
C8 39UUF
R14 51K
R15 100K
C25 1UF
Q7 2N930
Q6 2N930
C9 4.7UF
Q5 2N930
R16 100K
R19 1000
R18 56.2K
R17 301
C10 18UF
CR4 IN647
C12 4.7UF
CR5 IN647
C13 4.7UF
R20 100K
R21 24.3K
13 AGC SUMMING JUNCTION
R23 24.3K
R24 100K
C14 4.7UF
CR6 IN647
CR7 IN647
C15 4.7UF
R25 1000
Q9 2N930
C17 4.7UF
R27 100K
R26 56.2K
R28 301
Q10 2N930
CR3 IN968B
C20 1UF
R30 5110
C18 39UUF
R29 51.1K
R31 100K
Q11 2N930
C19 1UF
C16 18UF
Q12 2N930
C23 .068UF
R36 27.4K
R37 20K
C27 510 UUF
C24 .15UF
R38 20K
R22 30.1K

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010359-29	CAPACITOR	.01 UF	± 10%	200VDC
C 2	1010393-037		4.7 UF	± 10%	50VDC
C 3	1006755-69		1 UF	± 10%	35VDC
C 4	1006755-69		1 UF	± 10%	35VDC
C 7	1006755-69		1 UF	± 10%	35VDC
C 8	1010409-15		39 UUF	± 2%	500VDC
C 9	1006755-77		4.7UF	± 10%	35VDC
C 10	1010393-044		18 UF	± 10%	50VDC
C 11	1006755-77		4.7UF	± 10%	35VDC
C 12			4.7 UF	± 10%	35VDC
C 13			4.7 UF	± 10%	35VDC
C 14			4.7 UF	± 10%	35VDC
C 15	1006755-77		4.7 UF	± 10%	35VDC
C 16	1010393-044		18UF	± 10%	50VDC
C 17	1006755-77		4.7UF	± 10%	35VDC
C 18	1010409-15		39UUF	± 2%	500VDC
C 19	1006755-69		1UF	± 10%	35VDC
C 20	1006755-69		1UF	± 10%	35VDC
C 21	1010317-6		.160UF	± 1%	30VDC
C 22	1006755-61		.22UF	± 10%	35VDC
C 23	1006755-55		.068UF	± 10%	35VDC
C 24	1010317-7		.15UF	± 1%	30VDC
C 25	1006755-69		1UF	± 10%	35VDC
C 26	1010316-105		.00195UF	± 1%	100VDC
C 27	1006793-80	CAPACITOR	510 UUF	± 2%	500VDC
CR 1	1010286-12	DIODE	IN968B		
CR 2			IN968B		
CR 3	1010286-12		IN968B		
CR 4	1010362-002		IN647		
CR 5			IN647		
CR 6			IN647		
CR 7	1010362-002	DIODE	IN647		
Q 1	1010342	TRANSISTOR	2N998		
Q 2	1010367		3N68		
Q 3	1010367		3N68		
Q 4	1010397-001		2N930		
Q 5					
Q 6					
Q 7					
Q 8					
Q 9					
Q 10					
Q 11					
Q 12	1010397-001	TRANSISTOR	2N930		
R 1	1010374-1	RESISTOR	511K	±1%	1/8 W
R 2	1010374-29		1MEGO	±1%	
R 3	1010364-765		475K	±1%	
R 4	1010364-719		274K	±1%	1/8 W
R 5	1006750-51		6200	±2%	1/4 W
R 6	1010364-251		1000	±1%	1/8 W
R 7	-251		1000		
R 8	-251		1000		
R 10	-443		10K		
R 11	-683		178K		
R 13	-388		5110		
R 14	-580		51.1K		
R 15	-635		100K		
R 16	-635		100K		
R 17	-151		301		
R 18	-587		56.2K		
R 19	-251		1000		
R 20	-635		100K		
R 21	-518		24.3K		
R 22	-535		30.1K		
R 23	-518		24.3K		
R 24	-635		100K		
R 25	-251		1000		
R 26	-587		56.2K		
R 27	-635		100K		
R 28	-151		301		
R 29	-580		51.1K		
R 30	-388		5110		
R 31	-635		100K		
R 32	-535		30.1K		
R 33	-502		20K		
R 34	-502		20K		
R 35	-428		8.2K		
R 36	-528		27.4K		
R 37	-502		20K		
R 38	1010364-502	RESISTOR	20K	± 1%	1/8 W
T 1	1010329-1	TRANSFORMER			
T 2	1012054				
T 3	1012053	TRANSFORMER			

REVISIONS 3076

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14338	17 Nov 64	

1009520 A

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS

REF DWG:
TRACKER X CHANNEL
ELECTRONIC ASSY
DWG NO. 1007566

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 3-25-64
CHECKED 10 Mar 64
APPROVAL
APPROVAL
NASA APPROVAL 9-28-64
MIT APPROVAL Sept 21 1964

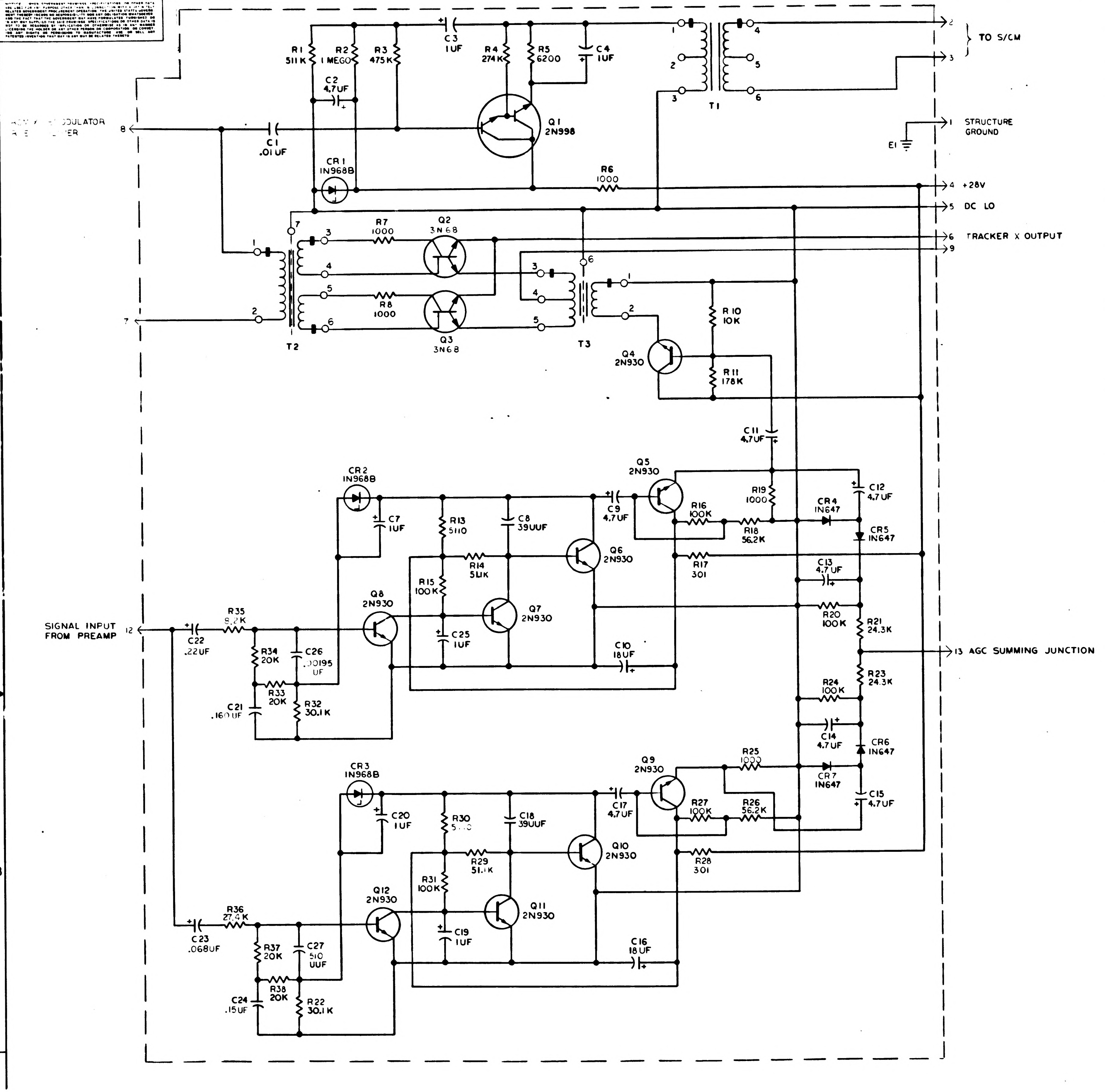
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TRACKER X CHANNEL ELECTRONIC

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009520
SCALE NONE
WT —
SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 14338	17 Nov 64	
B	REPLACED WITH CHANGE BY REV. C PER TDRR 20123	23 JUN 65	


4
3
2
MODULATOR
AMPLIFIER
8
7
C1 .01UF
C2 4.7UF
C3 1UF
C4 1UF
R1 511K
R2 1 MEGO
R3 475K
R4 274K
R5 6200
R6 1000
R7 1000
R8 1000
R10 10K
R11 178K
CR1 IN968B
Q1 2N998
Q2 3N68
Q3 3N68
Q4 2N930
T1
T2
T3
E1
TO S/CM
STRUCTURE GROUND
+28V
DC LO
TRACKER X OUTPUT
C11 4.7UF
Q5 2N930
CR2 IN968B
C7 1UF
R13 5110
C8 39UUF
C9 4.7UF
R16 100K
R19 1000
CR4 IN647
C12 4.7UF
CR5 IN647
R18 56.2K
R14 51.1K
Q6 2N930
R17 301
C13 4.7UF
R15 100K
Q8 2N930
Q7 2N930
C25 1UF
R21 24.3K
R20 100K
SIGNAL INPUT FROM PREAMP
12
C22 .22UF
R35 9.2K
R34 20K
C26 .00195 UF
C10 18UF
13 AGC SUMMING JUNCTION
R33 20K
R32 30.1K
C21 .160UF
R23 24.3K
R24 100K
C14 4.7UF
CR6 IN647
Q9 2N930
R25 1000
CR7 IN647
CR3 IN968B
C20 1UF
R30 5110
C18 39UUF
C17 4.7UF
R27 100K
R26 56.2K
C15 4.7UF
Q10 2N930
R29 51.1K
R28 301
R31 100K
Q11 2N930
Q12 2N930
C19 1UF
R36 27.4K
C23 .068UF
R37 20K
C27 510 UUF
C16 18UF
R38 20K
C24 .15UF
R22 30.1K

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010359-29	CAPACITOR	.01 UF	±10%	200V
C2	1010393-037		4.7 UF	±10%	50V
C3	1006755-69		1UF	±10%	35VDC
C4	1006755-69		1UF	±10%	35VDC
C7	1006755-69		1UF	±10%	35VDC
C8	1010409-15		39 UUF	±2%	500VDC
C9	1006755-77		4.7UF	±10%	35VDC
C10	1010393-044		18 UF	±10%	50VDC
C11	1006755-77		4.7 UF	±10%	35VDC
C12			4.7 UF	±10%	35VDC
C13			4.7 UF	±10%	35VDC
C14			4.7 UF	±10%	35VDC
C15	1006755-77		4.7 UF	±10%	35VDC
C16	1010393-044		18UF	±10%	50VDC
C17	1006755-77		4.7UF	±10%	35VDC
C18	1010409-15		39UUF	±2%	500VDC
C19	1006755-69		1UF	±10%	35VDC
C20	1006755-69		1UF	±10%	35VDC
C21	1010317-6		.160UF	±1%	30VDC
C22	1006755-61		.22UF	±10%	35VDC
C23	1006755-55		.068UF	±10%	35VDC
C24	1010317-7		.15UF	±1%	30VDC
C25	1006755-69		1UF	±10%	35VDC
C26	1010316-105		.00195UF	±1%	100VDC
C27	1006793-80	CAPACITOR	510 UUF	±2%	500VDC
CR1	1010286-12	DIODE	IN968B		
CR2			IN968B		
CR3	1010286-12		IN968B		
CR4	1010362-002		IN647		
CR5			IN647		
CR6			IN647		
CR7	1010362-002	DIODE	IN647		
Q1	1010342	TRANSISTOR	2N998		
Q2	1010367		3N68		
Q3	1010367		3N68		
Q4	1010397-001		2N930		
Q5					
Q6					
Q7					
Q8					
Q9					
Q10					
Q11					
Q12	1010397-001	TRANSISTOR	2N930		
R1	1010374-1	RESISTOR	511K	±1%	1/8 W
R2	1010374-29		1MEGO	±1%	
R3	1010364-765		475K	±1%	
R4	1010364-719		274K	±1%	1/8 W
R5	1006750-51		6200	±2%	1/4 W
R6	1010364-251		1000	±1%	1/8 W
R7	-251		1000		
R8	-251		1000		
R10	-443		10K		
R11	-683		178K		
R13	-388		5110		
R14	-580		51.1K		
R15	-635		100K		
R16	-635		100K		
R17	-151		301		
R18	-587		56.2K		
R19	-251		1000		
R20	-635		100K		
R21	-518		24.3K		
R22	-535		30.1K		
R23	-518		24.3K		
R24	-635		100K		
R25	-251		1000		
R26	-587		56.2K		
R27	-635		100K		
R28	-151		301		
R29	-580		51.1K		
R30	-388		5110		
R31	-635		100K		
R32	-535		30.1K		
R33	-502		20K		
R34	-502		20K		
R35	-423		9.2K		
R36	-528		27.4K		
R37	-502		20K		
R38	1010364-502	RESISTOR	20K	±1%	1/8 W
T1	1010329-1	TRANSFORMER			
T2	1012054				
T3	1012053	TRANSFORMER			

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS

Ⓑ REPLACED WITH CHANGE BY REV C

REF DWG:
TRACKER X CHANNEL
ELECTRONIC ASSY
DWG NO. 1007588

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN Wunderlich DATE 3-25-64
CHECKED 10 APR 64
APPROVAL CaKoso
APPROVAL
NASA APPROVAL 9-29-64
MIT APPROVAL 29

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TRACKER X CHANNEL
ELECTRONIC

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1009520
SCALE NONE
WT
SHEET 1 OF 1

> STRUCTURE GROUND

+28V

DC LO

TRACKER X OUTPUT

13 HV AGE CUT

10

11

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER TDRR 20,23	—	17 MAY 65	DKD

REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE, RATING
C1	1010359-29	CAPACITOR	.01 UF, ±10%, 200 VDC
C2	1010393-037		4.7 UF, ±10%, 50 VDC
C3	1006755-69		1UF, ±10%, 35 VDC
C4	1006755-69	CAPACITOR	1UF, ±10%, 35 VDC
	DELETED		
	DELETED		
C7	1006755-69	CAPACITOR	1UF, ±10%, 35VDC
C8	1010409-15		39UUF, ±2%, 500VDC
C9	1006755-77		4.7 UF, ±10%, 35VDC
C10	1010393-044		18 UF, +10%, 50VDC
C11	1006755-77	CAPACITOR	4.7 UF, ±10%, 35VDC
	DELETED		
	DELETED		
C16	1010393-044	CAPACITOR	18 UF, ±10%, 50 VDC
C17	1006755-77		4.7 UF, ±10%, 35 VDC
C18	1010409-15		39 UUF, ±2%, 500 VDC
C19	1006755-57		.1UF, ±10%, 35 VDC
C20	1006755-69		1 UF, ±10%, 35 VDC
C21	1010317-6		.160 UF, ±1%, 30 VDC
C22	1006755-61		.22 UF, ±10%, 35 VDC
C23	1006755-55		.068 UF, ±10%, 35VDC
C24	1010317-7		.15 UF, ±1%, 30 VDC
C25	1006755-57		.1UF, ±10%, 35 VDC
C26	1006793-79		470 UUF, ±2%, 500VDC
C27	1006793-79		470 UUF, ±2%, 500VDC
C28	1010393-044		18 UF, ±10%, 50 VDC
C29	1010393-044		18 UF, ±10%, 50 VDC
C30	1010393-044		18 UF, ±10%, 50 VDC
C31	1010393-037	CAPACITOR	4.7 UF, ±10%, 50 VDC
CR1	1010830-11	SEMICONDUCTOR DEVICE	1N967B
CR2	1010830-9	SEMICONDUCTOR DEVICE	1N965B
CR3	1010830-9	SEMICONDUCTOR DEVICE	1N965B
	DELETED		
	DELETED		
CR8	1010362-002	SEMICONDUCTOR DEVICE	1N647
Q1	1010342	TRANSISTOR	2N998
Q2	1010367		3N68
Q3	1010367		3N68
Q4	1010397-1		2N930
Q5			
Q6			
Q7			
Q8			
Q9			
Q10			
Q11			
Q12	1010397-1	TRANSISTOR	2N930
R1	1010374-1	RESISTOR	511K, ±1%, 1/8 W
R2	1010374-29		1 MEG, ±1%, 1/8 W
R3	1010364-765		475K, ±1%, 1/8 W
R4	1010364-719		274K, ±1%, 1/8 W
R5	1006750-51		6200, ±2%, 1/4 W
R6	1006750-39		2.0K, ±2%, 1/4 W
R7	1010364-251		1000, ±1%, 1/8 W
R8	1010364-251	RESISTOR	1000, ±1%, 1/8 W
	DELETED		
R10	1010364-477	RESISTOR	15K, ±1%, 1/8 W
R11	1010364-683	RESISTOR	178K, ±1%, 1/8 W
	DELETED		
R13	1010364-388	RESISTOR	5110, ±1%, 1/8 W
R14	-580		51.1 K, ±1%, 1/8 W
R15	-635		100 K, ±1%, 1/8 W
R16	-719		274 K, ±1%, 1/8 W
R17	-151		301, ±1%, 1/8 W
R18	1006750-60	RESISTOR	15K, ±2%, 1/4 W
	DELETED		
	DELETED		
	DELETED		
R22	1010364-535	RESISTOR	30.1K ±1%, 1/8 W
	DELETED		
	DELETED		
	DELETED		
R26	1006750-60	RESISTOR	15K, ±2%, 1/4 W
R27	1010364-719	RESISTOR	274K, ±1%, 1/8 W
R28	1010364-151	RESISTOR	301, ±1%, 1/8 W
R29	1010364-580	RESISTOR	51.1K, ±1%, 1/8 W

REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE RATING
R30	1010364-388	RESISTOR	5110, ±1%, 1/8 W
R31	-635		100K, ±1%, 1/8 W
R32	-535		30.1K, ±1%, 1/8 W
R33	-559		40.2 K, ±1%, 1/8 W
R34	1010364-559		40.2K, ±1%, 1/8 W
R35	1010768-13		681 K, ±1%, 1/8 W
R36	1010364-735		332 K, ±1%, 1/8 W
R37	1010364-505		21 K, ±1%, 1/8 W
R38	1010364-505		21 K, ±1%, 1/8 W
R39	1006750-108		490, ±2%, 1/4 W
R40	1006750-108		490, ±2%, 1/4 W
R41	1006750-108		490, ±2%, 1/4 W
R42	1010364-635		100K, ±1%, 1/8 W
R43	1006750-15		200, ±1%, 1/4 W
R44	1006750-8		100, ±2%, 1/4 W
R45	1010369-148		20, ±5%, 1/8 W
R46	1006750-15		200 ±2%, 1/4 W
R47	1006750-8		100, ±2%, 1/4 W
R48	1010369-148	RESISTOR	20, ±5%, 1/8 W
T1	1010329-1	TRANSFORMER	
T2	1012054		
T3	1012053		
T4	1010329-1		
T5	1010329-1	TRANSFORMER	

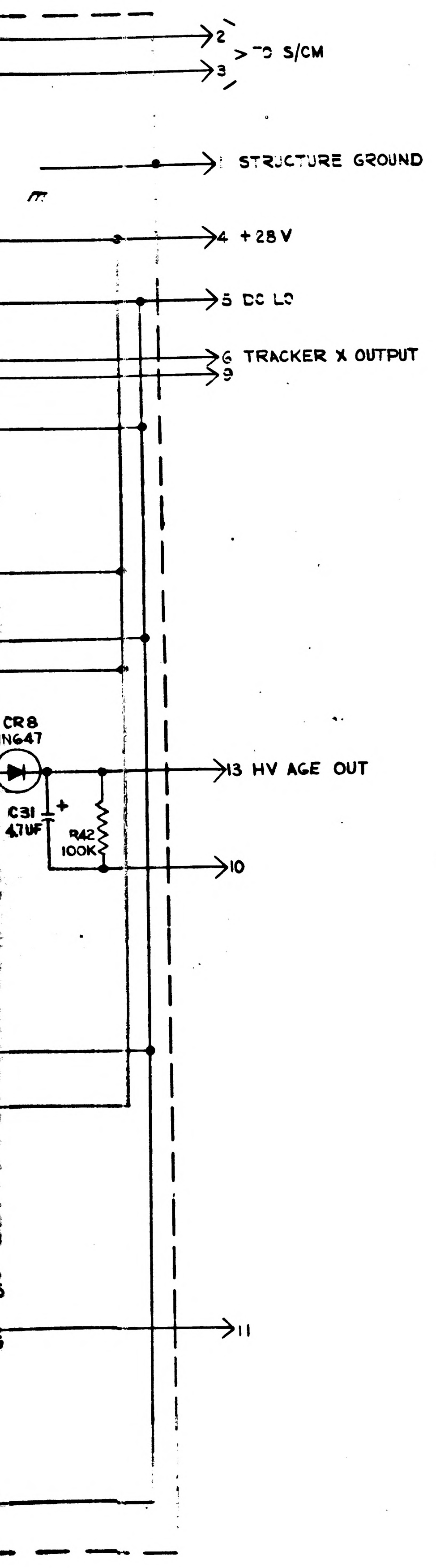
1009520 C 3H

Ⓒ REPLACES REV(B) WITH CHANGE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES + + + − − −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN M. Yeaholm DATE 13 APR 65 CHECKED Wilson 20APR65 APPROVAL 21 APR 65 APPROVAL 21 APR 65	SCHEMATIC TRACKER X CHANNEL ELECTRONIC
MATERIAL ———	RDSU 21 APR 65 NASA APPROVAL MIT APPROVAL 15 Jun 65	CODE IDENT NO. 80230 SIZE J 1009520
CONTRACT NAS 9-497		SCALE NONE SHEET 1 OF 1

1009520	REV LTR C	SH 1

E3



REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE, RATING
C1	1010359-29	CAPACITOR	.01 UF, ±10%, 200 VDC
C2	1010393-037		4.7 UF, ±10%, 50 VDC
C3	1006755-69		1 UF, ±10%, 35 VDC
C4	1006755-69	CAPACITOR	1 UF, ± 10%, 35 VDC
	DELETED		
	DELETED		
C7	1006755-69	CAPACITOR	1 UF, ±10%, 35 VDC
C8	1010409-15		39 UUF, ±2%, 500 VDC
C9	1006755-77		4.7 UF, ±10%, 35 VDC
C10	1010393-044		18 UF, ±10%, 50 VDC
C11	1006755-77	CAPACITOR	4.7 UF, ±10%, 35 VDC
	DELETED		
	DELETED		
C16	1010393-044	CAPACITOR	18 UF, ±10%, 50 VDC
C17	1006755-77		4.7 UF, ±10%, 35 VDC
C18	1010409-15		39 UUF, ±2%, 500 VDC
C19	1006755-57		.1 UF, ±10%, 35 VDC
C20	1006755-69		1 UF, ±10%, 35 VDC
C21	1010317-6		.160 UF, ±1%, 30 VDC
C22	1006755-61		.22 UF, ±10%, 35 VDC
C23	1006755-55		.068 UF, ±10%, 35 VDC
C24	1010317-7		.15 UF, ±1%, 30 VDC
C25	1006755-57		.1 UF, ±10%, 35 VDC
C26	1006793-79		470 UUF, ±2%, 500 VDC
C27	1006793-79		470 UUF, ±2%, 500 VDC
C28	1010393-044		18 UF, ±10%, 50 VDC
C29	1010393-044		18 UF, ±10%, 50 VDC
C30	1010393-044		18 UF, ±10%, 50 VDC
C31	1010393-037	CAPACITOR	4.7 UF, ±10%, 50 VDC
CR1	1010830-11	SEMICONDUCTOR DEVICE	1N967B
CR2	1010830-9	SEMICONDUCTOR DEVICE	1N965B
CR3	1010830-9	SEMICONDUCTOR DEVICE	1N965B
	DELETED		
	DELETED		
CR8	1010362-002	SEMICONDUCTOR DEVICE	1N647
Q1	1010342	TRANSISTOR	2N998
Q2	1010367		3N68
Q3	1010367		3N68
Q4	1010397-1		2N930
Q5			
Q6			
Q7			
Q8			
Q9			
Q10			
Q11			
Q12	1010397-1	TRANSISTOR	2N930
R1	1010374-1	RESISTOR	511K, ±1%, 1/8 W
R2	1010374-29		1 MEG, ±1%, 1/8 W
R3	1010364-765		475K, ±1%, 1/8 W
R4	1010364-719		274K, ±1%, 1/8 W
R5	1006750-51		6200, ±2%, 1/4 W
R6	1006750-39		2.0K, ±2%, 1/4 W
R7	1010364-251		1000, ±1%, 1/8 W
R8	1010364-251	RESISTOR	1000, ±1%, 1/8 W
	DELETED		
R10	1010364-477	RESISTOR	15K, ±1%, 1/8 W
R11	1010364-683	RESISTOR	178K, ±1%, 1/8 W
	DELETED		
R13	1010364-388	RESISTOR	5110, ±1%, 1/8 W
R14	-580		511 K, ±1%, 1/8 W
R15	-635		100 K, ±1%, 1/8 W
R16	-719		274 K, ±1%, 1/8 W
R17	-151		301, ±1%, 1/8 W
R18	1006750-60	RESISTOR	15K, ±2%, 1/4 W
	DELETED		
	DELETED		
	DELETED		
R22	1010364-535	RESISTOR	30.1K ±1%, 1/8 W
	DELETED		
	DELETED		
	DELETED		
R26	1006750-60	RESISTOR	15K, ±2%, 1/4 W
R27	1010364-719	RESISTOR	274K, ±1%, 1/8 W
R28	1010364-151	RESISTOR	301, ±1%, 1/8 W
R29	1010364-580	RESISTOR	51.1K, ±1%, 1/8 W

REF DES	PART NUMBER	DESCRIPTION	SCHEMATIC DIA OR VALUE, TOLERANCE RATING
R30	1010364-388	RESISTOR	5110, ±1%, 1/8 W
R31	-635		100K, ±1%, 1/8 W
R32	-535		30.1K, ±1%, 1/8 W
R33	-559		40.2K, ±1%, 1/8 W
R34	1010364-559		40.2K, ±1%, 1/8 W
R35	1010768-13		681 K, ±1%, 1/8 W
R36	1010364-735		332 K, ±1%, 1/8 W
R37	1010364-505		21 K, ±1%, 1/8 W
R38	1010364-505		21 K, ±1%, 1/8 W
R39	1006750-108		490, ±2%, 1/4 W
R40	1006750-108		490, ±2%, 1/4 W
R41	1006750-108		490, ±2%, 1/4 W
R42	1010364-635		100K, ±1%, 1/8 W
R43	1006750-15		200, ±1%, 1/4 W
R44	1006750-8		100, ±2%, 1/4 W
R45	1010369-148		20, ±5%, 1/8 W
R46	1006750-15		200, ±2%, 1/4 W
R47	1006750-8		100, ±2%, 1/4 W
R48	1010369-148	RESISTOR	20, ±5%, 1/8 W
T1	1010329-1	TRANSFORMER	
T2	1012054		
T3	1012053		
T4	1010329-1		
T5	1010329-1	TRANSFORMER	

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
C		REPLACES REVISION B WITH CHANGE PER [illegible]	–	17 MAY 65	[illegible]

Ⓒ REPLACES REV(B) WITH CHANGE

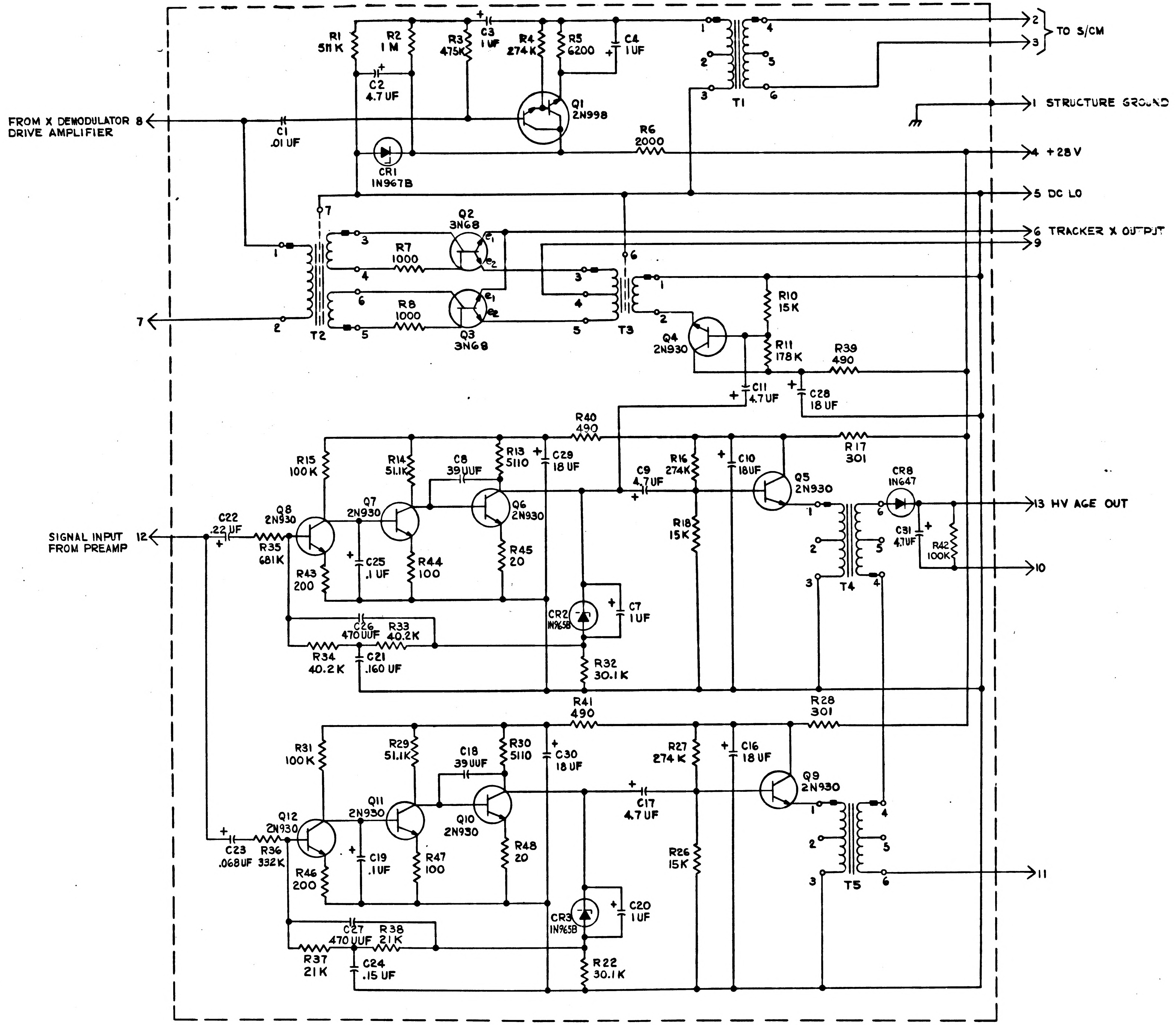
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ±	MIT INSTRUMENTATION LAB CAMBRIDGE MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN M. Heabner DATE 13 APR 65 CHECKED [illegible] Wilson 20 APR 65 APPROVAL [illegible] APPROVAL [illegible] 21 APR 65	SCHEMATIC TRACKER X CHANNEL ELECTRONIC
MATERIAL ———	NASA APPROVAL [illegible]	CODE IDENT NO. 80230 · SIZE J · 1009520
CONTRACT NAS 9-497	MIT APPROVAL [illegible]	SCALE NONE · SHEET 1 OF 1

1009520 REV LTR C SH 1

E2

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS.
3. DRAWINGS FOR REFERENCE:
   1007566 TRACKER X CHANNEL ELECTRONIC ASS'Y.

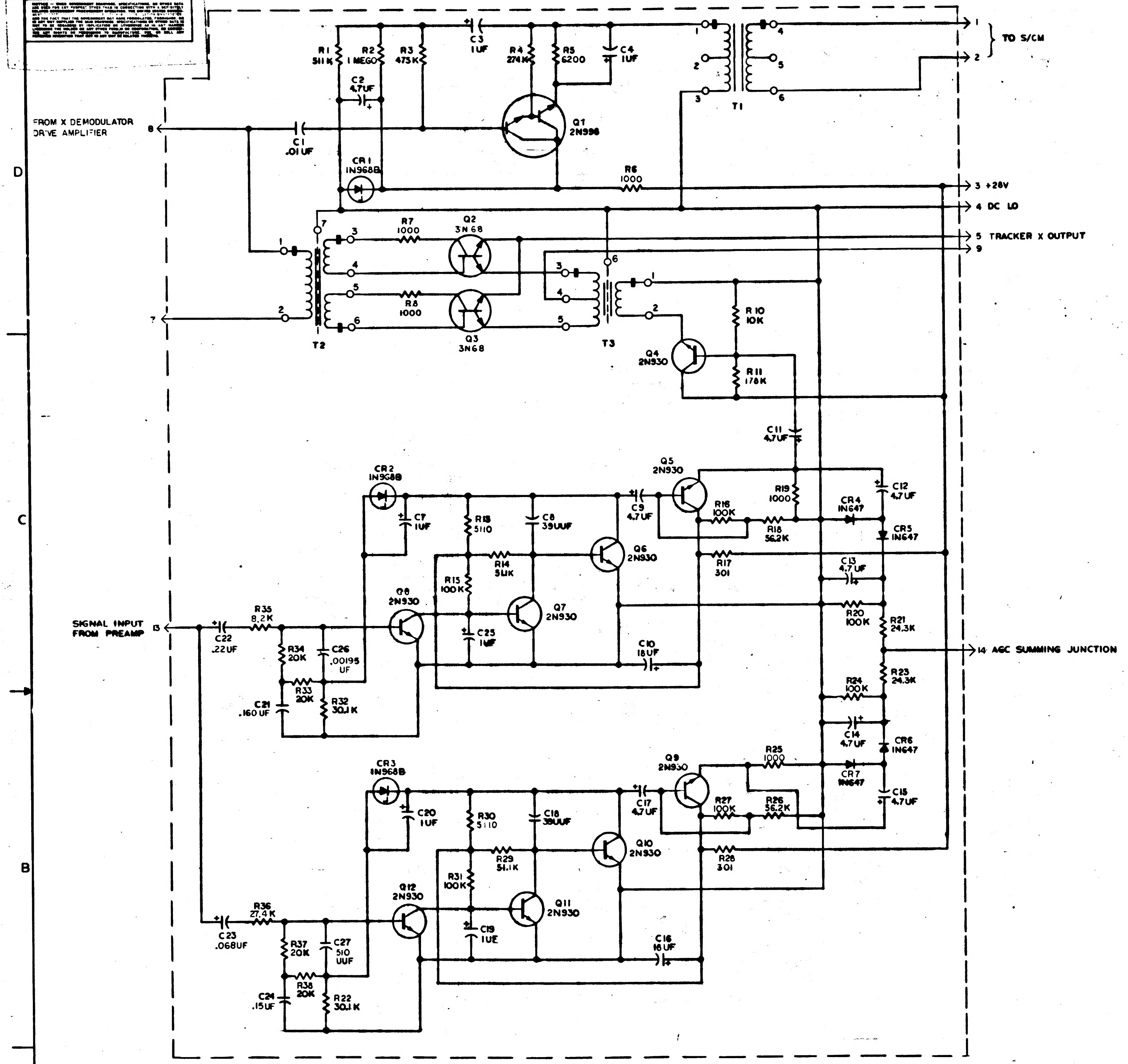

FROM X DEMODULATOR DRIVE AMPLIFIER 8
C1 .01 UF
R1 511 K
R2 1 M
C2 4.7 UF
CR1 1N967B
R3 475K
C3 1 UF
R4 274 K
R5 6200
C4 1 UF
Q1 2N998
R6 2000
T1
1
2
3
4
5
6
2
3
TO S/CM
1 STRUCTURE GROUND
4 +28 V
5 DC LO
6 TRACKER X OUTPUT
9
7
T2
Q2 3N68
Q3 3N68
R7 1000
R8 1000
e1
e2
T3
Q4 2N930
R10 15K
R11 178 K
R39 490
C11 4.7 UF
C28 18 UF
SIGNAL INPUT FROM PREAMP 12
C22 .22 UF
R35 681K
Q8 2N930
R15 100 K
R43 200
Q7 2N930
C25 .1 UF
R14 51.1K
R44 100
C8 39 UUF
Q6 2N930
R13 5110
R45 20
C29 18 UF
R40 490
C26 470 UUF
R33 40.2 K
R34 40.2 K
C21 .160 UF
CR2 1N965B
C7 1 UF
R32 30.1 K
C9 4.7 UF
R16 274K
R18 15K
C10 18UF
Q5 2N930
R17 301
CR8 1N647
T4
C31 4.7UF
R42 100K
13 HV AGE OUT
10
R41 490
R28 301
R31 100K
R29 51.1K
C18 39 UUF
R30 5110
C30 18 UF
R27 274 K
C16 18 UF
Q9 2N930
Q12 2N930
C23 .068UF
R36 332K
R46 200
Q11 2N930
C19 .1UF
R47 100
Q10 2N930
R48 20
C17 4.7 UF
R26 15K
T5
11
CR3 1N965B
C20 1 UF
C27 470 UUF
R38 21 K
R37 21 K
C24 .15 UF
R22 30.1 K

1009520 REV LTR C SH 1

1009520

REVISIONS , 30 F6

SYM	DESCRIPTION	DATE	APPROVAL


FROM X DEMODULATOR DRIVE AMPLIFIER
8
C1 .01 UF
R1 511 K
R2 1 MEGO
C2 4.7UF
R3 475K
C3 1UF
R4 274K
R5 6200
C4 1UF
Q1 2N998
CR1 1N968B
R6 1000
T1
1 2 3 4 5 6
TO S/CM
1
2
3 +28V
4 DC LO
5 TRACKER X OUTPUT
9
7
R7 1000
Q2 3N68
R8 1000
Q3 3N68
T2
T3
R10 10K
Q4 2N930
R11 178K
C11 4.7UF
CR2 1N968B
C7 1UF
R13 5110
C8 39UUF
Q5 2N930
C9 4.7UF
R16 100K
R19 1000
C12 4.7UF
CR4 1N647
R18 56.2K
CR5 1N647
R14 51.1K
Q6 2N930
R17 301
C13 4.7UF
R15 100K
Q8 2N930
Q7 2N930
R20 100K
R21 24.3K
SIGNAL INPUT FROM PREAMP
13
C22 .22UF
R35 8.2K
R34 20K
C26 .00195 UF
C25 1UF
C10 18UF
14 AGC SUMMING JUNCTION
R33 20K
R24 100K
R23 24.3K
C21 .160 UF
R32 30.1 K
C14 4.7UF
CR6 1N647
R25 1000
CR3 1N968B
Q9 2N930
CR7 1N647
C20 1UF
R30 5110
C18 39UUF
C17 4.7UF
R27 100K
R26 56.2K
C15 4.7UF
R29 51.1K
Q10 2N930
R28 301
R31 100K
Q12 2N930
Q11 2N930
C23 .068UF
R36 27.4K
R37 20K
C27 510 UUF
C19 1UF
C16 18UF
R38 20K
C24 .15UF
R22 30.1 K

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010359-29	CAPACITOR	.01 UF	± 10%	200 VDC
C 2	1010393-037		4.7 UF	± 10%	50VDC
C 3	1006755-69		1 UF	± 10%	35VDC
C 4	1006755-69		1 UF	± 10%	35VDC
C 7	1006755-69		1 UF	± 10%	35VDC
C 8	1010409-15		39 UUF	± 2%	500VDC
C 9	1006755-77		4.7UF	± 10%	35VDC
C 10	1010393-044		18 UF	± 10%	50VDC
C 11	1006755-77		4.7 UF	± 10%	35VDC
C 12			4.7 UF	± 10%	35VDC
C 13			4.7 UF	± 10%	35VDC
C 14			4.7 UF	± 10%	35VDC
C 15	1006755-77		4.7 UF	± 10%	35VDC
C 16	1010393-044		18 UF	± 10%	50VDC
C 17	1006755-77		4.7 UF	± 10%	35VDC
C 18	1010409-15		39 UUF	± 2%	500VDC
C 19	1006755-69		1 UF	± 10%	35VDC
C 20	1006755-69		1 UF	± 10%	35VDC
C 21	1010317-6		.160UF	± 1%	30VDC
C 22	1006755-61		.22UF	± 10%	35VDC
C 23	1006755-55		.068UF	± 10%	35VDC
C 24	1010317-7		.15UF	± 1%	30VDC
C 25	1006755-69		1 UF	± 10%	35VDC
C 26	1010316-105		.00195UF	± 1%	100VDC
C 27	1006793-80	CAPACITOR	510 UUF	± 2%	500VDC
CR 1	1010286-12	DIODE	1N968B		
CR 2			1N968B		
CR 3	1010286-12		1N968B		
CR 4	1010362-002		1N647		
CR 5			1N647		
CR 6			1N647		
CR 7	1010362-002	DIODE	1N647		
Q 1	1010342	TRANSISTOR	2N998		
Q 2	1010367		3N68		
Q 3	1010367		3N68		
Q 4	1010397-001		2N930		
Q 5					
Q 6					
Q 7					
Q 8					
Q 9					
Q 10					
Q 11					
Q 12	1010397-001	TRANSISTOR	2N930		
R 1	1010374-1	RESISTOR	511 K	± 1%	1/8 W
R 2	1010374-29		1MEGO	± 1%	
R 3	1010364-765		475K	± 1%	
R 4	1010364-719		274K	± 1%	1/8 W
R 5	1006750-51		6200	± 2%	1/4 W
R 6	1010364-251		1000	± 1%	1/8 W
R 7	-251		1000		
R 8	-251		1000		
R 10	-443		10K		
R 11	-683		178K		
R 13	-388		5110		
R 14	-580		51.1K		
R 15	-635		100K		
R 16	-635		100K		
R 17	-151		301		
R 18	-587		56.2K		
R 19	-251		1000		
R 20	-635		100K		
R 21	-518		24.3K		
R 22	-535		30.1K		
R 23	-518		24.3K		
R 24	-635		100K		
R 25	-251		1000		
R 26	-587		56.2K		
R 27	-635		100K		
R 28	-151		301		
R 29	-580		51.1K		
R 30	-388		5110		
R 31	-635		100K		
R 32	-535		30.1K		
R 33	-502		20K		
R 34	-502		20K		
R 35	-428		8.2K		
R 36	-528		27.4K		
R 37	-502		20K		
R 38	1010364-502	RESISTOR	20K	± 1%	1/8 W
T 1	1010329-1	TRANSFORMER			
T 2	1012054				
T 3	1012053	TRANSFORMER			

REF DWG:
TRACKER X CHANNEL
ELECTRONIC ASSY
DWG NO. 1007566

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 8-25-6
CHECKED
APPROVAL DaKoso
APPROVAL
NASA APPROVAL 9-29-6
MIT APPROVAL 21

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TRACKER X CHANNEL ELECTRONIC

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009520
SCALE NONE
WT —
SHEET OF

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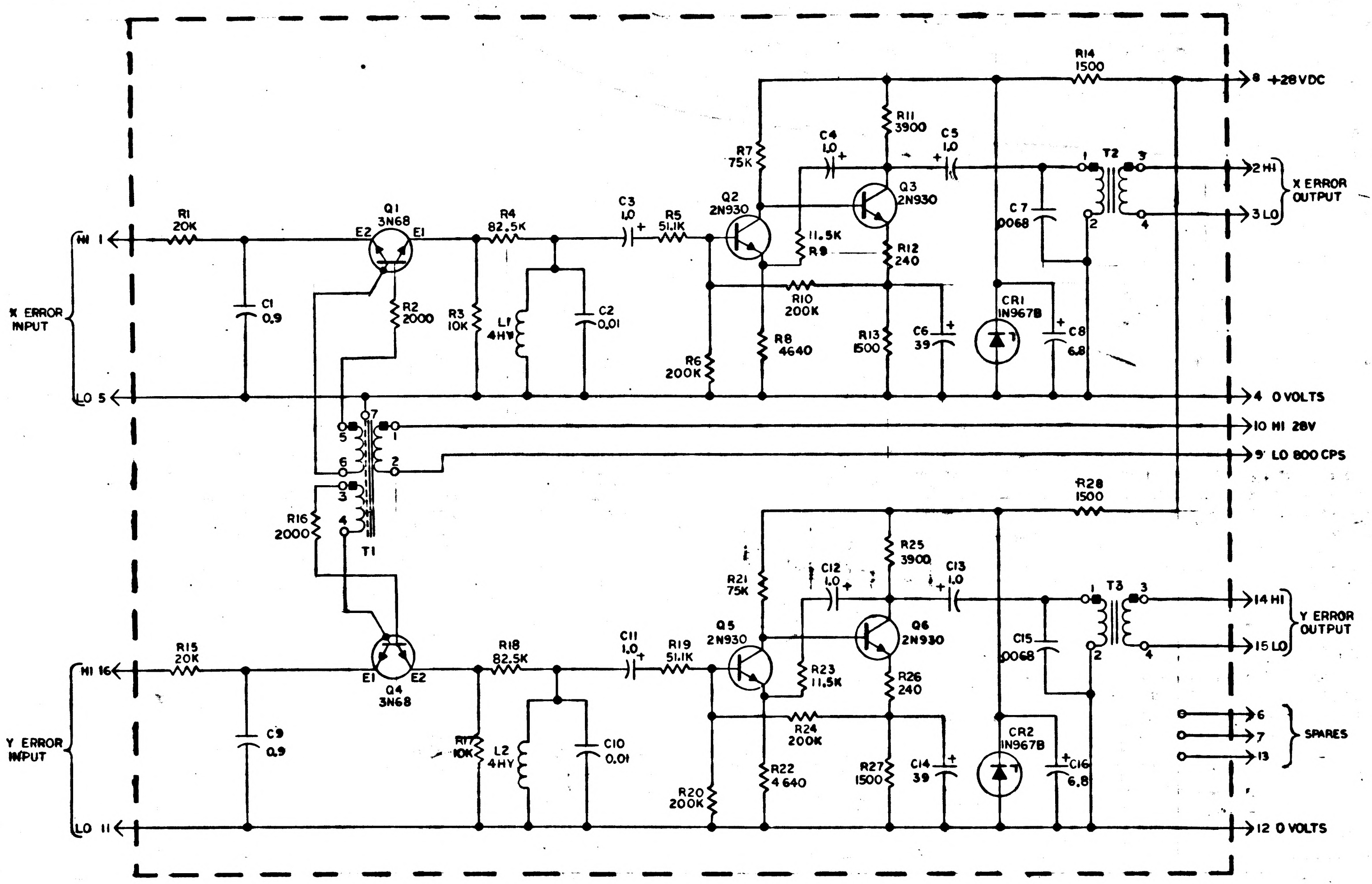
REVISIONS /3393			
SYM	DESCRIPTION	DATE	A
A	REVISED PER TDRR 1-3914	11/7/64	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R1 20K
C1 0.9
Q1 3N68
E2
E1
R2 2000
R3 10K
R4 82.5K
L1 4HY
C2 0.01
C3 1.0
R5 51.1K
Q2 2N930
R7 75K
C4 1.0
R11 3900
C5 1.0
Q3 2N930
11.5K R9
R12 240
R10 200K
R8 4640
R6 200K
R13 1500
C6 39
R14 1500
C7 .0068
CR1 1N967B
C8 6.8
T2
1
2
3
4
8 +28VDC
2 HI
3 LO
X ERROR OUTPUT
4 0 VOLTS
10 HI 28V
9 LO 800 CPS
T1
5
6
7
R16 2000
R28 1500
HI 16
Y ERROR INPUT
LO 11
R15 20K
C9 0.9
Q4 3N68
R17 10K
R18 82.5K
L2 4HY
C10 0.01
C11 1.0
R19 51.1K
Q5 2N930
R21 75K
C12 1.0
R25 3900
C13 1.0
Q6 2N930
R23 11.5K
R26 240
R24 200K
R22 4640
R20 200K
R27 1500
C14 39
C15 .0068
CR2 1N967B
C16 6.8
T3
14 HI
15 LO
Y ERROR OUTPUT
6
7
13
SPARES
12 0 VOLTS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	1%	1/8 W
R2	1006750-39		2000	2%	1/4 W
R3	1010364-443		10K	1%	1/8 W
R4	1010364-619		82.5K	1%	1/8 W
R5	1010364-579		51.1K	1%	1/8 W
R6	1010364-693		200K	1%	1/8 W
R7	1006750-77		75K	2%	1/4 W
R8	1010364-379		4640	1%	1/8 W
R9	1010364-455		11.5K	1%	1/8 W
R10	1010364-693		200K	1%	1/8 W
R11	1006750-46		3900	2%	1/4 W
R12	1006750-17		240	2%	1/4 W
R13	1006750-36		1500	2%	1/4 W
R14	1006750-36		1500	2%	1/4 W
R15	1010364-501		20K	1%	1/8 W
R16	1006750-39		2000	2%	1/4 W
R17	1010364-443		10K	1%	1/8 W
R18	1010364-619		82.5K	1%	1/8 W
R19	1010364-579		51.1K	1%	1/8 W
R20	1010364-693		200K	1%	1/8 W
R21	1006750-77		75K	2%	1/4 W
R22	1010364-379		4640	1%	1/8 W
R23	1010364-455		11.5K	1%	1/8 W
R24	1010364-693		200K	1%	1/8 W
R25	1006750-46		3900	2%	1/4 W
R26	1006750-17		240	2%	1/4 W
R27	1006750-36		1500	2%	1/4 W
R28	1006750-36	RESISTOR	1500	2%	1/4 W
C1	1010279-111	CAPACITOR	0.9	10%	15V
C2	1010264-13		0.01	5%	200V
C3	1006755-69		1.0	10%	35V
C4	1006755-69		1.0	10%	35V
C5	1006755-69		1.0	10%	35V
C6	1006755-13		39	10%	10V
C7	1010264-11		.0068	5%	200V
C8	1006755-79		6.8	10%	35V
C9	1010279-111		0.9	10%	15V
C10	1010264-13		0.01	5%	200V
C11	1006755-69		1.0	10%	35V
C12	1006755-69		1.0	10%	35V
C13	1006755-69		1.0	10%	35V
C14	1006755-13		39	10%	10V
C15	1010264-11		.0068	5%	200V
C16	1006755-79	CAPACITOR	6.8	10%	35V
CR1	1010830-11	DIODE	1N967B		
CR2	1010830-11	DIODE	1N967B		
L1	1010277-6	INDUCTOR	4HY		
L2	1010277-6	INDUCTOR	4HY		
Q1	1010367	TRANSISTOR	3N68		
Q2	1010397-1		2N930		
Q3	1010397-1		2N930		
Q4	1010367		3N68		
Q5	1010397-1		2N930		
Q6	1010397-1	TRANSISTOR	2N930		
T1	1010753	TRANSFORMER			
T2	1010759	TRANSFORMER			
T3	1010759	TRANSFORMER			

OTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG
MODULATOR AND LOOP COMPENSATION MODULE ASSEMB
DWG NO. 1007511

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN R.B. DATE
CHECKED
APPROVAL R.C. 9-23-64
APPROVAL 10-2-64
NASA APPROVAL W. J. 10-14-64
MIT APPROVAL

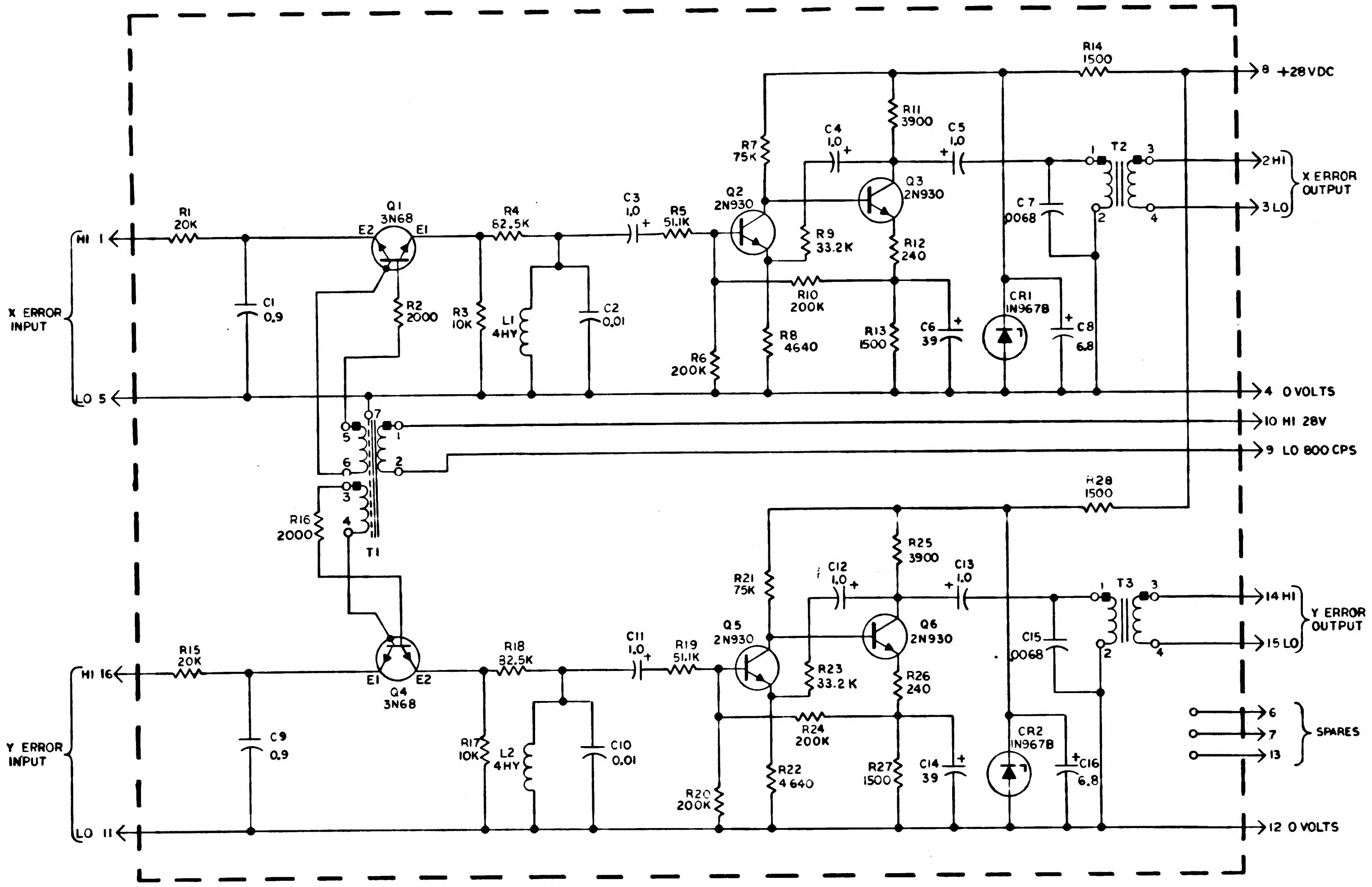
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC MODULATOR AND LOOP COMPENSATION

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009521
SCALE —
WT —
SHEET 1 OF

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 13393			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 13914		W.K.
B	REVISED PER TDRR 18956	14 MAY 65	A.N. E.F.



HI 1
X ERROR INPUT
LO 5
R1 20K
C1 0.9
Q1 3N68
E2
E1
R2 2000
R3 10K
R4 82.5K
L1 4HY
C2 0.01
C3 1.0
R5 51.1K
Q2 2N930
R7 75K
C4 1.0
R9 33.2K
R10 200K
R6 200K
R8 4640
R11 3900
Q3 2N930
R12 240
R13 1500
C6 39
C5 1.0
C7 .0068
CR1 1N967B
C8 6.8
R14 1500
T2
1
2
3
4
8 +28VDC
2 HI
3 LO
X ERROR OUTPUT
4 0 VOLTS
10 HI 28V
9 LO 800 CPS
T1
5
6
7
R16 2000
R28 1500
R21 75K
C12 1.0
R25 3900
C13 1.0
T3
14 HI
15 LO
Y ERROR OUTPUT
HI 16
Y ERROR INPUT
LO 11
R15 20K
C9 0.9
Q4 3N68
R17 10K
R18 82.5K
L2 4HY
C10 0.01
C11 1.0
R19 51.1K
Q5 2N930
Q6 2N930
R23 33.2K
R24 200K
R20 200K
R22 4640
R26 240
R27 1500
C14 39
C15 .0068
CR2 1N967B
C16 6.8
6
7
13
SPARES
12 0 VOLTS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	1%	1/8 W
R2	1006750-39		2000	2%	1/4 W
R3	1010364-443		10K	1%	1/8 W
R4	1010364-619		82.5K	1%	1/8 W
R5	1010364-579		51.1K	1%	1/8 W
R6	1010364-693		200K	1%	1/8 W
R7	1006750-77		75K	2%	1/4 W
R8	1010364-379		4640	1%	1/8 W
R9	1010364-543		33.2K	1%	1/8 W
R10	1010364-693		200K	1%	1/8 W
R11	1006750-46		3900	2%	1/4 W
R12	1006750-17		240	2%	1/4 W
R13	1006750-36		1500	2%	1/4 W
R14	1006750-36		1500	2%	1/4 W
R15	1010364-501		20K	1%	1/8 W
R16	1006750-39		2000	2%	1/4 W
R17	1010364-443		10K	1%	1/8 W
R18	1010364-619		82.5K	1%	1/8 W
R19	1010364-579		51.1K	1%	1/8 W
R20	1010364-693		200K	1%	1/8 W
R21	1006750-77		75K	2%	1/4 W
R22	1010364-379		4640	1%	1/8 W
R23	1010364-543		33.2K	1%	1/8 W
R24	1010364-693		200K	1%	1/8 W
R25	1006750-46		3900	2%	1/4 W
R26	1006750-17		240	2%	1/4 W
R27	1006750-36		1500	2%	1/4 W
R28	1006750-36	RESISTOR	1500	2%	1/4 W
C1	1010279-111	CAPACITOR	0.9	10%	15V
C2	1010264-13		0.01	5%	200V
C3	1006755-69		1.0	10%	35V
C4	1006755 69		1.0	10%	35V
C5	1006755-69		1.0	10%	35V
C6	1006755-13		39	10%	10V
C7	1010264-11		.0068	5%	200V
C8	1006755-79		6.8	10%	35V
C9	1010279-111		0.9	10%	15V
C10	1010264-13		0.01	5%	200V
C11	1006755-69		1.0	10%	35V
C12	1006755-69		1.0	10%	35V
C13	1006755-69		1.0	10%	35V
C14	1006755-13		39	10%	10V
C15	1010264-11		.0068	5%	200V
C16	1006755-79	CAPACITOR	6.8	10%	35V
CR1	1010830-11	DIODE	1N967B		
CR2	1010830-11	DIODE	1N967B		
L1	1010277-6	INDUCTOR	4HY		
L2	1010277-6	INDUCTOR	4HY		
Q1	1010367	TRANSISTOR	3N68		
Q2	1010397-1		2N930		
Q3	1010397-1		2N930		
Q4	1010367		3N68		
Q5	1010397-1		2N930		
Q6	1010397-1	TRANSISTOR	2N930		
T1	1010753	TRANSFORMER			
T2	1010759	TRANSFORMER			
T3	1010759	TRANSFORMER			

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG
MODULATOR AND LOOP COMPENSATION MODULE ASSEMBLY
DWG NO. 1007511

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN R.B. DATE 18 MAY 64
CHECKED
APPROVAL R.C. 9-22-64
APPROVAL 10-2-64
NASA APPROVAL W. J. 10-14-64
MIT APPROVAL

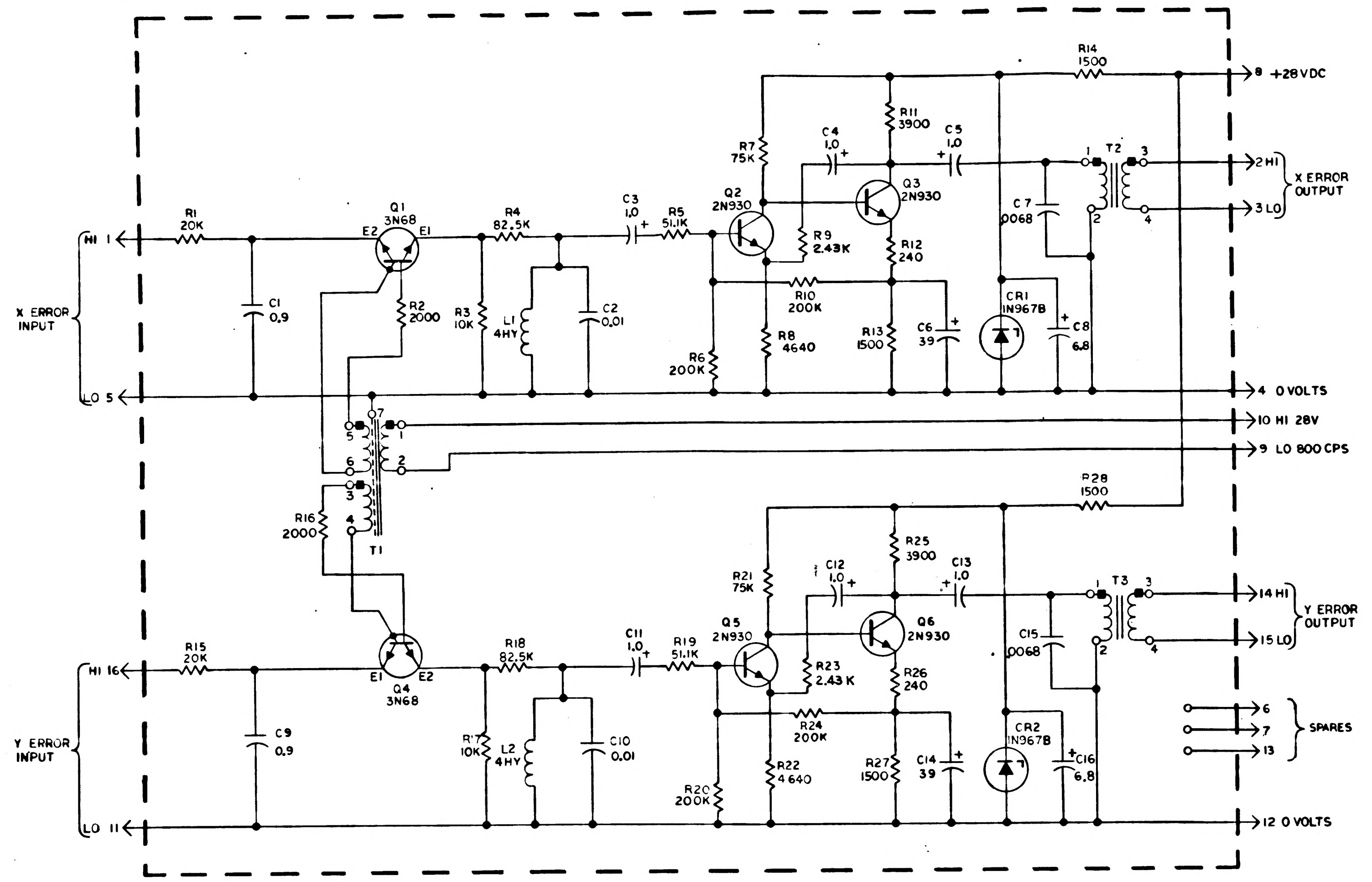
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC MODULATOR AND LOOP COMPENSATION

CODE IDENT NO 80230
SIZE E
NASA DRAWING NO 1009521
SCALE —
WT —
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 13914	[illegible]	WK.
B	REVISED PER TDRR 3956	14 MAY 65	A.N. EF
C	REVISED PER [illegible]ER 20125	19-JUN 65	MG


X ERROR INPUT
HI 1
LO 5
R1 20K
C1 0.9
Q1 3N68
E2
E1
R2 2000
R3 10K
R4 82.5K
L1 4HY
C2 0.01
C3 1.0
R5 51.1K
Q2 2N930
R6 200K
R7 75K
R8 4640
R9 2.43K
R10 200K
C4 1.0
Q3 2N930
R11 3900
R12 240
R13 1500
C5 1.0
C6 39
C7 .0068
CR1 1N967B
C8 6.8
R14 1500
T2
8 +28VDC
2 HI
3 LO
X ERROR OUTPUT
4 0 VOLTS
10 HI 28V
9 LO 800 CPS
T1
R16 2000
R28 1500
Y ERROR INPUT
HI 16
LO 11
R15 20K
C9 0.9
Q4 3N68
R17 10K
R18 82.5K
L2 4HY
C10 0.01
C11 1.0
R19 51.1K
Q5 2N930
R20 200K
R21 75K
R22 4640
R23 2.43K
R24 200K
C12 1.0
Q6 2N930
R25 3900
R26 240
R27 1500
C13 1.0
C14 39
C15 .0068
CR2 1N967B
C16 6.8
T3
14 HI
15 LO
Y ERROR OUTPUT
6
7
13
SPARES
12 0 VOLTS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	1%	1/8 W
R2	1006750-39		2000	2%	1/4 W
R3	1010364-443		10K	1%	1/8 W
R4	1010364-619		82.5K	1%	1/8 W
R5	1010364-579		51.1K	1%	1/8 W
R6	1010364-693		200K	1%	1/8 W
R7	1006750-77		75K	2%	1/4 W
R8	1010364-379		4640	1%	1/8 W
R9	1010364-325		2.43K	1%	1/8 W
R10	1010364-693		200K	1%	1/8 W
R11	1006750-46		3900	2%	1/4 W
R12	1006750-17		240	2%	1/4 W
R13	1006750-36		1500	2%	1/4 W
R14	1006750-36		1500	2%	1/4 W
R15	1010364-501		20K	1%	1/8 W
R16	1006750-39		2000	2%	1/4 W
R17	1010364-443		10K	1%	1/8 W
R18	1010364-619		82.5K	1%	1/8 W
R19	1010364-579		51.1K	1%	1/8 W
R20	1010364-693		200K	1%	1/8 W
R21	1006750-77		75K	2%	1/4 W
R22	1010364-379		4640	1%	1/8 W
R23	1010364-325		2.43K	1%	1/8 W
R24	1010364-693		200K	1%	1/8 W
R25	1006750-46		3900	2%	1/4 W
R26	1006750-17		240	2%	1/4 W
R27	1006750-36		1500	2%	1/4 W
R28	1006750-36	RESISTOR	1500	2%	1/4 W
C1	1010279-111	CAPACITOR	0.9	10%	15V
C2	1010264-13		0.01	5%	200V
C3	1006755-69		1.0	10%	35V
C4	1006755-69		1.0	10%	35V
C5	1006755-69		1.0	10%	35V
C6	1006755-13		39	10%	10V
C7	1010264-11		.0068	5%	200V
C8	1006755-79		6.8	10%	35V
C9	1010279-111		0.9	10%	15V
C10	1010264-13		0.01	5%	200V
C11	1006755-69		1.0	10%	35V
C12	1006755-69		1.0	10%	35V
C13	1006755-69		1.0	10%	35V
C14	1006755-13		39	10%	10V
C15	1010264-11		.0068	5%	200V
C16	1006755-79	CAPACITOR	6.8	10%	35V
CR1	1010830-11	DIODE	1N967B		
CR2	1010830-11	DIODE	1N967B		
L1	1010277-6	INDUCTOR	4HY		
L2	1010277-6	INDUCTOR	4HY		
Q1	1010367	TRANSISTOR	3N68		
Q2	1010397-1		2N930		
Q3	1010397-1		2N930		
Q4	1010367		3N68		
Q5	1010397-1		2N930		
Q6	1010397-1	TRANSISTOR	2N930		
T1	1010753	TRANSFORMER			
T2	1010759	TRANSFORMER			
T3	1010759	TRANSFORMER			

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG
MODULATOR AND LOOP COMPENSATION MODULE ASSEMBLY
DWG NO. 1007511

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO — CONTRACT
DRAWN R.B. [illegible] DATE 18MAY64
CHECKED [illegible]
APPROVAL R.C. [illegible] 9-22-64
APPROVAL [illegible] 10-2-64
NASA APPROVAL W.J. [illegible] 10-14-64
MIT APPROVAL [illegible]

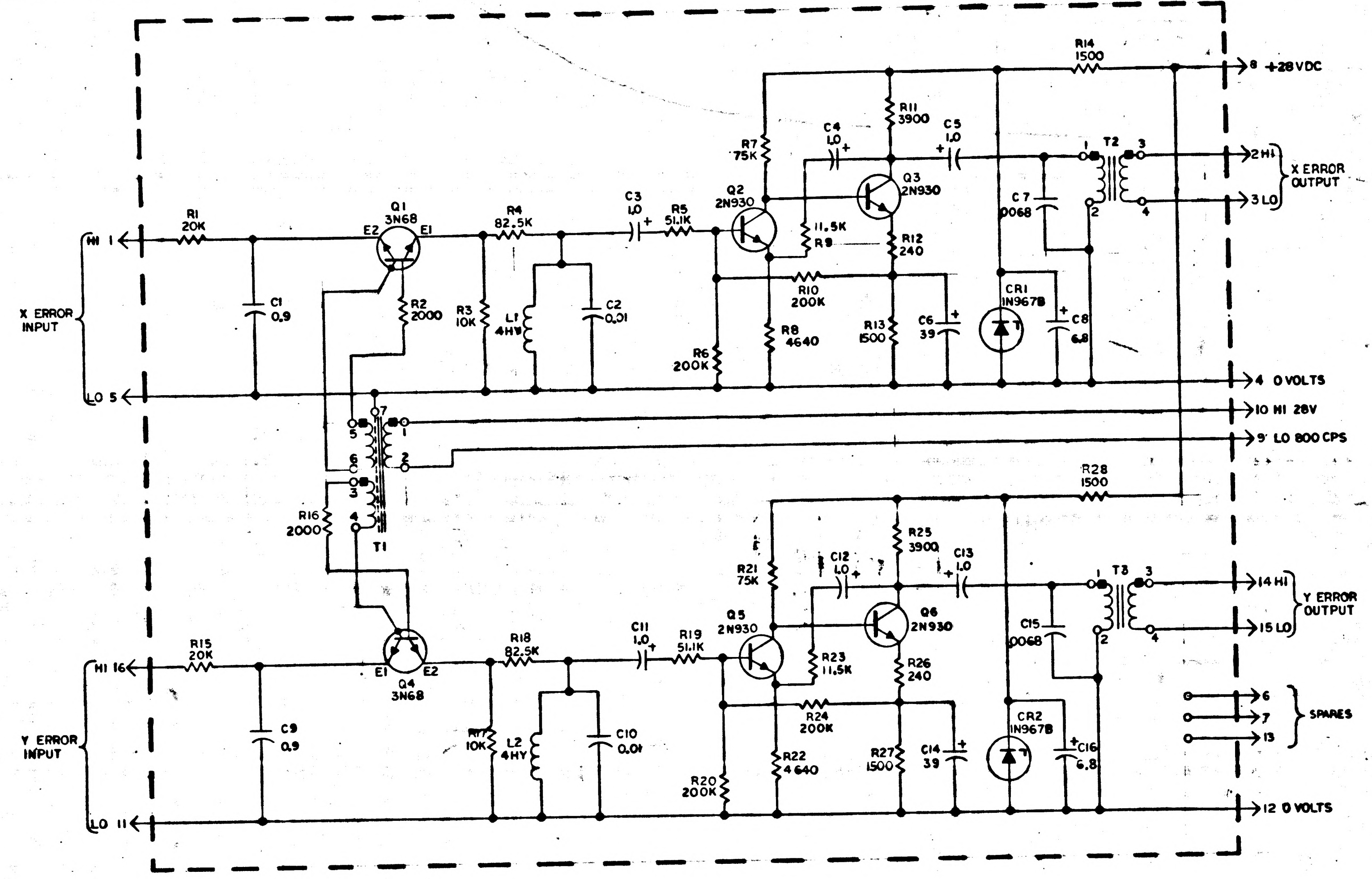
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC MODULATOR AND LOOP COMPENSATION

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO 1009521
SCALE —
WT —
SHEET 1 OF 1

REVISIONS /3593			
SYM	DESCRIPTION	DATE	APPROVAL

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO


X ERROR INPUT
HI 1
LO 5
R1 20K
C1 0.9
Q1 3N68
E2
E1
R2 2000
R3 10K
R4 82.5K
L1 4HY
C2 0.01
C3 1.0
R5 51.1K
Q2 2N930
R6 200K
R7 75K
R8 4640
R9 11.5K
R10 200K
C4 1.0
R11 3900
Q3 2N930
R12 240
R13 1500
C5 1.0
C6 39
CR1 1N967B
C7 .0068
C8 6.8
R14 1500
T2
8 +28VDC
2 HI
3 LO
X ERROR OUTPUT
4 0 VOLTS
10 HI 28V
9 LO 800 CPS
T1
R16 2000
R28 1500
Y ERROR INPUT
HI 16
LO 11
R15 20K
C9 0.9
Q4 3N68
R17 10K
R18 82.5K
L2 4HY
C10 0.01
C11 1.0
R19 51.1K
Q5 2N930
R20 200K
R21 75K
R22 4640
R23 11.5K
R24 200K
C12 1.0
R25 3900
Q6 2N930
R26 240
R27 1500
C13 1.0
C14 39
CR2 1N967B
C15 .0068
C16 6.8
T3
14 HI
15 LO
Y ERROR OUTPUT
SPARES
6
7
13
12 0 VOLTS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	1%	1/8 W
R2	1006750-39		2000	2%	1/4 W
R3	1010364-443		10K	1%	1/8 W
R4	1010364-619		82.5K	1%	1/8 W
R5	1010364-579		51.1K	1%	1/8 W
R6	1010364-693		200K	1%	1/8 W
R7	1006750-77		75K	2%	1/4 W
R8	1010364-379		4640	1%	1/8 W
R9	1010364-455		11.5K	1%	1/8 W
R10	1010364-693		200K	1%	1/8 W
R11	1006750-46		3900	2%	1/4 W
R12	1006750-17		240	2%	1/4 W
R13	1006750-36		1500	2%	1/4 W
R14	1006750-36		1500	2%	1/4 W
R15	1010364-501		20K	1%	1/8 W
R16	1006750-39		2000	2%	1/4 W
R17	1010364-443		10K	1%	1/8 W
R18	1010364-619		82.5K	1%	1/8 W
R19	1010364-579		51.1K	1%	1/8 W
R20	1010364-693		200K	1%	1/8 W
R21	1006750-77		75K	2%	1/4 W
R22	1010364-379		4640	1%	1/8 W
R23	1010364-455		11.5K	1%	1/8 W
R24	1010364-693		200K	1%	1/8 W
R25	1006750-46		3900	2%	1/4 W
R26	1006750-17		240	2%	1/4 W
R27	1006750-36		1500	2%	1/4 W
R28	1006750-36	RESISTOR	1500	2%	1/4 W
C1	1010279-111	CAPACITOR	0.9	10%	15V
C2	1010264-13		0.01	5%	200V
C3	1006755-69		1.0	10%	35V
C4	1006755-69		1.0	10%	35V
C5	1006755-69		1.0	10%	35V
C6	1006755-13		39	10%	10V
C7	1010264-11		.0068	5%	200V
C8	1006755-79		6.8	10%	35V
C9	1010279-111		0.9	10%	15V
C10	1010264-13		0.01	5%	200V
C11	1006755-69		1.0	10%	35V
C12	1006755-69		1.0	10%	35V
C13	1006755-69		1.0	10%	35V
C14	1006755-13		39	10%	10V
C15	1010264-11		.0068	5%	200V
C16	1006755-79	CAPACITOR	6.8	10%	35V
CR1	1010286-11	DIODE	1N967B		
CR2	1010286-11	DIODE	1N967B		
L1	1010277-6	INDUCTOR	4HY		
L2	1010277-6	INDUCTOR	4HY		
Q1	1010367	TRANSISTOR	3N68		
Q2	1010397-1		2N930		
Q3	1010397-1		2N930		
Q4	1010367		3N68		
Q5	1010397-1		2N930		
Q6	1010397-1	TRANSISTOR	2N930		
T1	1010753	TRANSFORMER			
T2	1010759	TRANSFORMER			
T3	1010759	TRANSFORMER			

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

REF DWG
MODULATOR AND LOOP COMPENSATION MODULE ASSEMBLY
DWG NO. 1007511

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

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DWG NO
CONTRACT
DRAWN R.B. DATE 15MAY64
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APPROVAL R.C. 9-23-64
APPROVAL 10-2-64
NASA APPROVAL W J 10-14-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
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SCHEMATIC MODULATOR AND LOOP COMPENSATION

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1009521
SCALE —
WT —
SHEET 1 OF 1

MASTER

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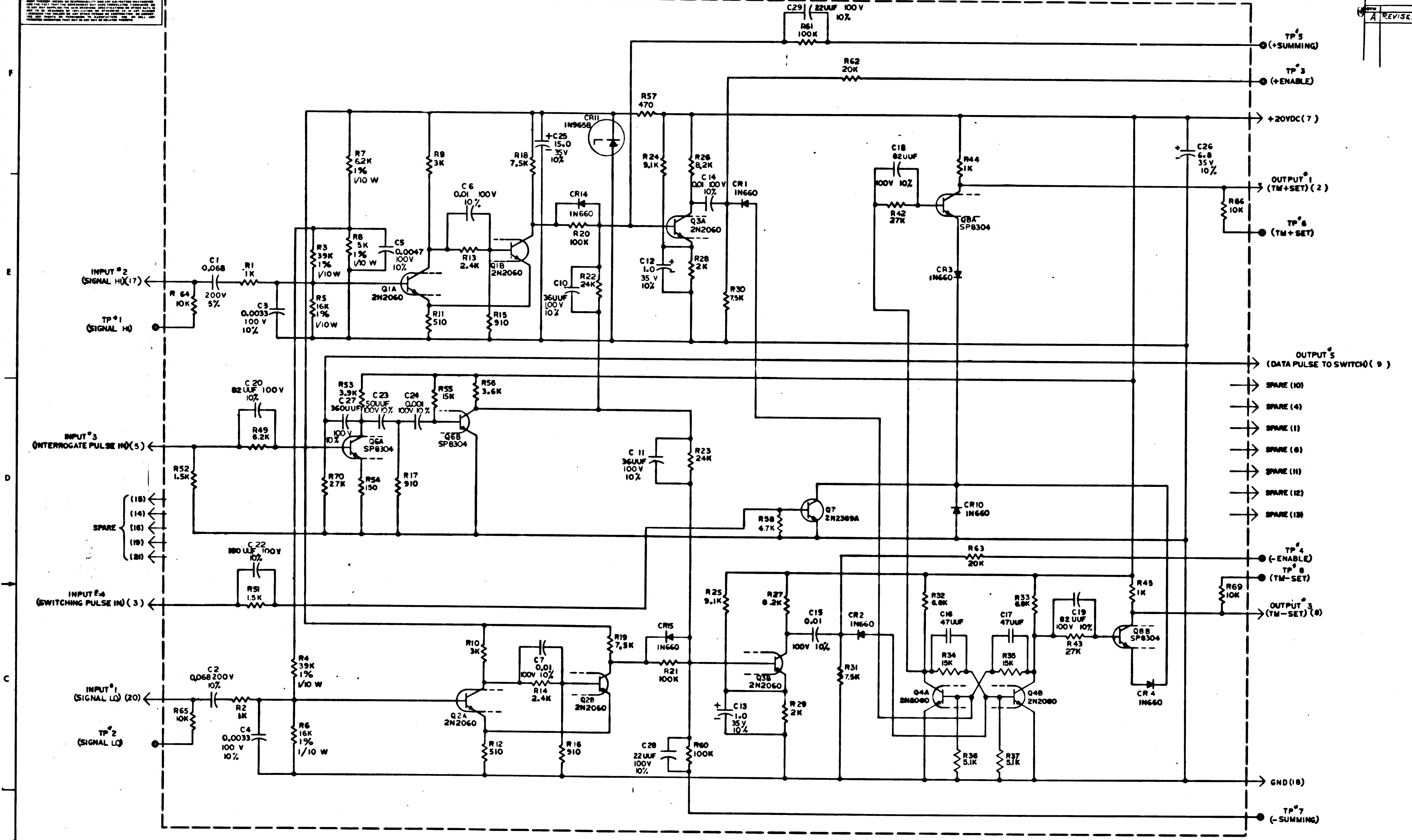
REVISIONS 14705

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16636	24-FEB-65	



C29 22UUF 100 V 10%
R61 100K
TP#5 (+SUMMING)
R62 20K
TP#3 (+ENABLE)
R57 470
+20VDC(7)
CR11 1N965B
C25 15.0 35V 10%
R7 6.2K 1% 1/10 W
R9 3K
R18 7.5K
R24 9.1K
R26 8.2K
C14 0.01 100V 10%
CR1 1N660
C18 82UUF 100V 10%
R44 1K
C26 6.8 35V 10%
OUTPUT#1 (TM+SET) (2)
R66 10K
TP#6 (TM+SET)
C6 0.01 100V 10%
CR14 1N660
R20 100K
Q3A 2N2060
R42 27K
Q8A SP8304
R3 39K 1% 1/10W
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
R13 2.4K
Q1B 2N2060
C12 1.0 35 V 10%
R28 2K
CR3 1N660
INPUT#2 (SIGNAL HI)(17)
C1 0.068 200V 5%
R1 1K
Q1A 2N2060
C10 36UUF 100V 10%
R22 24K
R30 7.5K
R64 10K
C3 0.0033 100 V 10%
R5 16K 1% 1/10W
R11 510
R15 910
TP#1 (SIGNAL HI)
OUTPUT#5 (DATA PULSE TO SWITCH)(9)
C20 82 UUF 100V 10%
R53 3.9K
C27 360UUF 100V 10%
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
SPARE (10)
SPARE (4)
SPARE (1)
SPARE (6)
SPARE (11)
SPARE (12)
SPARE (13)
INPUT#3 (INTERROGATE PULSE IN)(5)
R49 6.2K
Q6A SP8304
Q6B SP8304
C11 36UUF 100V 10%
R23 24K
R52 1.5K
R70 2.7K
R54 150
R17 910
Q7 2N2369A
CR10 1N660
R58 4.7K
SPARE (15) (14) (16) (19) (21)
C22 180 UUF 100V 10%
R63 20K
TP#4 (-ENABLE)
TP#8 (TM-SET)
INPUT#4 (SWITCHING PULSE IN) (3)
R51 1.5K
R25 9.1K
R27 8.2K
C15 0.01 100V 10%
CR2 1N660
R32 6.8K
C16 47UUF
C17 47UUF
R33 6.8K
C19 82 UUF 100V 10%
R45 1K
R69 10K
OUTPUT#3 (TM-SET) (8)
R10 3K
C7 0.01 100V 10%
R19 7.5K
CR15 1N660
R21 100K
Q3B 2N2060
R34 15K
R35 15K
R43 27K
Q8B SP8304
INPUT#1 (SIGNAL LO) (20)
C2 0.068 200V 10%
R2 1K
R4 39K 1% 1/10 W
Q2A 2N2060
R14 2.4K
Q2B 2N2060
R31 7.5K
Q4A 2N2060
Q4B 2N2060
CR4 1N660
R65 10K
C4 0.0033 100 V 10%
R6 16K 1% 1/10 W
R12 510
R16 910
C13 1.0 35V 10%
R29 2K
TP#2 (SIGNAL LO)
C28 22UUF 100V 10%
R60 100K
R36 5.1K
R37 5.1K
GND(18)
TP#7 (-SUMMING)

REFERENCE DRAWING:
INTERROGATOR ASSY DWG NO. 1007519

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUB ASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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DRAWN J. Klimowski DATE 2 OCT 64
CHECKED L. Udorich 15 OCT 64
APPROVAL J M Eleanor
APPROVAL Sitomer 12/2/64
NASA APPROVAL 12-8-64
MIT APPROVAL

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SCHEMATIC
INTERROGATOR

CODE IDENT NO. SIZE E NASA DRAWING NO. 1009522
SCALE — WT SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 6636	24-5-65	

REF. DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	1006750-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR WW	39K	±1%	1/10W
R4	↑ -49	↑	39K	±1%	1/10W
R5	-105		16K	±1%	1/10W
R6	-105		16K	±1%	1/10W
R7	↓ -106	↓	6.2K	±1%	1/10W
R8	1010377-51	RESISTOR WW	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	↑ -43	↑	3K	↑	↑
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-52		6.8K		
R33	-52		6.8K		
R34	-60		15K		
R35	-60		15K		
R36	↓ -49	↓	5.1K	↓	↓
R37	1006750-49	RESISTOR MF	5.1K	±2%	1/4W
R42	1006750-66	RESISTOR MF	27K	±2%	1/4W
R43	↑ -66	↑	27K	↑	↑
R44	↓ -32	↓	1K	↓	↓
R45	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R49	1006750-51	RESISTOR MF	6.2K	±2%	1/4W
R51	1006750-36	RESISTOR MF	1.5K	±2%	1/4W
R52	↑ -36	↑	1.5K	↑	↑
R53	-46		3.9K		
R54	-12		150		
R55	-60		15K		
R56	-45		3.6K		
R57	↓ -24	↓	470	↓	↓
R58	1006750-48	RESISTOR MF	4.7K	±2%	1/4W
R60	1006750-80	RESISTOR MF	100K	±2%	1/4W
R61	↑ -80	↑	100K	↑	↑
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	↓ -56	↓	10K	↓	↓
R66	1006750-56	RESISTOR MF	10K	±2%	1/4W
R69	1006750-56	RESISTOR MF	10K	±2%	1/4W
R70	1006750-42	RESISTOR MF	2.7K	±2%	1/4W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	0.068	±5 %	200V
C2	1010264-23	↓	0.068	±10 %	200V
C3	1006777-27	CAP CER	0.0033	±10 %	100V
C4	↑ -27	↑	0.0033	±10 %	100V
C5	-28		0.0047	±10 %	100V
C6	↓ 31	↓	0.01	±10 %	100V
C7	1006777-31	CAP CER	0.01	±10 %	100V
C10	1006777-5	CAP CER	36uuf	±10 %	100V
C11	1006777-5	CAP CER	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10 %	35 V
C13	1006755-69	↓	1.0	±10 %	35 V
C14	1006777-31	CAP CER	0.01	±10 %	100V
C15	↑ -31	↑	0.01	±10 %	100V
C16	-7		47uuf	±10 %	100V
C17	-7		47uuf	±10 %	100V
C18	-12		82 uuf	±10 %	100V
C19	↓ -12	↓	82 UUF	±10 %	100V
C20	1006777-12	CAP CER	82uuf	±10 %	100V
C22	1006777-13	CAP CER	100uuf	±10 %	100V
C23	1006777-8	CAP CEP	50uuf	±10 %	100V
C24	1006777-24	CAP CER	0.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±10 %	35 V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360uuf	±10 %	100V
C28	1006777-3	CAP CER	22 UUF	±10 %	100V
C29	1006777-3	CAP CER	22 UUF	±10 %	100V
CR1	1010385	DIODE IN660			
CR2	↑	↑			
CR3	↓				
CR4	1010385	DIODE IN660			
CR10	1010385	DIODE IN660			
CR11	1010286-9	DIODE IN965B			
CR14	1010385	DIODE IN660			
CR15	1010385	DIODE IN660			
Q1	1010376-1	TRANS 2N2060			
	↑	↑			
Q2					
Q3					
	↓	↓			
Q4	1010376-1	TRANS 2N2060			
Q6	1010395	TRANS SP8304			
Q7	1010675-001	TRANS 2N2369			
Q8A	1010395	TRANS SP8304			
Q8B	1010395	TRANS SP8304			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

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DRAWN J. Klhmper DATE 2 OCT 64
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APPROVAL
J M BLYTHE
APPROVAL J. S. TOMER 12/2/64
NASA APPROVAL 2-7-64
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SCHEMATIC
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CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009522
SCALE —
WT
SHEET 2 OF 2

1009522 A

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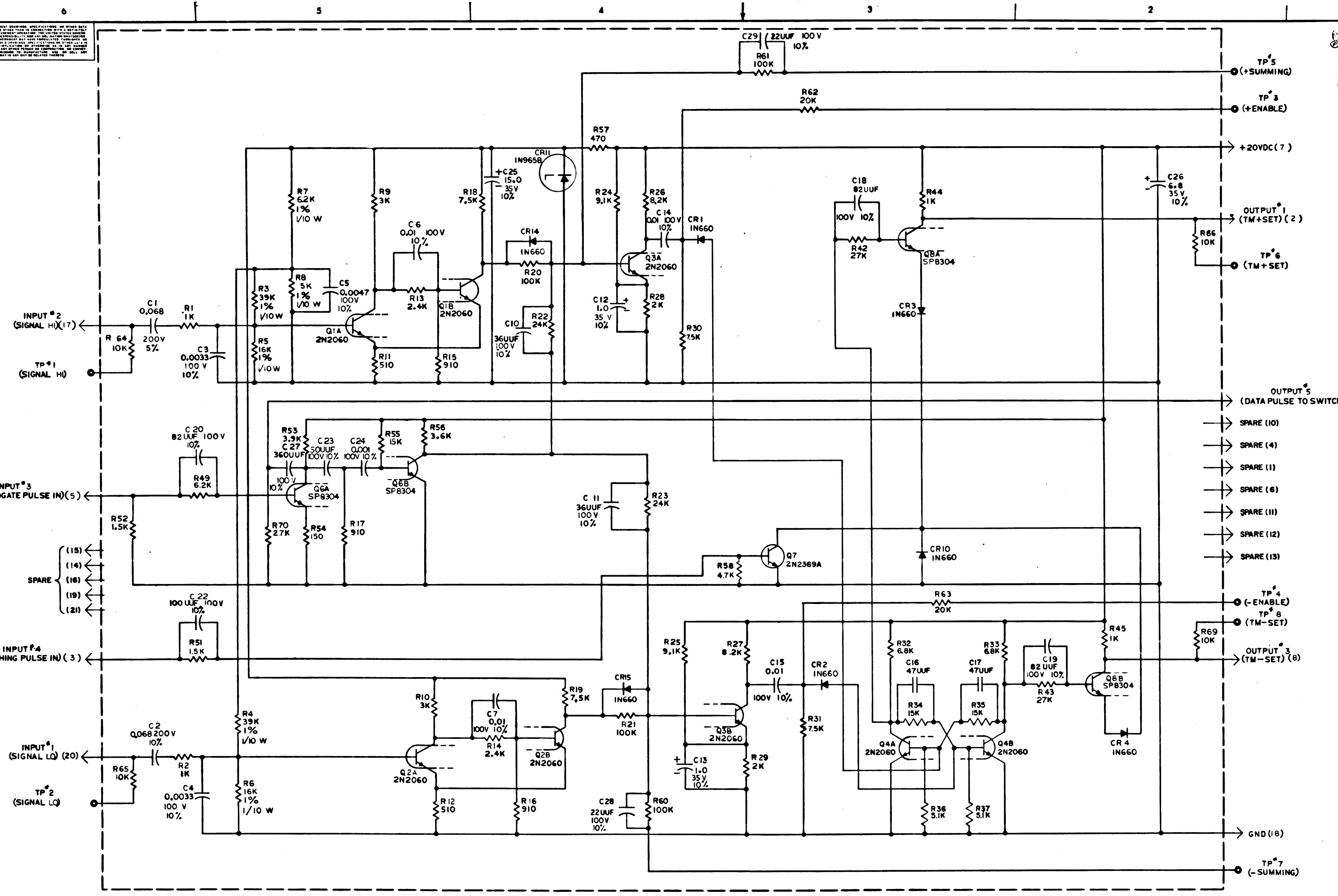
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16636	24-FEB-65	
B	REVISED PER TDRR 17966	6 APR 65	


INPUT #2 (SIGNAL HI)(17)
TP #1 (SIGNAL HI)
R 64 10K
C1 0.068 200V 5%
R1 1K
C3 0.0033 100 V 10%
R3 39K 1% 1/10W
R5 16K 1% 1/10W
R7 6.2K 1% 1/10 W
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
Q1A 2N2060
R9 3K
R11 510
C6 0.01 100V 10%
R13 2.4K
Q1B 2N2060
R15 910
R18 7.5K
C25 15.0 35V 10%
CR11 1N965B
CR14 1N660
R20 100K
C10 36UUF 100V 10%
R22 24K
R57 470
R24 9.1K
R26 8.2K
C14 0.01 100V 10%
Q3A 2N2060
C12 1.0 35 V 10%
R28 2K
CR1 1N660
R30 7.5K
C29 22UUF 100 V 10%
R61 100K
R62 20K
C18 82UUF 100V 10%
R42 27K
R44 1K
Q8A SP8304
CR3 1N660
C26 6.8 35V 10%
R66 10K
TP #5 (+SUMMING)
TP #3 (+ENABLE)
+20VDC(7)
OUTPUT #1 (TM+SET)(2)
TP #6 (TM+SET)
OUTPUT #5 (DATA PULSE TO SWITCH)(9)
SPARE (10)
SPARE (4)
SPARE (1)
SPARE (6)
SPARE (11)
SPARE (12)
SPARE (13)
INPUT #3 (INTERROGATE PULSE IN)(5)
C 20 82 UUF 100 V 10%
R49 6.2K
R52 1.5K
R53 3.9K
C 27 360UUF 100V 10%
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6A SP8304
Q6B SP8304
R70 2.7K
R54 150
R17 910
C 11 36UUF 100 V 10%
R23 24K
R58 4.7K
Q7 2N2369A
CR10 1N660
SPARE (15) (14) (16) (19) (21)
C 22 100 UUF 100V 10%
R51 1.5K
INPUT #4 (SWITCHING PULSE IN)(3)
R63 20K
TP #4 (-ENABLE)
TP #8 (TM-SET)
R25 9.1K
R27 8.2K
C15 0.01 100V 10%
CR2 1N660
R31 7.5K
R32 6.8K
R33 6.8K
C16 47UUF
C17 47UUF
R34 15K
R35 15K
Q4A 2N2060
Q4B 2N2060
R36 5.1K
R37 5.1K
C19 82 UUF 100V 10%
R43 27K
R45 1K
Q8B SP8304
CR 4 1N660
R69 10K
OUTPUT #3 (TM-SET)(8)
R4 39K 1% 1/10 W
R6 16K 1% 1/10 W
INPUT #1 (SIGNAL LO)(20)
TP #2 (SIGNAL LO)
R65 10K
C2 0.068 200V 10%
R2 1K
C4 0.0033 100 V 10%
R10 3K
Q2A 2N2060
R12 510
C7 0.01 100V 10%
R14 2.4K
Q2B 2N2060
R16 910
R19 7.5K
CR15 1N660
R21 100K
Q3B 2N2060
C13 1.0 35V 10%
R29 2K
C28 22UUF 100V 10%
R60 100K
GND (18)
TP #7 (-SUMMING)

REFERENCE DRAWING:
INTERROGATOR ASSY DWG NO. 1007519

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUB ASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIE
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DO NOT SCALE THIS DRAWING
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J M BARSHAE
APPROVAL S - owen 12/2/64
NASA APPROVAL W. [illegible] 12-8-64
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CODE IDENT NO.
SIZE E
NASA DRAWING NO 1009522
SCALE —
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SHEET 1 OF 2

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 6636	[illegible]	[illegible]
B	REVISED PER TDRR 17966	6 APR 65	[illegible]

REF. DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	1006750-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR W W	39K	±1%	1/10 W
R4	↑ -49	↑	39K	±1%	1/10 W
R5	-105		16K	±1%	1/10W
R6	-105		16K	±1%	1/10 W
R7	↓ -106	↓	6.2K	±1%	1/10 W
R8	1010377-51	RESISTOR WW	5K	±1%	1/10 W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	↑ -43	↑	3K	↑	↑
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-52		6.8K		
R33	-52		6.8K		
R34	-60		15K		
R35	-60		15K		
R36	↓ -49	↓	5.1K	↓	↓
R37	1006750-49	RESISTOR MF	5.1K	±2%	1/4 W
R42	1006750-66	RESISTOR MF	27K	±2%	1/4 W
R43	↑ -66	↑	27K	↑	↑
R44	↓ -32	↓	1K	↓	↓
R45	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R49	1006750-51	RESISTOR MF	6.2K	±2%	1/4W
R51	1006750-36	RESISTOR MF	1.5K	±2%	1/4W
R52	↑ -36	↑	1.5K	↑	↑
R53	-46		3.9K		
R54	-12		150		
R55	-60		15K		
R56	-45		3.6K		
R57	↓ -24	↓	470	↓	↓
R58	1006750-48	RESISTOR MF	4.7K	±2%	1/4 W
R60	1006750-80	RESISTOR MF	100K	±2%	1/4 W
R61	↑ -80	↑	100K	↑	↑
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	↓ -56	↓	10K	↓	↓
R66	1006750-56	RESISTOR MF	10K	±2%	1/4 W
R69	1006750-56	RESISTOR MF	10K	±2%	1/4 W
R70	1006750-42	RESISTOR MF	2.7K	±2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	0.068	±5 %	200V
C2	1010264-23	↓	0.068	±10 %	200V
C3	1006777-27	CAP CER	0.0033	±10 %	100 V
C4	↑ -27	↑	0.0033	±10 %	100 V
C5	-28		0.0047	±10 %	100V
C6	↓ 31	↓	0.01	±10 %	100V
C7	1006777-31	CAP CER	0.01	±10 %	100V
C10	1006777-5	CAP CER	36uuf	±10 %	100 V
C11	1006777-5	CAP CER	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10 %	35 V
C13	1006755-69	↓	1.0	±10 %	35 V
C14	1006777-31	CAP CER	0.01	±10%	100V
C15	↑ -31	↑	0.01	±10%	100V
C16	-7		47uuf	±10%	100V
C17	-7		47uuf	±10%	100V
C18	-12		82 uuf	±10 %	100V
C19	↓ -12	↓	82UUF	±10%	100V
C20	1006777-12	CAP CER	82uuf	±10 %	100V
C22	1006777-13	CAP CER	100uuf	±10 %	100V
C23	1006777-8	CAP CEP	50uuf	±10 %	100V
C24	1006777-24	CAP CER	0.001	±10 %	100V
C25	1006 55-83	CAP TANT SOLID P	15	±10 %	35 V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360uuf	±10 %	100 V
C28	1006777-3	CAP CER	22 UUF	±10%	100V
C29	1006777-3	CAP CER	22 UUF	±10%	100V
CR1	1010385	DIODE IN660			
CR2	↑	↑			
CR3	↓	↓			
CR4	1010385	DIODE IN660			
CR10	1010385	DIODE IN660			
CR11	1010830-9	DIODE IN965B			
CR14	1010385	DIODE IN660			
CR15	1010385	DIODE IN660			
Q1	1010376-1	TRANS 2N2060			
	↑	↑			
Q2					
Q3					
	↓	↓			
Q4	1010376-1	TRANS 2N2060			
Q6	1010395	TRANS SP8304			
Q7	1010675-001	TRANS 2N2369			
Q8A	1010395	TRANS SP8304			
Q8B	1010395	TRANS SP8304			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN J. Klumpp DATE 2 OCT 64
CHECKED
APPROVAL
APPROVAL S. Tower
NASA APPROVAL 12-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

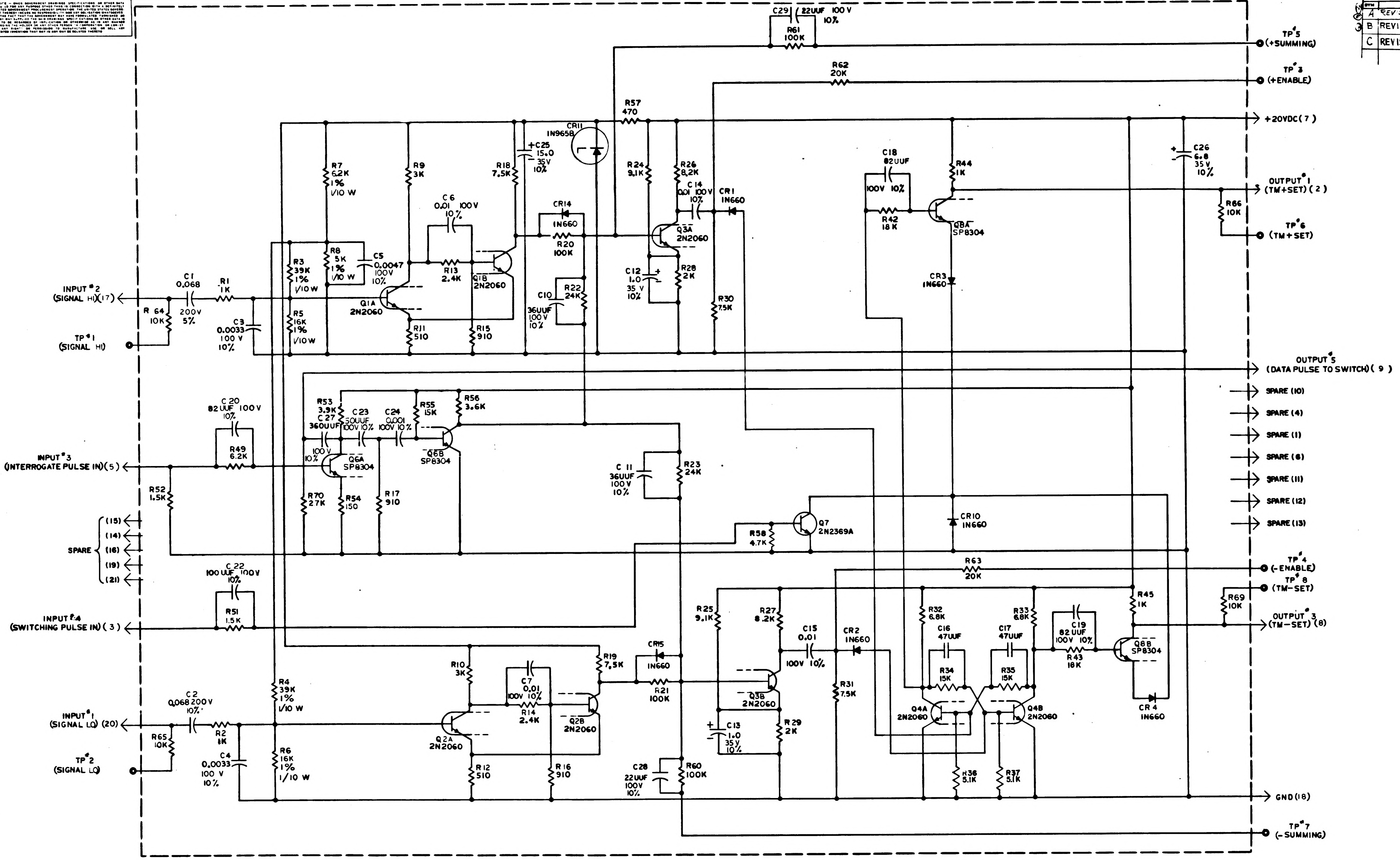
CODE IDENT NO
SIZE E
NASA DRAWING NO. 1009522
SCALE —
WT
SHEET 2 OF 2

1009522

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16636	24 FEB 65	
B	REVISED PER TDRR 17966	6 APR 65	
C	REVISED PER TDRR 25544	4 FEB 66	



INPUT #2
(SIGNAL HI) (17)
TP #1
(SIGNAL HI)
R 64
10K
C1
0.068
200V
5%
R1
1K
C3
0.0033
100 V
10%
R3
39K
1%
1/10 W
R5
16K
1%
1/10 W
R7
6.2K
1%
1/10 W
R8
5K
1%
1/10 W
C5
0.0047
100V
10%
Q1A
2N2060
R9
3K
C6
0.01 100V
10%
R13
2.4K
Q1B
2N2060
R11
510
R15
910
R18
7.5K
+C25
15.0
35V
10%
CR11
1N965B
CR14
1N660
R20
100K
C10
36UUF
100V
10%
R22
24K
R57
470
R24
9.1K
R26
8.2K
C14
0.01 100V
10%
Q3A
2N2060
C12
1.0
35 V
10%
R28
2K
CR1
1N660
R30
7.5K
C29
22UUF 100 V
10%
R61
100K
R62
20K
C18
82UUF
100V 10%
R42
18 K
Q8A
SP8304
R44
1K
CR3
1N660
C26
6.8
35 V
10%
R66
10K
TP #5
(+SUMMING)
TP #3
(+ENABLE)
+20VDC (7)
OUTPUT #1
(TM+SET) (2)
TP #6
(TM+SET)
OUTPUT #5
(DATA PULSE TO SWITCH) (9)
SPARE (10)
SPARE (4)
SPARE (1)
SPARE (6)
SPARE (11)
SPARE (12)
SPARE (13)
C 20
82 UUF 100 V
10%
R49
6.2K
INPUT #3
(INTERROGATE PULSE IN) (5)
R52
1.5K
R53
3.9K
C 27
360UUF
100 V
10%
C23
50UUF
100V 10%
C24
0.001
100V 10%
R55
15K
R56
3.6K
Q6A
SP8304
Q6B
SP8304
R70
2.7K
R54
150
R17
910
C 11
36UUF
100 V
10%
R23
24K
R58
4.7K
Q7
2N2369A
CR10
1N660
SPARE
(15)
(14)
(16)
(19)
(21)
C 22
100 UUF 100V
10%
R51
1.5K
INPUT #4
(SWITCHING PULSE IN) (3)
R63
20K
TP #4
(-ENABLE)
TP #8
(TM-SET)
R69
10K
OUTPUT #3
(TM-SET) (8)
R25
9.1K
R27
8.2K
C15
0.01
100V 10%
CR2
1N660
R31
7.5K
R32
6.8K
R33
6.8K
C16
47UUF
C17
47UUF
R34
15K
R35
15K
Q4A
2N2060
Q4B
2N2060
R36
5.1K
R37
5.1K
C19
82 UUF
100V 10%
R43
18K
Q8B
SP8304
R45
1K
CR 4
1N660
R10
3K
C7
0.01
100V 10%
R14
2.4K
Q2A
2N2060
Q2B
2N2060
R19
7.5K
CR15
1N660
R21
100K
Q3B
2N2060
C13
1.0
35 V
10%
R29
2K
C28
22UUF
100V
10%
R60
100K
R4
39K
1%
1/10 W
R6
16K
1%
1/10 W
C2
0.068 200 V
10%
R2
1K
C4
0.0033
100 V
10%
R65
10K
INPUT #1
(SIGNAL LO) (20)
TP #2
(SIGNAL LO)
GND (18)
TP #7
(-SUMMING)

REFERENCE DRAWING:
INTERROGATOR ASSY DWG NO. 1007519

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUBASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
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INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN J. Kilroy DATE 2 OCT 64
CHECKED L. Udovich 15 OCT 64
APPROVAL J M Bushnell
APPROVAL S Tomer 12/2/64
NASA APPROVAL 12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1009522

SCALE — WT SHEET 1 OF 2

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 6636	[illegible]	[illegible]
B	REVISED PER TDRR 17966	APR 65	[illegible]
C	REVISED PER TDRR 25544	4 FEB	[illegible]

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	1006750-32		1K		
R3	1010377-49	RESISTOR WW	39K	±1%	1/10W
R4	-49		39K	±1%	1/10W
R5	-105		16K	±1%	1/10W
R6	-105		16K	±1%	1/10W
R7	-106		6.2K	±1%	1/10W
R8	1010377-51	RESISTOR WW	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-52		6.8K		
R33	-52		6.8K		
R34	-60		15K		
R35	-60		15K		
R36	-49		5.1K		
R37	1006750-49	RESISTOR MF	5.1K	±2%	1/4W
R42	1006750-62	RESISTOR MF	18K	±2%	1/4W
R43	-62		18K		
R44	-32		1K		
R45	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R49	1006750-51	RESISTOR MF	6.2K	±2%	1/4W
R51	1006750-36	RESISTOR MF	1.5K	±2%	1/4W
R52	-36		1.5K		
R53	-46		3.9K		
R54	-12		150		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	1006750-48	RESISTOR MF	4.7K	±2%	1/4 W
R60	1006750-80	RESISTOR MF	100K	±2%	1/4 W
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	-56		10K		
R66	1006750-56	RESISTOR MF	10K	±2%	1/4 W
R69	1006750-56	RESISTOR MF	10K	±2%	1/4W
R70	1006750-42	RESISTOR MF	2.7K	±2%	1/4W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	0.068	±5%	200V
C2	1010264-23		0.068	±10%	200V
C3	1006777-27	CAP CER	0.0033	±10%	100V
C4	-27		0.0033	±10%	100V
C5	-28		0.0047	±10%	100V
C6	31		0.01	±10%	100V
C7	1006777-31	CAP CER	0.01	±10%	100V
C10	1006777-5	CAP CER	36uuf	±10%	100V
C11	1006777-5	CAP CER	36uuf	±10%	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10%	35 V
C13	1006755-69		1.0	±10%	35 V
C14	1006777-31	CAP CER	0.01	±10%	100V
C15	-31		0.01	±10%	100V
C16	-7		47uuf	±10%	100V
C17	-7		47uuf	±10%	100V
C18	-12		82 UUF	±10%	100V
C19	-12		82 UUF	±10%	100V
C20	1006777-12	CAP CER	82uuf	±10%	100V
C22	1006777-13	CAP CER	100uuf	±10%	100V
C23	1006777-8	CAP CEP	50uuf	±10%	100V
C24	1006777-24	CAP CER	0.001	±10%	100V
C25	1006755-83	CAP TANT SOLID P	15	±10%	35 V
C26	1006755-79		6.8	±10%	35V
C27	1006777-19	CAP CER	360 uuf	±10%	100 V
C28	1006777-3	CAP CER	22 UUF	±10%	100V
C29	1006777-3	CAP CER	22 UUF	±10%	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4	1010385	DIODE IN660			
CR10	1010385	DIODE IN660			
CR11	1010830-9	DIODE IN965B			
CR14	1010385	DIODE IN660			
CR15	1010385	DIODE IN660			
Q1	1010376-1	TRANS 2N2060			
Q2					
Q3					
Q4	1010376-1	TRANS 2N2060			
Q6	1010395	TRANS SP8304			
Q7	1010675-001	TRANS 2N2369			
Q8A	1010395	TRANS SP8304			
Q8B	1010395	TRANS SP8304			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

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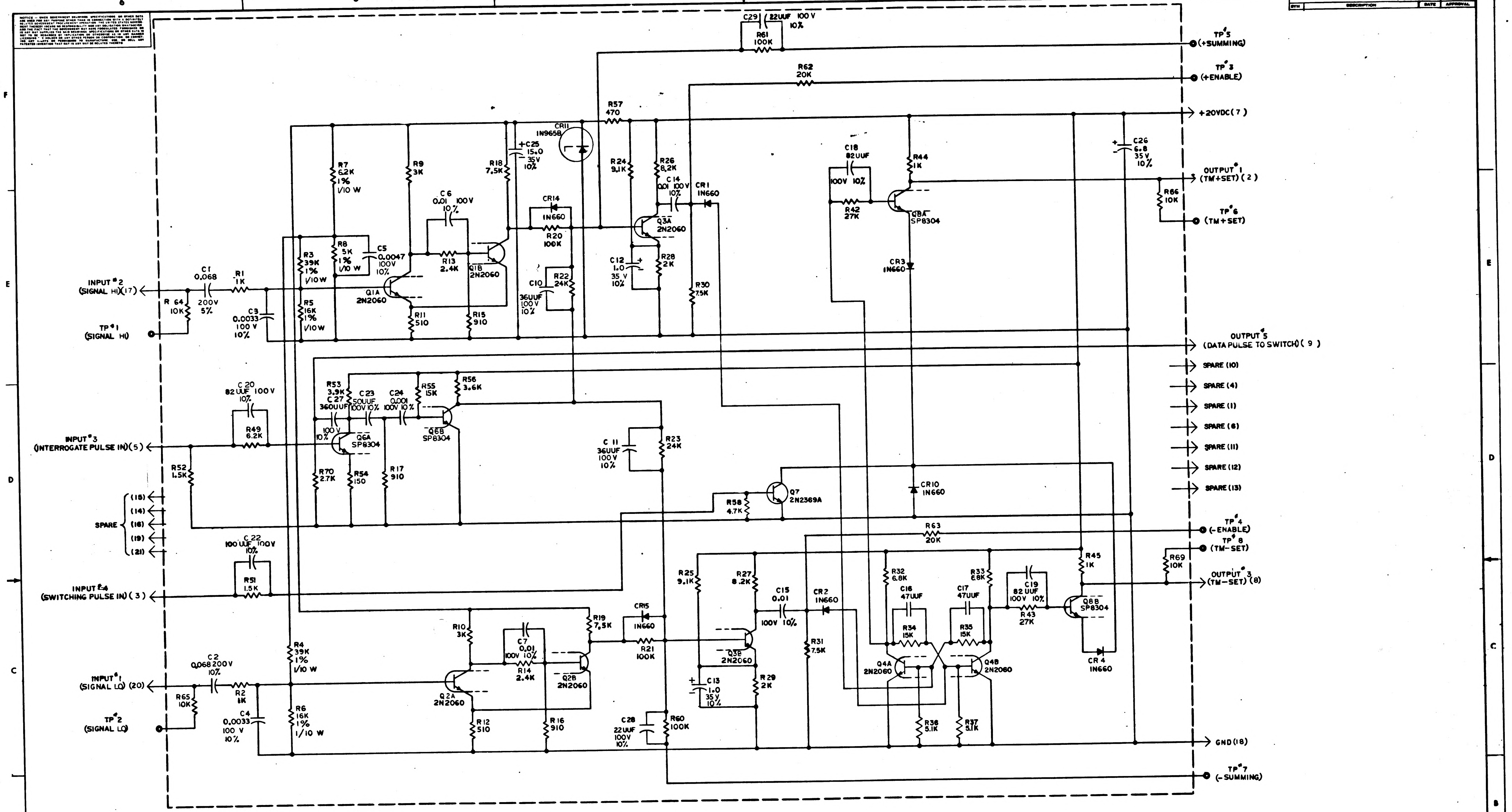
DRAWN DATE 2 OCT 64
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 2-1-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1009522
SCALE —
WT
SHEET 2 OF 2



C29 22UUF 100 V 10%
R61 100K
TP#5 (+SUMMING)
R62 20K
TP#3 (+ENABLE)
R57 470
+20VDC (7)
CR11 1N965B
+C25 15.0 35V 10%
C26 6.8 35V 10%
R7 6.2K 1% 1/10 W
R9 3K
R18 7.5K
R24 9.1K
R26 8.2K
C14 .01 100V 10%
CR1 1N660
C18 82UUF 100V 10%
R44 1K
OUTPUT#1 (TM+SET) (2)
R66 10K
TP#6 (TM+SET)
C6 0.01 100V 10%
CR14 1N660
R20 100K
Q3A 2N2060
R42 27K
Q8A SP8304
R3 39K 1% 1/10W
R8 5K 1% 1/10 W
C5 0.0047 100V
R13 2.4K
Q1B 2N2060
C12 1.0 35 V 10%
R28 2K
CR3 1N660
INPUT#2 (SIGNAL HI)(17)
C1 0.068 200V 5%
R1 1K
Q1A 2N2060
C10 36UUF 100V 10%
R22 24K
R30 7.5K
R 64 10K
C3 0.0033 100 V 10%
R5 16K 1% 1/10W
R11 510
R15 910
TP#1 (SIGNAL HI)
OUTPUT#5 (DATA PULSE TO SWITCH) (9)
SPARE (10)
SPARE (4)
SPARE (1)
SPARE (6)
SPARE (11)
SPARE (12)
SPARE (13)
C 20 82 UUF 100V 10%
R53 3.9K
C27 360UUF 100V 10%
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6B SP8304
R49 6.2K
Q6A SP8304
C 11 36UUF 100V 10%
R23 24K
INPUT#3 (INTERROGATE PULSE IN) (5)
R52 1.5K
R70 2.7K
R54 150
R17 910
Q7 2N2369A
R58 4.7K
CR10 1N660
SPARE (18) (14) (16) (19) (21)
TP#4 (-ENABLE)
TP#8 (TM-SET)
C 22 100 UUF 100V 10%
R63 20K
R25 9.1K
R27 8.2K
R32 6.8K
R33 6.8K
C19 82 UUF 100V 10%
R45 1K
R69 10K
OUTPUT#3 (TM-SET) (8)
INPUT#4 (SWITCHING PULSE IN) (3)
R51 1.5K
C15 0.01 100V 10%
CR2 1N660
C16 47UUF
C17 47UUF
R43 27K
Q8B SP8304
R34 15K
R35 15K
R10 3K
C7 0.01 100V 10%
R19 7.3K
CR15 1N660
R21 100K
Q3B 2N2060
R31 7.5K
Q4A 2N2060
Q4B 2N2060
CR 4 1N660
R4 39K 1% 1/10 W
R14 2.4K
Q2B 2N2060
C2 0.068 200V 10%
R2 1K
Q2A 2N2060
C13 1.0 35V 10%
R 29 2K
INPUT#1 (SIGNAL LO) (20)
R65 10K
C4 0.0033 100 V 10%
R6 16K 1% 1/10 W
R12 510
R16 910
C28 22UUF 100V 10%
R60 100K
R36 5.1K
R37 5.1K
GND (18)
TP#2 (SIGNAL LO)
TP#7 (-SUMMING)

REFERENCE DRAWING:
INTERROGATOR ASSY DWG NO. 1007519

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUB ASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2%. UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN J. Kilminger DATE 20 OCT 64
CHECKED L. Udorch 15 OCT 64
APPROVAL J M Kingsley
APPROVAL S. Tomeo 12/2/64
NASA APPROVAL W. J. Rhine 12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1009522
SCALE — | WT | SHEET 1 OF 2

REVISIONS 10-64
SYM | DESCRIPTION | DATE | APPROVAL

1009522

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REF. DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	1006750-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR WW	39K	±1%	1/10W
R4	↑ -49	↑	39K	±1%	1/10W
R5	-105		16K	±1%	1/10W
R6	-105		16K	±1%	1/10W
R7	↓ -106	↓	6.2K	±1%	1/10W
R8	1010377-51	RESISTOR WW	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	↑ -43	↑	3K	↑	↑
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-52		6.8K		
R33	-52		6.8K		
R34	-60		15K		
R35	-60		15K		
R36	↓ -49	↓	5.1K	↓	↓
R37	1006750-49	RESISTOR MF	5.1K	±2%	1/4W
R42	1006750-66	RESISTOR MF	27K	±2%	1/4W
R43	↑ -66	↑	27K	↑	↑
R44	↓ -32	↓	1K	↓	↓
R45	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R49	1006750-51	RESISTOR MF	6.2K	±2%	1/4W
R51	1006750-36	RESISTOR MF	1.5K	±2%	1/4W
R52	↑ -36	↑	1.5K	↑	↑
R53	-46		3.9K		
R54	-12		150		
R55	-60		15K		
R56	-45		3.6K		
R57	↓ -24	↓	470	↓	↓
R58	1006750-48	RESISTOR MF	4.7K	±2%	1/4 W
R60	1006750-80	RESISTOR MF	100K	±2%	1/4 W
R61	↑ -80	↑	100K	↑	↑
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	↓ -56	↓	10K	↓	↓
R66	1006750-56	RESISTOR MF	10K	±2%	1/4 W
R69	1006750-56	RESISTOR MF	10K	±2%	1/4W
R70	1006750-42	RESISTOR MF	2.7K	±2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	0.068	±5 %	200V
C2	1010264-23	↓	0.068	±10 %	200V
C3	1006777-27	CAP CER	0.0033	±10 %	100 V
C4	↑ -27	↑	0.0033	±10 %	100 V
C5	-28		0.0047	±10 %	100V
C6	↓ 31	↓	0.01	±10 %	100V
C7	1006777-31	CAP CER	0.01	±10 %	100V
C10	1006777-5	CAP CER	36uuf	±10 %	100V
C11	1006777-5	CAP CER	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10 %	35 V
C13	1006755-69	↓	1.0	±10 %	35 V
C14	1006777-31	CAP CER	0.01	±10 %	100V
C15	↑ -31	↑	0.01	±10 %	100V
C16	-7		47uuf	±10 %	100V
C17	-7		47uuf	±10 %	100V
C18	-12		82 UUF	±10 %	100V
C19	↓ -12	↓	82 UUF	±10 %	100V
C20	1006777-12	CAP CER	82uuf	±10 %	100V
C22	1006777-13	CAP CER	100uuf	±10 %	100V
C23	1006777-8	CAP CEP	50uuf	±10 %	100V
C24	1006777-24	CAP CER	0.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±10 %	35 V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100 V
C28	1006777-3	CAP CER	22 UUF	±10 %	100V
C29	1006777-3	CAP CER	22 UUF	±10 %	100V
CR1	1010385	DIODE IN660			
CR2	↑	↑			
CR3	↓	↓			
CR4	1010385	DIODE IN660			
CR10	1010385	DIODE IN660			
CR11	1010286-9	DIODE IN965B			
CR14	1010385	DIODE IN660			
CR15	1010385	DIODE IN660			
Q1	1010376-1	TRANS 2N2060			
	↑	↑			
Q2					
Q3					
	↓	↓			
Q4	1010376-1	TRANS 2N2060			
Q6	1010395	TRANS SP8304			
Q7	1010675	TRANS 2N2369			
Q8A	1010395	TRANS SP8304			
Q8B	1010395	TRANS SP8304			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

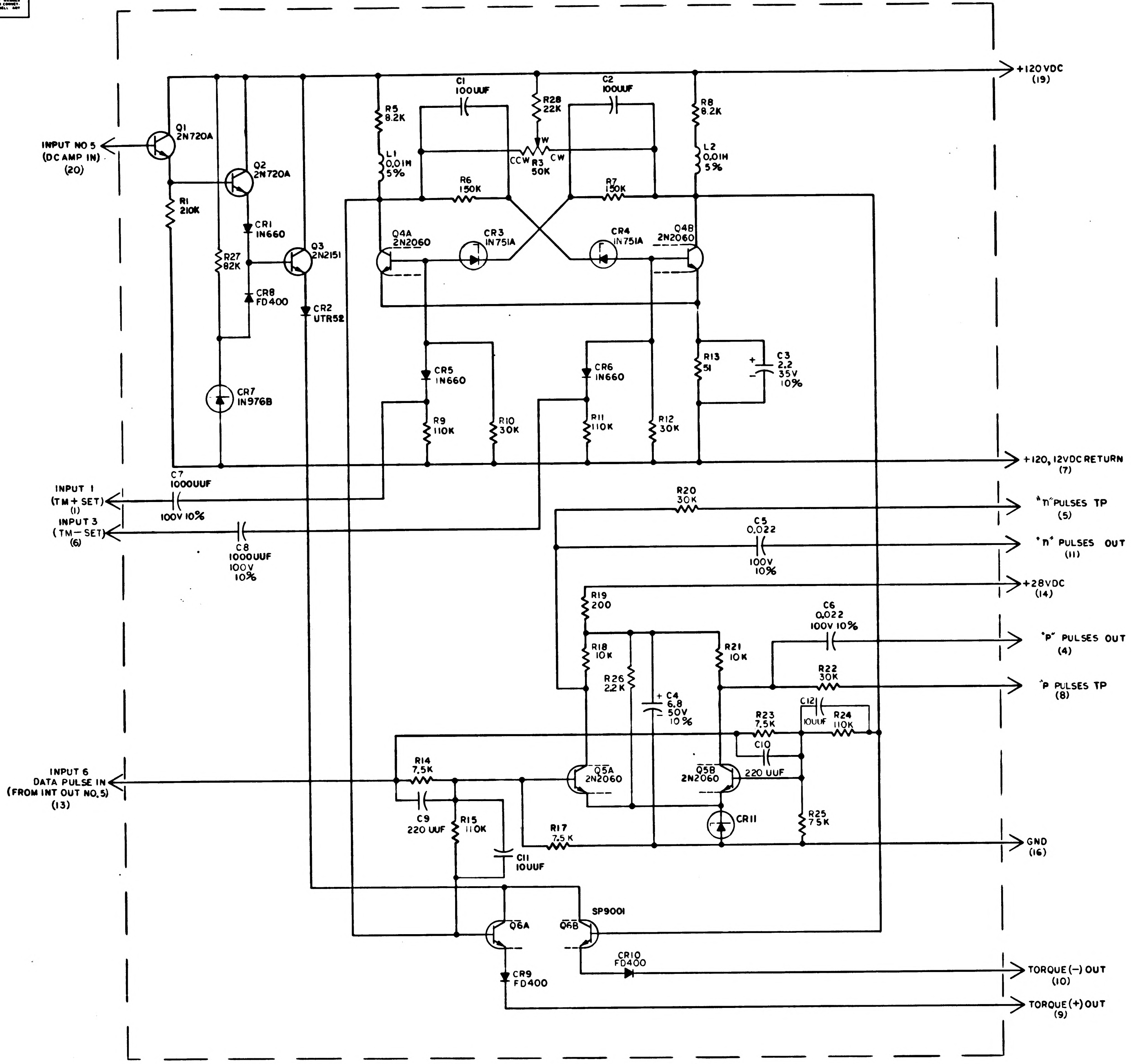
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN J. Klinger DATE 2 OCT 64
CHECKED
APPROVAL J.M. BLYTHAF
APPROVAL J. S. TOWER 2/2/64
NASA APPROVAL W. J. Rhine 2-7-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1009522
SCALE — | WT | SHEET 2 OF 2

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16825		



INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 210K
R27 82K
CR1 IN660
CR8 FD400
CR2 UTR52
CR7 IN976B
R5 8.2K
L1 0.01H 5%
C1 100UUF
R28 22K
W
CCW R3 50K CW
C2 100UUF
R6 150K
R7 150K
R8 8.2K
L2 0.01H 5%
Q4A 2N2060
CR3 IN751A
CR4 IN751A
Q4B 2N2060
CR5 IN660
CR6 IN660
R9 110K
R10 30K
R11 110K
R12 30K
R13 51
C3 2.2 35V 10%
+120 VDC (19)
+120, 12VDC RETURN (7)
INPUT 1 (TM + SET) (1)
C7 1000UUF 100V 10%
INPUT 3 (TM − SET) (6)
C8 1000UUF 100V 10%
R20 30K
"n" PULSES TP (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (14)
R19 200
R18 10K
R26 2.2K
C4 6.8 50V 10%
R21 10K
C6 0.022 100V 10%
"P" PULSES OUT (4)
R22 30K
"P PULSES TP (8)
C12 10UUF
R23 7.5K
R24 110K
C10 220 UUF
INPUT 6 DATA PULSE IN (FROM INT OUT NO.5) (13)
R14 7.5K
C9 220 UUF
R15 110K
C11 10UUF
R17 7.5K
Q5A 2N2060
Q5B 2N2060
CR11
R25 7.5K
GND (16)
Q6A
Q6B
SP9001
CR10 FD400
CR9 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-697	RESISTOR	210K	1%	1/8 W
R3	1010373-12		50K	5%	1 W
R5	1010389-78		8.2K	1%	3 W
R6	1010369-85		150K	5%	1/8 W
R7	1010369-65		150K	5%	1/8 W
R8	1010389-78		8.2K	1 %	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-1		51		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5 K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	-81		110 K		
R25	- 53		7.5 K		
R26	- 40		2.2 K		
R27	1006750-78		82K	2%	1/4W
R28	1010389-88	RESISTOR	22K	1 %	3 W
C1	1006777-13	CAPACITOR	100UUF	10%	100V
C2	1006777-13		100UUF	10%	100V
C3	1006755-73		2.2 UF	10%	35V
C4	1010393-039		6.8UF	10%	50V
C5	1006777-33		0.022UF	10%	100V
C6	1006777-33		0.022UF	10%	100V
C7	1006777-24		1000 UUF	10%	100V
C8	1006777-24		1000UUF	10%	100V
C9	1006777-16		220 UUF	10%	100V
C10	1006777-16		220 UUF	10%	100V
C11	1006777-1		10UUF	10%	100V
C12	1006777-1	CAPACITOR	10 UUF	10%	100V
CR1	1010385	DIODE	IN660		
CR2	1010497	DIODE	UTR-52		
CR3	1010833-1	ZENER DIODE	IN751A	±5%	5.1VDC
CR4	1010833-1	DIODE			
CR5	1010385	DIODE	IN660		
CR6	1010385	DIODE			
CR7	1010830-20	ZENER DIODE	IN976B	±5%	43 VDC
CR8	1010394	DIODE	FD400		
CR9	1010394	DIODE	FD400		
CR10	1010394	DIODE	FD400		
CR11	1010372-6	ZENER DIODE		±5%	3.3VDC
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357-1	TRANSISTOR	2N720A		
Q2	1010357-1		2N720A		
Q3	1010269-1		2N2151		
Q4	1010376-4		2N2060		
Q5	1010376-4		2N2060		
Q6	1010715-1	TRANSISTOR	SP9001		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

REFERENCE DRAWINGS:
1007527 BINARY CURRENT SWITCH
COMPUTER OUTPUT ASSEMBLY

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS9-497
DRAWN J. Kilinger DATE 15 SEP 64
CHECKED A. March 24 SEP 64
APPROVAL
JMB 3 DEC 64
APPROVAL
NASA APPROVAL
12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009523
SCALE
WT
SHEET 1 OF 1

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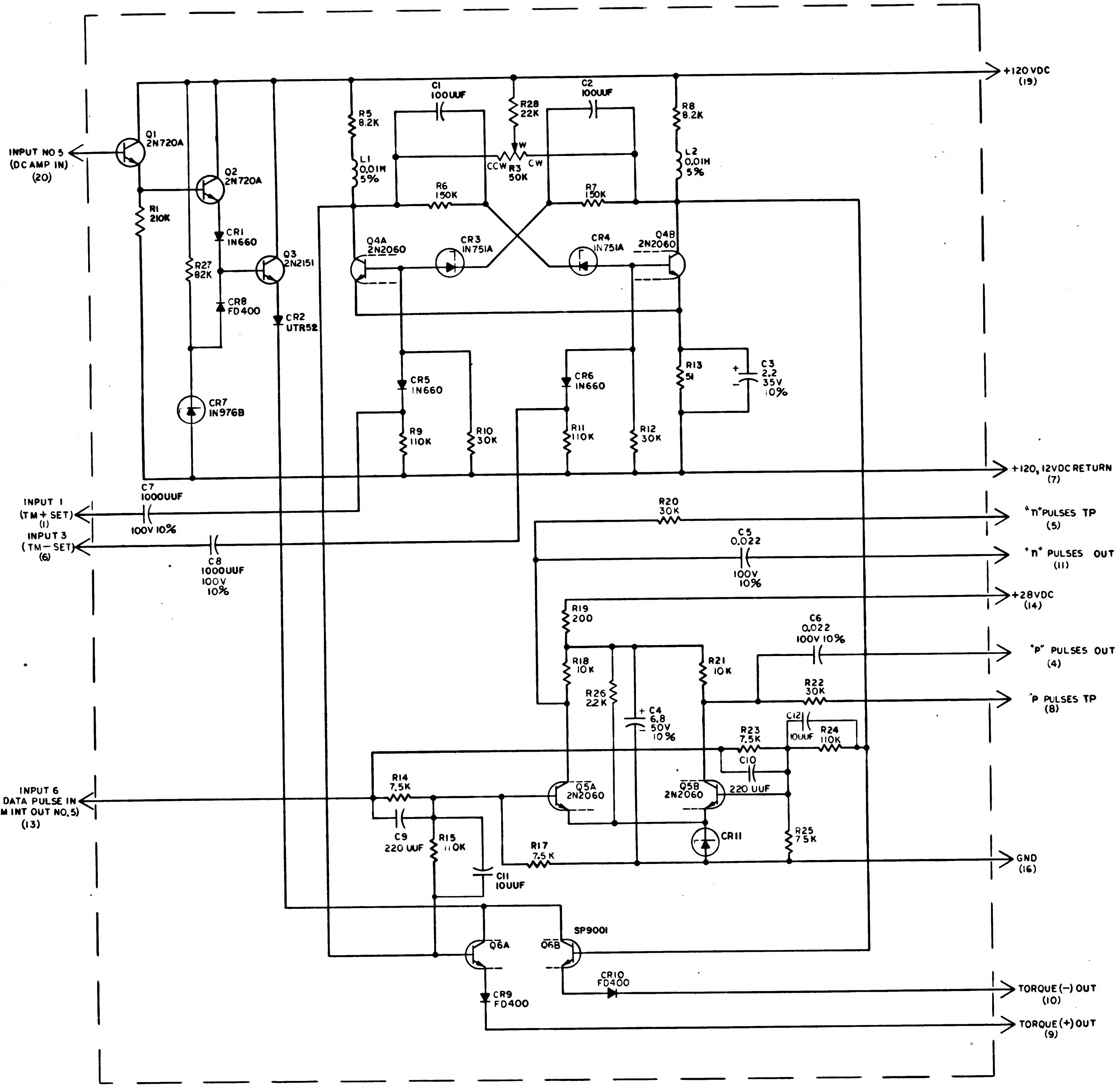
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16825		
B	REVISED PER TDRR 21284	31 JUL 65	JAP


+120VDC (19)
INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 210K
R27 82K
CR1 1N660
CR8 FD400
CR2 UTR52
CR7 1N976B
R5 8.2K
L1 0.01H 5%
C1 100UUF
R28 22K
R3 50K
CCW
W
CW
C2 100UUF
R8 8.2K
L2 0.01H 5%
R6 150K
R7 150K
Q4A 2N2060
CR3 1N751A
CR4 1N751A
Q4B 2N2060
CR5 1N660
CR6 1N660
R9 110K
R10 30K
R11 110K
R12 30K
R13 51
C3 2.2 35V 10%
+120, 12VDC RETURN (7)
INPUT 1 (TM + SET) (1)
INPUT 3 (TM − SET) (6)
C7 1000UUF 100V 10%
C8 1000UUF 100V 10%
R20 30K
"n" PULSES TP (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (14)
R19 200
C6 0.022 100V 10%
"p" PULSES OUT (4)
R18 10K
R21 10K
R22 30K
"P" PULSES TP (8)
R26 22K
C4 6.8 50V 10%
R23 7.5K
C12 10UUF
R24 110K
C10 220 UUF
INPUT 6 DATA PULSE IN (FROM INT OUT NO.5) (13)
R14 7.5K
Q5A 2N2060
Q5B 2N2060
C9 220 UUF
R15 110K
R17 7.5K
CR11
R25 7.5K
GND (16)
C11 10UUF
SP9001
Q6A
Q6B
CR10 FD400
CR9 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-697	RESISTOR	210K	1%	1/8W
R3	1010373-12		50K	5%	1 W
R5	1010389-78		8.2K	1%	3 W
R6	1010369-85		150K	5%	1/8 W
R7	1010369-85		150K	5%	1/8 W
R8	1010389-78		8.2K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-1		51		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5 K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	-81		110 K		
R25	-53		7.5K		
R26	-40		2.2K		
R27	1006750-78		82K	2%	1/4W
R28	1010389-88	RESISTOR	22K	1%	3 W
C1	1006777-13	CAPACITOR	100UUF	10%	100V
C2	1006777-13		100UUF	10%	100V
C3	1006755-73		2.2UF	10%	35V
C4	1010393-039		6.8UF	10%	50V
C5	1006777-33		0.022UF	10%	100V
C6	1006777-33		0.022UF	10%	100V
C7	1006777-24		1000UUF	10%	100V
C8	1006777-24		1000UUF	10%	100V
C9	1006777-16		220UUF	10%	100V
C10	1006777-16		220UUF	10%	100V
C11	1006777-1		10UUF	10%	100V
C12	1006777-1	CAPACITOR	10UUF	10%	100V
CR1	1010385	DIODE	IN660		
CR2	1010497	DIODE	UTR-52		
CR3	1010833-1	ZENER DIODE	IN751A	±5%	5.1VDC
CR4	1010833-1	DIODE			
CR5	1010385	DIODE	IN660		
CR6	1010385	DIODE			
CR7	1010830-20	ZENER DIODE	IN976B	±5%	43VDC
CR8	1010394	DIODE	FD400		
CR9	1010394	DIODE	FD400		
CR10	1010394	DIODE	FD400		
CR11	1010372-6	ZENER DIODE		±5%	3.3VDC
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357-1	TRANSISTOR	2N720A		
Q2	1010357-1		2N720A		
Q3	1010269-1		2N2151		
Q4	1010376-4		2N2060		
Q5	1010376-4		2N2060		
Q6	1010715-2	TRANSISTOR	SP9001		

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
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5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

REFERENCE DRAWINGS:
1007527 BINARY CURRENT SWITCH
COMPUTER OUTPUT ASSEMBLY

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS9-497
DRAWN J. Kilvinger DATE 16 SEP 64
CHECKED C. Ulrich 24 SEP 64
APPROVAL
JMB 3 DEC 64
APPROVAL
NASA APPROVAL
2-?-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009523
SCALE
WT
SHEET 1 OF 1

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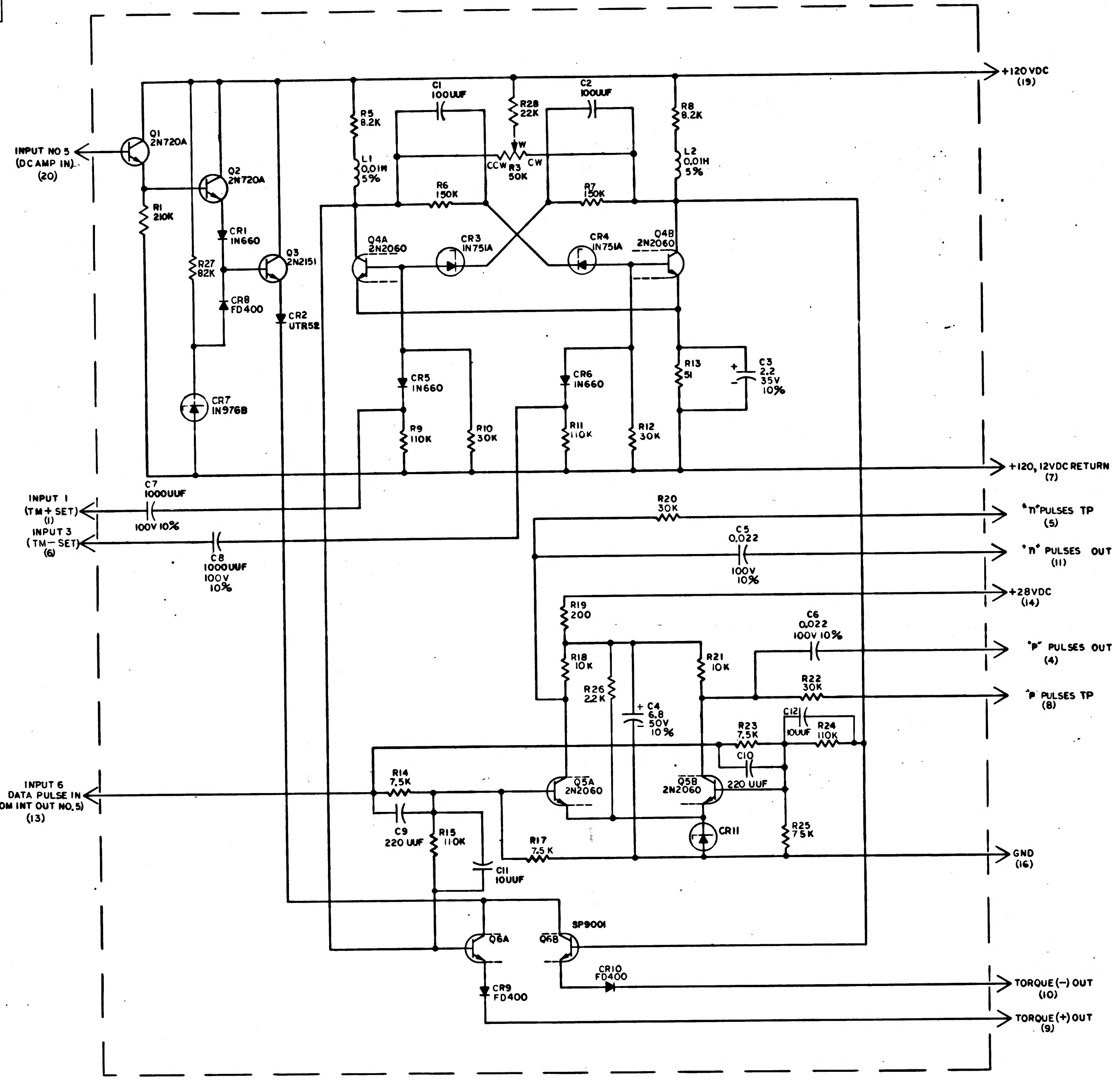
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


+120 VDC (19)
INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 210K
R27 82K
CR1 1N660
CR8 FD400
CR2 UTR52
CR7 1N976B
R5 8.2K
L1 0.01H 5%
C1 100UUF
R28 22K
C2 100UUF
CCW R3 50K CW
W
R6 150K
R7 150K
R8 8.2K
L2 0.01H 5%
Q4A 2N2060
CR3 1N751A
CR4 1N751A
Q4B 2N2060
CR5 1N660
CR6 1N660
R9 110K
R10 30K
R11 110K
R12 30K
R13 51
C3 2.2 35V 10%
+120, 12VDC RETURN (7)
INPUT 1 (TM+SET) (1)
C7 1000UUF
100V 10%
INPUT 3 (TM−SET) (6)
C8 1000UUF 100V 10%
R20 30K
"n" PULSES TP (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (14)
R19 200
C6 0.022 100V 10%
"P" PULSES OUT (4)
R18 10K
R26 2.2K
C4 6.8 50V 10%
R21 10K
R22 30K
"P" PULSES TP (8)
R23 7.5K
C12 10UUF
R24 110K
C10
INPUT 6 DATA PULSE IN (FROM INT OUT NO.5) (13)
R14 7.5K
Q5A 2N2060
Q5B 2N2060
220 UUF
CR11
R25 7.5K
C9 220 UUF
R15 110K
R17 7.5K
C11 10UUF
GND (16)
Q6A
Q6B
SP9001
CR10 FD400
CR9 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-697	RESISTOR	210K	1%	1/8W
R3	1010373-12		50K	5%	1 W
R5	1010389-78		8.2K	1%	3 W
R6	1010369 – 85		150K	5%	1/8 W
R7	1010369 – 85		150K	5%	1/8 W
R8	1010389-78		8.2K	1 %	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-1		51		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5 K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	-81		110 K		
R25	- 53		7.5K		
R26	↓ - 40		2.2K	↓	↓
R27	1006750-78	↓	82K	2%	1/4W
R28	1010389 -88	RESISTOR	22K	1 %	3 W
C1	1006777-13	CAPACITOR	100UUF	10%	100V
C2	1006777-13		100UUF	10%	100V
C3	1006755-73		2.2UF	10%	35V
C4	1010393-039		6.8UF	10%	50V
C5	1006777-33		0.022UF	10%	100V
C6	1006777-33		0.022UF	10%	100V
C7	1006777-24		1000 UUF	10%	100V
C8	1006777-24		1000UUF	10%	100V
C9	1006777-16		220 UUF	10%	100V
C10	1006777-16		220 UUF	10%	100V
C11	1006777-1	↓	10UUF	10%	100V
C12	1006777-1	CAPACITOR	10UUF	10%	100V
CR1	1010385	DIODE	IN660		
CR2	1010497	DIODE	UTR-52		
CR3	1010462-6	ZENER DIODE	IN751A	±5%	5.1VDC
CR4	1010462-6	DIODE	↓	↓	↓
CR5	1010385	DIODE	IN660		
CR6	1010385	DIODE	↓		
CR7	1010286-20	ZENER DIODE	IN976B	±5%	43VDC
CR8	1010394	DIODE	FD400		
CR9	1010394	DIODE	FD400		
CR10	1010394	DIODE	FD400		
CR11	1010372-6	ZENER DIODE		±5%	3.3VDC
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357-1	TRANSISTOR	2N720A		
Q2	1010357-1		2N720A		
Q3	1010269-1		2N2151		
Q4	1010376-4		2N2060		
Q5	1010376-4	↓	2N2060		
Q6	1010715-1	TRANSISTOR	SP9001		

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

REFERENCE DRAWINGS:
1007527 BINARY CURRENT SWITCH
COMPUTER OUTPUT ASSEMBLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS9-497
DRAWN J. Kilroy DATE 15 SEP 64
CHECKED C. Wasich 24 SEP 64
APPROVAL
J.H.B. 3 DEC 64
APPROVAL Stoner 12-2-64
NASA APPROVAL 12-8-64
MIT APPROVAL

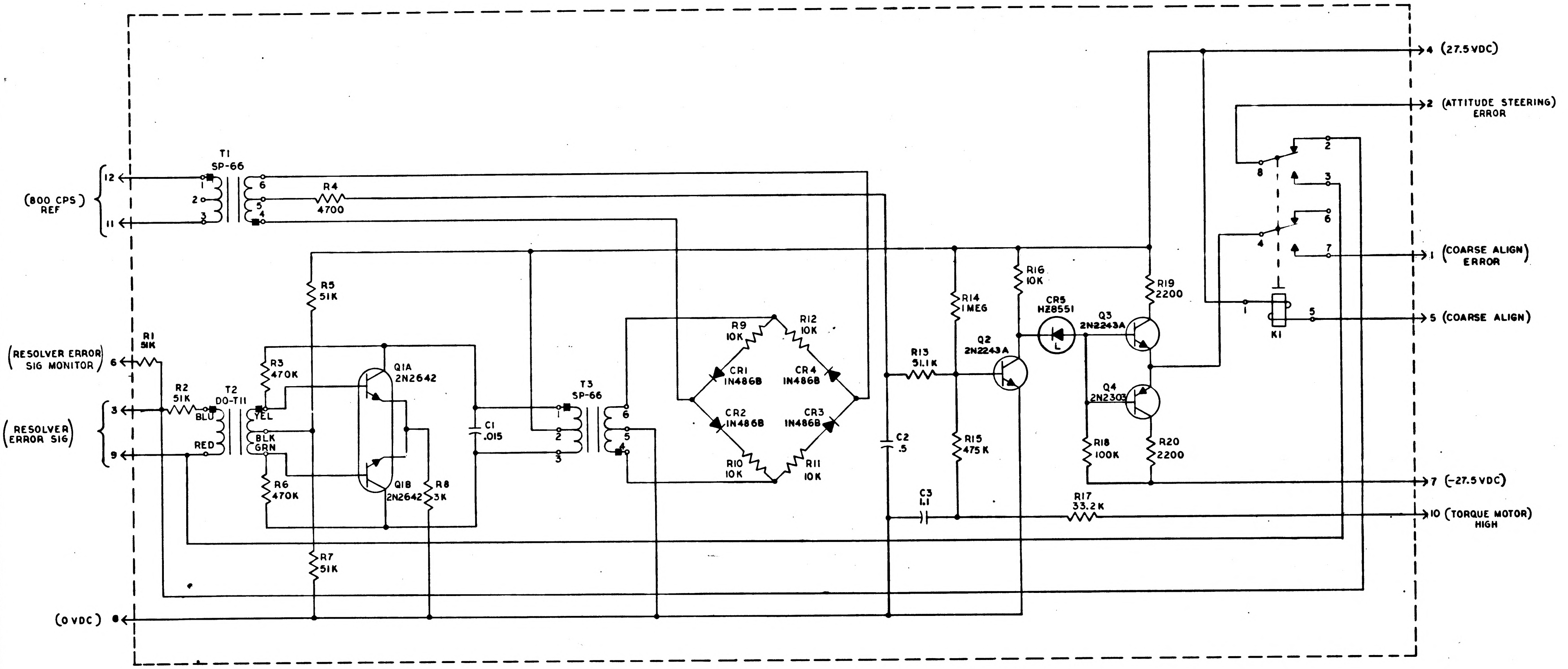
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009523
SCALE
WT
SHEET 1 OF 1

1009523

REVISIONS 13638			
SYM	DESCRIPTION	DATE	APPROVAL



T1
SP-66
12
11
(800 CPS) REF
1
2
3
6
5
4
R4
4700
R1
51K
(RESOLVER ERROR SIG MONITOR) 6
R2
51K
T2
DO-T11
BLU
RED
YEL
BLK
GRN
(RESOLVER ERROR SIG)
3
9
R3
470K
R5
51K
Q1A
2N2642
Q1B
2N2642
R6
470K
R7
51K
R8
3K
C1
.015
T3
SP-66
R9
10K
R12
10K
CR1
1N486B
CR4
1N486B
CR2
1N486B
CR3
1N486B
R10
10K
R11
10K
C2
.5
C3
1.1
R13
51.1K
R14
1MEG
R15
475K
Q2
2N2243A
R16
10K
CR5
HZ8551
L
Q3
2N2243A
Q4
2N2303
R17
33.2K
R18
100K
R19
2200
R20
2200
K1
8
4
7
(0 VDC) 8
4 (27.5VDC)
2 (ATTITUDE STEERING) ERROR
1 (COARSE ALIGN) ERROR
5 (COARSE ALIGN)
7 (-27.5VDC)
10 (TORQUE MOTOR) HIGH

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	1006750-73	↓	51K	±2%	1/4W
R3	1010369-97		470K	±5%	1/8W
R4	1006750-48		4700	±2%	1/4W
R5	1006750-73		51K	±2%	1/4W
R6	1010369-97		470K	±5%	1/8W
R7	1006750-73		51K	±2%	1/4W
R8	1006750-43		3K	±2%	1/4W
R9	1010364-443		10K	±1%	1/8W
R10	1010364-443		10K	↓	↓
R11	1010364-443		10K		
R12	1010364-443		10K		
R13	1010364-579		51.1K		
R14	1010369-105		1 MEG	±5%	1/8W
R15	1010364-765		475K	±1%	1/8W
R16	1006750-56		10K	±2%	1/4W
R17	1010364-543		33.2K	±1%	1/8W
R18	1006750-80		100K	±2%	1/4W
R19	1010278-71		2200	±5%	1/2W
R20	1010278-71		2200	±5%	1/2W
C1	1010264-15	CAPACITOR	0.015	±5%	200VDC
C2	1010279-228	↓	.5	±10%	35VDC
C3	1010279-232		1.1	±10%	35VDC
CR1	1010392-1	DIODE	1N486B		250MW
CR2	↓ -1	↓	↓		↓
CR3	-1				
CR4	-1				
CR5	1010372-22		HZ8551		200MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010270	↓	2N2243A		
Q3	1010270		2N2243A		
Q4	1010345-1		2N2303		
T1	1010329-1	TRANSFORMER	SP-66		
T2	1010326	↓	DO-T11		
T3	1010329-1		SP-66		
K1	1010353-1	RELAY			

REFERENCE DRAWINGS:
GIMBAL COARSE ALIGN AMPLIFIER MODULE ASS'Y 1007541

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN RM Kandt DATE 23 Sept 64
CHECKED A. Udovich 29 Sep 64
APPROVAL
APPROVAL
NASA APPROVAL W J Rhine 10-2-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
GIMBAL COARSE
ALIGN AMPLIFIER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1009524
SCALE WT SHEET 1 OF 1

MASTER

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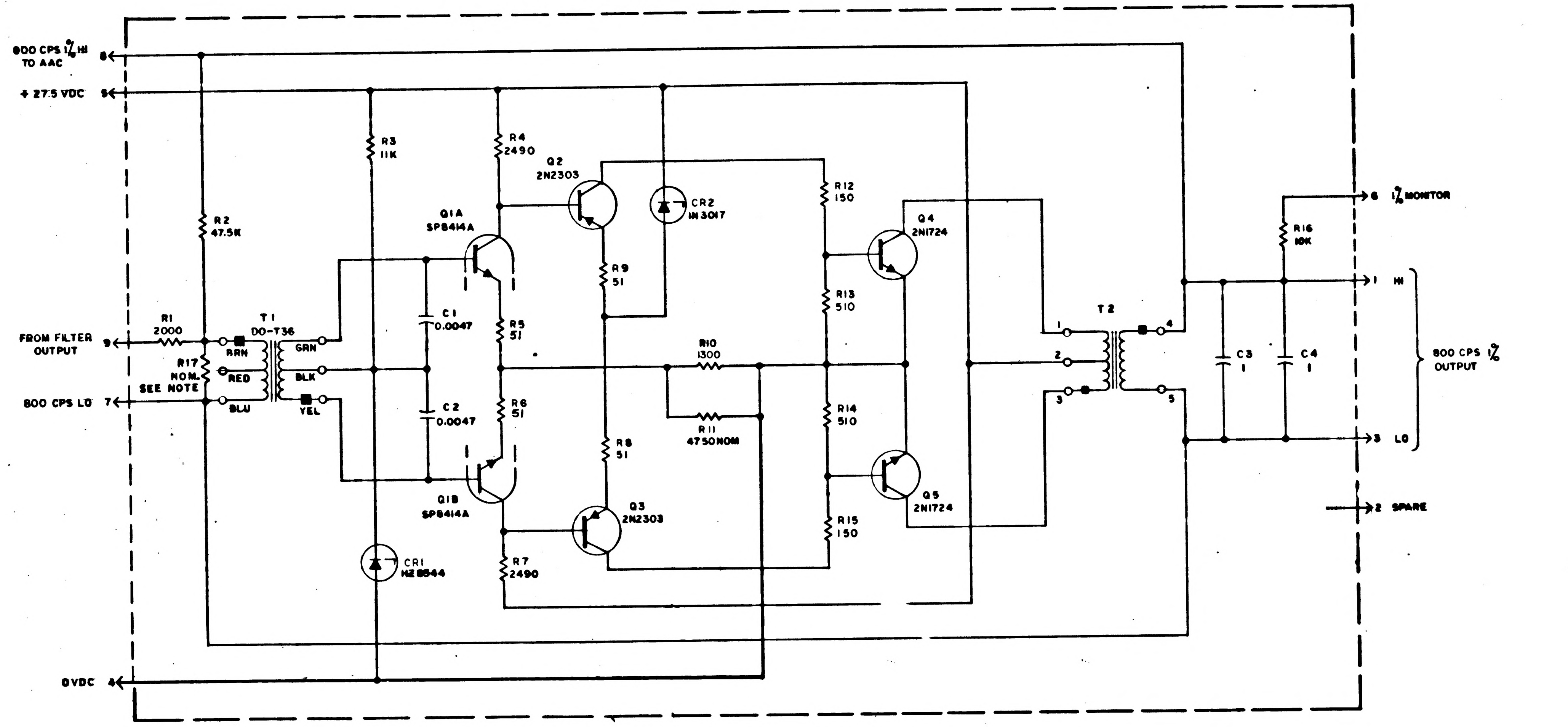
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15495	1-FEB	


800 CPS 1% HI TO AAC 8
+ 27.5 VDC 5
FROM FILTER OUTPUT 9
800 CPS LO 7
0VDC 4
R1 2000
R2 47.5K
R3 11K
R4 2490
R5 51
R6 51
R7 2490
R8 51
R9 51
R10 1300
R11 4750 NOM
R12 150
R13 510
R14 510
R15 150
R16 10K
R17 NOM. SEE NOTE
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
C1 0.0047
C2 0.0047
C3 1
C4 1
Q1A SP8414A
Q1B SP8414A
Q2 2N2303
Q3 2N2303
Q4 2N1724
Q5 2N1724
CR1 HZ8544
CR2 1N3017
T2
1
2
3
4
5
6 1% MONITOR
1 HI
3 LO
800 CPS 1% OUTPUT
2 SPARE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	± 1%	1/8 W
R2	1010364-573		47.5K	± 1%	1/8 W
R3	1006750-57		11 K	± 2%	1/4 W
R4	1010364-327		2490	± 1%	1/8 W
R5	1006750-1		51	± 2%	[illegible]
R6	1006750-1		51	± 2%	1/4 W
R7	1010364-327		2490	± 1%	1/8 W
R8	1006750-1		51	± 2%	1/4 W
R9	1006750-1		51	± 2%	1/4 W
R10	1010364-273		1300	± 1%	1/8 W
R11	1010364-		SEE NOTE 4	± 1%	1/8 W
R12	1006750-12		150	± 2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	-56		10K		
R17	1006750-		SEE NOTE 4		
C1	1010264-9	CAPACITOR	0.0047	± 5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37		1		
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010265-2	DIODE	1N3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010273-2		2N1724		
Q5			2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307				

SELECTION CHART FOR R11

PART NUMBER	VALUE
1010364-325	2430
-329	2550
-337	2800
-343	3010
-351	3320
-355	3480
-361	3740
-367	4020
-371	4220
-375	4420
-377	4530
-381	4750
-385	4990
-387	5110
-391	5360
-395	5620
-399	5900
-403	6190
-405	6340
-409	6650

SELECTION CHART FOR R17

PART NUMBER	VALUE
1006750-84	150 K
-56	10K
-49	5.1K
-44	3.3K
-41	2.4K
-38	1.8K
-36	1.5 K
-34	1.2K
-32	1.0K
-30	820
-29	750
-27	620
-25	510
-23	430
-22	390
-20	330
-18	270
-16	220

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 AND R17 TO BE DETERMINED BY ELECTRICAL TEST PER ATP 1007547 SEE SELECTION CHARTS

REF. DWG:
800 CPS 1% AMPL. ASS'Y
NO. 1007547

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN DATE
CHECKED 3 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, 800CPS 1% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009525
SCALE — WT — SHEET 1 OF 1

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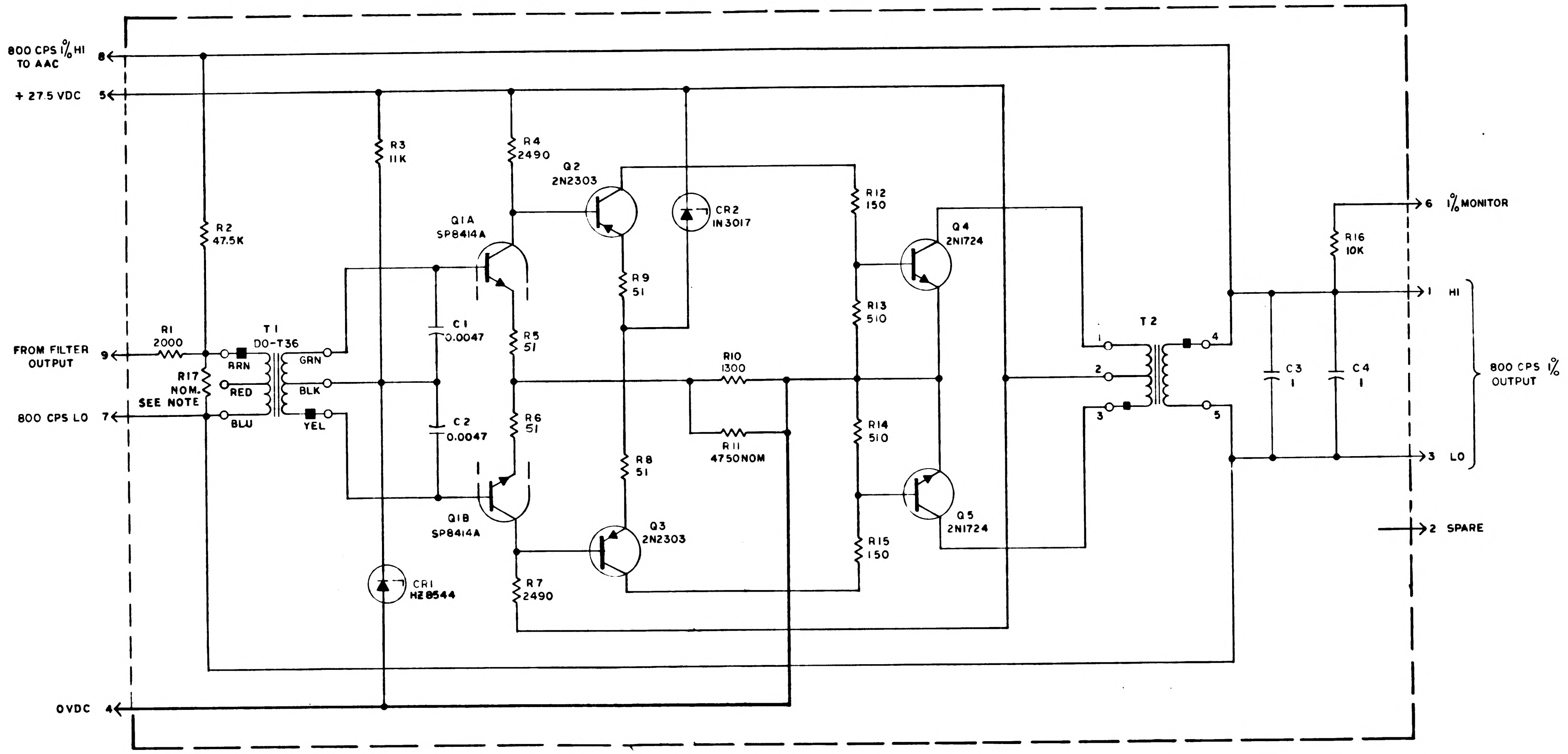
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 5495	FEB 65	[illegible]
B	REVISED PER TDRR 16637	25 FEB 68	[illegible]



800 CPS 1% HI TO AAC 8
+ 27.5 VDC 5
FROM FILTER OUTPUT 9
800 CPS LO 7
0VDC 4
R1 2000
R2 47.5K
R3 11K
R4 2490
R5 51
R6 51
R7 2490
R8 51
R9 51
R10 1300
R11 4750NOM
R12 150
R13 510
R14 510
R15 150
R16 10K
R17 NOM. SEE NOTE
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
C1 0.0047
C2 0.0047
C3 1
C4 1
Q1A SP8414A
Q1B SP8414A
Q2 2N2303
Q3 2N2303
Q4 2N1724
Q5 2N1724
CR1 HZ8544
CR2 1N3017
T2
1
2
3
4
5
6 1% MONITOR
1 HI
3 LO
800 CPS 1% OUTPUT
2 SPARE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	± 1%	1/8 W
R2	1010364-573		47.5K	± 1%	1/8 W
R3	1006750-57		11 K	± 2%	1/4 W
R4	1010364-327		2490	± 1%	1/8 W
R5	1006750-1		51	± 2%	1/4 W
R6	1006750-1		51	± 2%	1/4 W
R7	1010364-327		2490	± 1%	1/8 W
R8	1006750-1		51	± 2%	1/4 W
R9	1006750-1		51	± 2%	1/4 W
R10	1010364-273		1300	± 1%	1/8 W
R11	1010364-		SEE NOTE 4	± 1%	1/8 W
R12	1006750-12		150	± 2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	-56		10K		
R17	1006750-		SEE NOTE 4		
C1	1010264-9	CAPACITOR	0.0047	± 5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37		1		
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010265-2	DIODE	1N3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010273-3		2N1724		
Q5			2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307				

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 AND R17 TO BE DETERMINED BY ELECTRICAL TEST PER ATP 1007547 SEE SELECTION CHARTS

SELECTION CHART FOR R11

PART NUMBER	VALUE
1010364-325	2430
-329	2550
-337	2800
-343	3010
-351	3320
-355	3480
-361	3740
-367	4020
-371	4220
-375	4420
-377	4530
-381	4750
-385	4990
-387	5110
-391	5360
-395	5620
-399	5900
-403	6190
-405	6340
-409	6650

SELECTION CHART FOR R17

PART NUMBER	VALUE
1006750-84	150 K
-56	10K
-49	5.1K
-44	3.3K
-41	2.4K
-38	1.8K
-36	1.5 K
-34	1.2K
-32	1.0K
-30	820
-29	750
-27	620
-25	510
-23	430
-22	390
-20	330
-18	270
-16	220

REF. DWG:
800 CPS 1% AMPL. ASS'Y
NO. 1007547

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
Contract NAS 9-497

DRAWN Ozyel DATE 29 SEP 64
CHECKED A. Udornich 3 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800CPS 1% AMPLIFIER

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009525
SCALE — WT — SHEET 1 OF 1

1009525 B

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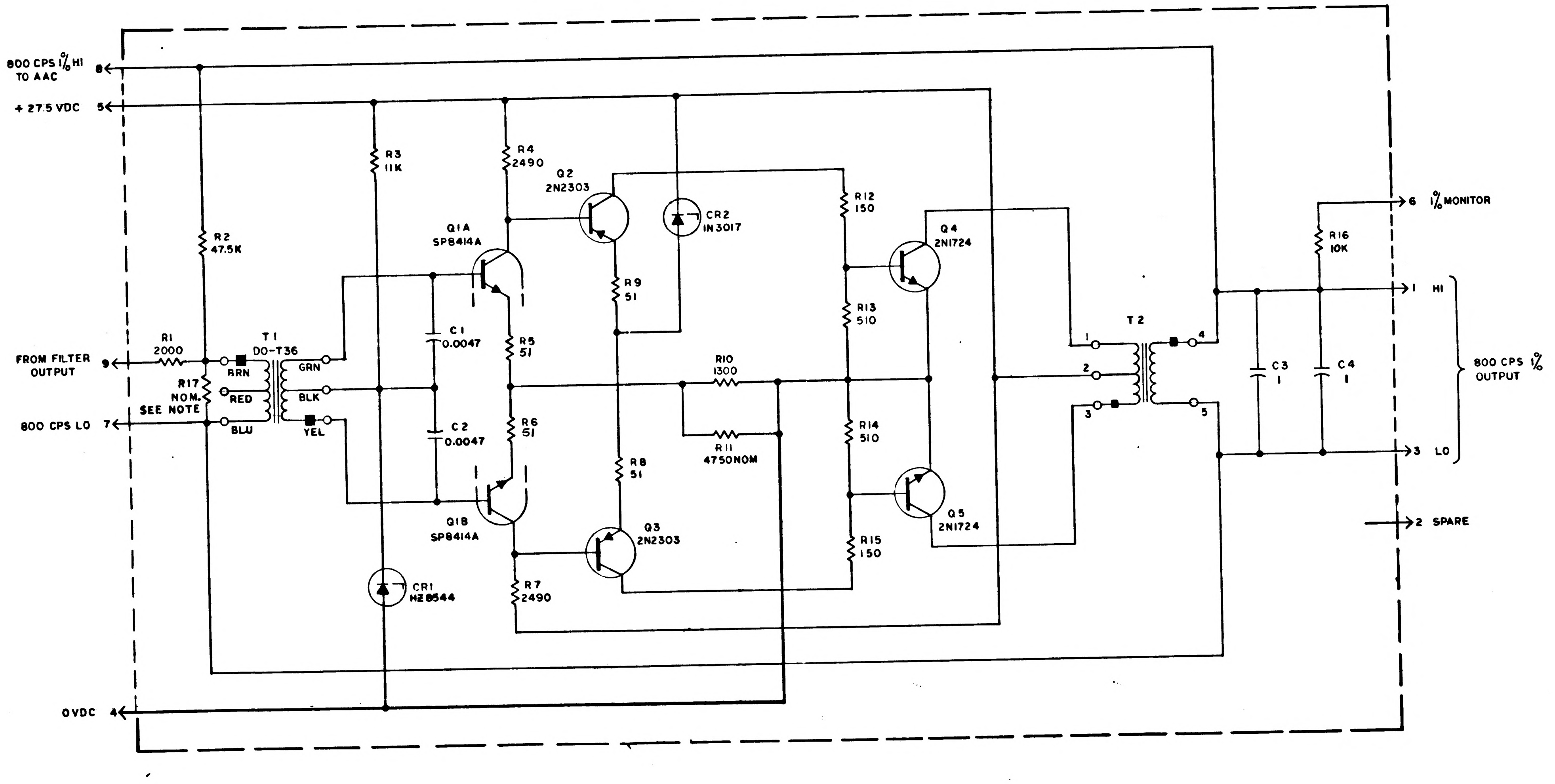
REVISIONS

	SYM	DESCRIPTION	DATE	APPROVAL
(M)	A	REVISED PER TDRR 15495	1-FEB-65	
(M)	B	REVISED PER TDRR 16637	25 FEB 65	HTO
	C	REVISED PER TDRR 17610	24 MAR 65	HTO


800 CPS 1% HI TO AAC 8
+ 27.5 VDC 5
FROM FILTER OUTPUT 9
800 CPS LO 7
OVDC 4
R1 2000
R2 47.5K
R3 11K
R4 2490
R5 51
R6 51
R7 2490
R8 51
R9 51
R10 1300
R11 4750NOM
R12 150
R13 510
R14 510
R15 150
R16 10K
R17 NOM. SEE NOTE
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
C1 0.0047
C2 0.0047
C3 1
C4 1
Q1A SP8414A
Q1B SP8414A
Q2 2N2303
Q3 2N2303
Q4 2N1724
Q5 2N1724
CR1 HZ8544
CR2 IN3017
T2
1
2
3
4
5
6 1% MONITOR
1 HI
3 LO
800 CPS 1% OUTPUT
2 SPARE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	± 1%	1/8 W
R2	1010364-573		47.5K	± 1%	1/8 W
R3	1006750-57		11 K	± 2%	1/4 W
R4	1010364-327		2490	± 1%	1/8 W
R5	1006750-1		51	± 2%	1/4 W
R6	1006750-1		51	± 2%	1/4 W
R7	1010364-327		2490	± 1%	1/8 W
R8	1006750-1		51	± 2%	1/4 W
R9	1006750-1		51	± 2%	1/4 W
R10	1010364-273		1300	± 1%	1/8 W
R11	1010364-		SEE NOTE 4	± 1%	1/8 W
R12	1006750-12		150	± 2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	-56		10K		
R17	1006750-		SEE NOTE 4		
C1	1010264-9	CAPACITOR	0.0047	± 5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37		1		
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010829-2	DIODE	IN3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010273-3		2N1724		
Q5			2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307				

SELECTION CHART FOR R11

PART NUMBER	VALUE
1010364-325	2430
-329	2550
-337	2800
-343	3010
-351	3320
-355	3480
-361	3740
-367	4020
-371	4220
-375	4420
-377	4530
-381	4750
-385	4990
-387	5110
-391	5360
-395	5620
-399	5900
-403	6190
-405	6340
-409	6650

SELECTION CHART FOR R17

PART NUMBER	VALUE
1006750-84	150 K
-56	10K
-49	5.1K
-44	3.3K
-41	2.4K
-38	1.8K
-36	1.5 K
-34	1.2K
-32	1.0K
-30	820
-29	750
-27	620
-25	510
-23	430
-22	390
-20	330
-18	270
-16	220

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 AND R17 TO BE DETERMINED BY ELECTRICAL TEST PER ATP 1007547 SEE SELECTION CHARTS

REF. DWG:
800 CPS 1% AMPL. ASS'Y
NO. 1007547

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

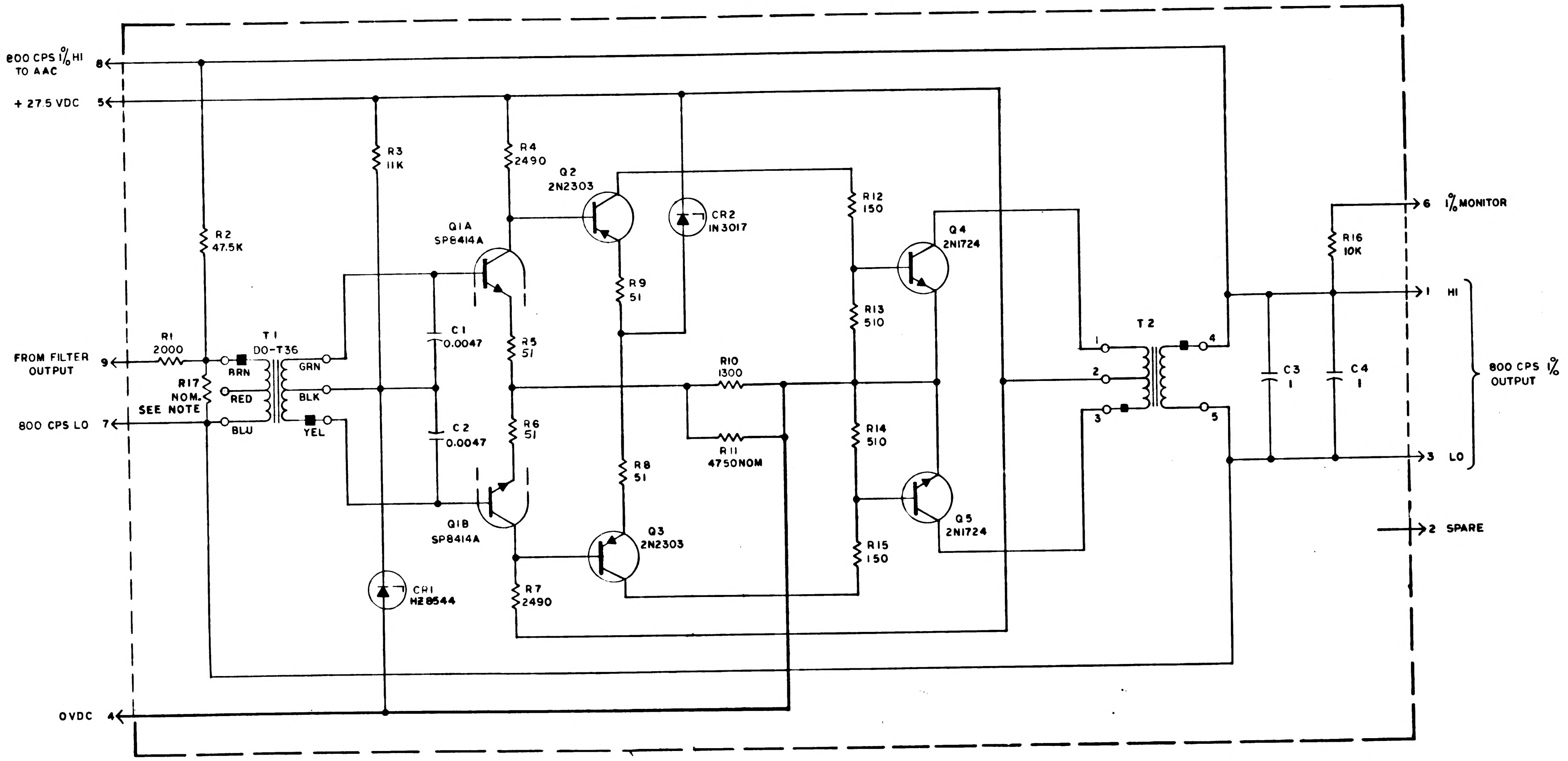
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN
DATE
CHECKED 3 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800CPS 1% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009525
SCALE #
WT #
SHEET 1 OF 1

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 5495	[illegible]	[illegible]
B	REVISED PER TDRR 16637	25 FEB 65	HTO
C	REVISED PER TDRR 17610	24 MAR 65	HTO
D	REVISED PER TDRR 23890	16 NOV 65	[illegible]


800 CPS 1% HI TO AAC 8
+ 27.5 VDC 5
FROM FILTER OUTPUT 9
800 CPS LO 7
OVDC 4
R1 2000
R2 47.5K
R3 11K
R4 2490
R5 51
R6 51
R7 2490
R8 51
R9 51
R10 1300
R11 4750NOM
R12 150
R13 510
R14 510
R15 150
R16 10K
R17 NOM. SEE NOTE
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
C1 0.0047
C2 0.0047
C3 1
C4 1
Q1A SP8414A
Q1B SP8414A
Q2 2N2303
Q3 2N2303
Q4 2N1724
Q5 2N1724
CR1 HZ8544
CR2 IN3017
T2
1
2
3
4
5
6 1% MONITOR
1 HI
3 LO
800 CPS 1% OUTPUT
2 SPARE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	± 1%	1/8 W
R2	1010364-573		47.5K	± 1%	1/8 W
R3	1006750-57		11 K	± 2%	1/4 W
R4	1010364-327		2490	± 1%	1/8 W
R5	1006750-1		51	± 2%	1/4 W
R6	1006750-1		51	± 2%	1/4 W
R7	1010364-327		2490	± 1%	1/8 W
R8	1006750-1		51	± 2%	1/4 W
R9	1006750-1		51	± 2%	1/4 W
R10	1010364-273		1300	± 1%	1/8 W
R11	1010364-		SEE NOTE 4	± 1%	1/8 W
R12	1006750-12		150	± 2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	-56		10K		
R17	1006750-		SEE NOTE 4		
C1	1010264-9	CAPACITOR	0.0047	± 5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37		1		
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010829-2	DIODE	IN3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010273-3		2N1724		
Q5			2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307				

SELECTION CHART FOR R11

PART NUMBER	VALUE	PART NUMBER	VALUE
1010364-411	6810	1010364-325	2430
-413	6980	-329	2550
-415	7150	-337	2800
-417	7320	-343	3010
-419	7500	-351	3320
-421	7680	-355	3480
		-361	3740
		-367	4020
		-371	4220
		-375	4420
		-377	4530
		-381	4750
		-385	4990
		-387	5110
		-391	5360
		-395	5620
		-399	5900
		-403	6190
		-405	6340
		-409	6650

SELECTION CHART FOR R17

PART NUMBER	VALUE
1006750-84	150 K
-56	10K
-49	5.1K
-44	3.3K
-41	2.4K
-38	1.8K
-36	1.5 K
-34	1.2K
-32	1.0K
-30	820
-29	750
-27	620
-25	510
-23	430
-22	390
-20	330
-18	270
-16	220

REF. DWG:
800 CPS 1% AMPL. ASS'Y
NO. 1007547

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 AND R17 TO BE DETERMINED BY ELECTRICAL TEST PER ATP 1007547 SEE SELECTION CHARTS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN Orgel DATE 29 SEP 64
CHECKED A. Udovich 3 OCT 64
APPROVAL
APPROVAL
NASA APPROVAL W. J. Rice
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800CPS 1% AMPLIFIER

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1009525
SCALE —
WT —
SHEET 1 OF 1

1009525

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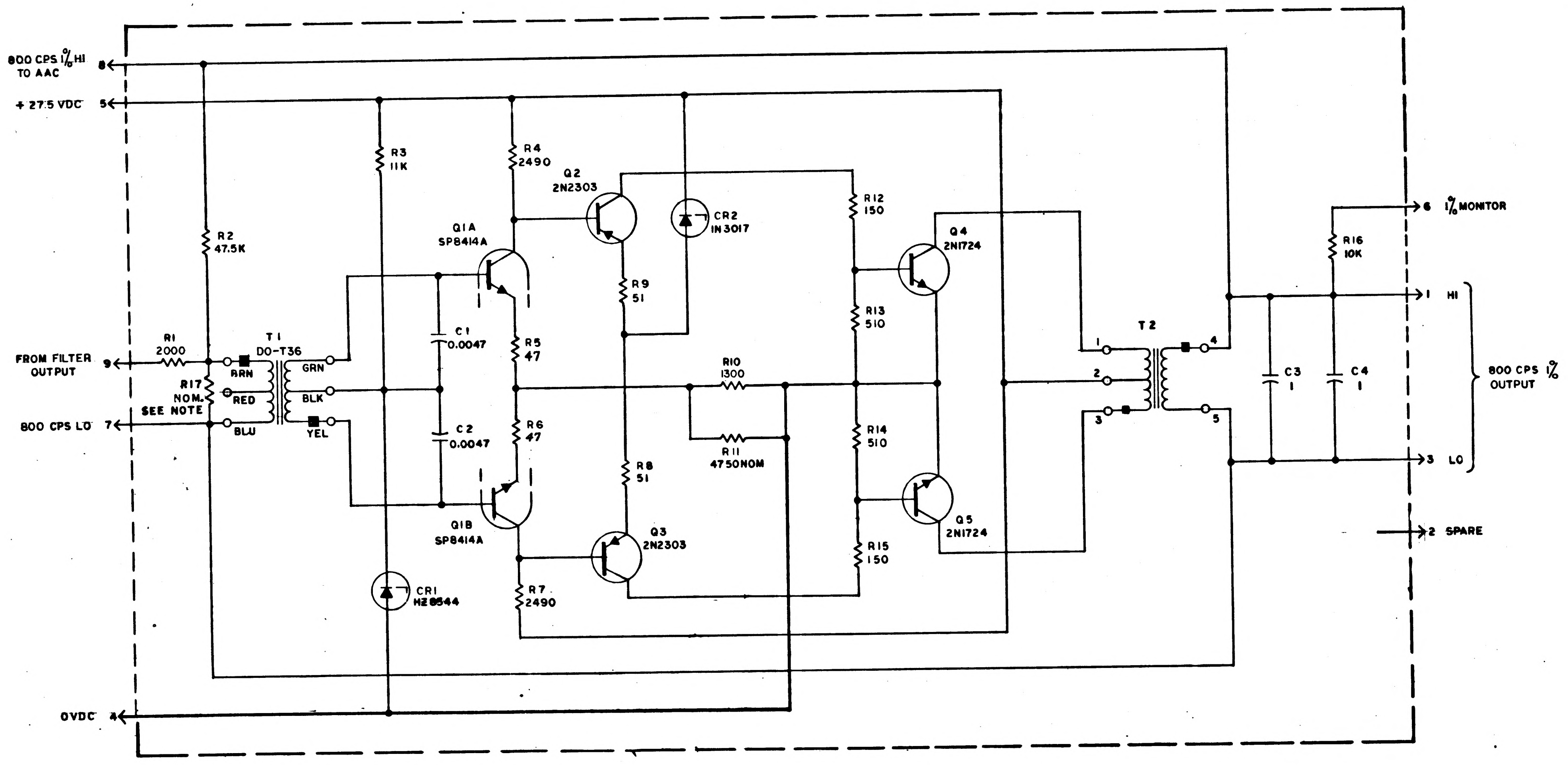
REVISIONS /3911

SYM	DESCRIPTION	DATE	APPROVAL


800 CPS 1% HI
TO AAC
8
+ 27.5 VDC
5
FROM FILTER
OUTPUT
9
800 CPS LO
7
OVDC
4
R1
2000
R2
47.5K
R17
NOM.
SEE NOTE
T1
DO-T36
BRN
RED
BLU
GRN
BLK
YEL
R3
11K
CR1
HZ8544
C1
0.0047
C2
0.0047
Q1A
SP8414A
Q1B
SP8414A
R4
2490
R5
47
R6
47
R7
2490
Q2
2N2303
Q3
2N2303
R9
51
R8
51
CR2
IN3017
R10
1300
R11
4750NOM
R12
150
R13
510
R14
510
R15
150
Q4
2N1724
Q5
2N1724
T2
1
2
3
4
5
C3
1
C4
1
R16
10K
6
1% MONITOR
1
HI
3
LO
800 CPS 1%
OUTPUT
2
SPARE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	±1%	1/8 W
R2	1010364-573		47.5K	±1%	1/8 W
R3	1006750-57		11 K	±2%	1/4 W
R4	1010364-327		2490	±1%	1/8 W
R5	1010369-1		47	±5%	
R6	1010369-1		47	±5%	
R7	1010364-327		2490	±1%	↓
R8	1006750-1		51	±2%	1/4 W
R9	1006750-1		51	±2%	1/4 W
R10	1010364-273		1300	±1%	1/8 W
R11	1010364-		SEE NOTE 4	±1%	1/8 W
R12	1006750-12		150	±2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	-56		10K		
R17	1006750-	↓	SEE NOTE 4	↓	↓
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37	↓	1	↓	↓
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010265-2	DIODE	1N3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010273-2		2N1724		
Q5		↓	2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307	↓			

1009525

SELECTION CHART FOR R11	
PART NUMBER	VALUE
1010364-325	2430
-329	2550
-337	2800
-343	3010
-351	3320
-355	3480
-361	3740
-367	4020
-371	4220
-375	4420
-377	4530
-381	4750
-385	4990
-387	5110
-391	5360
-395	5620
-399	5900
-403	6190
-405	6340
-409	6650

SELECTION CHART FOR R17	
PART NUMBER	VALUE
1006750-84	150 K
-56	10K
-49	5.1K
-44	3.3K
-41	2.4K
-38	1.8K
-36	1.5 K
-34	1.2K
-32	1.0K
-30	820
-29	750
-27	620
-25	510
-23	430
-22	390
-20	330
-18	270
-16	220

REF. DWG:
800 CPS 1% AMPL. ASS'Y
NO. 1007547

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 AND R17 TO BE DETERMINED BY ELECTRICAL TEST PER ATP 1007547 SEE SELECTION CHARTS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN [illegible] DATE 64
CHECKED [illegible] 3 OCT 64
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL W. J. [illegible] 11-4-64
MIT APPROVAL [illegible]

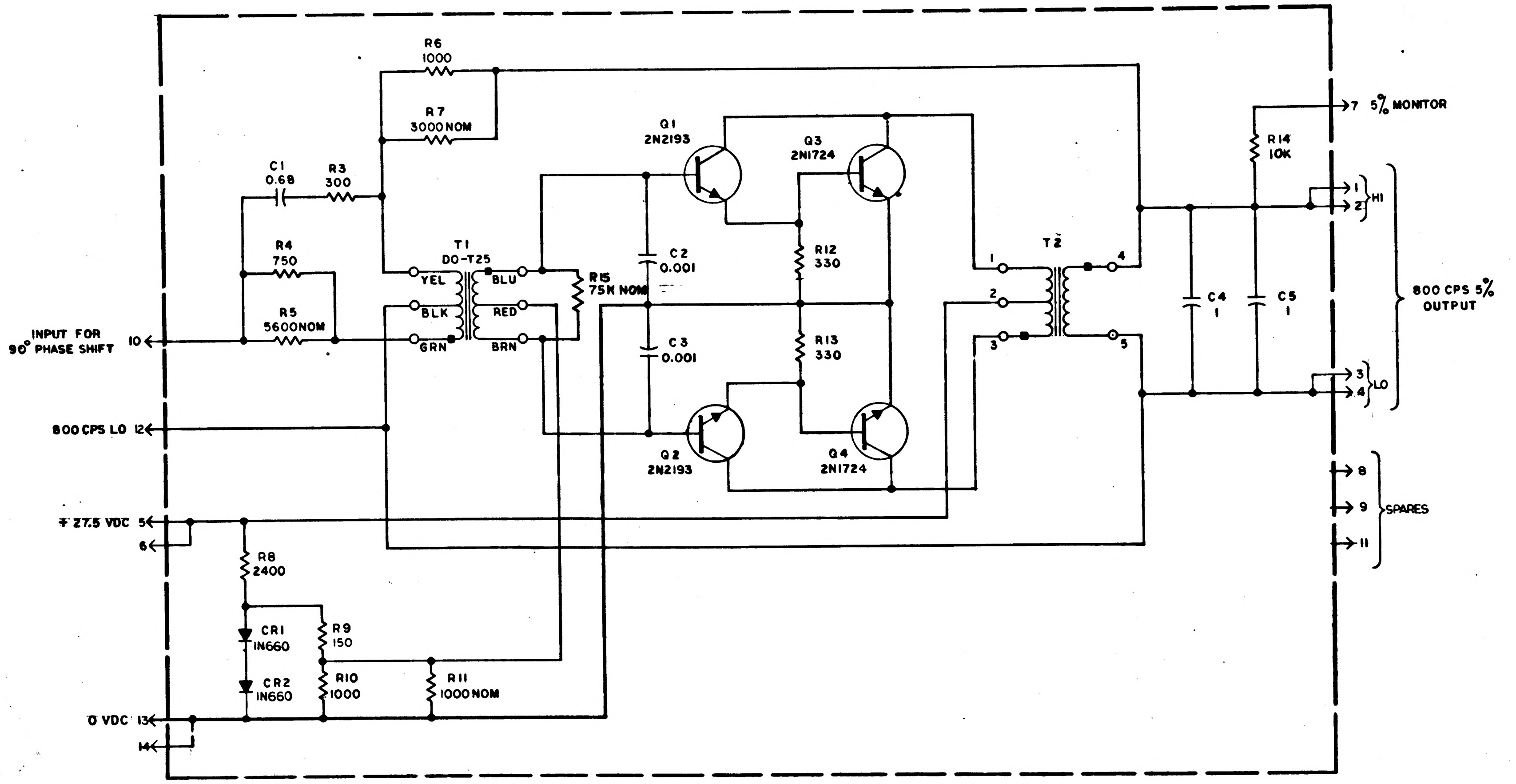
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800CPS 1% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009525
SCALE —
WT —
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


R6
1000
R7
3000 NOM
C1
0.68
R3
300
R4
750
R5
5600NOM
INPUT FOR 90° PHASE SHIFT
10
800 CPS LO 12
∓ 27.5 VDC 5
6
0 VDC 13
14
T1
DO-T25
YEL
BLK
GRN
BLU
RED
BRN
R15
75K NOM
Q1
2N2193
Q2
2N2193
Q3
2N1724
Q4
2N1724
C2
0.001
C3
0.001
R12
330
R13
330
R8
2400
CR1
IN660
CR2
IN660
R9
150
R10
1000
R11
1000 NOM
T2
1
2
3
4
5
C4
1
C5
1
R14
10K
7 5% MONITOR
1
2
HI
3
4
LO
800 CPS 5% OUTPUT
8
9
11
SPARES

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	——	NOT USED	——	—	—
R2	——	NOT USED	——	—	—
R3	1010389-43	RESISTOR	300	± 1%	3 W
R4	1010389-53		750		
R5	1010389-		SEE NOTE 4		
R6	1010389-56		1000		
R7	1010389-		SEE NOTE 4		
R8	1010389-65		2400		
R9	1006750-12		150	±2 %	1/4 W
R10	1010364-251		1000	± 1%	1/8 W
R11	1010364-		SEE NOTE 4	± 1%	1/8 W
R12	1006750-20		330	± 2%	1/4 W
R13	1006750-20		330		
R14	1006750-56		10K		
R15	1006750-		SEE NOTE 4		
C1	1010264-36	CAPACITOR	0.68	± 5 %	200VDC
C2	1010254 - 1		0.001	± 5 %	200VDC
C3	1010264 - 1		0.001	± 5 %	200VDC
C4	1010264-37		1	± 5 %	200VDC
C5	1010264-37		1	± 5%	200VDC
CR1	1010385	DIODE	IN660		
CR2	1010385		IN660		
Q1	1010398-4	TRANSISTOR	2N2193		
Q2	1010398-4		2N2193		
Q3	1010273-2		2N1724		
Q4			2N1724		
T1	1010407	TRANSFORMER	DO-T25		
T2	1010308				

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

SELECTION CHART FOR R5

PART NO.	VALUE Ω
1010389 - 96	2800
- 67	3000
- 68	3300
- 69	3600
- 70	3900
- 97	4100
- 71	4300
- 98	4500
- 110	4900
- 73	5100
- 99	5300
- 74	5600
- 100	5800
- 101	6100
- 102	6300
- 103	6600
- 104	6900
- 105	7200
- 77	7500
- 111	7800

SELECTION CHART FOR R15

PART NO.	VALUE Ω
1006750-23	430
-26	560
-29	750
-32	1000
-35	1300
-36	1500
-38	1800
-40	2200
-42	2700
-47	4300
-54	8200
-59	13K
-66	27K
-84	150K
-105	375
-108	490
-111	650
-114	865
-117	1150
-128	3450
-134	5900

SELECTION CHART FOR R7

PART NO.	VALUE Ω
1010389 - 60	1500
- 61	1600
- 62	1800
- 63	2000
- 64	2200
- 107	2300
- 65	2400
- 95	2600
- 96	2800
- 67	3000
- 108	3100
- 68	3300
- 109	3500
- 69	3600
- 70	3900
- 97	4100
- 71	4300
- 98	4500

SELECTION CHART FOR R11

PART NO.	VALUE Ω
1010364 - 195	511
- 203	562
- 211	619
- 219	681
- 227	750
- 235	825
- 243	909
- 251	1000
- 259	1100
- 267	1210
- 273	1300
- 279	1400
- 285	1500

REF DRAWING:
AMPLIFIER, 5% 800 CPS MODULE ASSY
DWG NO. 1007548

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL ——
HEAT TREATMENT ——
FINAL FINISH ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Ozol DATE 64
CHECKED A. Udovich 12 OCT 64
APPROVAL
APPROVAL M. Kramer 30 Oct 64
E.F. Dietz 30 Oct 64
NASA APPROVAL W J Rhine Nov 64
MIT APPROVAL 4 Nov 64

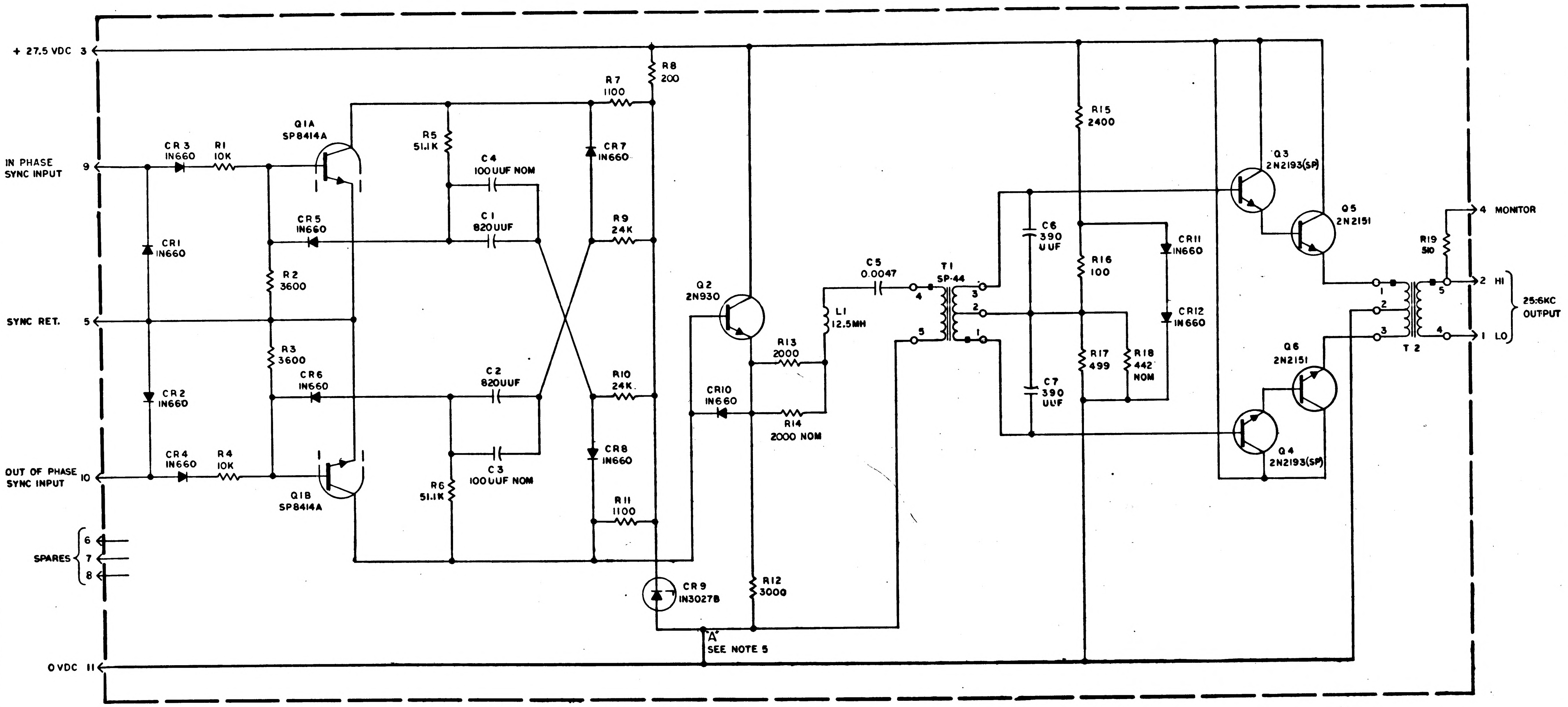
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800 CPS 5% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009526
SCALE ~
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG. NO.	DATE	APPD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IN PHASE SYNC INPUT 9
SYNC RET. 5
OUT OF PHASE SYNC INPUT 10
SPARES 6 7 8
OVDC 11
CR 3 IN660
R1 10K
CR1 IN660
CR2 IN660
CR4 IN660
R4 10K
Q1A SP8414A
Q1B SP8414A
CR5 IN660
CR6 IN660
R2 3600
R3 3600
R5 51.1K
R6 51.1K
C4 100UUF NOM
C1 820UUF
C2 820UUF
C3 100UUF NOM
R7 1100
R8 200
CR7 IN660
R9 24K
R10 24K
CR8 IN660
R11 1100
CR9 IN3027B
Q2 2N930
CR10 IN660
R12 3000
R13 2000
R14 2000 NOM
L1 12.5MH
C5 0.0047
'A' SEE NOTE 5
T1 SP-44
4 5 3 2 1
C6 390 UUF
C7 390 UUF
R15 2400
R16 100
R17 499
R18 442 NOM
CR11 IN660
CR12 IN660
Q3 2N2193(SP)
Q4 2N2193(SP)
Q5 2N2151
Q6 2N2151
R19 510
T2
1 2 3 4 5
4 MONITOR
2 HI
1 LO
25:6KC OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	± 2%	1/4 W
R2	1006750-45		3600		
R3	1006750-45		3600		
R4	1006750-56		10K	↓	↓
R5	1010364-579		51.1K	± 1%	1/8 W
R6	1010364-579		51.1K	± 1%	1/8 W
R7	1006760-33		1100	± 2%	1/2 W
R8	1010312-022		200	± 5%	2 W
R9	1006750-65		24K	± 2%	1/4 W
R10	1006750-65		24K		1/4W
R11	1006760-33		1100		1/2 W
R12	1006750-43		3000	↓	1/4 W
R13	1010364-309		2000	1%	1/8W
R14	1010364		SEE NOTE 4	1%	1/8 W
R15	1010278-72		2400	5%	1/2 W
R16	1006750-8		100	2%	1/4 W
R17	1010364-193		499	1%	1/8W
R18	1010364		SEE NOTE 4	1%	1/8 W
R19	1006750-25	↓	510	2%	1/4 W
C1	1010410-15	CAPACITOR	820UUF	± 2%	300V
C2	1010410-15		820UUF		300V
C3	1010409		SEE NOTE 4		
C4	1010409		SEE NOTE 4		
C5	1006793-023		0.0047		300 V
C6	1010410-7		390 UUF	↓	500 V
C7	1010410-7	↓	390 UUF	± 2%	500 V
L1	1010309-4	COIL	12.5MH		
CR1	1010385	DIODE	IN660		
CR2					
CR3					
CR4					
CR5					
CR6					
CR7			↓		
CR8	↓		IN660		
CR9	1010265-12		IN 3027B		
CR10	1010385		IN660		
CR11					
CR12	↓	↓	↓		
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010397-1		2N930		
Q3	1010398-4		2N2193(SP)		
Q4			2N2193(SP)		
Q5	1010269-2		2N2151		
Q6		↓	2N2151		
T1	1010291-2	TRANSFORMER	SP-44		
T2	1010422	↓			

R14		R18		C3 AND C4-uuf	
1010364-413	6980	1010364-459	12100	1010409-18	51
↑ -401	6040	↑ -381	4750	↑ -19	56
-389	5230	-327	2490	-20	62
-379	4640	-295	1690	-21	68
-369	4120	-271	1270	-22	75
-359	3650	-251	1000	-23	82
-351	3320	-237	845	-24	91
-343	3010	-223	715	-25	100
-335	2740	-211	619	-26	110
-325	2430	-201	549	-27	120
-317	2210	-191	487	-28	130
-309	2000	-183	442	-29	150
-301	1820	-175	402	-30	160
-293	1650	-169	374	↓ -31	180
-283	1470	-163	384	1010409-32	200
-275	1330	-157	324		
-267	1210	-151	301		
-259	1100	-145	280		
-249	976	-139	261		
-239	866	-133	243		
-229	768	-129	232		
↓ -217	665	↓ -125	221		
1010364-205	576	1010364-121	210		

REFERENCE DRAWINGS:

POWER SUPPLY 25.6KC MODULE ASS'Y 1007549

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. THE VALUE OF R14, R18, C3 & C4 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT POINT 'A' TO OVDC AT ONE POINT ONLY AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN R.M. Kun[illegible] DATE [illegible] SEP 64
CHECKED [illegible] 30 SEP 64
APPROVAL [illegible]
APPROVAL Manuel [illegible]
NASA APPROVAL W. J. R[illegible] 10-20-64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

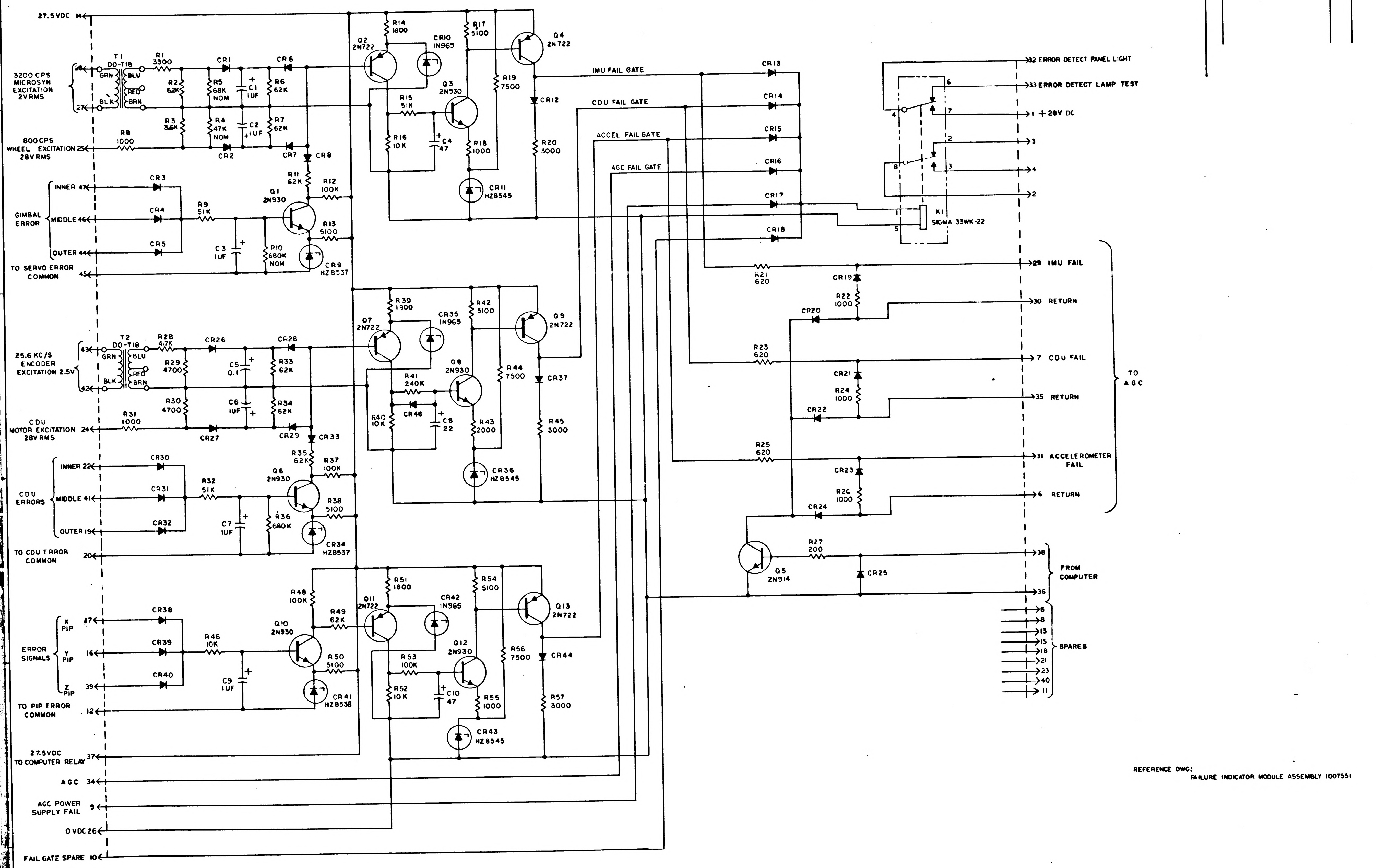
SCHEMATIC.
POWER SUPPLY, 25.6KC

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1009527
SCALE — WT — SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17610	31 MAR 65	



27.5VDC 14
3200 CPS MICROSYN EXCITATION 2V RMS
28
27
T1 DO-T18
GRN
BLU
RED
BLK
BRN
R1 3300
CR1
CR6
R2 6.2K
R5 68K NOM
C1 1UF
R6 62K
R3 3.6K
R4 47K NOM
C2 1UF
R7 62K
800 CPS WHEEL EXCITATION 25 28V RMS
R8 1000
CR2
CR7
CR8
Q2 2N722
R14 1800
CR10 1N965
R17 5100
Q4 2N722
Q3 2N930
R15 51K
R16 10K
C4 47
R18 1000
CR11 HZ8545
R19 7500
CR12
R20 3000
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
Q1 2N930
R11 62K
R12 100K
R13 5100
C3 1UF
R10 680K NOM
CR9 HZ8537
TO SERVO ERROR COMMON 45
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
1 +28V DC
3
4
2
6
7
8
5
K1 SIGMA 33WK-22
R21 620
29 IMU FAIL
CR19
R22 1000
30 RETURN
CR20
R23 620
7 CDU FAIL
CR21
R24 1000
35 RETURN
CR22
R25 620
31 ACCELEROMETER FAIL
CR23
R26 1000
6 RETURN
CR24
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5 8 13 15 18 21 23 40 11
SPARES
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
R28 4.7K
CR26
CR28
R29 4700
C5 0.1
R33 62K
R30 4700
C6 1UF
R34 62K
CDU MOTOR EXCITATION 24 28V RMS
R31 1000
CR27
CR29
CR33
Q7 2N722
R39 1800
CR35 1N965
R42 5100
Q9 2N722
Q8 2N930
R41 240K
CR46
R40 10K
C8 22
R43 2000
CR36 HZ8545
R44 7500
CR37
R45 3000
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
Q6 2N930
R35 62K
R37 100K
R38 5100
C7 1UF
R36 680K
CR34 HZ8537
TO CDU ERROR COMMON 20
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
Q10 2N930
R48 100K
R49 62K
R50 5100
C9 1UF
CR41 HZ8538
TO PIP ERROR COMMON 12
Q11 2N722
R51 1800
CR42 1N965
R54 5100
Q13 2N722
Q12 2N930
R53 100K
R52 10K
C10 47
R55 1000
CR43 HZ8545
R56 7500
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
0 VDC 26
FAIL GATE SPARE 10

REFERENCE DWG:
FAILURE INDICATOR MODULE ASSEMBLY 1007551

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN J Wolski DATE 15 SEP 64
CHECKED D Udmach 18 SEP 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 29 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1009528
SCALE —
WT —
SHEET 1 OF 2

REVISIONS 1308			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17610	24 MAR 65	HTO / CFP

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4 W
R2	-51		6.2 K		
R3	-45		3.6 K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	↓ -32		1000	↓	↓
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8 W
R11	1006750-75		62K	±2%	1/4 W
R12	↓ -80		100K		↓
R13	1006750-49		5100		1/4W
R14	1006760-38		1800		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	↓ -43		3000		
R21	1010604 - 3		620		
R22	1006750-32		1000		
R23	1010604 - 3		620		
R24	1006750-32		1000		
R25	1010604 - 3		620		
R26	1006750-32		1000		↓
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	↓ -75		62K	↓	↓
R35	1006750-75		62K	±2%	1/4 W
R36	1010369 -101		680K	±5%	1/8 W
R37	1006750 -80		100K	±2%	1/4 W
R38	1006750 -49		5100		1/4 W
R39	1006760 -38		1800		1/2 W
R40	1006750 -56		10K	↓	1/4 W
R41	1010369- 90		240K	±5%	1/8 W
R42	1006750 -49		5100	±2%	1/4 W
R43	1006750 -39		2000		1/4 W
R44	1006750 -53		7500		1/4 W
R45	1006760 -43		3000	↓	1/2 W
R46	1006750 -56		10K	±2%	1/4 W
R47	DELETED		—	—	—
R48	1006750 -80		100K	±2%	1/4 W
R49	↓ -75		62K		1/4 W
R50	1006750 -49		5100		1/4 W
R51	1006760 -38		1800		1/2 W
R52	1006750 -56		10K		1/4 W
R53	-80		100K		
R54	-49		5100		
R55	↓ -32		1000		↓
R56	1006750 -53		7500	↓	1/4 W
R57	1006760 -43	↓	3000	±2%	1/2 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-85		22		
C9	-69		1		
C10	↓ -89	↓	47	↓	↓
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7	↓		↓		↓
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010830-9		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	↓		↓		↓
CR33	1010385		IN660		250MW
CR34	1010372-8		HZ8537	±5%	200MW
CR35	1010830-9		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39	↓		↓		↓
CR40	1010385		IN 660		250MW
CR41	1010372 - 9		HZ8538	±5%	200MW
CR42	1010830-9		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385	↓	IN660		250MW
CR46	1010385	DIODE	IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1006752		2N914		
Q6	1010397		2N 930		
Q7	1010285		2N 722		
Q8	1010397		2N930		
Q9	1010285		2N 722		
Q10	1010397		2N 930		
Q11	1010285		2N 722		
Q12	1010397		2N 930		
Q13	1010285	↓	2N 722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467	↓	DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 45	3.6 K	1006750 - 60	15 K	1010369 - 93	330 K
- 46	3.9 K	- 61	16 K	-94	360 K
- 47	4.3 K	- 62	18 K	- 95	390 K
- 48	4.7 K	- 63	20 K	- 96	430 K
- 49	5.1 K	- 64	22 K	- 97	470 K
- 50	5.6 K	- 65	24 K	- 98	510 K
- 51	6.2 K	- 66	27 K	- 99	560 K
- 52	6.8 K	- 67	30 K	-100	620 K
- 53	7.5 K	- 68	33 K	-101	680 K
- 54	8.2 K	- 69	36 K	-102	750 K
- 55	9.1 K	- 70	39 K	-103	820 K
- 56	10 K	- 71	43 K	-104	910 K
- 57	11 K	- 72	47 K	-105	1 MEG
- 58	12 K	- 73	51 K	↓ - —	—
- 59	13 K	- 74	56 K	1010369 -106	1.1 MEG
- 60	15 K	- 75	62 K		
- 61	16 K	- 76	68 K		
- 62	18 K	↓ - 77	75 K		
- 63	20 K	1006750 - 78	82 K		
64	22 K				
- 65	24 K				
66	27 K				
67	30 K				
- 68	33 K				
- 69	36 K				
- 70	39 K				
↓ - 71	43 K				
1006750 - 72	47 K				

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN J Wolske DATE 15 SEP 64
CHECKED A Udovich 18 SEP 64
APPROVAL
APPROVAL L.H. Martinez 9/28/64
NASA APPROVAL W J Rhine 9-29-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1009528
SCALE —
WT —
SHEET 2 OF 2

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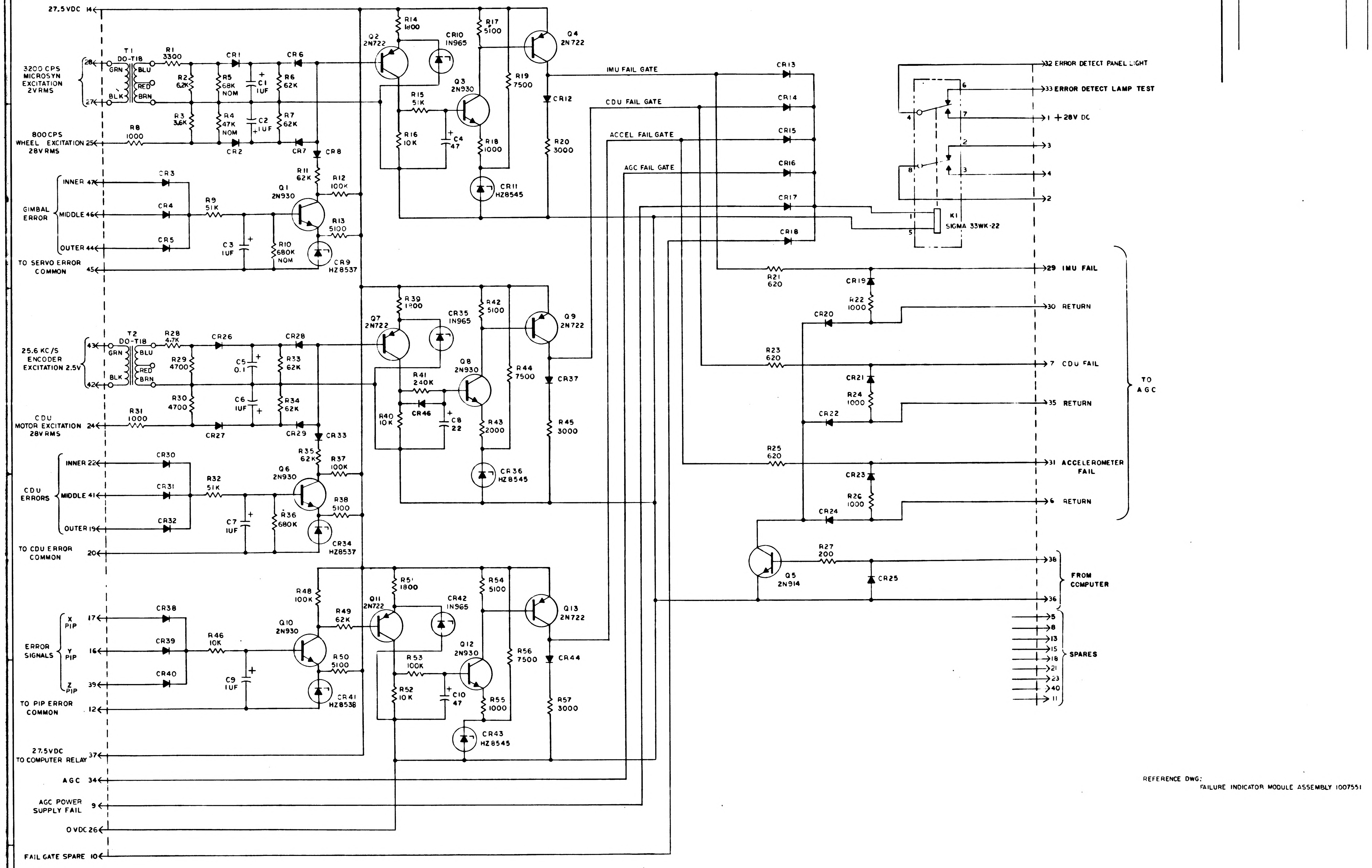
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDR 17610	24 MAR 65	
B	REVISION STATUS CHANGE	3 ... 65	


27.5VDC 14
3200 CPS MICROSYN EXCITATION 2V RMS 28 27
T1 DO-T18
GRN BLK BLU RED BRN
R1 3300
CR1
CR6
R2 62K
R5 68K NOM
C1 1UF
R6 62K
R3 3.6K
R4 47K NOM
C2 1UF
R7 62K
800 CPS WHEEL EXCITATION 28V RMS 25
R8 1000
CR2
CR7
CR8
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
C3 1UF
R10 680K NOM
R11 62K
Q1 2N930
R12 100K
R13 5100
CR9 HZ8537
TO SERVO ERROR COMMON 45
Q2 2N722
R14 1800
CR10 1N965
R17 5100
Q4 2N722
R15 51K
Q3 2N930
R16 10K
C4 47
R18 1000
CR11 HZ8545
R19 7500
CR12
R20 3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
25.6 KC/S ENCODER EXCITATION 2.5V 43 42
T2 DO-T18
R28 4.7K
CR26
CR28
R29 4700
C5 0.1
R33 62K
R30 4700
C6 1UF
R34 62K
CDU MOTOR EXCITATION 28V RMS 24
R31 1000
CR27
CR29
CR33
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
C7 1UF
R36 680K
R35 62K
Q6 2N930
R37 100K
R38 5100
CR34 HZ8537
TO CDU ERROR COMMON 20
Q7 2N722
R39 1800
CR35 1N965
R42 5100
Q9 2N722
R41 240K
Q8 2N930
CR46
C8 22
R40 10K
R43 2000
CR36 HZ8545
R44 7500
CR37
R45 3000
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
TO PIP ERROR COMMON 12
R48 100K
Q10 2N930
R49 62K
R50 5100
CR41 HZ8538
Q11 2N722
R51 1800
CR42 1N965
R54 5100
Q13 2N722
R53 100K
Q12 2N930
R52 10K
C10 47
R55 1000
CR43 HZ8545
R56 7500
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
0 VDC 26
FAIL GATE SPARE 10
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
1 +28V DC
3
4
2
K1 SIGMA 33WK-22
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5 8 13 15 18 21 23 40 11
SPARES

REFERENCE DWG:
FAILURE INDICATOR MODULE ASSEMBLY 1007551

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
Cambridge Mass

DRAWN J. Wolski DATE 15 SEP 64
CHECKED D. Adrnach 18 SEP 64
APPROVAL
APPROVAL
NASA APPROVAL 9-26-64
MIT APPROVAL 29 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009528
SCALE #
WT #
SHEET 1 OF 2

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR [illegible]	[illegible]	[illegible]
B	REVISED PER TDRR [illegible]3	[illegible]	[illegible]

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	↓ -32		1000	↓	↓
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8W
R11	1006750-75		62K	±2%	1/4W
R12	↓ -80		100K		↓
R13	1006750-49		5100		1/4W
R14	1006760-38		1800		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	↓ -43		3000		
R21	1010604 - 3		620		
R22	1006750-32		1000		
R23	1010604 - 3		620		
R24	1006750-32		1000		
R25	1010604 - 3		620		
R26	1006750-32		1000		↓
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	↓ -75		62K	↓	↓
R35	1006750-75		62K	±2%	1/4W
R36	1010369 -101		680K	±5%	1/8W
R37	1006750-80		100K	±2%	1/4W
R38	1006750-49		5100		1/4W
R39	1006760-38		1800		1/2W
R40	1006750-56		10K	↓	1/4W
R41	1010369- 90		240K	±5%	1/8W
R42	1006750-49		5100	±2%	1/4W
R43	1006750-39		2000		1/4W
R44	1006750-53		7500		1/4W
R45	1006760-43		3000	↓	1/2W
R46	1006750-56		10K	±2%	1/4W
R47	DELETED		—	—	—
R48	1006750-80		100K	±2%	1/4W
R49	↓ -75		62K		1/4W
R50	1006750-49		5100		1/4W
R51	1006760-38		1800		1/2W
R52	1006750-56		10K		1/4W
R53	-80		100K		
R54	-49		5100		
R55	↓ -32		1000		↓
R56	1006750-53		7500	↓	1/4W
R57	1006760-43	↓	3000	±2%	1/2W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-85		22		
C9	-69		1		
C10	↓ -89	↓	47	↓	↓
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7	↓		↓		↓
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010830-9		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	↓		↓		↓
CR33	1010385		IN660		250MW
CR34	1010372-8		HZ8537	±5%	200MW
CR35	1010830-9		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39	↓		↓		↓
CR40	1010385		IN660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010830-9		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385	↓	IN660		250MW
CR46	1010385	DIODE	IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1010966-1		2N914		
Q6	1010397		2N930		
Q7	1010285		2N722		
Q8	1010397		2N930		
Q9	1010285		2N722		
Q10	1010397		2N930		
Q11	1010285		2N722		
Q12	1010397		2N930		
Q13	1010285	↓	2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467	↓	DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 45	3.6K	1006750 - 60	15K	1010369 - 93	330K
- 46	3.9K	- 61	16K	- 94	360K
- 47	4.3K	- 62	18K	- 95	390K
- 48	4.7K	- 63	20K	- 96	430K
- 49	5.1K	- 64	22K	- 97	470K
- 50	5.6K	- 65	24K	- 98	510K
- 51	6.2K	- 66	27K	- 99	560K
- 52	6.8K	- 67	30K	-100	620K
- 53	7.5K	- 68	33K	-101	680K
- 54	8.2K	- 69	36K	-102	750K
- 55	9.1K	- 70	39K	-103	820K
- 56	10K	- 71	43K	-104	910K
- 57	11K	- 72	47K	-105	1MEG
- 58	12K	- 73	51K	↓ - —	—
- 59	13K	- 74	56K	1010369 -106	1.1MEG
60	15K	- 75	62K		
- 61	16K	- 76	68K		
- 62	18K	↓ - 77	75K		
- 63	20K	1006750 - 78	82K		
64	22K				
- 65	24K				
66	27K				
67	30K				
68	33K				
- 69	36K				
- 70	39K				
↓ - 71	43K				
1006750 - 72	47K				

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN D Rolske DATE 15 SEP 64
CHECKED A. Udovich 18 SEP 64
APPROVAL [illegible]
APPROVAL A. H. Martinez 9/28/64
NASA APPROVAL W. J. Rhine 9-29-64
MIT APPROVAL W. Kupfer 29 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

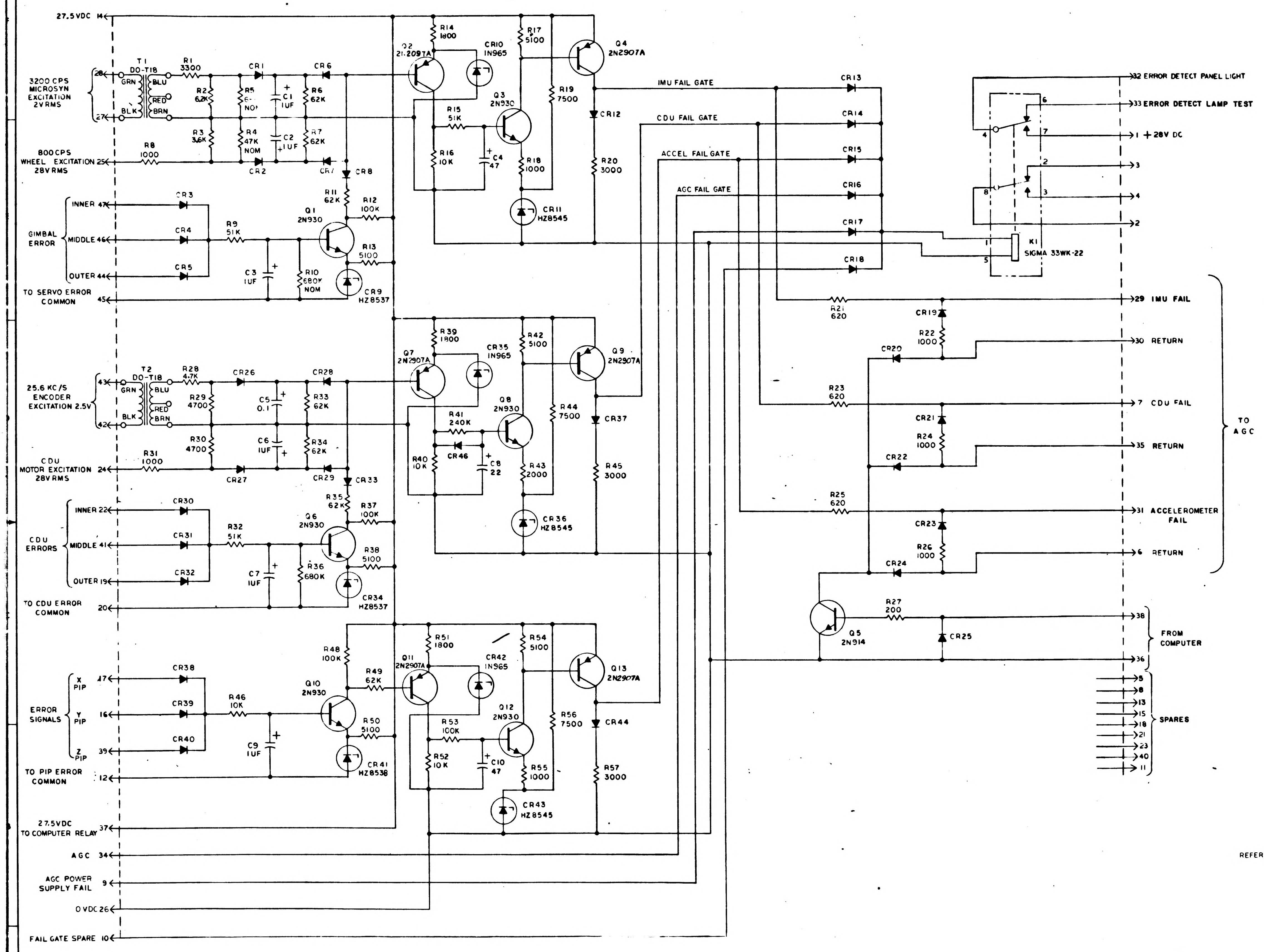
SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009528
SCALE —//—
WT —//—
SHEET 2 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 13087

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17610	24 MAR 65	HTP
B	REVISION STATUS CHANGED	13 JUL 65	RTP
C	REVISED PER TDRR 29751	29 JUN 66	RW.T. W.D.



27.5VDC 14
3200 CPS MICROSYN EXCITATION 2V RMS
28
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
R2 6.2K
R3 3.6K
R5 6- NOM
R4 47K NOM
CR1
CR2
C1 1UF
C2 1UF
CR6
R6 62K
R7 62K
CR7
CR8
800CPS WHEEL EXCITATION 25 28V RMS
R8 1000
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
C3 1UF
R10 680K NOM
Q1 2N930
R11 62K
R12 100K
R13 5100
CR9 HZ8537
TO SERVO ERROR COMMON 45
Q2 2N2907A
R14 1800
CR10 1N965
R15 51K
R16 10K
C4 47
Q3 2N930
R17 5100
R18 1000
CR11 HZ8545
R19 7500
Q4 2N2907A
CR12
R20 3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
K1 SIGMA 33WK-22
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
1 +28V DC
3
4
2
6
7
8
5
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
R28 4.7K
R29 4700
R30 4700
CR26
C5 0.1
C6 1UF
CR28
R33 62K
R34 62K
CR29
CR33
CDU MOTOR EXCITATION 24 28V RMS
R31 1000
CR27
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
C7 1UF
R36 680K
Q6 2N930
R35 62K
R37 100K
R38 5100
CR34 HZ8537
TO CDU ERROR COMMON 20
Q7 2N2907A
R39 1800
CR35 1N965
R41 240K
CR46
R40 10K
C8 22
Q8 2N930
R42 5100
R43 2000
CR36 HZ8545
R44 7500
Q9 2N2907A
CR37
R45 3000
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
Q10 2N930
R48 100K
R49 62K
R50 5100
CR41 HZ8538
TO PIP ERROR COMMON 12
Q11 2N2907A
R51 1800
CR42 1N965
R53 100K
R52 10K
C10 47
Q12 2N930
R54 5100
R55 1000
CR43 HZ8545
R56 7500
Q13 2N2907A
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
0 VDC 26
FAIL GATE SPARE 10
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
11
SPARES

REFERENCE DWG:
FAILURE INDICATOR MODULE ASSEMBLY 1007551

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

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FRACTIONS # DECIMALS # ANGLES #
DO NOT SCALE THIS DRAWING
MATERIAL
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MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN D. Wolske DATE 15 SEP 64
CHECKED A. Adorach 18 SEP 64
APPROVAL [illegible]
APPROVAL [illegible]
NASA APPROVAL W. J. Stine 9-29-64
MIT APPROVAL 29 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009528
SCALE #
WT #
SHEET 1 OF 2

1009528 C

REVISIONS 13087

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17610	24 MAR 65	HTO / C7P
B	REVISED PER TDRR 20683	13 JUL 65	RTP
C	REVISED PER TDRR 29751	28 JUN 66	R.M.T. / W.D.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4 W
R2	-51		6.2 K		
R3	-45		3.6 K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	↓ -32		1000	↓	↓
R9	1006750-73		51K	±2%	1/4 W
R10	1010369		SEE NOTE	±5%	1/8 W
R11	1006750-75		62K	±2%	1/4 W
R12	↓ -80		100K		↓
R13	1006750-49		5100		1/4 W
R14	1006760-38		1800		1/2 W
R15	1006750-73		51K		1/4 W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	↓ -43		3000		
R21	1010604 - 3		620		
R22	1006750-32		1000		
R23	1010604 - 3		620		
R24	1006750-32		1000		
R25	1010604 - 3		620		
R26	1006750-32		1000		↓
R27	1006750-15		200		1/4 W
R28	1006760-48		4700		1/2 W
R29	1006750-48		4700		1/4 W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	↓ -75		62K	↓	↓
R35	1006750-75		62K	±2%	1/4 W
R36	1010369 -101		680K	±5%	1/8 W
R37	1006750 -80		100K	±2%	1/4 W
R38	1006750 -49		5100		1/4 W
R39	1006760 -38		1800		1/2 W
R40	1006750 -56		10K	↓	1/4 W
R41	1010369 - 90		240K	±5%	1/8 W
R42	1006750 -49		5100	±2%	1/4 W
R43	1006750 -39		2000		1/4 W
R44	1006750 -53		7500		1/4 W
R45	1006760 -43		3000	↓	1/2 W
R46	1006750 -56		10K	±2%	1/4 W
R47	DELETED		—	—	—
R48	1006750 -80		100K	±2%	1/4 W
R49	↓ -75		62K		1/4 W
R50	1006750 -49		5100		1/4 W
R51	1006760 -38		1800		1/2 W
R52	1006750 -56		10K		1/4 W
R53	-80		100K		
R54	-49		5100		
R55	↓ -32		1000		↓
R56	1006750 -53		7500	↓	1/4 W
R57	1006760 -43	↓	3000	±2%	1/2 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-85		22		
C9	-69		1		
C10	↓ -89	↓	47	↓	↓
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7	↓		↓		↓
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010830-9		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	↓		↓		↓
CR33	1010385		IN660		250MW
CR34	1010372-8		HZ8537	±5%	200MW
CR35	1010830-9		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39	↓		↓		↓
CR40	1010385		IN660		250MW
CR41	1010372 - 9		HZ8538	±5%	200MW
CR42	1010830-9		IN965	±5%	400MW
CR43	1010372 -16		HZ8545	±5%	200MW
CR44	1010385	↓	IN660		250MW
CR46	1010385	DIODE	IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1008814-1		2N2907A		
Q3	1010397		2N930		
Q4	1008814-1		2N2907A		
Q5	1010966-1		2N914		
Q6	1010397		2N930		
Q7	1008814-1		2N2907A		
Q8	1010397		2N930		
Q9	1008814-1		2N2907A		
Q10	1010397		2N930		
Q11	1008814-1		2N2907A		
Q12	1010397		2N930		
Q13	1008814-1	↓	2N2907A		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467	↓	DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 45	.36 K	1006750 - 60	15 K	1010369 - 93	330 K
- 46	3.9 K	- 61	16 K	- 94	360 K
- 47	4.3 K	- 62	18 K	- 95	390 K
- 48	4.7 K	- 63	20 K	- 96	430 K
- 49	5.1 K	- 64	22 K	- 97	470 K
- 50	5.6 K	- 65	24 K	- 98	510 K
- 51	6.2 K	- 66	27 K	- 99	560 K
- 52	6.8 K	- 67	30 K	-100	620 K
- 53	7.5 K	- 68	33 K	-101	680 K
- 54	8.2 K	- 69	36 K	-102	750 K
- 55	9.1 K	- 70	39 K	-103	820 K
- 56	10 K	- 71	43 K	-104	910 K
- 57	11 K	- 72	47 K	-105	1 MEG
- 58	12 K	- 73	51 K	↓ - —	—
- 59	13 K	- 74	56 K	1010369 -106	1.1MEG
- 60	15 K	- 75	62 K		
- 61	16 K	- 76	68 K		
- 62	18 K	↓ - 77	75 K		
- 63	20 K	1006750 - 78	82 K		
64	22 K				
- 65	24 K				
66	27 K				
67	30 K				
68	33 K				
- 69	36 K				
- 70	39 K				
↓ - 71	43 K				
1006750 - 72	47 K				

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN D Wolski DATE 15 SEP 64
CHECKED A. Udovich 18 SEP 64
APPROVAL
APPROVAL L. H. Martinoja 9/28/64
NASA APPROVAL W. J. Rhine 9-29-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO
SIZE E
NASA DWG NO 1009528
SCALE — WT — SHEET 2 OF 2

1009528 C

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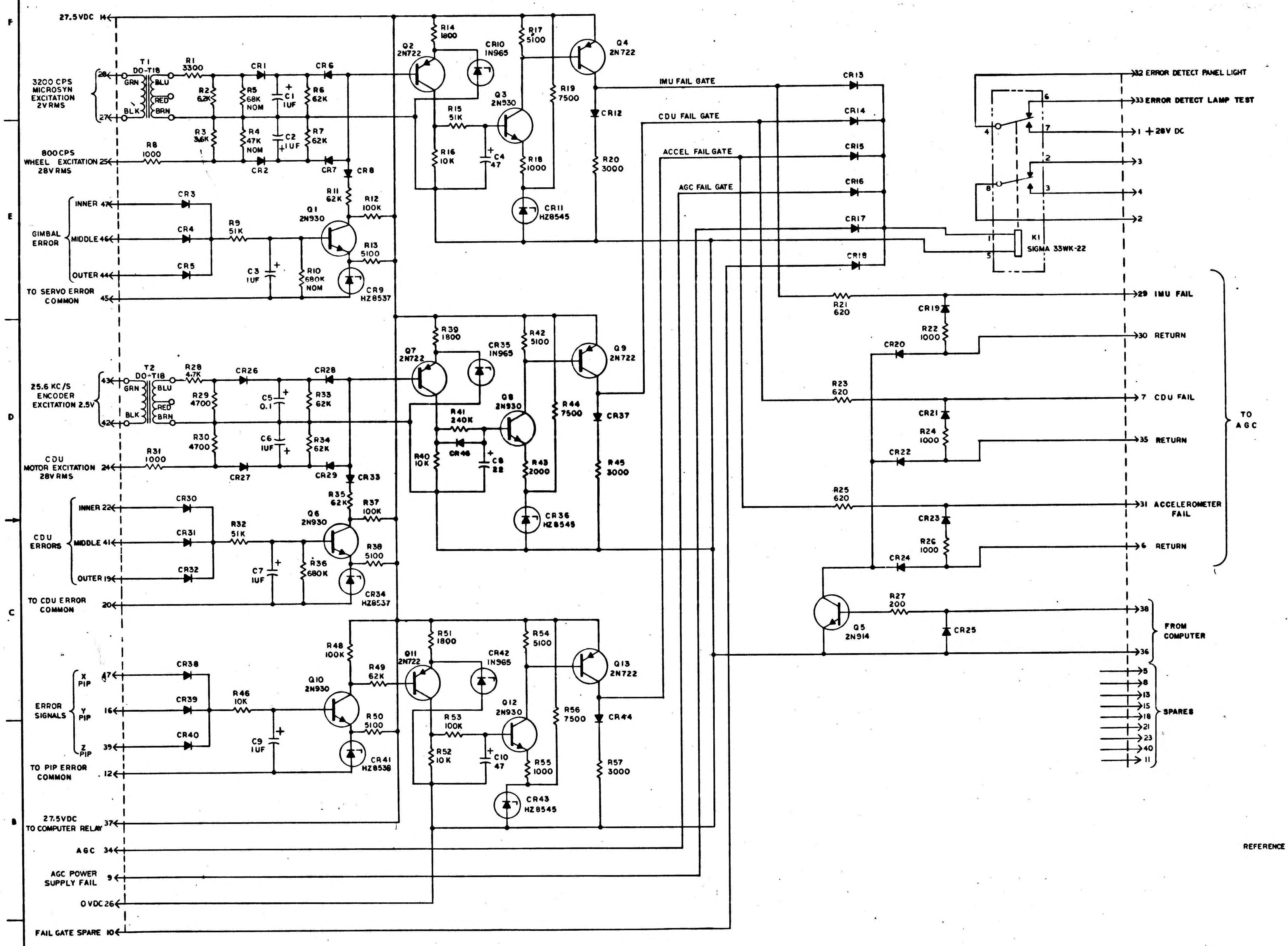
SYM	REVISIONS DESCRIPTION	DATE	APPROVAL


27.5VDC 14
3200 CPS MICROSYN EXCITATION 2VRMS
28
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
R2 6.2K
R3 3.6K
R5 68K NOM
R4 47K NOM
CR1
CR2
C1 1UF
C2 1UF
R6 62K
R7 62K
CR6
CR7
CR8
800CPS WHEEL EXCITATION 28VRMS 25
R8 1000
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
C3 1UF
R10 680K NOM
TO SERVO ERROR COMMON 45
Q1 2N930
R11 62K
R12 100K
R13 5100
CR9 HZ8537
Q2 2N722
R14 1800
CR10 1N965
R15 51K
R16 10K
C4 47
Q3 2N930
R17 5100
R18 1000
CR11 HZ8545
Q4 2N722
R19 7500
CR12
R20 3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
1 +28V DC
3
4
2
6
7
4
2
8
3
1
5
K1 SIGMA 33WK-22
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
GRN
BLK
BLU
RED
BRN
R28 4.7K
R29 4700
R30 4700
CR26
CR27
C5 0.1
C6 1UF
R33 62K
R34 62K
CR28
CR29
CR33
CDU MOTOR EXCITATION 28VRMS 24
R31 1000
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
C7 1UF
R36 680K
TO CDU ERROR COMMON 20
Q6 2N930
R35 62K
R37 100K
R38 5100
CR34 HZ8537
Q7 2N722
R39 1800
CR35 1N965
R41 240K
CR46
R40 10K
C8 22
Q8 2N930
R42 5100
R43 2000
CR36 HZ8545
Q9 2N722
R44 7500
CR37
R45 3000
ERROR SIGNALS
X PIP 47
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
TO PIP ERROR COMMON 12
Q10 2N930
R48 100K
R49 62K
R50 5100
CR41 HZ8538
Q11 2N722
R51 1800
CR42 1N965
R53 100K
R52 10K
C10 47
Q12 2N930
R54 5100
R55 1000
CR43 HZ8545
Q13 2N722
R56 7500
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
0 VDC 26
FAIL GATE SPARE 10
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
11
SPARES

REFERENCE DWG:
FAILURE INDICATOR MODULE ASSEMBLY 1007551

1009528

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN J Woloh DATE 15 SEP 64
CHECKED D Udmach 18 SEP 64
APPROVAL
APPROVAL
NASA APPROVAL W J Rhine
MIT APPROVAL 29 Sep 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO. SIZE E NASA DRAWING NO. 1009528
SCALE # WT # SHEET 1 OF 2

REVISIONS

LTR	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4 W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	-32		1000		
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEENOTE	±5%	1/8 W
R11	1006750-75		62K	±2%	1/4 W
R12	-80		100K		
R13	1006750-49		5100		1/4W
R14	1006760-38		1800		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	1010604 - 3		620		
R22	1006750 -32		1000		
R23	1010604 - 3		620		
R24	1006750 -32		1000		
R25	1010604 - 3		620		
R26	1006750-32		1000		
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	-75		62K		
R35	1006750 -75		62K	±2%	1/4 W
R36	1010369 -101		680K	±5%	1/8 W
R37	1006750 -80		100K	±2%	1/4 W
R38	1006750 -49		5100		1/4 W
R39	1006760 -38		1800		1/2 W
R40	1006750 -56		10K		1/4 W
R41	1010369- 90		240K	±5%	1/8 W
R42	1006750 -49		5100	±2%	1/4 W
R43	1006750 -39		2000		1/4 W
R44	1006750 -53		7500		1/4 W
R45	1006760 -43		3000		1/2 W
R46	1006750 -56		10K	±2%	1/4 W
R47	DELETED		—	—	—
R48	1006750 -80		100K	±2%	1/4 W
R49	-75		62K		1/4 W
R50	1006750 -49		5100		1/4 W
R51	1006760 -38		1800		1/2 W
R52	1006750 -56		10K		1/4 W
R53	-80		100K		
R54	-49		5100		
R55	-32		1000		
R56	1006750 -53		7500		1/4 W
R57	1006760 -43		3000	±2%	1/2 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-85		22		
C9	-69		1		
C10	-89		47		
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32					
CR33	1010385		IN660		250MW
CR34	1010372-8		HZ8537	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39					
CR40	1010385		IN 660		250MW
CR41	1010372 - 9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW
CR46	1010385	DIODE	IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1006752		2N914		
Q6	1010397		2N 930		
Q7	1010285		2N 722		
Q8	1010397		2N930		
Q9	1010285		2N 722		
Q10	1010397		2N 930		
Q11	1010285		2N 722		
Q12	1010397		2N 930		
Q13	1010285		2N 722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 45	3.6K	1006750 - 60	15 K	1010369 - 93	330 K
- 46	3.9 K	- 61	16 K	-94	360 K
- 47	4.3 K	- 62	18 K	- 95	390 K
- 48	4.7 K	- 63	20 K	- 96	430 K
- 49	5.1 K	- 64	22 K	- 97	470 K
- 50	5.6 K	- 65	24 K	- 98	510 K
- 51	6.2 K	- 66	27 K	- 99	560 K
- 52	6.8 K	- 67	30 K	-100	620 K
- 53	7.5 K	- 68	33 K	-101	680 K
- 54	8.2 K	- 69	36 K	-102	750 K
- 55	9.1 K	- 70	39 K	-103	820 K
- 56	10 K	- 71	43 K	-104	910 K
- 57	11 K	- 72	47 K	-105	1 MEG
- 58	12 K	- 73	51 K	— —	—
- 59	13 K	- 74	56 K	1010369 -106	1.1 MEG
- 60	15 K	- 75	62 K		
- 61	16 K	- 76	68 K		
- 62	18 K	- 77	75 K		
- 63	20 K	1006750 - 78	82 K		
- 64	22 K				
- 65	24 K				
- 66	27 K				
- 67	30 K				
- 68	33 K				
- 69	36 K				
- 70	39 K				
- 71	43 K				
1006750 - 72	47 K				

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO. CONTRACT
DRAWN DATE 5 SEP 68
CHECKED 18 SEP 68
APPROVAL
APPROVAL 9/20/69
NASA APPROVAL W J Rhine 9-29-69
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1009528
SCALE — | WT — | SHEET 2 OF 2

1009528

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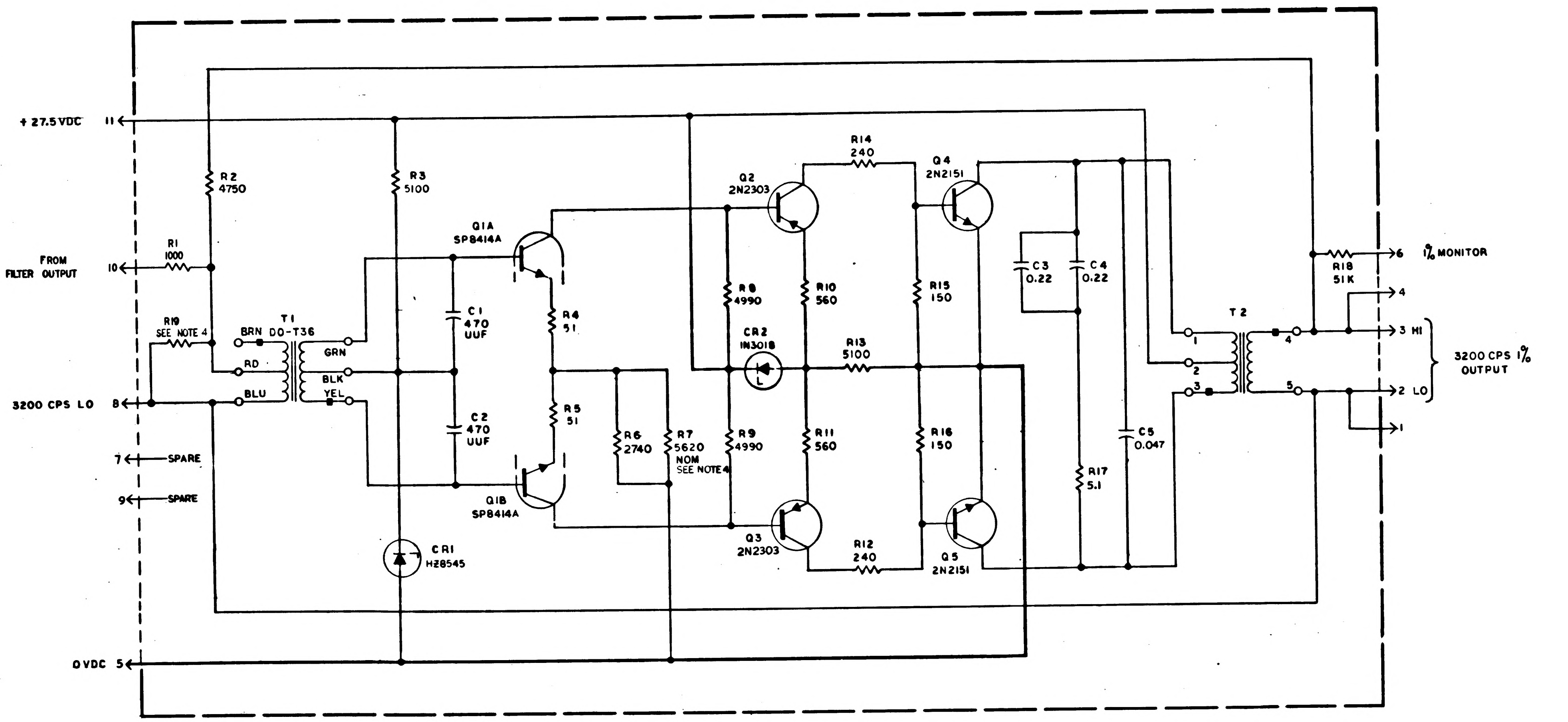
REVISIONS

SYM	ZONE	DESCRIPTION	CHG. NO.	DATE	APPD
A		REVISED PER TDRR 17610		24 MAR 68	470


+ 27.5 VDC
11
FROM FILTER OUTPUT
10
R1 1000
R2 4750
R3 5100
R19 SEE NOTE 4
T1 DO-T36
BRN
RD
BLU
GRN
BLK
YEL
3200 CPS LO
8
7
SPARE
9
SPARE
Q1A SP8414A
Q1B SP8414A
C1 470 UUF
C2 470 UUF
R4 51
R5 51
R6 2740
R7 5620 NOM SEE NOTE 4
CR1 HZ8545
0VDC
5
Q2 2N2303
Q3 2N2303
R8 4990
R9 4990
CR2 IN3018
R10 560
R11 560
R14 240
R13 5100
R12 240
Q4 2N2151
Q5 2N2151
R15 150
R16 150
C3 0.22
C4 0.22
C5 0.047
R17 5.1
T2
1
2
3
4
5
R18 51K
6
1% MONITOR
4
3 HI
2 LO
1
3200 CPS 1% OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-251	RESISTOR	1000	±1 %	1/8 W
R2	1010364-381		4750	±1 %	1/8 W
R3	1006750-49		5100	±2 %	1/4 W
R4	1006750-1		51	±2 %	1/4 W
R5	1006750-1		51	±2 %	1/4 W
R6	1010364-335		2740	±1 %	1/8 W
R7	1010364		SEE NOTES	±1 %	1/8 W
R8	1010364-385		4990	±1 %	1/8 W
R9	1010364-385		4990	±1 %	1/8 W
R10	1006750-26		560	±2 %	1/4 W
R11	1006750-26		560	±2 %	1/4 W
R12	1006750-17		240	±2 %	1/4 W
R13	1010278-80		5100	±5 %	1/2 W
R14	1006750-17		240	±2 %	1/4 W
R15	1006750-12		150	±2 %	1/4 W
R16	1006750-12		150	±2 %	1/4 W
R17	1010278-8		5.1	±5 %	1/2 W
R18	1006750-73		51K	±2 %	1/4 W
R19			SEE NOTES		1/8 W
C1	1010410-9	CAPACITOR	470 UUF	±2 %	500VDC
C2	1010410-9		470 UUF	±2 %	500VDC
C3	1010264-29		0.22	±5 %	200VDC
C4	1010264-29		0.22	±5 %	200VDC
C5	1010264-21		0.047	±5 %	200VDC
CR1	1010372-16	DIODE	HZ8545	±5 %	200 MA
CR2	1010829-3	DIODE	IN3018	±5 %	1W
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010269-2		2N2151		
Q5			2N2151		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010337				

PART NO.	R7
1010364-337	2800
-345	3090
-351	3320
-359	3650
-365	3920
-371	4220
-377	4530
-381	4750
-387	5110
-391	5360
-395	5620
-397	5760
-401	6040
-405	6340
-409	6650
-411	6810
-415	7150
-419	7500
-421	7680
-425	8060

PART NO.	R19
1006750-70	39K
-52	6.8 K
-45	3.6 K
-41	2.4K
-38	1.8 K
-35	1.3K
-33	1.1 K
-114	865
-113	785
-111	650
-110	590
-108	490
-107	450
-106	410

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R7 AND R19 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES.

REF DRAWING:
AMPLIFIER 1% 3200 CPS MODULE ASSY
DWG NO. 1007544

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
Contract NAS 9-497
DRAWN DATE
CHECKED 15 OCT 64
APPROVAL
APPROVAL M. Kramer 20 OCT 64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
3200 CPS 1% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1009529
SCALE —
WT —
SHEET 1 OF 1

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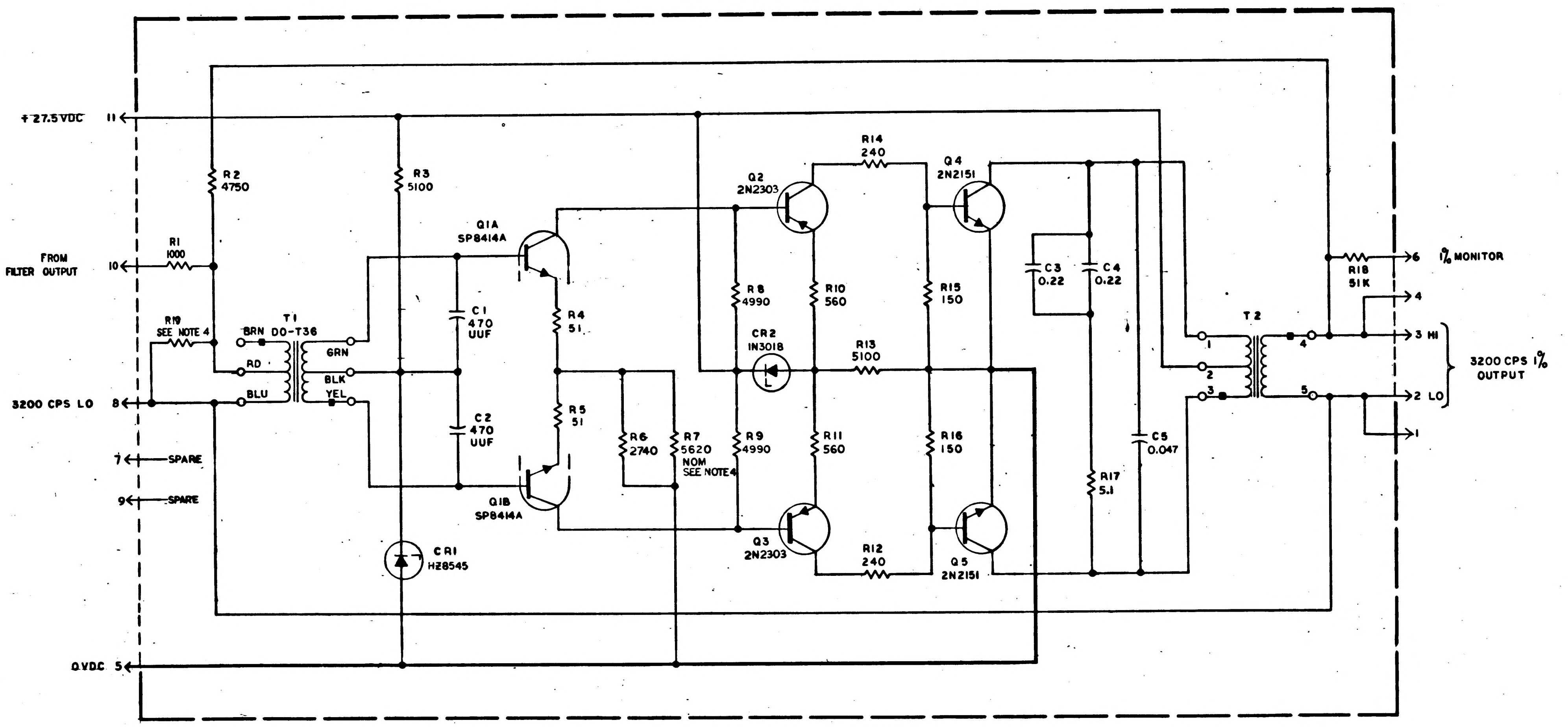
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD
		CHG. NO.		


+27.5 VDC
11
FROM FILTER OUTPUT
10
3200 CPS LO
8
7
SPARE
9
SPARE
0 VDC
5
R1
1000
R2
4750
R19
SEE NOTE 4
T1
DO-T36
BRN
RD
BLU
GRN
BLK
YEL
R3
5100
Q1A
SP8414A
Q1B
SP8414A
C1
470
UUF
C2
470
UUF
R4
51
R5
51
CR1
HZ8545
R6
2740
R7
5620
NOM
SEE NOTE 4
Q2
2N2303
Q3
2N2303
R8
4990
R9
4990
CR2
IN3018
R10
560
R11
560
R13
5100
R14
240
R12
240
Q4
2N2151
Q5
2N2151
R15
150
R16
150
C3
0.22
C4
0.22
R17
5.1
C5
0.047
T2
1
2
3
4
5
R18
51K
6
1% MONITOR
4
3 HI
2 LO
1
3200 CPS 1%
OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-251	RESISTOR	1000	±1 %	1/8 W
R2	1010364-381		4750	±1 %	1/8 W
R3	1006750-49		5100	±2 %	1/4 W
R4	1006750-1		51	±2 %	1/4 W
R5	1006750-1		51	±2 %	1/4 W
R6	1010364-335		2740	±1 %	1/8 W
R7	1010364		SEE NOTES	±1 %	1/8 W
R8	1010364-385		4990	±1 %	1/8 W
R9	1010364-385		4990	±1 %	1/8 W
R10	1006750-26		560	±2 %	1/4 W
R11	1006750-26		560	±2 %	1/4 W
R12	1006750-17		240	±2 %	1/4 W
R13	1010278-80		5100	±5 %	1/2 W
R14	1006750-17		240	±2 %	1/4 W
R15	1006750-12		150	±2 %	1/4 W
R16	1006750-12		150	±2 %	1/4 W
R17	1010278-8		5.1	±5 %	1/2 W
R18	1006750-73		51K	±2 %	1/4 W
R19			SEE NOTES		1/8 W
C1	1010410-9	CAPACITOR	470 UUF	±2 %	500VDC
C2	1010410-9		470 UUF	±2 %	500VDC
C3	1010264-29		0.22	±5 %	200VDC
C4	1010264-29		0.22	±5 %	200VDC
C5	1010264-21		0.047	±5 %	200VDC
CR1	1010372-16	DIODE	HZ8545	±5 %	200 MA
CR2	1010265-3	DIODE	IN3018	±5 %	1W
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010269-2		2N2151		
Q5			2N2151		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010337				

PART NO.	R7
1010364-337	2800
-345	3090
-351	3320
-359	3650
-365	3920
-371	4220
-377	4530
-381	4750
-387	5110
-391	5360
-395	5620
-397	5760
-401	6040
-405	6340
-409	6650
-411	6810
-415	7150
-419	7500
-421	7680
-425	8060

PART NO.	R19
1006750-70	39K
-52	6.8 K
-45	3.6 K
-41	2.4K
-38	1.8 K
-35	1.3K
-33	1.1 K
-114	865
-113	785
-111	650
-110	590
-108	490
-107	450
-106	410

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R7 AND R19 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES.

REF DRAWING:
AMPLIFIER 1% 3200 CPS MODULE ASSY
DWG NO. 1007544

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. Contract NAS 9-497
DRAWN DATE
CHECKED 15 OCT 64
APPROVAL
APPROVAL
M. Kramer 20 OCT 64
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

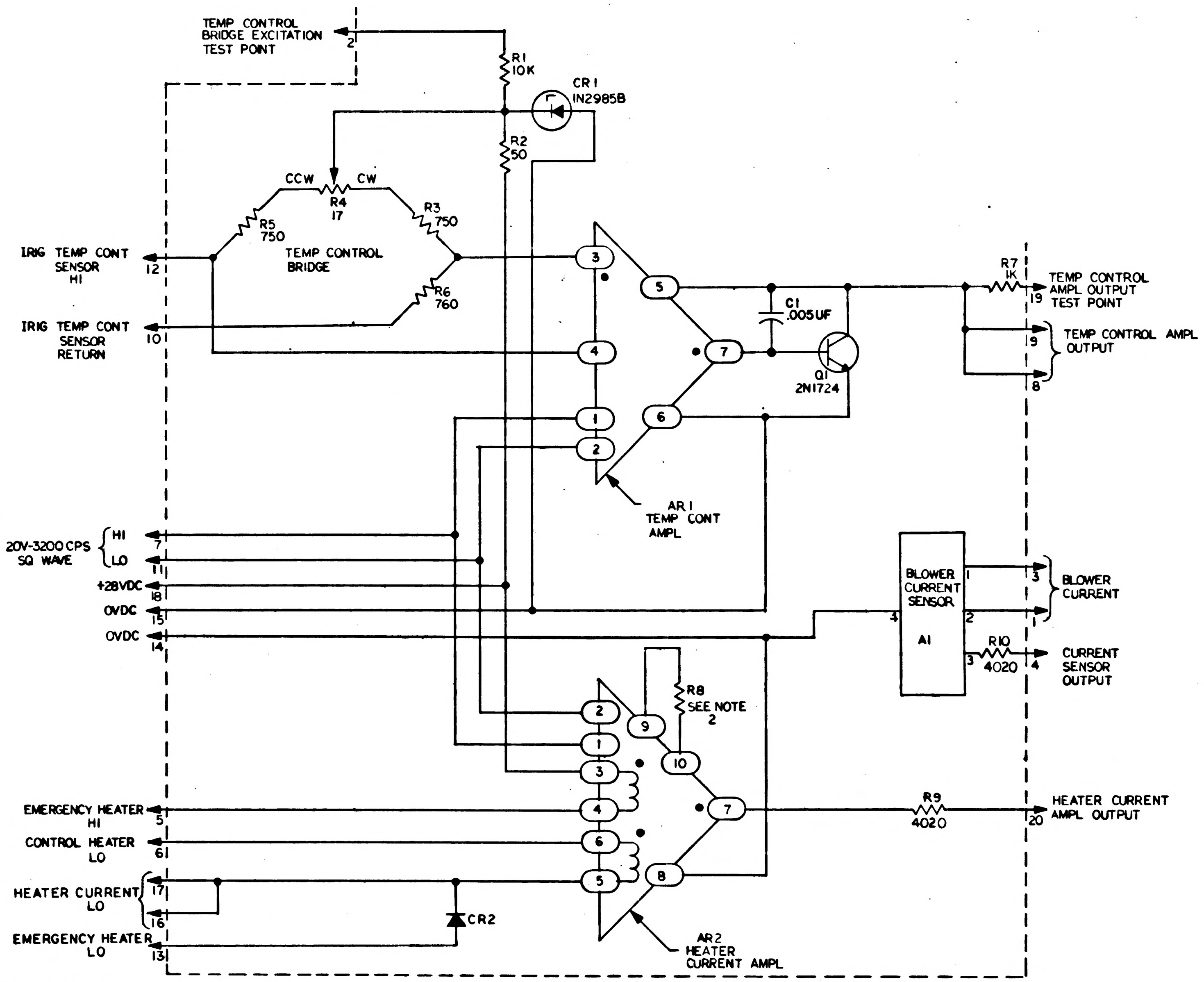
SCHEMATIC,
3200 CPS 1% AMPLIFIER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1009529
SCALE — WT — SHEET 1 OF 1

1009529

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 3376			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17964	6 APR 65	


TEMP CONTROL BRIDGE EXCITATION TEST POINT
2
R1 10K
CR1 IN2985B
R2 50
CCW
CW
R4 17
R5 750
R3 750
R6 760
TEMP CONTROL BRIDGE
IRIG TEMP CONT SENSOR HI
12
IRIG TEMP CONT SENSOR RETURN
10
3
4
1
2
5
6
7
C1 .005UF
Q1 2N1724
AR1 TEMP CONT AMPL
R7 1K
19
TEMP CONTROL AMPL OUTPUT TEST POINT
9
8
TEMP CONTROL AMPL OUTPUT
20V-3200 CPS SQ WAVE
HI
7
LO
11
+28VDC
18
OVDC
15
OVDC
14
BLOWER CURRENT SENSOR
A1
1
2
3
4
BLOWER CURRENT
R10 4020
CURRENT SENSOR OUTPUT
R8 SEE NOTE 2
9
10
EMERGENCY HEATER HI
5
CONTROL HEATER LO
6
HEATER CURRENT LO
17
16
EMERGENCY HEATER LO
13
CR2
R9 4020
20
HEATER CURRENT AMPL OUTPUT
AR2 HEATER CURRENT AMPL

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -56	RESISTOR	10K	±2%	1/4W
R2	1010399 -16		50	±5%	5W
R3	1010449 -1		750	0.01%	3/4W
R4	1010453 -1		17	±10%	1/4 W
R5	1010449 -1		750	0.01%	3/4W
R6	1010449 -2		760		
R7	1010312 -36		1K	5%	2W
R8	SEE NOTE 2			± 1%	1/10 W
R9	1010364-368		4020	±1%	1/8W
R10	1010364-369		4020	±1%	1/8W
CR1	1010331-009	DIODE	IN2985B	5%	10W
CR2	1010777-1				6 AMPS
Q1	1010273 -1	TRANSISTOR	2N1724		
AR1	1000285	AMPL			
AR2	1000286	AMPL			
A1	1000287	SEN			
C1	1006777-29	CAPACITOR	.005 UF		

DWG FOR REF:
IMU TEMP CONTROLLER ASSY
1007556

NOTES:—

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R8 TO BE SELECTED AT ASSEMBLY. PART NO. AND DASH NO. AS MARKED ON AMPLIFIER. RANGE OF VALUES 499 THRU 2K OHMS PER PART NO 1010311-97 THRU 1010311-155.
3. RESISTOR VALUES ARE IN OHMS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN S. Agne DATE 21SEP64
CHECKED A. Udovich 23 SEP 64
APPROVAL
APPROVAL
NASA APPROVAL 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

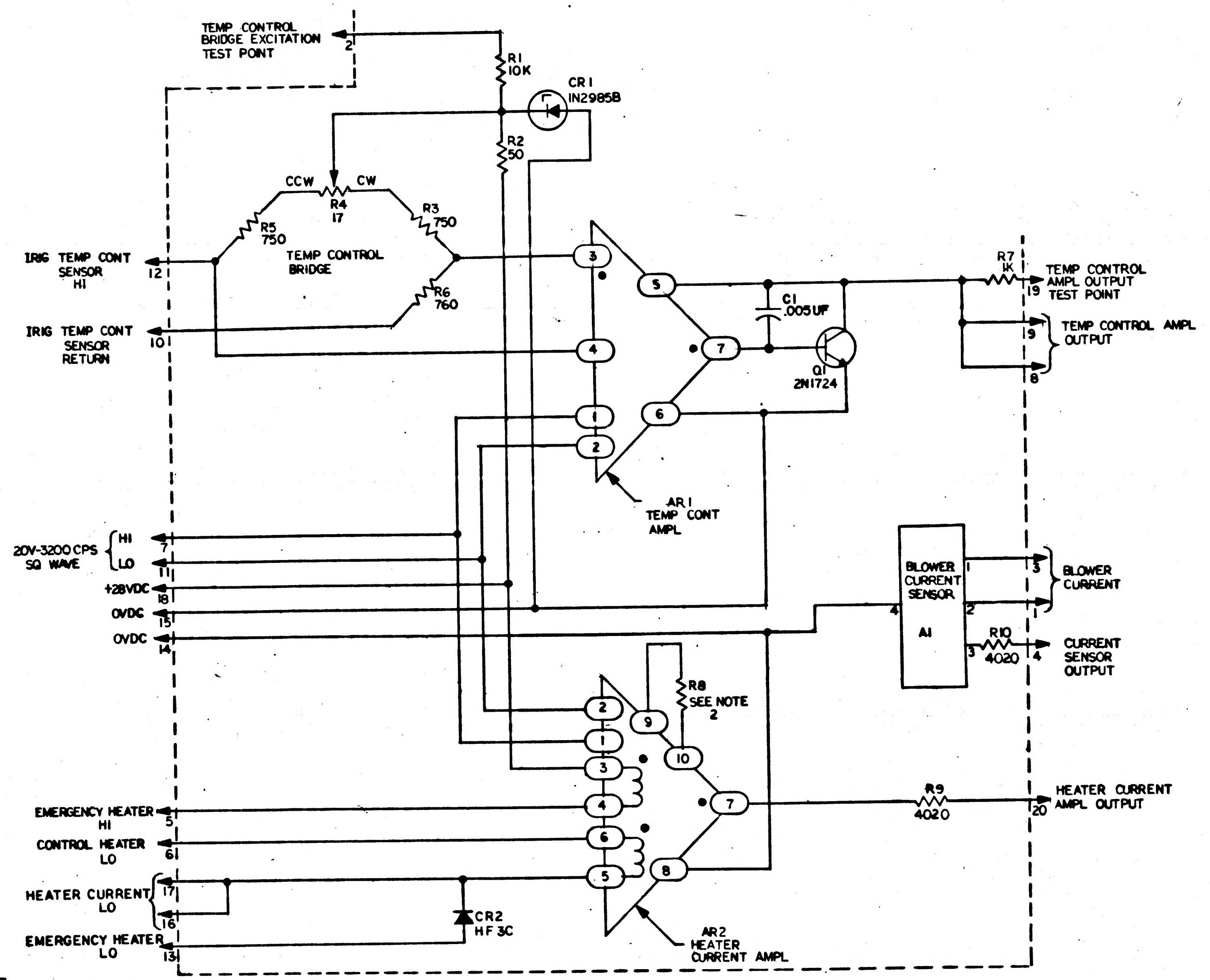
SCHEMATIC
IMU TEMP CONTROLLER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1009530
SCALE —
WT
SHEET 1 OF 1

1009530 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13396			
SYM	DESCRIPTION	DATE	APPROVAL


TEMP CONTROL BRIDGE EXCITATION TEST POINT
2
R1 10K
CR1 1N2985B
R2 50
CCW
CW
R4 17
R3 750
R5 750
TEMP CONTROL BRIDGE
R6 760
IRIG TEMP CONT SENSOR HI
12
IRIG TEMP CONT SENSOR RETURN
10
3
4
1
2
5
6
7
C1 .005UF
Q1 2N1724
AR1 TEMP CONT AMPL
R7 1K
19
TEMP CONTROL AMPL OUTPUT TEST POINT
9
8
TEMP CONTROL AMPL OUTPUT
20V-3200 CPS SQ WAVE
HI
LO
7
11
+28VDC
18
OVDC
15
OVDC
14
BLOWER CURRENT SENSOR
A1
4
1
2
3
BLOWER CURRENT
R10 4020
CURRENT SENSOR OUTPUT
R8 SEE NOTE 2
9
10
AR2 HEATER CURRENT AMPL
R9 4020
20
HEATER CURRENT AMPL OUTPUT
EMERGENCY HEATER HI
5
CONTROL HEATER LO
6
HEATER CURRENT LO
17
16
EMERGENCY HEATER LO
13
CR2 HF 3C

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -56	RESISTOR	10K	±2%	1/4W
R2	1010399 -16		50	±5%	5W
R3	1010449 -1		750	0.01%	3/4W
R4	1010453 -1		17	±10%	1/4 W
R5	1010449 -1		750	0.01%	3/4W
R6	1010449 -2		760		
R7	1010312 -36		1K	5%	2W
R8	SEE NOTE 2			± 1%	1/10 W
R9	1010364-368		4020	±1%	1/8W
R10	1010364-369		4020	±1%	1/8W
CR1	1010331-009	DIODE	1N2985B	5%	10W
CR2	1010322 -001		HF 3C		6 AMPS
Q1	1010273 -1	TRANSISTOR	2N1724		
AR1	1000285	AMPL			
AR2	1000286	AMPL			
A1	1000287	SEN			
C1	1006777-29	CAPACITOR	.005 UF		

DWG FOR REF:
IMU TEMP CONTROLLER ASSY
1007556

NOTES:—

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R8 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO. AS MARKED ON AMPLIFIER. RANGE OF VALUES 499 THRU 2K OHMS PER PART NO 1010311-97 THRU 1010311-155.
3. RESISTOR VALUES ARE IN OHMS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. Contract NAS 9-497
DRAWN S. Lyne DATE 21SEP64
CHECKED A. Udovich 23 SEP 64
APPROVAL
APPROVAL 10/1/64
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU TEMP CONTROLLER

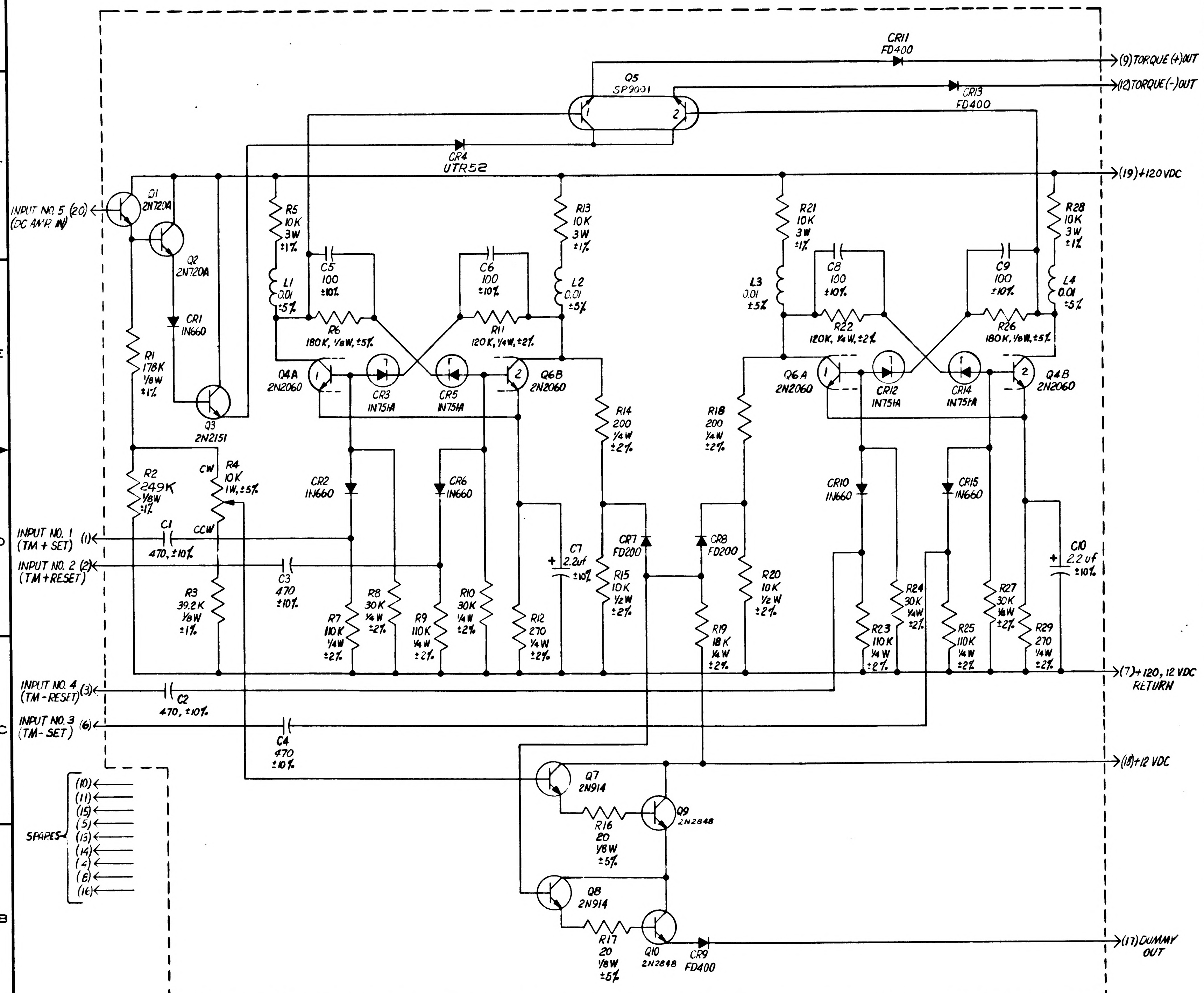
CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1009530
SCALE —
WT
SHEET 1 OF 1

MASTER

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL PART NUMBERS ARE FOR REFERENCE ONLY.
3. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICRO FARADS, INDUCTANCE VALUES ARE IN HENRIES


INPUT NO. 5 (20)
(DC AMP IN)
Q1
2N720A
Q2
2N720A
CR1
1N660
R1
178K
1/8W
±1%
Q3
2N2151
R2
249K
1/8W
±1%
CW
R4
10K
1W, ±5%
CCW
INPUT NO. 1 (1)
(TM + SET)
C1
470, ±10%
INPUT NO. 2 (2)
(TM + RESET)
C3
470
±10%
R3
39.2K
1/8W
±1%
INPUT NO. 4 (3)
(TM - RESET)
C2
470, ±10%
INPUT NO. 3 (6)
(TM - SET)
C4
470
±10%
SPARES
(10)
(11)
(15)
(5)
(13)
(14)
(4)
(8)
(16)
CR11
FD400
Q5
SP9001
CR13
FD400
(9) TORQUE (+) OUT
(12) TORQUE (-) OUT
CR4
UTR52
(19) +120 VDC
R5
10K
3W
±1%
C5
100
±10%
L1
0.01
±5%
R6
180K, 1/8W, ±5%
C6
100
±10%
R11
120K, 1/4W, ±2%
R13
10K
3W
±1%
L2
0.01
±5%
Q4A
2N2060
CR3
1N751A
CR5
1N751A
Q6B
2N2060
CR2
1N660
CR6
1N660
R7
110K
1/4W
±2%
R8
30K
1/4W
±2%
R9
110K
1/4W
±2%
R10
30K
1/4W
±2%
R12
270
1/4W
±2%
C7
2.2uf
±10%
R14
200
1/4W
±2%
CR7
FD200
R15
10K
1/2W
±2%
CR8
FD200
R18
200
1/4W
±2%
R19
18K
1/4W
±2%
R20
10K
1/2W
±2%
R21
10K
3W
±1%
L3
0.01
±5%
C8
100
±10%
R22
120K, 1/4W, ±2%
C9
100
±10%
R26
180K, 1/8W, ±5%
R28
10K
3W
±1%
L4
0.01
±5%
Q6A
2N2060
CR12
1N751A
CR14
1N751A
Q4B
2N2060
CR10
1N660
CR15
1N660
R23
110K
1/4W
±2%
R24
30K
1/4W
±2%
R25
110K
1/4W
±2%
R27
30K
1/4W
±2%
R29
270
1/4W
±2%
C10
2.2 uf
±10%
(7) +120, 12 VDC
RETURN
(18) +12 VDC
Q7
2N914
R16
20
1/8W
±5%
Q9
2N2848
Q8
2N914
R17
20
1/8W
±5%
Q10
2N2848
CR9
FD400
(17) DUMMY
OUT

REF. DES.	PART NUMBER	DESCRIPTION	VALUE-TOL-RATING
C1	1006777-20	CAPACITOR, CERAMIC	470UUF, ±10%, 100V
C2	1006777-20		470 UUF, ±10%, 100V
C3	1006777-20		470 UUF, ±10%, 100 V
C4	1006777-20		470 UUF, ±10%, 100 V
C5	1006777-13		100UUF, ±10%, 100 V
C6	1006777-13		100 UUF, ±10%, 100 V
C7	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35 V
C8	1006777-13	CAPACITOR CER	100UUF, ±10%, 100V
C9	1006777-13	CAPACITOR CER	100UUF, ±10%, 100V
C10	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
CR1	1010385	DIODE IN660	
CR2	1010385	DIODE IN660	
CR3	1010833-001	DIODE IN751 A	5.1 vdc ±5%
CR4	10104[illegible]7	DIODE UTR 52	
CR5	1010833-001	DIODE IN751 A	5.1vdc, ±5%
CR6	1010385	DIODE IN660	
CR7	1010384	DIODE FD200	
CR8	1010384	DIODE FD200	
CR9	1010394	DIODE FD400	
CR10	1010385	DIODE IN660	
CR11	1010394	DIODE FD 400	
CR12	1010833-001	DIODE IN751 A	5.1vdc, ±5%
CR13	1010394	DIODE FD 400	
CR14	1010833-001	DIODE IN751 A	5 vdc, ±5%
CR15	1010385	DIODE IN660	
L1	1010388-39	INDUCTOR	.01 H., ±5%, 75MA
L2	1010388-39		
L3	1010388-39		
L4	1010388-39		
Q1	1010357-1	TRANSISTOR 2N720A	
Q2	1010357-1	TRANSISTOR 2N720A	
Q3	1010269-3	TRANSISTOR 2N2151	
Q4	1010376-4	TRANSISTOR 2N2060	
Q5	1010715-1	TRANSISTOR SP9001	
Q6	1010376-4	TRANSISTOR 2N2060	
Q7	1006752	TRANSISTOR 2N914	
Q8	1006752	TRANSISTOR 2N914	
Q9	1010386	TRANSISTOR 2N2848	
Q10	1010386	TRANSISTOR 2N2848	
R1	1010364-683	RESISTOR, MF	178K, ±1%, 1/8W
R2	1010364-711	RESISTOR, MF	249K, ±1%, 1/8 W
R3	1010364-557	RESISTOR, MF	39.2K, ±1%, 1/8 W
R4	1010373-10	RESISTOR, VAR.	10 K, ±5%, 1W
R5	1010389-80	RESISTOR, W.W.	10 K, ±1%, 3 W
R6	1010369-87	RESISTOR, MF	180K, ±5%, 1/8 W
R7	1006750-81	RESISTOR, MF	110 K, ±2%, 1/4 W
R8	1006750-67	RESISTOR, MF	30 K, ±2%, 1/4 W
R9	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R10	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R11	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R12	1006750-18	RESISTOR, MF	270, ±2%, 1/4 W
R13	1010389-80	RESISTOR, W.W.	10K, ±1%, 3 W
R14	1006750-15	RESISTOR, MF	200, ±2%, 1/4 W
R15	1006760-56	RESISTOR, MF	10 K, ±2%, 1/2 W
R16	1010369-148	RESISTOR, MF	20, ±5%, 1/8 W
R17	1010369-148	RESISTOR, MF	20, ±5%, 1/8 W
R18	1006750-15	RESISTOR, MF	200, ±2%, 1/4 W
R19	1006750-62	RESISTOR, MF	18 K, ±2%, 1/4 W
R20	1006760-56	RESISTOR, MF	10 K, ±2%, 1/2 W
R21	1010389-80	RESISTOR, W.W.	10K, ±1%, 3 W
R22	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R23	1006750-81	RESISTOR, MF	110 K, ±2%, 1/4W
R24	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R25	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R26	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R27	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R28	1010389-80	RESISTOR, W W	10 K, ±1%, 3W
R29	1006750-18	RESISTOR, MF	270, ±2%, 1/4W

REF DWG:
TERNARY CURRENT SWITCH ASSY
DWG NO. 100T516

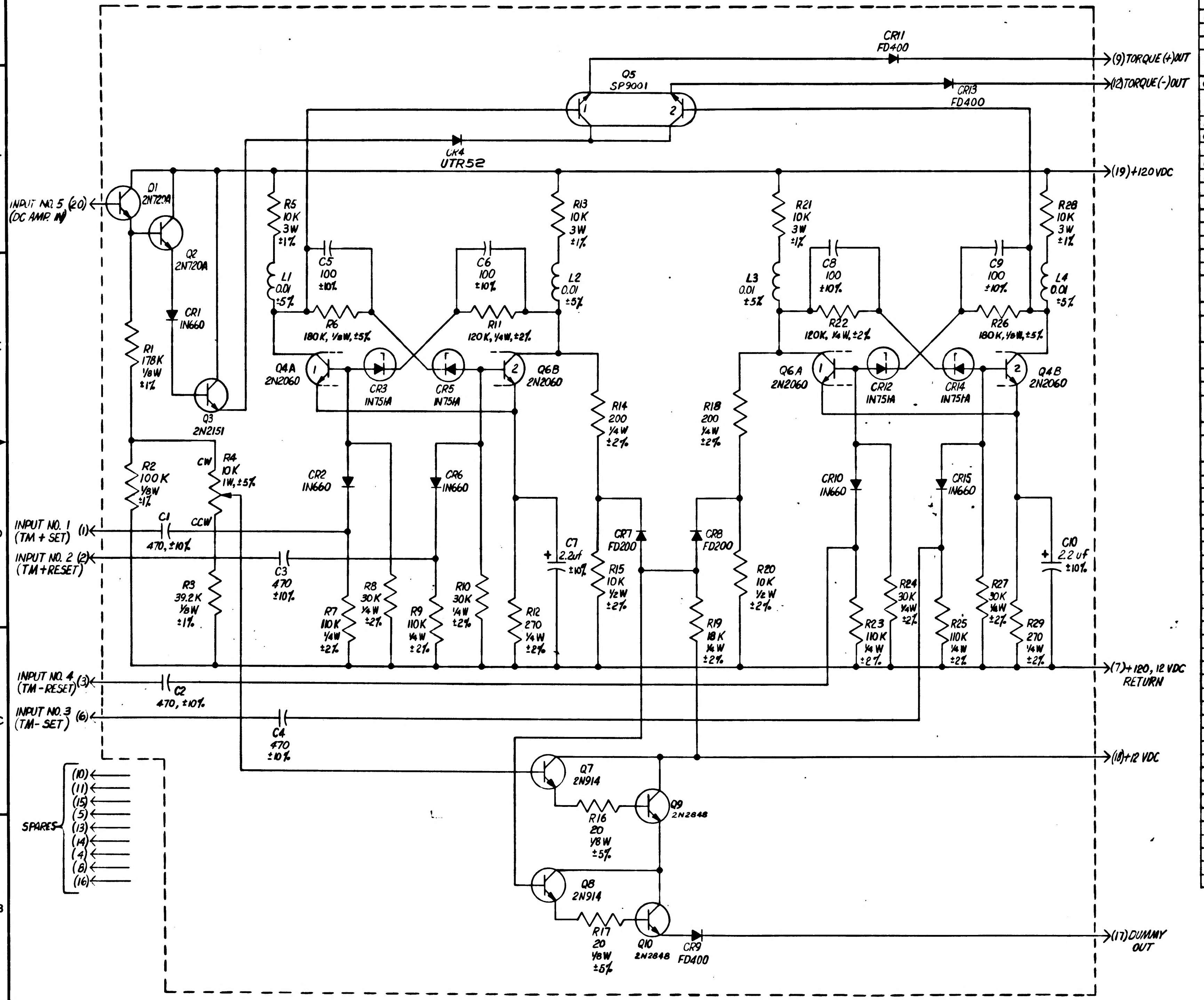
REVISIONS

SYM	ZONE	DESCRIPTION		DATE	APPD
A	—	REVISED PER TDRR-16854	CHG NO	4-MAR-65	B.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —	AC SPARK PLUG DIVISION. GMC MILWAUKEE. WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	ACSP PN	
	DRAWN Kostek DATE 6 JULY 64 CHECKED W. Diehl 24 AUG. '64 APPROVAL J. W. Bont 27 AUG '64 M BLYSHAK 3 DEC 64 APPROVAL J. S TOWER 11-2-64	SCHEMATIC DIAGRAM, ELECTRICAL TERNARY CURRENT SWITCH
DO NOT SCALE THIS DRAWING		
MATERIAL	NASA APPROVAL	CODE IDENT NO / SIZE E / 1009531
CONTRACT NAS 9-497	MIT APPROVAL	SCALE — / SHEET OF 1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL PART NUMBERS ARE FOR REFERENCE ONLY.
3. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICRO FARADS, INDUCTANCE VALUES ARE IN HENRIES


INPUT NO. 5 (20)
(DC AMP. IN)
Q1 2N720A
Q2 2N720A
CR1 1N660
R1 178K 1/8W ±1%
Q3 2N2151
R2 100K 1/8W ±1%
CW
R4 10K 1W, ±5%
CCW
INPUT NO. 1 (1)
(TM + SET)
C1 470, ±10%
INPUT NO. 2 (2)
(TM+RESET)
R3 39.2K 1/8W ±1%
C3 470 ±10%
INPUT NO. 4 (3)
(TM-RESET)
C2 470, ±10%
INPUT NO. 3 (6)
(TM-SET)
C4 470 ±10%
SPARES
(10)
(11)
(15)
(5)
(13)
(14)
(4)
(8)
(16)
Q5 SP9001
1
2
CR4 UTR52
CR11 FD400
CR13 FD400
(9) TORQUE (+) OUT
(12) TORQUE (-) OUT
(19) +120 VDC
R5 10K 3W ±1%
L1 0.01 ±5%
C5 100 ±10%
R6 180K, 1/8W, ±5%
C6 100 ±10%
R11 120K, 1/4W, ±2%
R13 10K 3W ±1%
L2 0.01 ±5%
Q4A 2N2060
CR3 1N751A
CR5 1N751A
Q6B 2N2060
CR2 1N660
CR6 1N660
R7 110K 1/4W ±2%
R8 30K 1/4W ±2%
R9 110K 1/4W ±2%
R10 30K 1/4W ±2%
R12 270 1/4W ±2%
C7 2.2uf ±10%
R14 200 1/4W ±2%
R15 10K 1/2W ±2%
CR7 FD200
CR8 FD200
R18 200 1/4W ±2%
R19 18K 1/4W ±2%
R20 10K 1/2W ±2%
R21 10K 3W ±1%
L3 0.01 ±5%
C8 100 ±10%
R22 120K, 1/4W, ±2%
C9 100 ±10%
R26 180K, 1/8W, ±5%
R28 10K 3W ±1%
L4 0.01 ±5%
Q6A 2N2060
CR12 1N751A
CR14 1N751A
Q4B 2N2060
CR10 1N660
CR15 1N660
R23 110K 1/4W ±2%
R24 30K 1/4W ±2%
R25 110K 1/4W ±2%
R27 30K 1/4W ±2%
R29 270 1/4W ±2%
C10 2.2uf ±10%
(7) +120, 12 VDC RETURN
(18) +12 VDC
Q7 2N914
Q9 2N2848
R16 20 1/8W ±5%
Q8 2N914
Q10 2N2848
R17 20 1/8W ±5%
CR9 FD400
(17) DUMMY OUT

REF. DES.	PART NUMBER	DESCRIPTION	VALUE-TOL-RATING
C1	1006777-20	CAPACITOR, CERAMIC	470 UUF, ±10%, 100V
C2	1006777-20		470 UUF, ±10%, 100V
C3	1006777-20		470 UUF, ±10%, 100V
C4	1006777-20		470 UUF, ±10%, 100V
C5	1006777-13		100 UUF, ±10%, 100V
C6	1006777-13		100 UUF, ±10%, 100V
C7	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
C8	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C9	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C10	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
CR1	1010385	DIODE 1N660	
CR2	1010385	DIODE 1N660	
CR3	1010833-001	DIODE 1N751 A	5.1 vdc ±5%
CR4	1010497	DIODE UTR 52	
CR5	1010833-001	DIODE 1N751 A	5.1 vdc, ±5%
CR6	1010385	DIODE 1N660	
CR7	1010384	DIODE FD200	
CR8	1010384	DIODE FD200	
CR9	1010394	DIODE FD400	
CR10	1010385	DIODE 1N660	
CR11	1010394	DIODE FD400	
CR12	1010833-001	DIODE 1N751 A	5.1 vdc, ±5%
CR13	1010394	DIODE FD400	
CR14	1010833-001	DIODE 1N751 A	5 vdc, ±5%
CR15	1010385	DIODE 1N660	
L1	1010388-39	INDUCTOR	.01 H., ±5%, 75MA
L2	1010388-39		
L3	1010388-39		
L4	1010388-39		
Q1	1010357-1	TRANSISTOR 2N720A	
Q2	1010357-1	TRANSISTOR 2N720A	
Q3	1010269-3	TRANSISTOR 2N2151	
Q4	1010376-4	TRANSISTOR 2N2060	
Q5	1010715-1	TRANSISTOR SP9001	
Q6	1010376-4	TRANSISTOR 2N2060	
Q7	1006752	TRANSISTOR 2N914	
Q8	1006752	TRANSISTOR 2N914	
Q9	1010386	TRANSISTOR 2N2848	
Q10	1010386	TRANSISTOR 2N2848	
R1	1010364-683	RESISTOR, MF	178K, ±1%, 1/8W
R2	1010364-635	RESISTOR, MF	100K ±1%, 1/8W
R3	1010364-557	RESISTOR, MF	39.2K, ±1%, 1/8W
R4	1010373-10	RESISTOR, VAR.	10K, ±5%, 1W
R5	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R6	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R7	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R8	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R9	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R10	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R11	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R12	1006750-18	RESISTOR, MF	270, ±2%, 1/4W
R13	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R14	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R15	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R16	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R17	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R18	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R19	1006750-62	RESISTOR, MF	18K, ±2%, 1/4W
R20	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R21	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R22	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R23	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R24	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R25	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R26	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R27	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R28	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R29	1006750-18	RESISTOR, MF	270, ±2%, 1/4W

REF DWG:
TERNARY CURRENT SWITCH ASSY
DWG NO. 100T516

REVISIONS

SYM	ZONE	DESCRIPTION		DATE	APPD
A	—	REVISED PER TDRR-16854	CHG NO.	4-[illegible]-65	
B	—	REVISED PER TDRR 18937		1 MAY 65	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DATE 6 JULY 64
CHECKED 24 AUG. 64
APPROVAL 27 AUG '64
APPROVAL 11-2-64
NASA APPROVAL 12-7-64
MIT APPROVAL

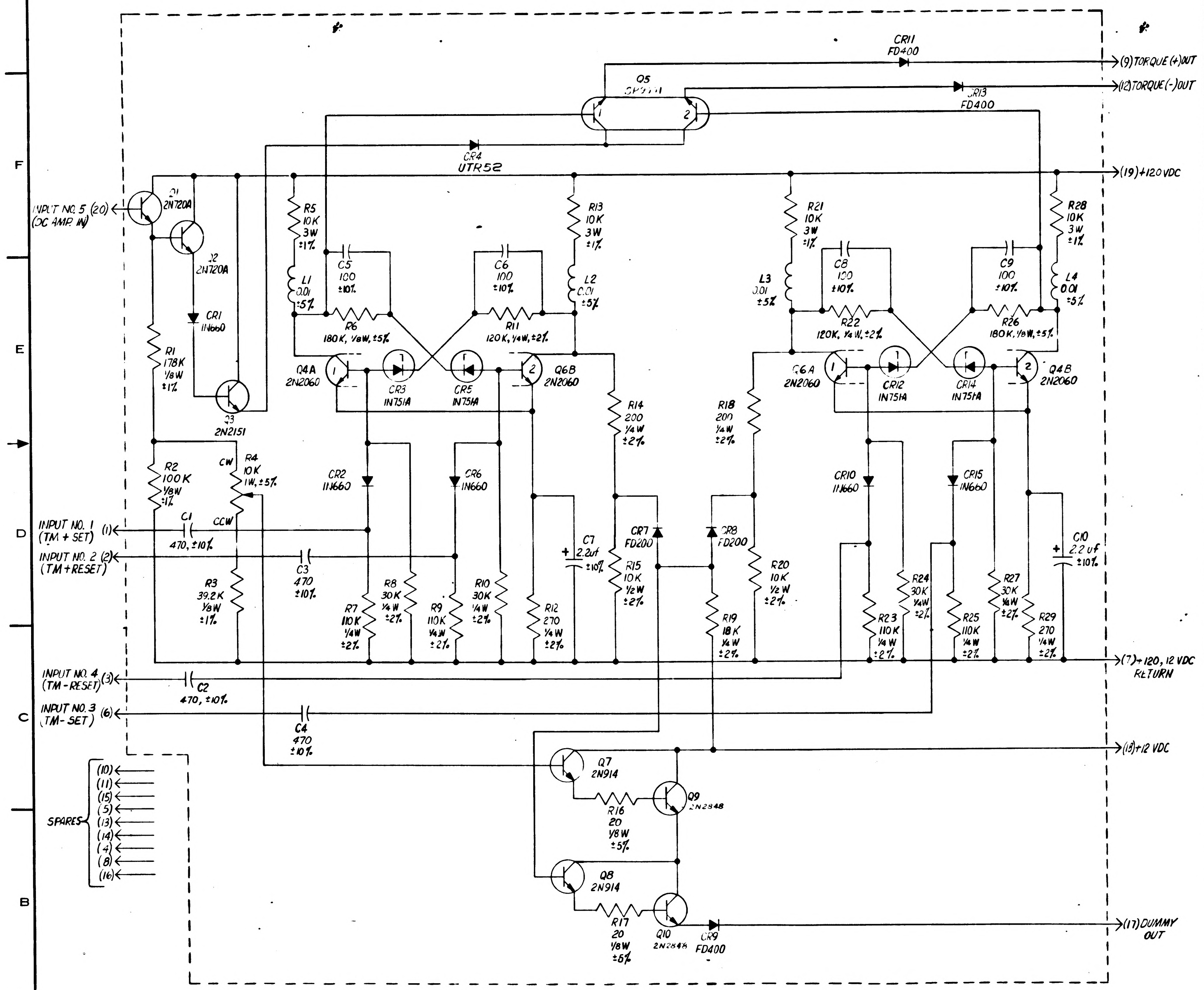
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM, ELECTRICAL
TERNARY CURRENT SWITCH

CODE IDENT NO. 80230
SIZE E
1009531
SCALE —
SHEET 1 OF 1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL PART NUMBERS ARE FOR REFERENCE ONLY.
3. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICRO FARADS, INDUCTANCE VALUES ARE IN HENRIES



INPUT NO. 5 (20) (DC AMP. IN)
Q1 2N720A
Q2 2N720A
CR1 1N660
R1 178K 1/8W ±1%
Q3 2N2151
R2 100K 1/8W ±1%
R4 10K 1W, ±5%
CW
CCW
INPUT NO. 1 (TM + SET) (1)
C1 470, ±10%
INPUT NO. 2 (TM + RESET) (2)
C3 470 ±10%
R3 39.2K 1/8W ±1%
INPUT NO. 4 (TM - RESET) (3)
C2 470, ±10%
INPUT NO. 3 (TM - SET) (6)
C4 470 ±10%
SPARES (10) (11) (15) (5) (13) (14) (4) (8) (16)
CR4 UTR52
R5 10K 3W ±1%
L1 0.01 ±5%
C5 100 ±10%
R6 180K, 1/8W, ±5%
C6 100 ±10%
R11 120K, 1/4W, ±2%
R13 10K 3W ±1%
L2 0.01 ±5%
Q4A 2N2060
CR3 1N751A
CR5 1N751A
Q6B 2N2060
CR2 1N660
CR6 1N660
R7 110K 1/4W ±2%
R8 30K 1/4W ±2%
R9 110K 1/4W ±2%
R10 30K 1/4W ±2%
R12 270 1/4W ±2%
C7 2.2uf ±10%
R14 200 1/4W ±2%
R15 10K 1/2W ±2%
CR7 FD200
CR8 FD200
R18 200 1/4W ±2%
R19 18K 1/4W ±2%
R20 10K 1/2W ±2%
Q5
CR11 FD400
(9) TORQUE (+) OUT
CR13 FD400
(12) TORQUE (-) OUT
(19) +120 VDC
R21 10K 3W ±1%
L3 0.01 ±5%
C8 100 ±10%
R22 120K, 1/4W, ±2%
C9 100 ±10%
R26 180K, 1/8W, ±5%
R28 10K 3W ±1%
L4 0.01 ±5%
Q6A 2N2060
CR12 1N751A
CR14 1N751A
Q4B 2N2060
CR10 1N660
CR15 1N660
R23 110K 1/4W ±2%
R24 30K 1/4W ±2%
R25 110K 1/4W ±2%
R27 30K 1/4W ±2%
R29 270 1/4W ±2%
C10 2.2 uf ±10%
(7) +120, 12 VDC RETURN
(18) +12 VDC
Q7 2N914
Q9 2N2848
R16 20 1/8W ±5%
Q8 2N914
Q10 2N2848
R17 20 1/8W ±5%
CR9 FD400
(17) DUMMY OUT

REF. DES.	PART NUMBER	DESCRIPTION	VALUE-TOL-RATING
C1	1006777-20	CAPACITOR, CERAMIC	470 UUF, ±10%, 100V
C2	1006777-20	↓	470 UUF, ±10%, 100V
C3	1006777-20		470 UUF, ±10%, 100V
C4	1006777-20		470 UUF, ±10%, 100V
C5	1006777-13		100 UUF, ±10%, 100V
C6	1006777-13	↓	100 UUF, ±10%, 100V
C7	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
C8	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C9	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C10	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
CR1	1010385	DIODE IN660	
CR2	1010385	DIODE IN660	
CR3	1010833-001	DIODE IN751 A	5.1vdc ±5%
CR4	1010[illegible]	DIODE UTR 52	
CR5	1010833-001	DIODE IN751 A	5.1vdc ±5%
CR6	1010385	DIODE IN660	
CR7	1010384	DIODE FD200	
CR8	1010384	DIODE FD200	
CR9	1010394	DIODE FD400	
CR10	1010385	DIODE IN660	
CR11	1010394	DIODE FD400	
CR12	1010833-001	DIODE IN751 A	5.1vdc, ±5%
CR13	1010394	DIODE FD400	
CR14	1010833-001	DIODE IN751 A	5vdc, ±5%
CR15	1010385	DIODE IN660	
L1	1010388-39	INDUCTOR	.01 H, ±5%, 75MA
L2	1010388-39	↓	↓
L3	1010388-39		
L4	1010388-39		
Q1	1010357-1	TRANSISTOR 2N720A	
Q2	1010357-1	TRANSISTOR 2N720A	
Q3	1010269-3	TRANSISTOR 2N2151	
Q4	1010376-4	TRANSISTOR 2N2060	
Q5	1010715-1	TRANSISTOR [illegible]	
Q6	1010376-4	TRANSISTOR 2N2060	
Q7	1010966-1	TRANSISTOR 2N914	
Q8	1010966-1	TRANSISTOR 2N914	
Q9	1010386	TRANSISTOR 2N2848	
Q10	1010386	TRANSISTOR 2N2848	
R1	1010364-683	RESISTOR, MF	178K, ±1%, 1/8W
R2	1010364-635	RESISTOR, MF	100K ±1%, 1/8W
R3	1010364-557	RESISTOR, MF	39.2K, ±1%, 1/8 W
R4	1010373-10	RESISTOR, VAR.	10K, ±5%, 1W
R5	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R6	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R7	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R8	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R9	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R10	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R11	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R12	1006750-18	RESISTOR, MF	270, ±2%, 1/4W
R13	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R14	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R15	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R16	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R17	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R18	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R19	1006750-62	RESISTOR, MF	18K, ±2%, 1/4W
R20	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R21	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R22	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R23	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R24	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R25	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R26	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R27	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R28	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R29	1006750-18	RESISTOR, MF	270, ±2%, 1/4W

REF DWG:
TERNARY CURRENT SWITCH ASSY
DWG NO. 100T516

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A	—	REVISED PER TDRR-16854		4-MAR-65	B.
B	—	REVISED PER TDRR18937		17 MAY 65	A N.
C		REVISED PER TDRR 21278		31 JUL 65	RLP

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
DRAWN DATE 6 JULY 64
CHECKED 24 AUG 64
APPROVAL
APPROVAL J. STONER 11-2-64
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

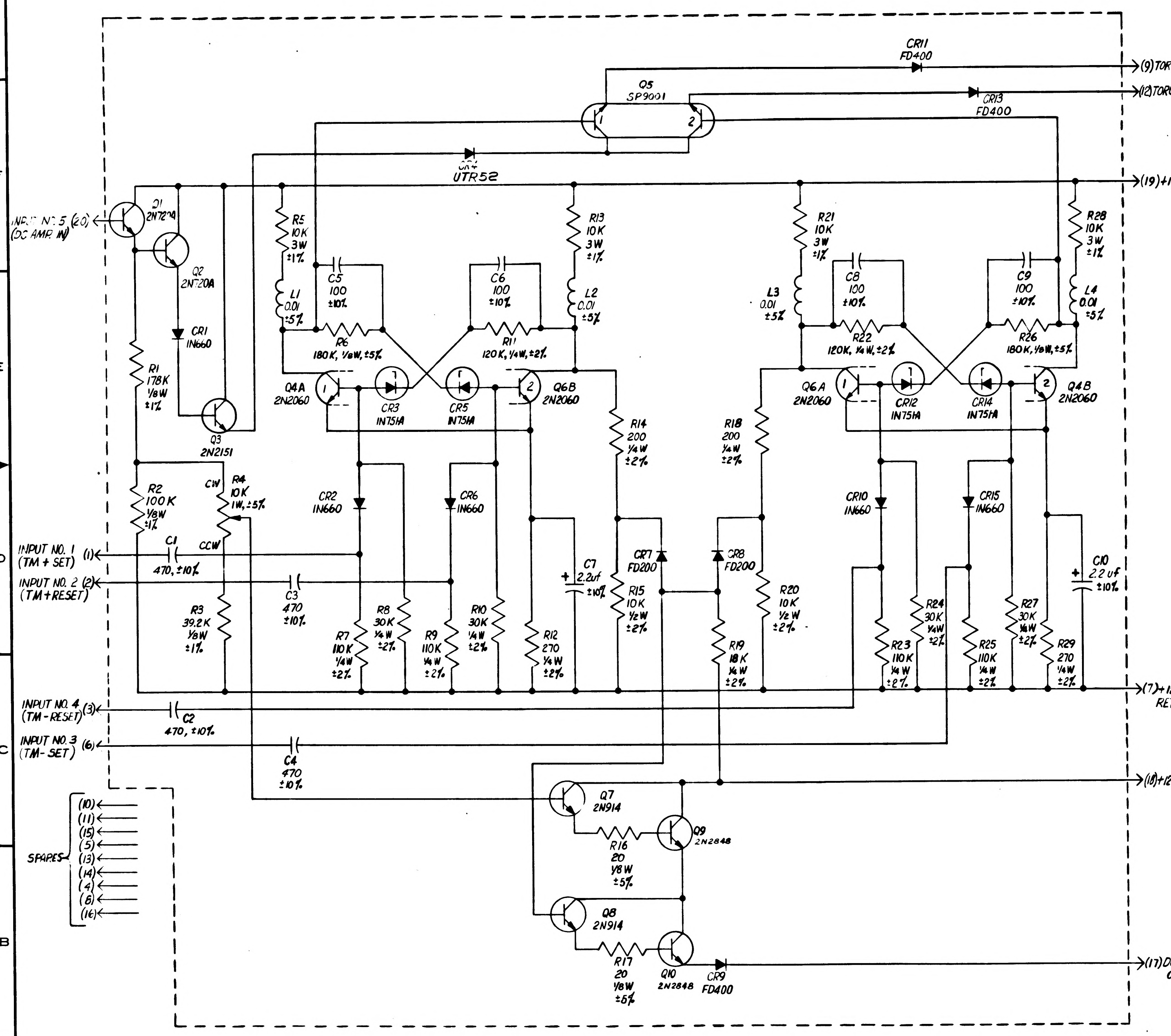
SCHEMATIC DIAGRAM, ELECTRICAL
TERNARY CURRENT SWITCH

CODE IDENT NO 80230
SIZE E
1009531
SCALE —
SHEET 1 OF 1

C
1009531

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL PART NUMBERS ARE FOR REFERENCE ONLY.
3. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICRO FARADS, INDUCTANCE VALUES ARE IN HENRIES



INPUT NO. 5 (20)
(DC AMP. IN)
Q1
2N720A
Q2
2N720A
CR1
1N660
R1
178K
1/8W
±1%
Q3
2N2151
R2
100K
1/8W
±1%
R4
10K
1W, ±5%
CW
CCW
INPUT NO. 1 (1)
(TM + SET)
C1
470, ±10%
INPUT NO. 2 (2)
(TM + RESET)
C3
470
±10%
R3
39.2K
1/8W
±1%
INPUT NO. 4 (3)
(TM - RESET)
C2
470, ±10%
INPUT NO. 3 (6)
(TM - SET)
C4
470
±10%
SPARES
(10)
(11)
(15)
(5)
(13)
(14)
(4)
(8)
(16)
Q5
SP9001
1
2
CR4
UTR52
CR11
FD400
(9) TORQUE (+) OUT
CR13
FD400
(12) TORQUE (-) OUT
(19) +120 VDC
R5
10K
3W
±1%
L1
0.01
±5%
C5
100
±10%
R6
180K, 1/8W, ±5%
C6
100
±10%
R11
120K, 1/4W, ±2%
R13
10K
3W
±1%
L2
0.01
±5%
Q4A
2N2060
CR3
1N751A
CR5
1N751A
Q6B
2N2060
CR2
1N660
CR6
1N660
R7
110K
1/4W
±2%
R8
30K
1/4W
±2%
R9
110K
1/4W
±2%
R10
30K
1/4W
±2%
R12
270
1/4W
±2%
C7
2.2uf
±10%
R14
200
1/4W
±2%
R15
10K
1/2W
±2%
CR7
FD200
CR8
FD200
R18
200
1/4W
±2%
R19
18K
1/4W
±2%
R20
10K
1/2W
±2%
R21
10K
3W
±1%
L3
0.01
±5%
C8
100
±10%
R22
120K, 1/4W, ±2%
C9
100
±10%
R26
180K, 1/8W, ±5%
R28
10K
3W
±1%
L4
0.01
±5%
Q6A
2N2060
CR12
1N751A
CR14
1N751A
Q4B
2N2060
CR10
1N660
CR15
1N660
R23
110K
1/4W
±2%
R24
30K
1/4W
±2%
R25
110K
1/4W
±2%
R27
30K
1/4W
±2%
R29
270
1/4W
±2%
C10
2.2uf
±10%
(7) +120, 12 VDC
RETURN
(18) +12 VDC
Q7
2N914
Q9
2N2848
R16
20
1/8W
±5%
Q8
2N914
R17
20
1/8W
±5%
Q10
2N2848
CR9
FD400
(17) DUMMY
OUT

REF. DES.	PART NUMBER	DESCRIPTION	VALUE-TOL-RATING
C1	1006777-20	CAPACITOR, CERAMIC	470 UUF, ±10%, 100V
C2	1006777-20		470 UUF, ±10%, 100V
C3	1006777-20		470 UUF, ±10%, 100V
C4	1006777-20		470 UUF, ±10%, 100V
C5	1006777-13		100 UUF, ±10%, 100V
C6	1006777-13		100 UUF, ±10%, 100V
C7	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
C8	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C9	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C10	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
CR1	1010385	DIODE IN660	
CR2	1010385	DIODE IN660	
CR3	1010833-001	DIODE IN751 A	5.1 vdc, ±5%
CR4	1010437	DIODE UTR 52	
CR5	1010833-001	DIODE IN751 A	5.1 vdc, ±5%
CR6	1010385	DIODE IN660	
CR7	1010384	DIODE FD200	
CR8	1010384	DIODE FD200	
CR9	1010394	DIODE FD400	
CR10	1010385	DIODE IN660	
CR11	1010394	DIODE FD400	
CR12	1010833-001	DIODE IN751 A	5.1 vdc, ±5%
CR13	1010394	DIODE FD400	
CR14	1010833-001	DIODE IN751 A	5 vdc, ±5%
CR15	1010385	DIODE IN660	
L1	1010388-39	INDUCTOR	.01 H., ±5%, 75MA
L2	1010388-39		
L3	1010388-39		
L4	1010388-39		
Q1	1010357-1	TRANSISTOR 2N720A	
Q2	1010357-1	TRANSISTOR 2N720A	
Q3	1010269-3	TRANSISTOR 2N2151	
Q4	1010376-4	TRANSISTOR 2N2060	
Q5	1010715-2	TRANSISTOR SP9001	
Q6	1010376-4	TRANSISTOR 2N2060	
Q7	1010966-1	TRANSISTOR 2N914	
Q8	1010966-1	TRANSISTOR 2N914	
Q9	1010386	TRANSISTOR 2N2848	
Q10	1010386	TRANSISTOR 2N2848	
R1	1010364-683	RESISTOR, MF	178K, ±1%, 1/8 W
R2	1010364-635	RESISTOR, MF	100K ±1%, 1/8 W
R3	1010364-557	RESISTOR, MF	39.2K, ±1%, 1/8 W
R4	1010373-10	RESISTOR, VAR.	10 K, ±5%, 1W
R5	1010389-80	RESISTOR, W.W.	10 K, ±1%, 3 W
R6	1010369-87	RESISTOR, MF	180K, ±5%, 1/8 W
R7	1006750-81	RESISTOR, MF	110 K, ±2%, 1/4 W
R8	1006750-67	RESISTOR, MF	30 K, ±2%, 1/4 W
R9	1006750-81	RESISTOR, MF	110K, ±2%, 1/4 W
R10	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R11	1006750-82	RESISTOR, MF	120K, ±2%, 1/4 W
R12	1006750-18	RESISTOR, MF	270, ±2%, 1/4 W
R13	1010389-80	RESISTOR, W.W.	10K, ±1%, 3 W
R14	1006750-15	RESISTOR, MF	200, ±2%, 1/4 W
R15	1006760-56	RESISTOR, MF	10 K, ±2%, 1/2 W
R16	1010369-148	RESISTOR, MF	20, ±5%, 1/8 W
R17	1010369-148	RESISTOR, MF	20, ±5%, 1/8 W
R18	1006750-15	RESISTOR, MF	200, ±2%, 1/4 W
R19	1006750-62	RESISTOR, MF	18K, ±2%, 1/4 W
R20	1006760-56	RESISTOR, MF	10 K, ±2%, 1/2 W
R21	1010389-80	RESISTOR, WW	10K, ±1%, 3 W
R22	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R23	1006750-81	RESISTOR, MF	110 K, ±2%, 1/4W
R24	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R25	1006750-81	RESISTOR, MF	110 K, ±2%, 1/4W
R26	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R27	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R28	1010389-80	RESISTOR, WW	10 K, ±1%, 3W
R29	1006750-18	RESISTOR, MF	270, ±2%, 1/4W

REF DWG:
TERNARY CURRENT SWITCH ASSY
DWG NO. 100T516

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A	—	REVISED PER TDRR 16854		4 MAR 65	
B	—	REVISED PER TDRR 18937		17 MAY 65	
C		REVISED PER TDRR 21278		31 Jul 65	
D		REVISED PER TDRR 21283		2 Aug 65	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 6 JULY 64
CHECKED W. Eichl 24 AUG. 64
APPROVAL 27 AUG 64
APPROVAL S. Stoner 11-2-64
NASA APPROVAL 12-8-64
MIT APPROVAL

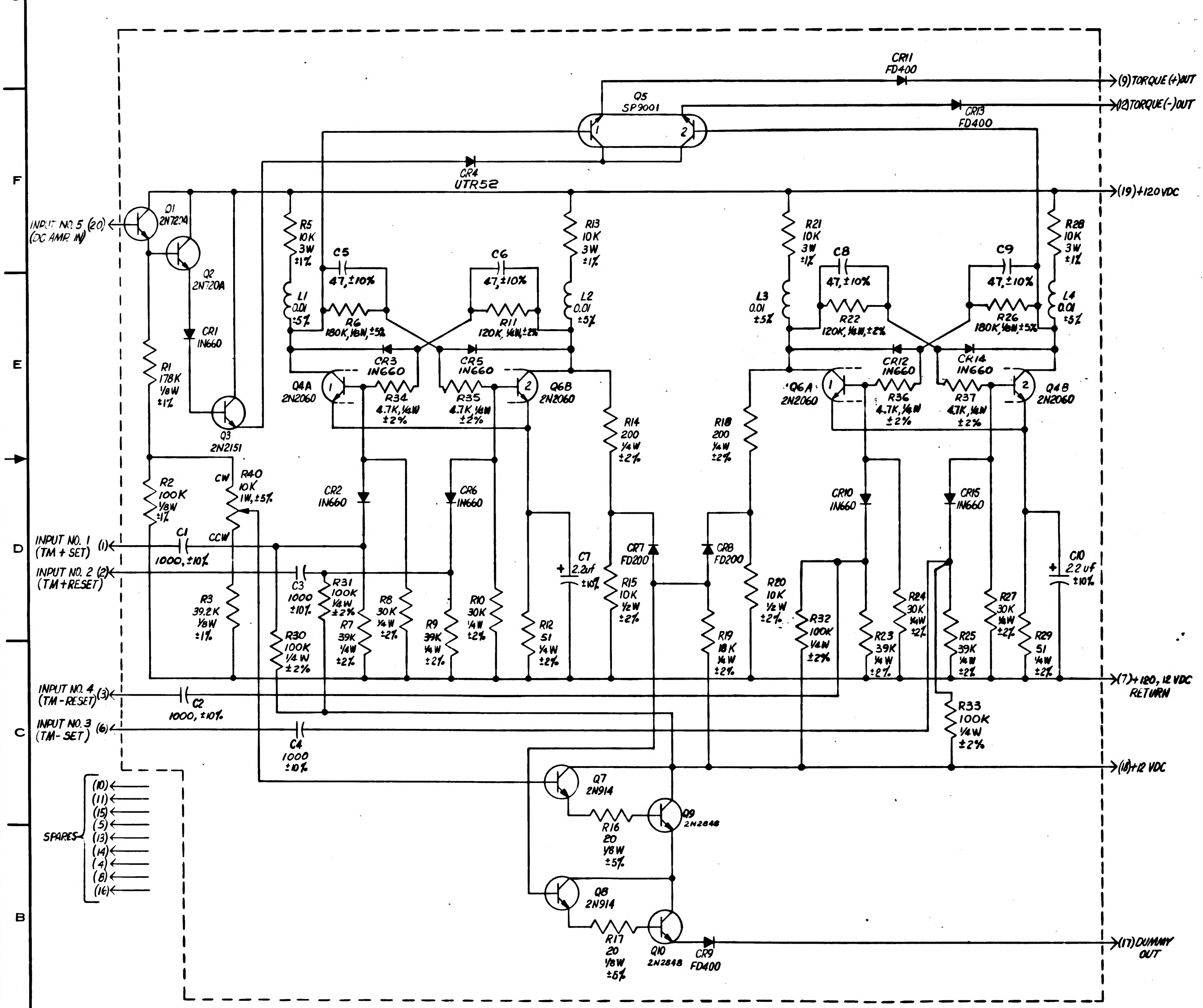
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM, ELECTRICAL
TERNARY CURRENT SWITCH

CODE IDENT NO. 80230
SIZE E
1009531
SCALE —
SHEET 1 OF 1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL PART NUMBERS ARE FOR REFERENCE ONLY.
3. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICRO FARADS, INDUCTANCE VALUES ARE IN HENRIES


INPUT NO. 5 (20)
(DC AMP. IN)
Q1
2N720A
Q2
2N720A
CR1
IN660
Q3
2N2151
R1
178K
1/8W
±1%
R2
100K
1/8W
±1%
CW
R40
10K
1W, ±5%
CCW
INPUT NO. 1 (1)
(TM + SET)
C1
1000, ±10%
INPUT NO. 2 (2)
(TM+RESET)
R3
39.2K
1/8W
±1%
C3
1000
±10%
R31
100K
1/4W
±2%
R30
100K
1/4 W
±2%
R7
39K
1/4W
±2%
R8
30K
1/4 W
±2%
R9
39K
1/4 W
±2%
R10
30K
1/4W
±2%
R12
51
1/4 W
±2%
INPUT NO. 4 (3)
(TM-RESET)
C2
1000, ±10%
INPUT NO. 3 (6)
(TM-SET)
C4
1000
±10%
SPARES
(10)
(11)
(15)
(5)
(13)
(14)
(4)
(8)
(16)
Q5
SP9001
1
2
CR4
UTR52
R5
10K
3W
±1%
C5
47, ±10%
L1
0.01
±5%
R6
180K, 1/8W, ±5%
C6
47, ±10%
R11
120K, 1/4W, ±2%
R13
10K
3W
±1%
L2
0.01
±5%
CR3
IN660
CR5
IN660
Q4A
2N2060
R34
4.7K, 1/4W
±2%
R35
4.7K, 1/4W
±2%
Q6B
2N2060
CR2
IN660
CR6
IN660
R14
200
1/4W
±2%
C7
2.2uf
±10%
CR7
FD200
R15
10K
1/2W
±2%
CR8
FD200
R18
200
1/4W
±2%
R19
18K
1/4W
±2%
R20
10K
1/2W
±2%
CR11
FD400
(9) TORQUE (+) OUT
CR13
FD400
(12) TORQUE (-) OUT
(19) +120 VDC
R21
10K
3W
±1%
C8
47, ±10%
L3
0.01
±5%
R22
120K, 1/4W, ±2%
C9
47, ±10%
R26
180K, 1/8W, ±5%
R28
10K
3W
±1%
L4
0.01
±5%
CR12
IN660
CR14
IN660
Q6A
2N2060
R36
4.7K, 1/4W
±2%
R37
4.7K, 1/4W
±2%
Q4B
2N2060
CR10
IN660
CR15
IN660
R32
100K
1/4W
±2%
R23
39K
1/4W
±2%
R24
30K
1/4W
±2%
R25
39K
1/4W
±2%
R27
30K
1/4W
±2%
R29
51
1/4W
±2%
C10
2.2 uf
±10%
(7) +120, 12 VDC
RETURN
R33
100K
1/4W
±2%
(18) +12 VDC
Q7
2N914
R16
20
1/8W
±5%
Q9
2N2848
Q8
2N914
R17
20
1/8W
±5%
Q10
2N2848
CR9
FD400
(17) DUMMY OUT

REF. DES.	PART NUMBER	DESCRIPTION	VALUE-TOL-RATING
C1	1006777-24	CAPACITOR, CERAMIC	1000UUF, ±10%, 100V
C2	1006777-24		1000UUF, ±10%, 100V
C3	1006777-24		1000UUF, ±10%, 100V
C4	1006777-24		1000UUF, ±10%, 100V
C5	1006777-7		47 UUF, ±10%, 100V
C6	1006777-7		47 UUF, ±10%, 100V
C7	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
C8	1006777-7	CAPACITOR CER	47 UUF, ±10%, 100V
C9	1006777-7	CAPACITOR CER	47 UUF, ±10%, 100V
C10	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
CR1	1010385	DIODE IN660	
CR2	1010385	DIODE IN660	
CR3	1010385	DIODE IN660	
CR4	1010497	DIODE UTR 52	
CR5	1010385	DIODE IN660	
CR6	1010385	DIODE IN660	
CR7	1010384	DIODE FD200	
CR8	1010384	DIODE FD200	
CR9	1010394	DIODE FD400	
CR10	1010385	DIODE IN660	
CR11	1010394	DIODE FD400	
CR12	1010385	DIODE IN660	
CR13	1010394	DIODE FD400	
CR14	1010385	DIODE IN660	
CR15	1010385	DIODE IN660	
L1	1010388-39	INDUCTOR	.01 H., ±5%, 75MA
L2	1010388-39		
L3	1010388-39		
L4	1010388-39		
Q1	1010357-1	TRANSISTOR 2N720A	
Q2	1010357-1	TRANSISTOR 2N720A	
Q3	1010269-3	TRANSISTOR 2N2151	
Q4	1010376-4	TRANSISTOR 2N2060	
Q5	1010715-2	TRANSISTOR SP9001	
Q6	1010376-4	TRANSISTOR 2N2060	
Q7	1010966-1	TRANSISTOR 2N914	
Q8	1010966-1	TRANSISTOR 2N914	
Q9	1010386	TRANSISTOR 2N2848	
Q10	1010386	TRANSISTOR 2N2848	
R1	1010364-683	RESISTOR, MF	178K, ±1%, 1/8W
R2	1010364-635	RESISTOR, MF	100K ±1%, 1/8 W
R3	1010364-557	RESISTOR, MF	39.2K, ±1%, 1/8 W
~~R4~~	~~1010373-10~~	~~RESISTOR, VAR.~~	~~10K, ±5%, 1W~~
R5	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R6	1010369-87	RESISTOR, MF	180K, ±5%, 1/8 W
R7	1006750-70	RESISTOR, MF	39K, ±2%, 1/4 W
R8	1006750-67	RESISTOR, MF	30K, ±2%, 1/4 W
R9	1006750-70	RESISTOR, MF	39K, ±2%, 1/4 W
R10	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R11	1006750-82	RESISTOR, MF	120K, ±2%, 1/4 W
R12	1006750-1	RESISTOR, MF	51, ±2%, 1/4 W
R13	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R14	1006750-15	RESISTOR, MF	200, ±2%, 1/4 W
R15	1006760-56	RESISTOR, MF	10K, ±2%, 1/2 W
R16	1010369-148	RESISTOR, MF	20, ±5%, 1/8 W
R17	1010369-148	RESISTOR, MF	20, ±5%, 1/8 W
R18	1006750-15	RESISTOR, MF	200, ±2%, 1/4 W
R19	1006750-62	RESISTOR, MF	18K, ±2%, 1/4 W
R20	1006760-56	RESISTOR, MF	10K, ±2%, 1/2 W
R21	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R22	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R23	1006750-70	RESISTOR, MF	39K, ±2%, 1/4W
R24	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R25	1006750-70	RESISTOR, MF	39K, ±2%, 1/4W
R26	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R27	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R28	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R29	1006750-1	RESISTOR, MF	51, ±2%, 1/4W
R30	1006750-80	RESISTOR, MF	100K, ±2%, 1/4W
R31	1006750-80	RESISTOR, MF	100K, ±2%, 1/4W
R32	1006750-80	RESISTOR, MF	100K, ±2%, 1/4W
R33	1006750-80	RESISTOR, MF	100K, ±2%, 1/4W
R34	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R35	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R36	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R37	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R40	1010373-10	RESISTOR, VAR	10K, ±5%, 1W

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A	—	REVISED PER TDRR-16854		4 MAR 65	
B	—	REVISED PER TDRR 18937		17 MAY 65	
C		REVISED PER TDRR 21278		31 Jul 65	
D		REVISED PER TDRR 21283		2 AUG 65	
E		REVISED PER TDRR 22360		20 SEP 65	

REF DWG:
TERNARY CURRENT SWITCH ASSY
DWG NO. 1007516

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN C. Kostak DATE 6 JULY 64
CHECKED W. Siebt 24 Aug. '64
APPROVAL J. W. Bost 27 Aug '64
J. M. ELYSHAR
APPROVAL J. S. TONER 11-2-64
NASA APPROVAL 12-7-64
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM, ELECTRICAL
TERNARY CURRENT SWITCH

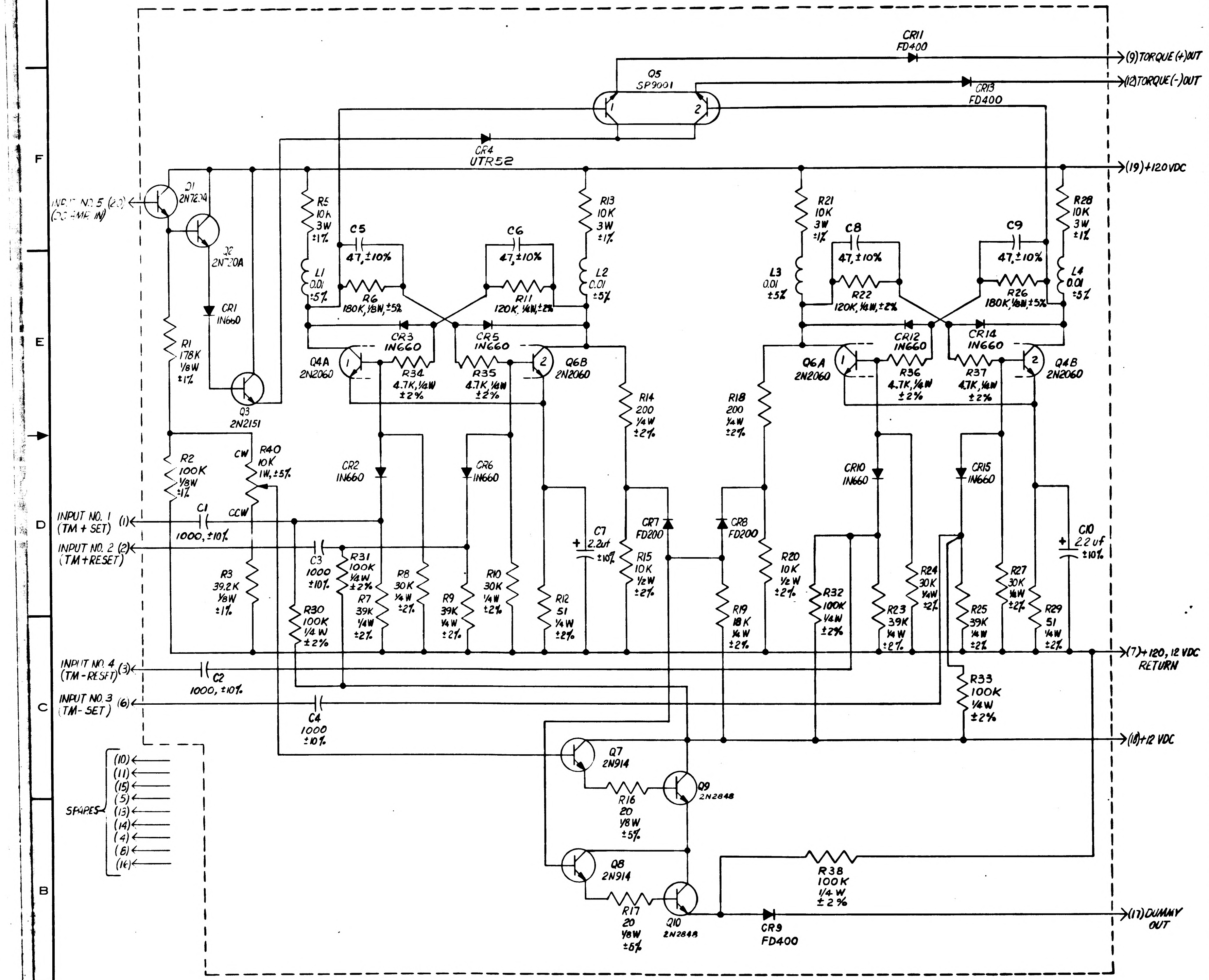
CODE IDENT NO. 80230
SIZE E
1009531
SCALE —
SHEET 1 OF 1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL PART NUMBERS ARE FOR REFERENCE ONLY.
3. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICRO FARADS, INDUCTANCE VALUES ARE IN HENRIES

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A	—	REVISED PER TDRR-16854		[illegible]	B.
B	—	REVISED PER TDRR 18937		17 MAY 65	F.N.
C		REVISED PER TDRR 21278		31 J[illegible] 65	
D		REVISED PER TDRR 21283		[illegible]	
E		REVISED PER TDRR 22360		20 [illegible]	
F		REVISED PER TDRR 23518		4 N[illegible] 65	

REF. DES.	PART NUMBER	DESCRIPTION	VALUE-TOL-RATING
C1	1006777-24	CAPACITOR, CERAMIC	1000UUF, ±10%, 100V
C2	1006777-24	↓ ↓	1000UUF, ±10%, 100V
C3	1006777-24		1000UUF, ±10%, 100V
C4	1006777-24		1000UUF, ±10%, 100V
C5	1006777-7		47UUF, ±10%, 100V
C6	1006777-7		47UUF, ±10%, 100V
C7	1006755-73	CAPACITOR TANT SOLID P	2.2UF, ±10%, 35V
C8	1006777-7	CAPACITOR CER	47UUF, ±10%, 100V
C9	1006777-7	CAPACITOR CER	47UUF, ±10%, 100V
C10	1006755-73	CAPACITOR TANT SOLID P	2.2UF, ±10%, 35V
CR1	1010385	DIODE IN660	
CR2	1010385	DIODE IN660	
CR3	1010385	DIODE IN660	
CR4	1010497	DIODE UTR 52	
CR5	1010385	DIODE IN660	
CR6	1010385	DIODE IN660	
CR7	1010384	DIODE FD200	
CR8	1010384	DIODE FD200	
CR9	1010394	DIODE FD400	
CR10	1010385	DIODE IN660	
CR11	1010394	DIODE FD400	
CR12	1010385	DIODE IN660	
CR13	1010394	DIODE FD400	
CR14	1010385	DIODE IN660	
CR15	1010385	DIODE IN660	
L1	1010388-39	INDUCTOR	.01H., ±5%, 75MA
L2	1010388-39	↓	↓
L3	1010388-39		
L4	1010388-39		
Q1	1010357-1	TRANSISTOR 2N720A	
Q2	1010357-1	TRANSISTOR 2N720A	
Q3	1010269-3	TRANSISTOR 2N2151	
Q4	1010376-4	TRANSISTOR 2N2060	
Q5	1010715-2	TRANSISTOR SP9001	
Q6	1010376-4	TRANSISTOR 2N2060	
Q7	1010966-1	TRANSISTOR 2N914	
Q8	1010966-1	TRANSISTOR 2N914	
Q9	1010386	TRANSISTOR 2N2848	
Q10	1010386	TRANSISTOR 2N2848	
R1	1010364-683	RESISTOR, MF	178K, ±1%, 1/8W
R2	1010364-635	RESISTOR, MF	100K ±1%, 1/8W
R3	1010364-557	RESISTOR, MF	39.2K, ±1%, 1/8W
~~R4~~	~~1010373-10~~	~~RESISTOR, VAR~~	~~10K, ±5%, 1W~~
R5	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R6	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R7	1006750-70	RESISTOR, MF	39K, ±2%, 1/4W
R8	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R9	1006750-70	RESISTOR, MF	39K, ±2%, 1/4W
R10	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R11	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R12	1006750-1	RESISTOR, MF	51, ±2%, 1/4W
R13	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R14	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R15	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R16	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R17	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R18	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R19	1006750-62	RESISTOR, MF	18K, ±2%, 1/4W
R20	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R21	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R22	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R23	1006750-70	RESISTOR, MF	39K, ±2%, 1/4W
R24	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R25	1006750-70	RESISTOR, MF	39K, ±2%, 1/4W
R26	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R27	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R28	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R29	1006750-1	RESISTOR, MF	51, ±2%, 1/4W
R30	1006750-80	RESISTOR, MF	100K, ±2%, 1/4W
R31	1006750-80	RESISTOR, MF	100K, ±2%, 1/4W
R32	1006750-80	RESISTOR, MF	100K, ±2%, 1/4W
R33	1006750-8	RESISTOR, MF	100K, ±2%, 1/4W
R34	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R35	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R36	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R37	1006750-48	RESISTOR, MF	4.7K, ±2%, 1/4W
R38	1006750-80	RESISTOR	100K, ±2%, 1/4W
R40	1010373-10	RESISTOR, VAR	10K, ±5%, 1W


INPUT NO. 5 (2,5) (COMMAND IN)
Q1 2N720A
Q2 2N720A
CR1 IN660
R1 178K 1/8W ±1%
Q3 2N2151
R2 100K 1/8W ±1%
R40 10K 1W, ±5%
CW
CCW
INPUT NO. 1 (TM + SET) (1)
C1 1000, ±10%
INPUT NO. 2 (TM + RESET) (2)
R3 39.2K 1/8W ±1%
C3 1000 ±10%
R30 100K 1/4W ±2%
R31 100K 1/4W ±2%
R7 39K 1/4W ±2%
R8 30K 1/4W ±2%
R9 39K 1/4W ±2%
R10 30K 1/4W ±2%
R12 51 1/4W ±2%
C7 2.2uf ±10%
CR7 FD200
R15 10K 1/2W ±2%
CR2 IN660
CR6 IN660
R5 10K 3W ±1%
L1 0.01 ±5%
C5 47, ±10%
R6 180K, 1/8W, ±5%
C6 47, ±10%
R11 120K, 1/4W, ±2%
R13 10K 3W ±1%
L2 0.01 ±5%
CR3 IN660
CR5 IN660
Q4A 2N2060
R34 4.7K, 1/4W ±2%
R35 4.7K, 1/4W ±2%
Q6B 2N2060
R14 200 1/4W ±2%
Q5 SP9001
CR11 FD400
CR13 FD400
CR4 UTR52
(9) TORQUE (+) OUT
(12) TORQUE (-) OUT
(19) +120 VDC
R21 10K 3W ±1%
C8 47, ±10%
L3 0.01 ±5%
R22 120K, 1/4W, ±2%
C9 47, ±10%
R26 180K, 1/8W, ±5%
R28 10K 3W ±1%
L4 0.01 ±5%
CR12 IN660
CR14 IN660
Q6A 2N2060
R36 4.7K, 1/4W ±2%
R37 4.7K, 1/4W ±2%
Q4B 2N2060
R18 200 1/4W ±2%
CR10 IN660
CR15 IN660
CR8 FD200
R19 18K 1/4W ±2%
R20 10K 1/2W ±2%
R32 100K 1/4W ±2%
R23 39K 1/4W ±2%
R24 30K 1/4W ±2%
R25 39K 1/4W ±2%
R27 30K 1/4W ±2%
R29 51 1/4W ±2%
C10 2.2 uf ±10%
(7) +120, 12 VDC RETURN
R33 100K 1/4W ±2%
INPUT NO. 4 (TM-RESET) (3)
C2 1000, ±10%
INPUT NO. 3 (TM-SET) (6)
C4 1000 ±10%
(18) +12 VDC
Q7 2N914
R16 20 1/8W ±5%
Q9 2N2848
Q8 2N914
R17 20 1/8W ±5%
Q10 2N2848
R38 100K 1/4W ±2%
CR9 FD400
(17) DUMMY OUT
SPARES (10) (11) (15) (5) (13) (14) (4) (8) (16)

REF DWG:
TERNARY CURRENT SWITCH ASSY
DWG NO. 1007516

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + — − —
DECIMALS + — − —
ANGLES + — − —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN C. Kavetake 6 JULY 64
CHECKED W. Bickel 24 AUG. 64
APPROVAL J. W. Bost 27 AUG '64
APPROVAL J. S. Tomec 11-2-64
NASA APPROVAL 12-8-64
MIT APPROVAL

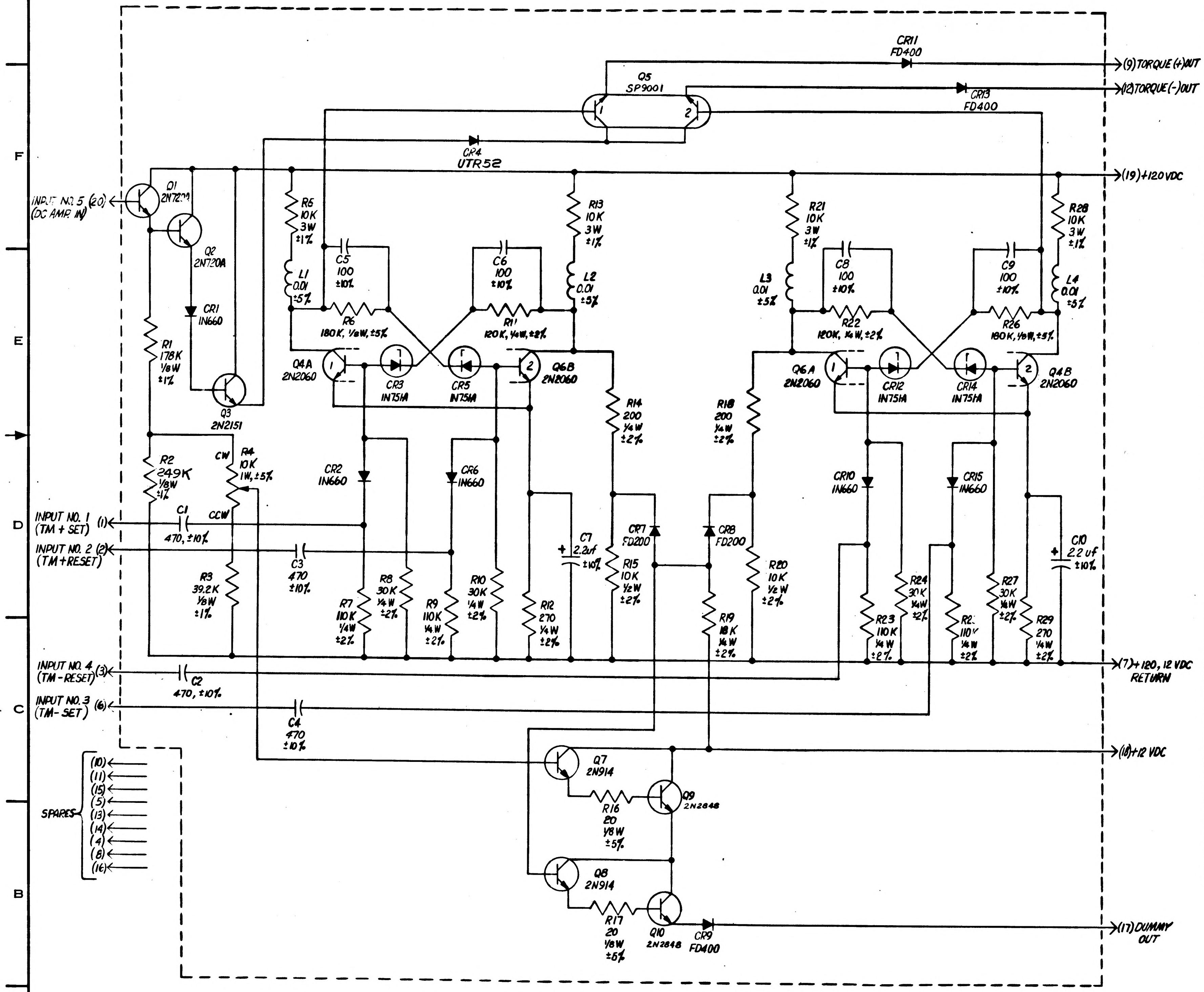
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM, ELECTRICAL
TERNARY CURRENT SWITCH

CODE IDENT NO 80230
SIZE E
1009531
SCALE —
SHEET 1 OF 1

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ALL PART NUMBERS ARE FOR REFERENCE ONLY.
3. UNLESS OTHERWISE SPECIFIED ALL RESISTANCE VALUES ARE IN OHMS, CAPACITANCE VALUES ARE IN MICRO-MICRO FARADS, INDUCTANCE VALUES ARE IN HENRIES


INPUT NO. 5 (20) (DC AMP. IN)
Q1 2N720A
Q2 2N720A
CR1 IN660
Q3 2N2151
R1 178K 1/8W ±1%
R2 249K 1/8W ±1%
R4 10K 1W, ±5%
CW
CCW
R3 39.2K 1/8W ±1%
INPUT NO. 1 (1) (TM + SET)
C1 470, ±10%
INPUT NO. 2 (2) (TM+RESET)
C3 470 ±10%
INPUT NO. 4 (3) (TM-RESET)
C2 470, ±10%
INPUT NO. 3 (6) (TM-SET)
C4 470 ±10%
Q5 SP9001
CR11 FD400
CR13 FD400
CR4 UTR52
(9) TORQUE (+) OUT
(12) TORQUE (-) OUT
(19) +120 VDC
R5 10K 3W ±1%
C5 100 ±10%
L1 0.01 ±5%
R6 180K, 1/8W, ±5%
C6 100 ±10%
R11 120K, 1/4W, ±2%
R13 10K 3W ±1%
L2 0.01 ±5%
Q4A 2N2060
CR3 IN751A
CR5 IN751A
Q6B 2N2060
R14 200 1/4W ±2%
CR2 IN660
CR6 IN660
C7 2.2uf ±10%
CR7 FD200
CR8 FD200
R7 110K 1/4W ±2%
R8 30K 1/4W ±2%
R9 110K 1/4W ±2%
R10 30K 1/4W ±2%
R12 270 1/4W ±2%
R15 10K 1/2W ±2%
R18 200 1/4W ±2%
R19 18K 1/4W ±2%
R20 10K 1/2W ±2%
R21 10K 3W ±1%
L3 0.01 ±5%
C8 100 ±10%
R22 120K, 1/4W, ±2%
C9 100 ±10%
R26 180K, 1/8W, ±5%
R28 10K 3W ±1%
L4 0.01 ±5%
Q6A 2N2060
CR12 IN751A
CR14 IN751A
Q4B 2N2060
CR10 IN660
CR15 IN660
C10 2.2 uf ±10%
R23 110K 1/4W ±2%
R24 30K 1/4W ±2%
R25 110K 1/4W ±2%
R27 30K 1/4W ±2%
R29 270 1/4W ±2%
(7) +120, 12 VDC RETURN
(18) +12 VDC
Q7 2N914
R16 20 1/8W ±5%
Q9 2N2848
Q8 2N914
R17 20 1/8W ±5%
Q10 2N2848
CR9 FD400
(17) DUMMY OUT
SPARES (10) (11) (15) (5) (13) (14) (4) (8) (16)

REF. DES.	PART NUMBER	DESCRIPTION	VALUE-TOL-RATING
C1	1006777-20	CAPACITOR, CERAMIC	470 UUF, ±10%, 100V
C2	1006777-20	↓	470 UUF, ±10%, 100V
C3	1006777-20	↓	470 UUF, ±10%, 100V
C4	1006777-20	↓	470 UUF, ±10%, 100V
C5	1006777-13	↓	100 UUF, ±10%, 100V
C6	1006777-13	↓	100 UUF, ±10%, 100V
C7	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
C8	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C9	1006777-13	CAPACITOR CER	100 UUF, ±10%, 100V
C10	1006755-73	CAPACITOR TANT SOLID P	2.2 UF, ±10%, 35V
CR1	1010385	DIODE IN660	
CR2	1010385	DIODE IN660	
CR3	1010462-6	DIODE IN751 A	5.1 vdc, ±5%
CR4	1010497	DIODE UTR 52	
CR5	1010462-6	DIODE IN751 A	5.1 vdc, ±5%
CR6	1010385	DIODE IN660	
CR7	1010384	DIODE FD200	
CR8	1010384	DIODE FD200	
CR9	1010394	DIODE FD400	
CR10	1010385	DIODE IN660	
CR11	1010394	DIODE FD400	
CR12	1010462-6	DIODE IN751 A	5.1 vdc, ±5%
CR13	1010394	DIODE FD400	
CR14	1010462-6	DIODE IN751 A	5 vdc, ±5%
CR15	1010385	DIODE IN660	
L1	1010388-39	INDUCTOR	.01 H., ±5%, 75MA
L2	1010388-39	↓	↓
L3	1010388-39	↓	↓
L4	1010388-39	↓	↓
Q1	1010357-1	TRANSISTOR 2N720A	
Q2	1010357-1	TRANSISTOR 2N720A	
Q3	1010269-3	TRANSISTOR 2N2151	
Q4	1010376-4	TRANSISTOR 2N2060	
Q5	1010715-1	TRANSISTOR SP9001	
Q6	1010376-4	TRANSISTOR 2N2060	
Q7	1006752	TRANSISTOR 2N914	
Q8	1006752	TRANSISTOR 2N914	
Q9	1010386	TRANSISTOR 2N2848	
Q10	1010386	TRANSISTOR 2N2848	
R1	1010364-683	RESISTOR, MF	178K, ±1%, 1/8W
R2	1010364-711	RESISTOR, MF	249K, ±1%, 1/8W
R3	1010364-557	RESISTOR, MF	39.2K, ±1%, 1/8W
R4	1010373-10	RESISTOR, VAR.	10K, ±5%, 1W
R5	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R6	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R7	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R8	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R9	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R10	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R11	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R12	1006750-18	RESISTOR, MF	270, ±2%, 1/4W
R13	1010389-80	RESISTOR, W.W.	10K, ±1%, 3W
R14	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R15	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R16	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R17	1010369-148	RESISTOR, MF	20, ±5%, 1/8W
R18	1006750-15	RESISTOR, MF	200, ±2%, 1/4W
R19	1006750-62	RESISTOR, MF	18K, ±2%, 1/4W
R20	1006760-56	RESISTOR, MF	10K, ±2%, 1/2W
R21	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R22	1006750-82	RESISTOR, MF	120K, ±2%, 1/4W
R23	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R24	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R25	1006750-81	RESISTOR, MF	110K, ±2%, 1/4W
R26	1010369-87	RESISTOR, MF	180K, ±5%, 1/8W
R27	1006750-67	RESISTOR, MF	30K, ±2%, 1/4W
R28	1010389-80	RESISTOR, WW	10K, ±1%, 3W
R29	1006750-18	RESISTOR, MF	270, ±2%, 1/4W

REF DWG:
TERNARY CURRENT SWITCH ASSY
DWG NO. 100T516

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.

1009531

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C. Kostek DATE 6 July 64
CHECKED W. Diehl 24 Aug. '64
APPROVAL J. W. Bart 27 Aug '64
J. M. BLYSHAK
APPROVAL J. S. Tomer 11-2-64
NASA APPROVAL 12-7-64
MIT APPROVAL

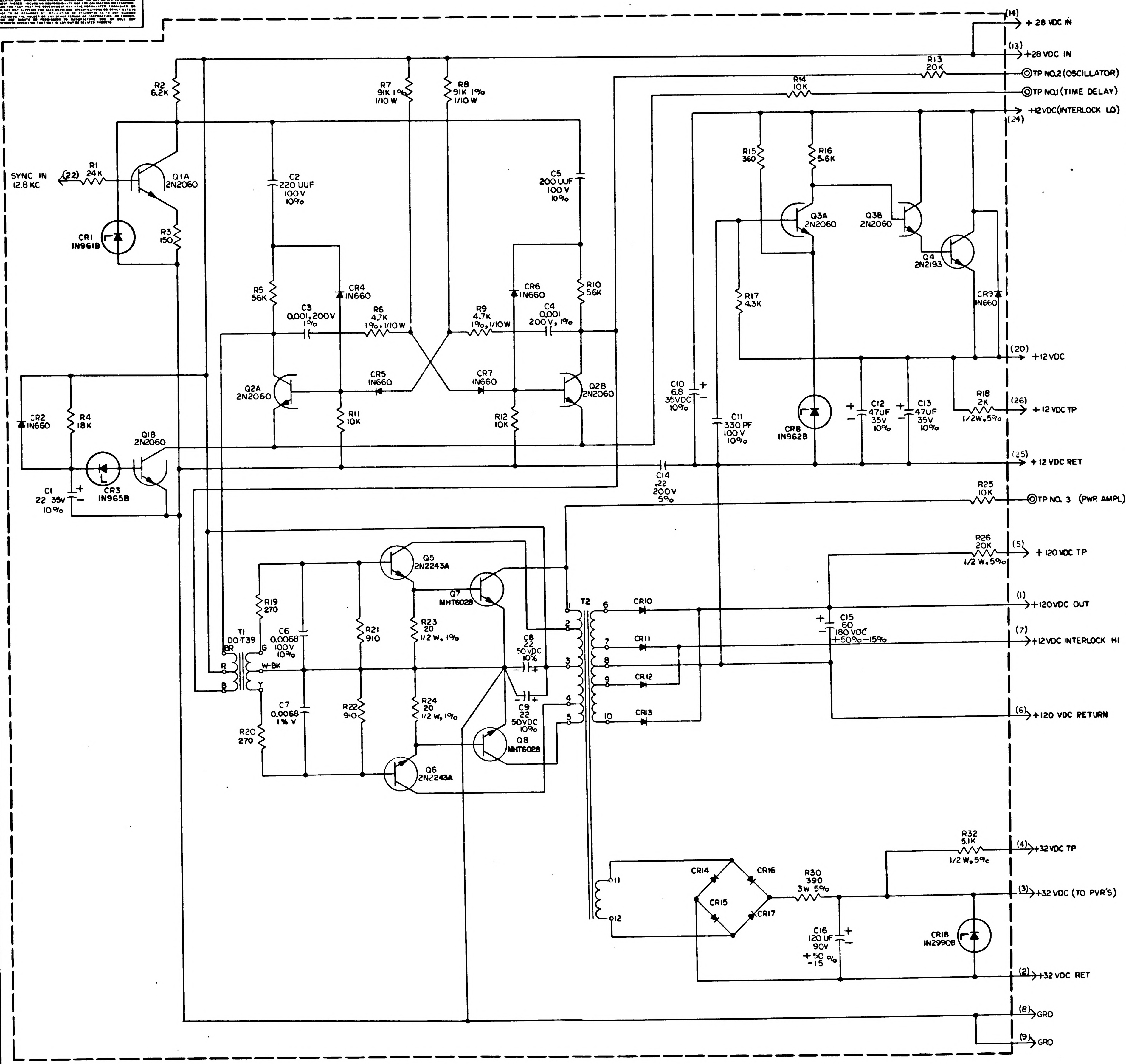
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM, ELECTRICAL
TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
1009531
SCALE —
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17610	25 MAR 65	


SYNC IN
12.8 KC
(22)
R1
24K
Q1A
2N2060
R2
6.2K
CR1
1N961B
R3
150
C2
220 UUF
100 V
10%
R7
91K 1%
1/10 W
R8
91K 1%
1/10 W
C5
200 UUF
100 V
10%
R5
56K
CR4
1N660
C3
0.001, 200V
1%
R6
4.7K
1%, 1/10 W
R9
4.7K
1%, 1/10W
CR6
1N660
C4
0.001
200 V, 1%
R10
56K
Q2A
2N2060
CR5
1N660
CR7
1N660
Q2B
2N2060
R11
10K
R12
10K
CR2
1N660
R4
18K
Q1B
2N2060
C1
22 35V
10%
CR3
1N965B
R13
20K
R14
10K
(14)
+ 28 VDC IN
(13)
+28 VDC IN
TP NO.2 (OSCILLATOR)
TP NO.1 (TIME DELAY)
+12VDC (INTERLOCK LO)
(24)
R15
360
R16
5.6K
Q3A
2N2060
Q3B
2N2060
Q4
2N2193
R17
4.3K
CR9
1N660
(20)
+12VDC
C10
6.8
35VDC
10%
C11
330 PF
100 V
10%
CR8
1N962B
C12
47UF
35V
10%
C13
47UF
35V
10%
R18
2K
1/2W, 5%
(26)
+ 12 VDC TP
(25)
+ 12 VDC RET
C14
.22
200V
5%
R25
10K
TP NO. 3 (PWR AMPL)
R26
20K
1/2 W, 5%
(5)
+ 120 VDC TP
Q5
2N2243A
Q7
MHT6028
R19
270
T1
DO-T39
BR
R
B
G
W-BK
Y
C6
0.0068
100V
10%
R21
910
R23
20
1/2 W, 1%
C8
22
50VDC
10%
C7
0.0068
1% V
R22
910
R24
20
1/2 W, 1%
C9
22
50VDC
10%
Q8
MHT6028
R20
270
Q6
2N2243A
T2
1
2
3
4
5
6
7
8
9
10
CR10
CR11
CR12
CR13
C15
60
180 VDC
+50% −15%
(1)
+120VDC OUT
(7)
+12 VDC INTERLOCK HI
(6)
+120 VDC RETURN
R32
5.1K
1/2 W, 5%
(4)
+32 VDC TP
11
12
CR14
CR16
CR15
CR17
R30
390
3W 5%
(3)
+32 VDC (TO PVR'S)
C16
120 UF
90V
+50 %
−15
CR18
1N2990B
(2)
+32 VDC RET
(8)
GRD
(9)
GRD

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	-51		6.2K		
R3	-12		150		
R4	↓ -62		18K	↓	↓
R5	1006750-74		56K	2%	1/4W
R6	1010377-110		4.7K	1%	1/10 W
R7	-111		91K		
R8	↓ -111		91K	↓	↓
R9	1010377-110		4.7K	1%	1/10W
R10	1006750-74		56K	2%	1/4W
R11	-56		10K		
R12	-56		10K		
R13	-63		20K		
R14	-56		10K		
R15	-21		360		
R16	↓ -50		5.6K	↓	↓
R17	1006750-47		4.3K	2%	1/4W
R18	1010278-70		2K	5%	1/2W
R19	1006750-18		270	2%	1/4W
R20	-18		270		
R21	↓ -31		910	↓	↓
R22	1006750-31		910	2%	1/4W
R23	1006802-2		20	1%	1/2 W
R24	1006802-2		20	1%	1/2 W
R25	1006750-56	↓	10K	2%	1/4 W
R26	1010278-94	RESISTOR	20K	5%	1/2 W
R30	1010389-46	RESISTOR	390	5%	3W
R32	1010278-80	RESISTOR	5.1K	5%	1/2 W
C1	1006755-85	CAPACITOR	22 UF	±10%	35VDC
C2	1006777-16		220 UUF	±10%	100V
C3	1010316-36		.001UF	±1%	200V
C4	1010316-36		.001UF	±1%	200V
C5	1006777-16		220UUF	±10%	100V
C6	1006777-30		.0068UF	±10%	100V
C7	1006777-30		.0068UF	±10%	100V
C8	1010393-045		22 UF	±10%	50VDC
C9	1010393-045		22UF	±10%	50VDC
C10	1006755-79		6.8UF	±10%	35VDC
C11	1006777-18		330PF	±10%	100V
C12	1006755-89		47UF	±10%	35VDC
C13	1006755-89		47UF	±10%	35VDC
C14	1010264-29		.22UF	±5%	200V
C15	1010460-1	↓	60 UF	+50-15	180VDC
C16	1010460-2	CAPACITOR	120 UF	+50-15	90VDC
CR1	1010830-5	ZENER DIODE	10 VDC	±5%	400MW
CR2	1010385	DIODE	1N660		
CR3	1010830-9	ZENER DIODE	15 VDC	±5%	400MW
CR4	1010385	DIODE	1N660		
CR5					
CR6	↓	↓	↓		
CR7	1010385	DIODE	1N660		
CR8	1010830-25	ZENER DIODE	11.5 VDC	±2%	400MW
CR9	1010385	DIODE	1N660		
CR10	1010497		UTR52		
CR11					
CR12	↓		↓		
CR13	1010497		UTR52		
CR14	1010384		FD200		
CR15					
CR16	↓	↓	↓		
CR17	1010384	DIODE	FD200		
CR18	1010331-013	ZENER DIODE	33 VDC	±5%	10W
Q1	1010376-1	TRANSISTORS	2N2060		
Q2	1010376-4		2N2060		
Q3	1010376-1		2N2060		
Q4	1010398-1		2N2193		
Q5	1010398-3		2N2243A		
Q6	1010398-3		2N2243A		
Q7	1010499-2	↓	MHT6028		
Q8	1010499-2	TRANSISTORS	MHT6028		
T1	1010315-2	TRANSFORMERS			
T2	1010745	TRANSFORMERS			

REF DRAWING:
PULSE TORQUING POWER SUPPLY ASSY
DWG NO. 1007552

NOTES—
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4 UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ±2%

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 5 OCT 64
CHECKED 12 OCT 64
APPROVAL
J M BLYSNAK
APPROVAL S. TAMER
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

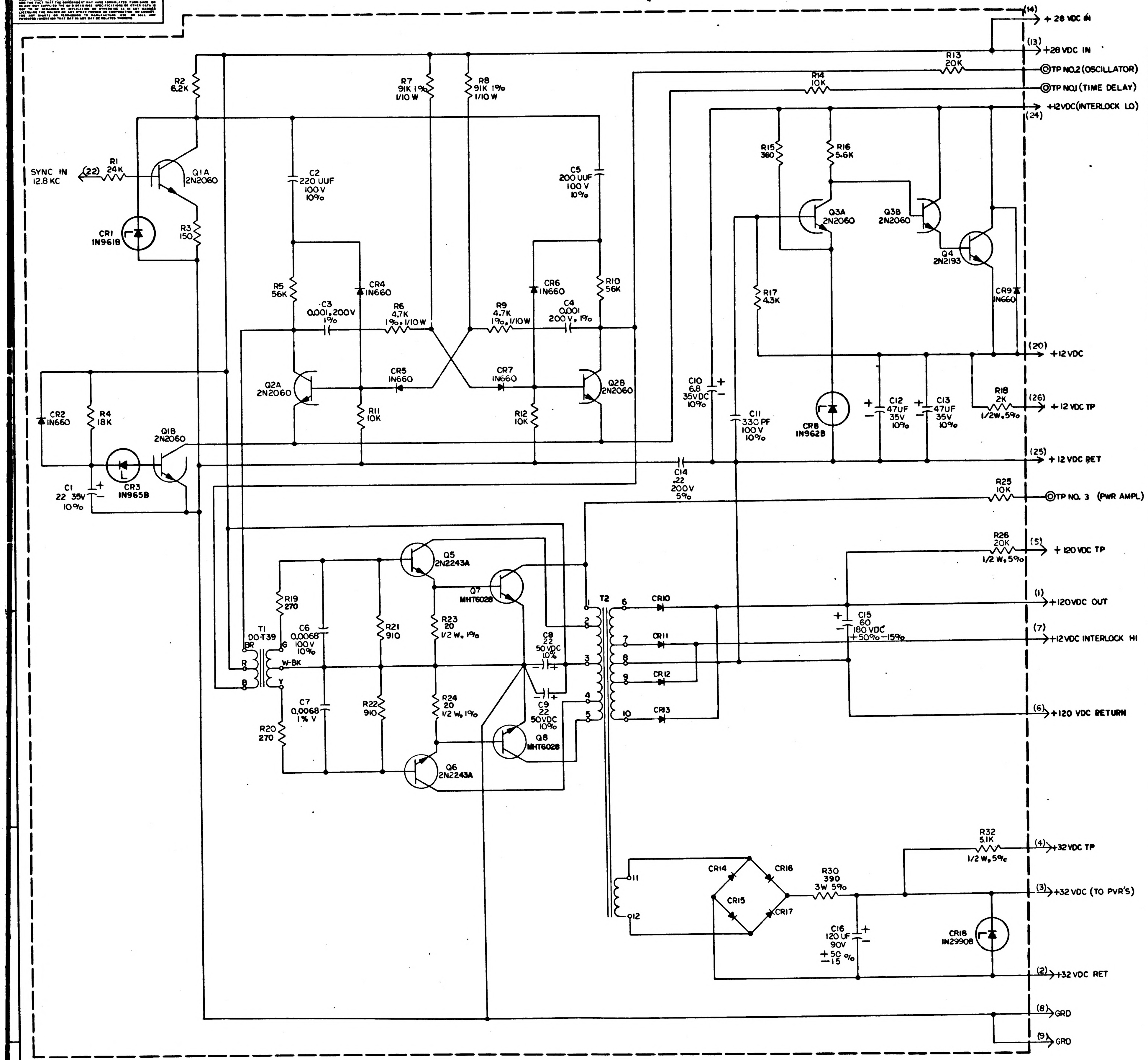
PULSE TORQUING
POWER SUPPLY
(PIPA AND PULSE
TORQUED GYRO)

CODE IDENT NO
SIZE E
NASA DRAWING NO 1009532
SCALE 2/1
WT
SHEET 1 OF 1

1009532 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


(14) + 28 VDC IN
(13) +28 VDC IN
R13 20K
TP NO.2 (OSCILLATOR)
R14 10K
TP NO.1 (TIME DELAY)
+12VDC (INTERLOCK LO) (24)
R2 6.2K
R7 91K 1% 1/10 W
R8 91K 1% 1/10 W
SYNC IN 12.8 KC
(22)
R1 24K
Q1A 2N2060
CR1 1N961B
R3 150
C2 220 UUF 100 V 10%
C5 200 UUF 100 V 10%
R5 56K
CR4 1N660
C3 0.001, 200V 1%
R6 4.7K 1%, 1/10 W
R9 4.7K 1%, 1/10 W
CR6 1N660
C4 0.001 200 V, 1%
R10 56K
Q2A 2N2060
CR5 1N660
CR7 1N660
Q2B 2N2060
R11 10K
R12 10K
CR2 1N660
R4 18K
Q1B 2N2060
C1 22 35V 10%
CR3 1N965B
R15 360
R16 5.6K
Q3A 2N2060
Q3B 2N2060
Q4 2N2193
R17 4.3K
CR9 1N660
(20) +12 VDC
C10 6.8 35VDC 10%
C11 330 PF 100 V 10%
CR8 1N962B
C12 47UF 35V 10%
C13 47UF 35V 10%
R18 2K 1/2W, 5%
(26) + 12 VDC TP
C14 .22 200V 5%
(25) + 12 VDC RET
R25 10K
TP NO. 3 (PWR AMPL)
R26 20K 1/2 W, 5%
(5) + 120 VDC TP
Q5 2N2243A
Q7 MHT6028
R19 270
T1 DO-T39
BR
R
B
G
W-BK
Y
C6 0.0068 100 V 10%
R21 910
R23 20 1/2 W, 1%
C8 22 50 VDC 10%
T2
1
2
3
4
5
6
7
8
9
10
CR10
CR11
CR12
CR13
C15 60 180 VDC +50% −15%
(1) +120VDC OUT
(7) +12 VDC INTERLOCK HI
(6) +120 VDC RETURN
C7 0.0068 1% V
R22 910
R24 20 1/2 W, 1%
C9 22 50VDC 10%
Q8 MHT6028
R20 270
Q6 2N2243A
R32 5.1K 1/2 W, 5%
(4) +32 VDC TP
11
12
CR14
CR16
CR15
CR17
R30 390 3W 5%
(3) +32 VDC (TO PVR'S)
C16 120 UF 90V +50 −15 %
CR18 1N2990B
(2) +32 VDC RET
(8) GRD
(9) GRD

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	-51	↓	6.2K	↓	↓
R3	-12	↓	150	↓	↓
R4	-62	↓	18K	↓	↓
R5	1006750-74	↓	56K	2%	1/4 W
R6	1010377-110	↓	4.7K	1%	1/10 W
R7	-111	↓	91K	↓	↓
R8	-111	↓	91K	↓	↓
R9	1010377-110	↓	4.7K	1%	1/10W
R10	1006750-74	↓	56K	2%	1/4W
R11	-56	↓	10K	↓	↓
R12	-56	↓	10K	↓	↓
R13	-63	↓	20K	↓	↓
R14	-56	↓	10K	↓	↓
R15	-21	↓	360	↓	↓
R16	-50	↓	5.6K	↓	↓
R17	1006750-47	↓	4.3K	2%	1/4W
R18	1010278-70	↓	2K	5%	1/2W
R19	1006750-18	↓	270	2%	1/4W
R20	-18	↓	270	↓	↓
R21	-31	↓	910	↓	↓
R22	1006750-31	↓	910	2%	1/4W
R23	1006802-2	↓	20	1%	1/2 W
R24	1006802-2	↓	20	1%	1/2 W
R25	1006750-56	↓	10K	2%	1/4 W
R26	1010278-94	RESISTOR	20K	5%	1/2 W
R30	1010389-46	RESISTOR	390	5%	3W
R32	1010278-80	RESISTOR	5.1K	5%	1/2 W
C1	1006755-85	CAPACITOR	22 UF	±10%	35VDC
C2	1006777-16	↓	220 UUF	±10%	100V
C3	1010316-36	↓	.001 UF	±1%	200V
C4	1010316-36	↓	.001 UF	±1%	200V
C5	1006777-16	↓	220UUF	±10%	100V
C6	1006777-30	↓	.0068UF	±10%	100V
C7	1006777-30	↓	.0068UF	±10%	100V
C8	1010393-045	↓	22 UF	±10%	50VDC
C9	1010393-045	↓	22UF	±10%	50VDC
C10	1006755-79	↓	6.8UF	±10%	35VDC
C11	1006777-18	↓	330PF	±10%	100V
C12	1006755-89	↓	47UF	±10%	35VDC
C13	1006755-89	↓	47UF	±10%	35VDC
C14	1010264-29	↓	.22UF	±5%	200V
C15	1010460-1	↓	60 UF	+50-15	180VDC
C16	1010460-2	CAPACITOR	120 UF	+50-15	90VDC
CR1	1010286-5	ZENER DIODE	10 VDC	±5%	400MW
CR2	1010385	DIODE	1N660		
CR3	1010286-9	ZENER DIODE	15 VDC	±5%	400MW
CR4	1010385	DIODE	1N660		
CR5	↓	↓	↓		
CR6	↓	↓	↓		
CR7	1010385	DIODE	1N660		
CR8	1010286-25	ZENER DIODE	11.5 VDC	±2%	400MW
CR9	1010385	DIODE	1N660		
CR10	1010497	↓	UTR52		
CR11	↓	↓	↓		
CR12	↓	↓	↓		
CR13	1010497	↓	UTR52		
CR14	1010384	↓	FD200		
CR15	↓	↓	↓		
CR16	↓	↓	↓		
CR17	1010384	DIODE	FD200		
CR18	1010331-013	ZENER DIODE	33 VDC	±5%	10W
Q1	1010376-1	TRANSISTORS	2N2060		
Q2	1010376-4	↓	2N2060		
Q3	1010376-1	↓	2N2060		
Q4	1010398-1	↓	2N2193		
Q5	1010398-3	↓	2N2243A		
Q6	1010398-3	↓	2N2243A		
Q7	1010499-2	↓	MHT6028		
Q8	1010499-2	TRANSISTORS	MHT6028		
T1	1010315-2	TRANSFORMERS			
T2	1010745	TRANSFORMERS			

REF DRAWING:
PULSE TORQUING POWER SUPPLY ASSY
DWG NO. 1007552

NOTES–
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4 UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ±2%

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN DATE 5 OCT 64
CHECKED 12 OCT 64
APPROVAL
J M BLYSHAK
APPROVAL S. TAMER 2/4/64
NASA APPROVAL W J Kline 12-4-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PULSE TORQUING POWER SUPPLY (PIPA AND PULSE TORQUED GYRO)

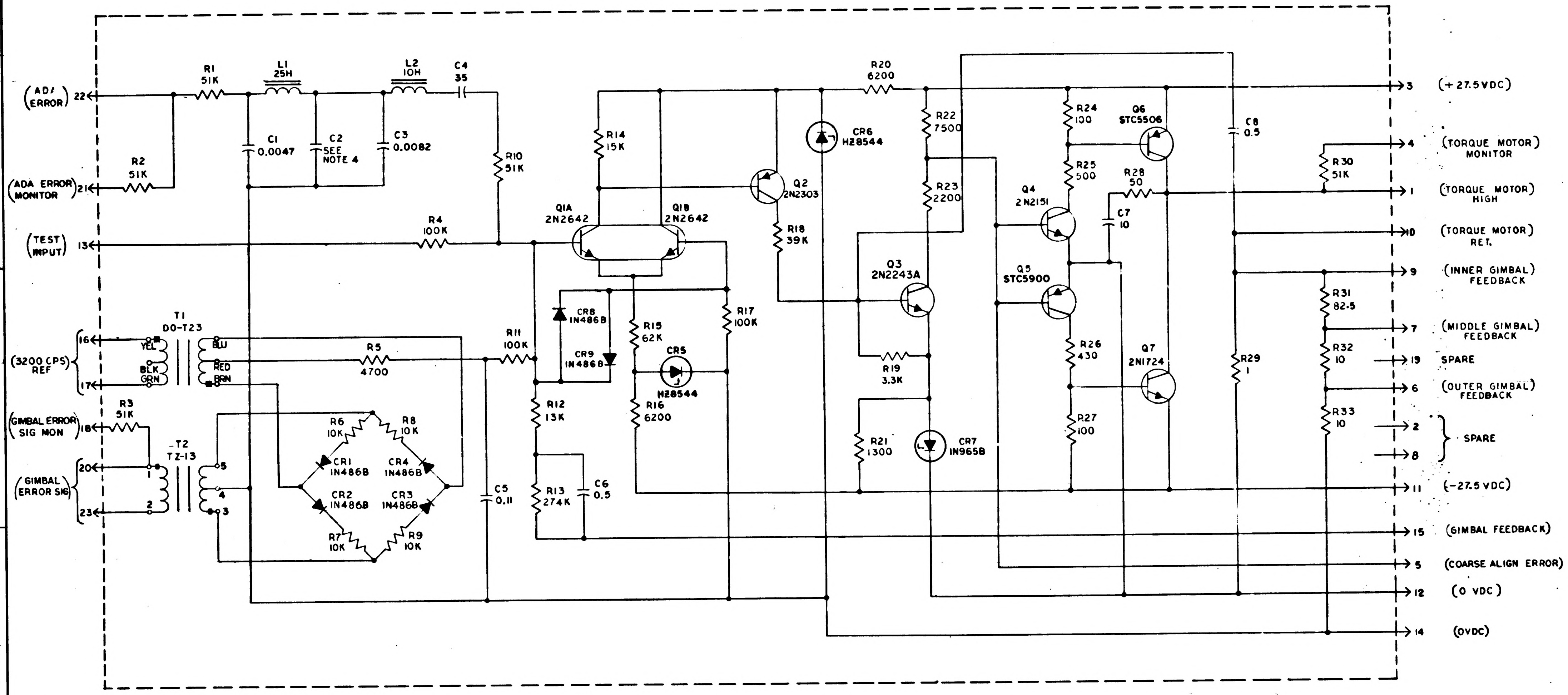
CODE IDENT NO.
SIZE E
NASA DRAWING NO 1009532
SCALE 2/1
WT
SHEET 1 OF 1

1009532

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 3 ~~75~~

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17610	25 MAR 65	nTO / C20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(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF 16 17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20 23
R1 51K
R2 51K
R3 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R10 51K
R4 100K
T1 DO-T23
YEL
BLK
GRN
BLU
RED
BRN
R5 4700
T2 TZ-13
1
2
5
4
3
R6 10K
R8 10K
CR1 IN486B
CR4 IN486B
CR2 IN486B
CR3 IN486B
R7 10K
R9 10K
C5 0.11
R11 100K
R12 13K
R13 274K
C6 0.5
Q1A 2N2642
Q1B 2N2642
R14 15K
CR8 IN486B
CR9 IN486B
R15 62K
CR5 HZ8544
R16 6200
R17 100K
Q2 2N2303
R18 39K
R20 6200
CR6 HZ8544
R22 7500
R23 2200
Q3 2N2243A
R19 3.3K
R21 1300
CR7 IN965B
Q4 2N2151
Q5 STC5900
R24 100
R25 500
Q6 STC5506
R28 50
C7 10
R26 430
R27 100
Q7 2N1724
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
3 (+27.5VDC)
4 (TORQUE MOTOR) MONITOR
1 (TORQUE MOTOR) HIGH
10 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
19 SPARE
6 (OUTER GIMBAL) FEEDBACK
2
8
SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)
14 (OVDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	↓ -73	↓	51K	↓	↓
R3	↓ -73	↓	51K	↓	↓
R4	↓ -80	↓	100K	↓	↓
R5	↓ -48	↓	4700	↓	↓
R6	1010364-443	↓	10K	±1%	1/8 W
R7	↓ - ↓	↓	10K	±1%	1/8 W
R8	↓ - ↓	↓	10K	±1%	1/8 W
R9	↓ - ↓	↓	10K	±1%	1/8 W
R10	1006750-73	↓	51K	±2%	1/4W
R11	1010364-635	↓	100K	±1%	1/8W
R12	↓ -465	↓	13K	↓	↓
R13	↓ -719	↓	274K	↓	↓
R14	1006750-60	↓	15K	±2%	1/4W
R15	↓ -75	↓	62K	↓	↓
R16	↓ -51	↓	6200	↓	↓
R17	↓ -80	↓	100K	↓	↓
R18	↓ -70	↓	39K	↓	↓
R19	↓ -44	↓	3.3K	↓	↓
R20	↓ -51	↓	6200	↓	↓
R21	1006760-35	↓	1300	↓	1/2W
R22	1006750-53	↓	7500	↓	1/4W
R23	1006750-40	↓	2200	↓	1/4W
R24	1010278-39	↓	100	±5%	1/2W
R25	1010399-31	↓	500	±5%	5W
R26	1010389-47	↓	430	±1%	3W
R27	1010278-39	↓	100	±5%	1/2W
R28	1010399-16	↓	50	±5%	5W
R29	1010389-94	↓	1	±1%	3W
R30	1006750-73	↓	51K	±2%	1/4W
R31	1010364-43	↓	82.5	±1%	1/8W
R32	1010377-66	↓	10	±.5%	1/10W
R33	1010377-66	↓	10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	↓ -	↓	SEE NOTE 4	↓	↓
C3	↓ -12	↓	.0082	↓	↓
C4	1010320-11	↓			25VDC
C5	1010279-220	↓	.11		35VDC
C6	1010279-9	↓	0.5		6VDC
C7	1010320-6	↓	10		50VDC
C8	1010279-228	↓	0.5	±10%	35VDC
L1	1010277-9	REACTOR	25H		
L2	1010277-8	REACTOR	10H		
CR1	1010392-1	DIODE	IN486B		250MW
CR2	1010392-1	↓	↓		↓
CR3	1010392-1	↓	↓		↓
CR4	1010392-1	↓	↓		↓
CR5	1010372-15	↓	HZ8544		200MW
CR6	1010372-15	↓	HZ8544		200MW
CR7	1010830-9	↓	IN965B		400MW
CR8	1010392-1	↓	IN486B		250MW
CR9	1010392-1	↓	IN486B		250MW
Q1	1010252-1	TRANSISTOR	2N2642		
Q2	1010345-1	↓	2N2303		
Q3	1010270	↓	2N2243A		
Q4	1010269-1	↓	2N2151		
Q5	1010437	↓	STC5900		
Q6	1010271	↓	STC5506		
Q7	1010273-1	↓	2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010710	TRANSFORMER	TZ-13		

C2	
1010264-1	.0010
↓ -2	.0012
↓ -3	.0015
↓ -4	.0018
↓ -5	.0022
↓ -6	.0027

NOTES:
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3-UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4-VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

DWG FOR REFERENCE:
GIMBAL SERVO AMPLIFIER MODULE ASS'Y 1007540

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
Contract NAS 9-497
DRAWN S. Ayres DATE 26 SEP 64
CHECKED A. Ulmarsh 26 SEP 64
APPROVAL
APPROVAL Manuel Kramer 15 Oct 64
NASA APPROVAL W J Rh 10-20-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

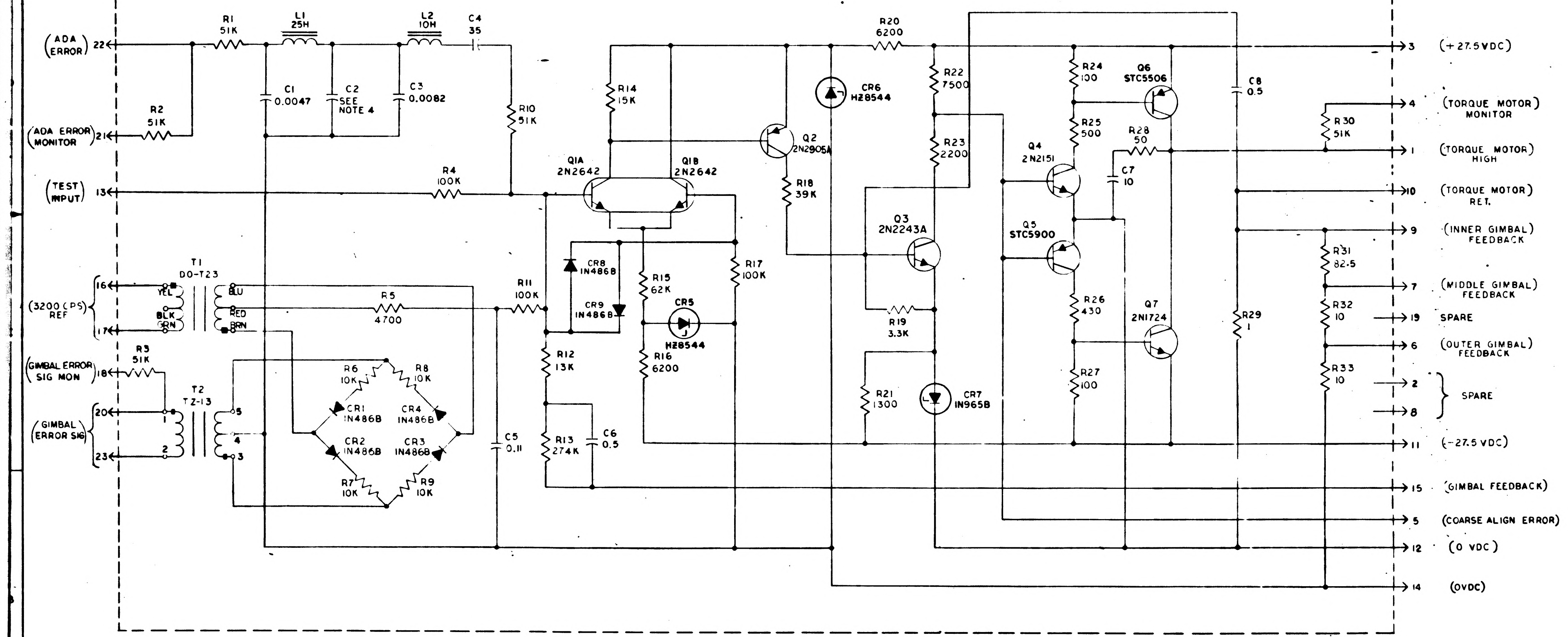
SCHEMATIC
GIMBAL SERVO
AMPLIFIER

CODE IDENT NO. —
SIZE E
NASA DRAWING NO 1009534
SCALE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13 6 75

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 17610	28 MAR 65	HTO CJP
B	REVISED PER TDRR 29751	28 JUN 66	R.W.T.



(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF
16
17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20
23
R1 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R2 51K
R10 51K
R4 100K
T1 DO-T23
YEL
BLK
GRN
BLU
RED
BRN
R5 4700
R3 51K
T2 TZ-13
1
2
5
4
3
R6 10K
R8 10K
CR1 IN486B
CR4 IN486B
CR2 IN486B
CR3 IN486B
R7 10K
R9 10K
C5 0.11
R11 100K
R12 13K
R13 274K
C6 0.5
R14 15K
Q1A 2N2642
Q1B 2N2642
CR8 IN486B
CR9 IN486B
R15 62K
CR5 HZ8544
R16 6200
R17 100K
Q2 2N2905A
R18 39K
CR6 HZ8544
R20 6200
R22 7500
R23 2200
Q3 2N2243A
R19 3.3K
R21 1300
CR7 IN965B
R24 100
R25 500
Q4 2N2151
Q5 STC5900
R26 430
R27 100
Q6 STC5506
R28 50
C7 10
Q7 2N1724
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
3 (+27.5VDC)
4 (TORQUE MOTOR) MONITOR
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11 (-27.5 VDC)
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REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73	↓	51K	↓	↓
R3	-73	↓	51K	↓	↓
R4	-80	↓	100K	↓	↓
R5	-48	↓	4700	↓	↓
R6	1010364-443	↓	10K	±1%	1/8 W
R7	-	↓	10K	±1%	1/8 W
R8	-	↓	10K	±1%	1/8 W
R9	-	↓	10K	±1%	1/8 W
R10	1006750-73	↓	51K	±2%	1/4W
R11	1010364-635	↓	100K	±1%	1/8W
R12	-465	↓	13K	↓	↓
R13	-719	↓	274K	↓	↓
R14	1006750-60	↓	15K	±2%	1/4W
R15	-75	↓	62K	↓	↓
R16	-51	↓	6200	↓	↓
R17	-80	↓	100K	↓	↓
R18	-70	↓	39K	↓	↓
R19	-44	↓	3.3K	↓	↓
R20	-51	↓	6200	↓	
R21	1006760-35	↓	1300	↓	1/2W
R22	1006750-53	↓	7500	↓	1/4W
R23	1006750-40	↓	2200	↓	1/4W
R24	1010278-39	↓	100	±5%	1/2W
R25	1010399-31	↓	500	±5%	5W
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R27	1010278-39	↓	100	±5%	1/2W
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R30	1006750-73	↓	51K	±2%	1/4W
R31	1010364-43	↓	82.5	±1%	1/8W
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R33	1010377-66	↓	10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-	↓	SEE NOTE 4	↓	↓
C3	-12	↓	.0082	↓	↓
C4	1010320-11	↓			25VDC
C5	1010279-220	↓	.11		35VDC
C6	1010279-9	↓	0.5		6VDC
C7	1010320-6	↓	10		50VDC
C8	1010279-228	↓	0.5	±10%	35VDC
L1	1010277-9	REACTOR	25H		
L2	1010277-8	REACTOR	10H		
CR1	1010392-1	DIODE	IN486B		250MW
CR2	1010392-1	↓	↓		↓
CR3	1010392-1	↓	↓		↓
CR4	1010392-1	↓	↓		↓
CR5	1010372-15	↓	HZ8544		200MW
CR6	1010372-15	↓	HZ8544		200MW
CR7	1010830-9	↓	IN965B		400MW
CR8	1010392-1	↓	IN486B		250MW
CR9	1010392-1	↓	IN486B		250MW
Q1	1010252-1	TRANSISTOR	2N2642		
Q2	1008813-1	↓	2N2905A		
Q3	1010270	↓	2N2243A		
Q4	1010269-1	↓	2N2151		
Q5	1010437	↓	STC5900		
Q6	1010271	↓	STC5506		
Q7	1010273-1	↓	2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010710	TRANSFORMER	TZ-13		

C2	
1010264-1	.0010
-2	.0012
-3	.0015
-4	.0018
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NOTES:

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DWG FOR REFERENCE:
GIMBAL SERVO AMPLIFIER MODULE ASS'Y 1007540

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
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FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN S. Ogne DATE 26 SEP 64
CHECKED A. Udonck 26 SEP 64
APPROVAL
APPROVAL Manuel Kramer
NASA APPROVAL 10-20-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
GIMBAL SERVO
AMPLIFIER

CODE IDENT NO —— SIZE E NASA DRAWING NO 1009534
SCALE WT SHEET 1 OF 1

1009534 B

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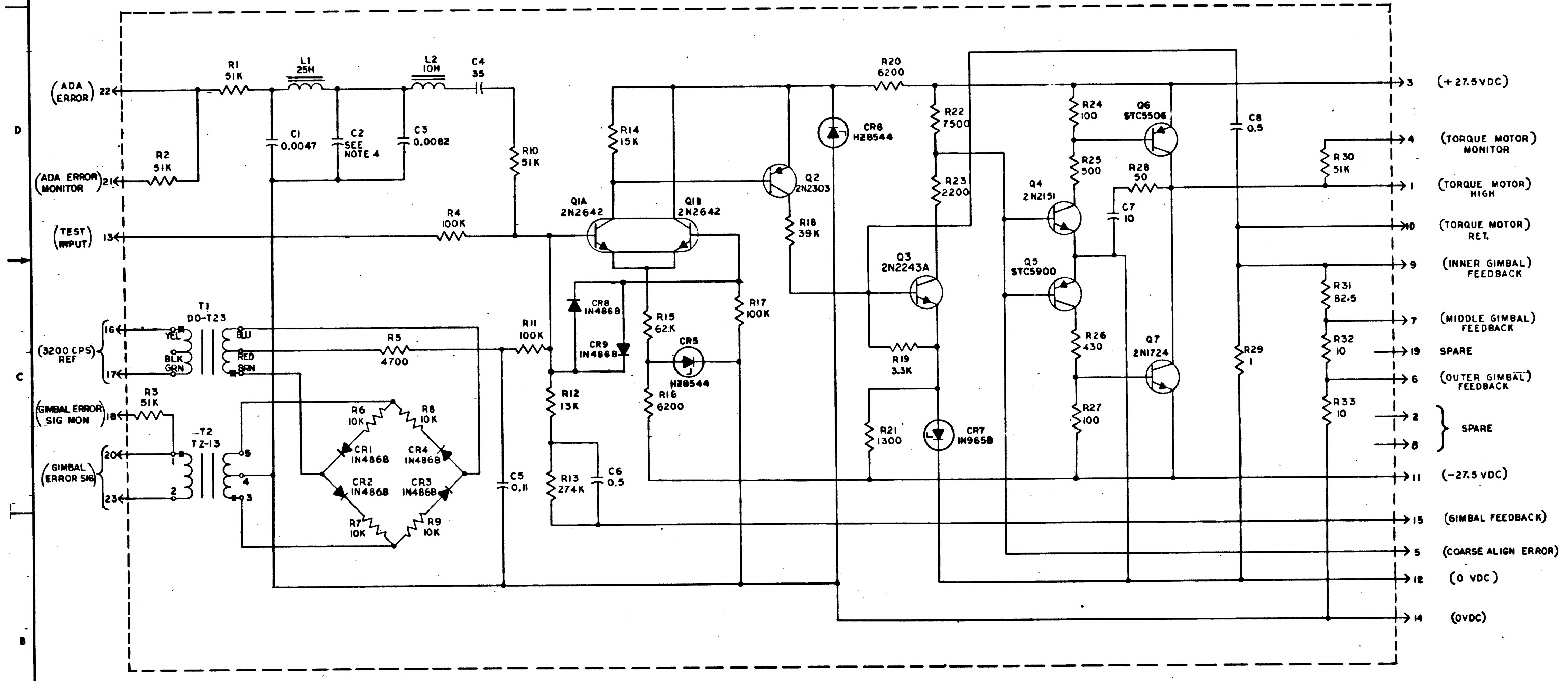
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



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(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20
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R2 51K
R3 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R10 51K
R4 100K
T1 DO-T23
YEL
BLK
GRN
BLU
RED
BRN
R5 4700
T2 TZ-13
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5
4
3
R6 10K
R8 10K
CR1 IN486B
CR4 IN486B
CR2 IN486B
CR3 IN486B
R7 10K
R9 10K
C5 0.11
R11 100K
R12 13K
R13 274K
C6 0.5
CR8 IN486B
CR9 IN486B
R14 15K
Q1A 2N2642
Q1B 2N2642
R15 62K
CR5 HZ8544
R16 6200
R17 100K
Q2 2N2303
R18 39K
R20 6200
CR6 HZ8544
R22 7500
R23 2200
Q3 2N2243A
R19 3.3K
R21 1300
CR7 IN965B
R24 100
R25 500
Q4 2N2151
Q5 STC5900
R26 430
R27 100
Q6 STC5506
R28 50
C7 10
Q7 2N1724
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
3 (+27.5VDC)
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1 (TORQUE MOTOR) HIGH
10 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
19 SPARE
6 (OUTER GIMBAL) FEEDBACK
2
8
SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)
14 (OVDC)

REFDES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73	↓	51K	↓	↓
R3	-73	↓	51K	↓	↓
R4	-80	↓	100K	↓	↓
R5	↓ -48	↓	4700	↓	↓
R6	1010364-443	↓	10K	±1%	1/8W
R7	-	↓	10K	±1%	1/8W
R8	-	↓	10K	±1%	1/8W
R9	-	↓	10K	±1%	1/8W
R10	1006750-73	↓	51K	±2%	1/4W
R11	1010364-635	↓	100K	±1%	1/8W
R12	-465	↓	13K	↓	↓
R13	↓ -719	↓	274K	↓	↓
R14	1006750-60	↓	15K	±2%	1/4W
R15	-75	↓	62K	↓	↓
R16	-51	↓	6200	↓	↓
R17	-80	↓	100K	↓	↓
R18	-70	↓	39K	↓	↓
R19	-44	↓	3.3K	↓	↓
R20	↓ -51	↓	6200	↓	
R21	1006760-35	↓	1300	↓	1/2W
R22	1006750-53	↓	7500	↓	1/4W
R23	1006750-40	↓	2200	↓	1/4W
R24	1010278-39	↓	100	±5%	1/2W
R25	1010399-31	↓	500	±5%	5W
R26	1010389-47	↓	430	±1%	3W
R27	1010278-39	↓	100	±5%	1/2W
R28	1010399-16	↓	50	±5%	5W
R29	1010389-94	↓	1	±1%	3W
R30	1006750-73	↓	51K	±2%	1/4W
R31	1010364-43	↓	82.5	±1%	1/8W
R32	1010377-66	↓	10	±.5%	1/10W
R33	1010377-66	↓	10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-	↓	SEE NOTE 4	↓	↓
C3	↓ -12	↓	.0082	↓	↓
C4	1010320-11	↓			25VDC
C5	1010279-220	↓	.11		35VDC
C6	1010279-9	↓	0.5		6VDC
C7	1010320-6	↓	10		50VDC
C8	1010279-228	↓	0.5	±10%	35VDC
L1	1010277-9	REACTOR	25H		
L2	1010277-8	REACTOR	10H		
CR1	1010392-1	DIODE	IN486B		250MW
CR2	1010392-1	↓	↓		↓
CR3	1010392-1	↓	↓		↓
CR4	1010392-1	↓	↓		↓
CR5	1010372-15	↓	HZ8544		200MW
CR6	1010372-15	↓	HZ8544		200MW
CR7	1010286-9	↓	IN965B		400MW
CR8	1010392-1	↓	IN486B		250MW
CR9	1010392-1	↓	IN486B		250MW
Q1	1010252-1	TRANSISTOR	2N2642		
Q2	1010345-1	↓	2N2303		
Q3	1010270	↓	2N2243A		
Q4	1010269-1	↓	2N2151		
Q5	1010437	↓	STC5900		
Q6	1010271	↓	STC5506		
Q7	1010273-1	↓	2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010710	TRANSFORMER	TZ-13		

C2	
1010264-1	.0010
-2	.0012
-3	.0015
-4	.0018
-5	.0022
↓ -6	.0027

NOTES:
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3-UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4-VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

DWG FOR REFERENCE:
GIMBAL SERVO AMPLIFIER MODULE ASS'Y 1007540

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. Contract NAS 9-497
DRAWN DATE 25 SEP 64
CHECKED 26 SEP 64
APPROVAL
APPROVAL Manuel Kramer
NASA APPROVAL W.O. Pl
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC GIMBAL SERVO AMPLIFIER

CODE IDENT NO. ——
SIZE E
NASA DRAWING NO. 1009534
SCALE
WT
SHEET 1 OF 1

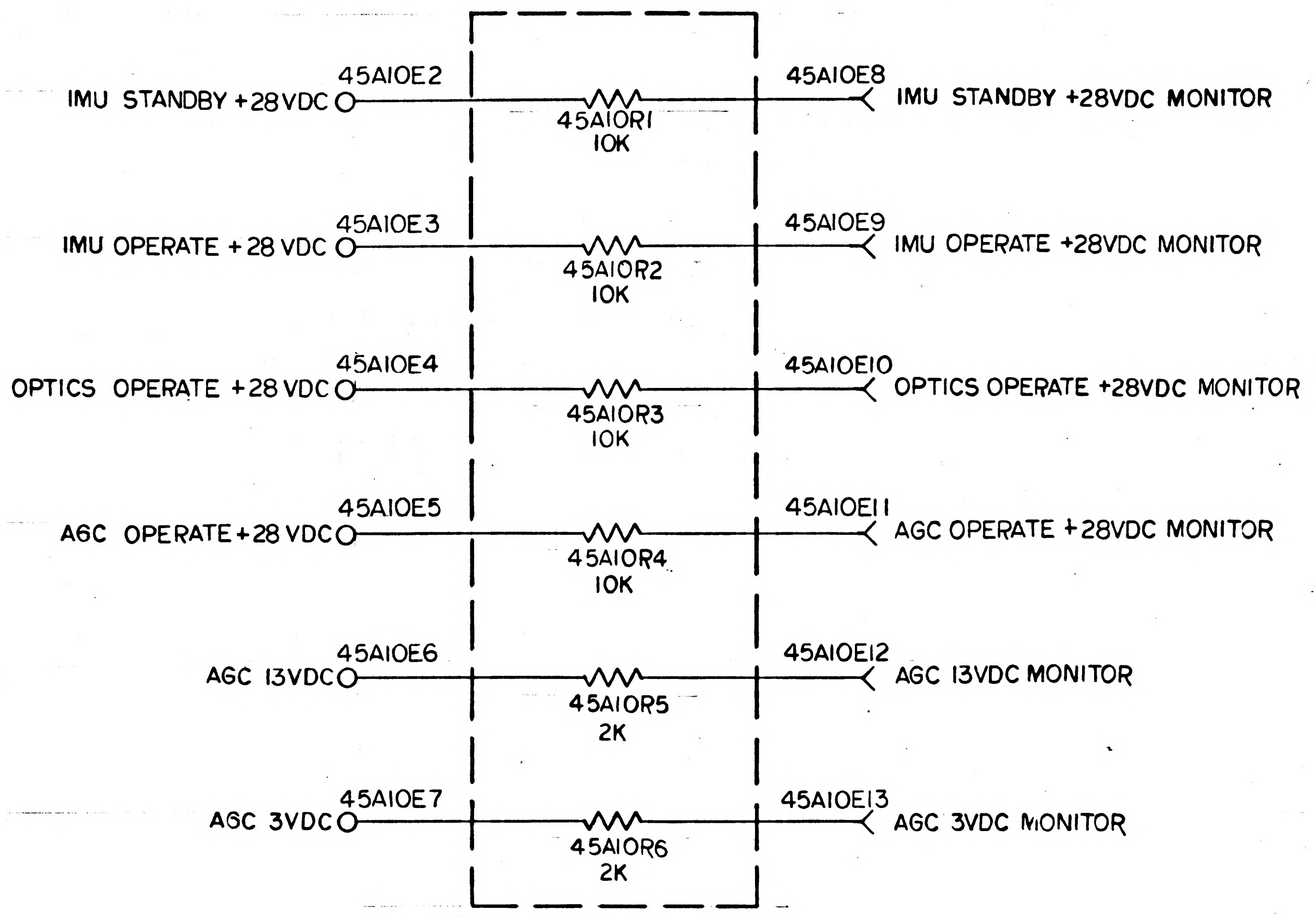
1009534

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13637

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



45A10E2
IMU STANDBY +28VDC
45A10R1
10K
45A10E8
IMU STANDBY +28VDC MONITOR
45A10E3
IMU OPERATE +28 VDC
45A10R2
10K
45A10E9
IMU OPERATE +28VDC MONITOR
45A10E4
OPTICS OPERATE +28 VDC
45A10R3
10K
45A10E10
OPTICS OPERATE +28VDC MONITOR
45A10E5
AGC OPERATE +28 VDC
45A10R4
10K
45A10E11
AGC OPERATE +28VDC MONITOR
45A10E6
AGC 13VDC
45A10R5
2K
45A10E12
AGC 13VDC MONITOR
45A10E7
AGC 3VDC
45A10R6
2K
45A10E13
AGC 3VDC MONITOR

REF DES	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010364-443	RESISTOR	10K	±1%	1/8W
R2					
R3					
R4					
R5	1010364-309		2K		
R6	1010364-309		2K		

REF DWG:
BUFFER RESISTORS MODULE ASSY
DWG NO. 1007582

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —/— DECIMALS ± —/— ANGLES ± —/—
DO NOT SCALE THIS DRAWING
MATERIAL —/—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN F. Roney 15 Sept 64
CHECKED A. Lindstrom 24 Sept 64
APPROVED Ed Sisolak Kruger 9 OCT 64
APPROVED J Green 19 oct 64
APPROVED MIT 10/26/64
APPROVED MSC W J Rhine 10-20-64
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY 10

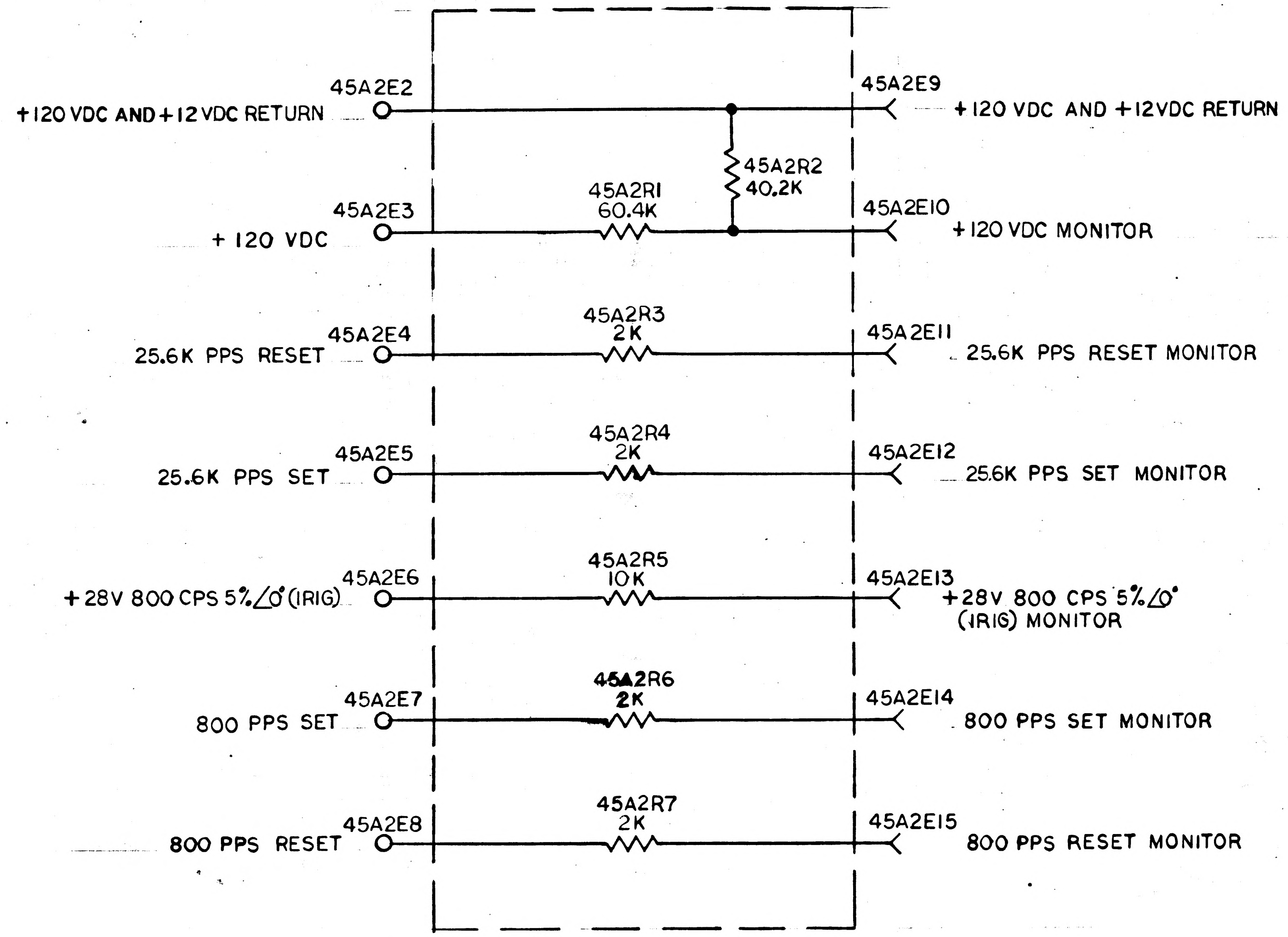
CODE IDENT NO. —
SIZE C
DRAWING NO. 1009537
SCALE —/—
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 13637

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


45A2E2
+120 VDC AND +12 VDC RETURN
45A2E9
+120 VDC AND +12VDC RETURN
45A2R2
40.2K
45A2R1
60.4K
45A2E3
+ 120 VDC
45A2E10
+120 VDC MONITOR
45A2R3
2K
45A2E4
25.6K PPS RESET
45A2E11
25.6K PPS RESET MONITOR
45A2R4
2K
45A2E5
25.6K PPS SET
45A2E12
25.6K PPS SET MONITOR
45A2R5
10K
45A2E6
+28V 800 CPS 5% ∠0° (IRIG)
45A2E13
+28V 800 CPS 5% ∠0° (IRIG) MONITOR
45A2R6
2K
45A2E7
800 PPS SET
45A2E14
800 PPS SET MONITOR
45A2R7
2K
45A2E8
800 PPS RESET
45A2E15
800 PPS RESET MONITOR

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-593	RESISTOR	60.4K	±1%	1/8W
R2	1010364-559		40.2K	±1%	1/8W
R3	1006750-39		2K	±2%	1/4W
R4	1006750-39		2K	±2%	1/4W
R5	1010364-443		10K	±1%	1/8W
R6	1006750-39		2K	±2%	1/4W
R7	1006750-39	RESISTOR	2K	±2%	1/4W

REF DWG:
BUFFER RESISTORS MODULE ASSY 1007587

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

		DATE
DRAWN		25Sep64
CHECKED	A. Lindstrom	1Oct64
APPROVED		9Oct64
APPROVED		19Oct64
APPROVED MIT		10/20/64
APPROVED MSC	W J Rhine	10-20-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTOR
TRAY 2

CODE IDENT NO.	SIZE	DRAWING NO.
—	C	1009539
SCALE NONE	—	SHEET 1 OF 1

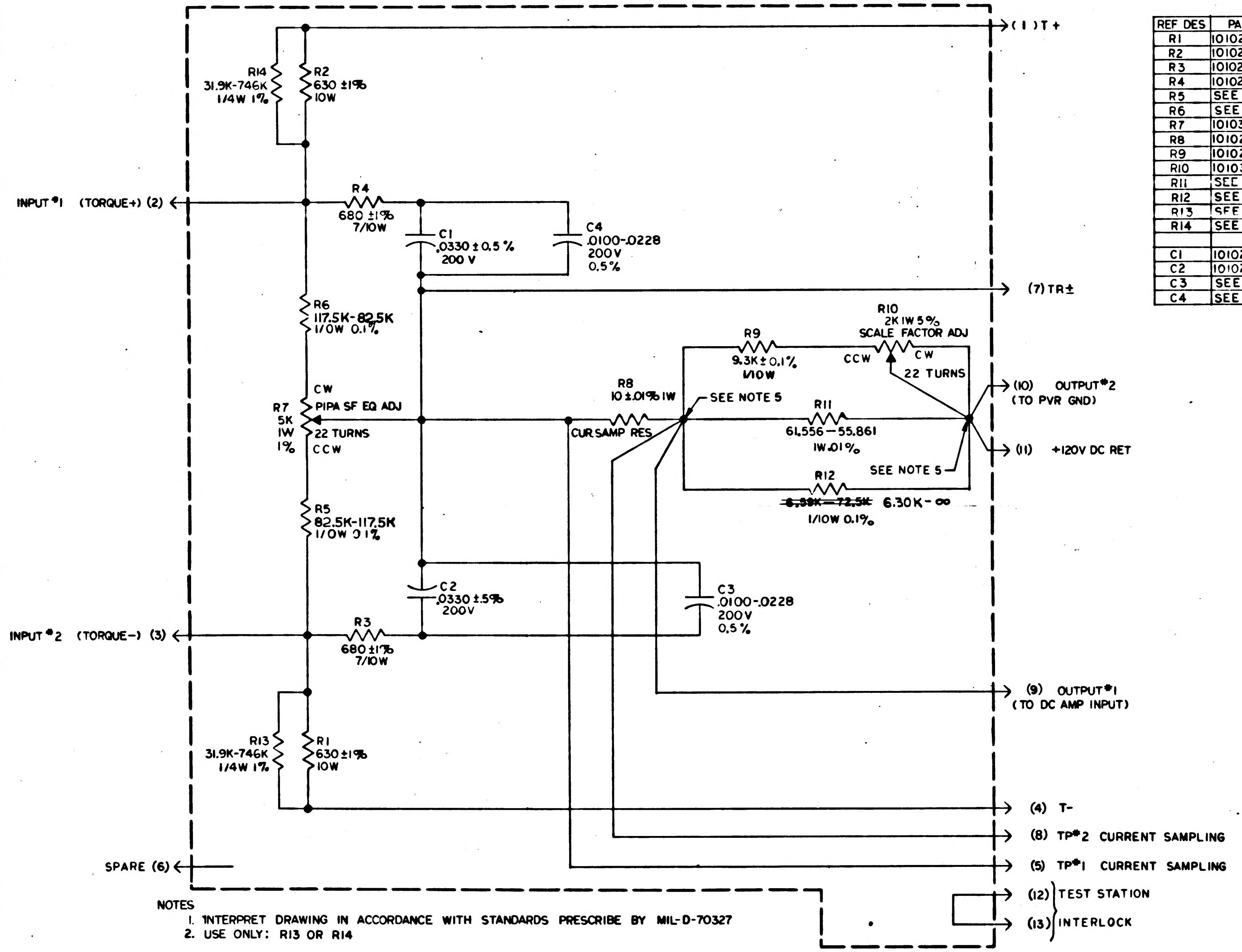
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14705

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 19799	7 JUN 65	JWP ET


(1) T+
R14
31.9K-746K
1/4W 1%
R2
630 ±1%
10W
INPUT #1 (TORQUE+) (2)
R4
680 ±1%
7/10W
C1
.0330 ± 0.5 %
200 V
C4
.0100-.0228
200V
0.5%
(7) TR±
R6
117.5K-82.5K
1/10W 0.1%
R10
2K 1W 5%
SCALE FACTOR ADJ
CCW
CW
22 TURNS
R9
9.3K ± 0.1%
1/10W
R8
10 ±.01% 1W
SEE NOTE 5
CUR SAMP RES
R7
5K
1W
1%
CW
PIPA SF EQ ADJ
22 TURNS
CCW
R11
61.556 — 55.861
1W .01%
(10) OUTPUT #2
(TO PVR GND)
(11) +120V DC RET
SEE NOTE 5
R12
~~6.39K — 72.5K~~ 6.30K - ∞
1/10W 0.1%
R5
82.5K-117.5K
1/10W 0.1%
C2
.0330 ±.5%
200V
C3
.0100-.0228
200V
0.5%
INPUT #2 (TORQUE−) (3)
R3
680 ±1%
7/10W
(9) OUTPUT #1
(TO DC AMP INPUT)
R13
31.9K-746K
1/4W 1%
R1
630 ±1%
10W
(4) T−
(8) TP #2 CURRENT SAMPLING
(5) TP #1 CURRENT SAMPLING
SPARE (6)
(12) TEST STATION
(13) INTERLOCK

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-2	RES, WW	630	±1%	10W
R2	1010262-2		630	±1%	10W
R3	1010250-1		680	±1%	.7 W
R4	1010250-1		680	±1%	.7 W
R5	SEE NOTE 6	↓		±0.1%	1/10W
R6	SEE NOTE 6	WW		±0.1%	1/10W
R7	1010373-9	VAR	5K	± 1%	1W
R8	1010253-12	WW	10	±0.01%	1W
R9	1010283-18	WW	9.3K	± 0.1%	1/10 W
R10	1010373-8	VAR	2K	± 5%	1W
R11	SEE NOTE 6	WW		±0.01%	1W
R12	SEE NOTE 6			± 0.1%	1/10W
R13	SEE NOTE 6	↓ ↓		± 1%	1/4 W
R14	SEE NOTE 6	RES, WW		± 1%	1/4 W
C1	1010289-18	CAP, POLY	.0330	±0.5%	200V
C2	1010289-18		.0330	±0.5%	200 V
C3	SEE NOTE 6	↓ ↓		±0.5%	200V
C4	SEE NOTE 6	CAP, POLY		±0.5%	200V

REF DRAWING:
PIPA CALIBRATION ASSY 1007509

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. USE ONLY: R13 OR R14

3. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
4. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS
5. WIRING TO BE TO A SINGLE POINT AS SHOWN
6. SELECT R5, R6, R11, R12, R13, R14, C3 & C4 PER ATP 1000013 FROM APPROPRIATE CHART
7. THE SUM OF R5 & R6 MUST EQUAL 200K. REFER TO SHEET 2, THIS DWG. FOR PERMISSIBLE VALUES.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN L. KRAHN DATE 4 NOV 64
CHECKED A. Lindstrom 2 Dec '64
J.M. BLYSHAK 3 DEC 64
APPROVAL J. SITOMER 2 Dec 64
APPROVAL
NASA APPROVAL 12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC.
PIPA CALIBRATION MODULE
(tq COMPENSATION & SCALE FACTOR RESISTORS)

CODE IDENT NO. 80230
SIZE D
NASA DRAWING NO. 1009541
SCALE —
WT
SHEET 1 OF 2

1009541 A

NOTICE -- WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14705

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 19799	7 JUN 65	JWP EF

R5 & R6

PART NO.	VALUE
1010377-337	82.5K
-338	83.75K
-339	85.0K
-344	86.25K
-2	87.5K
-3	88.75K
-4	90.0K
-5	91.25K
-6	92.5K
-7	93.75K
-8	95.0K
-9	96.25K
-10	97.5K
-11	98.75K
-12	100.0K
-13	101.25K
-14	102.5K
-15	103.75K
-16	105.0K
-17	106.25K
-18	107.5K
-19	108.75K
-20	110.0K
-21	111.25K
-22	112.5K
-340	113.75K
-341	115.0K
-342	116.25K
1010377-343	117.5K

R11

PART NO.	VALUE Ω
1010253-1	61.556
-2	60.934
-3	60.326
-4	59.729
-5	59.144
-6	58.570
-7	58.008
-8	57.456
-9	56.914
-10	56.383
1010253-11	55.861

R12

PART NO.	VALUE
~~1010283-1~~	~~72.5K~~
~~-2~~	~~36.2K~~
~~-3~~	~~24.2K~~
~~-4~~	~~18.1K~~
~~-5~~	~~14.5K~~
~~-6~~	~~12.1K~~
~~-7~~	~~10.4K~~
~~-8~~	~~9.06K~~
~~-9~~	~~8.05K~~
~~-10~~	~~7.25K~~
~~1010283-11~~	~~6.59K~~
1010283-42	6.30K
-11	6.59
-41	6.90
-10	7.25
-40	7.63
-9	8.05
-39	8.53
-8	9.06
-38	9.68
-7	10.4
-37	11.2
-6	12.1
-36	13.2
-5	14.5
-35	16.1
-4	18.1
-34	20.7
-3	24.2
-33	29
-2	36.2
-32	48.3
-1	72.5
-31	145
NO COMPONENT	∞

R13 & R14

PART NO.	VALUE
1010251-1	31.9K
-10	33.4K
-11	35.0K
-12	36.8K
-13	38.8K
-14	41.0K
-15	43.4K
-16	46.2K
-17	49.3K
-18	52.9K
-19	57.0K
-20	61.8K
-21	67.4K
-22	74.2K
-23	82.6K
-24	92.9K
-25	106K
-26	124K
-27	149K
-28	187K
-29	249K
-30	373K
1010251-31	746K

C3 & C4

PART NO.	VALUE uF
1010289-1	.0100
-2	.0108
-3	.0116
-4	.0124
-5	.0132
-6	.0140
-7	.0148
-8	.0156
-9	.0164
-10	.0172
-11	.0180
-12	.0188
-13	.0196
-14	.0204
-15	.0212
-16	.0220
1010289-17	.0228

1009541 A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ___
HEAT TREATMENT ___
FINAL FINISH ___

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT

DRAWN R.C. Tynda DATE 2 DEC 64
CHECKED A. Lindstrom 2 Dec 64
APPROVAL J SITOMER 2 DEC 64
J M BLYSHAK 3 DEC 64
APPROVAL ___
NASA APPROVAL W. J. Rhine 12-7-64
MIT APPROVAL W Kupfer 8 Dec 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIPA CALIBRATION MODULE
(Tg COMPENSATION & SCALE FACTOR RESISTORS)

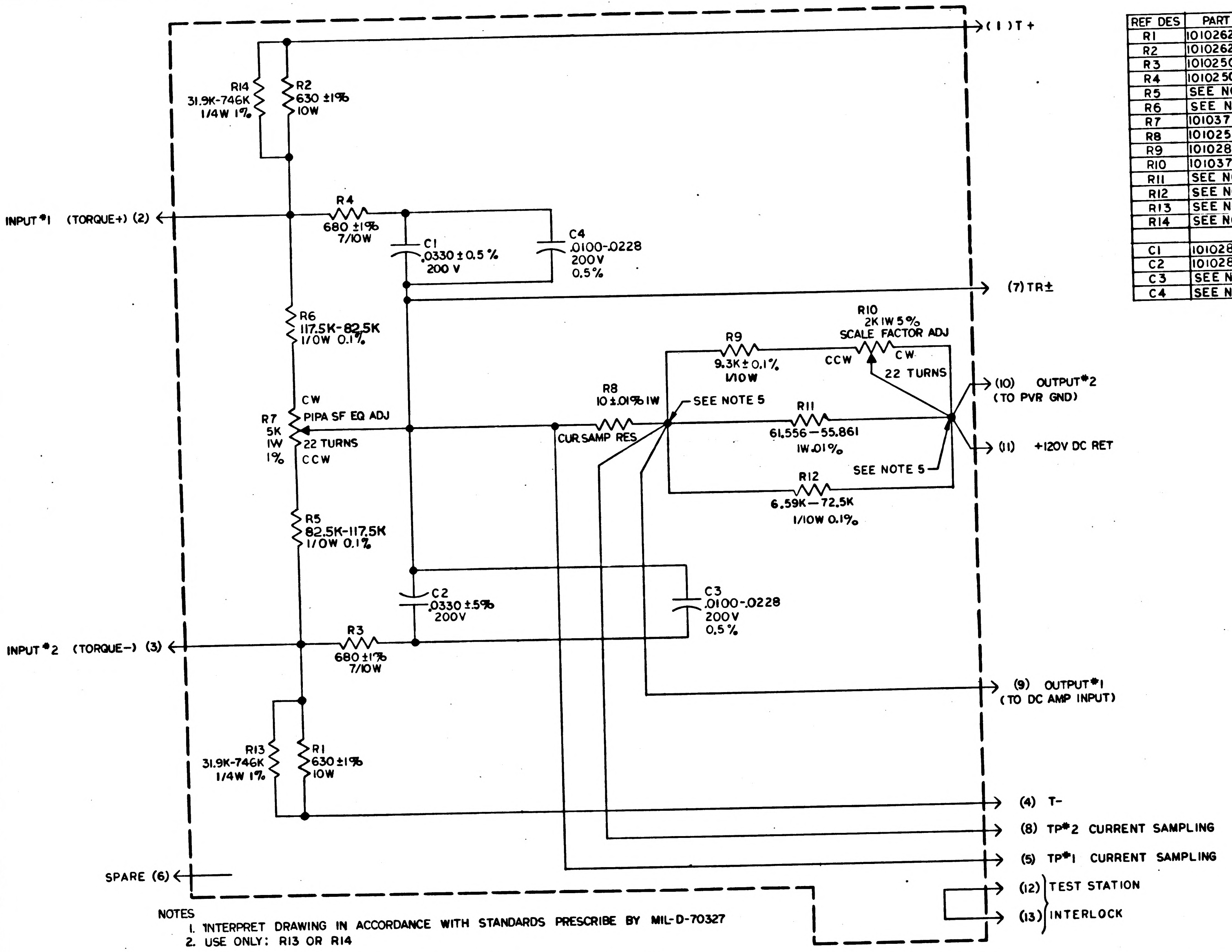
CODE IDENT NO.	SIZE	NASA DRAWING NO.
80230	D	1009541

SCALE ___ WT ___ SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14705

SYM	DESCRIPTION	DATE	APPROVAL



(1) T+
R14
31.9K-746K
1/4W 1%
R2
630 ±1%
10W
INPUT #1 (TORQUE+) (2)
R4
680 ±1%
7/10W
C1
.0330 ± 0.5 %
200 V
C4
.0100-.0228
200V
0.5%
(7) TR±
R6
117.5K-82.5K
1/10W 0.1%
R10
2K 1W 5%
SCALE FACTOR ADJ
R9
9.3K ± 0.1%
1/10W
CCW
CW
22 TURNS
(10) OUTPUT #2
(TO PVR GND)
R8
10 ±.01% 1W
SEE NOTE 5
CW
R7
5K
1W
1%
PIPA SF EQ ADJ
22 TURNS
CCW
CUR SAMP RES
R11
61.556—55.861
1W .01%
(11) +120V DC RET
SEE NOTE 5
R12
6.59K—72.5K
1/10W 0.1%
R5
82.5K-117.5K
1/10W 0.1%
C2
.0330 ±5%
200V
C3
.0100-.0228
200V
0.5%
INPUT #2 (TORQUE–) (3)
R3
680 ±1%
7/10W
(9) OUTPUT #1
(TO DC AMP INPUT)
R13
31.9K-746K
1/4W 1%
R1
630 ±1%
10W
(4) T-
(8) TP #2 CURRENT SAMPLING
(5) TP #1 CURRENT SAMPLING
SPARE (6)
(12) TEST STATION
(13) INTERLOCK

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-2	RES, WW	630	±1%	10W
R2	1010262-2		630	±1%	10W
R3	1010250-1		680	±1%	.7 W
R4	1010250-1		680	±1%	.7 W
R5	SEE NOTE 6			±0.1%	1/10W
R6	SEE NOTE 6	WW		±0.1%	1/10W
R7	1010373-9	VAR	5K	± 1%	1W
R8	1010253-12	WW	10	±0.01%	1W
R9	1010283-18	WW	9.3K	± 0.1%	1/10 W
R10	1010373-8	VAR	2K	± 5%	1W
R11	SEE NOTE 6	WW		±0.01%	1W
R12	SEE NOTE 6			± 0.1%	1/10W
R13	SEE NOTE 6			± 1%	1/4 W
R14	SEE NOTE 6	RES, WW		± 1%	1/4 W
C1	1010289-18	CAP, POLY	.0330	±0.5%	200V
C2	1010289-18		.0330	±0.5%	200 V
C3	SEE NOTE 6			±0.5%	200V
C4	SEE NOTE 6	CAP, POLY		±0.5 %	200V

REF DRAWING:
PIPA CALIBRATION ASSY 1007509

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. USE ONLY: R13 OR R14
3. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
4. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS
5. WIRING TO BE TO A SINGLE POINT AS SHOWN
6. SELECT R5, R6, R11, R12, R13, R14, C3 & C4 PER ATP 1000013 FROM APPROPRIATE CHART
7. THE SUM OF R5 & R6 MUST EQUAL 200K. REFER TO SHEET 2, THIS DWG. FOR PERMISSIBLE VALUES.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN L. KRAHN DATE 4 NOV 64
CHECKED A. Lindstrom 2 Dec '64
J.M. BLYSHAK 3 DEC 64
APPROVAL J. Sitomer 2 Dec 64
APPROVAL —
NASA APPROVAL
12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIPA CALIBRATION MODULE
(τg COMPENSATION & SCALE FACTOR RESISTORS)

CODE IDENT NO. —
SIZE D
NASA DRAWING NO. 1009541
SCALE —
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 14705

SYM	DESCRIPTION	DATE	APPROVAL

R5 & R6

PART NO.	VALUE
1010377-337	82.5K
-338	83.75K
-339	85.0K
-344	86.25K
-2	87.5K
-3	88.75K
-4	90.0K
-5	91.25K
-6	92.5K
-7	93.75K
-8	95.0K
-9	96.25K
-10	97.5K
-11	98.75K
-12	100.0K
-13	101.25K
-14	102.5K
-15	103.75K
-16	105.0K
-17	106.25K
-18	107.5K
-19	108.75K
-20	110.0K
-21	111.25K
-22	112.5K
-340	113.75K
-341	115.0K
-342	116.25K
1010377-343	117.5K

R11

PART NO.	VALUE Ω
1010253-1	61.556
-2	60.934
-3	60.326
-4	59.729
-5	59.144
-6	58.570
-7	58.008
-8	57.456
-9	56.914
-10	56.383
1010253-11	55.861

R12

PART NO.	VALUE
1010283-1	72.5K
-2	36.2K
-3	24.2K
-4	18.1K
-5	14.5K
-6	12.1K
-7	10.4K
-8	9.06K
-9	8.05K
-10	7.25K
1010283-11	6.59K

R13 & R14

PART NO.	VALUE
1010251-1	31.9K
-10	33.4K
-11	35.0K
-12	36.8K
-13	38.8K
-14	41.0K
-15	43.4K
-16	46.2K
-17	49.3K
-18	52.9K
-19	57.0K
-20	61.8K
-21	67.4K
-22	74.2K
-23	82.6K
-24	92.9K
-25	106K
-26	124K
-27	149K
-28	187K
-29	249K
-30	373K
1010251-31	746K

C3 & C4

PART NO.	VALUE UF
1010289-1	.0100
-2	.0108
-3	.0116
-4	.0124
-5	.0132
-6	.0140
-7	.0148
-8	.0156
-9	.0164
-10	.0172
-11	.0180
-12	.0188
-13	.0196
-14	.0204
-15	.0212
-16	.0220
1010289-17	.0228

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ___
HEAT TREATMENT ___
FINAL FINISH ___

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN R.C. Toyla DATE 2 DEC 64
CHECKED A. Lindstrom 2 Dec 64
APPROVAL J Sitomer 2 Dec 64
J.M. BLYSHAK 3 DEC 64
APPROVAL ___
NASA APPROVAL W J Rhine 12-7-64
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

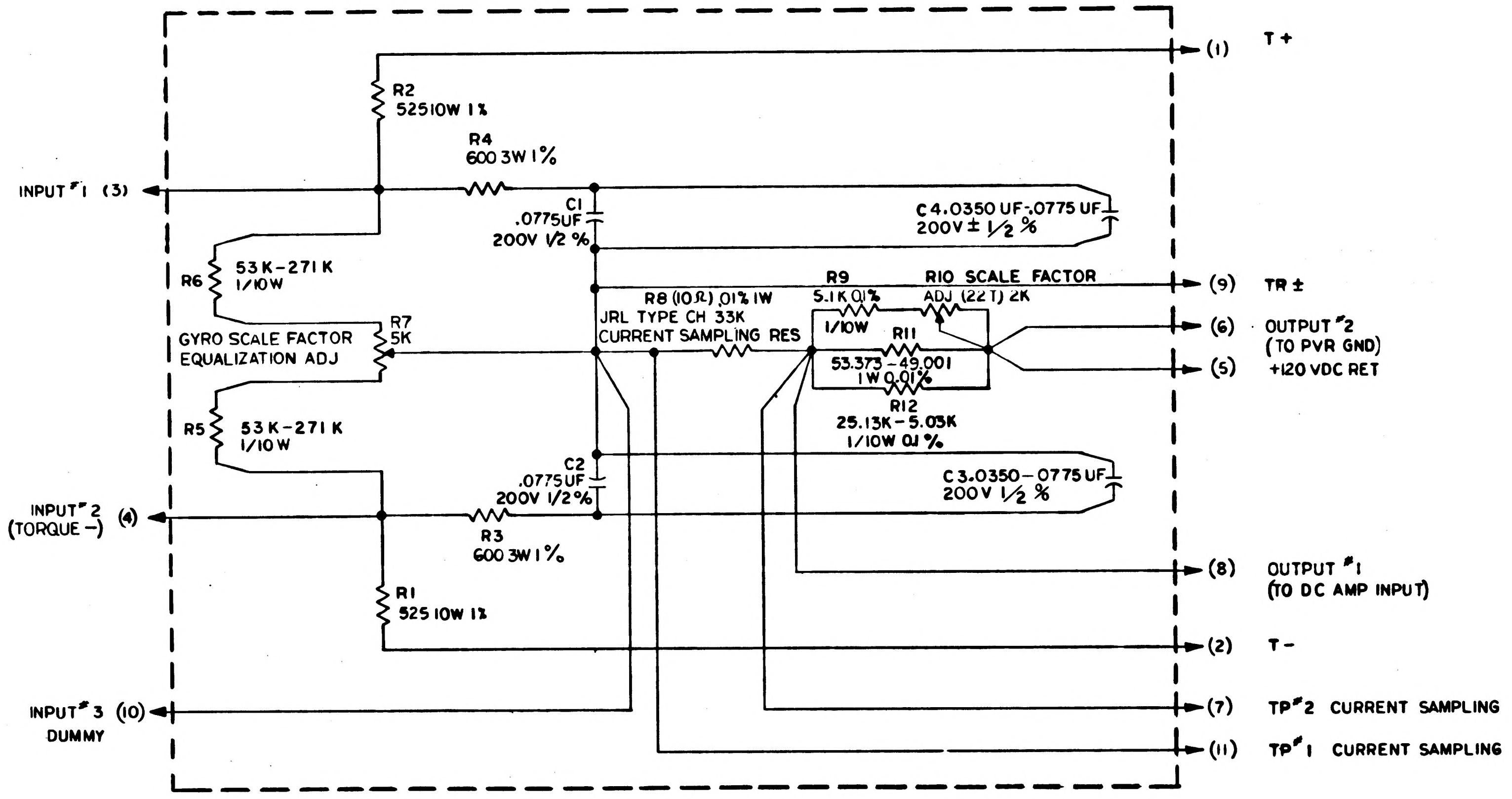
SCHEMATIC
PIPA CALIBRATION MODULE
(Tg COMPENSATION & SCALE FACTOR RESISTORS)

CODE IDENT NO. ———
SIZE D
NASA DRAWING NO. 1009541
SCALE ———
WT ———
SHEET 2 OF 2

INCHES
0 1 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 14702			
SYM	DESCRIPTION	DATE	APPROVAL



(1) T +
R2
525 10W 1%
R4
600 3W 1%
INPUT #1 (3)
C1
.0775UF
200V 1/2 %
C4 .0350 UF-.0775 UF
200V ± 1/2 %
R6
53K-271K
1/10W
R9
5.1K 0.1%
1/10W
R10 SCALE FACTOR
ADJ (22T) 2K
(9) TR ±
R8 (10Ω) .01% 1W
JRL TYPE CH 33K
CURRENT SAMPLING RES
R7
5K
GYRO SCALE FACTOR
EQUALIZATION ADJ
R11
53.373-49.001
1W 0.01%
(6) OUTPUT #2
(TO PVR GND)
(5) +120 VDC RET
R12
25.13K-5.03K
1/10W 0.1 %
R5
53K-271K
1/10W
C2
.0775UF
200V 1/2%
C3 .0350-.0775 UF
200V 1/2 %
INPUT #2
(TORQUE –) (4)
R3
600 3W 1%
(8) OUTPUT #1
(TO DC AMP INPUT)
R1
525 10W 1%
(2) T -
INPUT #3 (10)
DUMMY
(7) TP#2 CURRENT SAMPLING
(11) TP#1 CURRENT SAMPLING

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-1	RESISTOR, WW	525	±1%	10W
R2	1010262-1		525	±1%	10W
R3	1010389-93		600	±1%	3W
R4	1010389-93		600	±1%	3W
R5	1010377		53K-271K	0.1%	1/10W
R6	1010377		53K-271K	0.1%	1/10W
R7	1010373	VAR	5K-10K	5%	1W
R8	1010253-12	WW	10	0.01%	1W
R9	1010283-17	WW	510K	0.1%	1/10W
R10	1010373-8	VAR	2K	5%	1W
R11	1010253	WW	54770-49001	.01%	1W
R12	1010283	WW	25.13K-5.03K	0.1%	1/0W
C1	1010289-36	CAP, POLY	.0775UF	0.5%	200V
C2	1010289-36		.0775UF	0.5%	
C3	1010289		.0220UF-.0775UF	.5%	
C4	1010289		.0220UF-.0775UF	.5%	

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS.
4. VALUES OF R5 & R6 BETWEEN 82.5K & 117.5K ARE ± 0.1%.
ALL OTHER VALUES OF THESE RESISTORS ARE ± 1%.

REFERENCE DRAWING:
PULSE TORQUE GYRO CALIBRATE ASSEMBLY - 1007521

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Leo Ditas DATE 6 Nov 64
CHECKED P J Lynch 12-2-64
J.M. BLYSHAK 3 Dec 64
APPROVAL J. Sitomer 12/2/64
APPROVAL
NASA APPROVAL W J Rhine 12-8-64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PULSE TORQUE GYRO
CALIBRATION MODULE
(T.G. COMPENSATION AND SCALE FACTOR RESISTORS)

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1009542
SCALE 1/1
WT
SHEET 1 OF 1

1009542

INCHES
PHOTOGRAPHIC SCALE ONLY

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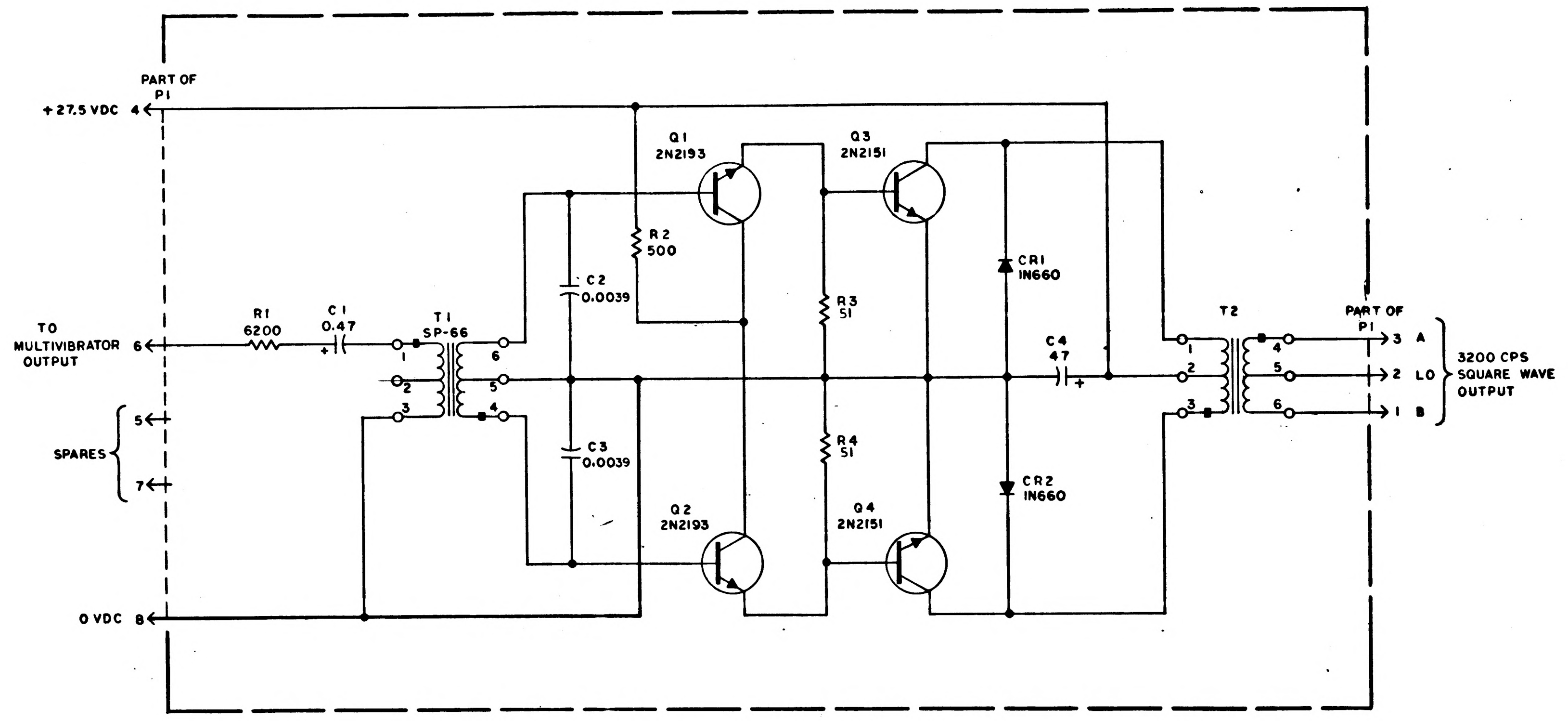
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


PART OF
P1
+27.5 VDC 4
TO MULTIVIBRATOR OUTPUT 6
SPARES
5
7
0 VDC 8
R1
6200
C1
0.47
T1
SP-66
1
2
3
6
5
4
C2
0.0039
C3
0.0039
R2
500
Q1
2N2193
Q2
2N2193
R3
51
R4
51
Q3
2N2151
Q4
2N2151
CR1
IN660
CR2
IN660
C4
47
T2
1
2
3
4
5
6
PART OF
P1
3 A
2 LO
1 B
3200 CPS
SQUARE WAVE
OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-51	RESISTOR	6200	± 2%	1/4 W
R2	1010312-029	↓	500	± 1%	2 W
R3	1006750- 1	↓	51	± 2%	1/4 W
R4	1006750- 1	↓	51	± 2%	1/4 W
C1	1006755-65	CAPACITOR	0.47	±10%	35V
C2	1010264-8	↓	0.0039	± 5%	200V
C3	1010264-8	↓	0.0039	± 5%	200V
C4	1006789-002	↓	47	±10%	50V
CR1	1010385	DIODE	IN660		
CR2	1010385	DIODE	IN660		
Q1	1010398-4	TRANSISTOR	2N2193		
Q2		↓	2N2193		
Q3	1010269-2	↓	2N2151		
Q4		↓	2N2151		
T1	1010329	TRANSFORMER	SP-66		
T2	1010338	↓			

REFERENCE DRAWING:
TEMP. CONTROLLER POWER SUPPLY 3200 CPS, 20V MODULE ASSY
DRAWING NUMBER 1007545

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN W. Munson DATE 3 NOV 6
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY
3200 CPS 20V SQUARE WAVE

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1009544
SCALE —	WT —	SHEET 1 OF 1

MASTER

PHOTOGRAPHIC SCALE ONLY

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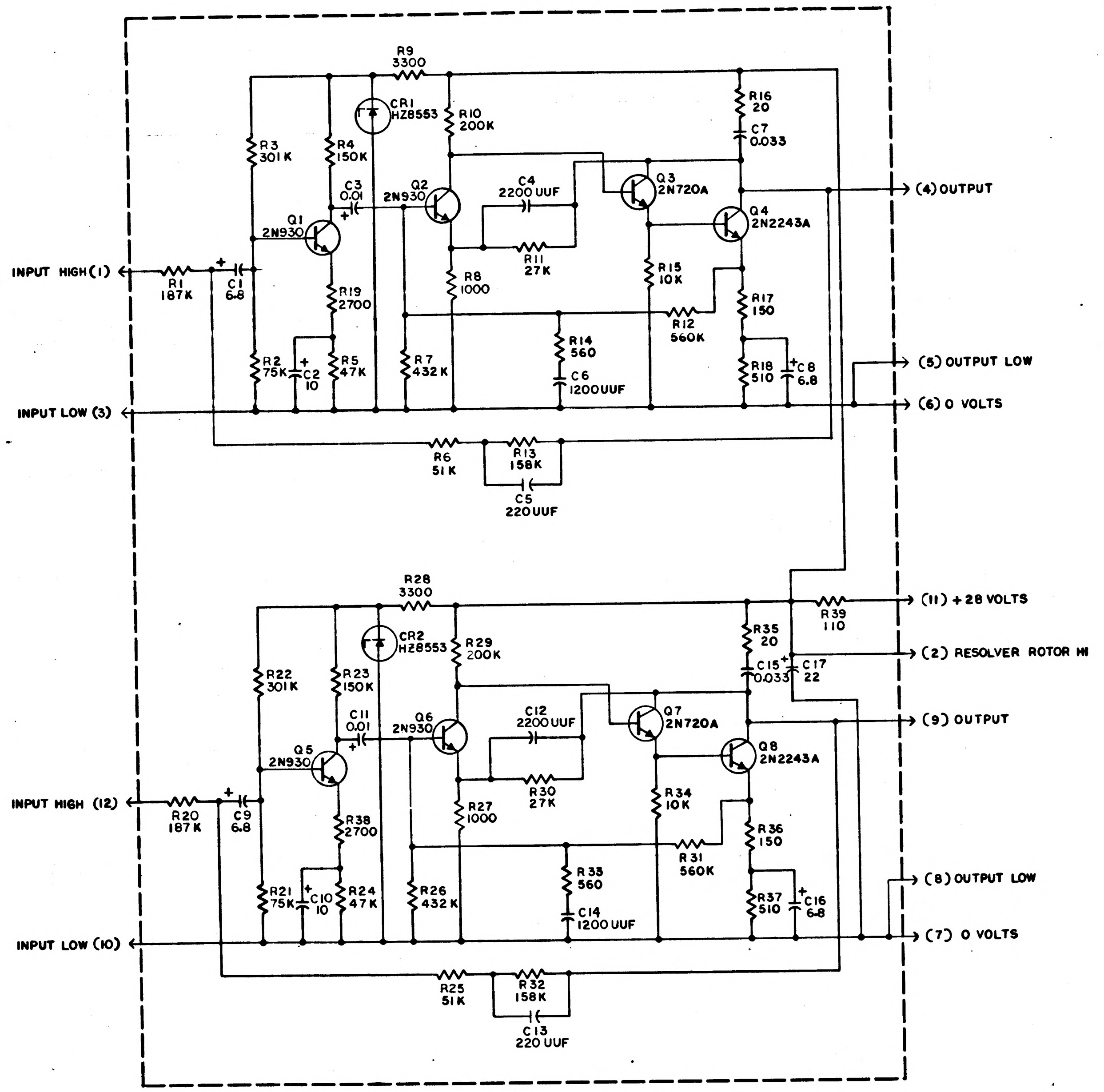
REVISIONS 16332						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


R9
3300
CR1
HZ8553
R10
200K
R16
20
C7
0.033
R3
301K
R4
150K
C3
0.01
Q2
2N930
C4
2200 UUF
Q3
2N720A
Q4
2N2243A
(4) OUTPUT
Q1
2N930
R11
27K
R15
10K
INPUT HIGH (1)
R1
187K
C1
6.8
R19
2700
R8
1000
R17
150
R12
560K
R14
560
R2
75K
C2
10
R5
47K
R7
432K
C6
1200UUF
R18
510
C8
6.8
(5) OUTPUT LOW
INPUT LOW (3)
(6) 0 VOLTS
R6
51K
R13
158K
C5
220UUF
R28
3300
(11) +28 VOLTS
R39
110
CR2
HZ8553
R29
200K
R35
20
C15
0.033
C17
22
(2) RESOLVER ROTOR HI
R22
301K
R23
150K
C11
0.01
Q6
2N930
C12
2200UUF
Q7
2N720A
(9) OUTPUT
Q5
2N930
R30
27K
Q8
2N2243A
INPUT HIGH (12)
R20
187K
C9
6.8
R38
2700
R27
1000
R34
10K
R36
150
R31
560K
R33
560
R21
75K
C10
10
R24
47K
R26
432K
C14
1200 UUF
R37
510
C16
6.8
(8) OUTPUT LOW
INPUT LOW (10)
(7) 0 VOLTS
R25
51K
R32
158K
C13
220 UUF

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-687	RESISTOR	187 K	1%	1/8 W
R2	1006750- 77		75 K	2%	1/4 W
R3	1010364 -727		301 K	1%	1/8 W
R4	1006750 - 84		150 K	2%	1/4 W
R5	1006750- 72		47 K	2%	1/4 W
R6	1006750 - 73		51 K	2%	1/4 W
R7	1010364 -757		432 K	1%	1/8 W
R8	1006750 - 32		1000	2%	1/4 W
R9	1006750 - 44		3300	2%	1/4 W
R10	1010364 - 693		200K	1%	1/8 W
R11	1006750 - 66		27 K	2%	1/4 W
R12	1010368 - 115		560 K	5%	1/4 W
R13	1010364 - 673		158 K	1%	1/8 W
R14	1006750 - 26		560	2%	1/4 W
R15	1006750 - 56		10 K	2%	1/4 W
R16	1010368 - 8		20	5%	1/4 W
R17	1006750 - 12		150	2%	1/4 W
R18	1006750 - 25		510	2%	1/4 W
R19	1006750 - 42		2700	2%	1/4 W
R20	1010364 -687		187K	1%	1/8 W
R21	1006750 - 77		75K	2%	1/4 W
R22	1010364 -727		301 K	1%	1/8 W
R23	1006750 - 84		150K	2%	1/4 W
R24	1006750 - 72		47 K	2%	1/4 W
R25	1006750 - 73		51 K	2%	1/4 W
R26	1010364 -757		432K	1%	1/8 W
R27	1006750 - 32		1000	2%	1/4 W
R28	1006750 - 44		3300	2%	1/4 W
R29	1010364 - 693		200 K	1%	1/8 W
R30	1006750 - 66		27 K	2%	1/4 W
R31	1010368 - 115		560 K	5%	1/4 W
R32	1010364 -673		158 K	1%	1/8 W
R33	1006750 - 26		560	2%	1/4 W
R34	1006750 - 56		10 K	2%	1/4 W
R35	1010368 - 8		20	5%	1/4 W
R36	1006750 - 12		150	2%	1/4 W
R37	1006750 - 25		510	2%	1/4 W
R38	1006750 - 42		2700	2%	1/4 W
R39	1010364 - 67	RESISTOR	110	1%	1/8 W
C1	1006755 - 79	CAPACITOR	6.8	10%	35 V
C2	1006755 - 31		10	10%	20 V
C3	1006755 - 45		0.01	10%	35 V
C4	1010359 - 21		2200 UUF	10%	200 V
C5	1010409 - 33		220 UUF	2%	300 V
C6	1010359 - 18		1200UUF	10%	200 V
C7	1010375 - 56		0.033	10%	100 V
C8	1006755 - 79		6.8	10%	35 V
C9	1006755 - 79		6.8	10%	35 V
C10	1006755 - 31		10	10%	20 V
C11	1006755 - 45		0.01	10%	35 V
C12	1010359 - 21		2200UUF	10%	200 V
C13	1010409 - 33		220UUF	2%	300 V
C14	1010359 - 18		1200UUF	10%	200 V
C15	1010375 - 56		0.033	10%	100 V
C16	1006755 - 79		6.8	10%	35 V
C17	1006755 - 134	CAPACITOR	22.0	10%	50 V
CR1	1010372 - 24	DIODE	HZ8553		18 V
CR2	1010372 - 24	DIODE	HZ8553		18 V
Q1	1010397 - 1	TRANSISTOR	2N930		
Q2	1010397 - 1		2N930		
Q3	1010357 - 1		2N720A		
Q4	1010398 - 2		2N2243A		
Q5	1010397 - 1		2N930		
Q6	1010397 - 1		2N930		
Q7	1010357 - 1		2N720A		
Q8	1010398 - 2	TRANSISTOR	2N2243A		

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REF DWG:
RESOLVER DRIVE AMPLIFIER ASSY
DRAWING NO. 1007651

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ——— ± ——— ± ———
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY	USED ON
APPLICATION	

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN 17 Dec 64
CHECKED 28 Dec 64
APPROVED 4 Feb 65
APPROVED 8 Feb 65
APPROVED MIT 6 Feb 65
APPROVED MSC 2-4-65
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

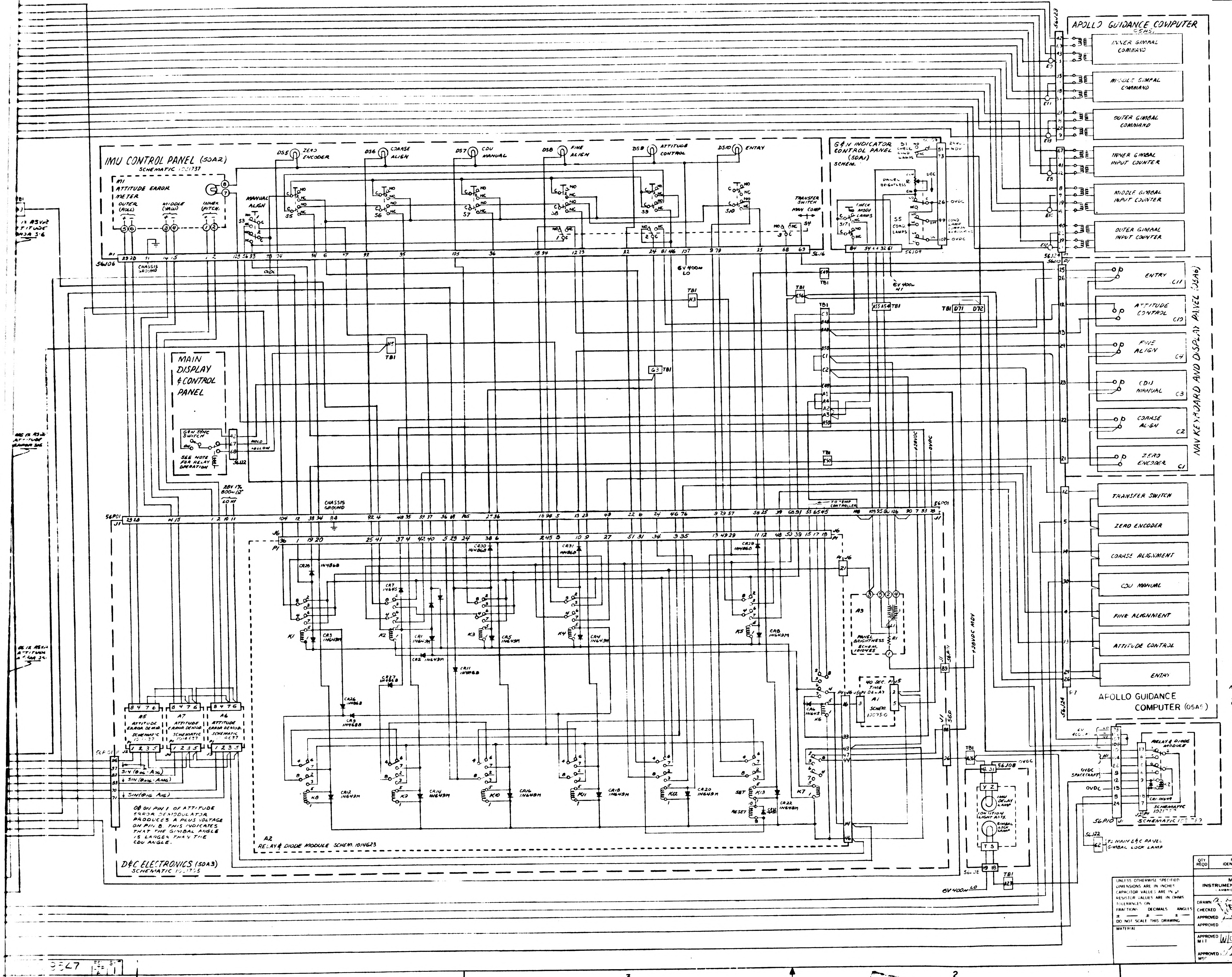
SCHEMATIC RESOLVER DRIVE AMPLIFIER

CODE IDENT NO. ———
SIZE E
DRAWING NO. 1009545
SCALE ———
SHEET 1 OF 1

MASTER

1009545

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REV. SED PER TDRR 20795	RT	RWH	20 JUL 65	



APOLLO GUIDANCE COMPUTER (50A5)
INNER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
OUTER GIMBAL COMMAND
INNER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
OUTER GIMBAL INPUT COUNTER
IMU CONTROL PANEL (50A2)
SCHEMATIC 1021737
M1 ATTITUDE ERROR METER
OUTER (ROLL)
MIDDLE (YAW)
INNER (PITCH)
DS5 ZERO ENCODER
DS6 COARSE ALIGN
DS7 CDU MANUAL
DS8 FINE ALIGN
DS9 ATTITUDE CONTROL
DS10 ENTRY
MANUAL ALIGN
TRANSFER SWITCH
MAN COMP
G&N INDICATOR CONTROL PANEL (50A1) SCHEM.
PANEL BRIGHTNESS
CHECK MODE LAMPS
CONDITION LAMPS
CHASSIS GROUND
6V 400~ LO
6V 400~ HI
MAIN DISPLAY & CONTROL PANEL
G&N SYNC SWITCH
HOLD
FOLLOW
SEE NOTE FOR RELAY OPERATION
28V 1% 800~ ¢2
NAV KEYBOARD AND DISPLAY PANEL (50A6)
ENTRY C11
ATTITUDE CONTROL C10
FINE ALIGN C4
CDU MANUAL C3
COARSE ALIGN C2
ZERO ENCODER C1
TRANSFER SWITCH
ZERO ENCODER
COARSE ALIGNMENT
CDU MANUAL
FINE ALIGNMENT
ATTITUDE CONTROL
ENTRY
APOLLO GUIDANCE COMPUTER (50A5)
TO TEMP CONTROLLER
A3 PANEL BRIGHTNESS SCHEM. 1010452
40 SEC TIME DELAY A1 SCHEM. 1021510
+28VDC MDV
A5 ATTITUDE ERROR DEMOD. SCHEMATIC
A7 ATTITUDE ERROR DEMOD. SCHEMATIC
A6 ATTITUDE ERROR DEMOD. SCHEMATIC
SIN (θ OG - A OG)
SIN (θ IG - A IG)
SIN (θ MG - A MG)
θ OR ON PIN 1 OF ATTITUDE ERROR DEMODULATOR PRODUCES A PLUS VOLTAGE ON PIN 8. THIS INDICATES THAT THE GIMBAL ANGLE IS LARGER THAN THE CDU ANGLE.
D&C ELECTRONICS (50A3) SCHEMATIC 1021735
A2 RELAY & DIODE MODULE SCHEM. 1014623
K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13
SET
RESET
IMU DELAY LAMP
CONDITION LIGHT ASSY
GIMBAL LOCK LAMP
RELAY & DIODE MODULE
SCHEMATIC 1021733
0VDC
SPACECRAFT
56P10
56J22
TO MAIN G&C PANEL GIMBAL LOCK LAMP
56J06 56J07 56J08 56J09 56P01 56J24
TB1

REFERENCE:
INTERCONNECT LIST 1015087

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS
PRESCRIBED BY MIL-D-70327

NOTES:

ALL VOLTAGES IMU UNLESS INDICATED OTHERWISE.

SYMBOLS USED IN PHASING NOTATIONS INDICATE THE FOLLOWING:
- θ - CDU RSVR SHAFT ANGLE
- A - IMU RSVR SHAFT ANGLE
- ↑ - DIRECTION OF ZERO PHASE IN FIRST AND SECOND QUADRANTS FOR SINE FUNCTIONS AND IN FIRST AND FOURTH QUADRANTS FOR COSINE FUNCTIONS

IMU ATTITUDE HOLD RELAY IS ENERGIZED WHEN ATTITUDE IMPULSE HAND CONTROL IS MOVED FROM ITS CENTER POSITION.

QTY REQD	PART OR IDENTIFYING NO	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS				

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

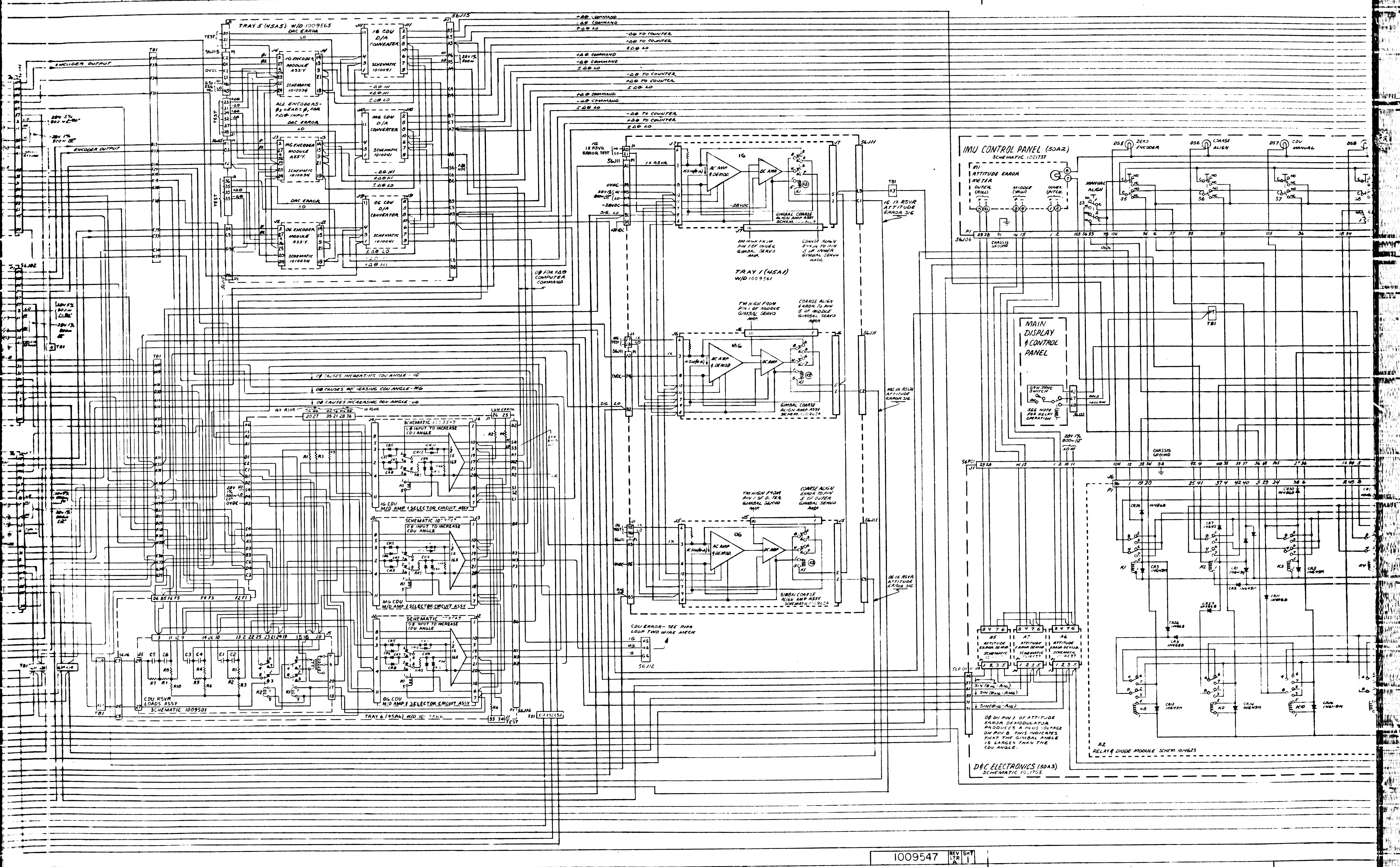
DRAWN A. L. Lee 12 MAR 65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

APOLLO IMU/CDU MODING MECHANIZATION DRAWING "100 SERIES"

CODE IDENT NO 80230
SIZE J
DRAWING NO. 1009547
SCALE —
SHEET 1 OF 1

1009547 A 3-H

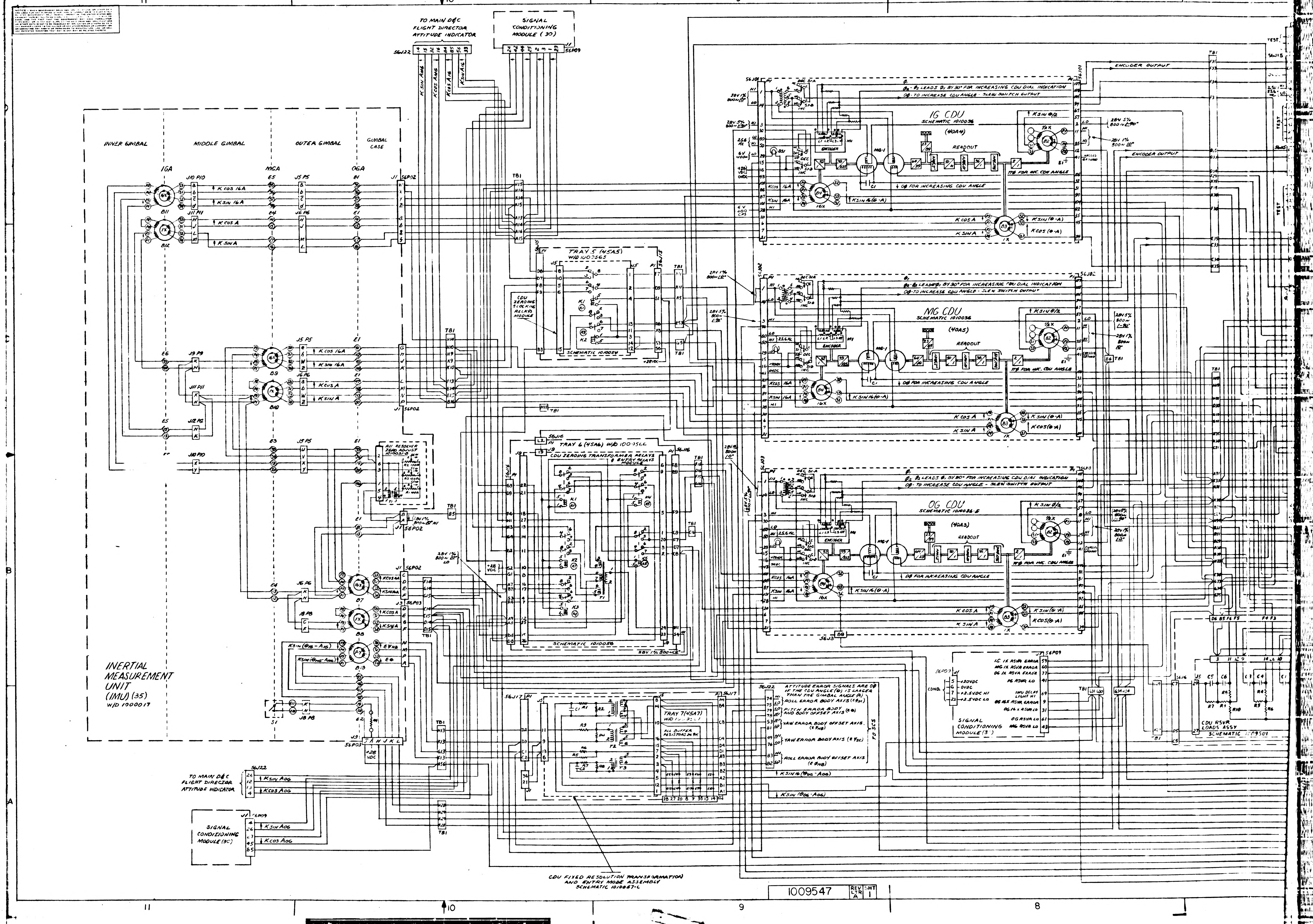
3-/1009547



7
6
5
4
TRAY 5 (45A5) W/O 1009565
1G CDU D/A CONVERTER SCHEMATIC 1010041
MG CDU D/A CONVERTER SCHEMATIC 1010041
OG CDU D/A CONVERTER SCHEMATIC 1010041
1G ENCODER MODULE ASS'Y SCHEMATIC 1010034
MG ENCODER MODULE ASS'Y SCHEMATIC 1010034
OG ENCODER MODULE ASS'Y SCHEMATIC 1010034
ALL ENCODERS-Ø2 LEADS Ø1 FOR +ΔΘ INPUT
DAC ERROR
ENCODER OUTPUT
TEST
+ΔΘ COMMAND
-ΔΘ COMMAND
+ΔΘ TO COUNTER
-ΔΘ TO COUNTER
ΣΔΘ LO
28V 1% 800~
ØB FOR +ΔΘ COMPUTER COMMAND
1X RSVR ERROR TEST
1G
MG
OG
AC AMP & DEMOD.
DC AMP
GIMBAL COARSE ALIGN AMP ASSY
TRAY 1 (45A1) W/O 1009561
TM HIGH FROM PIN 1 OF INNER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF INNER GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF MIDDLE GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF MIDDLE GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF OUTER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF OUTER GIMBAL SERVO AMP.
1G 1X RSVR ATTITUDE ERROR SIG.
MG 1X RSVR ATTITUDE ERROR SIG.
OG 1X RSVR ATTITUDE ERROR SIG.
ØB CAUSES INCREASING CDU ANGLE - IG
ØB CAUSES INCREASING CDU ANGLE - MG
ØB CAUSES INCREASING CDU ANGLE - OG
IG CDU MID AMP & SELECTOR CIRCUIT ASSY
MG CDU MID AMP & SELECTOR CIRCUIT ASSY
OG CDU MID AMP & SELECTOR CIRCUIT ASSY
ØB INPUT TO INCREASE CDU ANGLE
CDU RSVR LOADS ASSY SCHEMATIC 1009501
TRAY 6 (45A6) W/O 1009566
CDU ERROR - SEE PIPA LOOP TWO WIRE MECH
56J12
TB1
IMU CONTROL PANEL (50A2)
SCHEMATIC 1021737
M1 ATTITUDE ERROR METER
OUTER (ROLL)
MIDDLE (YAW)
INNER (PITCH)
MANUAL ALIGN
DS5 ZERO ENCODER
DS6 COARSE ALIGN
DS7 CDU MANUAL
DS8
CHASSIS GROUND
MAIN DISPLAY & CONTROL PANEL
GEN SYNC SWITCH
SEE NOTE FOR RELAY OPERATION
HOLD
YELLOW
A5 ATTITUDE ERROR DEMOD
A7 ATTITUDE ERROR DEMOD
A6 ATTITUDE ERROR DEMOD
ØB ON PIN 1 OF ATTITUDE ERROR DEMODULATOR PRODUCES A PLUS VOLTAGE ON PIN 8. THIS INDICATES THAT THE GIMBAL ANGLE IS LARGER THAN THE CDU ANGLE.
A2 RELAY & DIODE MODULE SCHEM. 1014623
D&C ELECTRONICS (50A3) SCHEMATIC 1011705

1009547 REV A SHT 1

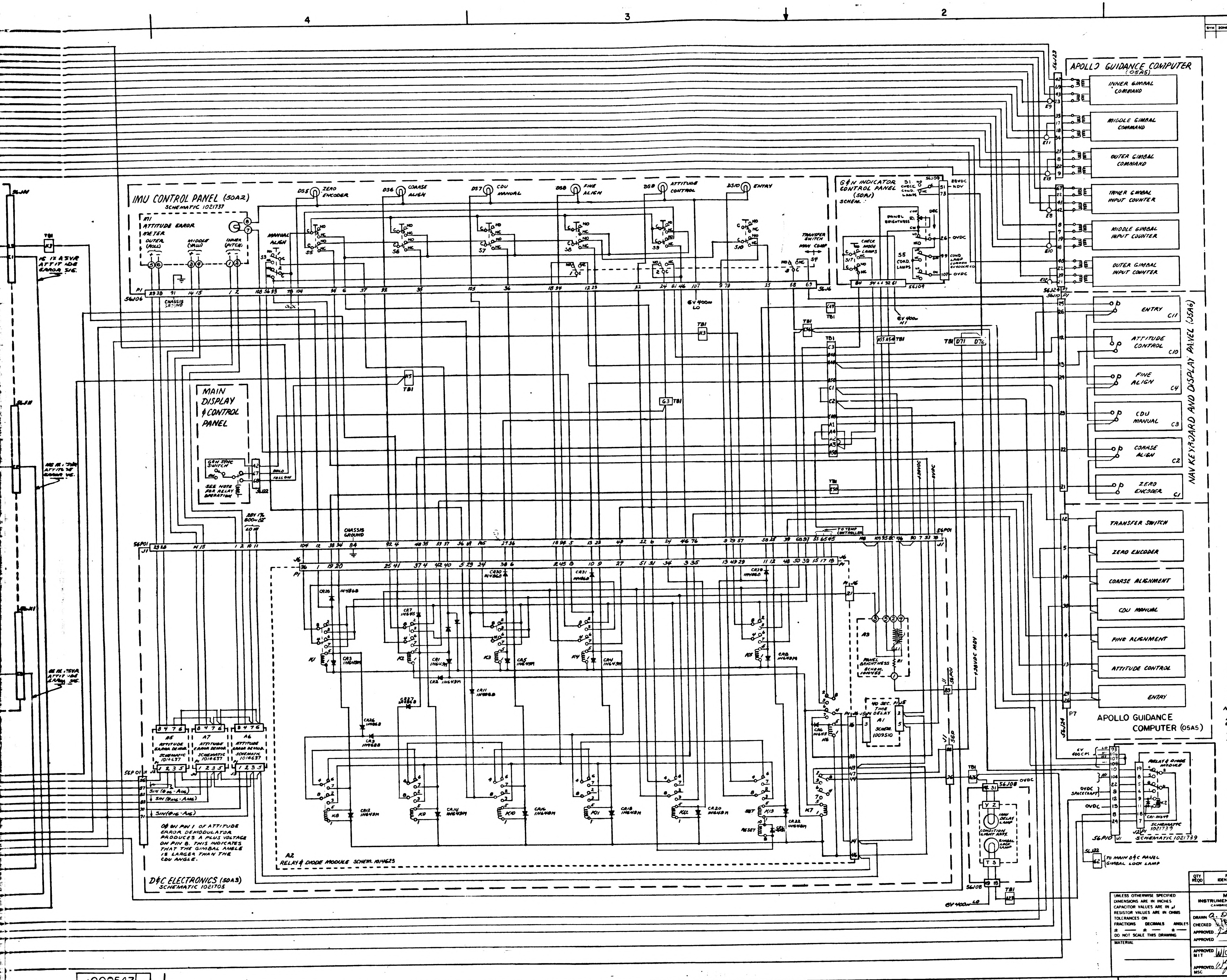
2/1009547


TO MAIN D&C FLIGHT DIRECTOR ATTITUDE INDICATOR
56J22
K SIN AMG
K COS AMG
K COS A IG
K SIN A IG
SIGNAL CONDITIONING MODULE (30)
J1 56P09
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
GIMBAL CASE
IGA
MGA
OGA
J10 P10
J11 P11
J5 P5
J6 P6
J1 56P02
K COS 16A
K SIN 16A
K COS A
K SIN A
B11
B12
16X
1X
TB1
TRAY 5 (45A5) W/D 1009565
CDU ZEROING & LOCKING RELAYS MODULE
SCHEMATIC 1010054
K1
K2
K3
+28VDC
TRAY 6 (45A6) W/D 1009566
CDU ZEROING TRANSFORMER RELAYS & ENTRY RELAYS MODULE
SCHEMATIC 1010056
K4
K5
T1
28V 1% 800~ L0°
56J16
L2
J9
B9
B10
J9 P9
J11 P11
J12 P12
J10 P10
AH RESOLVER ZERO ADJUST
B7
B8
B13
J8 P8
J3 56P03
K SIN (θIG - AIG)
K SIN (θMG - AMG)
EΨNB
Eθ
S1
+28 VDC
INERTIAL MEASUREMENT UNIT (IMU) (35) W/D 1000017
TO MAIN D&C FLIGHT DIRECTOR ATTITUDE INDICATOR
56J22
K SIN AOG
K COS AOG
SIGNAL CONDITIONING MODULE (3C)
J1 56P09
56J17
TRAY 7 (45A7)
ALL BUFFER RESISTORS 24.9K
T2
T3
CDU FIXED RESOLUTION TRANSFORMATION AND ENTRY MODE ASSEMBLY SCHEMATIC 1010057-C
56J22
ATTITUDE ERROR SIGNALS ARE 0Φ IF THE CDU ANGLE (θ) IS LARGER THAN THE GIMBAL ANGLE (A)
ROLL ERROR BODY AXIS (EΦSC)
PITCH ERROR BODY AND BODY OFFSET AXIS (Eθ)
YAW ERROR BODY OFFSET AXIS (EΨNB)
YAW ERROR BODY AXIS (EΨSC)
ROLL ERROR BODY OFFSET AXIS (EΦNB)
TO SCS
K SIN 16 (θOG - AOG)
K SIN (θOG - AOG)
56J01
28V 1% 800~ L0°
28V 5% 800~ L-90°
25.6 KC
6V 400~
+28 VDC
0VDC
6V 400 CPS
Φ1
Φ2 - Φ2 LEADS Φ1 BY 90° FOR INCREASING CDU DIAL INDICATION
0Φ - TO INCREASE CDU ANGLE - SLEW SWITCH OUTPUT
IG CDU
SCHEMATIC 1010036
(40A4)
ENCODER
MG-1
READOUT
DEC
INC
S1-A
S1-B
DS1
C1
B4
B2
B3
1/2 X
16X
1X
K SIN θ/2
0Φ FOR INCREASING CDU ANGLE
180Φ FOR INC. CDU ANGLE
K SIN 16 (θ - A)
K SIN (θ - A)
K COS (θ - A)
CHASSIS GROUND
E1
ENCODER OUTPUT
56J15
TEST
25.6 KC
56J02
MG CDU
SCHEMATIC 1010036
(40A5)
56J03
OG CDU
SCHEMATIC 1010036-E
(40A3)
56J3
B8
B6
SIGNAL CONDITIONING MODULE (3)
J1 56P09
56P09 J1
COND.
+20VDC
0VDC
+2.5VDC HI
+2.5VDC LO
IG 1X RSVR ERROR
MG 1X RSVR ERROR
OG 1X RSVR ERROR
IG RSVR LO
IMU DELAY LIGHT HI
OG 16X RSVR ERROR
OG 16X RSVR LO
OG RSVR LO
MG RSVR LO
56J6
J5
C5
C6
C3
C4
C1
R4
R5
R6
R7
R8
R10
CDU RSVR LOADS ASSY
SCHEMATIC 1009501
11
10
9
8
1009547
REV LTR A
SHT 1

1/1009547

SYM	ZONE	DESCRIPTION	BY	CHK	DATE	APPROVED

REVISIONS


APOLLO GUIDANCE COMPUTER (05A5)
INNER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
OUTER GIMBAL COMMAND
INNER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
OUTER GIMBAL INPUT COUNTER
IMU CONTROL PANEL (50A2)
SCHEMATIC 1021737
M1 ATTITUDE ERROR METER
OUTER (ROLL)
MIDDLE (YAW)
INNER (PITCH)
ZERO ENCODER
COARSE ALIGN
CDU MANUAL
FINE ALIGN
ATTITUDE CONTROL
ENTRY
MANUAL ALIGN
TRANSFER SWITCH
MAN COMP
G&N INDICATOR CONTROL PANEL (50A1)
CHECK MODE LAMPS
PANEL BRIGHTNESS
COND. LAMPS
CHASSIS GROUND
6V 400~ LO
6V 400~ HI
MAIN DISPLAY & CONTROL PANEL
G&N SYNC SWITCH
SEE NOTE FOR RELAY OPERATION
HOLD
FOLLOW
NAV KEYBOARD AND DISPLAY PANEL (05A6)
ENTRY
ATTITUDE CONTROL
FINE ALIGN
CDU MANUAL
COARSE ALIGN
ZERO ENCODER
TRANSFER SWITCH
ZERO ENCODER
COARSE ALIGNMENT
CDU MANUAL
FINE ALIGNMENT
ATTITUDE CONTROL
ENTRY
APOLLO GUIDANCE COMPUTER (05A5)
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014637
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014637
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014637
0Ø ON PIN 1 OF ATTITUDE ERROR DEMODULATOR PRODUCES A PLUS VOLTAGE ON PIN 8. THIS INDICATES THAT THE GIMBAL ANGLE IS LARGER THAN THE CDU ANGLE.
D&C ELECTRONICS (50A3) SCHEMATIC 1021705
A2 RELAY & DIODE MODULE SCHEM. 1014623
40 SEC. TIME DELAY A1 SCHEM. 1009510
PANEL BRIGHTNESS SCHEM. 1010995
IMU DELAY LAMP
CONDITION LIGHT ASSY.
GIMBAL LOCK LAMP
RELAY & DIODE MODULE
SCHEMATIC 1021739
SCHEMATIC 1021739
TO MAIN D&C PANEL GIMBAL LOCK LAMP
SET
RESET
28V 1% 800~ ØI
+28VDC
28VDC
OVDC
6V 400~ LO

REFERENCE:
INTERCONNECT LIST 1015087

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

NOTES:

ALL VOLTAGES IMU UNLESS INDICATED OTHERWISE.

SYMBOLS USED IN PHASING NOTATIONS INDICATE THE FOLLOWING:
θ - CDU RSVR SHAFT ANGLE
A - IMU RSVR SHAFT ANGLE
↑ - DIRECTION OF ZERO PHASE IN FIRST AND SECOND QUADRANTS FOR SINE FUNCTIONS AND IN FIRST AND FOURTH QUADRANTS FOR COSINE FUNCTIONS

IMU ATTITUDE HOLD RELAY IS ENERGIZED WHEN ATTITUDE IMPULSE HAND CONTROL IS MOVED FROM ITS CENTER POSITION.

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

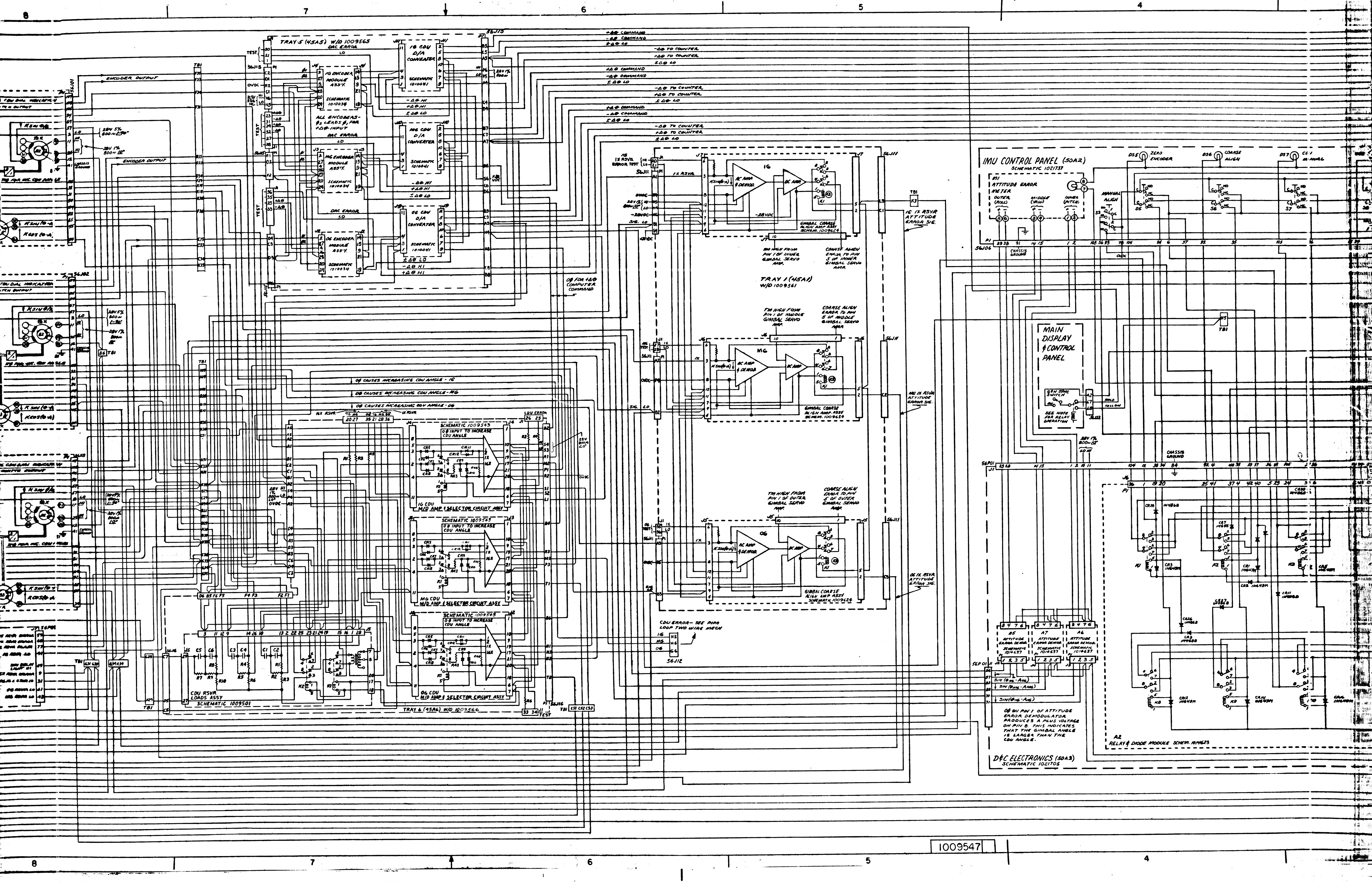
DRAWN	A. D. Lee	12 MAR 65
CHECKED	D. J. Brown	
APPROVED		1/8/65
APPROVED		
APPROVED MIT	W. Crafton	
APPROVED MSC		
		DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

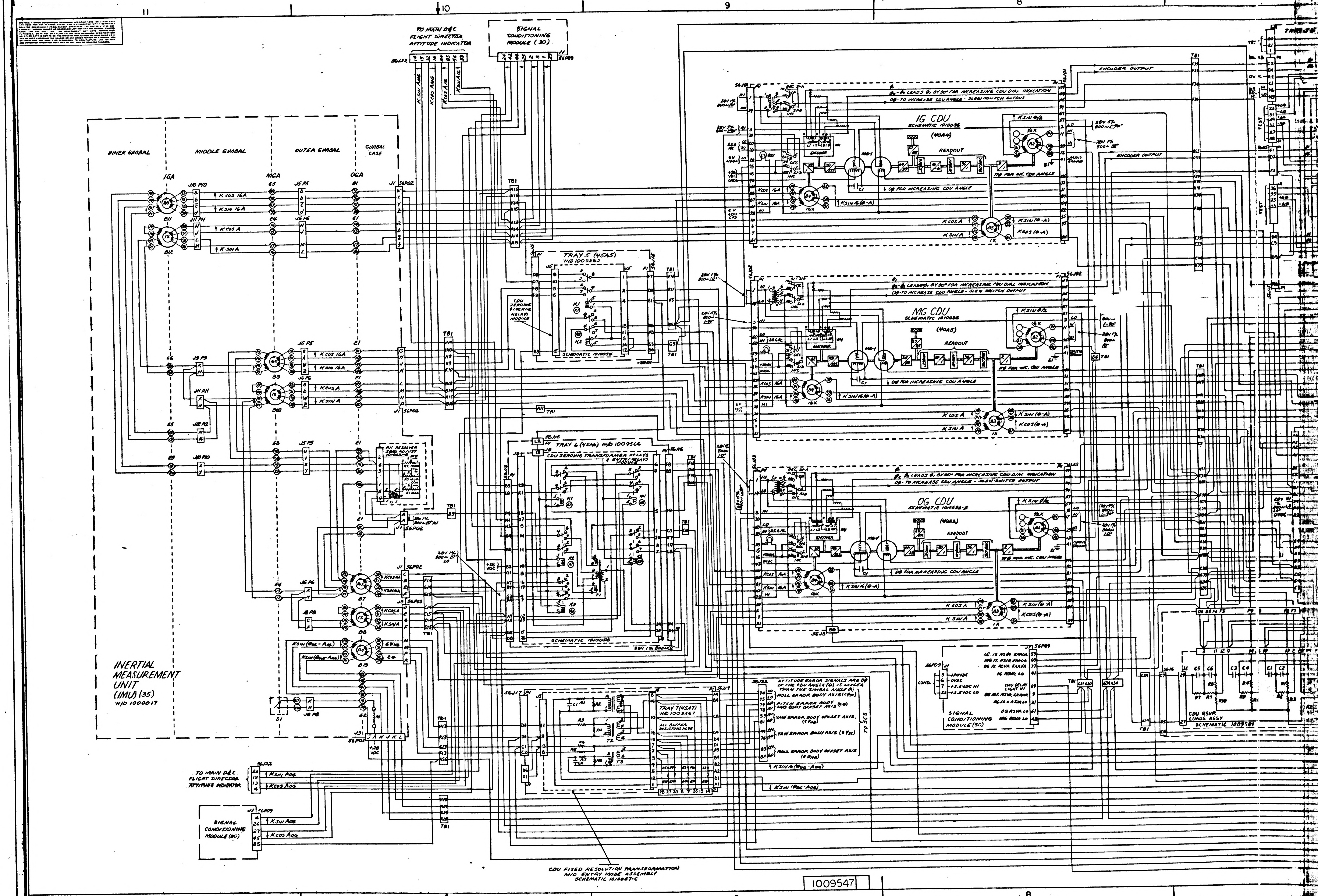
APOLLO IMU/CDU MODING MECHANIZATION DRAWING "100 SERIES"

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1009547
SCALE
SHEET 1 OF 1

1009547

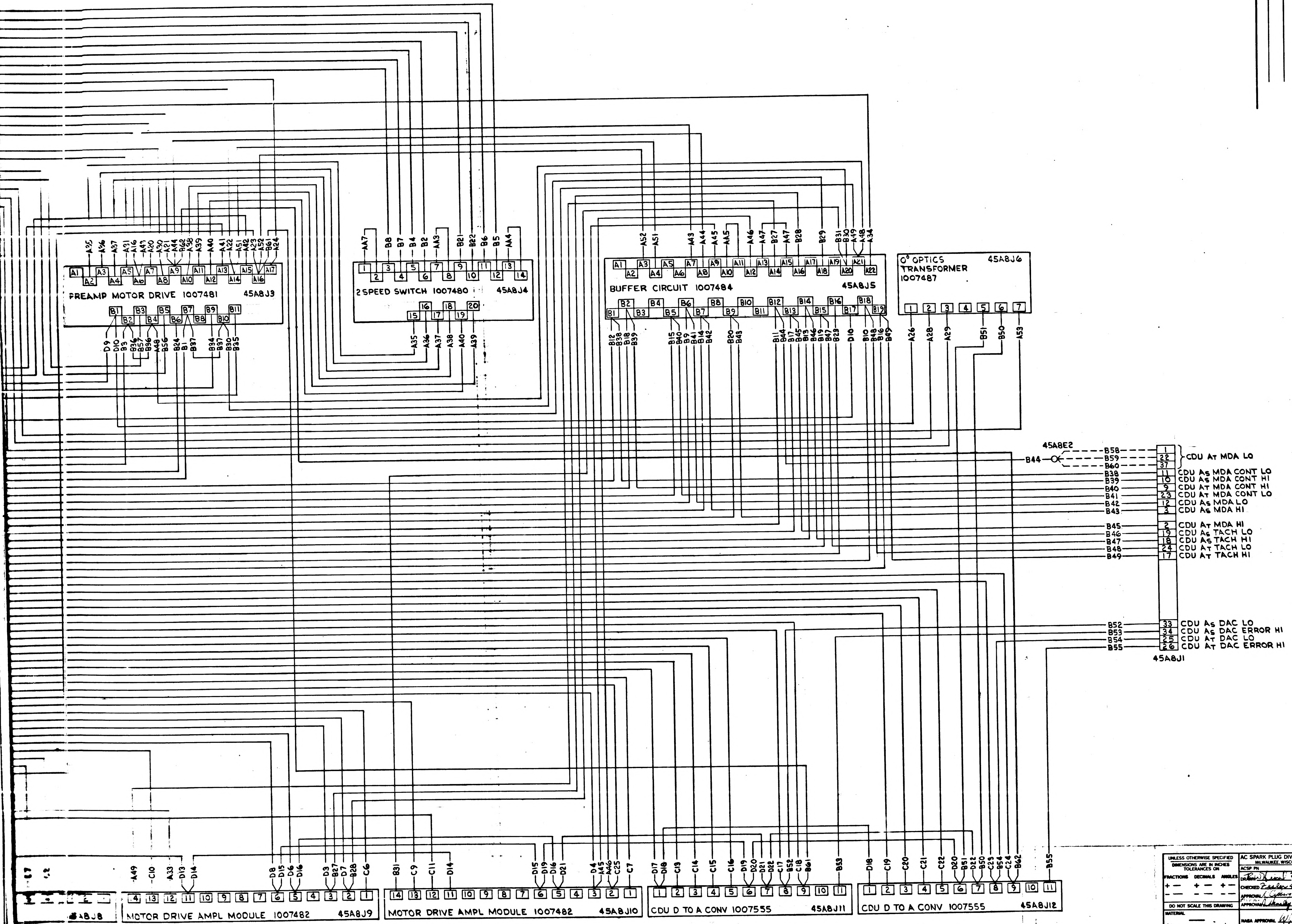

8
7
6
5
4
TRAY 5 (45A5) W/D 1009565
DAC ERROR
LO
TEST
OVDC
1G ENCODER MODULE ASS'Y. SCHEMATIC 1010034
MG ENCODER MODULE ASS'Y. SCHEMATIC 1010034
OG ENCODER MODULE ASS'Y. SCHEMATIC 1010034
ALL ENCODERS- ϕ_2 LEADS ϕ_1 FOR +Δθ INPUT
1G CDU D/A CONVERTER SCHEMATIC 1010041
MG CDU D/A CONVERTER SCHEMATIC 1010041
OG CDU D/A CONVERTER SCHEMATIC 1010041
-Δθ HI
+Δθ HI
±Δθ LO
56J13
56J15
28V 1% 800~
+28 VDC
+Δθ COMMAND
-Δθ COMMAND
±Δθ LO
-Δθ TO COUNTER
+Δθ TO COUNTER
±Δθ LO
0φ FOR +Δθ COMPUTER COMMAND
ENCODER OUTPUT
TB1
56J01
56J02
56J03
CDU DIAL INDICATION
K SIN θ/2
K SIN (θ-A)
K COS (θ-A)
28V 5% 800~ ∠-90°
28V 1% 800~ ∠0°
CHASSIS GROUND
56P02
0φ CAUSES INCREASING CDU ANGLE - IG
0φ CAUSES INCREASING CDU ANGLE - MG
0φ CAUSES INCREASING CDU ANGLE - OG
1X RSVR
CDU ERROR
SCHEMATIC 1009543
0φ INPUT TO INCREASE CDU ANGLE
IG CDU M/D AMP & SELECTOR CIRCUIT ASSY
MG CDU M/D AMP & SELECTOR CIRCUIT ASSY
OG CDU M/D AMP & SELECTOR CIRCUIT ASSY
CDU RSVR LOADS ASSY SCHEMATIC 1009501
TRAY 6 (45A6) W/D 1009566
56J16
TEST
IG 1X RSVR ERROR TEST
56J11
-28VDC
SIG. LO
AC AMP & DEMOD.
DC AMP
IG
MG
OG
GIMBAL COARSE ALIGN AMP ASSY SCHEM. 1009624
TM HIGH FROM PIN 1 OF INNER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF INNER GIMBAL SERVO AMP.
TRAY 1 (45A1) W/D 1009561
TM HIGH FROM PIN 1 OF MIDDLE GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF MIDDLE GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF OUTER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF OUTER GIMBAL SERVO AMP.
IG 1X RSVR ATTITUDE ERROR SIG.
MG 1X RSVR ATTITUDE ERROR SIG.
OG 1X RSVR ATTITUDE ERROR SIG.
CDU ERROR- SEE PIPA LOOP TWO WIRE MECH
56J12
IMU CONTROL PANEL (50A2)
SCHEMATIC 1021737
M1 ATTITUDE ERROR METER
OUTER (ROLL)
MIDDLE (YAW)
INNER (PITCH)
MANUAL ALIGN
DS5 ZERO ENCODER
DS6 COARSE ALIGN
DS7 CDU MANUAL
S3
S5
S6
S7
56J06
MAIN DISPLAY & CONTROL PANEL
GEN SYNC SWITCH
HOLD
FOLLOW
SEE NOTE FOR RELAY OPERATION
28V 1% 800~ ∠0°
56P01
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014637
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014637
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014637
SIN (θOG - AOG)
SIN (θMG - AMG)
SIN (θIG - AIG)
0φ ON PIN 1 OF ATTITUDE ERROR DEMODULATOR PRODUCES A PLUS VOLTAGE ON PIN 8. THIS INDICATES THAT THE GIMBAL ANGLE IS LARGER THAN THE CDU ANGLE.
A2 RELAY & DIODE MODULE SCHEM. 1014623
D&C ELECTRONICS (50A3) SCHEMATIC 1021705
1009547

NOTICE - When government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.


11
10
9
8
TO MAIN D&C FLIGHT DIRECTOR ATTITUDE INDICATOR
56J22
K SIN A MG
K COS A MG
K COS A IG
K SIN A IG
SIGNAL CONDITIONING MODULE (30)
J1 56P09
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
GIMBAL CASE
IGA
MGA
OGA
J10 P10
J11 P11
J5 P5
J5 P6
J1 56P02
K COS IGA
K SIN IGA
K COS A
K SIN A
B11
B12
B9
B10
B7
B8
B13
TB1
TRAY 5 (45A5) W/D 1009565
CDU ZEROING & LOCKING RELAYS MODULE
SCHEMATIC 1010054
+28VDC
TRAY 6 (45A6) W/D 1009566
CDU ZEROING TRANSFORMER RELAYS & ENTRY RELAYS MODULE
SCHEMATIC 1010056
28V 1% 800~ L0°
28V 5% 800~ L-90°
A11 RESOLVER ZERO ADJUST
J3 56P03
K SIN (θIG - AIG)
K SIN (θMG - AMG)
EΨNB
Eθ
S1
J8 P8
J31 56P03
+28 VDC
INERTIAL MEASUREMENT UNIT (IMU) (35) W/D 1000017
TO MAIN D&C FLIGHT DIRECTOR ATTITUDE INDICATOR
K SIN AOG
K COS AOG
SIGNAL CONDITIONING MODULE (30)
56J01
IG CDU
SCHEMATIC 1010036
(40A4)
θ1
θ2 - θ2 LEADS θ1 BY 90° FOR INCREASING CDU DIAL INDICATION
Oθ - TO INCREASE CDU ANGLE - SLEW SWITCH OUTPUT
28V 1% 800~ L0°
28V 5% 800~ L-90°
25.6 KC
6V 400~
+28 VDC
0VDC
6V 400 CPS
DEC S1A
S1B
INC
ENCODER
MG-1
READOUT
1/2X
16X
1X
CHASSIS GROUND
E1
↑Oθ FOR INC. CDU ANGLE
↓Oθ FOR INCREASING CDU ANGLE
K SIN θ/2
K SIN 16 (θ-A)
K SIN (θ-A)
K COS (θ-A)
ENCODER OUTPUT
56J02
MG CDU
SCHEMATIC 1010036
(40A5)
56J03
OG CDU
SCHEMATIC 1010036-E
(40A3)
56J17
TRAY 7 (45A7) W/D 1009567
ALL BUFFER RESISTORS 24.9K
CDU FIXED RESOLUTION TRANSFORMATION AND ENTRY MODE ASSEMBLY SCHEMATIC 1010057-C
ATTITUDE ERROR SIGNALS ARE 0θ IF THE CDU ANGLE (θ) IS LARGER THAN THE GIMBAL ANGLE (A)
ROLL ERROR BODY AXIS (EΦSC)
PITCH ERROR BODY AND BODY OFFSET AXIS (Eθ)
YAW ERROR BODY OFFSET AXIS. (EΨNB)
YAW ERROR BODY AXIS (EΨSC)
ROLL ERROR BODY OFFSET AXIS (EΦNB)
TO SCS
K SIN 16 (θOG - AOG)
K SIN (θOG - AOG)
SIGNAL CONDITIONING MODULE (30)
COND.
+20VDC
0VDC
+2.5VDC HI
+2.5VDC LO
IG 1X RSVR ERROR
MG 1X RSVR ERROR
OG 1X RSVR ERROR
IG RSVR LO
IMU DELAY LIGHT HI
OG 16X RSVR ERROR
OG 16X RSVR LO
OG RSVR LO
MG RSVR LO
CDU RSVR LOADS ASSY SCHEMATIC 1009581
TEST

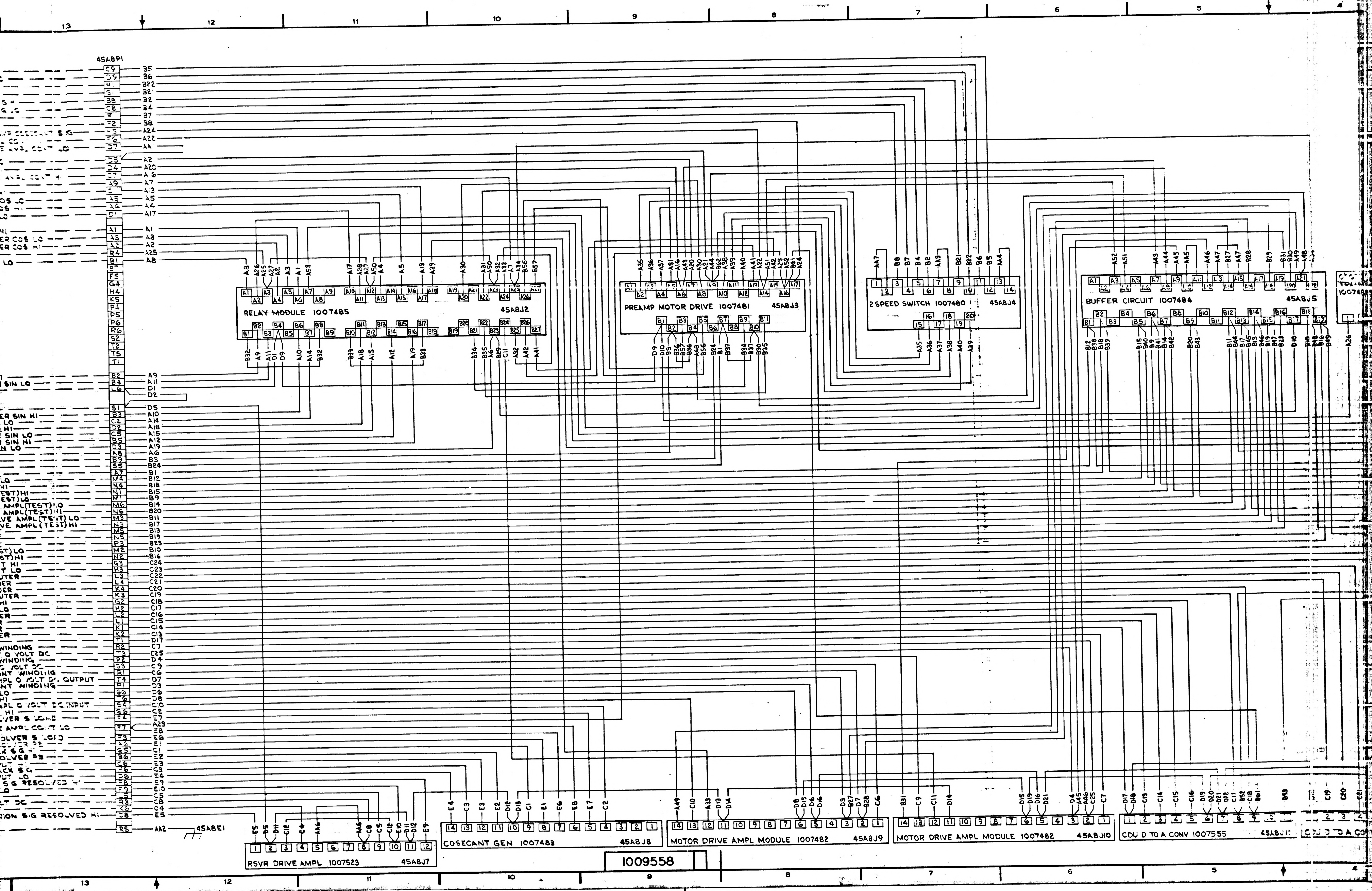
1009547

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD


FREAMP MOTOR DRIVE 1007481 45A8J3
2 SPEED SWITCH 1007480 45A8J4
BUFFER CIRCUIT 1007484 45A8J5
0° OPTICS TRANSFORMER 1007487 45A8J6
45A8E2
B44
B58
B59
B60
CDU AT MDA LO
B38 11 CDU AS MDA CONT LO
B39 10 CDU AS MDA CONT HI
B40 9 CDU AT MDA CONT HI
B41 23 CDU AT MDA CONT LO
B42 12 CDU AS MDA LO
B43 3 CDU AS MDA HI
B45 2 CDU AT MDA HI
B46 19 CDU AS TACH LO
B47 18 CDU AS TACH HI
B48 24 CDU AT TACH LO
B49 17 CDU AT TACH HI
B52 33 CDU AS DAC LO
B53 34 CDU AS DAC ERROR HI
B54 25 CDU AT DAC LO
B55 26 CDU AT DAC ERROR HI
45A8J1
45A8J8
MOTOR DRIVE AMPL MODULE 1007482 45A8J9
MOTOR DRIVE AMPL MODULE 1007482 45A8J10
CDU D TO A CONV 1007555 45A8J11
CDU D TO A CONV 1007555 45A8J12

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ±	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	ACSP PN DRAWN Ron W Kesel DATE 22 OCT 64 CHECKED Zesler 4 NOV 64 APPROVAL L Gibson 4 Nov 64 APPROVAL Stanley 4 Nov 64	WIRING DIAGRAM TRAY 8
MATERIAL — Christensen 4 Nov 64	NASA APPROVAL W J Klein	CODE IDENT NO. SIZE 1009558
CONTRACT NAS9-497	MIT APPROVAL	SCALE — SHEET 1 OF 1

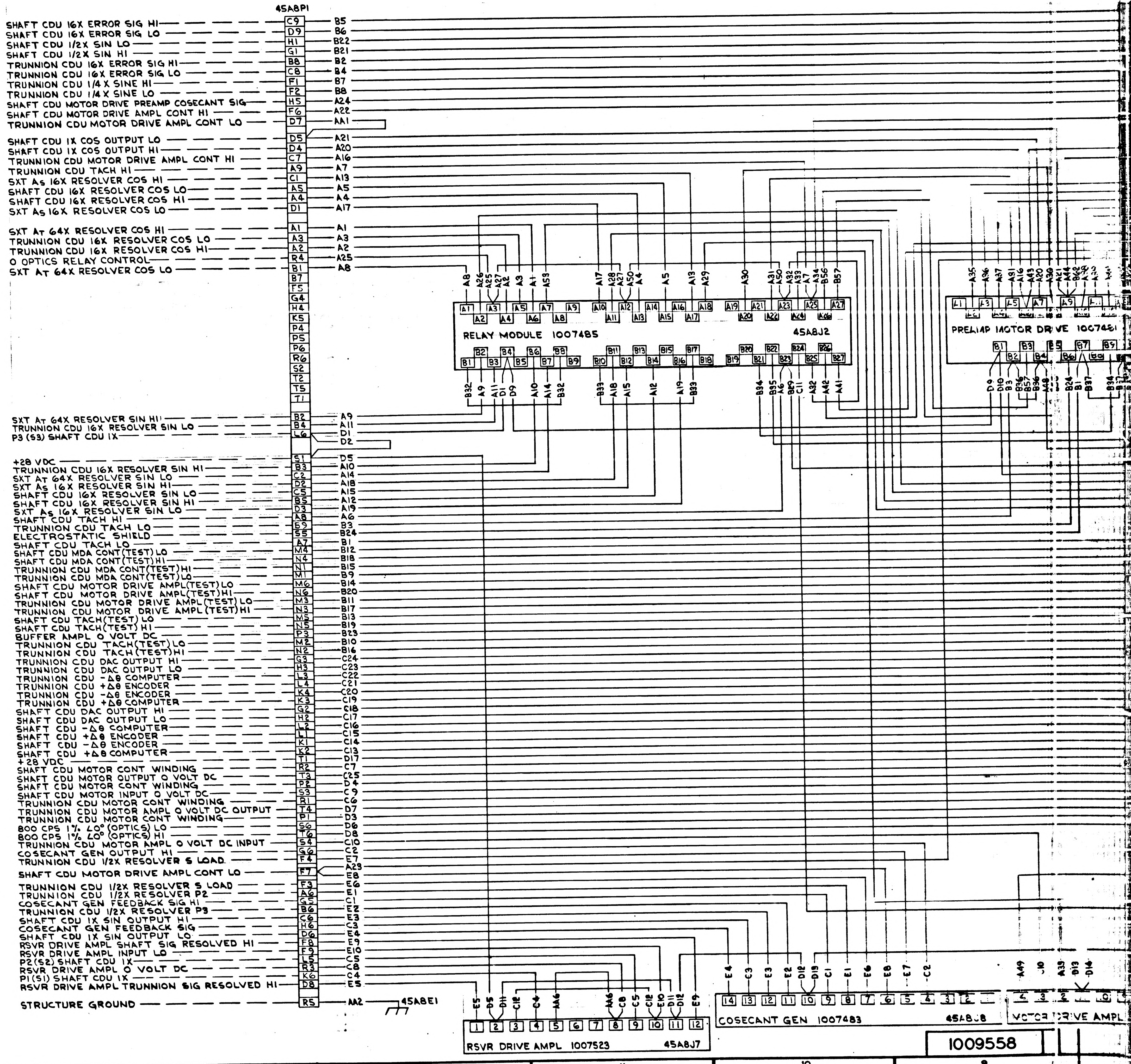
1009558

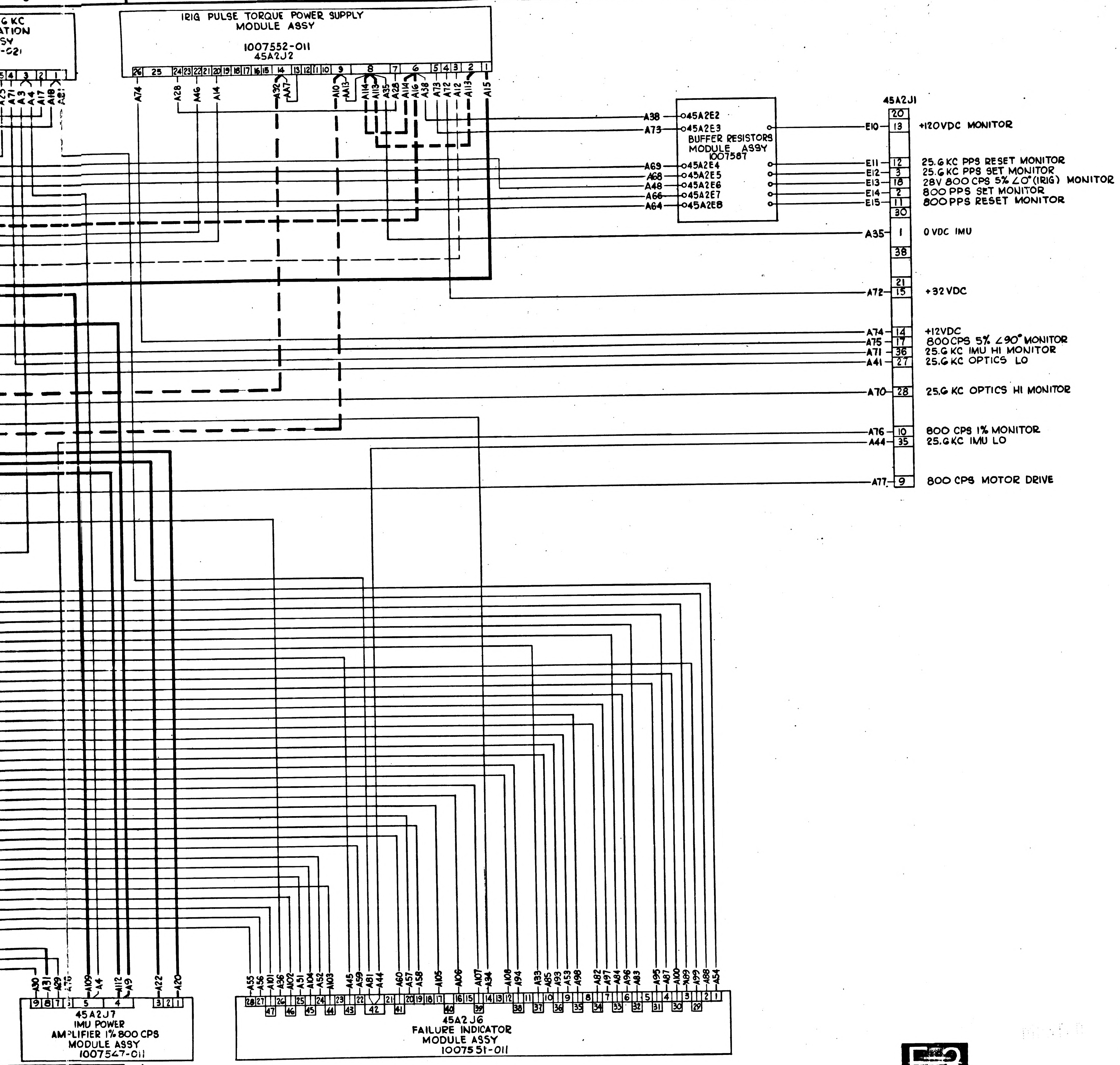

45A8P1
RELAY MODULE 1007485
45A8J2
PREAMP MOTOR DRIVE 1007481
45A8J3
2 SPEED SWITCH 1007480
45A8J4
BUFFER CIRCUIT 1007484
45A8J5
RSVR DRIVE AMPL 1007523
45A8J7
COSECANT GEN 1007483
45A8J8
MOTOR DRIVE AMPL MODULE 1007482
45A8J9
MOTOR DRIVE AMPL MODULE 1007482
45A8J10
CDU D TO A CONV 1007555
45A8E1
1009558
13
12
11
10
9
8
7
6
5
4

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. ——— INDICATES #24 GAGE WIRE PER 1010639-2.
3. – – – INDICATES #24 GAGE WIRE PER MIL-W-16878/1-24-19 STRAND WHITE.
4. SCHEMATIC DIAGRAMS FOR REFERENCE:

1015108	RELAY MODULE
1015120	RSVR DRIVE AMPL
1015112	PREAMP MOTOR DRIVE
1015148	COSECANT GEN
1015102	2 SPEED SWITCH
1015116	MOTOR DRIVE AMPL MODULE
1015126	BUFFER CIRCUIT MODULE ASSY
1007487	0° OPTICS TRANSFORMER
1010041	CDU D TO A CONV


45A8P1
SHAFT CDU 16X ERROR SIG HI — C9 — B5
SHAFT CDU 16X ERROR SIG LO — D9 — B6
SHAFT CDU 1/2X SIN LO — H1 — B22
SHAFT CDU 1/2X SIN HI — G1 — B21
TRUNNION CDU 16X ERROR SIG HI — B8 — B2
TRUNNION CDU 16X ERROR SIG LO — C8 — B4
TRUNNION CDU 1/4X SINE HI — F1 — B7
TRUNNION CDU 1/4X SINE LO — F2 — B8
SHAFT CDU MOTOR DRIVE PREAMP COSECANT SIG — H5 — A24
SHAFT CDU MOTOR DRIVE AMPL CONT HI — F6 — A22
TRUNNION CDU MOTOR DRIVE AMPL CONT LO — D7 — AA1
SHAFT CDU 1X COS OUTPUT LO — D5 — A21
SHAFT CDU 1X COS OUTPUT HI — D4 — A20
TRUNNION CDU MOTOR DRIVE AMPL CONT HI — C7 — A16
TRUNNION CDU TACH HI — A9 — A7
SXT As 16X RESOLVER COS HI — C1 — A13
SHAFT CDU 16X RESOLVER COS LO — A5 — A5
SHAFT CDU 16X RESOLVER COS HI — A4 — A4
SXT As 16X RESOLVER COS LO — D1 — A17
SXT At 64X RESOLVER COS HI — A1 — A1
TRUNNION CDU 16X RESOLVER COS LO — A3 — A3
TRUNNION CDU 16X RESOLVER COS HI — A2 — A2
O OPTICS RELAY CONTROL — R4 — A25
SXT At 64X RESOLVER COS LO — B1 — A8
B7
F5
G4
H4
K5
P4
P5
P6
R6
S2
T2
T5
T1
SXT At 64X RESOLVER SIN HI — B2 — A9
TRUNNION CDU 16X RESOLVER SIN LO — B4 — A11
P3 (S3) SHAFT CDU 1X — L6 — D1, D2
+28 VDC — S1 — D5
TRUNNION CDU 16X RESOLVER SIN HI — B3 — A10
SXT At 64X RESOLVER SIN LO — C2 — A14
SXT As 16X RESOLVER SIN HI — D2 — A18
SHAFT CDU 16X RESOLVER SIN LO — C5 — A15
SHAFT CDU 16X RESOLVER SIN HI — B5 — A12
SXT As 16X RESOLVER SIN LO — D3 — A19
SHAFT CDU TACH HI — A8 — A6
TRUNNION CDU TACH LO — B9 — B3
ELECTROSTATIC SHIELD — S5 — B24
SHAFT CDU TACH LO — A7 — B1
SHAFT CDU MDA CONT(TEST) LO — M4 — B12
SHAFT CDU MDA CONT(TEST) HI — N4 — B18
TRUNNION CDU MDA CONT(TEST) HI — N1 — B15
TRUNNION CDU MDA CONT(TEST) LO — M1 — B9
SHAFT CDU MOTOR DRIVE AMPL(TEST) LO — M6 — B14
SHAFT CDU MOTOR DRIVE AMPL(TEST) HI — N6 — B20
TRUNNION CDU MOTOR DRIVE AMPL(TEST) LO — M3 — B11
TRUNNION CDU MOTOR DRIVE AMPL(TEST) HI — N3 — B17
SHAFT CDU TACH(TEST) LO — M5 — B13
SHAFT CDU TACH(TEST) HI — N5 — B19
BUFFER AMPL O VOLT DC — P3 — B23
TRUNNION CDU TACH(TEST) LO — M2 — B10
TRUNNION CDU TACH(TEST) HI — N2 — B16
TRUNNION CDU DAC OUTPUT HI — G3 — C24
TRUNNION CDU DAC OUTPUT LO — H3 — C23
TRUNNION CDU -Δθ COMPUTER — L3 — C22
TRUNNION CDU +Δθ ENCODER — L4 — C21
TRUNNION CDU -Δθ ENCODER — K4 — C20
TRUNNION CDU +Δθ COMPUTER — K3 — C19
SHAFT CDU DAC OUTPUT HI — G2 — C18
SHAFT CDU DAC OUTPUT LO — H2 — C17
SHAFT CDU -Δθ COMPUTER — L2 — C16
SHAFT CDU +Δθ ENCODER — L1 — C15
SHAFT CDU -Δθ ENCODER — K1 — C14
SHAFT CDU +Δθ COMPUTER — K2 — C13
+28 VDC — T1 — D17
SHAFT CDU MOTOR CONT WINDING — R2 — C7
SHAFT CDU MOTOR OUTPUT O VOLT DC — T3 — C25
SHAFT CDU MOTOR CONT WINDING — P2 — D4
SHAFT CDU MOTOR INPUT O VOLT DC — S3 — C9
TRUNNION CDU MOTOR CONT WINDING — R1 — C6
TRUNNION CDU MOTOR AMPL O VOLT DC OUTPUT — T4 — D7
TRUNNION CDU MOTOR CONT WINDING — P1 — D3
800 CPS 1% ∠0° (OPTICS) LO — S6 — D6
800 CPS 1% ∠0° (OPTICS) HI — T6 — D8
TRUNNION CDU MOTOR AMPL O VOLT DC INPUT — S4 — C10
COSECANT GEN OUTPUT HI — G6 — C2
TRUNNION CDU 1/2X RESOLVER S LOAD — F4 — E7
SHAFT CDU MOTOR DRIVE AMPL CONT LO — F7 — A23, E8
TRUNNION CDU 1/2X RESOLVER S LOAD — F3 — E6
TRUNNION CDU 1/2X RESOLVER P2 — A6 — E1
COSECANT GEN FEEDBACK SIG HI — G5 — C1
TRUNNION CDU 1/2X RESOLVER P3 — B6 — E2
SHAFT CDU 1X SIN OUTPUT HI — C6 — E3
COSECANT GEN FEEDBACK SIG — H6 — C3
SHAFT CDU 1X SIN OUTPUT LO — D6 — E4
RSVR DRIVE AMPL SHAFT SIG RESOLVED HI — F8 — E9
RSVR DRIVE AMPL INPUT LO — F9 — E10
P2(S2) SHAFT CDU 1X — L5 — C5
RSVR DRIVE AMPL O VOLT DC — R3 — C8
P1(S1) SHAFT CDU 1X — K6 — C4
RSVR DRIVE AMPL TRUNNION SIG RESOLVED HI — D8 — E5
STRUCTURE GROUND — R5 — AA2
45A8E1
RELAY MODULE 1007485
45A8J2
PREAMP MOTOR DRIVE 100748
COSECANT GEN 1007483
45A8J8
RSVR DRIVE AMPL 1007523
45A8J7
MOTOR DRIVE AMPL
1009558



IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY
1007552-011
45A2J2
26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
A74
A28
A46
A14
A32
AA7
A10
AA13
A114
A113
A35
A28
A114
A16
A38
A73
A72
A12
A113
A15
6 KC
ATION
SY
-021
5 4 3 2 1
A25
A71
A3
A4
A17
A18
A81
A38
A73
45A2E2
45A2E3
BUFFER RESISTORS MODULE ASSY
1007567
A69
A68
A48
A66
A64
45A2E4
45A2E5
45A2E6
45A2E7
45A2E8
45A2J1
E10
E11
E12
E13
E14
E15
A35
A72
A74
A75
A71
A41
A70
A76
A44
A77
20
13
12
3
18
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1
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21
15
14
17
36
27
28
10
35
9
+120VDC MONITOR
25.6 KC PPS RESET MONITOR
25.6 KC PPS SET MONITOR
28V 800 CPS 5% ∠0° (IRIG) MONITOR
800 PPS SET MONITOR
800 PPS RESET MONITOR
0 VDC IMU
+32 VDC
+12VDC
800 CPS 5% ∠90° MONITOR
25.6 KC IMU HI MONITOR
25.6 KC OPTICS LO
25.6 KC OPTICS HI MONITOR
800 CPS 1% MONITOR
25.6 KC IMU LO
800 CPS MOTOR DRIVE
A30
A31
A29
A76
A109
A4
A112
A9
A22
A20
9 8 7 6 5 4 3 2 1
45A2J7
IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY
1007547-011
A55
A56
A101
A36
A102
A51
A104
A52
A103
A45
A59
A81
A44
A60
A57
A58
A105
A106
A107
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A83
A95
A87
A100
A89
A99
A88
A54
28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29
45A2J6
FAILURE INDICATOR MODULE ASSY
1007551-011

SYM	ZONE	REVISIONS DESCRIPTION	CHG NO	DATE	APPD

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ — + — + —
— — — — — —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Jdell Sedanski 12 Nov DATE 64
CHECKED R Udonich 7 DEC 64
APPROVAL R Cyning 7 DEC 64
APPROVAL Hennelly 8 DEC 64
NASA APPROVAL W G Rhine 12-23-64
MIT APPROVAL W Kupff 23 Dec

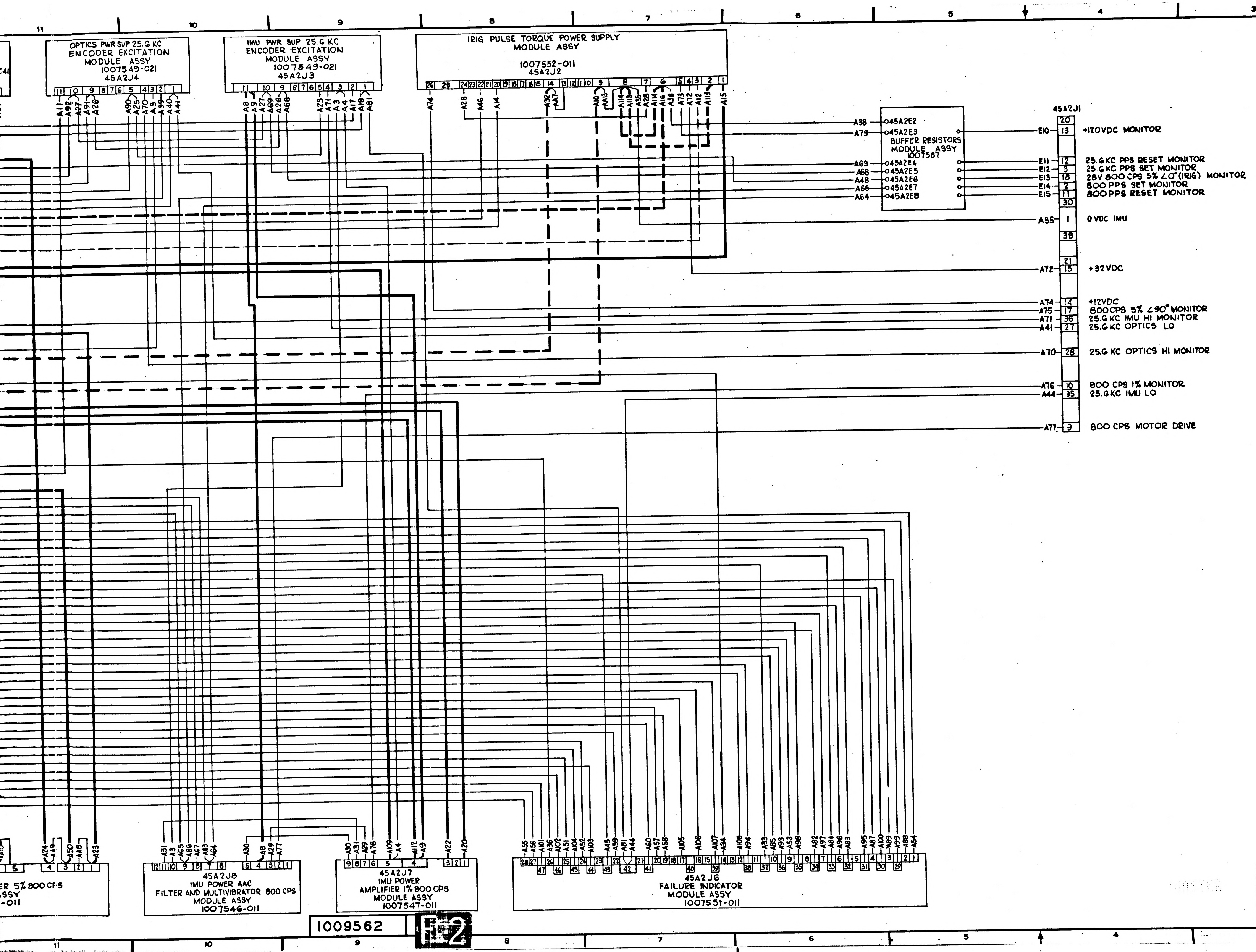
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 2

CODE IDENT NO.
SIZE J2
1009562
SCALE —
SHEET 1 OF 1

1009562

F3


OPTICS PWR SUP 25.6 KC ENCODER EXCITATION MODULE ASSY 1007549-021 45A2J4
IMU PWR SUP 25.6 KC ENCODER EXCITATION MODULE ASSY 1007549-021 45A2J3
IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY 1007552-011 45A2J2
BUFFER RESISTORS MODULE ASSY 1007587
45A2E2
45A2E3
45A2E4
45A2E5
45A2E6
45A2E7
45A2E8
45A2J1
+120VDC MONITOR
25.6KC PPS RESET MONITOR
25.6KC PPS SET MONITOR
28V 800 CPS 5% ∠0° (IRIG) MONITOR
800 PPS SET MONITOR
800 PPS RESET MONITOR
0 VDC IMU
+32 VDC
+12VDC
800CPS 5% ∠90° MONITOR
25.6KC IMU HI MONITOR
25.6KC OPTICS LO
25.6 KC OPTICS HI MONITOR
800 CPS 1% MONITOR
25.6KC IMU LO
800 CPS MOTOR DRIVE
ER 5% 800 CPS
ASSY
-011
45A2J8
IMU POWER AAC FILTER AND MULTIVIBRATOR 800 CPS MODULE ASSY 1007546-011
45A2J7
IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007547-011
45A2J6
FAILURE INDICATOR MODULE ASSY 1007551-011
MASTER
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1009562

F-2

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
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DO NOT SCALE THIS DRAWING
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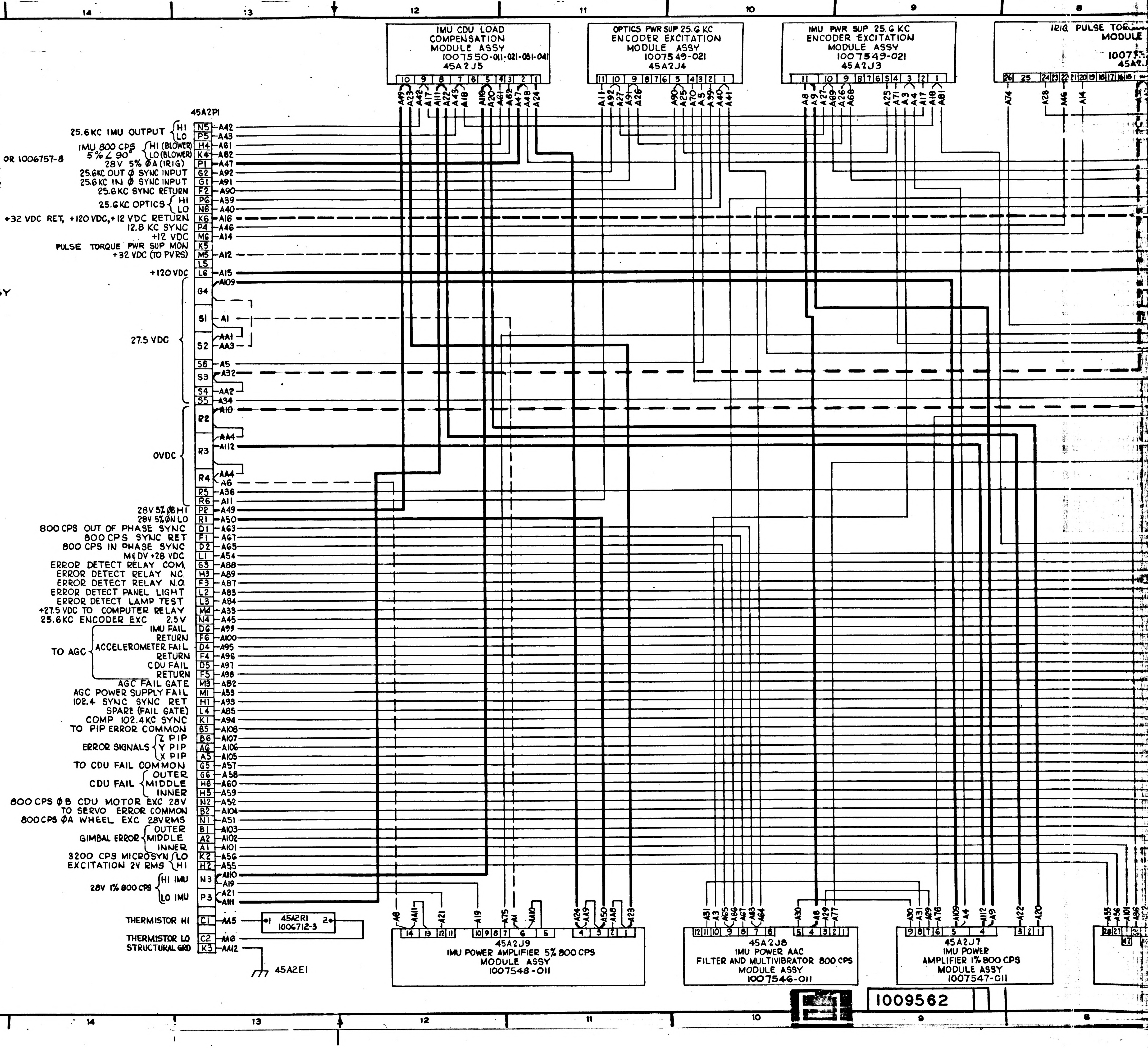
CONTRACT NAS 9-497

AC SPARK PLUG DIVISIO
MILWAUKEE, WISCONSI
ACSP PN
DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. —— INDICATES NO. 24 GAGE WIRE PER 1010848-2 OR 1006757-8
3. ▬▬ INDICATES NO. 20 GAGE WIRE PER 1010848-4
4. ▬ ▬ INDICATES NO. 20 GAGE WIRE PER 1010847-4
5. — — INDICATES NO. 24 GAGE WIRE PER 1010847-2
6. SCHEMATIC DIAGRAMS FOR REFERENCE
   - 1010042 IMU CDU LOAD COMPENSATION
   - 1009527 POWER SUPPLY 25.6 KC
   - 1009532 POWER SUPPLY PULSE TORQUE
   - 1009526 AMPLIFIER 5% 800 CPS.
   - 1010044 AAC FILTER AND MULTIVIBRATOR
   - 1009525 AMPLIFIER 1% 800 CPS
   - 1009528 FAILURE INDICATOR
   - 1009539 BUFFER RESISTORS
   - 1008628 WIRE LIST AA
   - 1008627 WIRING HARNESS A
   - 1007572-011 POWER SUPPLY ELECTRICAL ASSY



16
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H
G
F
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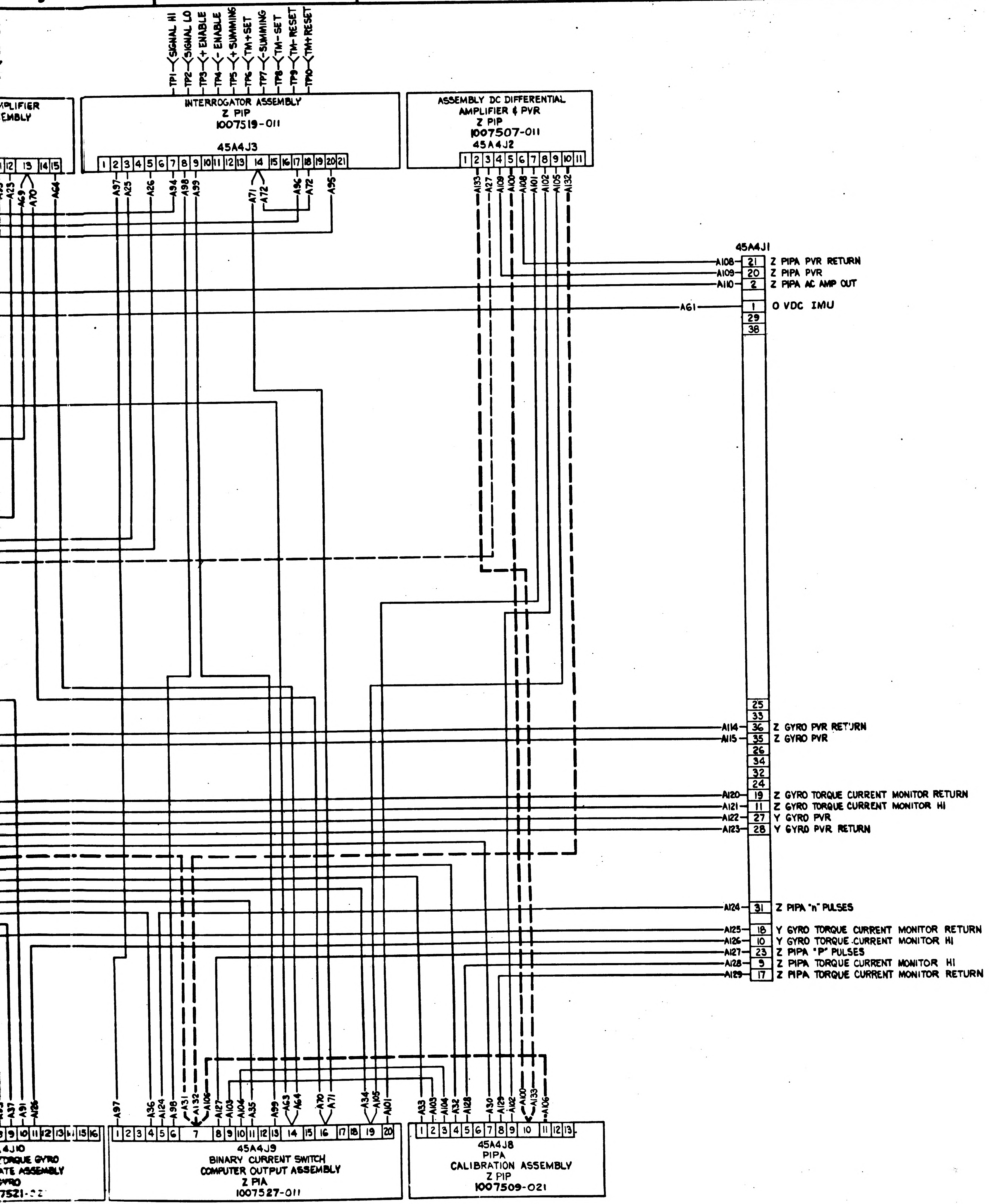
D
C
B
A
IMU CDU LOAD COMPENSATION MODULE ASSY 1007550-011-021-031-041 45A2J5
OPTICS PWR SUP 25.6 KC ENCODER EXCITATION MODULE ASSY 1007549-021 45A2J4
IMU PWR SUP 25.6 KC ENCODER EXCITATION MODULE ASSY 1007549-021 45A2J3
IRIG PULSE TOR MODULE
45A2P1
25.6 KC IMU OUTPUT HI N5 A42
LO P5 A43
IMU 800 CPS 5% ∠ 90° HI (BLOWER) H4 A61
LO (BLOWER) K4 A62
28V 5% ØA (IRIG) P1 A47
25.6 KC OUT Ø SYNC INPUT G2 A92
25.6 KC IN Ø SYNC INPUT G1 A91
25.6 KC SYNC RETURN F2 A90
25.6 KC OPTICS HI P6 A39
LO N6 A40
+32 VDC RET, +120 VDC, +12 VDC RETURN K6 A16
12.8 KC SYNC P4 A46
+12 VDC M6 A14
PULSE TORQUE PWR SUP MON K5
+32 VDC (TO PVRS) M5 A12
L5
+120 VDC L6 A15
27.5 VDC
G4 A109
S1 A1
S2 AA1 AA3
S6 A5
S3 A32
S4 AA2
S5 A34
OVDC
R2 A10
R3 AA4 A112
R4 AA4 A6
R5 A36
R6 A11
28V 5% ØB HI P2 A49
28V 5% ØN LO R1 A50
800 CPS OUT OF PHASE SYNC D1 A63
800 CPS SYNC RET F1 A67
800 CPS IN PHASE SYNC D2 A65
M & DV +28 VDC L1 A54
ERROR DETECT RELAY COM. G3 A88
ERROR DETECT RELAY N.C. H3 A89
ERROR DETECT RELAY N.O. F3 A87
ERROR DETECT PANEL LIGHT L2 A83
ERROR DETECT LAMP TEST L3 A84
+27.5 VDC TO COMPUTER RELAY M4 A33
25.6 KC ENCODER EXC 2.5V N4 A45
TO AGC
IMU FAIL D6 A99
RETURN F6 A100
ACCELEROMETER FAIL D4 A95
RETURN F4 A96
CDU FAIL D5 A97
RETURN F5 A98
AGC FAIL GATE M3 A82
AGC POWER SUPPLY FAIL M1 A53
102.4 SYNC SYNC RET H1 A93
SPARE (FAIL GATE) L4 A85
COMP 102.4 KC SYNC K1 A94
TO PIP ERROR COMMON B5 A108
ERROR SIGNALS Z PIP B6 A107
Y PIP A6 A106
X PIP A5 A105
TO CDU FAIL COMMON G5 A57
CDU FAIL OUTER G6 A58
MIDDLE H6 A60
INNER H5 A59
800 CPS ØB CDU MOTOR EXC 28V N2 A52
TO SERVO ERROR COMMON B2 A104
800 CPS ØA WHEEL EXC 28V RMS N1 A51
GIMBAL ERROR OUTER B1 A103
MIDDLE A2 A102
INNER A1 A101
3200 CPS MICROSYN EXCITATION 2V RMS LO K2 A56
HI H2 A55
28V 1% 800 CPS HI IMU N3 A110 A19
LO IMU P3 A21 A111
THERMISTOR HI C1 AA5
THERMISTOR LO C2 AA6
STRUCTURAL GRD K3 AA12
45A2R1 1006712-3
45A2E1
45A2J9 IMU POWER AMPLIFIER 5% 800 CPS MODULE ASSY 1007548-011
45A2J8 IMU POWER AAC FILTER AND MULTIVIBRATOR 800 CPS MODULE ASSY 1007546-011
45A2J7 IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007547-011

1009562

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD



TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 + ENABLE
TP4 - ENABLE
TP5 + SUMMING
TP6 TM+SET
TP7 -SUMMING
TP8 TM-SET
TP9 TM-RESET
TP10 TM+RESET
MPLIFIER
EMBLY
INTERROGATOR ASSEMBLY
Z PIP
1007519-011
45A4J3
ASSEMBLY DC DIFFERENTIAL
AMPLIFIER & PVR
Z PIP
1007507-011
45A4J2
A23 A69 A70 A64
A97 A25 A26 A94 A98 A99 A71 A72 A96 A72 A95
A133 A27 A109 A100 A108 A101 A102 A105 A132
45A4J1
A108 21 Z PIPA PVR RETURN
A109 20 Z PIPA PVR
A110 2 Z PIPA AC AMP OUT
A61 1 O VDC IMU
29
38
25
33
A114 36 Z GYRO PVR RETURN
A115 35 Z GYRO PVR
26
34
32
24
A120 19 Z GYRO TORQUE CURRENT MONITOR RETURN
A121 11 Z GYRO TORQUE CURRENT MONITOR HI
A122 27 Y GYRO PVR
A123 28 Y GYRO PVR RETURN
A124 31 Z PIPA "n" PULSES
A125 18 Y GYRO TORQUE CURRENT MONITOR RETURN
A126 10 Y GYRO TORQUE CURRENT MONITOR HI
A127 23 Z PIPA "P" PULSES
A128 9 Z PIPA TORQUE CURRENT MONITOR HI
A129 17 Z PIPA TORQUE CURRENT MONITOR RETURN
A37 A91 A126
A97 A36 A124 A98 A31 A132 A106 A127 A103 A104 A35 A99 A63 A64 A70 A71 A34 A105 A101
A33 A103 A104 A32 A128 A30 A129 A102 A100 A133 A106
4J10
TORQUE GYRO
ATE ASSEMBLY
GYRO
7521-
45A4J9
BINARY CURRENT SWITCH
COMPUTER OUTPUT ASSEMBLY
Z PIA
1007527-011
45A4J8
PIPA
CALIBRATION ASSEMBLY
Z PIP
1007509-021
1009564

1007534-011	1007574-011
NEXT ASSY	USED ON
APPLICATION	

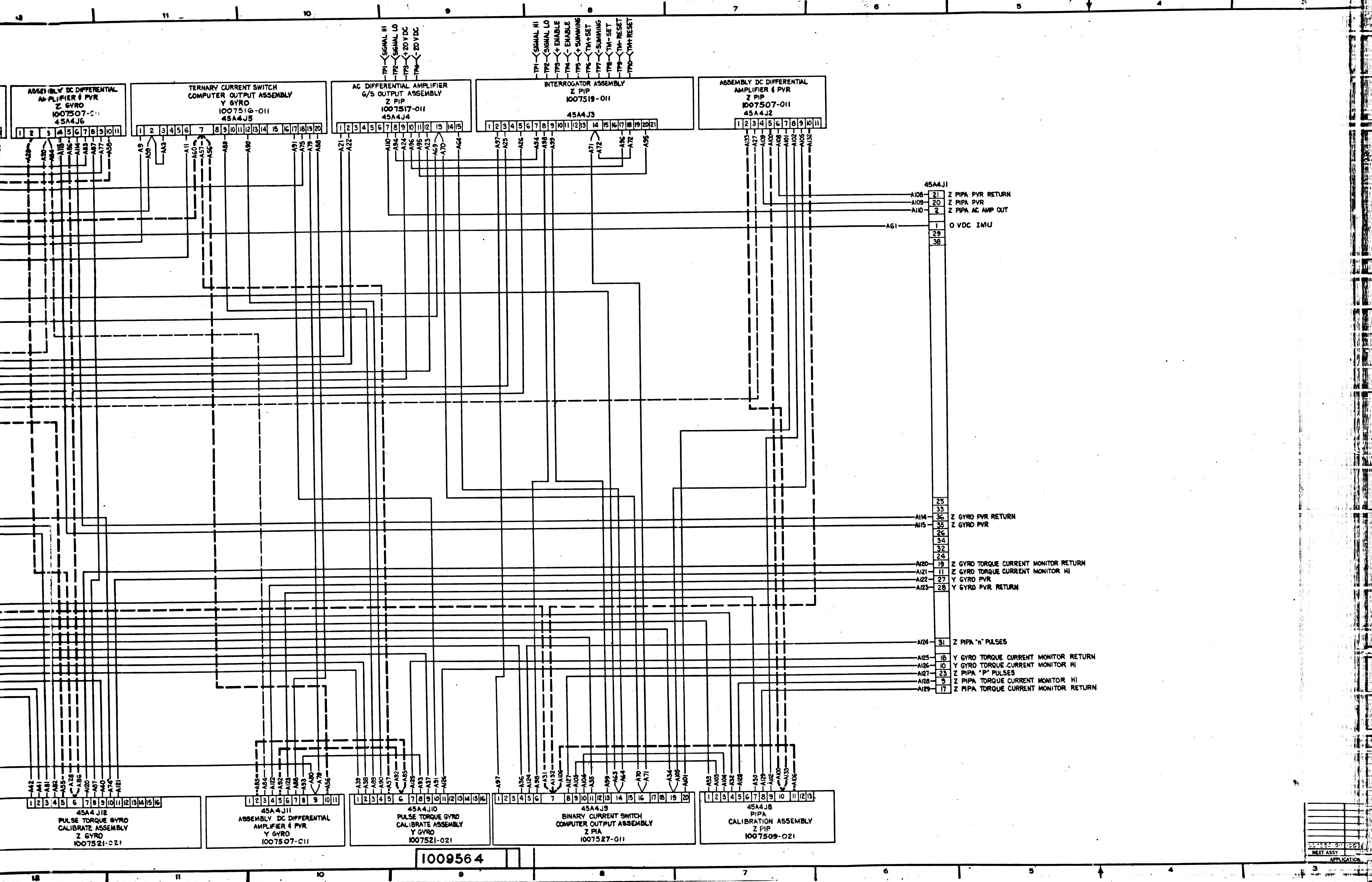
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN H. Fricke DATE 10 Nov 64
CHECKED Zeeler 20 NOV 64
APPROVAL R Oberg 20 Nov 64
APPROVAL Schaible 20 NOV 64
NASA APPROVAL 2-27-64
MIT APPROVAL 23 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 4

CODE IDENT NO.
SIZE J
1009564
SCALE —
SHEET 1 OF 1


ASSEMBLY DC DIFFERENTIAL AMPLIFIER & PVR
Z GYRO
1007507-011
45A4J6
TERNARY CURRENT SWITCH
COMPUTER OUTPUT ASSEMBLY
Y GYRO
1007516-011
45A4J5
AC DIFFERENTIAL AMPLIFIER
G/S OUTPUT ASSEMBLY
Z PIP
1007517-011
45A4J4
TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 +20 V DC
TP4 -20 V DC
INTERROGATOR ASSEMBLY
Z PIP
1007519-011
45A4J3
TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 + ENABLE
TP4 - ENABLE
TP5 + SUMMING
TP6 TM+SET
TP7 -SUMMING
TP8 TM-SET
TP9 TM-RESET
TP10 TM+RESET
ASSEMBLY DC DIFFERENTIAL AMPLIFIER & PVR
Z PIP
1007507-011
45A4J2
45A4J1
A108 21 Z PIPA PVR RETURN
A109 20 Z PIPA PVR
A110 2 Z PIPA AC AMP OUT
A61 1 O VDC IMU
29
38
25
33
A114 36 Z GYRO PVR RETURN
A115 35 Z GYRO PVR
26
34
32
24
A120 19 Z GYRO TORQUE CURRENT MONITOR RETURN
A121 11 Z GYRO TORQUE CURRENT MONITOR HI
A122 27 Y GYRO PVR
A123 28 Y GYRO PVR RETURN
A124 31 Z PIPA "n" PULSES
A125 18 Y GYRO TORQUE CURRENT MONITOR RETURN
A126 10 Y GYRO TORQUE CURRENT MONITOR HI
A127 23 Z PIPA "P" PULSES
A128 9 Z PIPA TORQUE CURRENT MONITOR HI
A129 17 Z PIPA TORQUE CURRENT MONITOR RETURN
45A4 J12
PULSE TORQUE GYRO
CALIBRATE ASSEMBLY
Z GYRO
1007521-021
45A4J11
ASSEMBLY DC DIFFERENTIAL AMPLIFIER & PVR
Y GYRO
1007507-011
45A4J10
PULSE TORQUE GYRO
CALIBRATE ASSEMBLY
Y GYRO
1007521-021
45A4J9
BINARY CURRENT SWITCH
COMPUTER OUTPUT ASSEMBLY
Z PIA
1007527-011
45A4J8
PIPA
CALIBRATION ASSEMBLY
Z PIP
1007509-021
12
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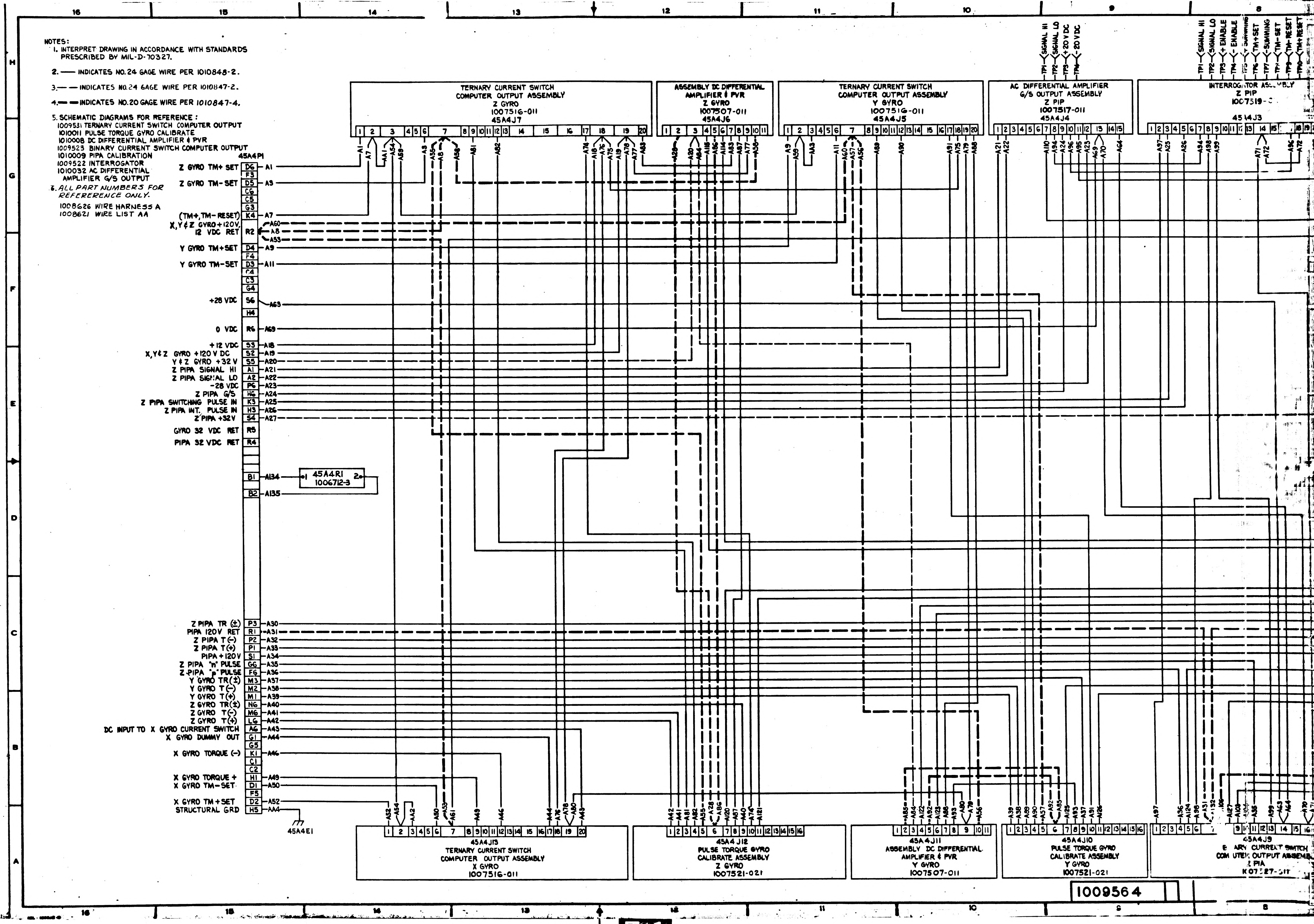
NEXT ASSY
APPLICATION

1009564

E-2



NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. —— INDICATES NO. 24 GAGE WIRE PER 1010848-2.
3. — — INDICATES NO. 24 GAGE WIRE PER 1010847-2.
4. ▬ ▬ INDICATES NO. 20 GAGE WIRE PER 1010847-4.
5. SCHEMATIC DIAGRAMS FOR REFERENCE:
   1009531 TERNARY CURRENT SWITCH COMPUTER OUTPUT
   1010011 PULSE TORQUE GYRO CALIBRATE
   1010008 DC DIFFERENTIAL AMPLIFIER & PVR
   1009523 BINARY CURRENT SWITCH COMPUTER OUTPUT
   1010009 PIPA CALIBRATION
   1009522 INTERROGATOR
   1010032 AC DIFFERENTIAL AMPLIFIER G/S OUTPUT
6. *ALL PART NUMBERS FOR REFEREERENCE ONLY.*

1008626 WIRE HARNESS A
1008621 WIRE LIST AA

45A4P1
Z GYRO TM+ SET D6 A1
F3
Z GYRO TM- SET D5 A3
C6
C5
G3
(TM+, TM- RESET) K4 A7
X, Y & Z GYRO +120V, 12 VDC RET R2 A60 A8 A53
Y GYRO TM+SET D4 A9
F4
Y GYRO TM-SET D3 A11
C4
C3
G4
+28 VDC S6 A63
H4
0 VDC R6 A69
+12 VDC S3 A18
X, Y & Z GYRO +120 V DC S2 A19
Y & Z GYRO +32 V S5 A20
Z PIPA SIGNAL HI A1 A21
Z PIPA SIGNAL LO A2 A22
-28 VDC P6 A23
Z PIPA G/S H6 A24
Z PIPA SWITCHING PULSE IN K3 A25
Z PIPA INT. PULSE IN H3 A26
Z PIPA +32V S4 A27
GYRO 32 VDC RET R5
PIPA 32 VDC RET R4
B1 A134
45A4R1 1006712-3
B2 A135
Z PIPA TR (±) P3 A30
PIPA 120V RET R1 A31
Z PIPA T(-) P2 A32
Z PIPA T(+) P1 A33
PIPA +120V S1 A34
Z PIPA "n" PULSE G6 A35
Z PIPA "p" PULSE F6 A36
Y GYRO TR(±) M3 A37
Y GYRO T(-) M2 A38
Y GYRO T(+) M1 A39
Z GYRO TR(±) N6 A40
Z GYRO T(-) M6 A41
Z GYRO T(+) L6 A42
DC INPUT TO X GYRO CURRENT SWITCH A6 A43
X GYRO DUMMY OUT G1 A44
G5
X GYRO TORQUE (-) K1 A46
C1
C2
X GYRO TORQUE + H1 A49
X GYRO TM-SET D1 A50
F5
X GYRO TM+SET D2 A52
STRUCTURAL GRD H5 AA4
45A4E1
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSEMBLY Z GYRO 1007516-011 45A4J7
ASSEMBLY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007507-011 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSEMBLY Y GYRO 1007516-011 45A4J5
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSEMBLY Z PIP 1007517-011 45A4J4
TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 +20 V DC
TP4 -20 V DC
INTERROGATOR ASSEMBLY Z PIP 1007519- 45A4J3
TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 + ENABLE
TP4 - ENABLE
TP5 + SUMMING
TP6 TM+SET
TP7 -SUMMING
TP8 TM-SET
TP9 TM-RESET
TP10 TM+RESET
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSEMBLY X GYRO 1007516-011
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSEMBLY Z GYRO 1007521-021
45A4J11 ASSEMBLY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007507-011
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSEMBLY Y GYRO 1007521-021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEMBLY Z PIA 1007527-011
1009564
16
15
14
13
12
11
10
9
8
H
G
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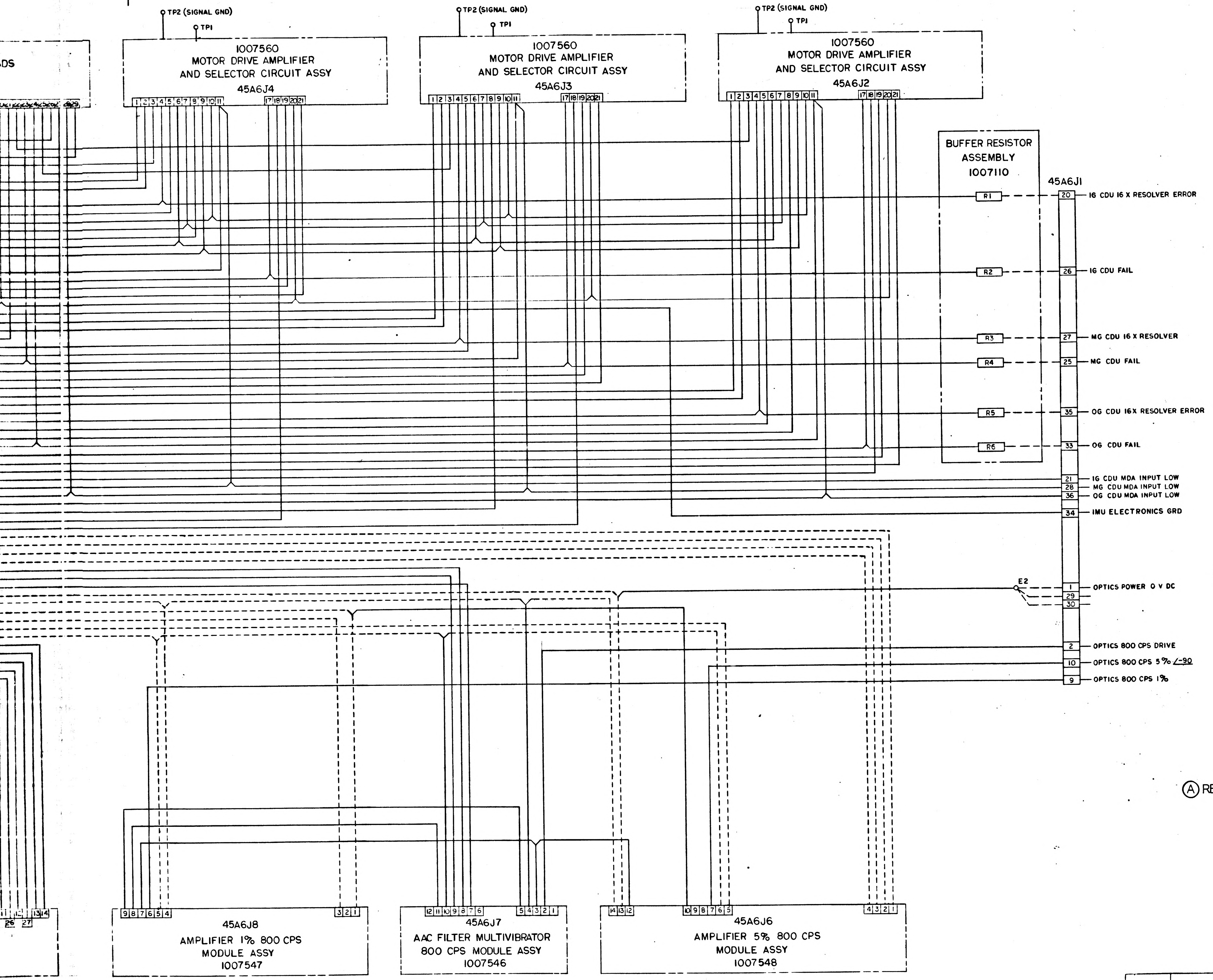
REVISIONS 13099

SYM	DESCRIPTION	DATE	APPROVAL
A	REPLACED WITH CHANGE BY REV B PER TDRR 15946	7/3/65	WK



ADS
TP2 (SIGNAL GND)
TP1
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J4
1 2 3 4 5 6 7 8 9 10 11
17 18 19 20 21
TP2 (SIGNAL GND)
TP1
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J3
1 2 3 4 5 6 7 8 9 10 11
17 18 19 20 21
TP2 (SIGNAL GND)
TP1
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J2
1 2 3 4 5 6 7 8 9 10 11
17 18 19 20 21
BUFFER RESISTOR
ASSEMBLY
1007110
R1
R2
R3
R4
R5
R6
45A6J1
20 16 CDU 16 X RESOLVER ERROR
26 IG CDU FAIL
27 MG CDU 16 X RESOLVER
25 MG CDU FAIL
35 OG CDU 16X RESOLVER ERROR
33 OG CDU FAIL
21 IG CDU MDA INPUT LOW
28 MG CDU MDA INPUT LOW
36 OG CDU MDA INPUT LOW
34 IMU ELECTRONICS GRD
E2
1 OPTICS POWER 0 V DC
29
30
2 OPTICS 800 CPS DRIVE
10 OPTICS 800 CPS 5% /-90
9 OPTICS 800 CPS 1%
13 14
26 27
9 8 7 6 5 4
3 2 1
45A6J8
AMPLIFIER 1% 800 CPS
MODULE ASSY
1007547
12 11 10 9 8 7 6
5 4 3 2 1
45A6J7
AAC FILTER MULTIVIBRATOR
800 CPS MODULE ASSY
1007546
14 13 12
10 9 8 7 6 5
4 3 2 1
45A6J6
AMPLIFIER 5% 800 CPS
MODULE ASSY
1007548

Ⓐ REPLACED WITH CHANGE BY REV B

SCHEMATIC REF:
RESOLVER LOADS — 1009501
CDU MOTOR DRIVE AMPL SELECTOR CIRCUIT AND FINE ALIGN RELAY — 1010035
CDU ZEROING TRANSFORMER, RELAYS AND ENTRY RELAYS — 1010056
800 CPS 1% AMPLIFIER —
AAC FILTER AND MULTIVIBRATOR — 1010044
800 CPS 5% AMPLIFIER —

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN W. Horgan DATE 9-4-64
CHECKED
APPROVAL
APPROVAL J. Brown/ART
NASA APPROVAL W J Rhine 8-27-64
MIT APPROVAL 28 Aug 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #6

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1009566
SCALE — | WT — | SHEET 1 OF 1

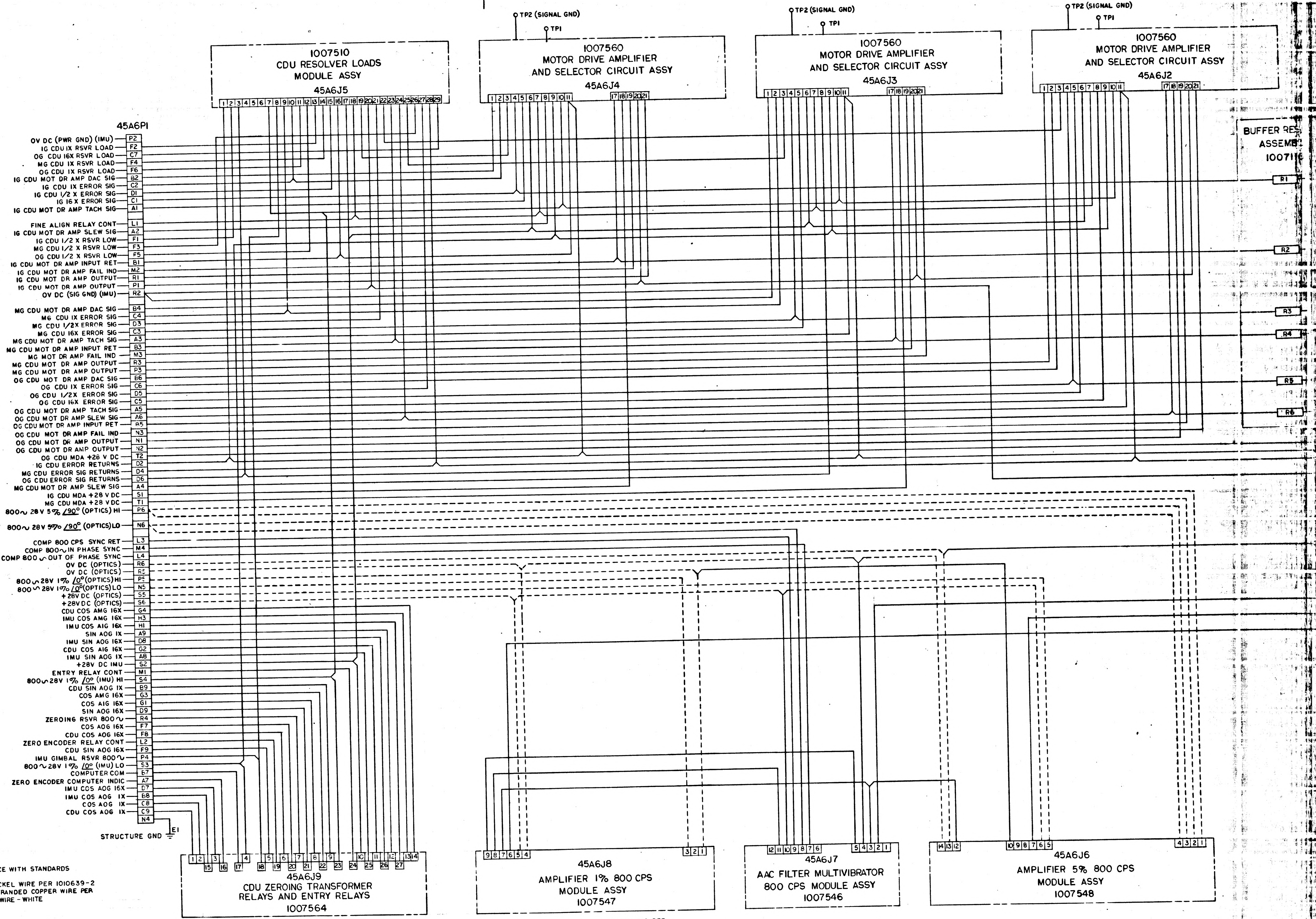
1009566 A

1009566 A

1009566

2H

F-2



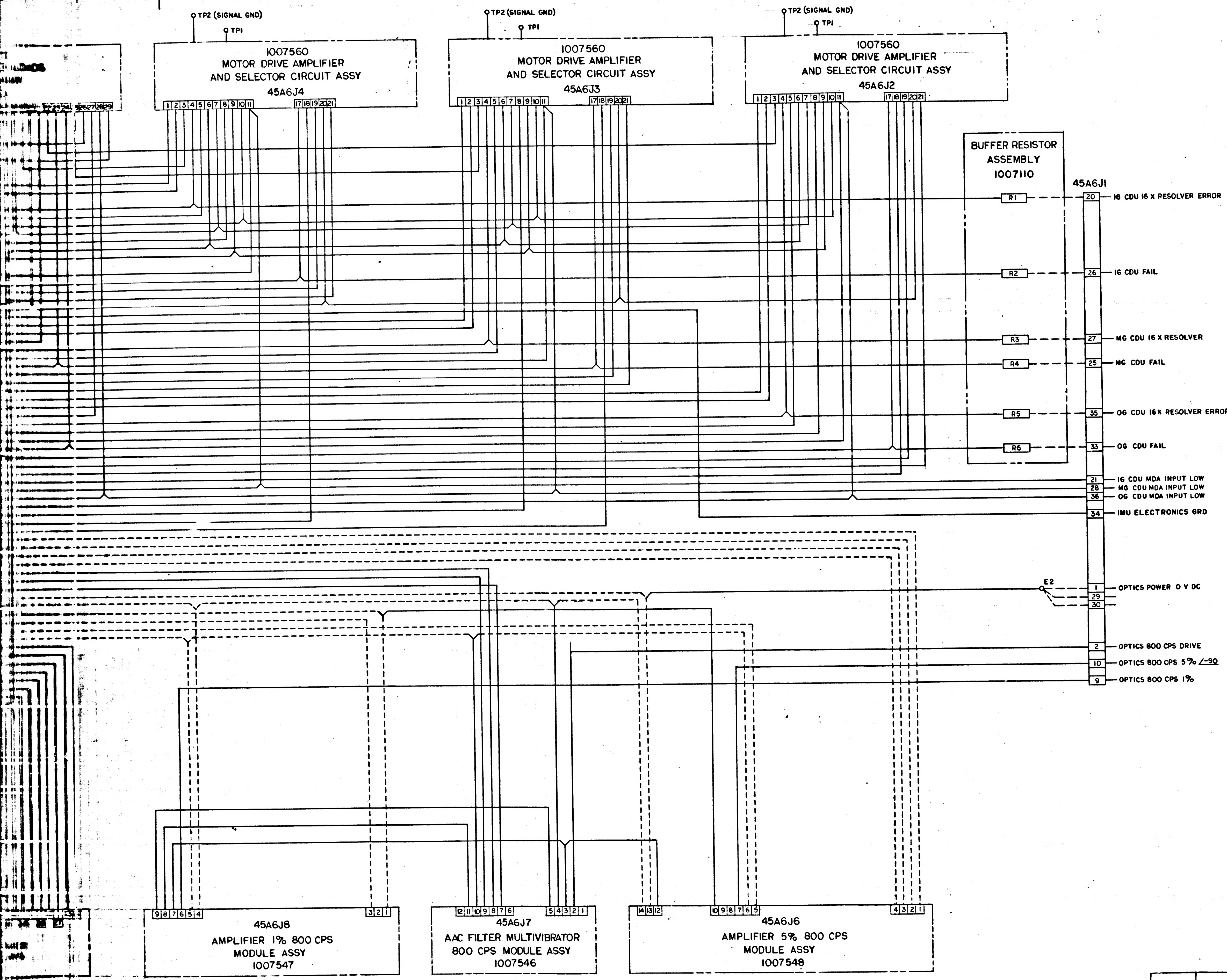
TP2 (SIGNAL GND)
TP1
1007510
CDU RESOLVER LOADS
MODULE ASSY
45A6J5
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J4
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J3
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J2
BUFFER RES
ASSEMB
10071
R1
R2
R3
R4
R5
R6
45A6P1
OV DC (PWR GND) (IMU) — P2
IG CDU 1X RSVR LOAD — F2
OG CDU 16X RSVR LOAD — C7
MG CDU 1X RSVR LOAD — F4
OG CDU 1X RSVR LOAD — F6
IG CDU MOT DR AMP DAC SIG — B2
IG CDU 1X ERROR SIG — C2
IG CDU 1/2 X ERROR SIG — D1
IG 16 X ERROR SIG — C1
IG CDU MOT DR AMP TACH SIG — A1
FINE ALIGN RELAY CONT — L1
IG CDU MOT DR AMP SLEW SIG — A2
IG CDU 1/2 X RSVR LOW — F1
MG CDU 1/2 X RSVR LOW — F3
OG CDU 1/2 X RSVR LOW — F5
IG CDU MOT DR AMP INPUT RET — B1
IG CDU MOT DR AMP FAIL IND — M2
IG CDU MOT DR AMP OUTPUT — R1
IG CDU MOT DR AMP OUTPUT — P1
OV DC (SIG GND) (IMU) — R2
MG CDU MOT DR AMP DAC SIG — B4
MG CDU 1X ERROR SIG — C4
MG CDU 1/2X ERROR SIG — D3
MG CDU 16X ERROR SIG — C3
MG CDU MOT DR AMP TACH SIG — A3
MG CDU MOT DR AMP INPUT RET — B3
MG MOT DR AMP FAIL IND — M3
MG CDU MOT DR AMP OUTPUT — R3
MG CDU MOT DR AMP OUTPUT — P3
OG CDU MOT DR AMP DAC SIG — B6
OG CDU 1X ERROR SIG — C6
OG CDU 1/2X ERROR SIG — D5
OG CDU 16X ERROR SIG — C5
OG CDU MOT DR AMP TACH SIG — A5
OG CDU MOT DR AMP SLEW SIG — A6
OG CDU MOT DR AMP INPUT RET — B5
OG CDU MOT DR AMP FAIL IND — N3
OG CDU MOT DR AMP OUTPUT — N1
OG CDU MOT DR AMP OUTPUT — N2
OG CDU MDA +28 V DC — T2
IG CDU ERROR RETURNS — D2
MG CDU ERROR SIG RETURNS — D4
OG CDU ERROR SIG RETURNS — D6
MG CDU MOT DR AMP SLEW SIG — A4
IG CDU MDA +28 V DC — S1
MG CDU MDA +28 V DC — T1
800~ 28V 5% /90° (OPTICS) HI — P6
800~ 28V 5% /90° (OPTICS) LO — N6
COMP 800 CPS SYNC RET — L3
COMP 800~ IN PHASE SYNC — M4
COMP 800~ OUT OF PHASE SYNC — L4
OV DC (OPTICS) — R6
OV DC (OPTICS) — R5
800~ 28V 1% /0° (OPTICS) HI — P5
800~ 28V 1% /0° (OPTICS) LO — N5
+28V DC (OPTICS) — S5
+28V DC (OPTICS) — S6
CDU COS AMG 16X — G4
IMU COS AMG 16X — H3
IMU COS AIG 16X — H1
SIN AOG 1X — A9
IMU SIN AOG 16X — D8
CDU COS AIG 16X — G2
IMU SIN AOG 1X — A8
+28V DC IMU — S2
ENTRY RELAY CONT — M1
800~ 28V 1% /0° (IMU) HI — S4
CDU SIN AOG 1X — B9
COS AMG 16X — G3
COS AIG 16X — G1
SIN AOG 16X — D9
ZEROING RSVR 800~ — R4
COS AOG 16X — F7
CDU COS AOG 16X — F8
ZERO ENCODER RELAY CONT — L2
CDU SIN AOG 16X — F9
IMU GIMBAL RSVR 800~ — P4
800~ 28V 1% /0° (IMU) LO — S3
COMPUTER COM — B7
ZERO ENCODER COMPUTER INDIC — A7
IMU COS AOG 16X — D7
IMU COS AOG 1X — B8
COS AOG 1X — C8
CDU COS AOG 1X — C9
N4
E1
STRUCTURE GND
45A6J9
CDU ZEROING TRANSFORMER
RELAYS AND ENTRY RELAYS
1007564
45A6J8
AMPLIFIER 1% 800 CPS
MODULE ASSY
1007547
45A6J7
AAC FILTER MULTIVIBRATOR
800 CPS MODULE ASSY
1007546
45A6J6
AMPLIFIER 5% 800 CPS
MODULE ASSY
1007548
6
5
4
3
D
C
B
A

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ——— INDICATES NO. 24 GA NICKEL WIRE PER 1010639-2
3. - - - - - INDICATES NO. 24 GA STRANDED COPPER WIRE PER MIL-W-16878 / 18-24-19 STND. WIRE - WHITE

SCHEMATIC REF:

RESOLVER LOADS — 1009501
CDU MOTOR DRIVE AMPL SELECTOR CIRCUIT AND FINE ALIGN RELAY — 1010035
CDU ZEROING TRANSFORMER, RELAYS AND ENTRY RELAYS — 1010056
800 CPS 1% AMPLIFIER —
AAC FILTER AND MULTIVIBRATOR — 1010044
800 CPS 5% AMPLIFIER —


TP2 (SIGNAL GND)
TP1
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J4
45A6J3
45A6J2
1 2 3 4 5 6 7 8 9 10 11
17 18 19 20 21
BUFFER RESISTOR
ASSEMBLY
1007110
R1
R2
R3
R4
R5
R6
45A6J1
20 IG CDU 16 X RESOLVER ERROR
26 IG CDU FAIL
27 MG CDU 16 X RESOLVER
25 MG CDU FAIL
35 OG CDU 16X RESOLVER ERROR
33 OG CDU FAIL
21 IG CDU MDA INPUT LOW
28 MG CDU MDA INPUT LOW
36 OG CDU MDA INPUT LOW
34 IMU ELECTRONICS GRD
E2
1 OPTICS POWER 0 V DC
29
30
2 OPTICS 800 CPS DRIVE
10 OPTICS 800 CPS 5% ∠-90
9 OPTICS 800 CPS 1%
9 8 7 6 5 4
3 2 1
45A6J8
AMPLIFIER 1% 800 CPS
MODULE ASSY
1007547
12 11 10 9 8 7 6
5 4 3 2 1
45A6J7
AAC FILTER MULTIVIBRATOR
800 CPS MODULE ASSY
1007546
14 13 12
10 9 8 7 6 5
4 3 2 1
45A6J6
AMPLIFIER 5% 800 CPS
MODULE ASSY
1007548
25 26 27 28 29

SCHEMATIC REF:

RESOLVER LOADS — 1009501
CDU MOTOR DRIVE AMPL SELECTOR CIRCUIT AND FINE ALIGN RELAY — 1010035
CDU ZEROING TRANSFORMER, RELAYS AND ENTRY RELAYS — 1010056
800 CPS 1% AMPLIFIER —
AAC FILTER AND MULTIVIBRATOR — 1010044
800 CPS 5% AMPLIFIER —

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN W. Horgan DATE 9-4-64
CHECKED
APPROVAL
APPROVAL J. [illegible]
NASA APPROVAL W. J. [illegible] 2-27-64
MIT APPROVAL

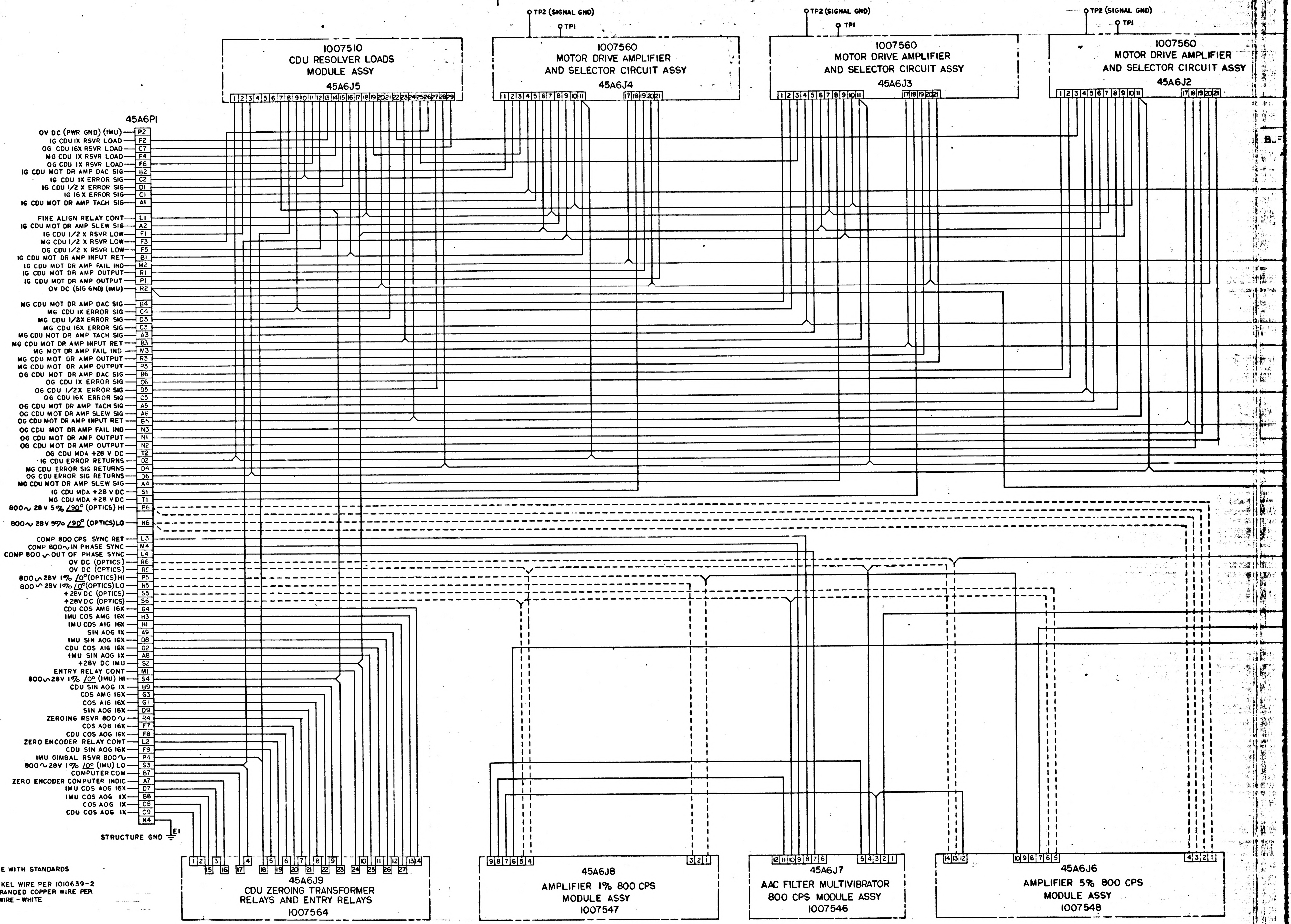
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #6

CODE IDENT NO. SIZE J NASA DRAWING NO. 1009566
SCALE — WT — SHEET 1 OF 1

1009566

2H


TP2 (SIGNAL GND)
TP1
1007510
CDU RESOLVER LOADS
MODULE ASSY
45A6J5
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J4
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J3
1007560
MOTOR DRIVE AMPLIFIER
AND SELECTOR CIRCUIT ASSY
45A6J2
45A6P1
OV DC (PWR GND) (IMU) P2
IG CDU 1X RSVR LOAD F2
OG CDU 16X RSVR LOAD C7
MG CDU 1X RSVR LOAD F4
OG CDU 1X RSVR LOAD F6
IG CDU MOT DR AMP DAC SIG B2
IG CDU 1X ERROR SIG C2
IG CDU 1/2 X ERROR SIG D1
IG 16 X ERROR SIG C1
IG CDU MOT DR AMP TACH SIG A1
FINE ALIGN RELAY CONT L1
IG CDU MOT DR AMP SLEW SIG A2
IG CDU 1/2 X RSVR LOW F1
MG CDU 1/2 X RSVR LOW F3
OG CDU 1/2 X RSVR LOW F5
IG CDU MOT DR AMP INPUT RET B1
IG CDU MOT DR AMP FAIL IND M2
IG CDU MOT DR AMP OUTPUT R1
IG CDU MOT DR AMP OUTPUT P1
OV DC (SIG GND) (IMU) R2
MG CDU MOT DR AMP DAC SIG B4
MG CDU 1X ERROR SIG C4
MG CDU 1/2X ERROR SIG D3
MG CDU 16X ERROR SIG C3
MG CDU MOT DR AMP TACH SIG A3
MG CDU MOT DR AMP INPUT RET B3
MG MOT DR AMP FAIL IND M3
MG CDU MOT DR AMP OUTPUT R3
MG CDU MOT DR AMP OUTPUT P3
OG CDU MOT DR AMP DAC SIG B6
OG CDU 1X ERROR SIG C6
OG CDU 1/2X ERROR SIG D5
OG CDU 16X ERROR SIG C5
OG CDU MOT DR AMP TACH SIG A5
OG CDU MOT DR AMP SLEW SIG A6
OG CDU MOT DR AMP INPUT RET B5
OG CDU MOT DR AMP FAIL IND N3
OG CDU MOT DR AMP OUTPUT N1
OG CDU MOT DR AMP OUTPUT N2
OG CDU MDA +28 V DC T2
IG CDU ERROR RETURNS D2
MG CDU ERROR SIG RETURNS D4
OG CDU ERROR SIG RETURNS D6
MG CDU MOT DR AMP SLEW SIG A4
IG CDU MDA +28 V DC S1
MG CDU MDA +28 V DC T1
800∼ 28V 5% ∠90° (OPTICS) HI P6
800∼ 28V 5% ∠90° (OPTICS) LO N6
COMP 800 CPS SYNC RET L3
COMP 800∼ IN PHASE SYNC M4
COMP 800∼ OUT OF PHASE SYNC L4
OV DC (OPTICS) R6
OV DC (OPTICS) R5
800∼ 28V 1% ∠0° (OPTICS) HI P5
800∼ 28V 1% ∠0° (OPTICS) LO N5
+28V DC (OPTICS) S5
+28V DC (OPTICS) S6
CDU COS AMG 16X G4
IMU COS AMG 16X H3
IMU COS AIG 16X H1
SIN AOG 1X A9
IMU SIN AOG 16X D8
CDU COS AIG 16X G2
IMU SIN AOG 1X A8
+28V DC IMU S2
ENTRY RELAY CONT M1
800∼ 28V 1% ∠0° (IMU) HI S4
CDU SIN AOG 1X B9
COS AMG 16X G3
COS AIG 16X G1
SIN AOG 16X D9
ZEROING RSVR 800∼ R4
COS AOG 16X F7
CDU COS AOG 16X F8
ZERO ENCODER RELAY CONT L2
CDU SIN AOG 16X F9
IMU GIMBAL RSVR 800∼ P4
800∼ 28V 1% ∠0° (IMU) LO S3
COMPUTER COM B7
ZERO ENCODER COMPUTER INDIC A7
IMU COS AOG 16X D7
IMU COS AOG 1X B8
COS AOG 1X C8
CDU COS AOG 1X C9
N4
STRUCTURE GND
E1
45A6J9
CDU ZEROING TRANSFORMER
RELAYS AND ENTRY RELAYS
1007564
45A6J8
AMPLIFIER 1% 800 CPS
MODULE ASSY
1007547
45A6J7
AAC FILTER MULTIVIBRATOR
800 CPS MODULE ASSY
1007546
45A6J6
AMPLIFIER 5% 800 CPS
MODULE ASSY
1007548

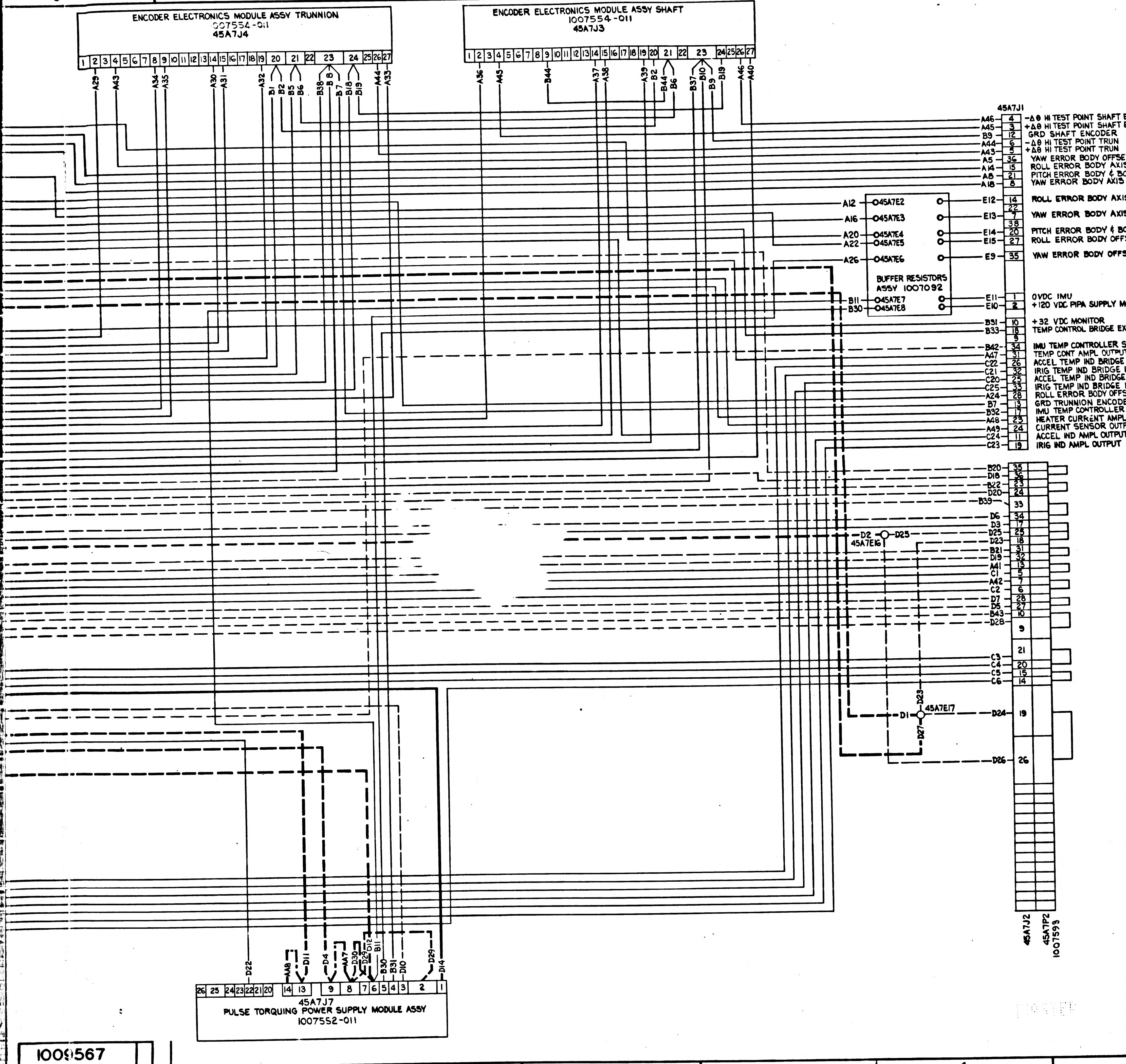
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ———— INDICATES NO. 24 GA NICKEL WIRE PER 1010639-2
3. - - - - - - INDICATES NO. 24 GA STRANDED COPPER WIRE PER MIL-W-16878 / 1B-24-19 STND. WIRE - WHITE

SCHEMATIC REF:

RESOLVER LOADS —— 1009501
CDU MOTOR DRIVE AMPL SELECTOR CIRCUIT AND FINE ALIGN RELAY —— 1010035
CDU ZEROING TRANSFORMER, RELAYS AND ENTRY RELAYS —— 1010056
800 CPS 1% AMPLIFIER ——
AAC FILTER AND MULTIVIBRATOR —— 1010044
800 CPS 5% AMPLIFIER ——

1009566

1009566


ENCODER ELECTRONICS MODULE ASSY TRUNNION
1007554-011
45A7J4
ENCODER ELECTRONICS MODULE ASSY SHAFT
1007554-011
45A7J3
45A7J1
A46 4 -Δθ HI TEST POINT SHAFT ENCODER
A45 3 +Δθ HI TEST POINT SHAFT ENCODER
B9 12 GRD SHAFT ENCODER
A44 6 -Δθ HI TEST POINT TRUN ENCODER
A43 5 +Δθ HI TEST POINT TRUN ENCODER
A5 36 YAW ERROR BODY OFFSET AXIS LO
A14 15 ROLL ERROR BODY AXIS LO
A8 21 PITCH ERROR BODY & BODY OFFSET AXIS LO
A18 8 YAW ERROR BODY AXIS LO
E12 14 ROLL ERROR BODY AXIS HI
22
E13 7 YAW ERROR BODY AXIS HI
38
E14 20 PITCH ERROR BODY & BODY OFFSET AXIS HI
E15 27 ROLL ERROR BODY OFFSET AXIS HI
E9 35 YAW ERROR BODY OFFSET AXIS HI
E11 1 OVDC IMU
E10 2 +120 VDC PIPA SUPPLY MONITOR
B31 10 +32 VDC MONITOR
B33 18 TEMP CONTROL BRIDGE EXC TEST POINT
9
B42 34 IMU TEMP CONTROLLER SIGNAL GRD
A47 31 TEMP CONT AMPL OUTPUT
C22 26 ACCEL TEMP IND BRIDGE HI
C21 32 IRIG TEMP IND BRIDGE LO
C20 25 ACCEL TEMP IND BRIDGE LO
C25 33 IRIG TEMP IND BRIDGE HI
A24 28 ROLL ERROR BODY OFFSET AXIS LO
B7 13 GRD TRUNNION ENCODER
B32 17 IMU TEMP CONTROLLER HEATER GRD
A48 23 HEATER CURRENT AMPL OUTPUT
A49 24 CURRENT SENSOR OUTPUT
C24 11 ACCEL IND AMPL OUTPUT
C23 19 IRIG IND AMPL OUTPUT
A12 45A7E2
A16 45A7E3
A20 45A7E4
A22 45A7E5
A26 45A7E6
B11 45A7E7
B30 45A7E8
BUFFER RESISTORS
ASSY 1007092
B20 35
D18 36
B22 23
D20 24
B39 33
D6 34
D3 17
D25 25
D23 18
B21 31
D19 32
A41 13
C1 5
A42 7
C2 6
D7 28
D5 27
B43 10
D28 9
C3 21
C4 20
C5 15
C6 14
D24 19
D26 26
D2 45A7E16 D25
D1 45A7E17 D23 D27
45A7J2
45A7P2
1007593
45A7J7
PULSE TORQUING POWER SUPPLY MODULE ASSY
1007552-011
D22 A48 D11 D4 A47 D30 D29 D12 B11 B30 B31 D10 D29 D14

1007537-011	1007577-011
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN DATE 2 NOV 64
CHECKED W. Tuile 17 Nov. 64
APPROVAL R Dairy 18 Nov 64
APPROVAL Hensley 18 Nov 64
NASA APPROVAL 12-23-64
MIT APPROVAL 22 Dec 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

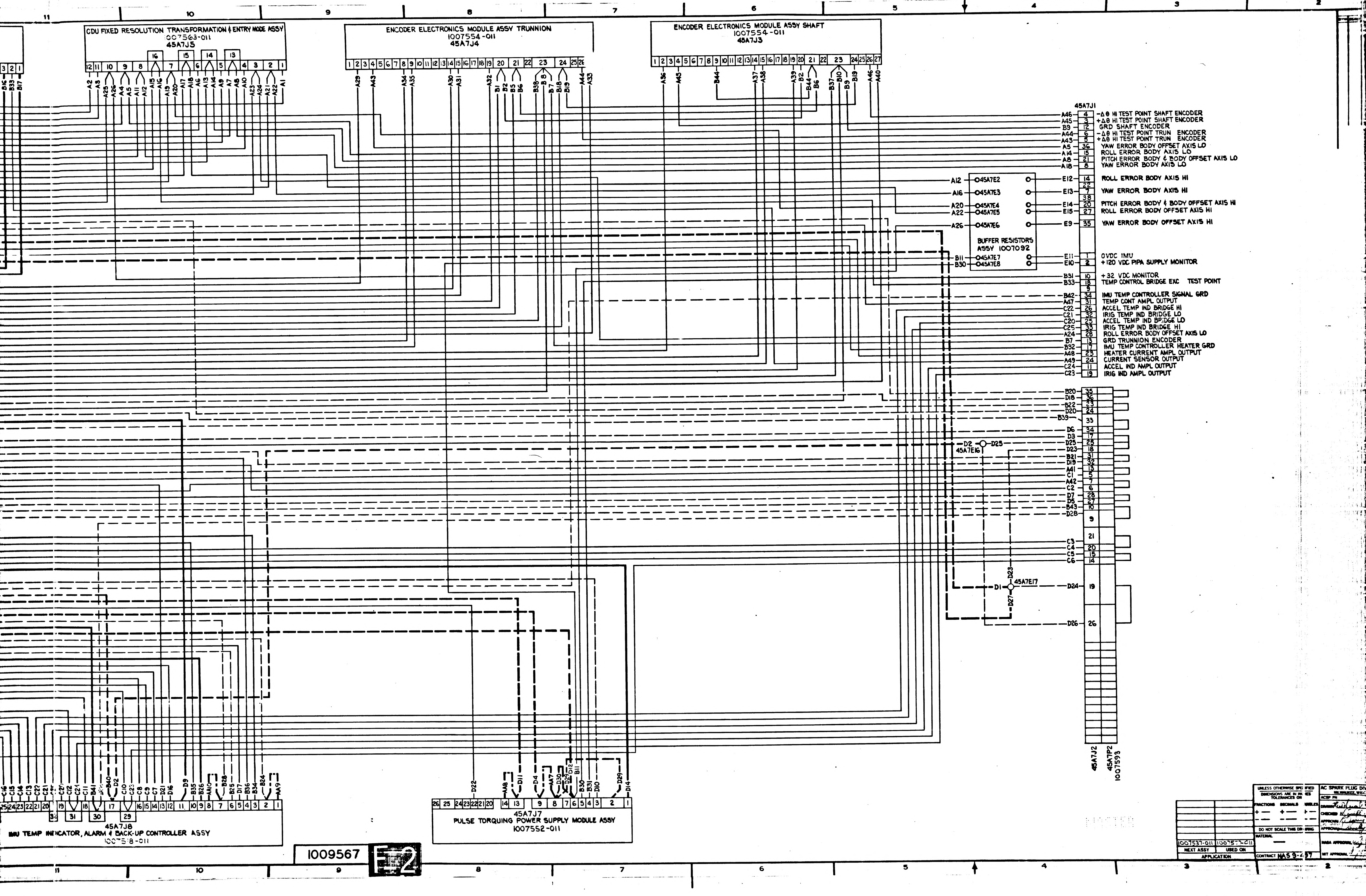
WIRING DIAGRAM
TRAY 7

CODE IDENT NO. SIZE J 1009567
SCALE — SHEET 1 OF 1

REVISIONS
SYM ZONE DESCRIPTION CHG NO DATE APP'D

1009567

1009567


CDU FIXED RESOLUTION TRANSFORMATION & ENTRY MODE ASSY
1007563-011
45A7J5
ENCODER ELECTRONICS MODULE ASSY TRUNNION
1007554-011
45A7J4
ENCODER ELECTRONICS MODULE ASSY SHAFT
1007554-011
45A7J3
45A7J1
A46 4 −Δθ HI TEST POINT SHAFT ENCODER
A45 3 +Δθ HI TEST POINT SHAFT ENCODER
B9 12 GRD SHAFT ENCODER
A44 6 −Δθ HI TEST POINT TRUN ENCODER
A43 5 +Δθ HI TEST POINT TRUN ENCODER
A5 36 YAW ERROR BODY OFFSET AXIS LO
A14 15 ROLL ERROR BODY AXIS LO
A8 21 PITCH ERROR BODY & BODY OFFSET AXIS LO
A18 8 YAW ERROR BODY AXIS LO
A12 45A7E2 E12 14 ROLL ERROR BODY AXIS HI
22
A16 45A7E3 E13 7 YAW ERROR BODY AXIS HI
38
A20 45A7E4 E14 20 PITCH ERROR BODY & BODY OFFSET AXIS HI
A22 45A7E5 E15 27 ROLL ERROR BODY OFFSET AXIS HI
A26 45A7E6 E9 35 YAW ERROR BODY OFFSET AXIS HI
BUFFER RESISTORS ASSY 1007092
B11 45A7E7 E11 1 0VDC IMU
B30 45A7E8 E10 2 +120 VDC PIPA SUPPLY MONITOR
B31 10 +32 VDC MONITOR
B33 18 TEMP CONTROL BRIDGE EXC TEST POINT
9
B42 34 IMU TEMP CONTROLLER SIGNAL GRD
A47 31 TEMP CONT AMPL OUTPUT
C22 26 ACCEL TEMP IND BRIDGE HI
C21 32 IRIG TEMP IND BRIDGE LO
C20 25 ACCEL TEMP IND BRIDGE LO
C25 33 IRIG TEMP IND BRIDGE HI
A24 28 ROLL ERROR BODY OFFSET AXIS LO
B7 13 GRD TRUNNION ENCODER
B32 17 IMU TEMP CONTROLLER HEATER GRD
A48 23 HEATER CURRENT AMPL OUTPUT
A49 24 CURRENT SENSOR OUTPUT
C24 11 ACCEL IND AMPL OUTPUT
C23 19 IRIG IND AMPL OUTPUT
B20 35
D18 36
B22 23
D20 24
B39 33
D6 34
D3 17
D2 45A7E16 D25 25
D23 18
B21 31
D19 32
A41 13
C1 5
A42 7
C2 6
D7 28
D5 27
B43 10
D28 9
21
C3 3
C4 20
C5 15
C6 14
D1 45A7E17 D23 D27 D24 19
D26 26
45A7J2
45A7P2
1007593
45A7J8
IMU TEMP INDICATOR, ALARM & BACK-UP CONTROLLER ASSY
1007518-011
45A7J7
PULSE TORQUING POWER SUPPLY MODULE ASSY
1007552-011
1009567
E2
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
1007537-011
1007572-011
NEXT ASSY
USED ON
APPLICATION
CONTRACT NAS 9-497
AC SPARK PLUG DIV
MILWAUKEE, WISC
ACSP PN
DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
11 10 9 8 7 6 5 4 3 2

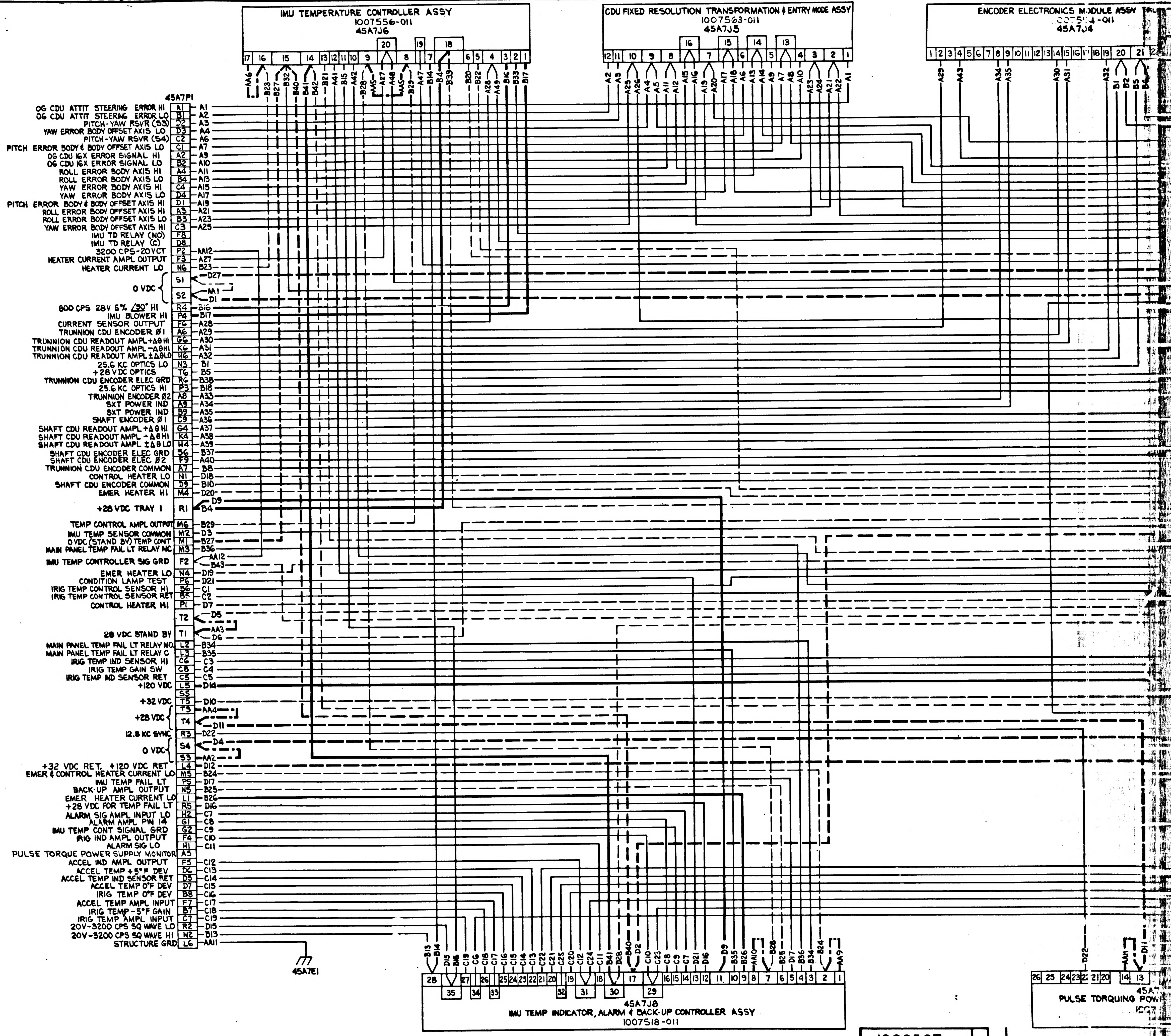
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ——INDICATES NO. 24 GAGE WIRE PER 1010848-2.
3. ━━INDICATES NO. 20 GAGE WIRE PER 1010848-4.
4. ━ ━INDICATES NO. 20 GAGE WIRE PER 1010847-4.
5. — —INDICATES NO. 24 GAGE WIRE PER 1010847-2.
6. —‑‑—INDICATES .020 DIA WIRE PER 1006757-8.
7. ━‑━INDICATES .032 DIA WIRE PER 1006757-9.
8. SCHEMATICS FOR REFERENCE:

1010034	ENCODER ELECTRONICS
1010057	FIXED RESOLUTION TRANSFORMATION AND ENTRY MODE
1009530	IMU TEMP CONTROLLER
1009532	PULSE TORQUING POWER SUPPLY (PIPA & PULSE TORQUED GYRO)
1010140	IMU TEMP INDICATOR ALARM AND BACK-UP CONTROLLER
1010089	BUFFER

9. PART NUMBERS ARE FOR REFERENCE ONLY.
10. DRAWINGS FOR REFERENCE:

1007537	FRAME ASSEMBLY-TRAY 7
1008629	WIRING HARNESS "A"
1008630	WIRING HARNESS "B"
1008631	WIRING HARNESS "C"
1008632	WIRING HARNESS "D"
1008633	WIRE LIST "AA"


IMU TEMPERATURE CONTROLLER ASSY
1007556-011
45A7J6
CDU FIXED RESOLUTION TRANSFORMATION & ENTRY MODE ASSY
1007563-011
45A7J5
ENCODER ELECTRONICS MODULE ASSY
45A7J4
45A7P1
OG CDU ATTIT STEERING ERROR HI A1 A1
OG CDU ATTIT STEERING ERROR LO B1 A2
PITCH-YAW RSVR (S3) D2 A3
YAW ERROR BODY OFFSET AXIS LO D3 A4
PITCH-YAW RSVR (S4) C2 A6
PITCH ERROR BODY & BODY OFFSET AXIS LO C1 A7
OG CDU 16X ERROR SIGNAL HI A2 A9
OG CDU 16X ERROR SIGNAL LO B2 A10
ROLL ERROR BODY AXIS HI A4 A11
ROLL ERROR BODY AXIS LO B4 A13
YAW ERROR BODY AXIS HI C4 A15
YAW ERROR BODY AXIS LO D4 A17
PITCH ERROR BODY & BODY OFFSET AXIS HI D1 A19
ROLL ERROR BODY OFFSET AXIS HI A3 A21
ROLL ERROR BODY OFFSET AXIS LO B3 A23
YAW ERROR BODY OFFSET AXIS HI C3 A25
IMU TD RELAY (NO) F8
IMU TD RELAY (C) D8
3200 CPS-20VCT P2 AA12
HEATER CURRENT AMPL OUTPUT F3 A27
HEATER CURRENT LO N6 B23
0 VDC S1 S2 D27 AA1 D1
800 CPS 28V 5% ∠90° HI R4 B16
IMU BLOWER HI P4 B17
CURRENT SENSOR OUTPUT F6 A28
TRUNNION CDU ENCODER Ø1 A6 A29
TRUNNION CDU READOUT AMPL+Δθ HI G6 A30
TRUNNION CDU READOUT AMPL-Δθ HI K6 A31
TRUNNION CDU READOUT AMPL±Δθ LO H6 A32
25.6 KC OPTICS LO N3 B1
+28 VDC OPTICS T6 B5
TRUNNION CDU ENCODER ELEC GRD R6 B38
25.6 KC OPTICS HI P3 B18
TRUNNION ENCODER Ø2 A8 A33
SXT POWER IND A9 A34
SXT POWER IND B9 A35
SHAFT ENCODER Ø1 C9 A36
SHAFT CDU READOUT AMPL +Δθ HI G4 A37
SHAFT CDU READOUT AMPL -Δθ HI K4 A38
SHAFT CDU READOUT AMPL ±Δθ LO H4 A39
SHAFT CDU ENCODER ELEC GRD S6 B37
SHAFT CDU ENCODER ELEC Ø2 F9 A40
TRUNNION CDU ENCODER COMMON A7 B8
CONTROL HEATER LO N1 D18
SHAFT CDU ENCODER COMMON D9 B10
EMER HEATER HI M4 D20
+28 VDC TRAY 1 R1 D9 B4
TEMP CONTROL AMPL OUTPUT M6 B29
IMU TEMP SENSOR COMMON M2 D3
0 VDC (STAND BY) TEMP CONT M1 B27
MAIN PANEL TEMP FAIL LT RELAY NC M3 B36
IMU TEMP CONTROLLER SIG GRD F2 AA12 B43
EMER HEATER LO N4 D19
CONDITION LAMP TEST P6 D21
IRIG TEMP CONTROL SENSOR HI B6 C1
IRIG TEMP CONTROL SENSOR RET B5 C2
CONTROL HEATER HI P1 D7
T2 D5
28 VDC STAND BY T1 AA3 D6
MAIN PANEL TEMP FAIL LT RELAY NO. L2 B34
MAIN PANEL TEMP FAIL LT RELAY C L3 B35
IRIG TEMP IND SENSOR HI C6 C3
IRIG TEMP GAIN SW C8 C4
IRIG TEMP IND SENSOR RET C5 C5
+120 VDC L5 D14
S5
+32 VDC T5 D10
+28 VDC T3 T4 AA4 D11
12.8 KC SYNC R3 D22
0 VDC S4 S3 D4 AA2
+32 VDC RET, +120 VDC RET L4 D12
EMER & CONTROL HEATER CURRENT LO M5 B24
IMU TEMP FAIL LT P5 D17
BACK-UP AMPL OUTPUT N5 B25
EMER HEATER CURRENT LO L1 B26
+28 VDC FOR TEMP FAIL LT R5 D16
ALARM SIG AMPL INPUT LO H2 C7
ALARM AMPL PIN 14 G1 C8
IMU TEMP CONT SIGNAL GRD G2 C9
IRIG IND AMPL OUTPUT F4 C10
ALARM SIG LO H1 C11
PULSE TORQUE POWER SUPPLY MONITOR A5
ACCEL IND AMPL OUTPUT F5 C12
ACCEL TEMP +5°F DEV D6 C13
ACCEL TEMP IND SENSOR RET D5 C14
ACCEL TEMP 0°F DEV D7 C15
IRIG TEMP 0°F DEV B8 C16
ACCEL TEMP AMPL INPUT F7 C17
IRIG TEMP -5°F GAIN B7 C18
IRIG TEMP AMPL INPUT C7 C19
20V-3200 CPS SQ WAVE LO R2 D15
20V-3200 CPS SQ WAVE HI N2 B13
STRUCTURE GRD L6 AA11
45A7E1
45A7J8
IMU TEMP INDICATOR, ALARM & BACK-UP CONTROLLER ASSY
1007518-011
PULSE TORQUING POW
16 15 14 13 12 11 10 9 8
H G F E D C B A

1009568 A

SYM	DESCRIPTION	DATE	APPROVAL
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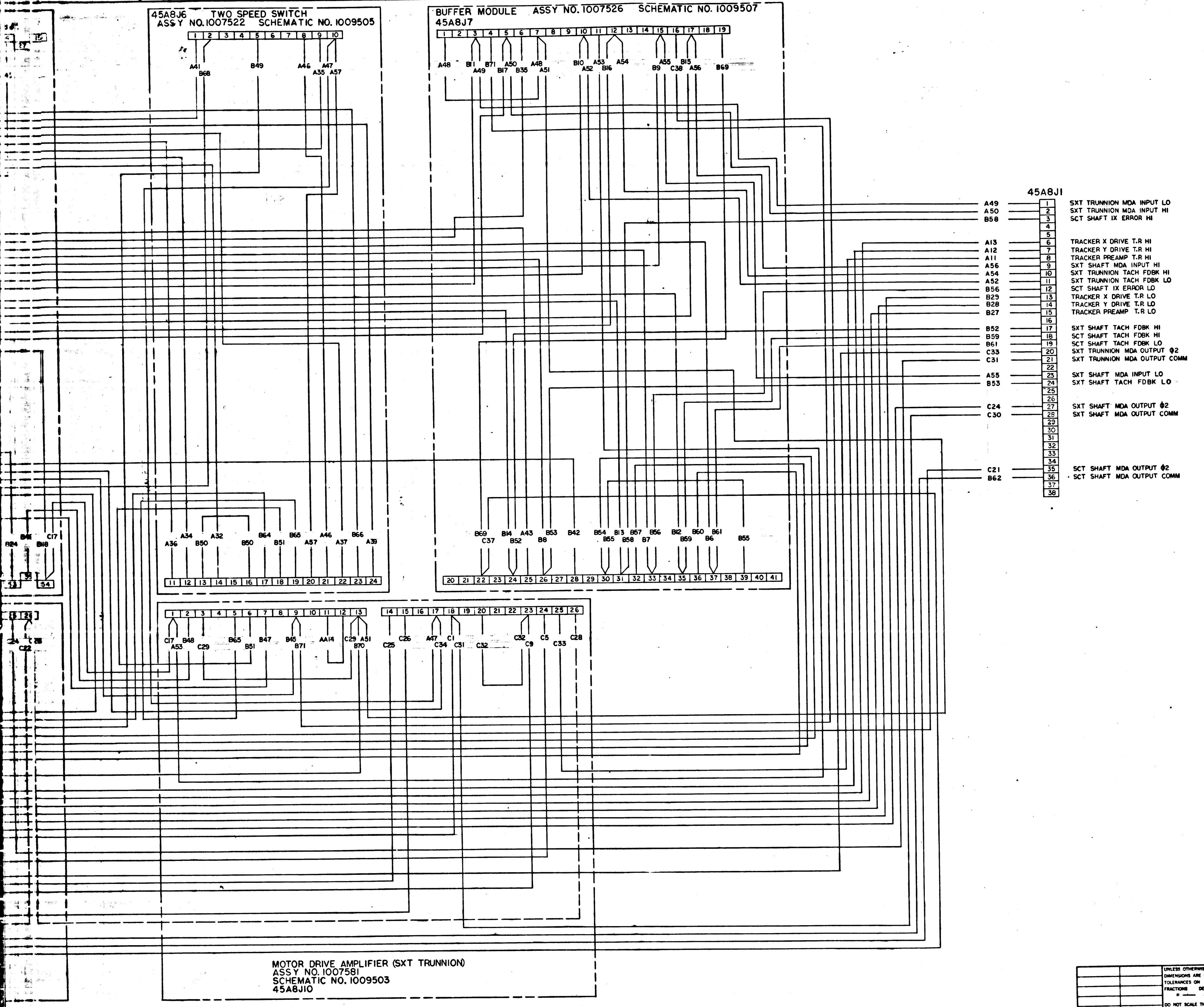


45A8J6 TWO SPEED SWITCH
ASSY NO. 1007522 SCHEMATIC NO. 1009505
BUFFER MODULE ASSY NO. 1007526 SCHEMATIC NO. 1009507
45A8J7
45A8J1
A49 1 SXT TRUNNION MDA INPUT LO
A50 2 SXT TRUNNION MDA INPUT HI
B58 3 SCT SHAFT IX ERROR HI
4
5
A13 6 TRACKER X DRIVE T.P HI
A12 7 TRACKER Y DRIVE T.P HI
A11 8 TRACKER PREAMP T.P HI
A56 9 SXT SHAFT MDA INPUT HI
A54 10 SXT TRUNNION TACH FDBK HI
A52 11 SXT TRUNNION TACH FDBK LO
B56 12 SCT SHAFT IX ERROR LO
B29 13 TRACKER X DRIVE T.P LO
B28 14 TRACKER Y DRIVE T.P LO
B27 15 TRACKER PREAMP T.P LO
16
B52 17 SXT SHAFT TACH FDBK HI
B59 18 SCT SHAFT TACH FDBK HI
B61 19 SCT SHAFT TACH FDBK LO
C33 20 SXT TRUNNION MDA OUTPUT ϕ2
C31 21 SXT TRUNNION MDA OUTPUT COMM
22
A55 23 SXT SHAFT MDA INPUT LO
B53 24 SXT SHAFT TACH FDBK LO
25
26
C24 27 SXT SHAFT MDA OUTPUT ϕ2
C30 28 SXT SHAFT MDA OUTPUT COMM
29
30
31
32
33
34
C21 35 SCT SHAFT MDA OUTPUT ϕ2
B62 36 SCT SHAFT MDA OUTPUT COMM
37
38
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J10

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY	USED ON
1007538	

APPLICATION

MIT INSTRUMENTATION LAB CAMBRIDGE MASS

DRAWN J.F. Walsh DATE 15 Sep 64
CHECKED
APPROVAL John Green 1964
APPROVAL
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D Hoag 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

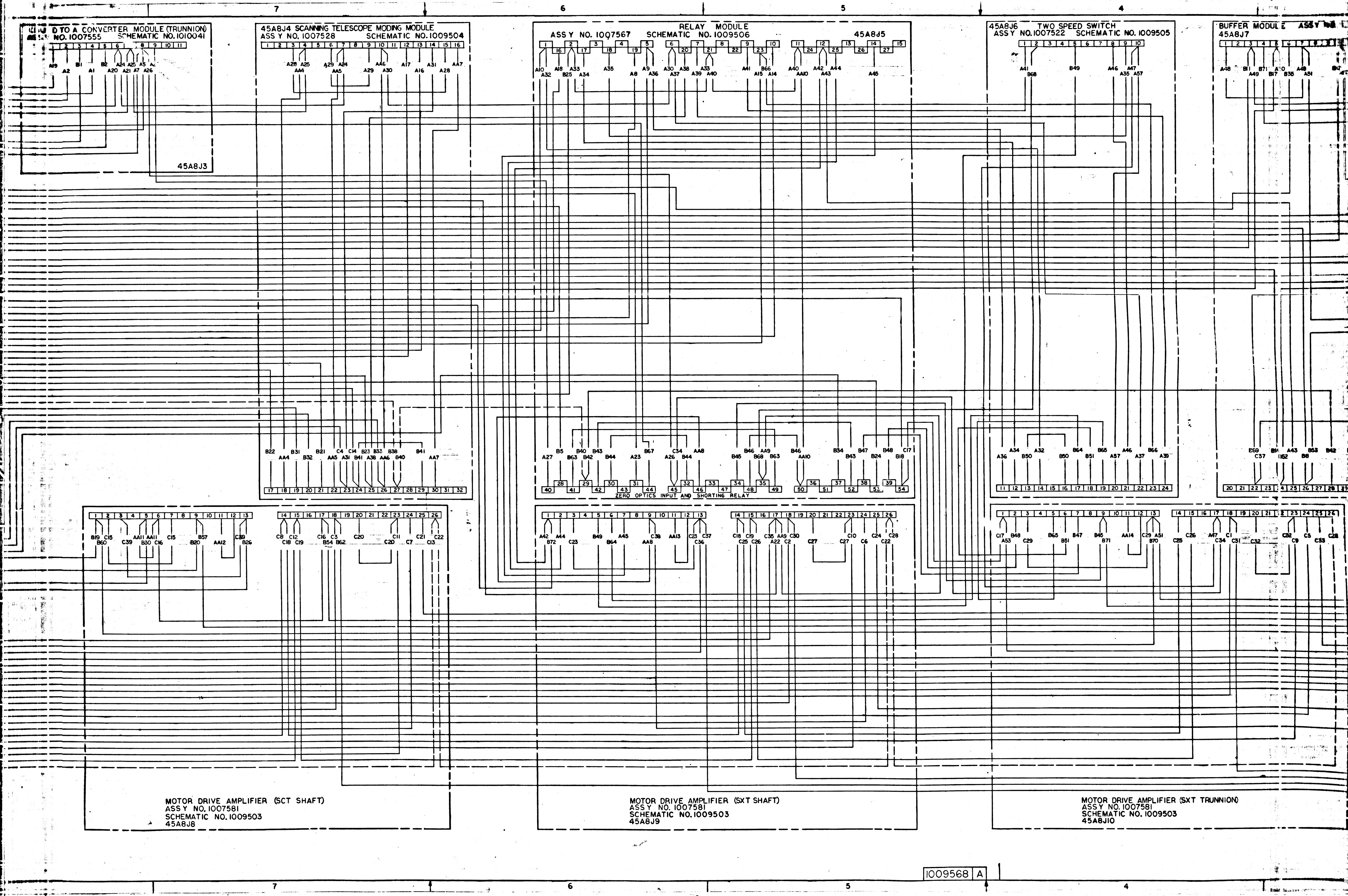
WIRING DIAGRAM TRAY 8

CODE IDENT NO. —— SIZE J NASA DRAWING NO. 1009568
SCALE NONE WT —— SHEET 1 OF 1

1009568 A

MASTER

(3H)


7
6
5
4
D TO A CONVERTER MODULE (TRUNNION)
NO. 1007555 SCHEMATIC NO. 1010041
45A8J3
45A8J4 SCANNING TELESCOPE MODING MODULE
ASS'Y NO. 1007528 SCHEMATIC NO. 1009504
RELAY MODULE
ASS'Y NO. 1007567 SCHEMATIC NO. 1009506
45A8J5
45A8J6 TWO SPEED SWITCH
ASS'Y NO. 1007522 SCHEMATIC NO. 1009505
BUFFER MODULE
45A8J7
ZERO OPTICS INPUT AND SHORTING RELAY
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
ASS'Y NO. 1007581
SCHEMATIC NO. 1009503
45A8J8
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
ASS'Y NO. 1007581
SCHEMATIC NO. 1009503
45A8J9
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
ASS'Y NO. 1007581
SCHEMATIC NO. 1009503
45A8J10
7
6
5
4

1009568 A

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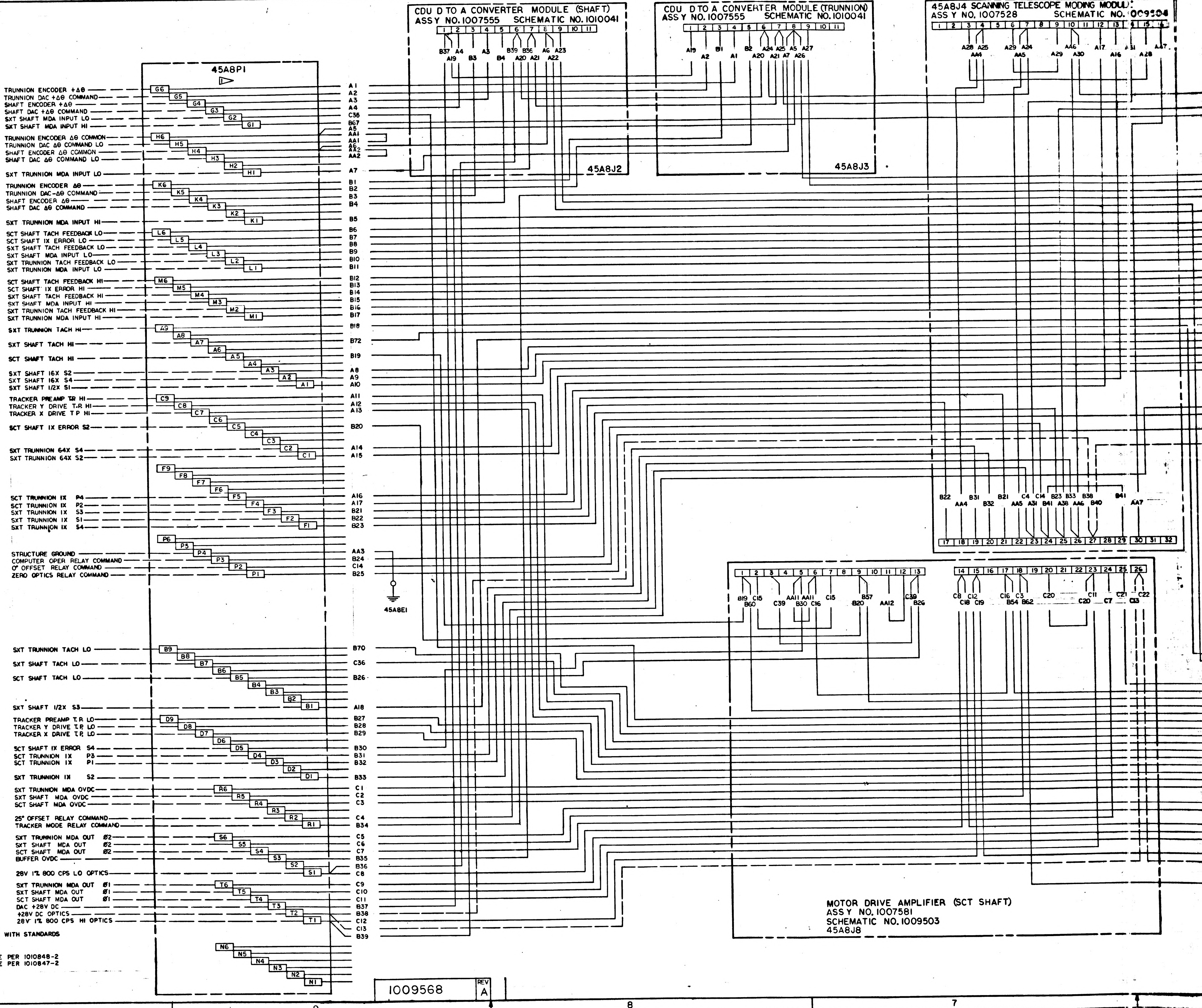

10
9
8
7
D
C
B
A
45A8P1
TRUNNION ENCODER +Δθ
TRUNNION DAC +Δθ COMMAND
SHAFT ENCODER +Δθ
SHAFT DAC +Δθ COMMAND
SXT SHAFT MDA INPUT LO
SXT SHAFT MDA INPUT HI
TRUNNION ENCODER Δθ COMMON
TRUNNION DAC Δθ COMMAND LO
SHAFT ENCODER Δθ COMMON
SHAFT DAC Δθ COMMAND LO
SXT TRUNNION MDA INPUT LO
TRUNNION ENCODER Δθ
TRUNNION DAC-Δθ COMMAND
SHAFT ENCODER Δθ
SHAFT DAC Δθ COMMAND
SXT TRUNNION MDA INPUT HI
SCT SHAFT TACH FEEDBACK LO
SCT SHAFT IX ERROR LO
SXT SHAFT TACH FEEDBACK LO
SXT SHAFT MDA INPUT LO
SXT TRUNNION TACH FEEDBACK LO
SXT TRUNNION MDA INPUT LO
SCT SHAFT TACH FEEDBACK HI
SCT SHAFT IX ERROR HI
SXT SHAFT TACH FEEDBACK HI
SXT SHAFT MDA INPUT HI
SXT TRUNNION TACH FEEDBACK HI
SXT TRUNNION MDA INPUT HI
SXT TRUNNION TACH HI
SXT SHAFT TACH HI
SCT SHAFT TACH HI
SXT SHAFT 16X S2
SXT SHAFT 16X S4
SXT SHAFT 1/2X S1
TRACKER PREAMP T.P. HI
TRACKER Y DRIVE T.P. HI
TRACKER X DRIVE T P HI
SCT SHAFT IX ERROR S2
SXT TRUNNION 64X S4
SXT TRUNNION 64X S2
SCT TRUNNION IX P4
SCT TRUNNION IX P2
SXT TRUNNION IX S3
SXT TRUNNION IX S1
SXT TRUNNION IX S4
STRUCTURE GROUND
COMPUTER OPER RELAY COMMAND
0° OFFSET RELAY COMMAND
ZERO OPTICS RELAY COMMAND
SXT TRUNNION TACH LO
SXT SHAFT TACH LO
SCT SHAFT TACH LO
SXT SHAFT 1/2X S3
TRACKER PREAMP T.P. LO
TRACKER Y DRIVE T.P. LO
TRACKER X DRIVE T.P. LO
SCT SHAFT IX ERROR S4
SCT TRUNNION IX P3
SCT TRUNNION IX P1
SXT TRUNNION IX S2
SXT TRUNNION MDA OVDC
SXT SHAFT MDA OVDC
SCT SHAFT MDA OVDC
25° OFFSET RELAY COMMAND
TRACKER MODE RELAY COMMAND
SXT TRUNNION MDA OUT Ø2
SXT SHAFT MDA OUT Ø2
SCT SHAFT MDA OUT Ø2
BUFFER OVDC
28V 1% 800 CPS LO OPTICS
SXT TRUNNION MDA OUT Ø1
SXT SHAFT MDA OUT Ø1
SCT SHAFT MDA OUT Ø1
DAC +28V DC
+28V DC OPTICS
28V 1% 800 CPS HI OPTICS
G6 G5 G4 G3 G2 G1
H6 H5 H4 H3 H2 H1
K6 K5 K4 K3 K2 K1
L6 L5 L4 L3 L2 L1
M6 M5 M4 M3 M2 M1
A9 A8 A7 A6 A5 A4 A3 A2 A1
C9 C8 C7 C6 C5 C4 C3 C2 C1
F9 F8 F7 F6 F5 F4 F3 F2 F1
P6 P5 P4 P3 P2 P1
B9 B8 B7 B6 B5 B4 B3 B2 B1
D9 D8 D7 D6 D5 D4 D3 D2 D1
R6 R5 R4 R3 R2 R1
S6 S5 S4 S3 S2 S1
T6 T5 T4 T3 T2 T1
N6 N5 N4 N3 N2 N1
A1 A2 A3 A4 C35 B67 A5 AA1 AA1 A6 AA2 AA2 A7
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B72 B19
A8 A9 A10 A11 A12 A13 B20 A14 A15 A16 A17 B21 B22 B23
AA3 B24 C14 B25
45A8E1
B70 C36 B26 A18 B27 B28 B29 B30 B31 B32 B33
C1 C2 C3 C4 B34 C5 C6 C7 B35 B36 C8 C9 C10 C11 B37 B38 C12 C13 B39
CDU D TO A CONVERTER MODULE (SHAFT)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
1 2 3 4 5 6 7 8 9 10 11
B37 A4 A19 B3 A3 B4 B39 B36 A20 A21 A6 A23 A22
45A8J2
CDU D TO A CONVERTER MODULE (TRUNNION)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
1 2 3 4 5 6 7 8 9 10 11
A19 A2 B1 A1 B2 A20 A24 A21 A25 A7 A5 A26 A27
45A8J3
45A8J4 SCANNING TELESCOPE MODING MODUL
ASSY NO. 1007528 SCHEMATIC NO. 009504
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A28 A25 AA4 A29 A24 AA5 A29 AA6 A30 A17 A16 A31 A28 AA7
B22 AA4 B31 B32 B21 C4 AA5 A31 C14 B41 B23 A38 B33 AA6 B38 B40 B41 AA7
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
1 2 3 4 5 6 7 8 9 10 11 12 13
B19 B60 C15 C39 AA11 AA11 B30 C16 C15 B57 B20 AA12 C39 B26
14 15 16 17 18 19 20 21 22 23 24 25 26
C8 C18 C12 C19 C16 C3 B54 B62 C20 C11 C20 C7 C21 C13 C22
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J8

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J18
3. —— INDICATES NO. 24 GAGE WIRE PER 1010848-2
4. — — INDICATES NO. 24 GAGE WIRE PER 1010847-2
5. HARNESS LISTS (REF)

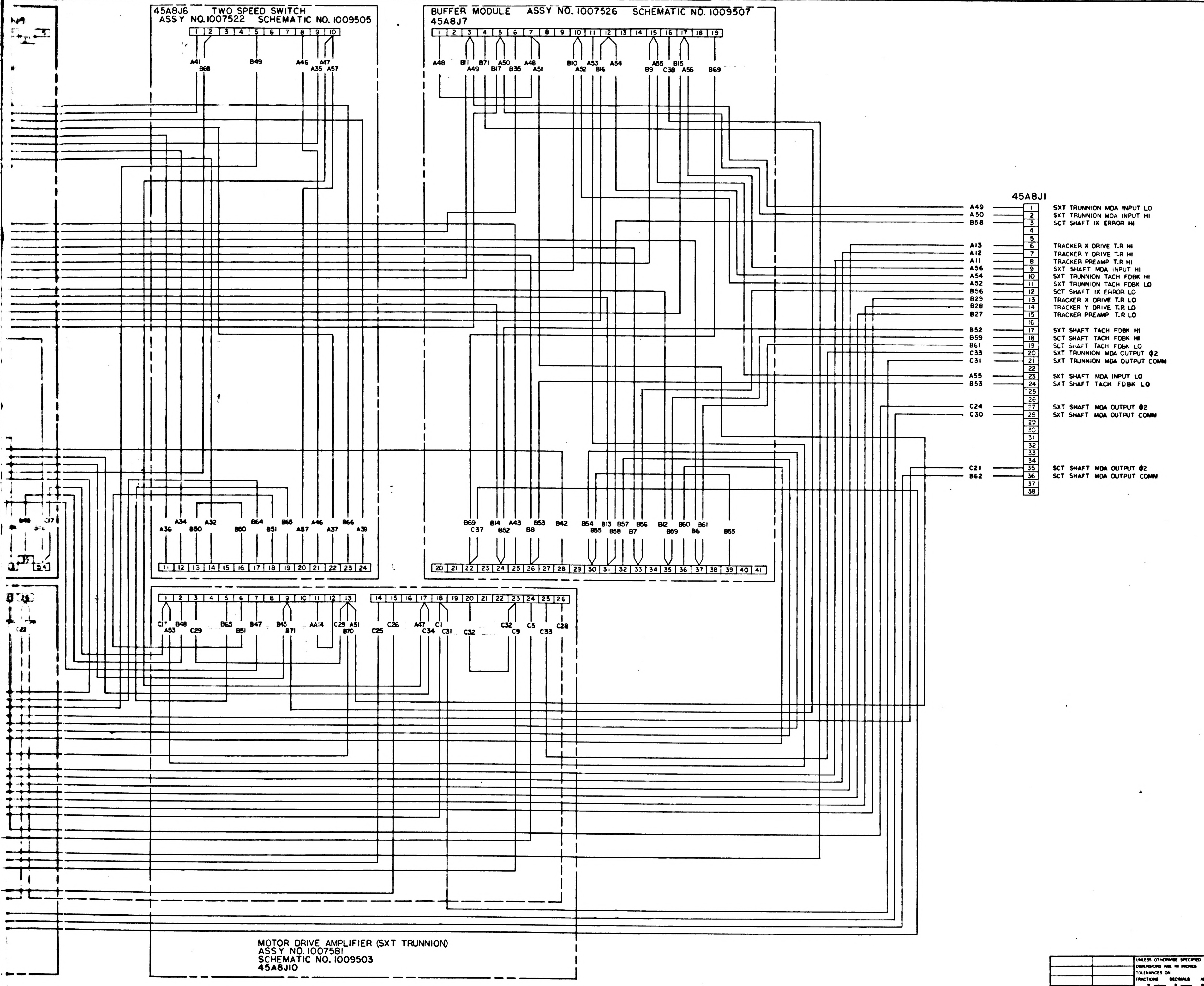
A	HARNESS	1008611
B	HARNESS	1008612
C	HARNESS	1008613
AA	WIRE LIST	1008614

	REV
1009568	A

1009568

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15951	3 Feb 65	WR
B	REVISED PER TDRR 17970	6 APR 65	JJJ

REVISIONS 73397



45A8J6 TWO SPEED SWITCH
ASSY NO. 1007522 SCHEMATIC NO. 1009505
BUFFER MODULE ASSY NO. 1007526 SCHEMATIC NO. 1009507
45A8J7
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J10
45A8J1
A49 1 SXT TRUNNION MDA INPUT LO
A50 2 SXT TRUNNION MDA INPUT HI
B58 3 SCT SHAFT IX ERROR HI
4
5
A13 6 TRACKER X DRIVE T.R HI
A12 7 TRACKER Y DRIVE T.R HI
A11 8 TRACKER PREAMP T.R HI
A56 9 SXT SHAFT MDA INPUT HI
A54 10 SXT TRUNNION TACH FDBK HI
A52 11 SXT TRUNNION TACH FDBK LO
B56 12 SCT SHAFT IX ERROR LO
B29 13 TRACKER X DRIVE T.R LO
B28 14 TRACKER Y DRIVE T.R LO
B27 15 TRACKER PREAMP T.R LO
16
B52 17 SXT SHAFT TACH FDBK HI
B59 18 SCT SHAFT TACH FDBK HI
B61 19 SCT SHAFT TACH FDBK LO
C33 20 SXT TRUNNION MDA OUTPUT ϕ2
C31 21 SXT TRUNNION MDA OUTPUT COMM
22
A55 23 SXT SHAFT MDA INPUT LO
B53 24 SXT SHAFT TACH FDBK LO
25
26
C24 27 SXT SHAFT MDA OUTPUT ϕ2
C30 28 SXT SHAFT MDA OUTPUT COMM
29
30
31
32
33
34
C21 35 SCT SHAFT MDA OUTPUT ϕ2
B62 36 SCT SHAFT MDA OUTPUT COMM
37
38

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN J.F. Walsh DATE 1 Sept
CHECKED
APPROVAL Johnson
APPROVAL
NASA APPROVAL W J Rhine 10-14-64
MIT APPROVAL D Hoag

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 8

CODE IDENT NO —
SIZE J
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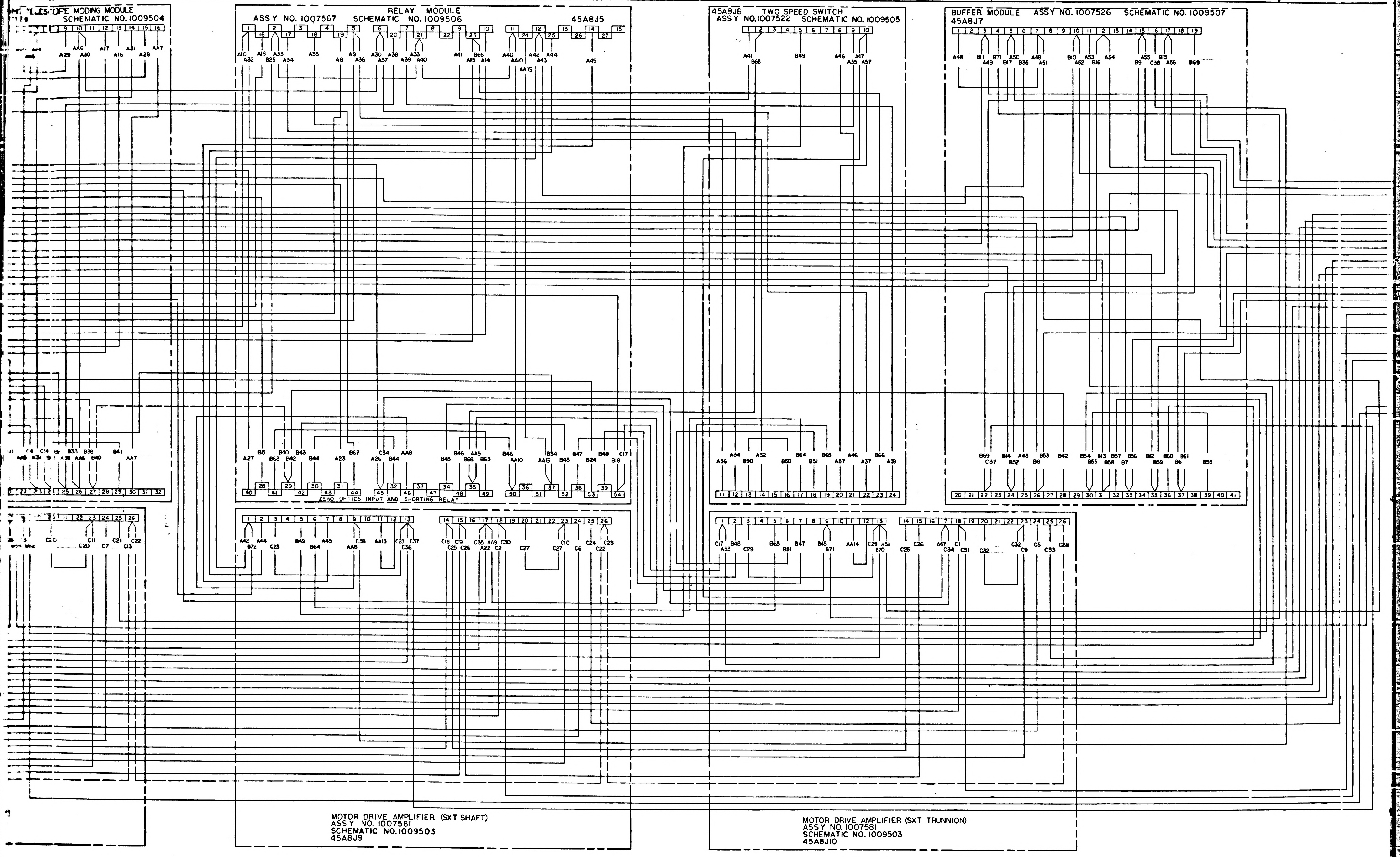
SCALE NONE
WT
SHEET 1 OF 1

3H

1009568 B 3H/1

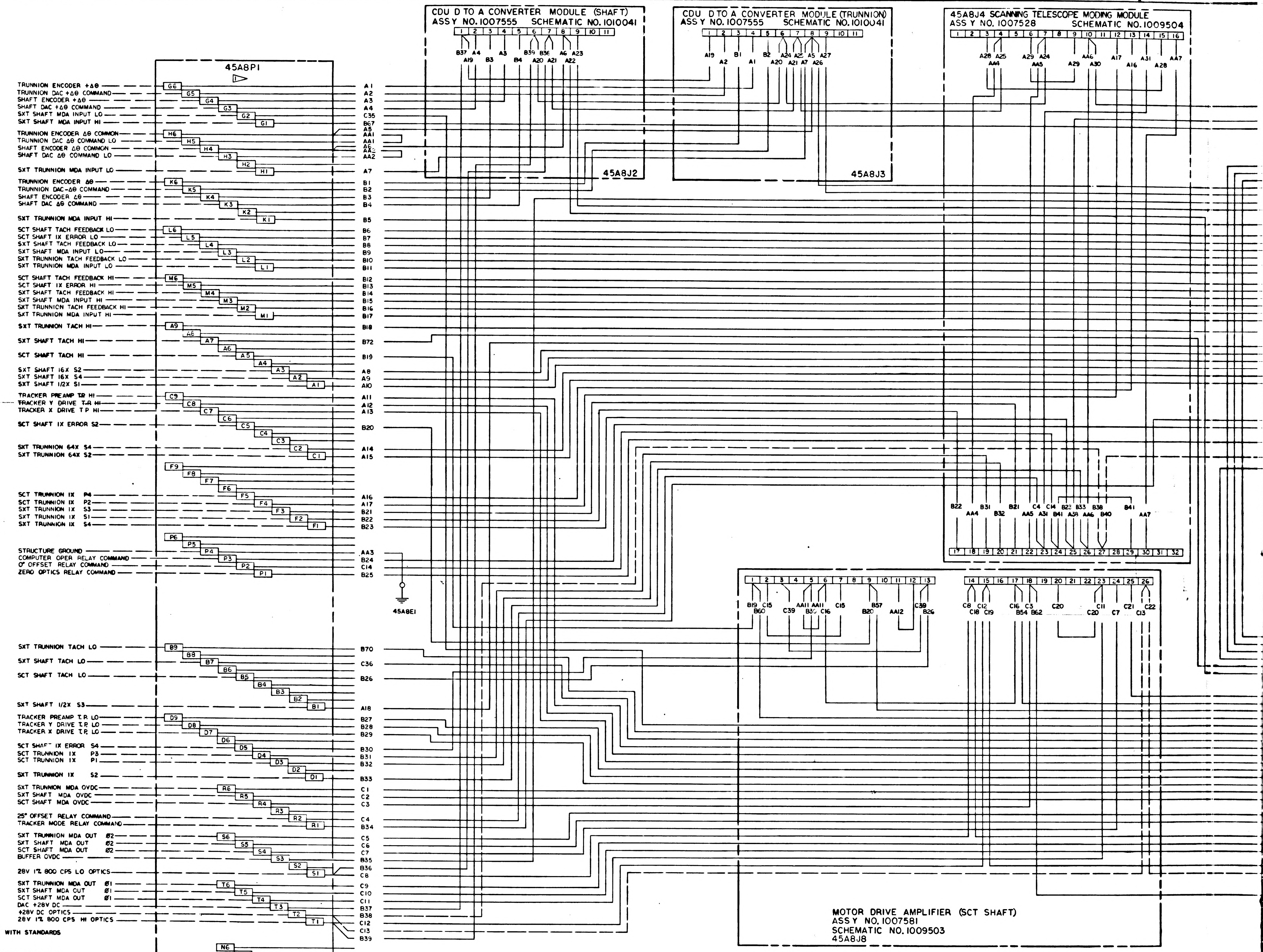
1009568 B

3/1009568


TELESCOPE MODING MODULE
SCHEMATIC NO. 1009504
RELAY MODULE
ASSY NO. 1007567 SCHEMATIC NO. 1009506
45A8J5
ZERO OPTICS INPUT AND SHORTING RELAY
45A8J6 TWO SPEED SWITCH
ASSY NO. 1007522 SCHEMATIC NO. 1009505
BUFFER MODULE ASSY NO. 1007526 SCHEMATIC NO. 1009507
45A8J7
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J9
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J10

1009568 B SH 1

27 1009568


45A8P1
TRUNNION ENCODER +Δθ
TRUNNION DAC +Δθ COMMAND
SHAFT ENCODER +Δθ
SHAFT DAC +Δθ COMMAND
SXT SHAFT MDA INPUT LO
SXT SHAFT MDA INPUT HI
TRUNNION ENCODER Δθ COMMON
TRUNNION DAC Δθ COMMAND LO
SHAFT ENCODER Δθ COMMON
SHAFT DAC Δθ COMMAND LO
SXT TRUNNION MDA INPUT LO
TRUNNION ENCODER Δθ
TRUNNION DAC-Δθ COMMAND
SHAFT ENCODER Δθ
SHAFT DAC Δθ COMMAND
SXT TRUNNION MDA INPUT HI
SCT SHAFT TACH FEEDBACK LO
SCT SHAFT IX ERROR LO
SXT SHAFT TACH FEEDBACK LO
SXT SHAFT MDA INPUT LO
SXT TRUNNION TACH FEEDBACK LO
SXT TRUNNION MDA INPUT LO
SCT SHAFT TACH FEEDBACK HI
SCT SHAFT IX ERROR HI
SXT SHAFT TACH FEEDBACK HI
SXT SHAFT MDA INPUT HI
SXT TRUNNION TACH FEEDBACK HI
SXT TRUNNION MDA INPUT HI
SXT TRUNNION TACH HI
SXT SHAFT TACH HI
SCT SHAFT TACH HI
SXT SHAFT 16X S2
SXT SHAFT 16X S4
SXT SHAFT 1/2X S1
TRACKER PREAMP T.P. HI
~~TRACKER Y DRIVE T.P. HI~~
TRACKER X DRIVE T P HI
SCT SHAFT IX ERROR S2
SXT TRUNNION 64X S4
SXT TRUNNION 64X S2
SCT TRUNNION IX P4
SCT TRUNNION IX P2
SXT TRUNNION IX S3
SXT TRUNNION IX S1
SXT TRUNNION IX S4
STRUCTURE GROUND
COMPUTER OPER RELAY COMMAND
0° OFFSET RELAY COMMAND
ZERO OPTICS RELAY COMMAND
SXT TRUNNION TACH LO
SXT SHAFT TACH LO
SCT SHAFT TACH LO
SXT SHAFT 1/2X S3
TRACKER PREAMP T.P. LO
TRACKER Y DRIVE T.P. LO
TRACKER X DRIVE T.P. LO
SCT SHAFT IX ERROR S4
SCT TRUNNION IX P3
SCT TRUNNION IX P1
SXT TRUNNION IX S2
SXT TRUNNION MDA OVDC
SXT SHAFT MDA OVDC
SCT SHAFT MDA OVDC
25° OFFSET RELAY COMMAND
TRACKER MODE RELAY COMMAND
SXT TRUNNION MDA OUT Ø2
SXT SHAFT MDA OUT Ø2
SCT SHAFT MDA OUT Ø2
BUFFER OVDC
28V 1% 800 CPS LO OPTICS
SXT TRUNNION MDA OUT Ø1
SXT SHAFT MDA OUT Ø1
SCT SHAFT MDA OUT Ø1
DAC +28V DC
+28V DC OPTICS
28V 1% 800 CPS HI OPTICS
G6 G5 G4 G3 G2 G1
H6 H5 H4 H3 H2 H1
K6 K5 K4 K3 K2 K1
L6 L5 L4 L3 L2 L1
M6 M5 M4 M3 M2 M1
A9 A8 A7 A6 A5 A4 A3 A2 A1
C9 C8 C7 C6 C5 C4 C3 C2 C1
F9 F8 F7 F6 F5 F4 F3 F2 F1
P6 P5 P4 P3 P2 P1
B9 B8 B7 B6 B5 B4 B3 B2 B1
D9 D8 D7 D6 D5 D4 D3 D2 D1
R6 R5 R4 R3 R2 R1
S6 S5 S4 S3 S2 S1
T6 T5 T4 T3 T2 T1
N6 N5 N4 N3 N2 N1
A1 A2 A3 A4 C35 B67 A5 AA1 AA1 A6 AA2 AA2 A7
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B72 B19
A8 A9 A10 A11 A12 A13 B20 A14 A15 A16 A17 B21 B22 B23
AA3 B24 C14 B25
45A8E1
B70 C36 B26 A18 B27 B28 B29 B30 B31 B32 B33
C1 C2 C3 C4 B34 C5 C6 C7 B35 B36 C8 C9 C10 C11 B37 B38 C12 C13 B39
CDU D TO A CONVERTER MODULE (SHAFT)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
1 2 3 4 5 6 7 8 9 10 11
B37 A4 A3 B39 B36 A6 A23
A19 B3 B4 A20 A21 A22
45A8J2
CDU D TO A CONVERTER MODULE (TRUNNION)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
1 2 3 4 5 6 7 8 9 10 11
A19 B1 B2 A24 A25 A5 A27
A2 A1 A20 A21 A7 A26
45A8J3
45A8J4 SCANNING TELESCOPE MODING MODULE
ASSY NO. 1007528 SCHEMATIC NO. 1009504
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A28 A25 A29 A24 AA6 A17 A31 AA7
AA4 AA5 A29 A30 A16 A28
B22 B31 B21 C4 C14 B23 B33 B38 B41
AA4 B32 AA5 A31 B41 A38 AA6 B40 AA7
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
1 2 3 4 5 6 7 8 9 10 11 12 13
B19 C15 C39 AA11 AA11 C15 B57 C39
B60 B30 C16 B20 AA12 B26
14 15 16 17 18 19 20 21 22 23 24 25 26
C8 C12 C16 C3 C20 C11 C21 C22
C18 C19 B54 B62 C20 C7 C13
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J8
D
C
B
A
10
9
8
7

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J18
3. —— INDICATES NO. 24 GAGE WIRE PER 1010848-2
4. — — INDICATES NO. 24 GAGE WIRE PER 1010847-2
5. HARNESS LISTS (REF)
   A HARNESS 1008611
   B HARNESS 1008612
   C HARNESS 1008613
   AA WIRE LIST 1008614

	REV	SH
1009568	B	1

1/1009568

(34)

4/1009568

1009568 C

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS 13399		
A	REVISED PER TDRR 15951	3 Feb 65	WR
B	REVISED PER TDRR 17970	6 APR 65	JJJ
C	REVISED PER TDRR 18824	10-MAY-65	M.G.

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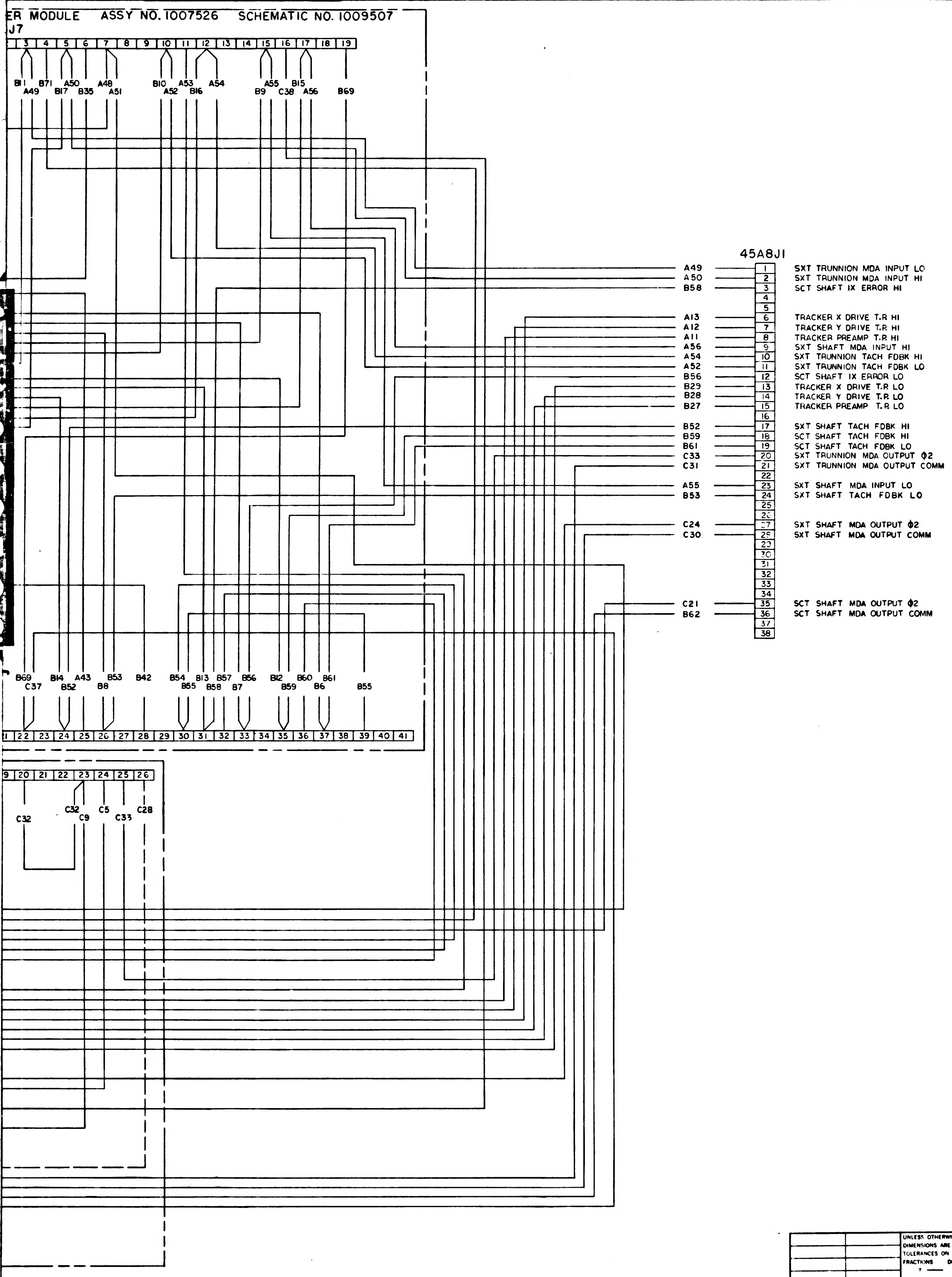


ER MODULE ASSY NO. 1007526 SCHEMATIC NO. 1009507
J7
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
B11 A49 B71 A50 B17 B35 A48 A51 B10 A52 A53 B16 A54 B9 A55 C38 B15 A56 B69
B69 C37 B14 B52 A43 B53 B8 B42 B54 B55 B13 B58 B57 B7 B56 B12 B59 B60 B6 B61 B55
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
9 20 21 22 23 24 25 26
C32 C32 C9 C5 C33 C28
45A8J1
A49 1 SXT TRUNNION MDA INPUT LO
A50 2 SXT TRUNNION MDA INPUT HI
B58 3 SCT SHAFT IX ERROR HI
4
5
A13 6 TRACKER X DRIVE T.R HI
A12 7 TRACKER Y DRIVE T.P. HI
A11 8 TRACKER PREAMP T.P. HI
A56 9 SXT SHAFT MDA INPUT HI
A54 10 SXT TRUNNION TACH FDBK HI
A52 11 SXT TRUNNION TACH FDBK LO
B56 12 SCT SHAFT IX ERROR LO
B29 13 TRACKER X DRIVE T.P. LO
B28 14 TRACKER Y DRIVE T.P. LO
B27 15 TRACKER PREAMP T.P. LO
16
B52 17 SXT SHAFT TACH FDBK HI
B59 18 SCT SHAFT TACH FDBK HI
B61 19 SCT SHAFT TACH FDBK LO
C33 20 SXT TRUNNION MDA OUTPUT Φ2
C31 21 SXT TRUNNION MDA OUTPUT COMM
22
A55 23 SXT SHAFT MDA INPUT LO
B53 24 SXT SHAFT TACH FDBK LO
25
26
C24 27 SXT SHAFT MDA OUTPUT Φ2
C30 28 SXT SHAFT MDA OUTPUT COMM
29
30
31
32
33
34
C21 35 SCT SHAFT MDA OUTPUT Φ2
B62 36 SCT SHAFT MDA OUTPUT COMM
37
38
3
2
1
D
C
B
A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007538	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

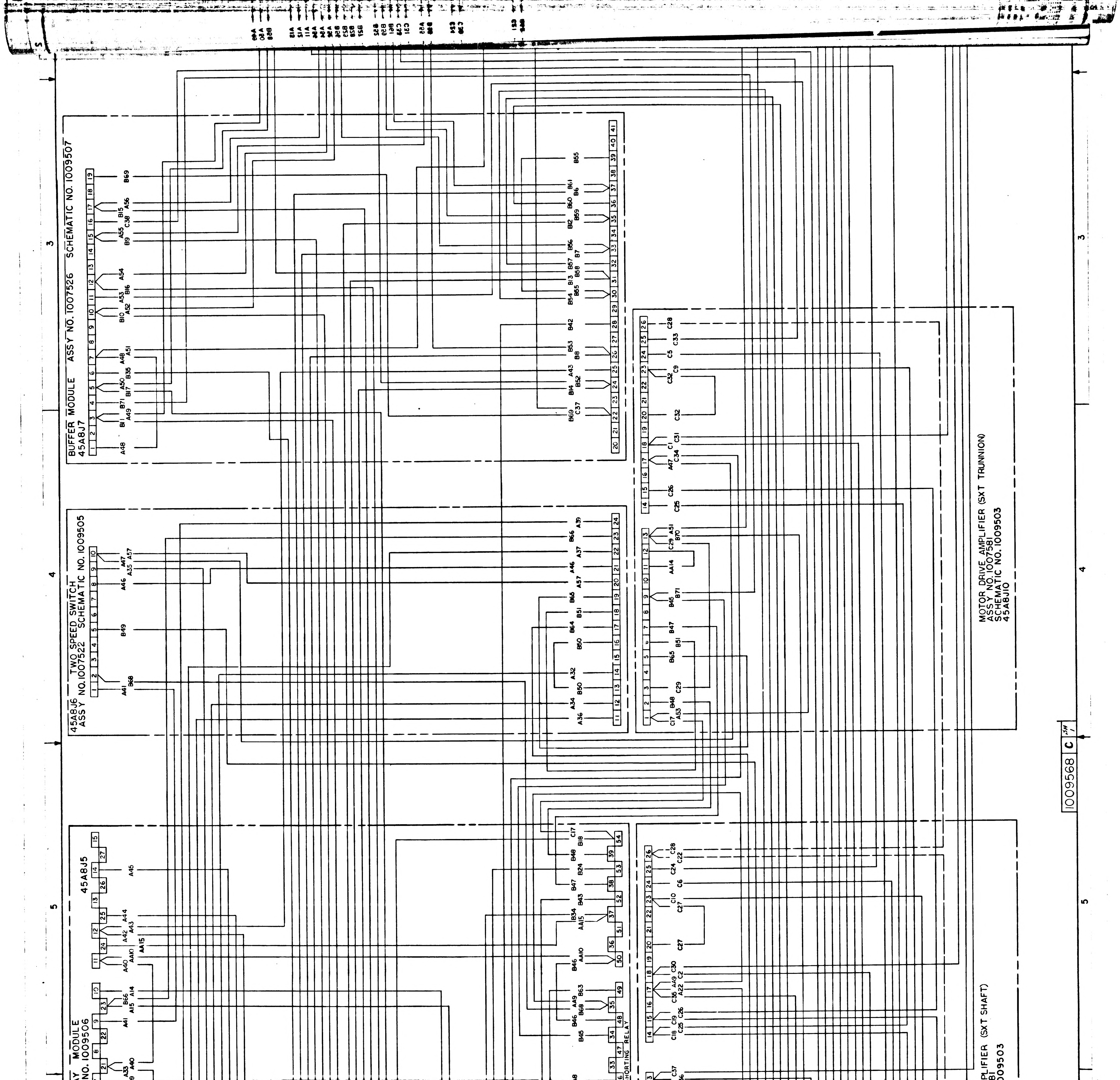
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN J.F. Walsh DATE 11 Sept
CHECKED
APPROVAL John Green
APPROVAL
NASA APPROVAL W J Rh 10-14-64
MIT APPROVAL

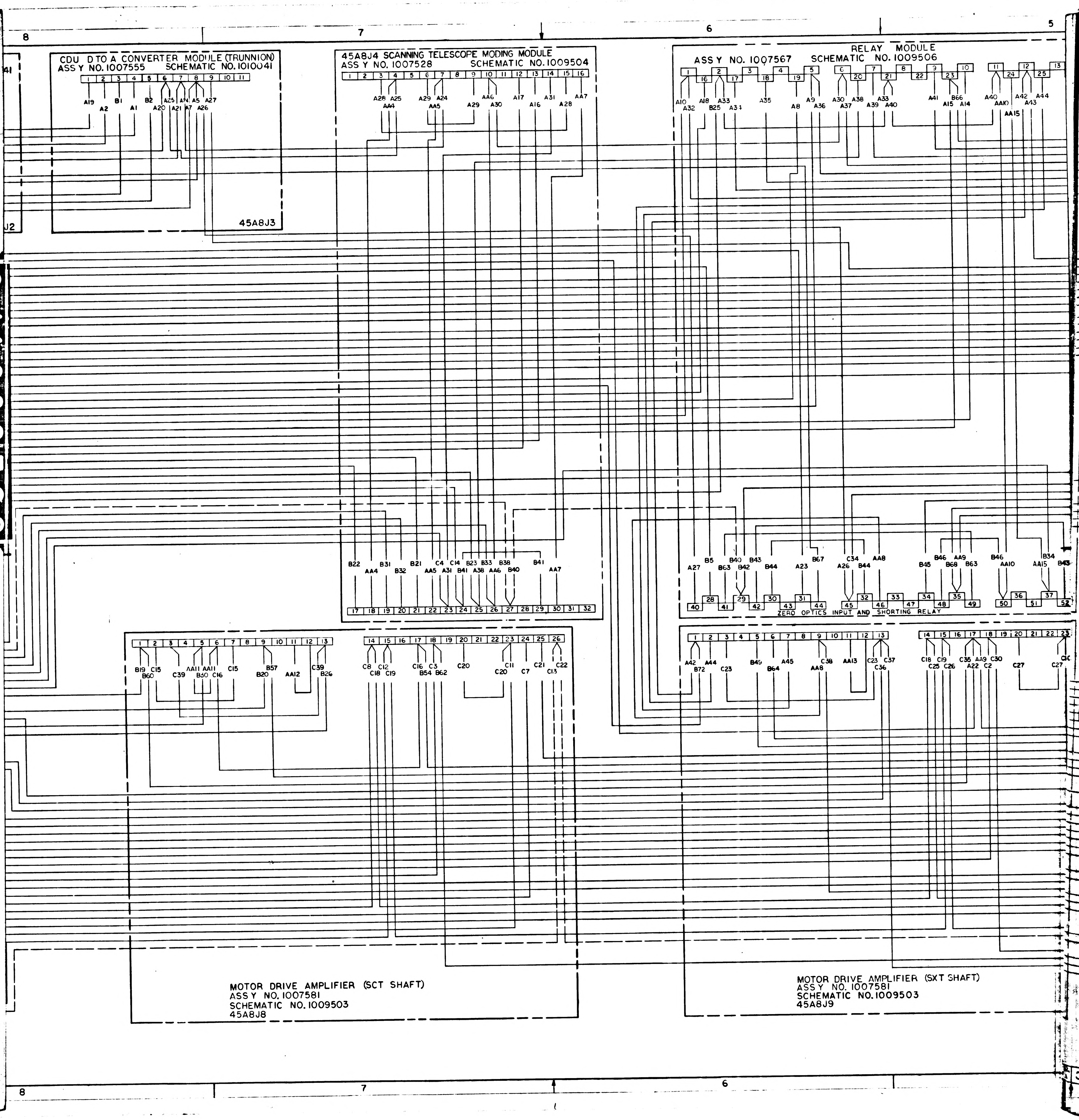
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 8

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 1009568
SCALE NONE
WT
SHEET 1 OF 1

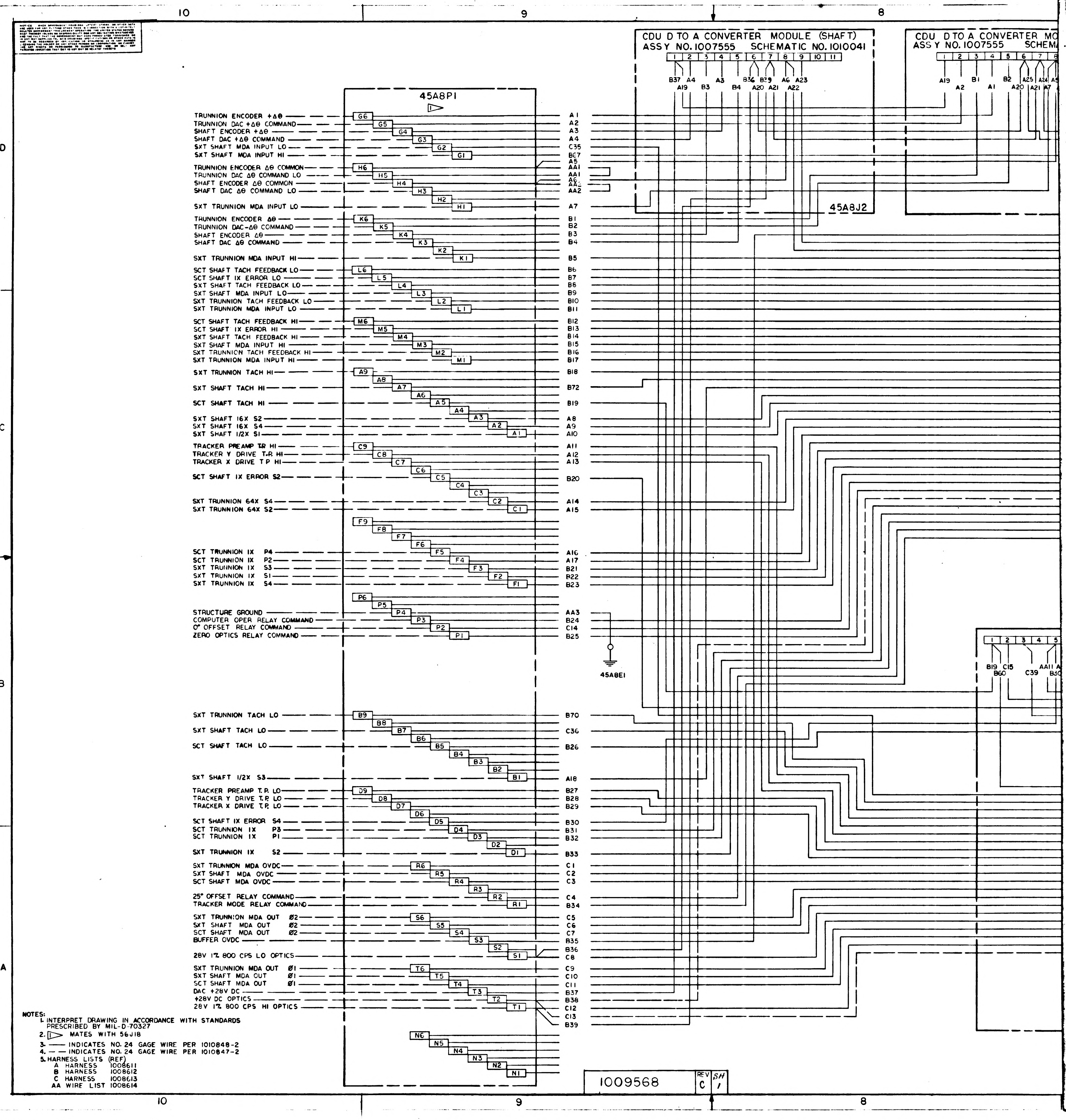

BUFFER MODULE ASSY NO. 1007526 SCHEMATIC NO. 1009507
45A8J7
45A8J6 TWO SPEED SWITCH
ASSY NO. 1007522 SCHEMATIC NO. 1009505
45A8J5
AY MODULE
NO. 1009506
SHORTING RELAY
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J10
AMPLIFIER (SXT SHAFT)
581
1009503
3
4
5
1009568 C

3/1009568


CDU D TO A CONVERTER MODULE (TRUNNION)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
45A8J3
45A8J4 SCANNING TELESCOPE MODING MODULE
ASSY NO. 1007528 SCHEMATIC NO. 1009504
RELAY MODULE
ASSY NO. 1007567 SCHEMATIC NO. 1009506
ZERO OPTICS INPUT AND SHORTING RELAY
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J8
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J9
J1
J2
8
7
6
5

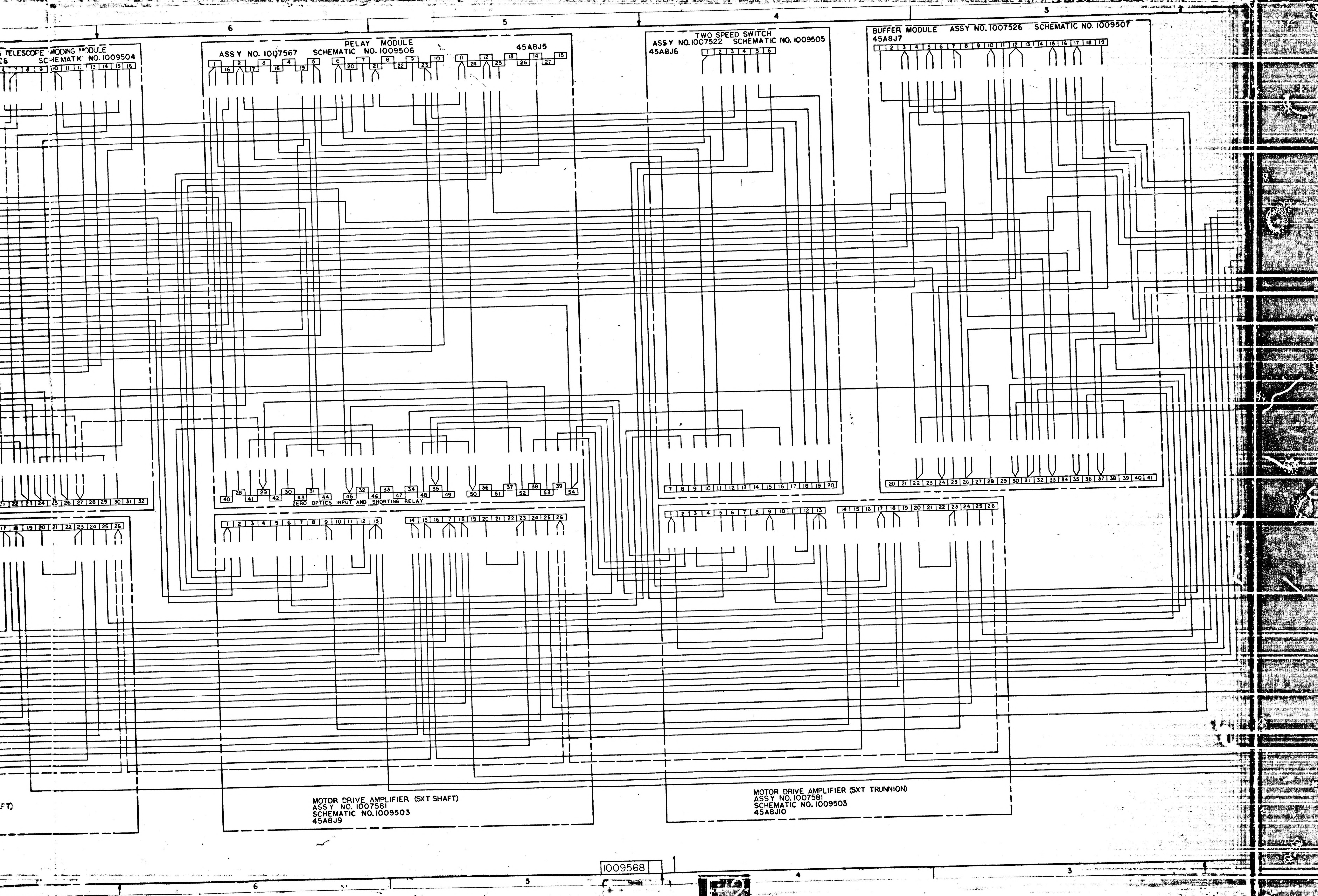
2/1009568

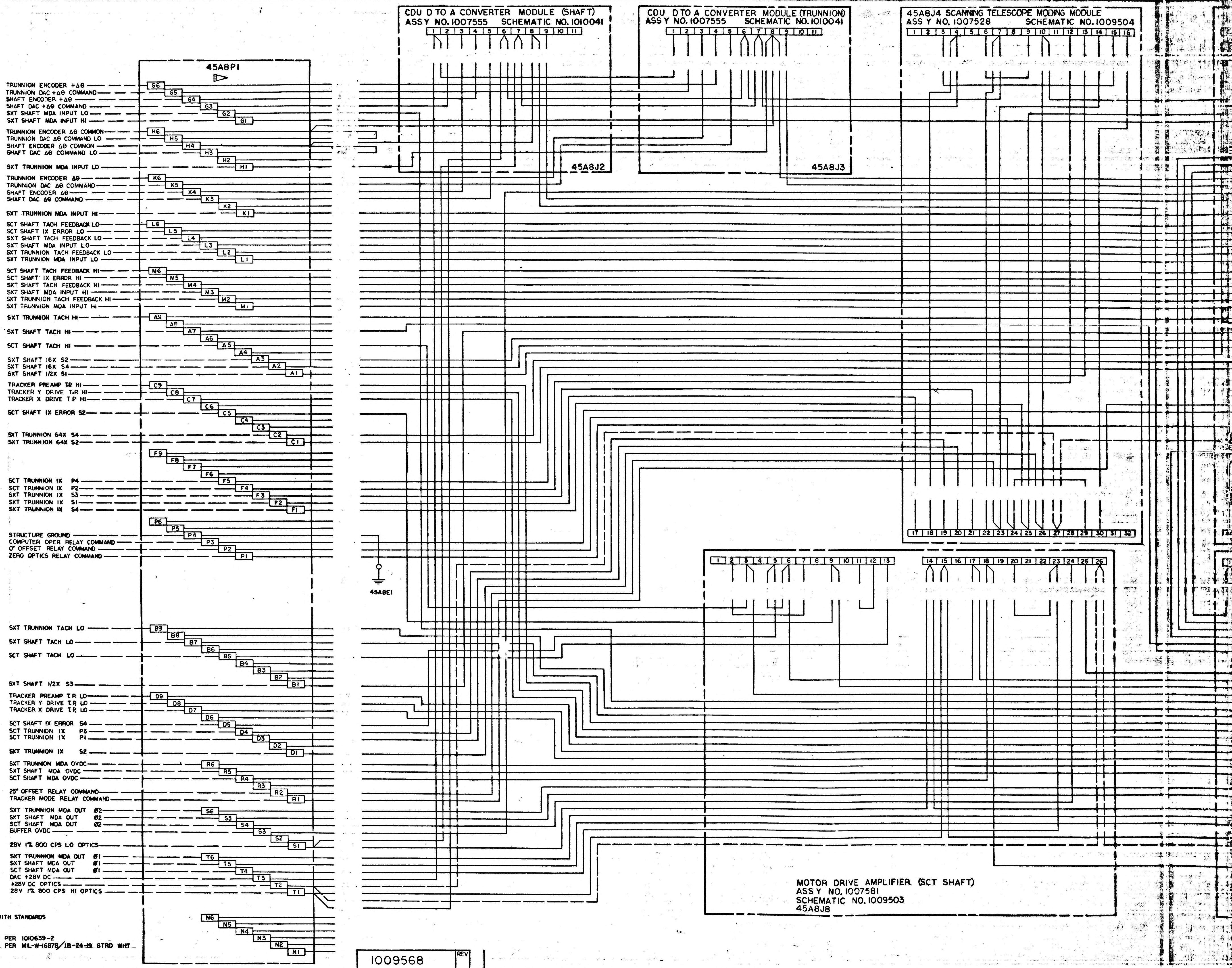
1/41009568


CDU D TO A CONVERTER MODULE (SHAFT)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
1 2 3 4 5 6 7 8 9 10 11
B37 A4 A3 B36 B39 A6 A23
A19 B3 B4 A20 A21 A22
45A8J2
CDU D TO A CONVERTER MO
ASSY NO. 1007555 SCHEMA
1 2 3 4 5 6 7 8
A19 B1 B2 A25 A24 A5
A2 A1 A20 A21 A7
1 2 3 4 5
B19 C15 C39 AA11
B60 B30
45A8P1
1
TRUNNION ENCODER +Δθ — G6 — A1
TRUNNION DAC +Δθ COMMAND — G5 — A2
SHAFT ENCODER +Δθ — G4 — A3
SHAFT DAC +Δθ COMMAND — G3 — A4
SXT SHAFT MDA INPUT LO — G2 — C35
SXT SHAFT MDA INPUT HI — G1 — B67
A5
TRUNNION ENCODER Δθ COMMON — H6 — AA1
TRUNNION DAC Δθ COMMAND LO — H5 — AA1
A6
SHAFT ENCODER Δθ COMMON — H4 — AA2
SHAFT DAC Δθ COMMAND LO — H3 — AA2
H2
SXT TRUNNION MDA INPUT LO — H1 — A7
TRUNNION ENCODER Δθ — K6 — B1
TRUNNION DAC-Δθ COMMAND — K5 — B2
SHAFT ENCODER Δθ — K4 — B3
SHAFT DAC Δθ COMMAND — K3 — B4
K2
SXT TRUNNION MDA INPUT HI — K1 — B5
SCT SHAFT TACH FEEDBACK LO — L6 — B6
SCT SHAFT 1X ERROR LO — L5 — B7
SXT SHAFT TACH FEEDBACK LO — L4 — B8
SXT SHAFT MDA INPUT LO — L3 — B9
SXT TRUNNION TACH FEEDBACK LO — L2 — B10
SXT TRUNNION MDA INPUT LO — L1 — B11
SCT SHAFT TACH FEEDBACK HI — M6 — B12
SCT SHAFT 1X ERROR HI — M5 — B13
SXT SHAFT TACH FEEDBACK HI — M4 — B14
SXT SHAFT MDA INPUT HI — M3 — B15
SXT TRUNNION TACH FEEDBACK HI — M2 — B16
SXT TRUNNION MDA INPUT HI — M1 — B17
SXT TRUNNION TACH HI — A9 — B18
A8
SXT SHAFT TACH HI — A7 — B72
A6
SCT SHAFT TACH HI — A5 — B19
A4
SXT SHAFT 16X S2 — A3 — A8
SXT SHAFT 16X S4 — A2 — A9
SXT SHAFT 1/2X S1 — A1 — A10
TRACKER PREAMP T.P. HI — C9 — A11
TRACKER Y DRIVE T.P. HI — C8 — A12
TRACKER X DRIVE T.P. HI — C7 — A13
C6
SCT SHAFT 1X ERROR S2 — C5 — B20
C4
C3
SXT TRUNNION 64X S4 — C2 — A14
SXT TRUNNION 64X S2 — C1 — A15
F9
F8
F7
F6
SCT TRUNNION 1X P4 — F5 — A16
SCT TRUNNION 1X P2 — F4 — A17
SXT TRUNNION 1X S3 — F3 — B21
SXT TRUNNION 1X S1 — F2 — B22
SXT TRUNNION 1X S4 — F1 — B23
P6
P5
STRUCTURE GROUND — P4 — AA3
COMPUTER OPER RELAY COMMAND — P3 — B24
0° OFFSET RELAY COMMAND — P2 — C14
ZERO OPTICS RELAY COMMAND — P1 — B25
45A8E1
SXT TRUNNION TACH LO — B9 — B70
B8
SXT SHAFT TACH LO — B7 — C36
B6
SCT SHAFT TACH LO — B5 — B26
B4
B3
B2
SXT SHAFT 1/2X S3 — B1 — A18
TRACKER PREAMP T.P. LO — D9 — B27
TRACKER Y DRIVE T.P. LO — D8 — B28
TRACKER X DRIVE T.P. LO — D7 — B29
D6
SCT SHAFT 1X ERROR S4 — D5 — B30
SCT TRUNNION 1X P3 — D4 — B31
SCT TRUNNION 1X P1 — D3 — B32
D2
SXT TRUNNION 1X S2 — D1 — B33
SXT TRUNNION MDA OVDC — R6 — C1
SXT SHAFT MDA OVDC — R5 — C2
SCT SHAFT MDA OVDC — R4 — C3
R3
25° OFFSET RELAY COMMAND — R2 — C4
TRACKER MODE RELAY COMMAND — R1 — B34
SXT TRUNNION MDA OUT Ø2 — S6 — C5
SXT SHAFT MDA OUT Ø2 — S5 — C6
SCT SHAFT MDA OUT Ø2 — S4 — C7
BUFFER OVDC — S3 — B35
S2 — B36
28V 1% 800 CPS LO OPTICS — S1 — C8
SXT TRUNNION MDA OUT Ø1 — T6 — C9
SXT SHAFT MDA OUT Ø1 — T5 — C10
SCT SHAFT MDA OUT Ø1 — T4 — C11
DAC +28V DC — T3 — B37
+28V DC OPTICS — T2 — B38
28V 1% 800 CPS HI OPTICS — T1 — C12
C13
B39
N6
N5
N4
N3
N2
N1
D
C
B
A
10
9
8

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. 1 MATES WITH 56J18
3. —— INDICATES NO. 24 GAGE WIRE PER 1010848-2
4. — — INDICATES NO. 24 GAGE WIRE PER 1010847-2
5. HARNESS LISTS (REF)
   A HARNESS 1008611
   B HARNESS 1008612
   C HARNESS 1008613
   AA WIRE LIST 1008614

1009568	REV	SH
	C	1

6
5
4
3
TELESCOPE MODING MODULE
E8 SCHEMATIC NO. 1009504
RELAY MODULE
ASSY NO. 1007567 SCHEMATIC NO. 1009506
45A8J5
TWO SPEED SWITCH
ASSY NO. 1007522 SCHEMATIC NO. 1009505
45A8J6
BUFFER MODULE ASSY NO. 1007526 SCHEMATIC NO. 1009507
45A8J7
ZERO OPTICS INPUT AND SHORTING RELAY
FT)
MOTOR DRIVE AMPLIFIER (SXT SHAFT)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J9
MOTOR DRIVE AMPLIFIER (SXT TRUNNION)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J10
1009568
F2



45A8P1
TRUNNION ENCODER +Δθ
TRUNNION DAC +Δθ COMMAND
SHAFT ENCODER +Δθ
SHAFT DAC +Δθ COMMAND
SXT SHAFT MDA INPUT LO
SXT SHAFT MDA INPUT HI
TRUNNION ENCODER Δθ COMMON
TRUNNION DAC Δθ COMMAND LO
SHAFT ENCODER Δθ COMMON
SHAFT DAC Δθ COMMAND LO
SXT TRUNNION MDA INPUT LO
TRUNNION ENCODER Δθ
TRUNNION DAC Δθ COMMAND
SHAFT ENCODER Δθ
SHAFT DAC Δθ COMMAND
SXT TRUNNION MDA INPUT HI
SCT SHAFT TACH FEEDBACK LO
SCT SHAFT IX ERROR LO
SXT SHAFT TACH FEEDBACK LO
SXT SHAFT MDA INPUT LO
SXT TRUNNION TACH FEEDBACK LO
SXT TRUNNION MDA INPUT LO
SCT SHAFT TACH FEEDBACK HI
SCT SHAFT IX ERROR HI
SXT SHAFT TACH FEEDBACK HI
SXT SHAFT MDA INPUT HI
SXT TRUNNION TACH FEEDBACK HI
SXT TRUNNION MDA INPUT HI
SXT TRUNNION TACH HI
SXT SHAFT TACH HI
SCT SHAFT TACH HI
SXT SHAFT 16X S2
SXT SHAFT 16X S4
SXT SHAFT 1/2X S1
TRACKER PREAMP T.R HI
TRACKER Y DRIVE T.P. HI
TRACKER X DRIVE T.P HI
SCT SHAFT IX ERROR S2
SXT TRUNNION 64X S4
SXT TRUNNION 64X S2
SCT TRUNNION IX P4
SCT TRUNNION IX P2
SCT TRUNNION IX S3
SXT TRUNNION IX S1
SXT TRUNNION IX S4
STRUCTURE GROUND
COMPUTER OPER RELAY COMMAND
0° OFFSET RELAY COMMAND
ZERO OPTICS RELAY COMMAND
45A8E1
SXT TRUNNION TACH LO
SXT SHAFT TACH LO
SCT SHAFT TACH LO
SXT SHAFT 1/2X S3
TRACKER PREAMP T.P. LO
TRACKER Y DRIVE T.P. LO
TRACKER X DRIVE T.P. LO
SCT SHAFT IX ERROR S4
SCT TRUNNION IX P3
SCT TRUNNION IX P1
SXT TRUNNION IX S2
SXT TRUNNION MDA OVDC
SXT SHAFT MDA OVDC
SCT SHAFT MDA OVDC
25° OFFSET RELAY COMMAND
TRACKER MODE RELAY COMMAND
SXT TRUNNION MDA OUT Ø2
SXT SHAFT MDA OUT Ø2
SCT SHAFT MDA OUT Ø2
BUFFER OVDC
28V 1% 800 CPS LO OPTICS
SXT TRUNNION MDA OUT Ø1
SXT SHAFT MDA OUT Ø1
SCT SHAFT MDA OUT Ø1
DAC +28V DC
+28V DC OPTICS
28V 1% 800 CPS HI OPTICS
G6 G5 G4 G3 G2 G1
H6 H5 H4 H3 H2 H1
K6 K5 K4 K3 K2 K1
L6 L5 L4 L3 L2 L1
M6 M5 M4 M3 M2 M1
A9 A8 A7 A6 A5 A4 A3 A2 A1
C9 C8 C7 C6 C5 C4 C3 C2 C1
F9 F8 F7 F6 F5 F4 F3 F2 F1
P6 P5 P4 P3 P2 P1
B9 B8 B7 B6 B5 B4 B3 B2 B1
D9 D8 D7 D6 D5 D4 D3 D2 D1
R6 R5 R4 R3 R2 R1
S6 S5 S4 S3 S2 S1
T6 T5 T4 T3 T2 T1
N6 N5 N4 N3 N2 N1
CDU D TO A CONVERTER MODULE (SHAFT)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
1 2 3 4 5 6 7 8 9 10 11
45A8J2
CDU D TO A CONVERTER MODULE (TRUNNION)
ASSY NO. 1007555 SCHEMATIC NO. 1010041
1 2 3 4 5 6 7 8 9 10 11
45A8J3
45A8J4 SCANNING TELESCOPE MODING MODULE
ASSY NO. 1007528 SCHEMATIC NO. 1009504
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25 26
MOTOR DRIVE AMPLIFIER (SCT SHAFT)
ASSY NO. 1007581
SCHEMATIC NO. 1009503
45A8J8

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J18
3. —— INDICATES NO. 24 GAGE WIRE PER 1010639-2
4. - - - INDICATES NO. 24 GAGE WIRE PER MIL-W-16878/1B-24-19 STRD WHT

1009568 REV

SYM	DESCRIPTION	DATE	APPROVAL
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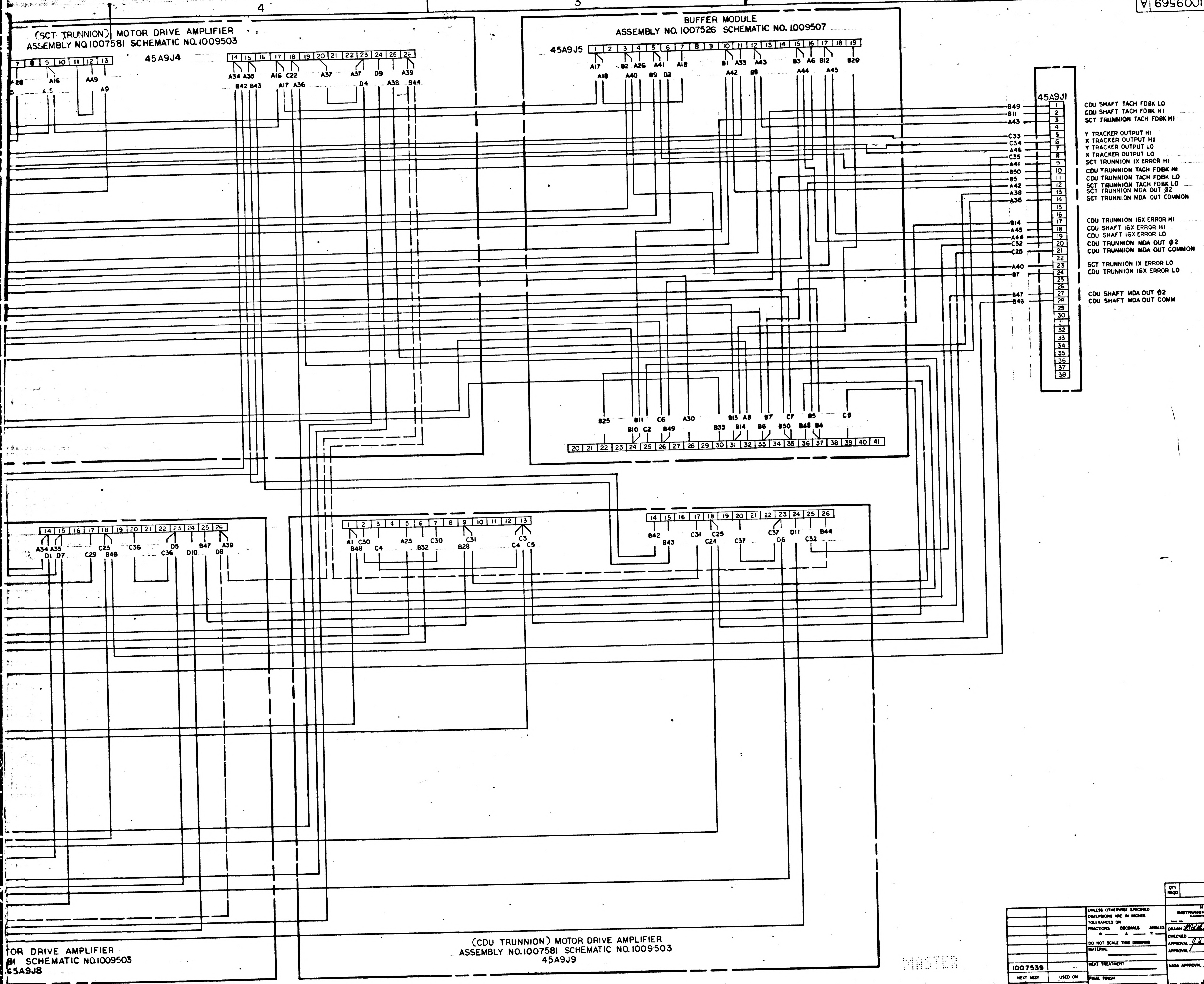
REVISIONS 73397

1009569 A


(SCT TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO. 1007581 SCHEMATIC NO. 1009503
45A9J4
BUFFER MODULE
ASSEMBLY NO. 1007526 SCHEMATIC NO. 1009507
45A9J5
45A9J1
1 CDU SHAFT TACH FDBK LO
2 CDU SHAFT TACH FDBK HI
3 SCT TRUNNION TACH FDBK HI
5 Y TRACKER OUTPUT HI
6 X TRACKER OUTPUT HI
7 Y TRACKER OUTPUT LO
8 X TRACKER OUTPUT LO
9 SCT TRUNNION 1X ERROR HI
10 CDU TRUNNION TACH FDBK HI
11 CDU TRUNNION TACH FDBK LO
12 SCT TRUNNION TACH FDBK LO
13 SCT TRUNNION MDA OUT Ø2
14 SCT TRUNNION MDA OUT COMMON
17 CDU TRUNNION 16X ERROR HI
18 CDU SHAFT 16X ERROR HI
19 CDU SHAFT 16X ERROR LO
20 CDU TRUNNION MDA OUT Ø2
21 CDU TRUNNION MDA OUT COMMON
23 SCT TRUNNION 1X ERROR LO
24 CDU TRUNNION 16X ERROR LO
27 CDU SHAFT MDA OUT Ø2
28 CDU SHAFT MDA OUT COMM
TOR DRIVE AMPLIFIER
81 SCHEMATIC NO. 1009503
5A9J8
(CDU TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO. 1007581 SCHEMATIC NO. 1009503
45A9J9

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

1007539	
NEXT ASSY	USED ON

APPLICATION

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN DATE
CHECKED
APPROVAL 10/12/64
APPROVAL
NASA APPROVAL 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 9

CODE IDENT NO. —
SIZE J
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WT
SHEET 1 OF 1

1009569 A

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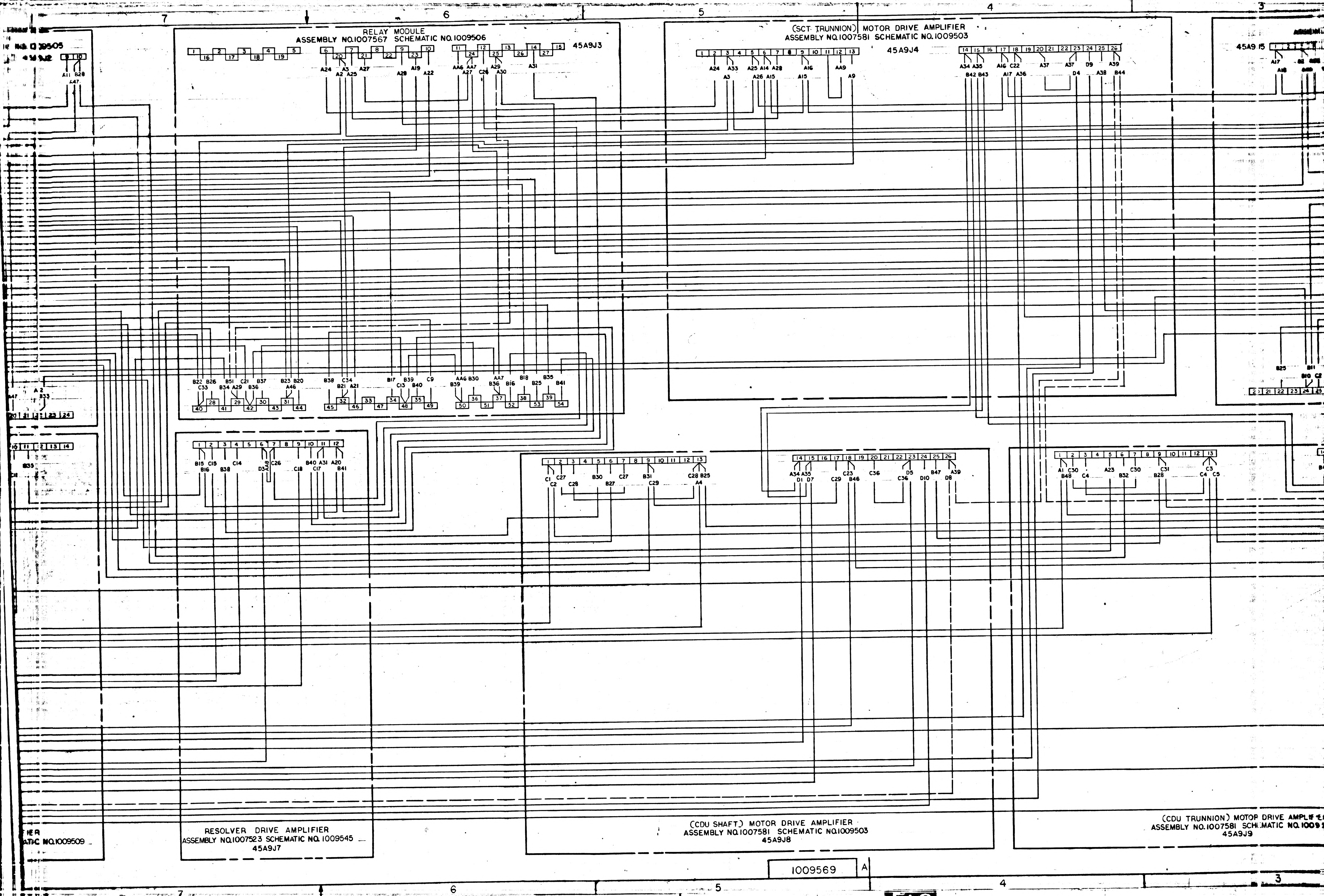

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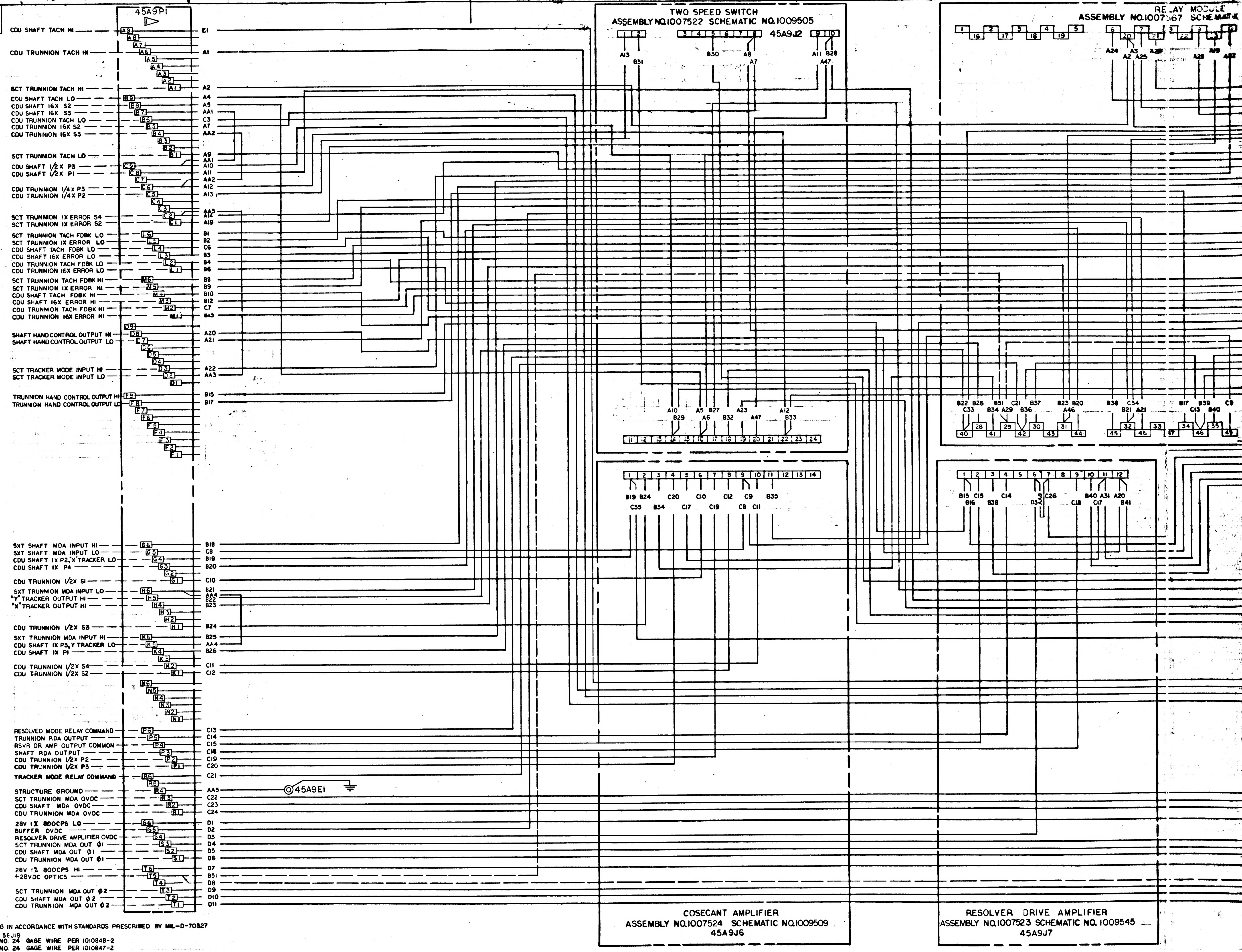
6
5
4
3
RELAY MODULE
ASSEMBLY NO.1007567 SCHEMATIC NO.1009506
45A9J3
(SCT TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J4
45A9J5
RESOLVER DRIVE AMPLIFIER
ASSEMBLY NO.1007523 SCHEMATIC NO. 1009545
45A9J7
(CDU SHAFT) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J8
(CDU TRUNNION) MOTOP DRIVE AMPLIF
ASSEMBLY NO.1007581 SCHEMATIC NO.1009
45A9J9
NO.1009505
45A9J2
ATIC NO.1009509

1009569 A


10
9
8
7
D
C
B
A
45A9P1
CDU SHAFT TACH HI
CDU TRUNNION TACH HI
SCT TRUNNION TACH HI
CDU SHAFT TACH LO
CDU SHAFT 16X S2
CDU SHAFT 16X S3
CDU TRUNNION TACH LO
CDU TRUNNION 16X S2
CDU TRUNNION 16X S3
SCT TRUNNION TACH LO
CDU SHAFT 1/2X P3
CDU SHAFT 1/2X P1
CDU TRUNNION 1/4X P3
CDU TRUNNION 1/4X P2
SCT TRUNNION 1X ERROR S4
SCT TRUNNION 1X ERROR S2
SCT TRUNNION TACH FDBK LO
SCT TRUNNION 1X ERROR LO
CDU SHAFT TACH FDBK LO
CDU SHAFT 16X ERROR LO
CDU TRUNNION TACH FDBK LO
CDU TRUNNION 16X ERROR LO
SCT TRUNNION TACH FDBK HI
SCT TRUNNION 1X ERROR HI
CDU SHAFT TACH FDBK HI
CDU SHAFT 16X ERROR HI
CDU TRUNNION TACH FDBK HI
CDU TRUNNION 16X ERROR HI
SHAFT HAND CONTROL OUTPUT HI
SHAFT HAND CONTROL OUTPUT LO
SCT TRACKER MODE INPUT HI
SCT TRACKER MODE INPUT LO
TRUNNION HAND CONTROL OUTPUT HI
TRUNNION HAND CONTROL OUTPUT LO
SXT SHAFT MDA INPUT HI
SXT SHAFT MDA INPUT LO
CDU SHAFT 1X P2, "X" TRACKER LO
CDU SHAFT 1X P4
CDU TRUNNION 1/2X S1
SXT TRUNNION MDA INPUT LO
"Y" TRACKER OUTPUT HI
"X" TRACKER OUTPUT HI
CDU TRUNNION 1/2X S3
SXT TRUNNION MDA INPUT HI
CDU SHAFT 1X P3, Y TRACKER LO
CDU SHAFT 1X P1
CDU TRUNNION 1/2X S4
CDU TRUNNION 1/2X S2
RESOLVED MODE RELAY COMMAND
TRUNNION RDA OUTPUT
RSVR DR AMP OUTPUT COMMON
SHAFT RDA OUTPUT
CDU TRUNNION 1/2X P2
CDU TRUNNION 1/2X P3
TRACKER MODE RELAY COMMAND
STRUCTURE GROUND
SCT TRUNNION MDA OVDC
CDU SHAFT MDA OVDC
CDU TRUNNION MDA OVDC
28V 1% 800CPS LO
BUFFER OVDC
RESOLVER DRIVE AMPLIFIER OVDC
SCT TRUNNION MDA OUT ϕ1
CDU SHAFT MDA OUT ϕ1
CDU TRUNNION MDA OUT ϕ1
28V 1% 800CPS HI
+28VDC OPTICS
SCT TRUNNION MDA OUT ϕ2
CDU SHAFT MDA OUT ϕ2
CDU TRUNNION MDA OUT ϕ2
45A9E1
TWO SPEED SWITCH
ASSEMBLY NO.1007522 SCHEMATIC NO.1009505
45A9J2
RELAY MODULE
ASSEMBLY NO.1007?67 SCHEMATIC
COSECANT AMPLIFIER
ASSEMBLY NO.1007524 SCHEMATIC NO.1009509
45A9J6
RESOLVER DRIVE AMPLIFIER
ASSEMBLY NO.1007523 SCHEMATIC NO. 1009545
45A9J7

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J19
3. —— INDICATES NO. 24 GAGE WIRE PER 1010848-2
4. — — INDICATES NO. 24 GAGE WIRE PER 1010847-2
5. HARNESS LISTS (REF)
A HARNESS 1008638 B HARNESS 1008639 AA WIRE LIST 1008642
C HARNESS 1008640 D HARNESS 1008641

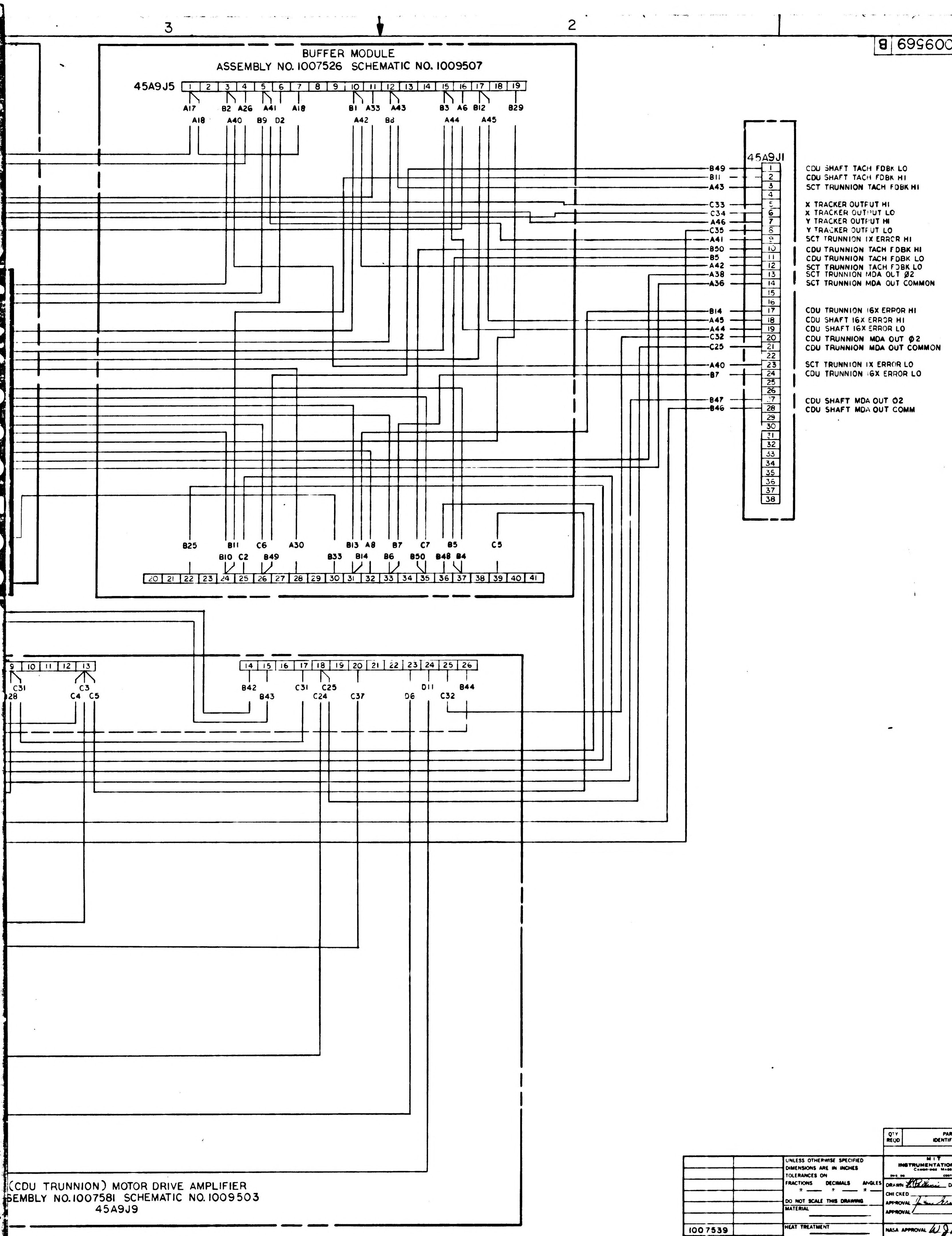
1009569 A

4/1009569

1009569 B

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15954	3/2/65	WK
B	REVISED PER TDRR 17762	29 MAR 65	EF

REVISIONS 13397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B25 B11 B10 C2 C6 B49 A30 B33 B13 B14 A8 B7 B6 B50 C7 B5 B48 B4 C5
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
45A9J1
B49 1 CDU SHAFT TACH FDBK LO
B11 2 CDU SHAFT TACH FDBK HI
A43 3 SCT TRUNNION TACH FDBK HI
4
C33 5 X TRACKER OUTPUT HI
C34 6 X TRACKER OUTPUT LO
A46 7 Y TRACKER OUTPUT HI
C35 8 Y TRACKER OUTPUT LO
A41 9 SCT TRUNNION 1X ERROR HI
B50 10 CDU TRUNNION TACH FDBK HI
B5 11 CDU TRUNNION TACH FDBK LO
A42 12 SCT TRUNNION TACH FDBK LO
A38 13 SCT TRUNNION MDA OUT Ø2
A36 14 SCT TRUNNION MDA OUT COMMON
15
16
B14 17 CDU TRUNNION 16X ERROR HI
A45 18 CDU SHAFT 16X ERROR HI
A44 19 CDU SHAFT 16X ERROR LO
C32 20 CDU TRUNNION MDA OUT Ø2
C25 21 CDU TRUNNION MDA OUT COMMON
22
A40 23 SCT TRUNNION 1X ERROR LO
B7 24 CDU TRUNNION 16X ERROR LO
25
26
B47 27 CDU SHAFT MDA OUT Ø2
B46 28 CDU SHAFT MDA OUT COMM
29 30 31 32 33 34 35 36 37 38
9 10 11 12 13
C31 28 C3 C4 C5
14 15 16 17 18 19 20 21 22 23 24 25 26
B42 B43 C31 C25 C24 C37 D6 D11 C32 B44
(CDU TRUNNION) MOTOR DRIVE AMPLIFIER
SEMBLY NO. 1007581 SCHEMATIC NO. 1009503
45A9J9
D C B A
3 2 1

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007539	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL W J 10-14-60
MIT APPROVAL

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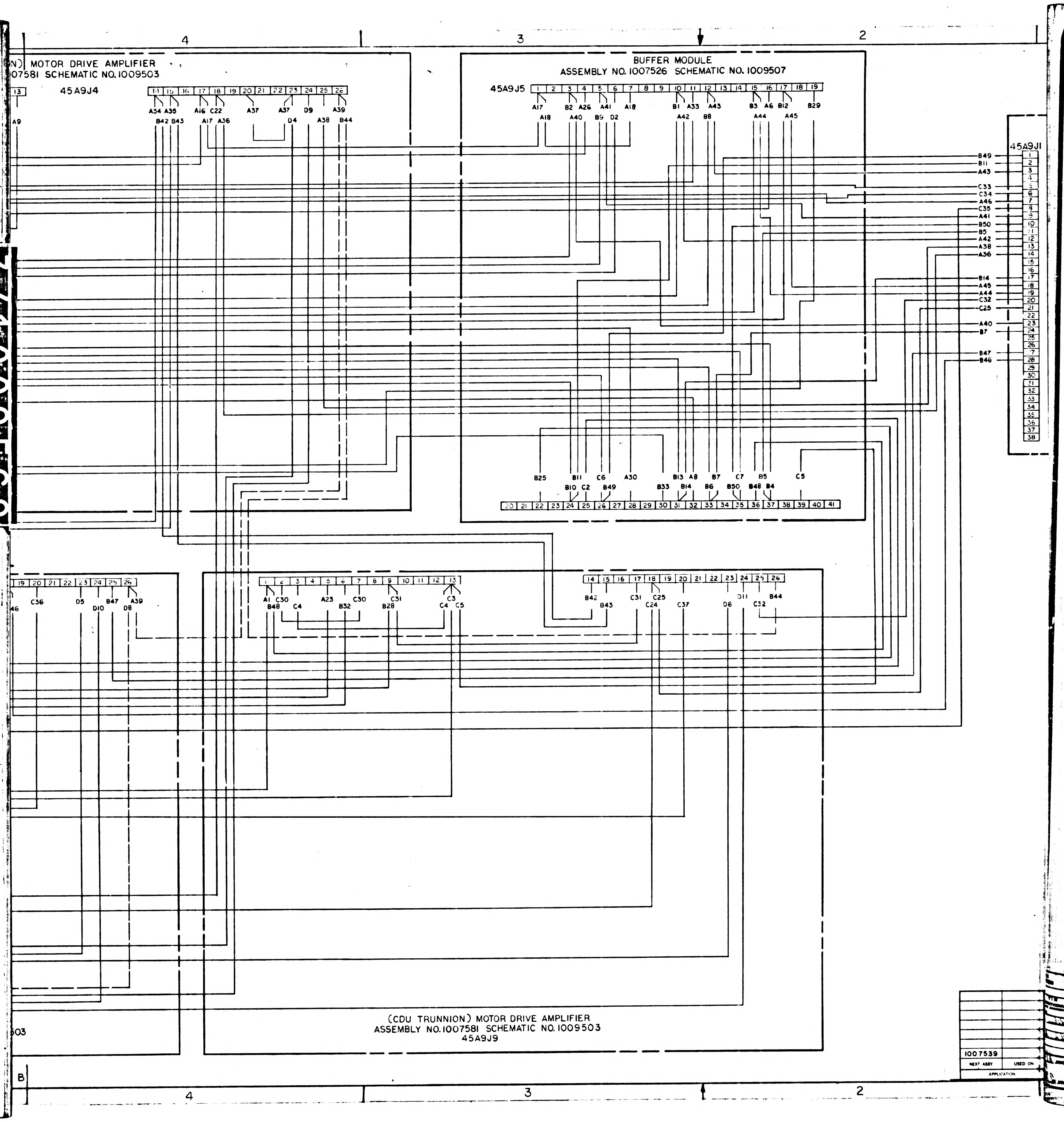
HOUSTON, TEXAS

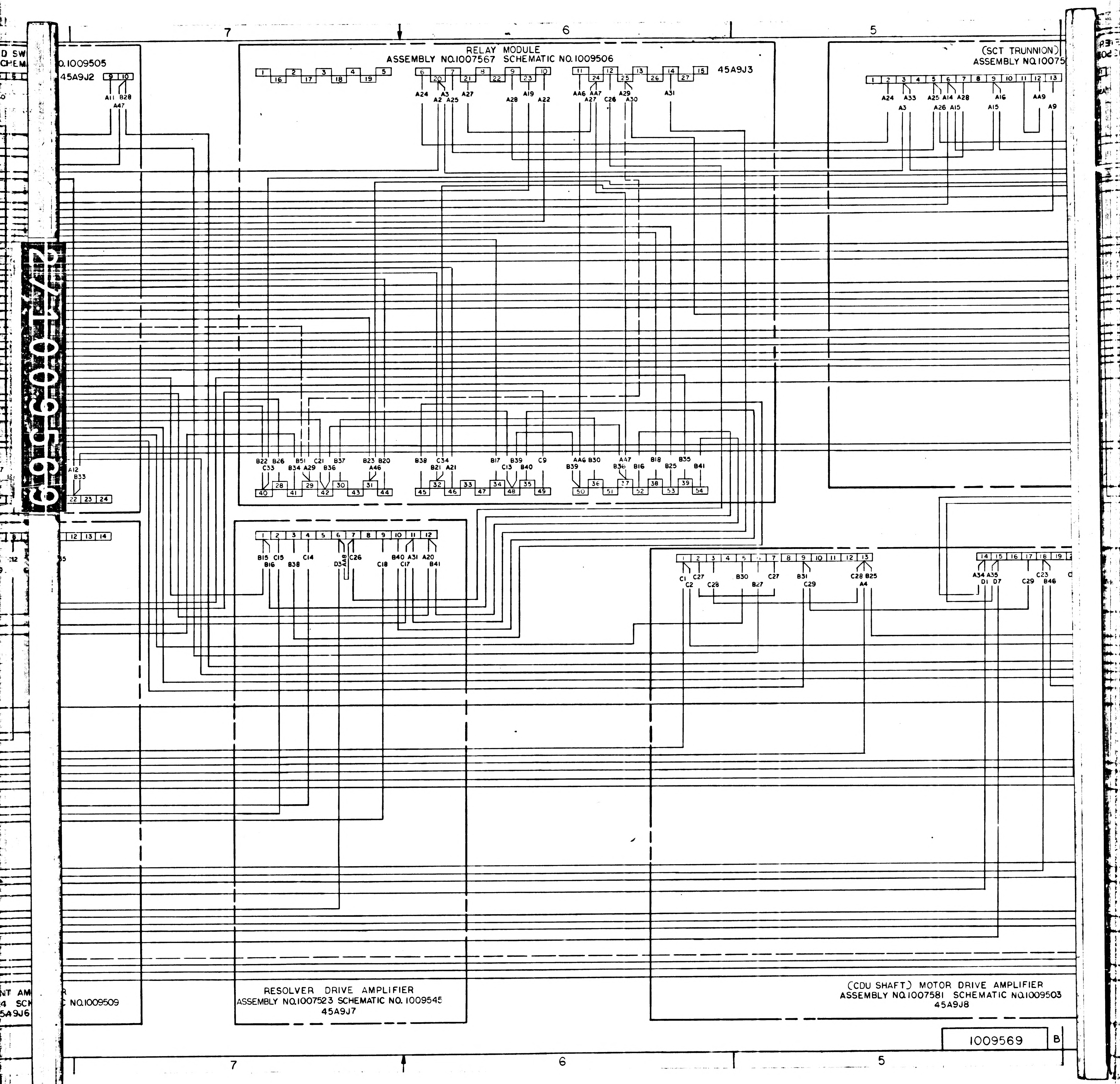
WIRING DIAGRAM
TRAY 9

CODE IDENT NO. —
SIZE J
NASA DRAWING NO 1009569
SCALE NONE
WT
SHEET 1 OF 1

3H

N) MOTOR DRIVE AMPLIFIER
007581 SCHEMATIC NO. 1009503
45A9J4
A9
A34 A35 A16 C22 A37 A37 D9 A39
B42 B43 A17 A36 D4 A38 B44
BUFFER MODULE
ASSEMBLY NO. 1007526 SCHEMATIC NO. 1009507
45A9J5
A17 B2 A26 A41 A18 B1 A33 A43 B3 A6 B12 B29
A18 A40 B9 D2 A42 B8 A44 A45
B25 B11 C6 A30 B13 A8 B7 C7 B5 C5
B10 C2 B49 B33 B14 B6 B50 B48 B4
45A9J1
B49 B11 A43 C33 C34 A46 C35 A41 B50 B5 A42 A38 A36 B14 A45 A44 C32 C25 A40 B7 B47 B46
C36 D5 D10 B47 D8 A39
A1 C30 B48 C4 A23 B32 C30 C31 B28 C4 C3 C5
B42 B43 C31 C25 C24 C37 D6 D11 C32 B44
(CDU TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO. 1007581 SCHEMATIC NO. 1009503
45A9J9
1007539
NEXT ASSY
USED ON
APPLICATION
4
3
2
B

37/1009569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6
5
RELAY MODULE
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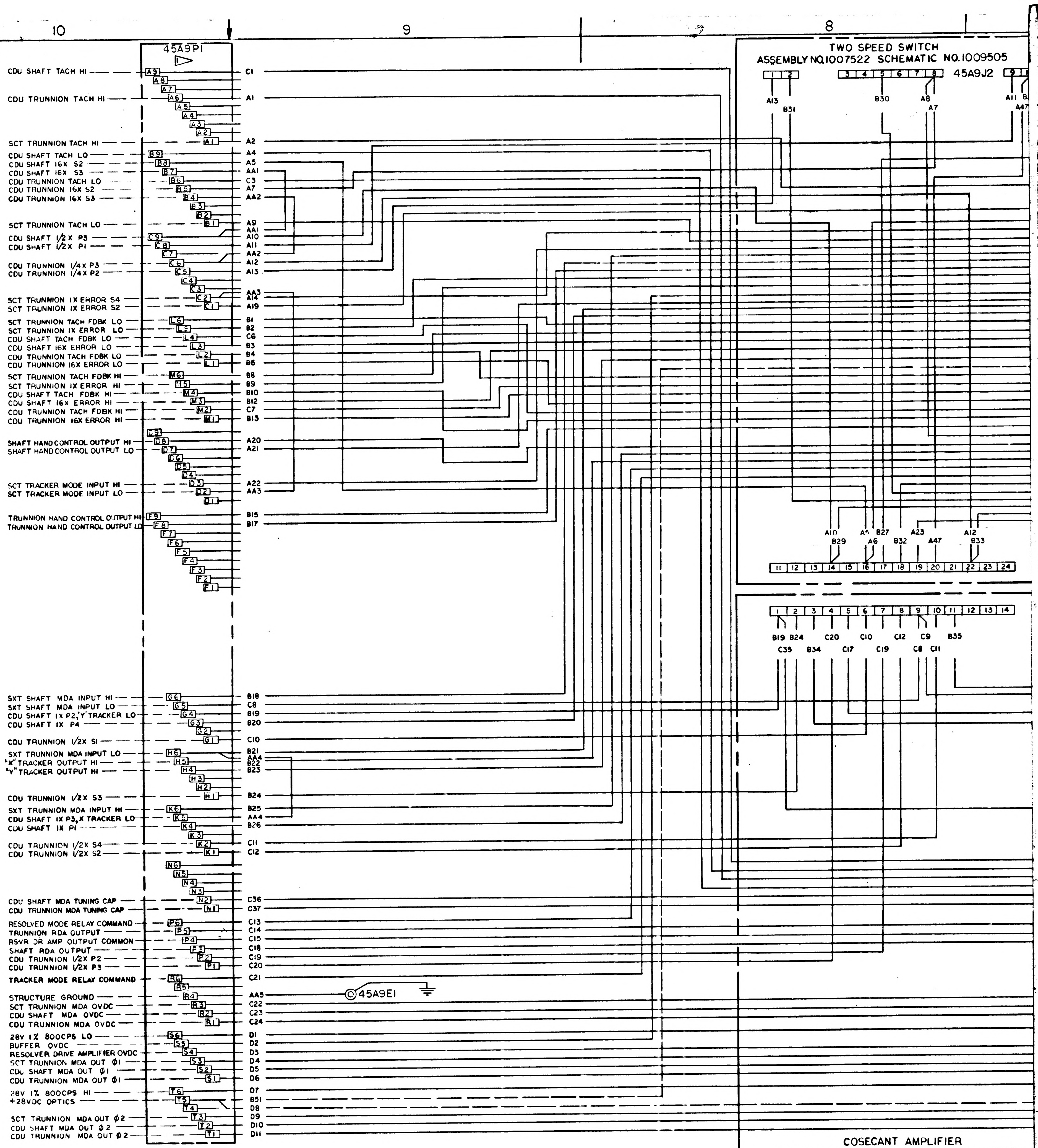
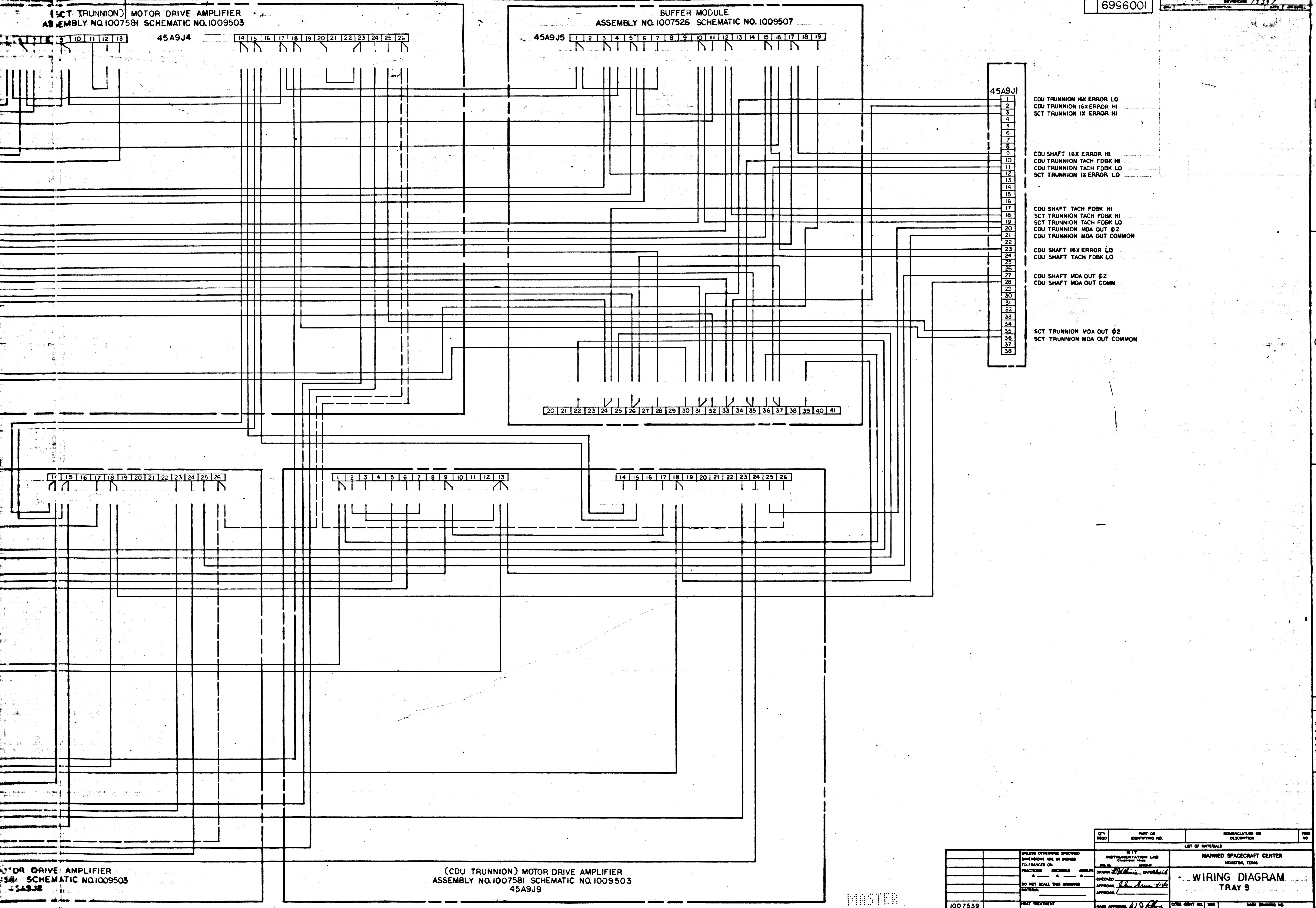
45A9J3
(SCT TRUNNION)
ASSEMBLY NO.10075
D SW
CHEM
0.1009505
45A9J2
A11 B28
A47
A12
B33
22 23 24
12 13 14
A24 A2 A3 A25 A27 A28 A19 A22
AA6 A27 AA7 C26 A29 A30 A31
A24 A3 A33 A25 A26 A14 A15 A28 A15 A16 AA9 A9
B22 B26 B51 C21 B37 B23 B20
C33 B34 A29 B36 A46
B38 C34 B21 A21 B17 B39 C13 B40 C9
AA6 B30 B39 A47 B36 B16 B18 B25 B35 B41
B15 C15 B16 B38 C14 D3 A8 C26 C18 B40 A31 C17 A20 B41
C1 C27 C2 C28 B30 C27 B27 B31 C29 C28 B25 A4
A34 A35 D1 D7 C29 C23 B46
RESOLVER DRIVE AMPLIFIER
ASSEMBLY NO.1007523 SCHEMATIC NO. 1009545
45A9J7
(CDU SHAFT) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J8
NT AM
4 SC
5A9J6
NO.1009509
1009569
B
2/1009569


45A9P1
CDU SHAFT TACH HI
CDU TRUNNION TACH HI
SCT TRUNNION TACH HI
CDU SHAFT TACH LO
CDU SHAFT 16X S2
CDU SHAFT 16X S3
CDU TRUNNION TACH LO
CDU TRUNNION 16X S2
CDU TRUNNION 16X S3
SCT TRUNNION TACH LO
CDU SHAFT 1/2X P3
CDU SHAFT 1/2X P1
CDU TRUNNION 1/4X P3
CDU TRUNNION 1/4X P2
SCT TRUNNION 1X ERROR S4
SCT TRUNNION 1X ERROR S2
SCT TRUNNION TACH FDBK LO
SCT TRUNNION 1X ERROR LO
CDU SHAFT TACH FDBK LO
CDU SHAFT 16X ERROR LO
CDU TRUNNION TACH FDBK LO
CDU TRUNNION 16X ERROR LO
SCT TRUNNION TACH FDBK HI
SCT TRUNNION 1X ERROR HI
CDU SHAFT TACH FDBK HI
CDU SHAFT 16X ERROR HI
CDU TRUNNION TACH FDBK HI
CDU TRUNNION 16X ERROR HI
SHAFT HAND CONTROL OUTPUT HI
SHAFT HAND CONTROL OUTPUT LO
SCT TRACKER MODE INPUT HI
SCT TRACKER MODE INPUT LO
TRUNNION HAND CONTROL OUTPUT HI
TRUNNION HAND CONTROL OUTPUT LO
SXT SHAFT MDA INPUT HI
SXT SHAFT MDA INPUT LO
CDU SHAFT 1X P2,"Y" TRACKER LO
CDU SHAFT 1X P4
CDU TRUNNION 1/2X S1
SXT TRUNNION MDA INPUT LO
"X" TRACKER OUTPUT HI
"Y" TRACKER OUTPUT HI
CDU TRUNNION 1/2X S3
SXT TRUNNION MDA INPUT HI
CDU SHAFT 1X P3,X TRACKER LO
CDU SHAFT 1X P1
CDU TRUNNION 1/2X S4
CDU TRUNNION 1/2X S2
CDU SHAFT MDA TUNING CAP
CDU TRUNNION MDA TUNING CAP
RESOLVED MODE RELAY COMMAND
TRUNNION RDA OUTPUT
RSVR DR AMP OUTPUT COMMON
SHAFT RDA OUTPUT
CDU TRUNNION 1/2X P2
CDU TRUNNION 1/2X P3
TRACKER MODE RELAY COMMAND
STRUCTURE GROUND
SCT TRUNNION MDA OVDC
CDU SHAFT MDA OVDC
CDU TRUNNION MDA OVDC
28V 1% 800CPS LO
BUFFER OVDC
RESOLVER DRIVE AMPLIFIER OVDC
SCT TRUNNION MDA OUT Ø1
CDU SHAFT MDA OUT Ø1
CDU TRUNNION MDA OUT Ø1
28V 1% 800CPS HI
+28VDC OPTICS
SCT TRUNNION MDA OUT Ø2
CDU SHAFT MDA OUT Ø2
CDU TRUNNION MDA OUT Ø2
45A9E1
TWO SPEED SWITCH
ASSEMBLY NO.1007522 SCHEMATIC NO.1009505
45A9J2
COSECANT AMPLIFIER
ASSEMBLY NO.1007524 SCHEMATIC NO.1009509
45A9J6

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J19
3. —— INDICATES NO. 24 GAGE WIRE PER 1010848-2
4. — — INDICATES NO. 24 GAGE WIRE PER 1010847-2
5. HARNESS LISTS (REF)
A HARNESS 1008638 B HARNESS 1008639 AA WIRE LIST 1008642
C HARNESS 1008640 D HARNESS 1008641

1009569 B


(SCT TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J4
BUFFER MODULE
ASSEMBLY NO.1007526 SCHEMATIC NO.1009507
45A9J5
45A9J1
CDU TRUNNION 16X ERROR LO
CDU TRUNNION 16X ERROR HI
SCT TRUNNION 1X ERROR HI
CDU SHAFT 16X ERROR HI
CDU TRUNNION TACH FDBK HI
CDU TRUNNION TACH FDBK LO
SCT TRUNNION 1X ERROR LO
CDU SHAFT TACH FDBK HI
SCT TRUNNION TACH FDBK HI
SCT TRUNNION TACH FDBK LO
CDU TRUNNION MDA OUT ϕ2
CDU TRUNNION MDA OUT COMMON
CDU SHAFT 16X ERROR LO
CDU SHAFT TACH FDBK LO
CDU SHAFT MDA OUT ϕ2
CDU SHAFT MDA OUT COMM
SCT TRUNNION MDA OUT ϕ2
SCT TRUNNION MDA OUT COMMON
OTOR DRIVE AMPLIFIER
581 SCHEMATIC NO.1009503
45A9J8
(CDU TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J9
4
3
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1009569

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007539	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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MATERIAL
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INSTRUMENTATION LAB
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APPROVAL
APPROVAL
NASA APPROVAL W J 10-14-60
MIT APPROVAL

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HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 9

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MASTER

1009569

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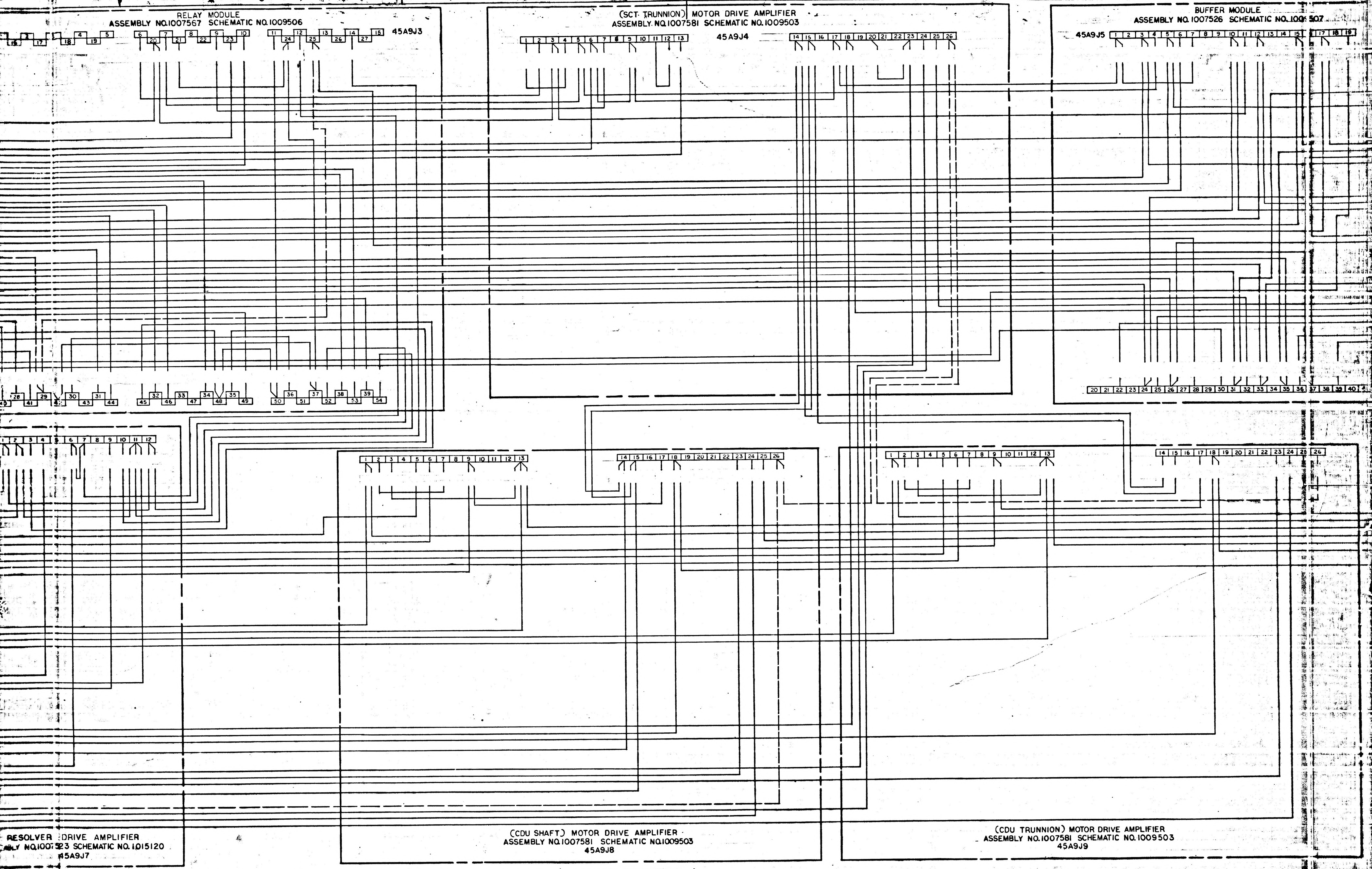
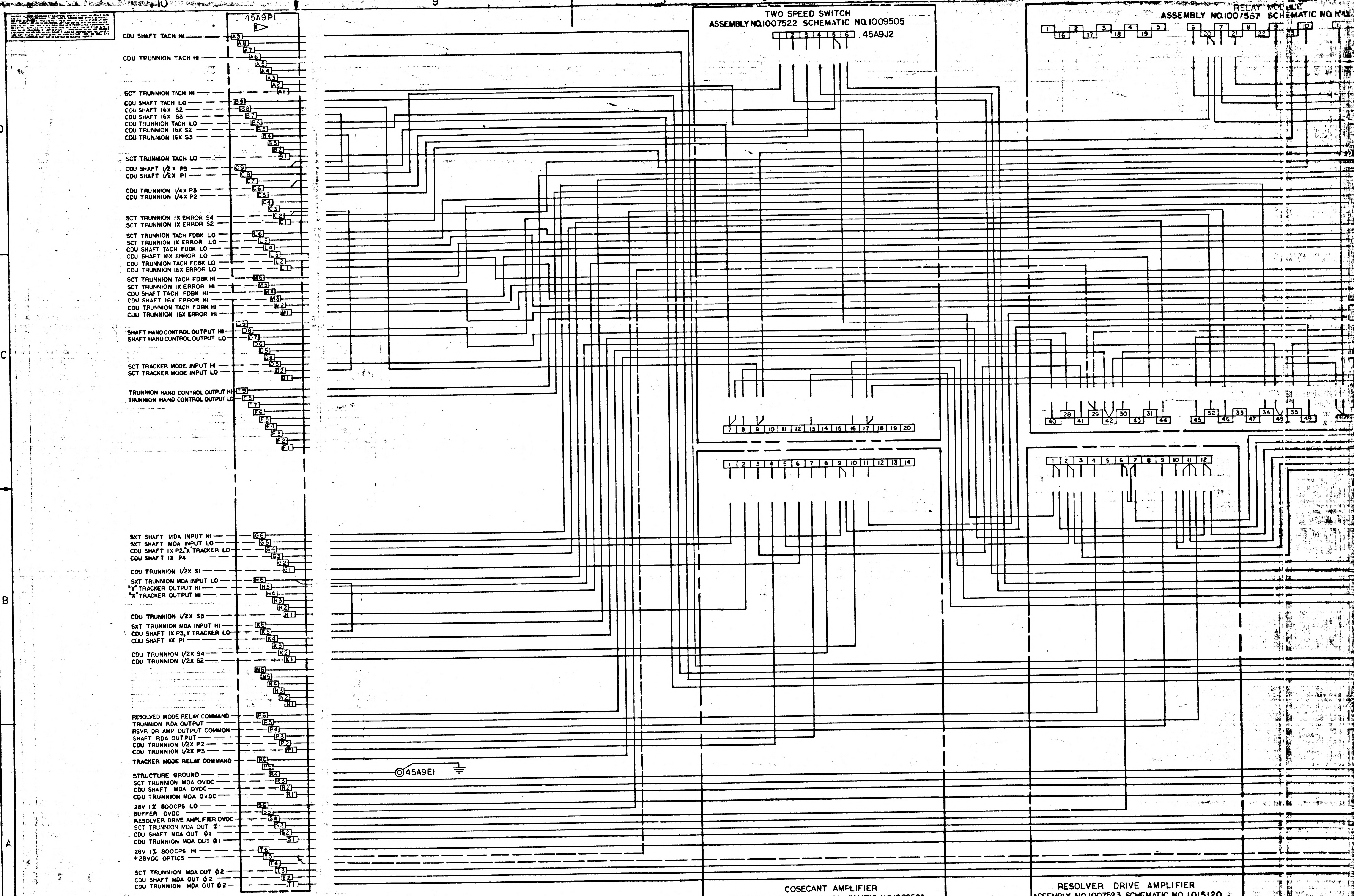

RELAY MODULE
ASSEMBLY NO.1007567 SCHEMATIC NO.1009506
45A9J3
(SCT TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J4
BUFFER MODULE
ASSEMBLY NO.1007526 SCHEMATIC NO.1009507
45A9J5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54
RESOLVER DRIVE AMPLIFIER
BLY NO.1007523 SCHEMATIC NO.1015120
45A9J7
(CDU SHAFT) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J8
(CDU TRUNNION) MOTOR DRIVE AMPLIFIER
ASSEMBLY NO.1007581 SCHEMATIC NO.1009503
45A9J9


10
9
8
7
D
C
B
A
45A9P1
1
CDU SHAFT TACH HI
CDU TRUNNION TACH HI
SCT TRUNNION TACH HI
CDU SHAFT TACH LO
CDU SHAFT 16X S2
CDU SHAFT 16X S3
CDU TRUNNION TACH LO
CDU TRUNNION 16X S2
CDU TRUNNION 16X S3
SCT TRUNNION TACH LO
CDU SHAFT 1/2X P3
CDU SHAFT 1/2X P1
CDU TRUNNION 1/4X P3
CDU TRUNNION 1/4X P2
SCT TRUNNION 1X ERROR S4
SCT TRUNNION 1X ERROR S2
SCT TRUNNION TACH FDBK LO
SCT TRUNNION 1X ERROR LO
CDU SHAFT TACH FDBK LO
CDU SHAFT 16X ERROR LO
CDU TRUNNION TACH FDBK LO
CDU TRUNNION 16X ERROR LO
SCT TRUNNION TACH FDBK HI
SCT TRUNNION 1X ERROR HI
CDU SHAFT TACH FDBK HI
CDU SHAFT 16X ERROR HI
CDU TRUNNION TACH FDBK HI
CDU TRUNNION 16X ERROR HI
SHAFT HAND CONTROL OUTPUT HI
SHAFT HAND CONTROL OUTPUT LO
SCT TRACKER MODE INPUT HI
SCT TRACKER MODE INPUT LO
TRUNNION HAND CONTROL OUTPUT HI
TRUNNION HAND CONTROL OUTPUT LO
SXT SHAFT MDA INPUT HI
SXT SHAFT MDA INPUT LO
CDU SHAFT 1X P2, "X" TRACKER LO
CDU SHAFT 1X P4
CDU TRUNNION 1/2X S1
SXT TRUNNION MDA INPUT LO
"Y" TRACKER OUTPUT HI
"X" TRACKER OUTPUT HI
CDU TRUNNION 1/2X S5
SXT TRUNNION MDA INPUT HI
CDU SHAFT 1X P3, Y TRACKER LO
CDU SHAFT 1X P1
CDU TRUNNION 1/2X S4
CDU TRUNNION 1/2X S2
RESOLVED MODE RELAY COMMAND
TRUNNION RDA OUTPUT
RSVR DR AMP OUTPUT COMMON
SHAFT RDA OUTPUT
CDU TRUNNION 1/2X P2
CDU TRUNNION 1/2X P3
TRACKER MODE RELAY COMMAND
STRUCTURE GROUND
SCT TRUNNION MDA OVDC
CDU SHAFT MDA OVDC
CDU TRUNNION MDA OVDC
28V 1% 800CPS LO
BUFFER OVDC
RESOLVER DRIVE AMPLIFIER OVDC
SCT TRUNNION MDA OUT ϕ1
CDU SHAFT MDA OUT ϕ1
CDU TRUNNION MDA OUT ϕ1
28V 1% 800CPS HI
+28VDC OPTICS
SCT TRUNNION MDA OUT ϕ2
CDU SHAFT MDA OUT ϕ2
CDU TRUNNION MDA OUT ϕ2
45A9E1
TWO SPEED SWITCH
ASSEMBLY NO.1007522 SCHEMATIC NO.1009505
45A9J2
RELAY MODULE
ASSEMBLY NO.1007567 SCHEMATIC NO.
COSECANT AMPLIFIER
ASSEMBLY NO.1007524 SCHEMATIC NO.1009509
45A9J6
RESOLVER DRIVE AMPLIFIER
ASSEMBLY NO.1007523 SCHEMATIC NO.1015120
45A9J7

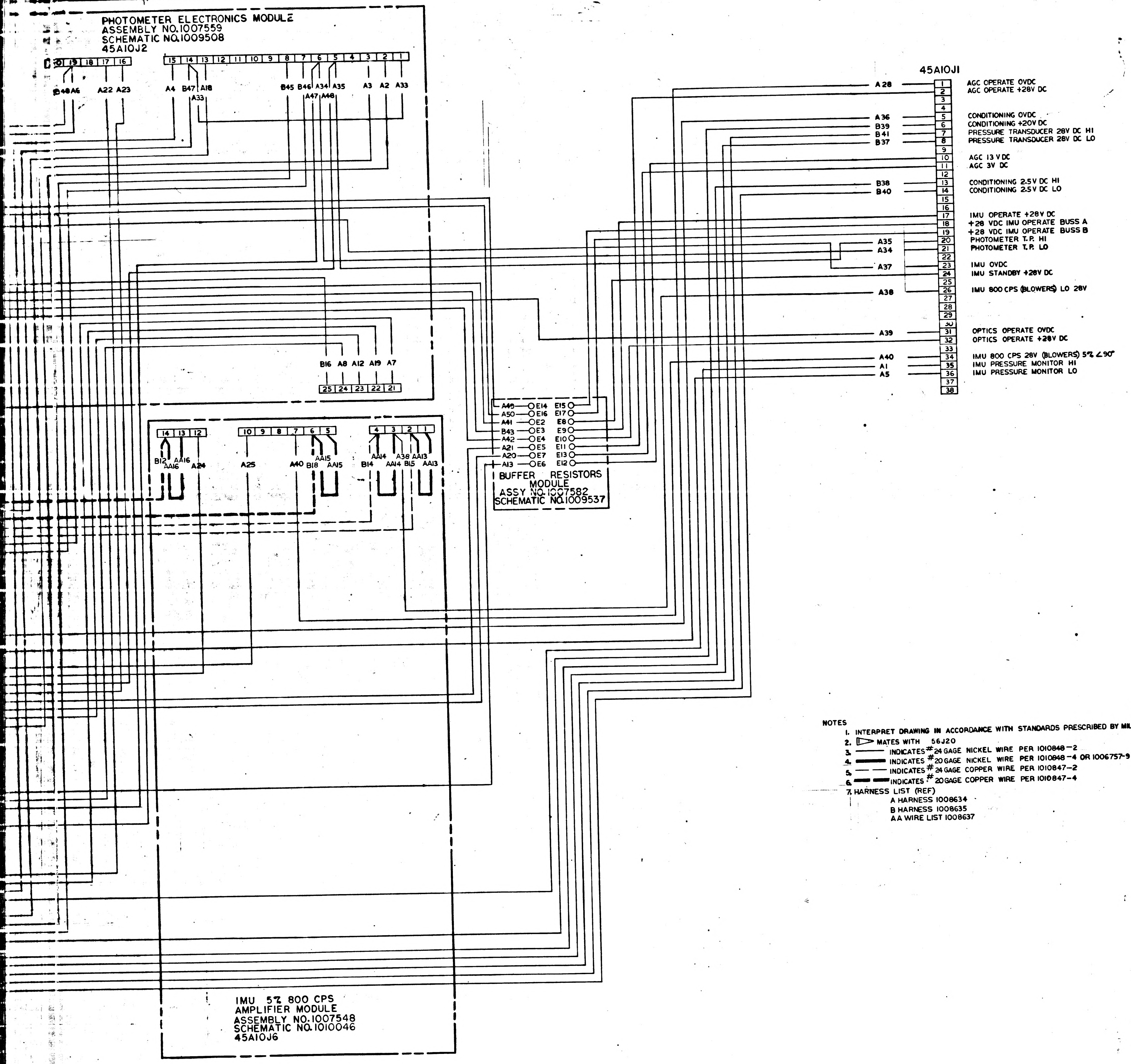
NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J19
3. —— INDICATES NO. 24 GAGE WIRE PER 1010639-2
4. — — INDICATES NO. 24 GAGE WIRE PER MIL-W-16878/1B-24-19 STRD WHT

1009569

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15559		VR

REVISIONS 13397

1009570 A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ASSEMBLY NO.1007559
SCHEMATIC NO.1009508
45A10J2
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15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
B48 A6 A22 A23 A4 B47 A18 A33 B45 B46 A34 A35 A47 A48 A3 A2 A33
B16 A8 A12 A19 A7
25 24 23 22 21
45A10J1
A28 1 AGC OPERATE OVDC
2 AGC OPERATE +28V DC
3
4
A36 5 CONDITIONING OVDC
B39 6 CONDITIONING +20V DC
B41 7 PRESSURE TRANSDUCER 28V DC HI
B37 8 PRESSURE TRANSDUCER 28V DC LO
9
10 AGC 13 V DC
11 AGC 3V DC
12
B38 13 CONDITIONING 2.5V DC HI
B40 14 CONDITIONING 2.5V DC LO
15
16
17 IMU OPERATE +28V DC
18 +28 VDC IMU OPERATE BUSS A
19 +28 VDC IMU OPERATE BUSS B
A35 20 PHOTOMETER T.P. HI
A34 21 PHOTOMETER T.P. LO
22
A37 23 IMU OVDC
24 IMU STANDBY +28V DC
25
A38 26 IMU 800 CPS (BLOWERS) LO 28V
27
28
29
30
A39 31 OPTICS OPERATE OVDC
32 OPTICS OPERATE +28V DC
33
A40 34 IMU 800 CPS 28V (BLOWERS) 5% ∠90°
A1 35 IMU PRESSURE MONITOR HI
A5 36 IMU PRESSURE MONITOR LO
37
38
14 13 12 10 9 8 7 6 5 4 3 2 1
B12 AA16 AA16 A24 A25 A40 B18 AA15 AA15 B14 AA14 AA14 A38 B15 AA13 AA13
A49 E14 E15
A50 E16 E17
A41 E2 E8
B43 E3 E9
A42 E4 E10
A21 E5 E11
A20 E7 E13
A13 E6 E12
BUFFER RESISTORS MODULE
ASSY NO.1007582
SCHEMATIC NO.1009537
IMU 5% 800 CPS
AMPLIFIER MODULE
ASSEMBLY NO.1007548
SCHEMATIC NO.1010046
45A10J6

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J20
3. ——— INDICATES #24 GAGE NICKEL WIRE PER 1010848-2
4. ━━━ INDICATES #20 GAGE NICKEL WIRE PER 1010848-4 OR 1006757-9 (UNINSULATED)
5. — — INDICATES #24 GAGE COPPER WIRE PER 1010847-2
6. ━ ━ INDICATES #20 GAGE COPPER WIRE PER 1010847-4
7. HARNESS LIST (REF)
A HARNESS 1008634
B HARNESS 1008635
AA WIRE LIST 1008637

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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NEXT ASSY	USED ON
1007530	

APPLICATION

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CAMBRIDGE, MASS
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APPROVAL 10/7/64
APPROVAL
NASA APPROVAL 10-14-64
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HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 10

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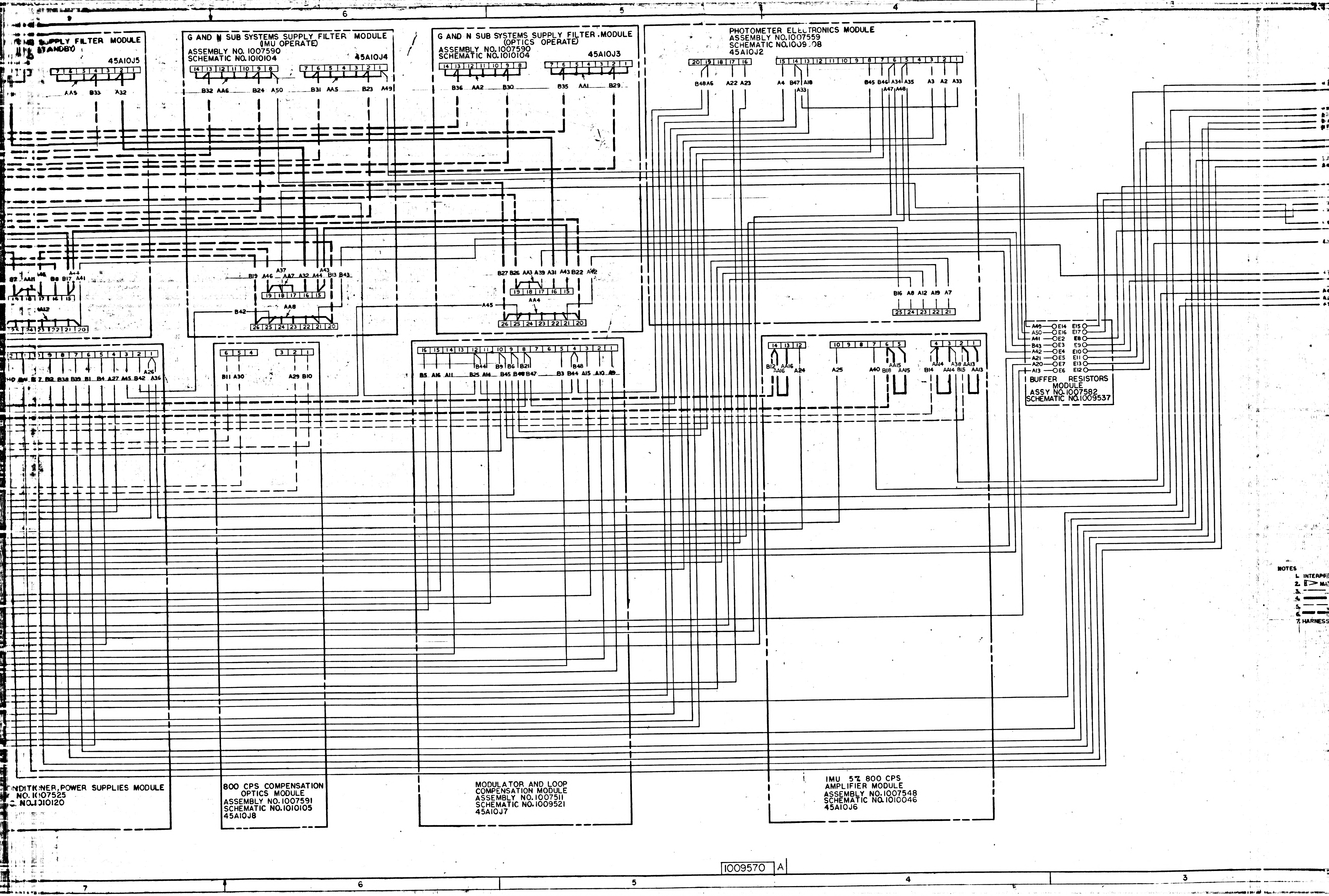
SCALE NONE
WT
SHEET 1 OF 1

1009570 A

6
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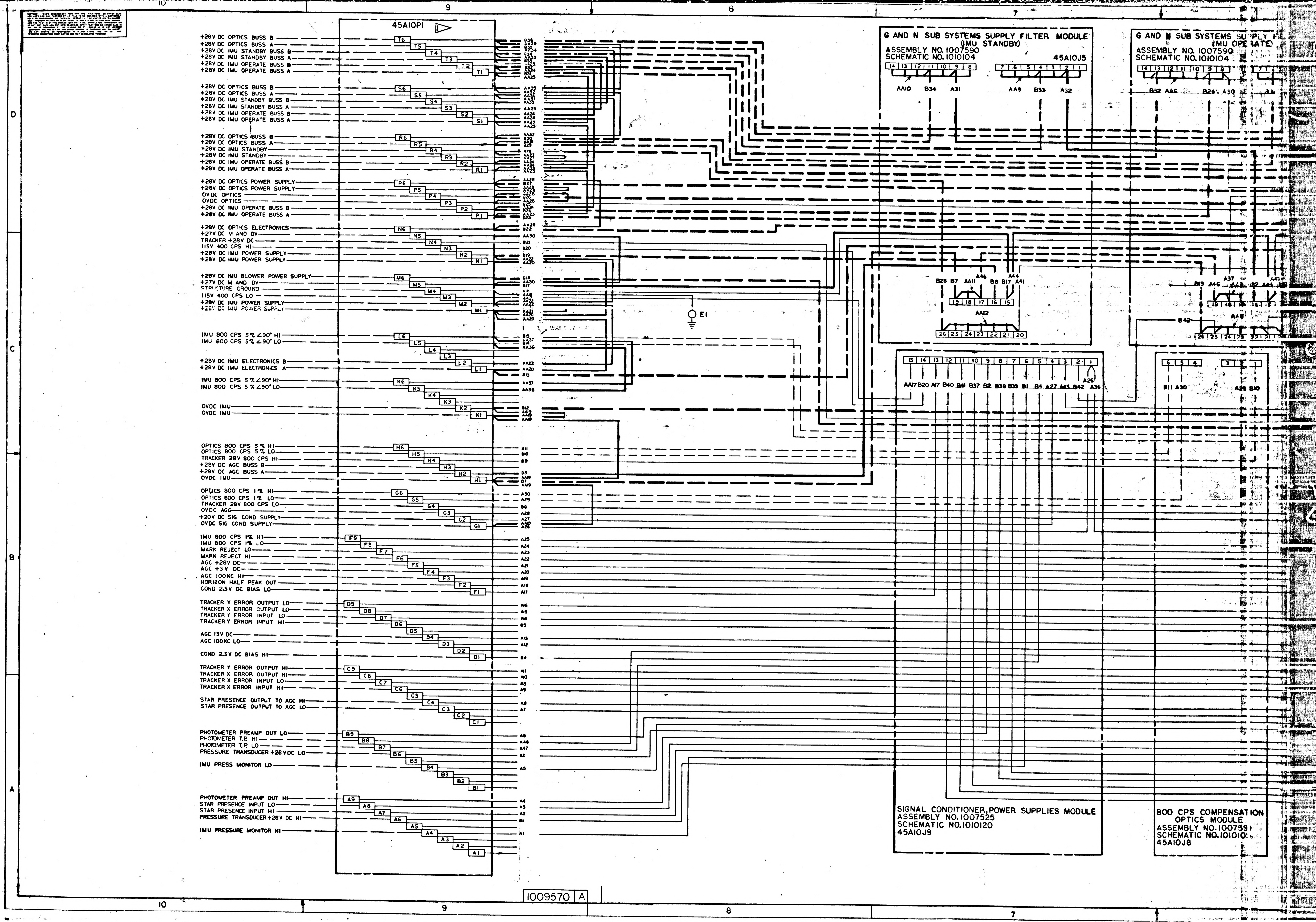
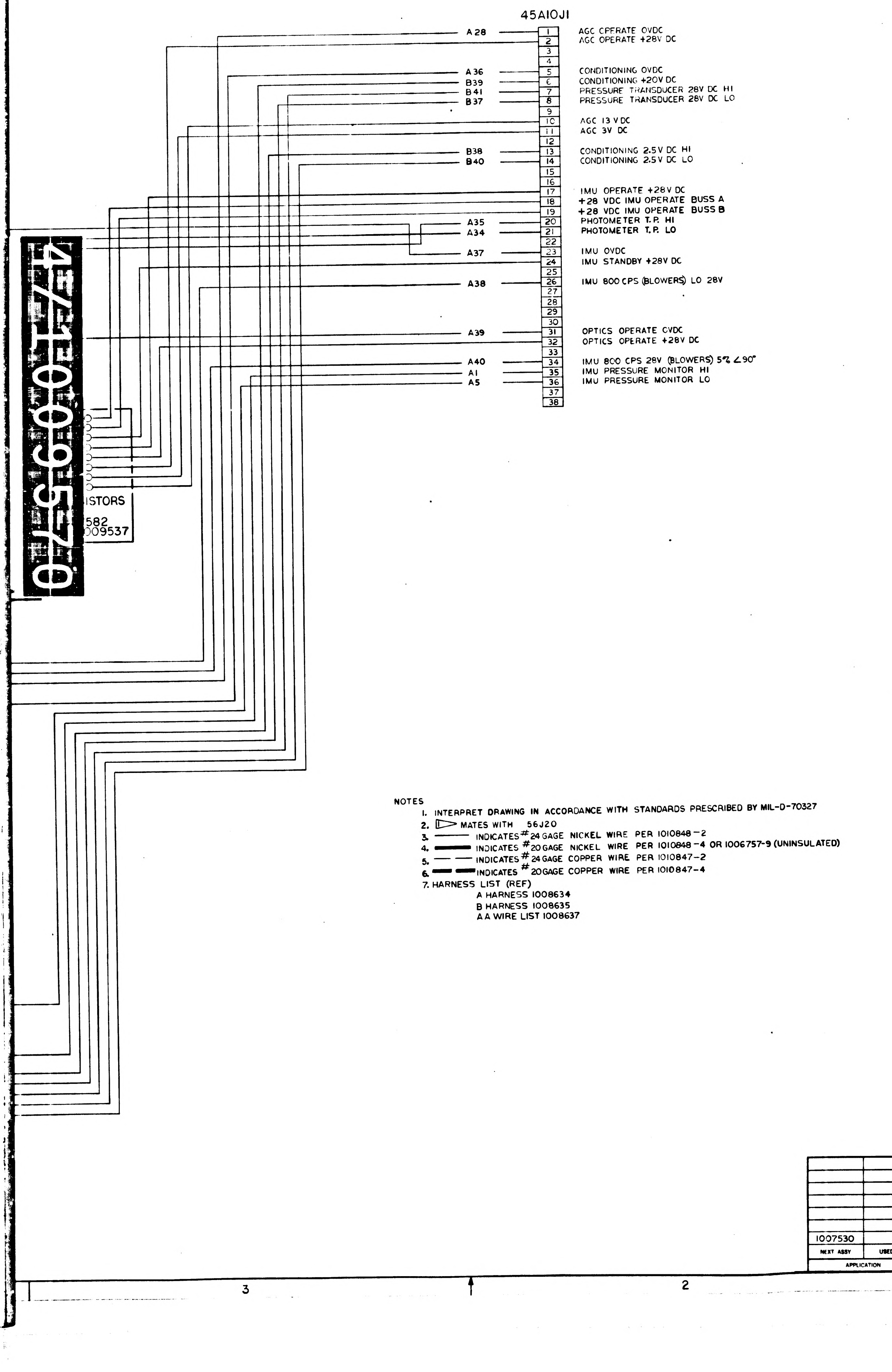
4
SUPPLY FILTER MODULE
(STANDBY)
45A10J5
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(IMU OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J4
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(OPTICS OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J3
PHOTOMETER ELECTRONICS MODULE
ASSEMBLY NO. 1007559
SCHEMATIC NO. 1009508
45A10J2
BUFFER RESISTORS MODULE
ASSY NO. 1007582
SCHEMATIC NO. 1009537
CONDITIONER, POWER SUPPLIES MODULE
NO. 1007525
NO. 1010120
800 CPS COMPENSATION OPTICS MODULE
ASSEMBLY NO. 1007591
SCHEMATIC NO. 1010105
45A10J8
MODULATOR AND LOOP COMPENSATION MODULE
ASSEMBLY NO. 1007511
SCHEMATIC NO. 1009521
45A10J7
IMU 5% 800 CPS AMPLIFIER MODULE
ASSEMBLY NO. 1007548
SCHEMATIC NO. 1010046
45A10J6
NOTES
1. INTERPRE
2. MA
7. HARNESS
7
6
5
4
3


10
9
8
7
D
C
B
A
45A10P1
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY BUSS B
+28V DC IMU STANDBY BUSS A
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
+28V DC IMU STANDBY
+28V DC OPTICS POWER SUPPLY
OV DC OPTICS
+28V DC OPTICS ELECTRONICS
+27V DC M AND DV
TRACKER +28V DC
115V 400 CPS HI
+28V DC IMU POWER SUPPLY
+28V DC IMU BLOWER POWER SUPPLY
STRUCTURE GROUND
115V 400 CPS LO
IMU 800 CPS 5% ∠90° HI
IMU 800 CPS 5% ∠90° LO
+28V DC IMU ELECTRONICS B
+28V DC IMU ELECTRONICS A
OVDC IMU
OPTICS 800 CPS 5% HI
OPTICS 800 CPS 5% LO
TRACKER 28V 800 CPS HI
+28V DC AGC BUSS B
+28V DC AGC BUSS A
OPTICS 800 CPS 1% HI
OPTICS 800 CPS 1% LO
TRACKER 28V 800 CPS LO
OVDC AGC
+20V DC SIG COND SUPPLY
OVDC SIG COND SUPPLY
IMU 800 CPS 1% HI
IMU 800 CPS 1% LO
MARK REJECT LO
MARK REJECT HI
AGC +28V DC
AGC +3 V DC
AGC 100KC HI
HORIZON HALF PEAK OUT
COND 2.5V DC BIAS LO
TRACKER Y ERROR OUTPUT LO
TRACKER X ERROR OUTPUT LO
TRACKER Y ERROR INPUT LO
TRACKER Y ERROR INPUT HI
AGC 13V DC
AGC 100KC LO
COND 2.5V DC BIAS HI
TRACKER Y ERROR OUTPUT HI
TRACKER X ERROR OUTPUT HI
TRACKER X ERROR INPUT LO
TRACKER X ERROR INPUT HI
STAR PRESENCE OUTPUT TO AGC HI
STAR PRESENCE OUTPUT TO AGC LO
PHOTOMETER PREAMP OUT LO
PHOTOMETER T.P. HI
PHOTOMETER T.P. LO
PRESSURE TRANSDUCER +28 VDC LO
IMU PRESS MONITOR LO
PHOTOMETER PREAMP OUT HI
STAR PRESENCE INPUT LO
STAR PRESENCE INPUT HI
PRESSURE TRANSDUCER +28V DC HI
IMU PRESSURE MONITOR HI
T6 T5 T4 T3 T2 T1
S6 S5 S4 S3 S2 S1
R6 R5 R4 R3 R2 R1
P6 P5 P4 P3 P2 P1
N6 N5 N4 N3 N2 N1
M6 M5 M4 M3 M2 M1
L6 L5 L4 L3 L2 L1
K6 K5 K4 K3 K2 K1
H6 H5 H4 H3 H2 H1
G6 G5 G4 G3 G2 G1
F9 F8 F7 F6 F5 F4 F3 F2 F1
D9 D8 D7 D6 D5 D4 D3 D2 D1
C9 C8 C7 C6 C5 C4 C3 C2 C1
B9 B8 B7 B6 B5 B4 B3 B2 B1
A9 A8 A7 A6 A5 A4 A3 A2 A1
E1
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(IMU STANDBY)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J5
AA10 B34 A31 AA9 B33 A32
B28 B7 AA11 A46 B8 B17 A44 A41
AA12
G AND N SUB SYSTEMS SU PLY F
(IMU OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
B32 AA6 B24 A50
B19 A46 A37 B42 AA8
AA17 B20 A17 B40 B41 B37 B2 B38 B39 B1 B4 A27 A45 B42 A26 A36
B11 A30 A29 B10
SIGNAL CONDITIONER, POWER SUPPLIES MODULE
ASSEMBLY NO. 1007525
SCHEMATIC NO. 1010120
45A10J9
800 CPS COMPENSATION
OPTICS MODULE
ASSEMBLY NO. 100759
SCHEMATIC NO. 101010
45A10J8

1009570 A

1009570 B

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 1[illegible]9		WJ
B	REVISED PER TDPR 2[illegible]2[illegible]2	SEP 65	ALI


45A10J1
A28 — 1 — AGC OPERATE OVDC
2 — AGC OPERATE +28V DC
3
4
A36 — 5 — CONDITIONING OVDC
B39 — 6 — CONDITIONING +20V DC
B41 — 7 — PRESSURE TRANSDUCER 28V DC HI
B37 — 8 — PRESSURE TRANSDUCER 28V DC LO
9
10 — AGC 13 V DC
11 — AGC 3V DC
12
B38 — 13 — CONDITIONING 2.5V DC HI
B40 — 14 — CONDITIONING 2.5V DC LO
15
16
17 — IMU OPERATE +28V DC
18 — +28 VDC IMU OPERATE BUSS A
19 — +28 VDC IMU OPERATE BUSS B
A35 — 20 — PHOTOMETER T.P. HI
A34 — 21 — PHOTOMETER T.P. LO
22
A37 — 23 — IMU OVDC
24 — IMU STANDBY +28V DC
25
A38 — 26 — IMU 800 CPS (BLOWERS) LO 28V
27
28
29
30
A39 — 31 — OPTICS OPERATE OVDC
32 — OPTICS OPERATE +28V DC
33
A40 — 34 — IMU 800 CPS 28V (BLOWERS) 5% ∠90°
A1 — 35 — IMU PRESSURE MONITOR HI
A5 — 36 — IMU PRESSURE MONITOR LO
37
38
ISTORS
582
009537

4/1009570

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J20
3. ——— INDICATES #24 GAGE NICKEL WIRE PER 1010848-2
4. ━━━ INDICATES #20 GAGE NICKEL WIRE PER 1010848-4 OR 1006757-9 (UNINSULATED)
5. — — INDICATES #24 GAGE COPPER WIRE PER 1010847-2
6. ━ ━ INDICATES #20 GAGE COPPER WIRE PER 1010847-4
7. HARNESS LIST (REF)
   - A HARNESS 1008634
   - B HARNESS 1008635
   - AA WIRE LIST 1008637

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
1007530	

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

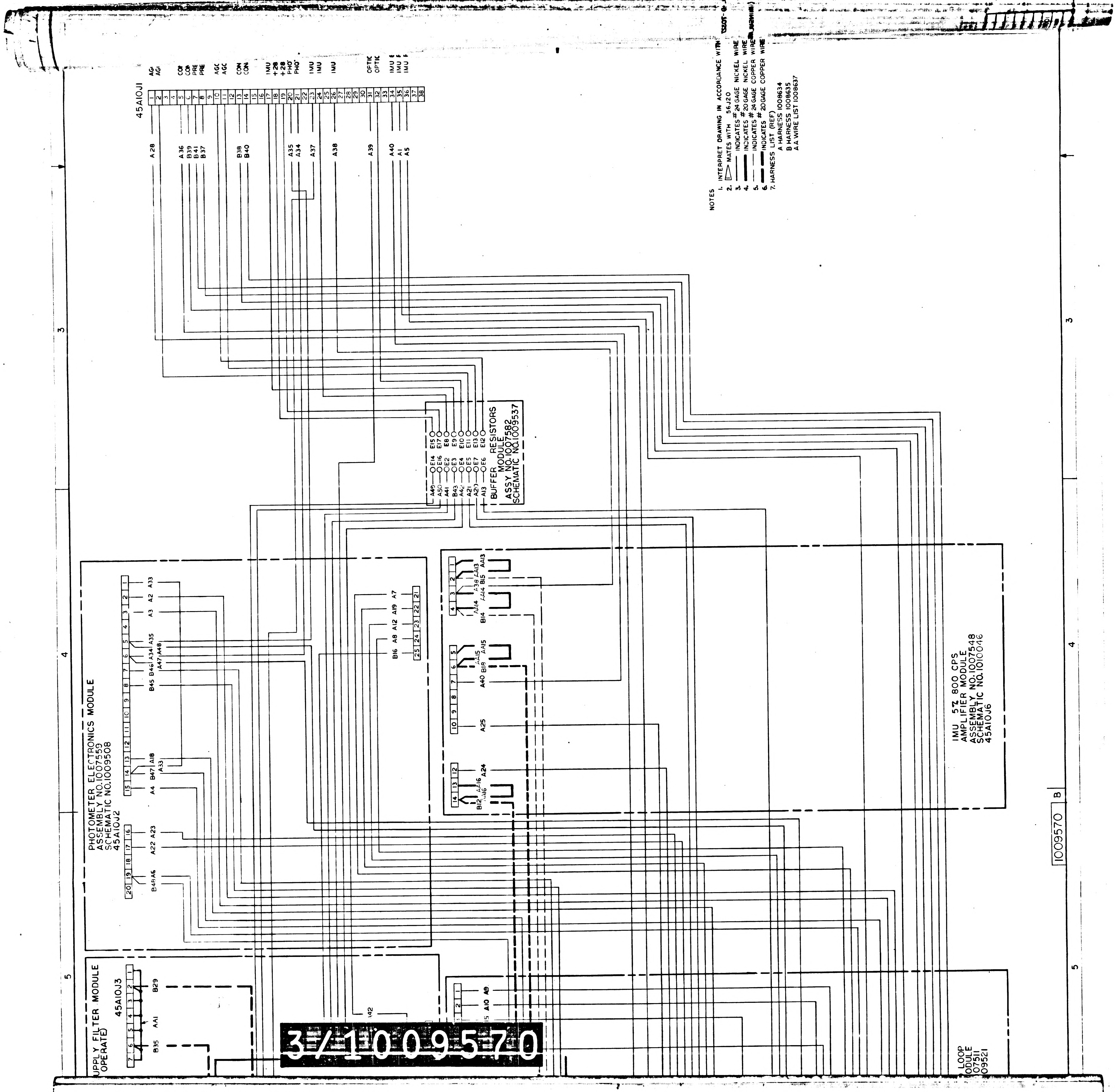
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
APPROVAL John [illegible] 10/7/64
APPROVAL
NASA APPROVAL 10-14-64
MIT APPROVAL 10/14/64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

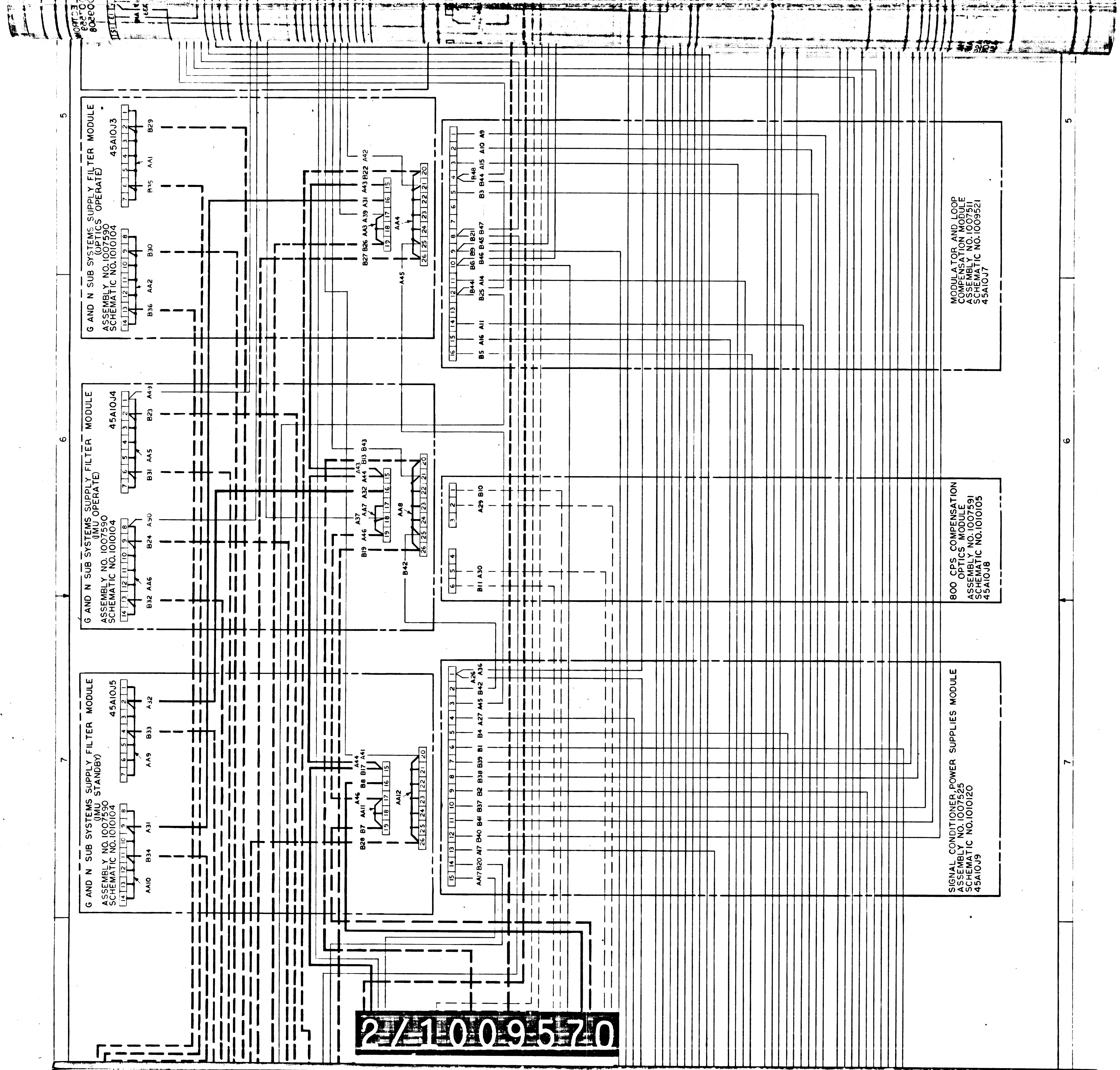
WIRING DIAGRAM
TRAY 10

CODE IDENT NO. 80230
SIZE J
NASA DRAWING NO 1009570
SCALE NONE
WT
SHEET 1 OF 1

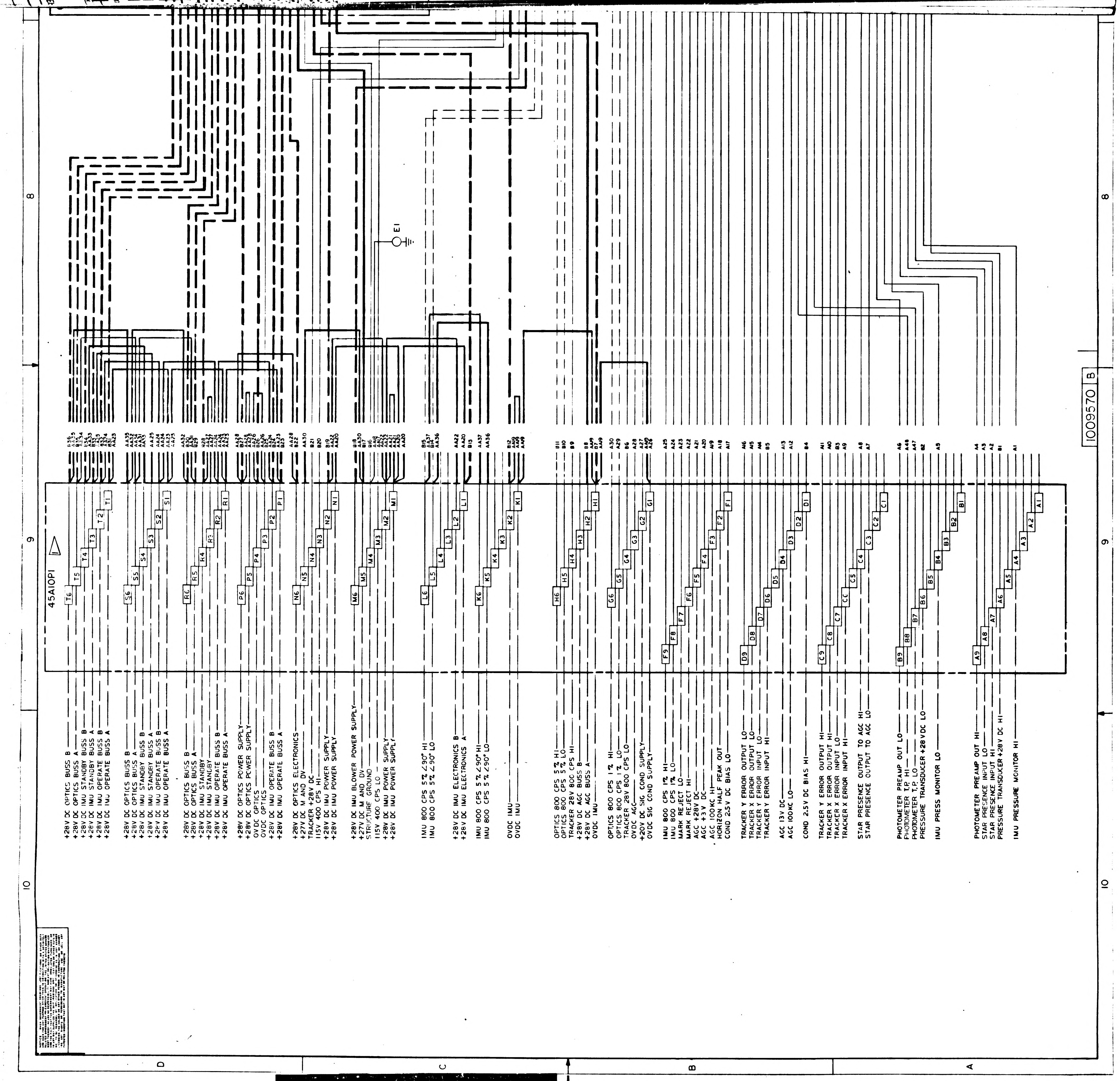
(38)


45A10J1
A28
A36
B39
B41
B37
B38
B40
A35
A34
A37
A38
A39
A40
A1
A5
BUFFER RESISTORS
MODULE
ASSY NO.1007582
SCHEMATIC NO.1009537
A49
A50
A41
B43
A42
A21
A20
A13
E14
E16
E2
E3
E4
E5
E7
E6
E15
E17
E8
E9
E10
E11
E13
E12
PHOTOMETER ELECTRONICS MODULE
ASSEMBLY NO.1007559
SCHEMATIC NO.1009508
45A10J2
A33
A2
A3
A35
A34
B46
A48
A47
B45
A18
B47
A33
A4
A23
A22
B48A6
A7
A19
A12
B16
A8
IMU 5Z 800 CPS
AMPLIFIER MODULE
ASSEMBLY NO.1007548
SCHEMATIC NO.1010046
45A10J6
AA13
B15
AA14
B14
AA15
B18
A40
A25
A24
AA16
B12
UPPLY FILTER MODULE
OPERATE)
45A10J3
B29
AA1
B35
A9
A10
LOOP
ODULE
07511
09521
1009570 B
3/1009570
3
4
5

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH
2. ▷ MATES WITH 56J20
3. ── INDICATES #24 GAGE NICKEL WIRE
4. ━━ INDICATES #20 GAGE NICKEL WIRE
5. ─ INDICATES #24 GAGE COPPER WIRE
6. ━ ━ INDICATES #20 GAGE COPPER WIRE
7. HARNESS LIST (REF)
A HARNESS 1008634
B HARNESS 1008635
A A WIRE LIST 1008637


G AND N SUB SYSTEMS SUPPLY FILTER MODULE (OPTICS OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J3
G AND N SUB SYSTEMS SUPPLY FILTER MODULE (IMU OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J4
G AND N SUB SYSTEMS SUPPLY FILTER MODULE (IMU STANDBY)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J5
MODULATOR AND LOOP COMPENSATION MODULE
ASSEMBLY NO. 1007511
SCHEMATIC NO. 1009521
45A10J7
800 CPS COMPENSATION OPTICS MODULE
ASSEMBLY NO. 1007591
SCHEMATIC NO. 1010105
45A10J8
SIGNAL CONDITIONER POWER SUPPLIES MODULE
ASSEMBLY NO. 1007525
SCHEMATIC NO. 1010120
45A10J9
AA1
AA2
AA4
AA5
AA6
AA8
AA9
AA10
AA11
AA12
AA3
AA7
5
6
7

2/1009570


45A10P1
E1
1009570 B
T1 T2 T3 T4 T5 T6
S1 S2 S3 S4 S5 S6
R1 R2 R3 R4 R5 R6
P1 P2 P3 P4 P5 P6
N1 N2 N3 N4 N5 N6
M1 M2 M3 M4 M5 M6
L1 L2 L3 L4 L5 L6
K1 K2 K3 K4 K5 K6
H1 H2 H3 H4 H5 H6
G1 G2 G3 G4 G5 G6
F1 F2 F3 F4 F5 F6 F7 F8 F9
D1 D2 D3 D4 D5 D6 D7 D8 D9
C1 C2 C3 C4 C5 CC C7 C8 C9
B1 B2 B3 B4 B5 B6 B7 B8 B9
A1 A2 A3 A4 A5 A6 A7 A8 A9
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY BUSS B
+28V DC IMU STANDBY BUSS A
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY BUSS B
+28V DC IMU STANDBY BUSS A
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY
+28V DC IMU STANDBY
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
+28V DC OPTICS POWER SUPPLY
+28V DC OPTICS POWER SUPPLY
OV DC OPTICS
OVDC OPTICS
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
+28V DC OPTICS ELECTRONICS
+27V DC M AND DV
TRACKER +28V DC
115V 400 CPS HI
+28V DC IMU POWER SUPPLY
+28V DC IMU POWER SUPPLY
+28V DC IMU BLOWER POWER SUPPLY
+27V DC M AND DV
STRUCTURE GROUND
115V 400 CPS LO
+28V DC IMU POWER SUPPLY
+28V DC IMU POWER SUPPLY
IMU 800 CPS 5% ∠90° HI
IMU 800 CPS 5% ∠90° LO
+28V DC IMU ELECTRONICS B
+28V DC IMU ELECTRONICS A
IMU 800 CPS 5% ∠90° HI
IMU 800 CPS 5% ∠90° LO
OVDC IMU
OVDC IMU
OPTICS 800 CPS 5% HI
OPTICS 800 CPS 5% LO
TRACKER 28V 800 CPS HI
+28V DC AGC BUSS B
+28V DC AGC BUSS A
OVDC IMU
OPTICS 800 CPS 1% HI
OPTICS 800 CPS 1% LO
TRACKER 28V 800 CPS LO
OV DC AGC
+20V DC SIG COND SUPPLY
OVDC SIG COND SUPPLY
IMU 800 CPS 1% HI
IMU 800 CPS 1% LO
MARK REJECT LO
MARK REJECT HI
AGC +28V DC
AGC +3V DC
AGC 100KC HI
HORIZON HALF PEAK OUT
COND 2.5V DC BIAS LO
TRACKER Y ERROR OUTPUT LO
TRACKER X ERROR OUTPUT LO
TRACKER Y ERROR INPUT LO
TRACKER Y ERROR INPUT HI
AGC 13V DC
AGC 100KC LO
COND 2.5V DC BIAS HI
TRACKER Y ERROR OUTPUT HI
TRACKER X ERROR OUTPUT HI
TRACKER X ERROR INPUT LO
TRACKER X ERROR INPUT HI
STAR PRESENCE OUTPUT TO AGC HI
STAR PRESENCE OUTPUT TO AGC LO
PHOTOMETER PREAMP OUT LO
PHOTOMETER T.P. HI
PHOTOMETER T.P. LO
PRESSURE TRANSDUCER +28VDC LO
IMU PRESS MONITOR LO
PHOTOMETER PREAMP OUT HI
STAR PRESENCE INPUT LO
STAR PRESENCE INPUT HI
PRESSURE TRANSDUCER +28V DC HI
IMU PRESSURE MONITOR HI
8
9
10
D
C
B
A

1710009570

1009570 C

SYM	DESCRIPTION	DATE	APPROVAL
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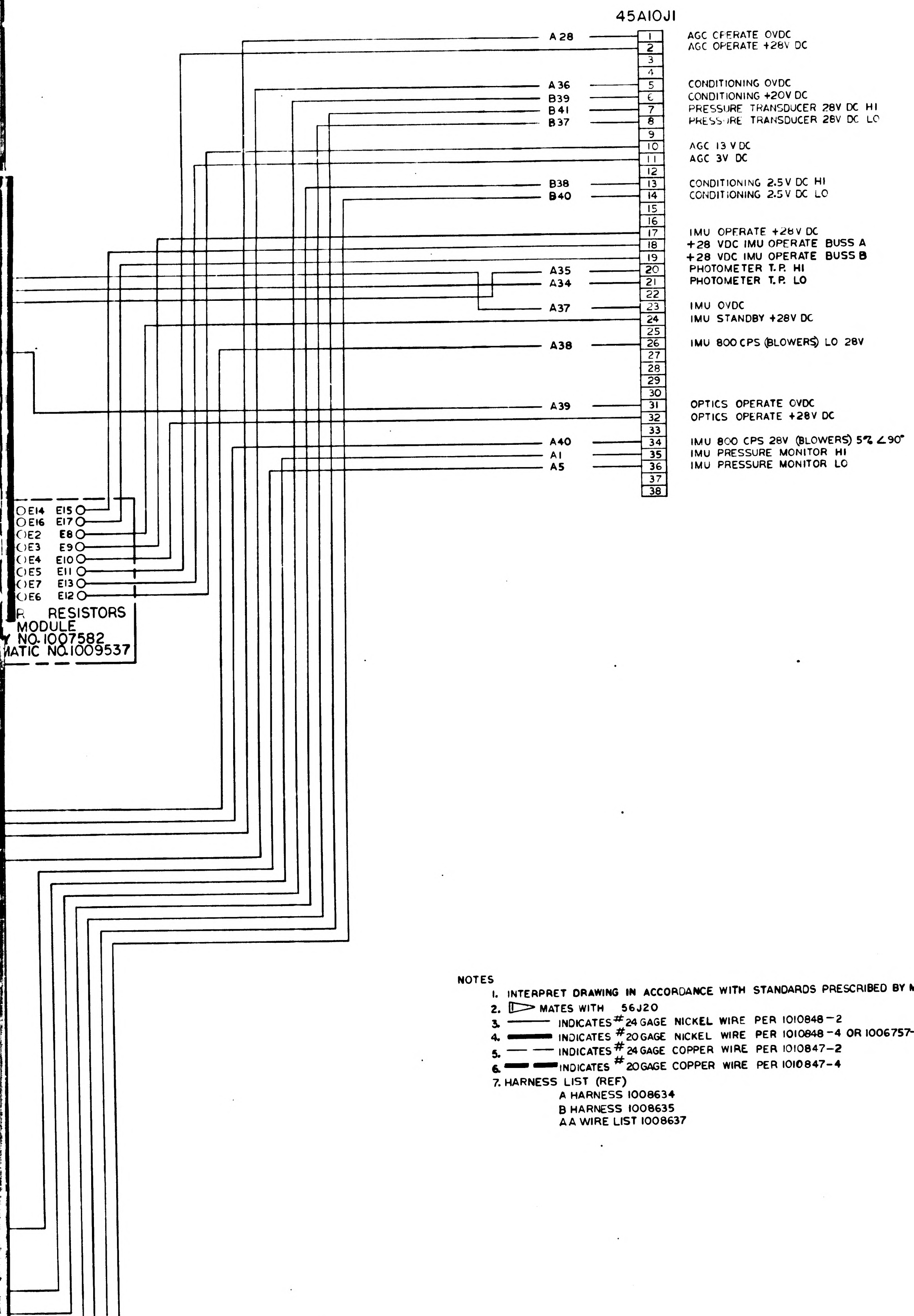
B	REVISED PER TERR 22202	SEP	AJ
C	REVISED PER TERR 23695	8 NOV	HTO

REVISIONS 13397


45A10J1
A 28
A 36
B39
B 41
B 37
B38
B40
A35
A34
A37
A38
A39
A40
A1
A5
1 AGC OPERATE 0VDC
2 AGC OPERATE +28V DC
3
4
5 CONDITIONING 0VDC
6 CONDITIONING +20V DC
7 PRESSURE TRANSDUCER 28V DC HI
8 PRESSURE TRANSDUCER 28V DC LO
9
10 AGC 13 V DC
11 AGC 3V DC
12
13 CONDITIONING 2.5V DC HI
14 CONDITIONING 2.5V DC LO
15
16
17 IMU OPERATE +28V DC
18 +28 VDC IMU OPERATE BUSS A
19 +28 VDC IMU OPERATE BUSS B
20 PHOTOMETER T.P. HI
21 PHOTOMETER T.P. LO
22
23 IMU 0VDC
24 IMU STANDBY +28V DC
25
26 IMU 800 CPS (BLOWERS) LO 28V
27
28
29
30
31 OPTICS OPERATE 0VDC
32 OPTICS OPERATE +28V DC
33
34 IMU 800 CPS 28V (BLOWERS) 5% ∠90°
35 IMU PRESSURE MONITOR HI
36 IMU PRESSURE MONITOR LO
37
38
E14 E15
E16 E17
E2 E8
E3 E9
E4 E10
E5 E11
E7 E13
E6 E12
R RESISTORS
MODULE
Y NO. 1007582
MATIC NO. 1009537

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J20
3. ——— INDICATES #24 GAGE NICKEL WIRE PER 1010848-2
4. ▬▬▬ INDICATES #20 GAGE NICKEL WIRE PER 1010848-4 OR 1006757-9 (UNINSULATED)
5. — — INDICATES #24 GAGE COPPER WIRE PER 1010847-2
6. ▬ ▬ INDICATES #20 GAGE COPPER WIRE PER 1010847-4
7. HARNESS LIST (REF)
   A HARNESS 1008634
   B HARNESS 1008635
   AA WIRE LIST 1008637

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

1007530	
NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN J. Walsh DATE
CHECKED
APPROVAL 10/7/64
APPROVAL
NASA APPROVAL
MIT APPROVAL

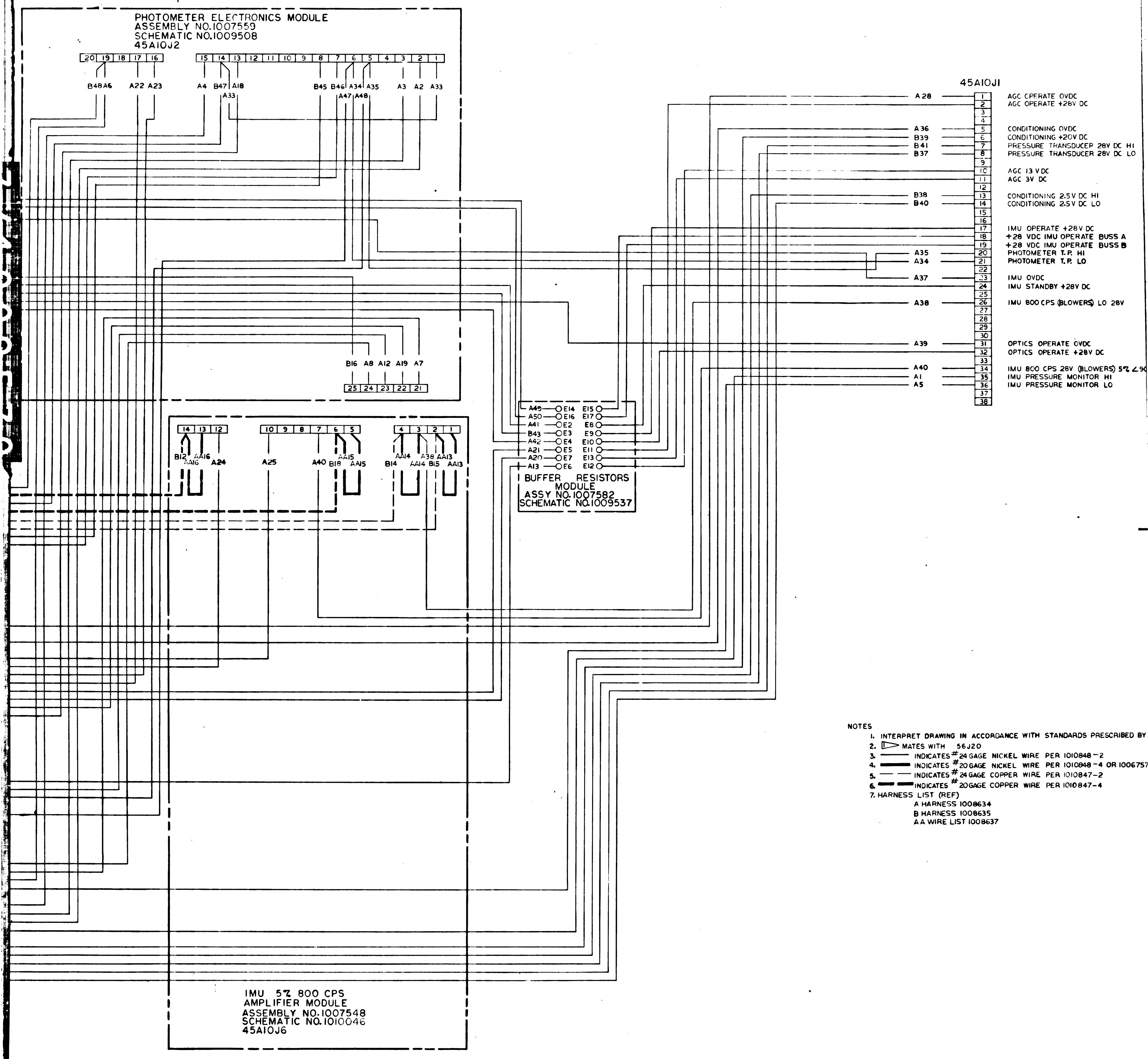
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 10

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO 1009570
SCALE NONE
WT
SHEET 1 OF 1

1009570 C

47 1009570


PHOTOMETER ELECTRONICS MODULE
ASSEMBLY NO.1007559
SCHEMATIC NO.1009508
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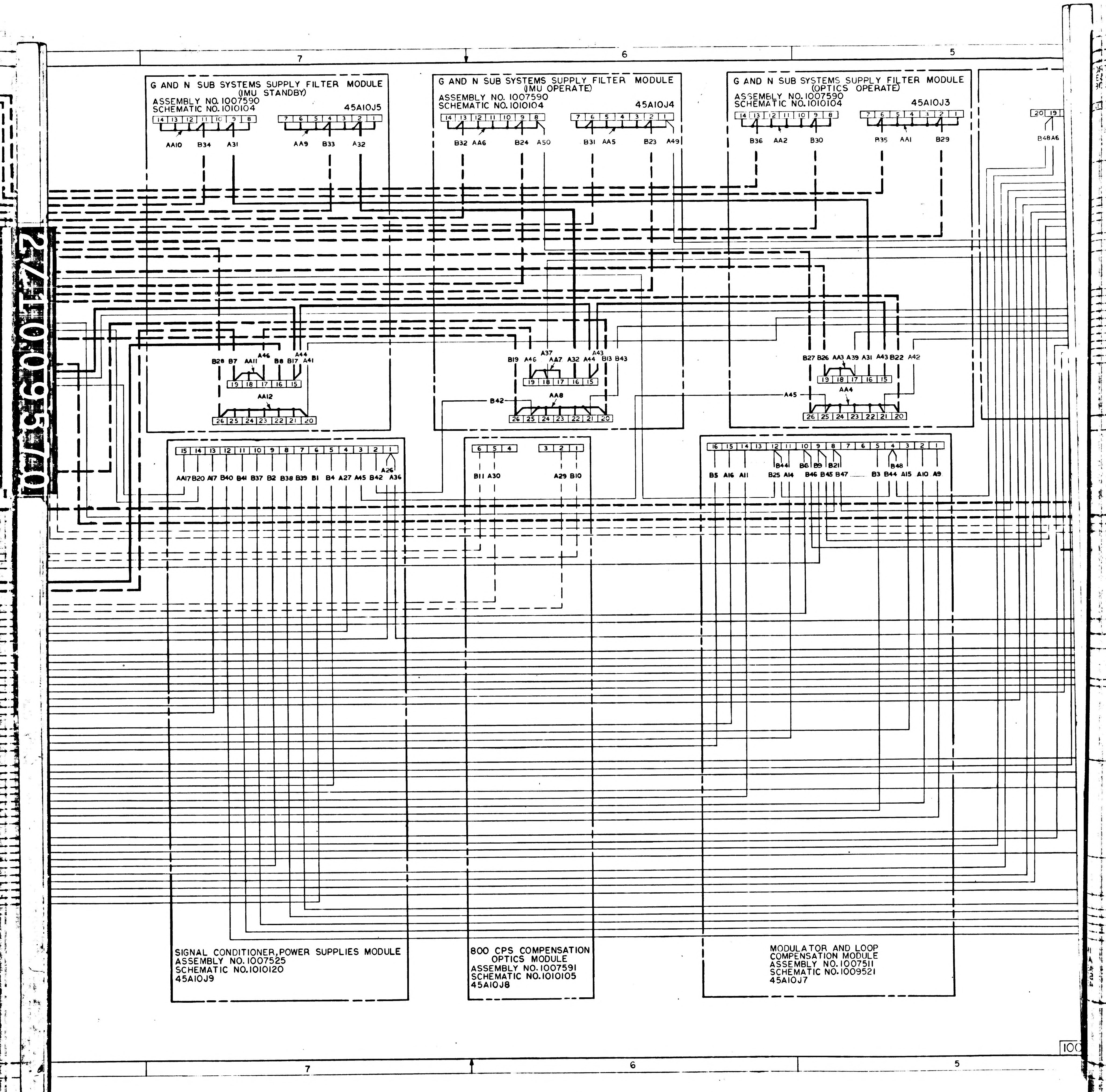
B48 A6 A22 A23 A4 B47 A18 A33 B45 B46 A34 A35 A47 A48 A3 A2 A33
B16 A8 A12 A19 A7
25 24 23 22 21
14 13 12 10 9 8 7 6 5 4 3 2 1
B12 AA16 AA16 A24 A25 A40 B18 AA15 AA15 B14 AA14 AA14 A38 B15 AA13 AA13
IMU 5% 800 CPS
AMPLIFIER MODULE
ASSEMBLY NO.1007548
SCHEMATIC NO.1010046
45A10J6
A49 E14 E15
A50 E16 E17
A41 E2 E8
B43 E3 E9
A42 E4 E10
A21 E5 E11
A20 E7 E13
A13 E6 E12
BUFFER RESISTORS MODULE
ASSY NO.1007582
SCHEMATIC NO.1009537
45A10J1
A28 1 AGC CPERATE OVDC
2 AGC OPERATE +28V DC
3
4
A36 5 CONDITIONING OVDC
B39 6 CONDITIONING +20V DC
B41 7 PRESSURE TRANSDUCEP 28V DC HI
B37 8 PRESSURE TRANSDUCER 28V DC LO
9
10 AGC 13 V DC
11 AGC 3V DC
12
B38 13 CONDITIONING 2.5V DC HI
B40 14 CONDITIONING 2.5V DC LO
15
16
17 IMU OPERATE +28V DC
18 +28 VDC IMU OPERATE BUSS A
19 +28 VDC IMU OPERATE BUSS B
A35 20 PHOTOMETER T.P. HI
A34 21 PHOTOMETER T.P. LO
22
A37 23 IMU OVDC
24 IMU STANDBY +28V DC
25
A38 26 IMU 800 CPS (BLOWERS) LO 28V
27
28
29
30
A39 31 OPTICS OPERATE OVDC
32 OPTICS OPERATE +28V DC
33
A40 34 IMU 800 CPS 28V (BLOWERS) 5% ∠9
A1 35 IMU PRESSURE MONITOR HI
A5 36 IMU PRESSURE MONITOR LO
37
38
4
3
2

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY
2. ▷ MATES WITH 56J20
3. ——— INDICATES #24 GAGE NICKEL WIRE PER 1010848-2
4. ━━━ INDICATES #20 GAGE NICKEL WIRE PER 1010848-4 OR 1006757
5. — — INDICATES #24 GAGE COPPER WIRE PER 1010847-2
6. ━ ━ INDICATES #20 GAGE COPPER WIRE PER 1010847-4
7. HARNESS LIST (REF)
   A HARNESS 1008634
   B HARNESS 1008635
   AA WIRE LIST 1008637

1009570 C

3/1009570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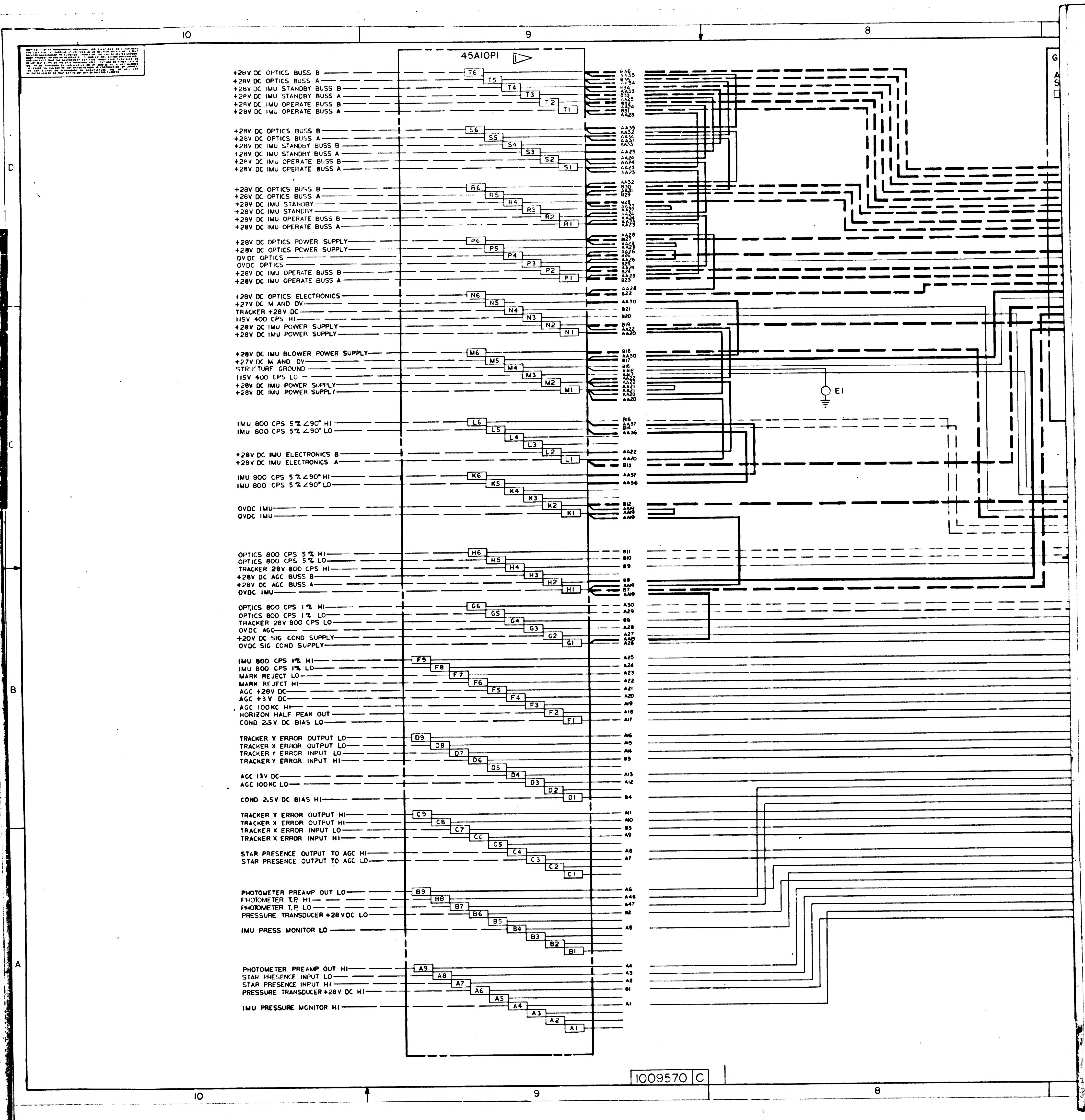
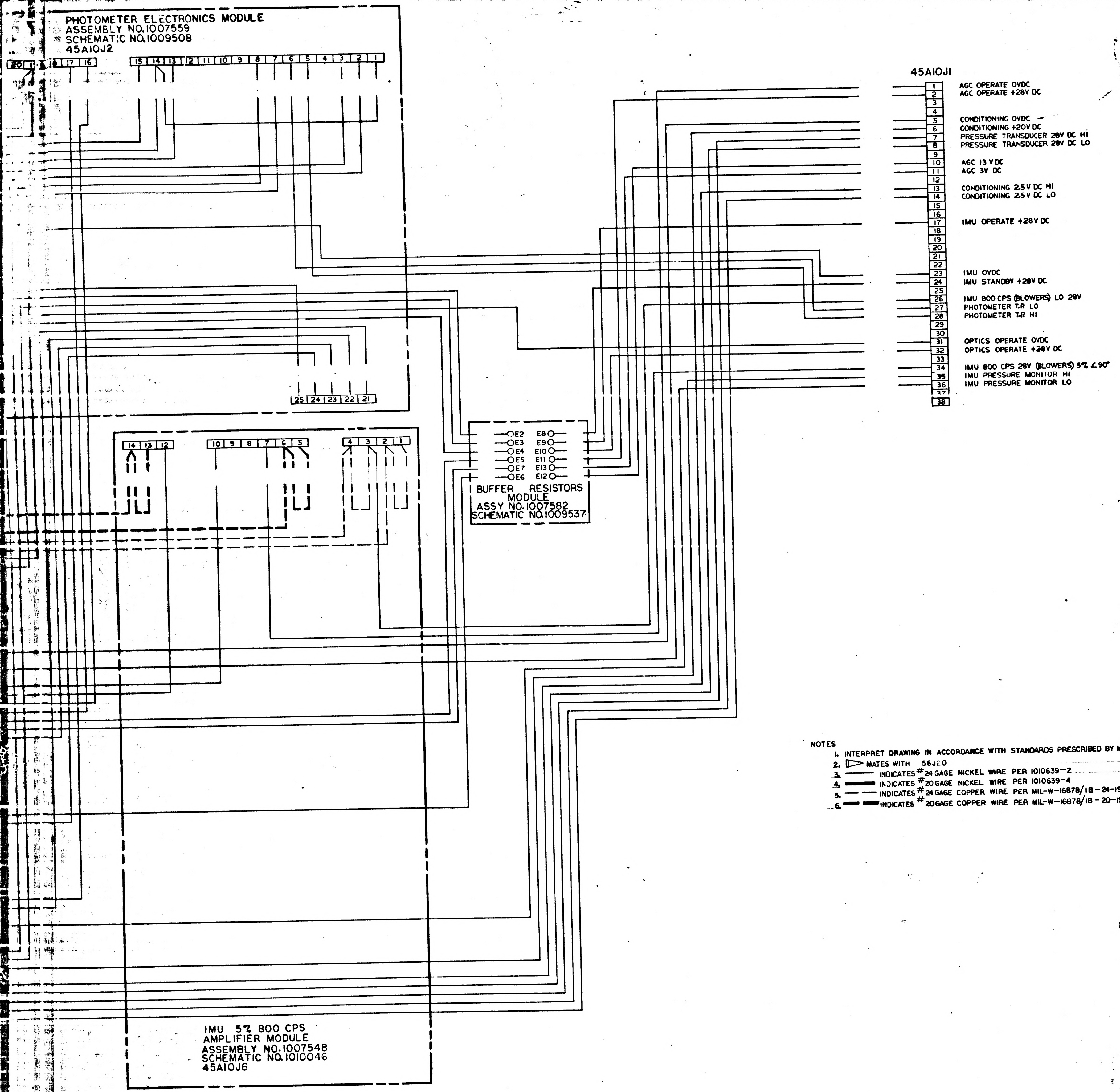
5
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(IMU STANDBY)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J5
AA10 B34 A31
AA9 B33 A32
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(IMU OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J4
B32 AA6 B24 A50
B31 AA5 B23 A49
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(OPTICS OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J3
B36 AA2 B30
B35 AA1 B29
B48A6
B28 B7 A46 AA11 B8 B17 A44 A41
AA12
B19 A46 A37 AA7 A32 A44 A43 B13 B43
B42
AA8
B27 B26 AA3 A39 A31 A43 B22 A42
A45
AA4
AA17 B20 A17 B40 B41 B37 B2 B38 B39 B1 B4 A27 A45 B42 A26 A36
B11 A30
A29 B10
B5 A16 A11 B44 B25 A14 B6 B46 B9 B45 B21 B47 B3 B48 B44 A15 A10 A9
SIGNAL CONDITIONER, POWER SUPPLIES MODULE
ASSEMBLY NO. 1007525
SCHEMATIC NO. 1010120
45A10J9
800 CPS COMPENSATION
OPTICS MODULE
ASSEMBLY NO. 1007591
SCHEMATIC NO. 1010105
45A10J8
MODULATOR AND LOOP
COMPENSATION MODULE
ASSEMBLY NO. 1007511
SCHEMATIC NO. 1009521
45A10J7
100

2710095700



10
9
8
D
C
B
A
45A10P1
1
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY BUSS B
+28V DC IMU STANDBY BUSS A
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
T6
T5
T4
T3
T2
T1
B36 AA35 B35 AA34 B34 AA33 B33 AA25 B32 AA24 B31 AA23
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY BUSS B
+28V DC IMU STANDBY BUSS A
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
S6
S5
S4
S3
S2
S1
AA35 AA32 AA34 AA31 AA33 AA25 AA24 AA24 AA23 AA23
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY
+28V DC IMU STANDBY
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
R6
R5
R4
R3
R2
R1
AA32 B30 AA31 B29 B28 AA27 AA27 AA24 AA24 AA23 AA23
+28V DC OPTICS POWER SUPPLY
+28V DC OPTICS POWER SUPPLY
OVDC OPTICS
OVDC OPTICS
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
P6
P5
P4
P3
P2
P1
AA28 B27 AA28 AA28 AA26 B26 AA26 B25 AA24 B24 AA23 B23
+28V DC OPTICS ELECTRONICS
+27V DC M AND DV
TRACKER +28V DC
115V 400 CPS HI
+28V DC IMU POWER SUPPLY
+28V DC IMU POWER SUPPLY
N6
N5
N4
N3
N2
N1
AA28 B22 AA30 B21 B20 B19 AA22 AA20
+28V DC IMU BLOWER POWER SUPPLY
+27V DC M AND DV
STRUCTURE GROUND
115V 400 CPS LO
+28V DC IMU POWER SUPPLY
+28V DC IMU POWER SUPPLY
M6
M5
M4
M3
M2
M1
B18 AA30 B17 B16 AA18 AA17 AA22 AA22 AA21 AA21 AA20 AA20
E1
IMU 800 CPS 5% ∠90° HI
IMU 800 CPS 5% ∠90° LO
L6
L5
L4
L3
L2
L1
B15 AA37 B14 AA36
+28V DC IMU ELECTRONICS B
+28V DC IMU ELECTRONICS A
AA22 AA20 B13
IMU 800 CPS 5% ∠90° HI
IMU 800 CPS 5% ∠90° LO
K6
K5
K4
K3
K2
K1
AA37 AA36
OVDC IMU
OVDC IMU
B12 AA19 AA19 AA19
OPTICS 800 CPS 5% HI
OPTICS 800 CPS 5% LO
TRACKER 28V 800 CPS HI
+28V DC AGC BUSS B
+28V DC AGC BUSS A
OVDC IMU
H6
H5
H4
H3
H2
H1
B11 B10 B9 B8 AA19 B7 AA19
OPTICS 800 CPS 1% HI
OPTICS 800 CPS 1% LO
TRACKER 28V 800 CPS LO
OVDC AGC
+20V DC SIG COND SUPPLY
OVDC SIG COND SUPPLY
G6
G5
G4
G3
G2
G1
A30 A29 B6 A28 A27 AA19 A26
IMU 800 CPS 1% HI
IMU 800 CPS 1% LO
MARK REJECT LO
MARK REJECT HI
AGC +28V DC
AGC +3 V DC
AGC 100KC HI
HORIZON HALF PEAK OUT
COND 2.5V DC BIAS LO
F9
F8
F7
F6
F5
F4
F3
F2
F1
A25 A24 A23 A22 A21 A20 A19 A18 A17
TRACKER Y ERROR OUTPUT LO
TRACKER X ERROR OUTPUT LO
TRACKER Y ERROR INPUT LO
TRACKER Y ERROR INPUT HI
AGC 13V DC
AGC 100KC LO
COND 2.5V DC BIAS HI
D9
D8
D7
D6
D5
D4
D3
D2
D1
A16 A15 A14 B5 A13 A12 B4
TRACKER Y ERROR OUTPUT HI
TRACKER X ERROR OUTPUT HI
TRACKER X ERROR INPUT LO
TRACKER X ERROR INPUT HI
STAR PRESENCE OUTPUT TO AGC HI
STAR PRESENCE OUTPUT TO AGC LO
C9
C8
C7
CC
C5
C4
C3
C2
C1
A11 A10 B3 A9 A8 A7
PHOTOMETER PREAMP OUT LO
PHOTOMETER T.P. HI
PHOTOMETER T.P. LO
PRESSURE TRANSDUCER +28 VDC LO
IMU PRESS MONITOR LO
B9
B8
B7
B6
B5
B4
B3
B2
B1
A6 A48 A47 B2 A5
PHOTOMETER PREAMP OUT HI
STAR PRESENCE INPUT LO
STAR PRESENCE INPUT HI
PRESSURE TRANSDUCER +28V DC HI
IMU PRESSURE MONITOR HI
A9
A8
A7
A6
A5
A4
A3
A2
A1
A4 A3 A2 B1 A1
G
A
S
1009570 C

1/1009570


PHOTOMETER ELECTRONICS MODULE
ASSEMBLY NO.1007559
SCHEMATIC NO.1009508
45A10J2
20
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
25
24
23
22
21
45A10J1
1 AGC OPERATE OVDC
2 AGC OPERATE +28V DC
3
4
5 CONDITIONING OVDC
6 CONDITIONING +20V DC
7 PRESSURE TRANSDUCER 28V DC HI
8 PRESSURE TRANSDUCER 28V DC LO
9
10 AGC 13 V DC
11 AGC 3V DC
12
13 CONDITIONING 2.5V DC HI
14 CONDITIONING 2.5V DC LO
15
16
17 IMU OPERATE +28V DC
18
19
20
21
22
23 IMU OVDC
24 IMU STANDBY +28V DC
25
26 IMU 800 CPS (BLOWERS) LO 28V
27 PHOTOMETER T.R LO
28 PHOTOMETER T.R HI
29
30
31 OPTICS OPERATE OVDC
32 OPTICS OPERATE +28V DC
33
34 IMU 800 CPS 28V (BLOWERS) 5% ∠90°
35 IMU PRESSURE MONITOR HI
36 IMU PRESSURE MONITOR LO
37
38
E2
E3
E4
E5
E7
E6
E8
E9
E10
E11
E13
E12
BUFFER RESISTORS MODULE
ASSY NO.1007582
SCHEMATIC NO.1009537
14
13
12
10
9
8
7
6
5
4
3
2
1
IMU 5% 800 CPS
AMPLIFIER MODULE
ASSEMBLY NO.1007548
SCHEMATIC NO.1010046
45A10J6
D
C
B
A
4
3
2
1

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ▷ MATES WITH 56J20
3. ——— INDICATES #24 GAGE NICKEL WIRE PER 1010639-2
4. ▬▬▬ INDICATES #20 GAGE NICKEL WIRE PER 1010639-4
5. — — INDICATES #24 GAGE COPPER WIRE PER MIL-W-16878/1B-24-19 STRANDS WHITE
6. ▬ ▬ INDICATES #20 GAGE COPPER WIRE PER MIL-W-16878/1B-20-19 STRANDS WHITE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE 22 Sept
CHECKED
APPROVAL 10/7/64
APPROVAL
NASA APPROVAL 10-7-64
MIT APPROVAL 10-14-64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 10

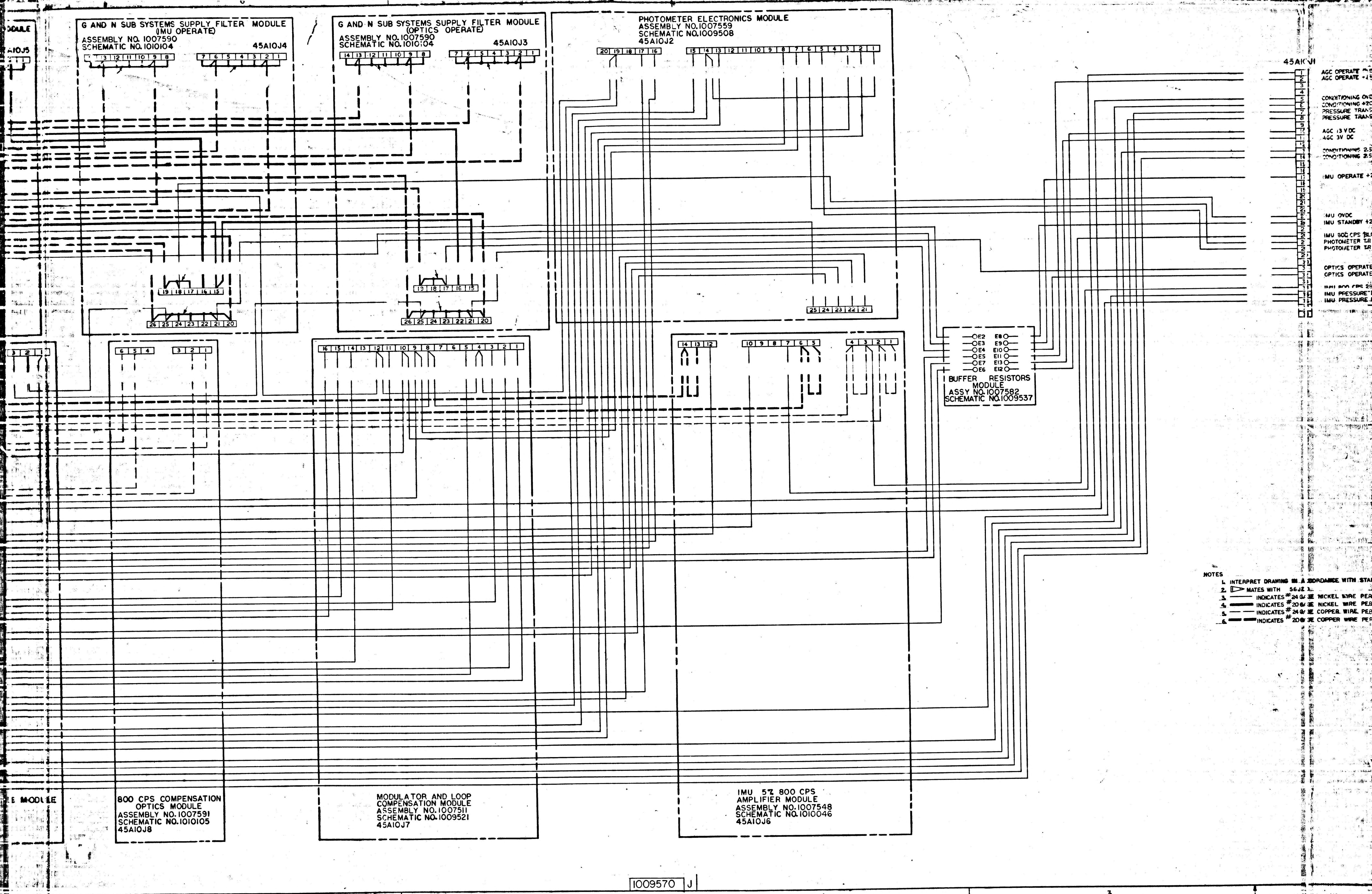
CODE IDENT NO. —
SIZE J
NASA DRAWING NO. 1009570
SCALE NONE
WT —
SHEET 1 OF 1

MASTER

1009570 J

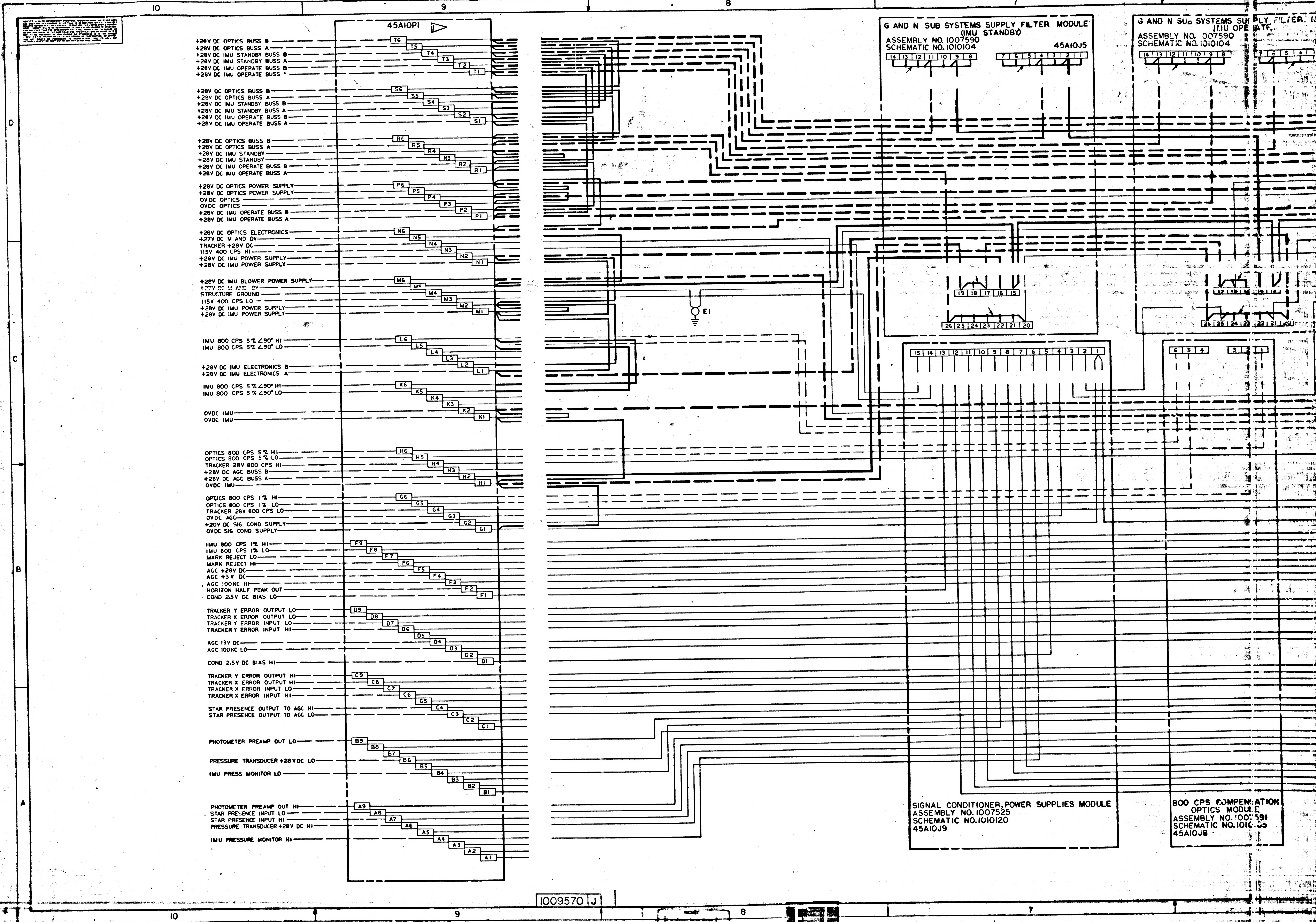
1009570

E3


G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(IMU OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J4
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(OPTICS OPERATE)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J3
PHOTOMETER ELECTRONICS MODULE
ASSEMBLY NO. 1007559
SCHEMATIC NO. 1009508
45A10J2
45A10J1
AGC OPERATE
AGC OPERATE +
CONDITIONING OVD
CONDITIONING +20
PRESSURE TRANS
PRESSURE TRANS
AGC 13 V DC
AGC 3V DC
CONDITIONING 2.5
CONDITIONING 2.5
IMU OPERATE +2
IMU OVDC
IMU STANDBY +2
IMU 800 CPS BL
PHOTOMETER TR
PHOTOMETER TR
OPTICS OPERATE
OPTICS OPERATE
IMU 800 CPS 28
IMU PRESSURE
IMU PRESSURE
BUFFER RESISTORS MODULE
ASSY NO. 1007582
SCHEMATIC NO. 1009537
E2 E3 E4 E5 E7 E6
E8 E9 E10 E11 E13 E12
800 CPS COMPENSATION OPTICS MODULE
ASSEMBLY NO. 1007591
SCHEMATIC NO. 1010105
45A10J8
MODULATOR AND LOOP COMPENSATION MODULE
ASSEMBLY NO. 1007511
SCHEMATIC NO. 1009521
45A10J7
IMU 5% 800 CPS AMPLIFIER MODULE
ASSEMBLY NO. 1007548
SCHEMATIC NO. 1010046
45A10J6
ODULE
A10J5
E MODULE

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STA
2. ▷ MATES WITH 56J2
3. ——— INDICATES #24 GA 3E NICKEL WIRE PER
4. ━━━ INDICATES #20 GA 3E NICKEL WIRE PER
5. — — INDICATES #24 GA 3E COPPER WIRE PER
6. ━ ━ INDICATES #20 GA 3E COPPER WIRE PER

1009570 J


45A10P1
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY BUSS B
+28V DC IMU STANDBY BUSS A
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
T6
T5
T4
T3
T2
T1
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY BUSS B
+28V DC IMU STANDBY BUSS A
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
S6
S5
S4
S3
S2
S1
+28V DC OPTICS BUSS B
+28V DC OPTICS BUSS A
+28V DC IMU STANDBY
+28V DC IMU STANDBY
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
R6
R5
R4
R3
R2
R1
+28V DC OPTICS POWER SUPPLY
+28V DC OPTICS POWER SUPPLY
OV DC OPTICS
OVDC OPTICS
+28V DC IMU OPERATE BUSS B
+28V DC IMU OPERATE BUSS A
P6
P5
P4
P3
P2
P1
+28V DC OPTICS ELECTRONICS
+27V DC M AND DV
TRACKER +28V DC
115V 400 CPS HI
+28V DC IMU POWER SUPPLY
+28V DC IMU POWER SUPPLY
N6
N5
N4
N3
N2
N1
+28V DC IMU BLOWER POWER SUPPLY
+27V DC M AND DV
STRUCTURE GROUND
115V 400 CPS LO
+28V DC IMU POWER SUPPLY
+28V DC IMU POWER SUPPLY
M6
M5
M4
M3
M2
M1
E1
IMU 800 CPS 5% ∠90° HI
IMU 800 CPS 5% ∠90° LO
+28V DC IMU ELECTRONICS B
+28V DC IMU ELECTRONICS A
L6
L5
L4
L3
L2
L1
IMU 800 CPS 5% ∠90° HI
IMU 800 CPS 5% ∠90° LO
OVDC IMU
OVDC IMU
K6
K5
K4
K3
K2
K1
OPTICS 800 CPS 5% HI
OPTICS 800 CPS 5% LO
TRACKER 28V 800 CPS HI
+28V DC AGC BUSS B
+28V DC AGC BUSS A
OVDC IMU
H6
H5
H4
H3
H2
H1
OPTICS 800 CPS 1% HI
OPTICS 800 CPS 1% LO
TRACKER 28V 800 CPS LO
OVDC AGC
+20V DC SIG COND SUPPLY
OVDC SIG COND SUPPLY
G6
G5
G4
G3
G2
G1
IMU 800 CPS 1% HI
IMU 800 CPS 1% LO
MARK REJECT LO
MARK REJECT HI
AGC +28V DC
AGC +3 V DC
AGC 100KC HI
HORIZON HALF PEAK OUT
COND 2.5V DC BIAS LO
F9
F8
F7
F6
F5
F4
F3
F2
F1
TRACKER Y ERROR OUTPUT LO
TRACKER X ERROR OUTPUT LO
TRACKER Y ERROR INPUT LO
TRACKER Y ERROR INPUT HI
AGC 13V DC
AGC 100KC LO
COND 2.5V DC BIAS HI
D9
D8
D7
D6
D5
D4
D3
D2
D1
TRACKER Y ERROR OUTPUT HI
TRACKER X ERROR OUTPUT HI
TRACKER X ERROR INPUT LO
TRACKER X ERROR INPUT HI
STAR PRESENCE OUTPUT TO AGC HI
STAR PRESENCE OUTPUT TO AGC LO
C9
C8
C7
C6
C5
C4
C3
C2
C1
PHOTOMETER PREAMP OUT LO
PRESSURE TRANSDUCER +28 VDC LO
IMU PRESS MONITOR LO
B9
B8
B7
B6
B5
B4
B3
B2
B1
PHOTOMETER PREAMP OUT HI
STAR PRESENCE INPUT LO
STAR PRESENCE INPUT HI
PRESSURE TRANSDUCER +28V DC HI
IMU PRESSURE MONITOR HI
A9
A8
A7
A6
A5
A4
A3
A2
A1
G AND N SUB SYSTEMS SUPPLY FILTER MODULE
(IMU STANDBY)
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
45A10J5
14 13 12 11 10 9 8
7 6 5 4 3 2 1
19 18 17 16 15
26 25 24 23 22 21 20
G AND N SUB SYSTEMS SU PLY FILTER
IMU OPE ATE
ASSEMBLY NO. 1007590
SCHEMATIC NO. 1010104
14 13 12 11 10 9 8
7 6 5 4
26 25 24 23 22 21 20
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
SIGNAL CONDITIONER, POWER SUPPLIES MODULE
ASSEMBLY NO. 1007525
SCHEMATIC NO. 1010120
45A10J9
6 5 4
3 2 1
800 CPS COMPENSATION
OPTICS MODULE
ASSEMBLY NO. 1007591
SCHEMATIC NO. 1010[illegible]35
45A10J8
10
9
8
7
6
D
C
B
A

1009570 J

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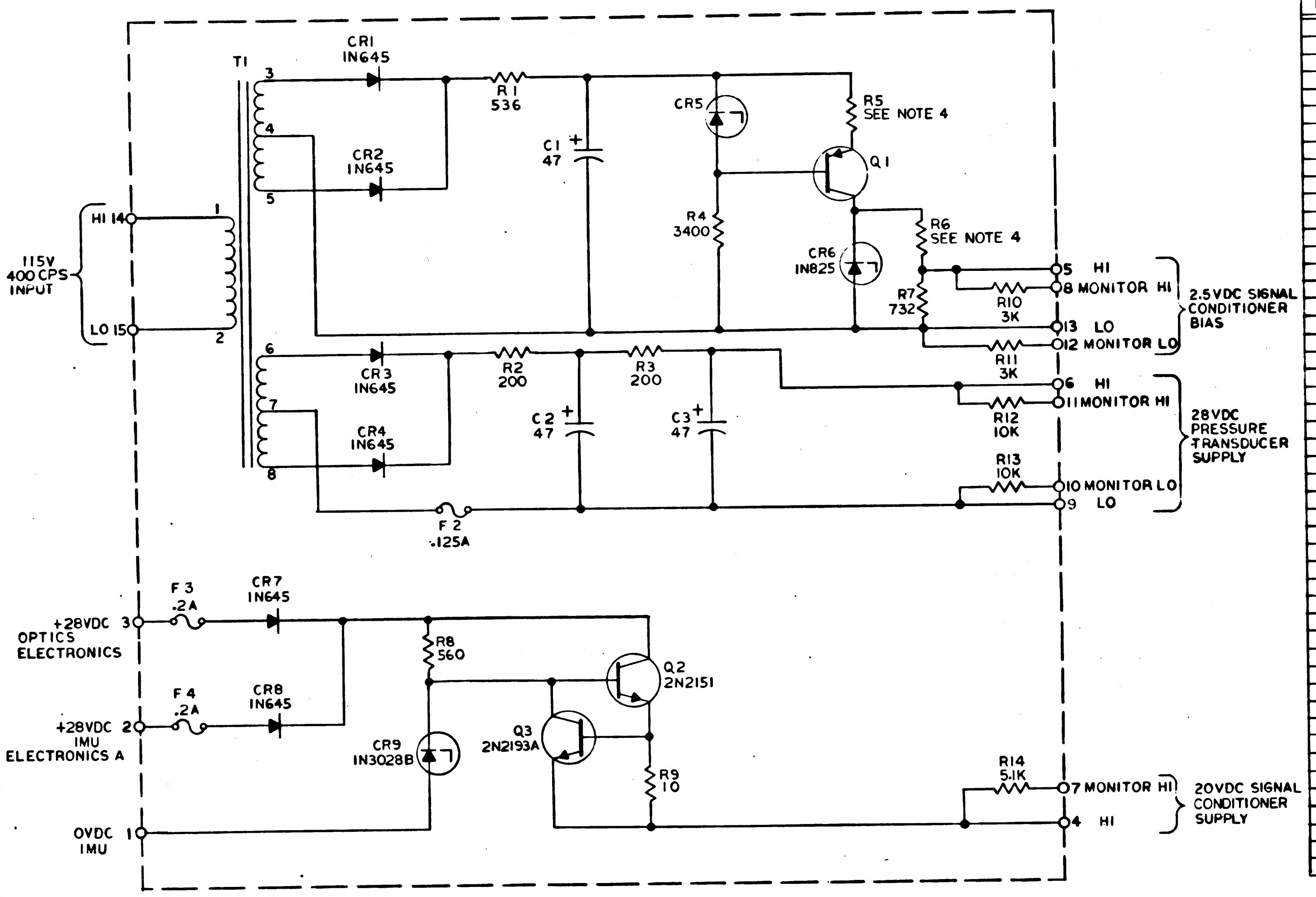
REVISIONS TDIRL 21286			
SYM	DESCRIPTION	DATE	APPROVAL


T1
3
4
5
1
2
6
7
8
CR1
1N645
CR2
1N645
R1
536
C1
47
CR5
R5
SEE NOTE 4
Q1
R4
3400
CR6
1N825
R6
SEE NOTE 4
R7
732
R10
3K
R11
3K
HI 14
LO 15
115V
400 CPS
INPUT
5 HI
8 MONITOR HI
13 LO
12 MONITOR LO
2.5VDC SIGNAL CONDITIONER BIAS
CR3
1N645
CR4
1N645
R2
200
R3
200
C2
47
C3
47
6 HI
11 MONITOR HI
R12
10K
R13
10K
10 MONITOR LO
9 LO
28VDC PRESSURE TRANSDUCER SUPPLY
F2
.125A
+28VDC 3
OPTICS ELECTRONICS
F3
.2A
CR7
1N645
R8
560
Q2
2N2151
+28VDC 2
IMU ELECTRONICS A
F4
.2A
CR8
1N645
CR9
1N3028B
Q3
2N2193A
R9
10
R14
5.1K
7 MONITOR HI
4 HI
20VDC SIGNAL CONDITIONER SUPPLY
OVDC 1
IMU

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010452-129	RESISTOR	536	± 1%	1 W
R2	1010389-39	↑	200	↑	3 W
R3	1010389-39		200		3 W
R4	1010364-353		3400		1/8 W
R5	1010267 -		SEE NOTE 4		1/2 W
R6	1010364 -		SEE NOTE 4		1/8 W
R7	1010364-225		732	↓	1/8 W
R8	1010389-50		560	± 1%	3 W
R9	1010369-141		10	± 5%	1/8 W
R10	1006750-43		3K	± 2%	1/4 W
R11	1006750-43		3K	↑	↑
R12	1006750-56		10K		
R13	1006750-56	↓	10K	↓	↓
R14	1006750-49	RESISTOR	5.1K	± 2%	1/4 W
C1	1006789-002	CAPACITOR	47	± 10%	50 V
C2	1006789-002	CAPACITOR	47	± 10%	50 V
C3	1006789-002	CAPACITOR	47	± 10%	50 V
CR1	1010362-001	DIODE			
CR2	1010362-001	↑			
CR3	1010362-001				
CR4	1010362-001				
CR5	1010372-24		18V	5 %	250 MW
CR6	1010259		6.325V		400 MW
CR7	1010362-001				
CR8	1010362-001	↓			
CR9	1010829-25	DIODE	22V	2%	1W
Q1	1010633-1	TRANSISTOR			
Q2	1010269-1	TRANSISTOR			
Q3	1010398-1	TRANSISTOR			
T1	1010751	TRANSFORMER			
F1					
F2	1000170-4	FUSE			.125A
F3	1000170-6	FUSE			.2A
F4	1000170-6	FUSE			.2A

REF DWG:
POWER SUPPLIES, SIGNAL CONDITIONER
ASS'Y DWG NO. 1007525

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES TO BE IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES TO BE IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. SELECT R5 & R6 PER APPLICABLE PS FROM APPROPRIATE CHART

R5 1010267		R6 1010364	
DASH NO.	VALUE OHMS	DASH NO.	VALUE OHMS
171	1470	255	1050
172	1500	257	1070
173	1540	259	1100
174	1580	261	1130
175	1620	263	1150
176	1650	265	1180
177	1690		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

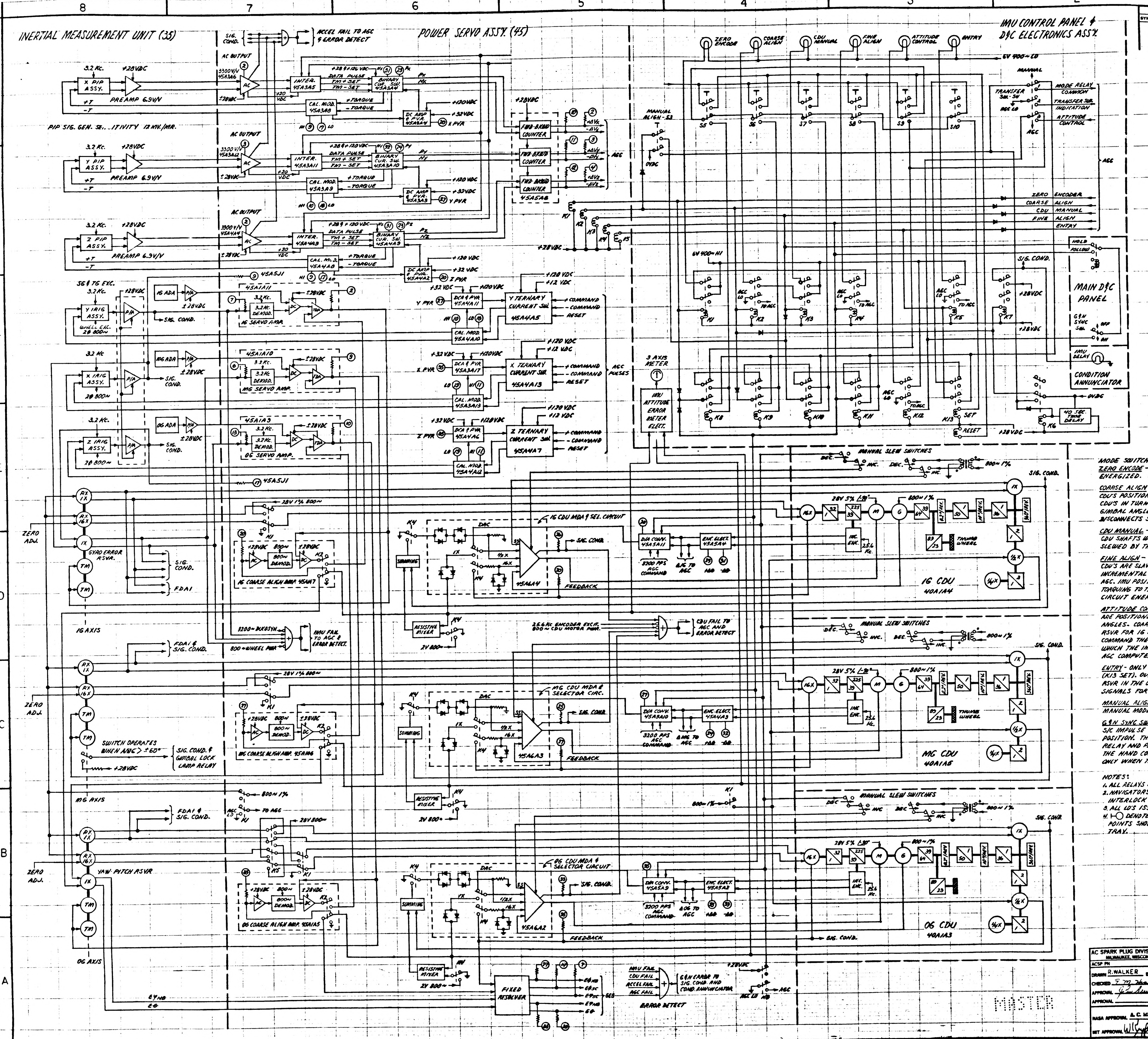
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//— DECIMALS ± —//— ANGLES ± —//—
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Di Lego DATE 6 JULY 65
CHECKED CC R.P. Kuykendall 8 Jul 65
APPROVAL Bruce L Hutch 9 Jul 65
APPROVAL John E. Miller 7/26/65
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC POWER SUPPLIES SIGNAL CONDITIONER

CODE IDENT NO. 80230
SIZE D
NASA DRAWING NO. 1009571
SCALE NONE
WT ——
SHEET 1 OF 1


INERTIAL MEASUREMENT UNIT (35)
POWER SERVO ASSY. (45)
IMU CONTROL PANEL & D&C ELECTRONICS ASSY.
REVISIONS
SYM ZONE DESCRIPTION DATE APPD
ZERO ENCODE
COARSE ALIGN
CDU MANUAL
FINE ALIGN
ATTITUDE CONTROL
ENTRY
6V 400~ LO
MANUAL
TRANSFER SW.
AGC LO
MODE RELAY COMMON
TRANSFER SW. INDICATION
ATTITUDE CONTROL
AGC
S5 S6 S7 S8 S9 S10
MANUAL ALIGN - S3
SIG. COND.
ACCEL FAIL TO AGC & ERROR DETECT
AC OUTPUT
3300 V/V 45A3A6
INTER. 45A3A5
DATA PULSE
TM + SET
TM - SET
BINARY CUR. SW. 45A3A4
CAL. MOD. 45A3A6
+ TORQUE
- TORQUE
DC AMP & PVR 45A3A4
X PVR
Y PVR
Z PVR
+28VDC
±28VDC
+32 VDC
+120 VDC
X PIP ASSY.
Y PIP ASSY.
Z PIP ASSY.
PREAMP 6.9V/V
3.2 Kc.
PIP SIG. GEN. SE...ITIVITY 12 MV/MR.
FWD-BKWD COUNTER
45A5A8
AGC
K1 K2 K3 K4 K5
6V 400~ H1
Y IRIG ASSY.
X IRIG ASSY.
Z IRIG ASSY.
SG & TG EXC.
IG ADA
MG ADA
OG ADA
PIA
SIG. COND.
28 800~
IG SERVO AMP.
MG SERVO AMP.
OG SERVO AMP.
45A1A11
45A1A10
45A1A3
3.2 Kc. DEMOD.
DC
FDA
45A5J1
Y TERNARY CURRENT SW. 45A4A5
X TERNARY CURRENT SW. 45A4A13
Z TERNARY CURRENT SW. 45A4A7
DCA & PVR 45A4A11
DCA & PVR 45A3A17
DCA & PVR 45A4A6
CAL. MOD. 45A4A10
CAL. MOD. 45A3A13
CAL. MOD. 45A4A12
+ COMMAND
- COMMAND
RESET
AGC PULSES
3 AXIS METER
IMU ATTITUDE ERROR METER ELECT.
K1 K2 K3 K4 K5 K7
K8 K9 K10 K11 K12 K13 K6
SET
RESET
HOLD FOLLOW
MAIN D&C PANEL
G&N SYNC SW.
IMU DELAY
CONDITION ANNUNCIATOR
40 SEC. TIME DELAY
+28VDC
MANUAL SLEW SWITCHES
DEC. INC.
800~1%
SIG. COND.
RX 1X
RX 16X
1X
ZERO ADJ.
GYRO ERROR RSVR.
TM
FDAI
IG AXIS
MG AXIS
OG AXIS
YAW-PITCH RSVR
28V 1% 800~
IG COARSE ALIGN AMP. 45A1A7
MG COARSE ALIGN AMP. 45A1A6
OG COARSE ALIGN AMP. 45A1A5
800 DEMOD.
SUMMING
RESISTIVE MIXER
2V 800~
DAC
IG CDU MDA & SEL. CIRCUIT
MG CDU MDA & SELECTOR CIRC.
OG CDU MDA & SELECTOR CIRCUIT
45A6A4
45A6A3
45A6A2
FEEDBACK
D/A CONV. 45A5A10
D/A CONV. 45A5A9
ENC. ELECT. 45A5A4
ENC. ELECT. 45A5A2
3200 PPS AGC COMMAND
ΔIG TO AGC
ΔMG TO AGC
ΔOG TO AGC
INC. ENC.
25.6 Kc.
28V 5%
THUMB WHEEL
IG CDU 40A1A4
MG CDU 40A1A6
OG CDU 40A1A3
3200-ΔKOSIN
800~WHEEL PWR
IMU FAIL TO AGC & ERROR DETECT
25.6 Kc. ENCODER EXCIT. 800~ CDU MOTOR PWR.
CDU FAIL TO AGC AND ERROR DETECT
FDAI & SIG. COND.
SWITCH OPERATES WHEN ΔMG > ±60°
SIG. COND. & GIMBAL LOCK LAMP RELAY
FIXED RESOLVER
E4 E3
IMU FAIL
CDU FAIL
ACCEL FAIL
AGC FAIL
G&N ERROR TO SIG. COND. AND COND. ANNUNCIATOR
ERROR DETECT
AGC LO
SIG. COND.

MODE SWITCHING:

ZERO ENCODE – ONLY K1 & K4 (PSA) AND K1, K4 & K8 (D&C) ENERGIZED. CDU SHAFTS ZEROED.

COARSE ALIGN – ONLY K2 (PSA) AND K2 & K9 (D&C) ENERGIZED. CDU'S POSITIONED BY AGC TO COMPUTED GIMBAL ANGLES. THE CDU'S IN TURN COARSE ALIGN THE IMU TO THE COMPUTED GIMBAL ANGLES VIA THE STAB SERVO ELECTRONICS. DISCONNECTS SCS INTERFACE.

CDU MANUAL – ONLY K3 (PSA) AND K3 & K10 (D&C) ENERGIZED. CDU SHAFTS WILL NOT MOVE UNLESS DRIVEN MANUALLY OR SLEWED BY THE SLEW SWITCH.

FINE ALIGN – ONLY K4 (PSA) AND K4 & K11 (D&C) ENERGIZED. CDU'S ARE SLAVED TO FOLLOW THE IMU GIMBAL ANGLES. CDU INCREMENTAL ENCODERS TRANSMIT IMU ORIENTATION TO AGC. IMU POSITION MAY NOW BE CHANGED BY AGC PULSE TORQUING TO THE IRIG ELECTRONICS. CDU AMBIGUITY CIRCUIT ENERGIZED.

ATTITUDE CONTROL – ONLY K12 (D&C) ENERGIZED. CDU SHAFTS ARE POSITIONED BY THE AGC TO THE COMPUTED GIMBAL ANGLES. COARSE CDU 1X RSVR OUTPUTS (THRU YAW-PITCH RSVR FOR IG AND MG CDU'S) ARE FED TO THE SCS TO COMMAND THE SPACECRAFT TO THE DESIRED ATTITUDE AT WHICH THE IMU GIMBAL ANGLES ARE THE SAME AS THE AGC COMPUTED GIMBAL ANGLES.

ENTRY – ONLY K5 (PSA) AND K5 & K13 (D&C) ENERGIZED (K13 SET). OUTER GIMBAL 1X RSVR IS SWITCHED TO THE 16X RSVR IN THE OG CDU AND USED AS ONE OF THE ERROR SIGNALS FOR ROLL STEERING DURING ENTRY.

MANUAL ALIGN – PROVIDES TIME DELAY OVER-RIDE. IN CDU MANUAL MODE GIMBALS ARE MADE TO FOLLOW CDU ANGLES.

G&N SYNC SWITCH – PLACES SYSTEM IN "CDU MANUAL" UNTIL S/C IMPULSE HAND CONTROL IS MOVED FROM ITS NEUTRAL POSITION. THIS ACTION ENERGIZES THE "HOLD-FOLLOW" RELAY AND PLACES THE SYSTEM IN "FINE ALIGN" UNTIL THE HAND CONTROL IS RELEASED. THIS FUNCTION OPERATES ONLY WHEN THE G & N SYSTEM IS IN THE ATTITUDE CONTROL MODE.

NOTES:
1. ALL RELAYS SHOWN DE-ENERGIZED – K13 RESET.
2. NAVIGATORS SIX BUTTON MODE SWITCH HAS ELECTRICAL INTERLOCK FOR ONE AT A TIME CLOSURE ONLY.
3. ALL LO'S ISS UNLESS OTHERWISE NOTED.
4. ⊢○ DENOTES TEST POINT. PHYSICAL LOCATION OF TEST POINTS SHOW ADJACENT TO MODULES IS ON J1 OF MODULE TRAY.

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN R. WALKER DATE 7/21/65
CHECKED F. M. Headley
APPROVAL
APPROVAL
NASA APPROVAL A. C. METZGER
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

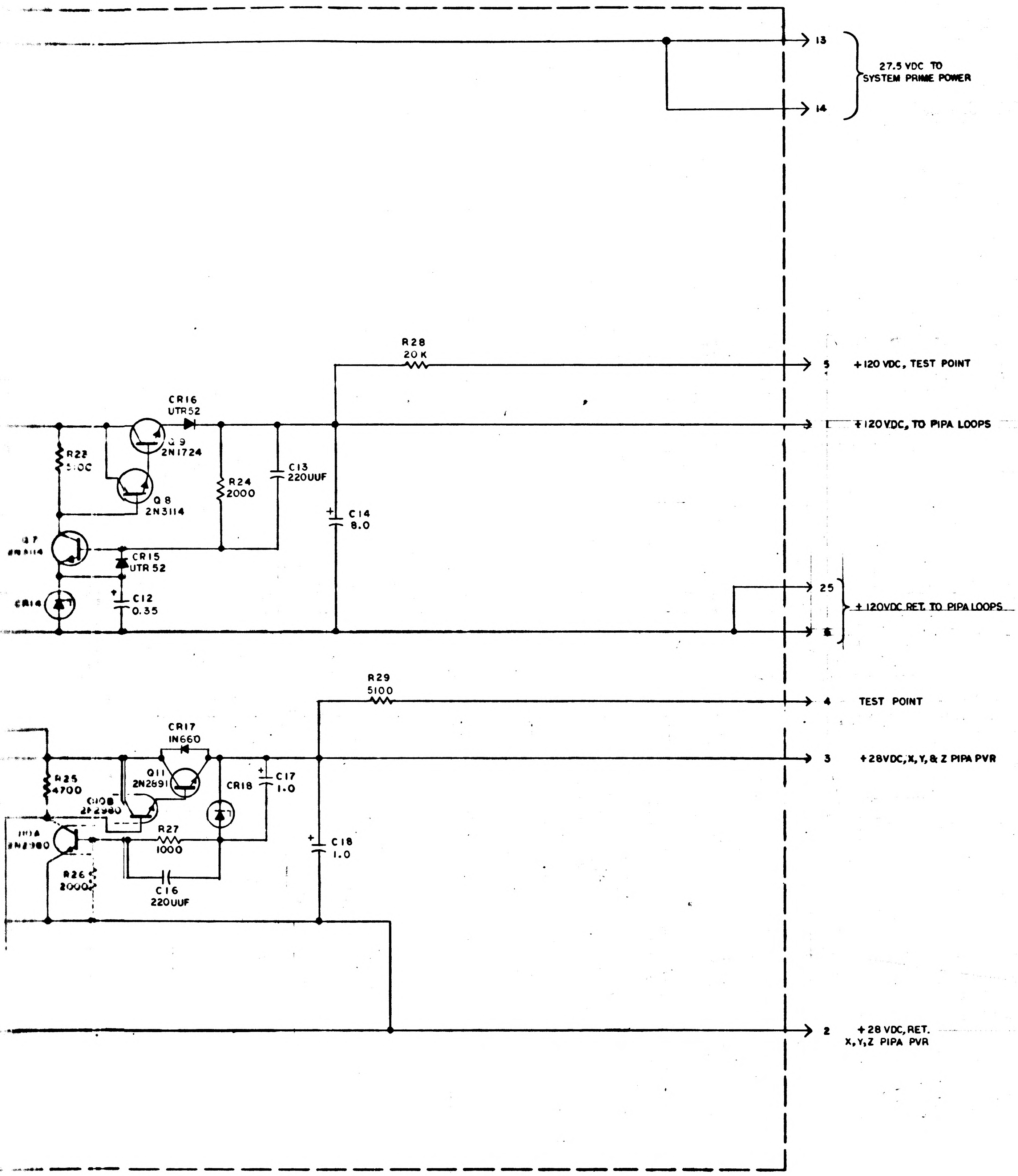
APOLLO INERTIAL SUBSYSTEM
ONE LINE MECHANIZATION
DRAWING BLOCK I-100

CODE IDENT NO.	SIZE	
	E	1009575
SCALE		SHEET 1 OF 1

MASTER

REVISIONS 27/79

SYM	ZONE	DESCRIPTION	BY	CHK	DATE	APPROVED


13
14
27.5 VDC TO SYSTEM PRIME POWER
R28
20 K
5
+120 VDC, TEST POINT
CR16
UTR52
1
+120VDC, TO PIPA LOOPS
R22
5100
Q9
2N1724
Q8
2N3114
R24
2000
C13
220UUF
C14
8.0
Q7
2N3114
CR15
UTR 52
CR14
C12
0.35
25
+120VDC RET. TO PIPA LOOPS
R29
5100
4
TEST POINT
CR17
IN660
3
+28VDC, X, Y, & Z PIPA PVR
R25
4700
Q11
2N2891
Q10B
2N2980
CR18
C17
1.0
Q10A
2N2980
R27
1000
C18
1.0
R26
2000
C16
220UUF
2
+28 VDC, RET.
X, Y, Z PIPA PVR

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1006750 - 25	RESISTOR	510	±2 %	1/4 W
R 2	- 65		24K		
R 3	- 62		18K		
R 4	- 51		6200		
R 5	- 12		150		
R 6	- 74		56 K		
R 7	- 32		1000		
R 8	- 18		270		
R 9	- 18		270		
R10	- 32		1000		
R11	1006750 - 56		10 K	±2 %	1/4 W
R12	1010377 - 110		4700	±1 %	1/10 W
R13	1010377 - 314		80K	±1 %	1/10 W
R14	1010377 - 314		80K	±1 %	1/10 W
R15	1010377 - 110		4700	±1 %	1/10 W
R16	1006750 - 31		910	±2 %	1/4 W
R17	1006750 - 31		910	±2 %	1/4 W
R18	1006802 - 1		10	±1 %	1/2 W
R19	1006802 - 1		10	±1 %	1/2 W
R20	1006750 - 56		10 K	±2 %	1/4 W
R21	1006750 - 15		200	±2 %	1/4 W
R22	1006750 - 74		56K	±2 %	1/4 W
R23	1010389 - 73		5100	±1 %	3 W
R24	1006750 - 39		2000	±2 %	1/4 W
R25	- 48		4700		
R26	- 39		2000		
R27	- 32		1000		
R28	- 63		20 K		
R29	1006750 - 49		5100	±2 %	1/4 W
R30	1010369 - 99		560K	±5 %	1/8 W
R31	1010369 - 100		620K	±5 %	1/8 W
R32	1010369 - 94		360 K	±5 %	1/8 W
R33	1006750 - 73	RESISTOR	51K	±2 %	1/4 W
C1	1006755 - 85	CAPACITOR	22	±10 %	35 VDC
C2	1006755 - 69		1.0	±10 %	35 VDC
C3	1006777 - 16		220 UUF	±10 %	100 VDC
C4	1010316 - 1		0.001	±1 %	
C5	1010316 - 1		0.001	±1 %	
C6	1006777 - 16		220 UUF	±10 %	
C7	1006777 - 39		0.015		
C8	1006777 - 39		0.015		100 VDC
C9	1006755 - 134		22		50 VDC
C10	1006755 - 134		22	±10 %	50 VDC
C11	1010769 - 001		8.0	-15+50%	270 VDC
C12	1010438 - 103		0.35	±20%	150 VDC
C13	1006777 - 16		220 UUF	±10 %	100 VDC
C14	1010769 - 001		8.0	-15+50%	270 VDC
C15	1006755 - 122		2.2	±10 %	50 VDC
C16	1006777 - 16		220 UUF		100 VDC
C17	1006755 - 69		1.0		35 VDC
C18	1006755 - 118		1.0		50 VDC
C19	1006755 - 133		18		50 VDC
C20	1006755 - 53	CAPACITOR	0.047	±10 %	35 VDC
CR1	1010385	DIODE	IN660		
CR2	1010830 - 5		IN961B		
CR3	1010830 - 9		IN965B		
CR4	1010385		IN660		
CR5	1010385		IN660		
CR6	1010385		IN660		
CR7	1010385		IN660		
CR8	1010497		UTR52		
CR9					
CR10					
CR11					
CR12					
CR13	1010497		UTR52		
CR14	1010829 - 26				
CR15	1010497		UTR52		
CR16	1010497		UTR52		
CR17	1010385		IN660		
CR18	1010830 - 29				
CR19	1010497		UTR52		
CR20	1010372 - 15		IN755A		
CR21	1010385	DIODE	IN660		
Q1	1010652 - 1	TRANSISTOR	2N2980		
Q2	1010652 - 1		2N2980		
Q3	1010398 - 3		2N2243A		
Q4	1010398 - 3		2N2243A		
Q5	1010499 - 2		MHT6028		
Q6	1010499 - 2		MHT6028		
Q7	1010747 - 1		2N3114		
Q8	1010747 - 1		2N3114		
Q9	1010273 - 1		2N1724		
Q10	1010652 - 1		2N2980		
Q11	1010713 - 1		2N2891		
Q12	1010342	TRANSISTOR	2N998		
T1	1010315 - 2	TRANSFORMER			
T2	1008880	TRANSFORMER			

REF DWG:
PULSE TORQUE POWER SUPPLY, REGULATED
DWG NO. 1007370

1009583

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. Aldarcio Jr. 12 Dec 65
CHECKED
APPROVED
APPROVED 2/23/66
APPROVED MIT
A. KK MEEHAN
APPROVED MSC
DATE

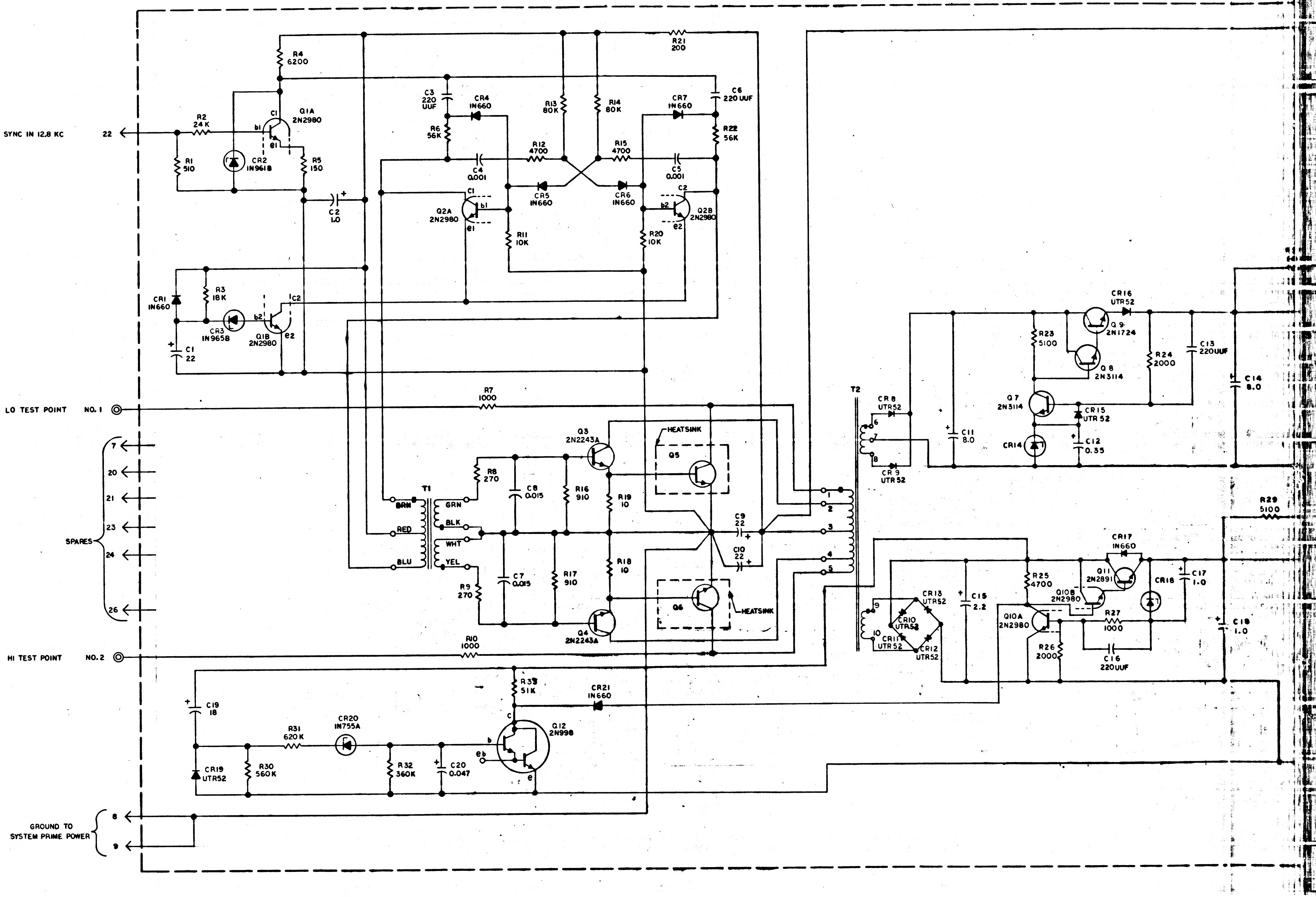
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PULSE TORQUE
POWER SUPPLY REGULATED

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1009583
SCALE
SHEET 1 OF 1

1009583

E-2



SYNC IN 12.8 KC
22
R2 24K
R1 510
CR2 1N961B
Q1A 2N2980
R4 6200
R5 150
C2 1.0
CR1 1N660
R3 18K
CR3 1N965B
Q1B 2N2980
C1 22
C3 220 UUF
CR4 1N660
R6 56K
C4 0.001
R12 4700
R13 80K
R14 80K
R15 4700
CR5 1N660
CR6 1N660
Q2A 2N2980
Q2B 2N2980
R11 10K
R20 10K
CR7 1N660
C5 0.001
C6 220 UUF
R22 56K
R21 200
LO TEST POINT NO. 1
R7 1000
T1
BRN
RED
BLU
GRN
BLK
WHT
YEL
R8 270
R9 270
C8 0.015
C7 0.015
R16 910
R17 910
R19 10
R18 10
Q3 2N2243A
Q4 2N2243A
Q5
Q6
HEATSINK
C9 22
C10 22
HI TEST POINT NO. 2
R10 1000
SPARES
7
20
21
23
24
26
T2
CR8 UTR52
CR9 UTR52
C11 8.0
CR14
Q7 2N3114
CR15 UTR52
C12 0.35
R23 5100
Q8 2N3114
Q9 2N1724
CR16 UTR52
R24 2000
C13 220UUF
C14 8.0
R29 5100
CR13 UTR52
CR10 UTR52
CR11 UTR52
CR12 UTR52
C15 2.2
R25 4700
Q10A 2N2980
Q10B 2N2980
Q11 2N2891
CR17 1N660
R27 1000
CR18
C17 1.0
C18 1.0
R26 2000
C16 220UUF
C19 18
CR19 UTR52
R30 560K
R31 620K
CR20 1N755A
R32 360K
C20 0.047
R33 51K
CR21 1N660
Q12 2N998
GROUND TO SYSTEM PRIME POWER
8
9

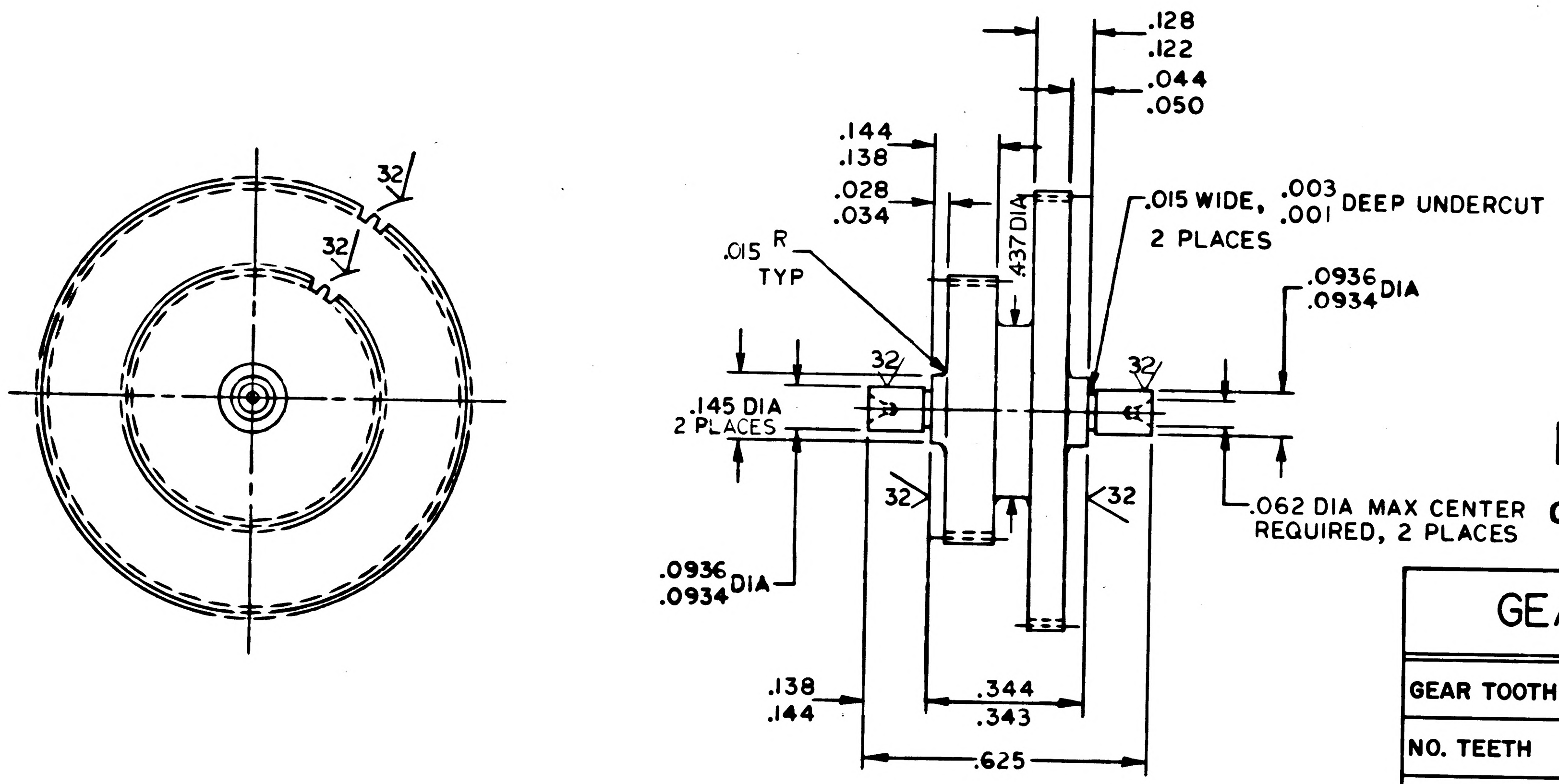
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

1009583

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1009965

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00120 **DATE** 11-26-62

GEAR DATA	PINION	GEAR
GEAR TOOTH FORM	20° FULL DEPTH INVOLUTE	
NO. TEETH	54	90
DIAM. PITCH	96	96
PITCH DIA.	.56250	.93750
OUTSIDE DIA.	.583 $^{+.000}_{-.001}$	.958 $^{+.000}_{-.001}$
AGMA CLASS P2		

NOTES:

1. **INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESRIBED BY MIL-D-70327**
2. **MAT'L.–STAINLESS STEEL NO. 416 PER MIL QQ-S-763-1**
3. UNLESS OTHERWISE SPECIFIED MACHINE FINISH $\overset{63}{\surd}$ ALL OVER.
4. REMOVE BURRS AND SHARP EDGES.
5. HARDEN TO 28-32 ROCKWELL "C".
6. IMMUNIZE NITRIC ACID DIP

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL **SEE NOTE 2**
HEAT TREATMENT SEE NOTE 5
FINAL FINISH SEE NOTE 6

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Ken Kealy DATE 101962
CHECKED
APPROVAL 27 NOV 62
APPROVAL
NASA APPROVAL 11/30/62
MIT APPROVAL 29 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

GEAR, SPUR, CLUSTER, 96 DP, 54 T ; 96 DP, 90 T, WITH INTEGRAL SHAFT

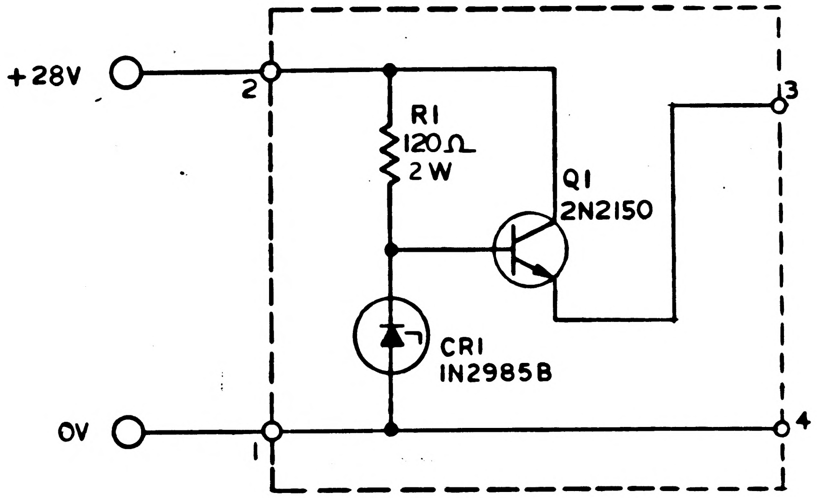
CODE IDENT NO. SIZE C NASA DRAWING NO. 1009965
SCALE 4 : 1 WT SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1010003 (M)

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00229	1-4-63	J.C.A.



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00174 DATE

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR			
CR1		DIODE			
Q1		TRANSISTOR			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN N F Troy DATE 11-14-62
CHECKED 12-19-62
APPROVAL S. C. Smith 12-19-62
APPROVAL B. Katz 12-19-62

NASA APPROVAL W J Rhine 12-19-62

MIT APPROVAL 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, PIP FIXED HEATER 28V DC REGULATOR

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1010003

SCALE | WT | SHEET 1 OF 1

1010003A

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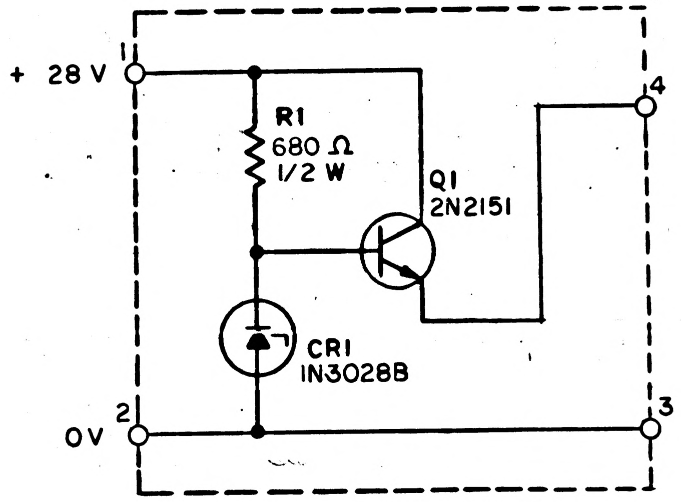
1010003 | B

REVISIONS CLASS B TDRR 00174

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00229	1-4-63	I.C.I.
B	UPGRADED FOR CLASS A RELEASE PER TDRR 00498	9-2-63	I.C.I. A.K.



REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006760-28	RESISTOR	680Ω	2%	1/2 W
CR1	1010265-013	DIODE	IN3028B	5%	
Q1	1010269	TRANSISTOR	2N2151		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 11-14-62
CHECKED
APPROVAL 12-19-62
APPROVAL B. Katz 12-19-62
NASA APPROVAL W. J. Rhine 12-19-62
MIT APPROVAL 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
PIP FIXED HEATER
28V DC REGULATOR

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010003
SCALE
WT
SHEET 1 OF 1

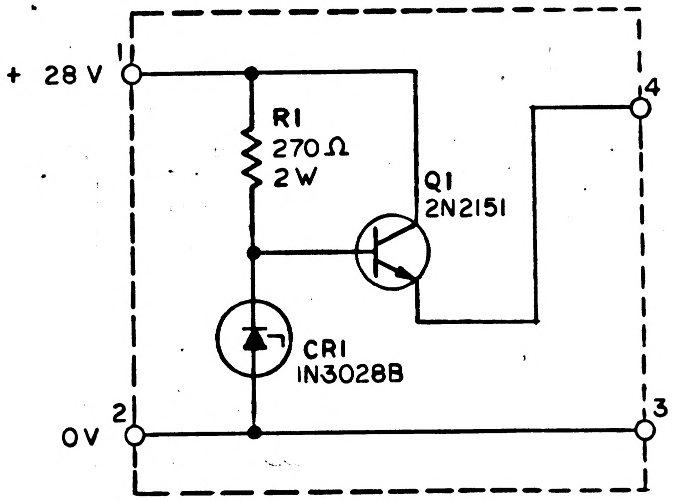
1010003 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

C 1010003

REVISIONS CLASS B TDRR 00174

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00229	1-4-63	J.C.L.
B	UPGRADED FOR CLASS A RELEASE PER TDRR 00498	9-2-63	J.C.L. A.K. WK
C	REVISED PER TDRR 01184	5-8-63	SCS WK



REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010312–035	RESISTOR	270Ω	1%	2W
CR1	1010265–013	DIODE	IN3028B	5%	
Q1	1010269	TRANSISTOR	2N2151		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY
USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN N F Troy DATE 11-14-62
CHECKED 12-19-62
APPROVAL S. C. Smith 12-19-62
APPROVAL 12-19-62
NASA APPROVAL W J Rhine 12-16-62
MIT APPROVAL 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
PIP FIXED HEATER
28V DC REGULATOR

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010003
SCALE
WT
SHEET 1 OF 1

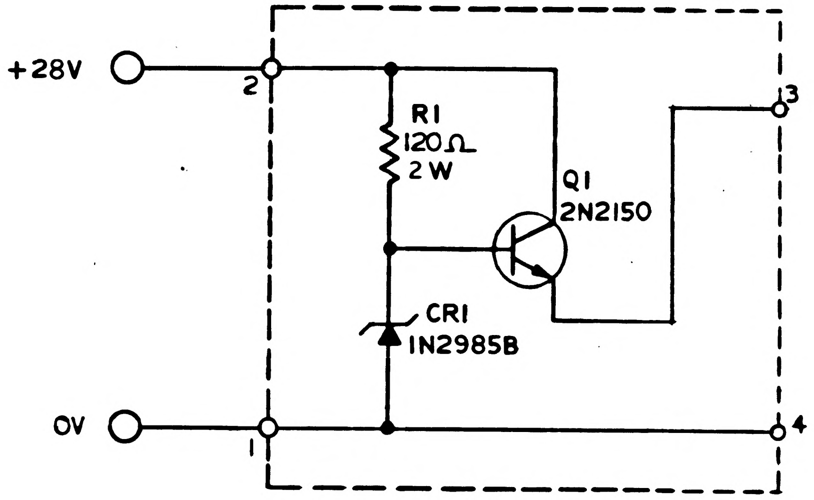
1010003A B

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1010003

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00174 **DATE**

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR			
CR1		DIODE			
Q1		TRANSISTOR			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
±	±	±

DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DWG. NO. CONTRACT

DRAWN W F Troy DATE 11-14-62
CHECKED [illegible] 12-19-62
APPROVAL S. C. Smith 12-19-62
APPROVAL B. Katz 12-19-62

NASA APPROVAL W. J. Rhine 12-19-62

MIT APPROVAL [illegible] 19 Dec 62

MANNED SPACECRAFT CENTER
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SCHEMATIC
28VDC REGULATOR

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	C	1010003
SCALE	WT	SHEET 1 OF 1

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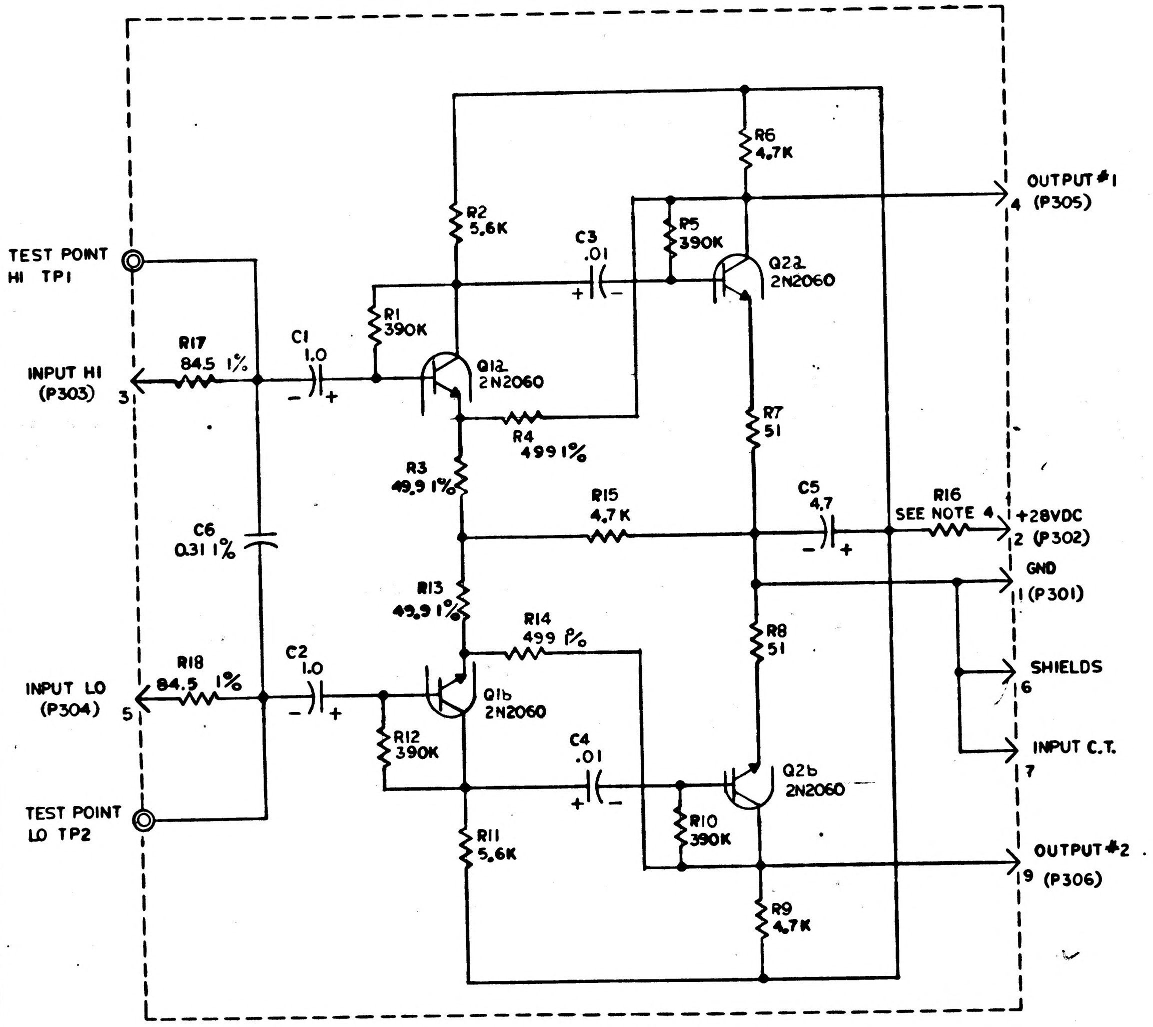
REVISIONS CLASS B TDRR 00174

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED AND UP GRADED TO CLASS A PER TDRR 00371	4-30-63 2-18-63	J.S. WK.


TEST POINT
HI TP1
INPUT HI
(P303)
3
R17
84.5 1%
C1
1.0
R1
390K
Q1a
2N2060
R2
5.6K
C3
.01
R5
390K
Q2a
2N2060
R6
4.7K
OUTPUT #1
4 (P305)
R4
499 1%
R3
49.9 1%
R7
51
R15
4.7K
C5
4.7
R16
SEE NOTE 4
+28VDC
2 (P302)
GND
1 (P301)
C6
0.31 1%
R13
49.9 1%
R14
499 1%
R8
51
SHIELDS
6
INPUT LO
(P304)
5
R18
84.5 1%
C2
1.0
Q1b
2N2060
R12
390K
C4
.01
Q2b
2N2060
INPUT C.T.
7
TEST POINT
LO TP2
R10
390K
R11
5.6K
OUTPUT #2
9 (P306)
R9
4.7K

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010369 - 95	RESISTOR	390 K	5 %	1/4 W
R2	1006750-50		5.6K	2 %	1/4 W
R3	1010311 —		49.9	1 %	1/10 W
R4	1010311 —		499	1 %	1/10 W
R5	1010369 — 95		390 K	5 %	1/4 W
R6	1006750—48		4.7 K	2 %	
R7	1006750—1		51		
R8	1006750—1		51		
R9	1006750—48		4.7 K		
R10	1010369—95		390 K	5%	
R11	1006750—50		5.6 K	2%	
R12	1010369 — 95		390 K	5 %	
R13	1010311 —		49.9	1 %	1/10 W
R14	1010311 —		499	1 %	1/10 W
R15	1006750-48		4.7K	2 %	1/4 W
R16	1006750	SEE NOTE 4		2 %	1/4 W
R17	1010311		84.5	1 %	1/10W
R18	1010311		84.5	1 %	1/10W
C1	1006755 — 69	CAPACITOR	1.0	10%	35 V
C2	1006755 — 69		1.0		35 V
C3	1006755—45		.01		35 V
C4	1006755—45		.01		35 V
C5	1010393 —		4.7		50 V
C6	1010317 —		0.31	1 %	30 V
Q1	1010376 —	TRANSISTOR	2N2060		
Q2	1010376 —	TRANSISTOR	2N2060		
P1	1010318 —	CONNECTOR			
TP1	1010292 — 1	TEST POINT			
TP2	1010292 — 1	TEST POINT			

REF DRAWING:
PIP PREAMPLIFIER ASSY 1007015

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. VALUE OF R16 TO BE SPECIFED AT LATER DATE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG. NO.
CONTRACT
DRAWN DATE
CHECKED
APPROVAL
APPROVAL J. S. 12-19-62
NASA APPROVAL 12-19-62
MIT APPROVAL 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIP PREAMPLIFIER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010006
SCALE //
WT
SHEET 1 OF 1

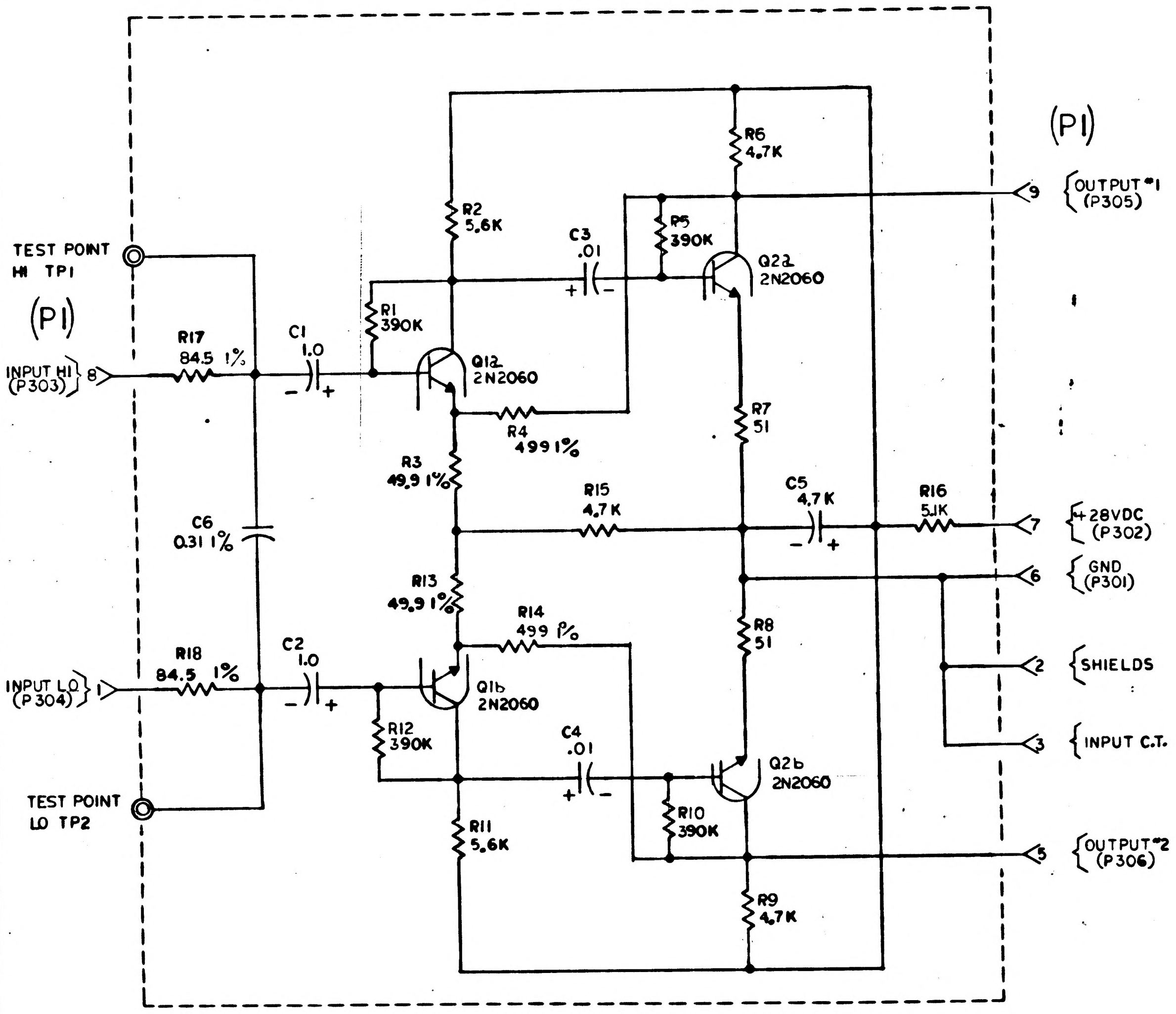
1010006 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 00174

(M)

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED AND UP GRADED TO CLASS A PER TDRR 00371	1-30-63 2-13-63	J.R.S. WK.
B	REVISED PER TDRR 01311		TJS WK.


TEST POINT
HI TP1
(P1)
INPUT HI 8
(P303)
R17
84.5 1%
C1
1.0
R1
390K
Q1a
2N2060
R2
5.6K
C3
.01
R5
390K
R6
4.7K
Q2a
2N2060
R4
499 1%
R3
49.9 1%
R7
51
R15
4.7K
C5
4.7K
R16
5.1K
C6
0.31 1%
R13
49.9 1%
R14
499 1%
R8
51
R18
84.5 1%
C2
1.0
INPUT LO 1
(P304)
Q1b
2N2060
R12
390K
C4
.01
R10
390K
Q2b
2N2060
TEST POINT
LO TP2
R11
5.6K
R9
4.7K
(P1)
9 OUTPUT #1 (P305)
7 +28VDC (P302)
6 GND (P301)
2 SHIELDS
3 INPUT C.T.
5 OUTPUT #2 (P306)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010369-95	RESISTOR	390K	5%	1/4 W
R2	1006750-50		5.6K	2%	1/4 W
R3	1010311 -001		49.9	1%	1/10 W
R4	1010311 -097		499	1%	1/10 W
R5	1010369-95		390K	5%	1/4 W
R6	1006750-48		4.7K	2%	
R7	1006750-1		51		
R8	1006750-1		51		
R9	1006750-48		4.7 K		
R10	1010369-95		390K	5%	
R11	1006750-50		5.6 K	2%	
R12	1010369-95		390K	5%	
R13	1010311-001		49.9	1%	1/10 W
R14	1010311-097		499	1%	1/10 W
R15	1006750-48		4.7K	2%	1/4 W
R16	1006750-49		5.1K	2%	1/4 W
R17	1010311-023		64.5	1%	1/10W
R18	1010311-023		84.5	1%	1/10W
C1	1006755-69	CAPACITOR	1.0	10%	35 V
C2	1006755-69		1.0		35 V
C3	1006755-45		.01		35V
C4	1006755-45		.01		35V
C5	1010393-037		4.7		50V
C6	1010317		0.31	1%	30V
Q1	1010376 -1	TRANSISTOR	2N2060		
Q2	1010376 -1	TRANSISTOR	2N2060		
P1	1010318 -2	CONNECTOR			
TP1	1010292 - 1	TEST POINT			
TP2	1010292 - 1	TEST POINT			

REF DRAWING:
PIP PREAMPLIFIER ASSY 1007015

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN M. Hughes DATE 9-24-62
CHECKED 12-18-62
APPROVAL S. C. Smith
APPROVAL J. L. Sitomer 12-19-62
NASA APPROVAL W. J. Rhine 12-19-62
MIT APPROVAL W. Kupfer 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIP PREAMPLIFIER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010006
SCALE —
WT
SHEET 1 OF 1

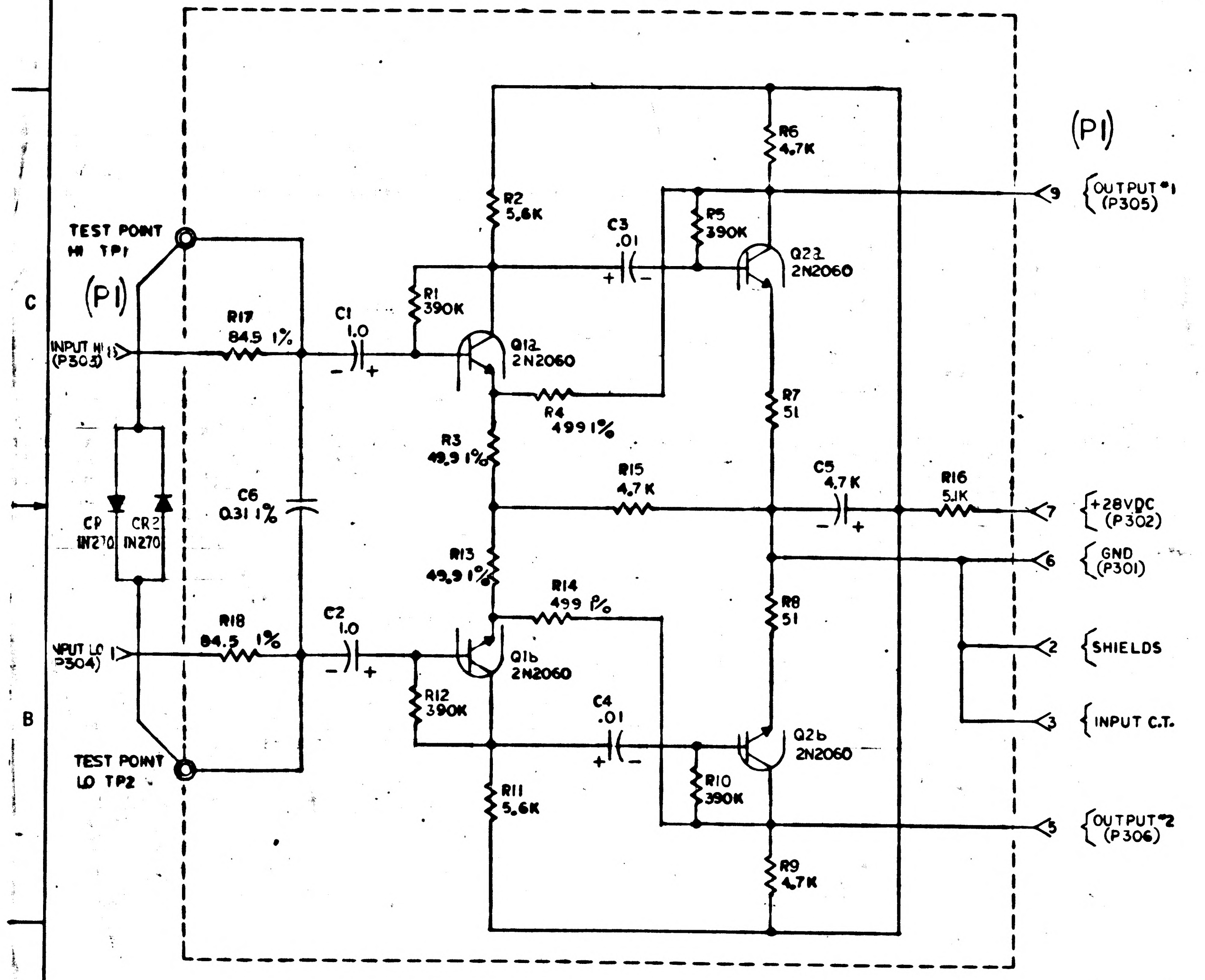
1010006 B

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00194

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED AND UP GRADED TO CLASS A PER TDRR 00371	1-30-63 8-13-63	WK
B	REVISED PER TDRR 01311		WK
C	REVISED PER TDRR 11095	3 AUG 64	


TEST POINT HI TP1
(P1)
INPUT HI 1 (P303)
R17 84.5 1%
C1 1.0
R1 390K
Q1a 2N2060
R2 5.6K
C3 .01
R5 390K
Q2a 2N2060
R6 4.7K
R4 499 1%
R3 49.9 1%
R15 4.7K
R7 51
C5 4.7K
R16 5.1K
R13 49.9 1%
R14 499 1%
R8 51
C6 0.31 1%
CR1 1N270
CR2 1N270
INPUT LO 1 (P304)
R18 84.5 1%
C2 1.0
Q1b 2N2060
R12 390K
C4 .01
Q2b 2N2060
R10 390K
R11 5.6K
R9 4.7K
TEST POINT LO TP2
(P1)
9 OUTPUT #1 (P305)
7 +28VDC (P302)
6 GND (P301)
2 SHIELDS
3 INPUT C.T.
5 OUTPUT #2 (P306)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010369 - 95	RESISTOR	390K	5 %	1/4 W
R2	1006750-50		5.6K	2 %	1/4 W
R3	1010311 -001		49.9	1 %	1/10 W
R4	1010311 -097		499	1 %	1/10 W
R5	1010369 - 95		390K	5 %	1/4 W
R6	1006750-48		4.7K	2 %	
R7	1006750-1		51		
R8	1006750-1		51		
R9	1006750-48		4.7 K		
R10	1010369-95		390K	5%	
R11	1006750-50		5.6 K	2%	
R12	1010369 - 95		390K	5%	
R13	1010311-001		49.9	1 %	1/10 W
R14	1010311-097		499	1 %	1/10 W
R15	1006750-48		4.7K	2 %	1/4 W
R16	1006750-49		5.1K	2 %	1/4 W
R17	1010311-023		84.5	1 %	1/10W
R18	1010311-023		84.5	1 %	1/10W
C1	1006755 - 69	CAPACITOR	1.0	10%	35 V
C2	1006755 - 69		1.0		35 V
C3	1006755 - 45		.01		35V
C4	1006755 - 45		.01		35V
C5	1010393-037		4.7		50V
C6	1010317		0.31	1 %	30V
Q1	1010376 -1	TRANSISTOR	2N2060		
Q2	1010376 -1	TRANSISTOR	2N2060		
P1	1010318 -2	CONNECTOR			
TP1	1010292 - 1	TEST POINT			
TP2	1010292 - 1	TEST POINT			
CR1	1010761	SEMICONDUCTOR	1N270		
CR2	1010761	SEMICONDUCTOR	1N270		

REF DRAWING:
PIP PREAMPLIFIER ASSY 1007015

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN DATE 2-20-62
CHECKED
APPROVAL
APPROVAL 12-19-62
NASA APPROVAL 12-19-62
MIT APPROVAL W.K. 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIP PREAMPLIFIER

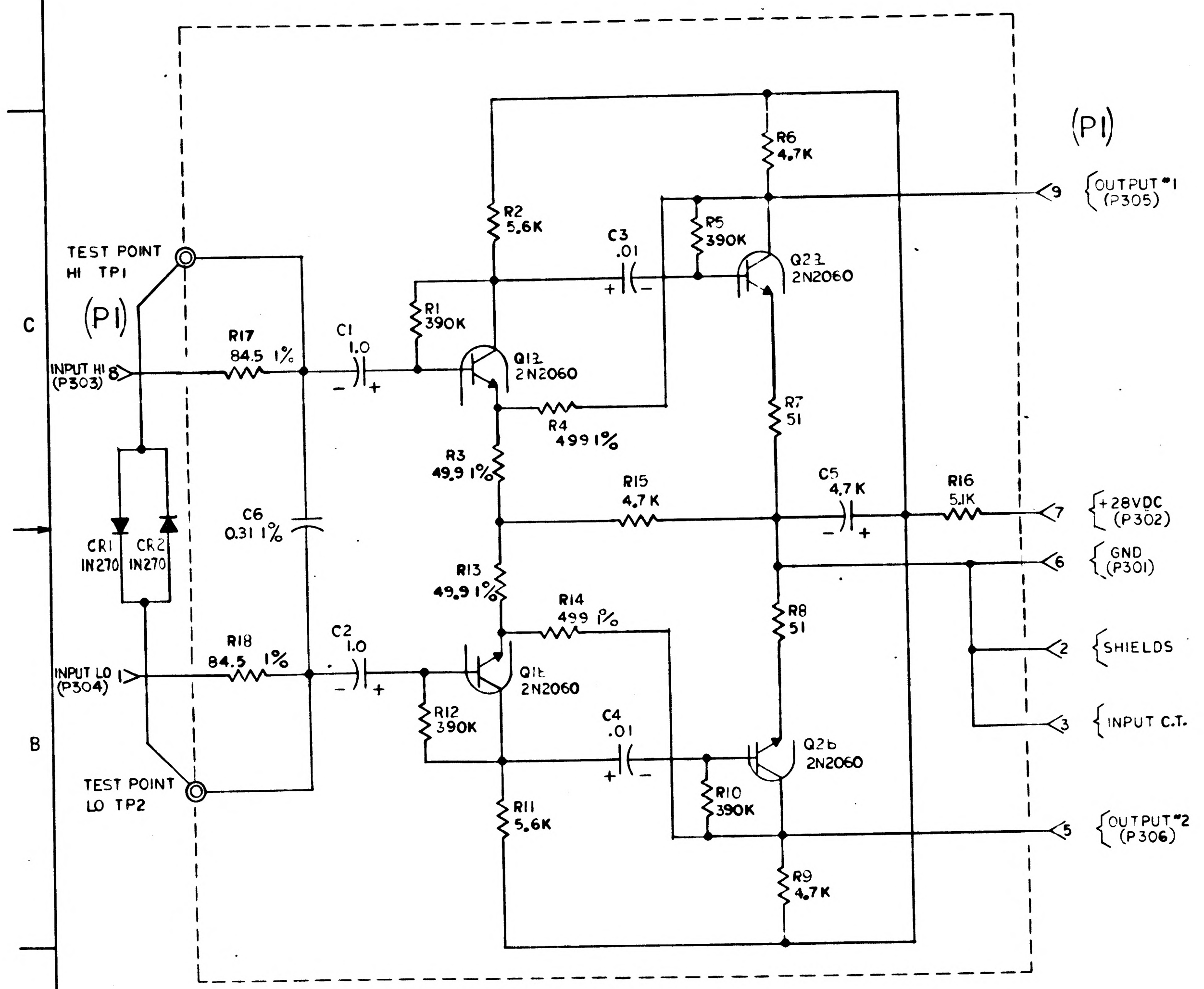
CODE IDENT NO. | SIZE D | NASA DRAWING NO. 1010006
SCALE — | WT | SHEET 1 OF 1

1010006 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED AND UP GRADED TO CLASS A PER TDRR 00371	1-30-63 2-18-63	JJS. WK
B	REVISED PER TDRR 01311		ms WK
C	REVISED PER TDRR 11095	3 AUG 64	JWP
D	REVISED PER TDRR 14993	4 JAN 64	J.W.P


TEST POINT HI TP1
(P1)
INPUT HI 8 (P303)
R17 84.5 1%
C1 1.0
R1 390K
R2 5.6K
C3 .01
R5 390K
R6 4.7K
Q1a 2N2060
Q2a 2N2060
R4 499 1%
R3 49.9 1%
R15 4.7K
R7 51
C5 4.7K
R16 5.1K
CR1 1N270
CR2 1N270
C6 0.31 1%
R13 49.9 1%
R14 499 1%
R8 51
R18 84.5 1%
INPUT LO 1 (P304)
C2 1.0
Q1b 2N2060
R12 390K
C4 .01
Q2b 2N2060
R10 390K
R11 5.6K
R9 4.7K
TEST POINT LO TP2
(P1)
9 OUTPUT #1 (P305)
7 +28VDC (P302)
6 GND (P301)
2 SHIELDS
3 INPUT C.T.
5 OUTPUT #2 (P306)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010369-95	RESISTOR	390K	5%	1/4 W
R2	1006750-50		5.6K	2%	1/4 W
R3	1010311-001		49.9	1%	1/10 W
R4	1010311-097		499	1%	1/10 W
R5	1010369-95		390K	5%	1/4 W
R6	1006750-48		4.7K	2%	
R7	1006750-1		51		
R8	1006750-1		51		
R9	1006750-48		4.7K		
R10	1010369-95		390K	5%	
R11	1006750-50		5.6K	2%	
R12	1010369-95		390K	5%	
R13	1010311-001		49.9	1%	1/10 W
R14	1010311-097		499	1%	1/10 W
R15	1006750-48		4.7K	2%	1/4 W
R16	1006750-49		5.1K	2%	1/4 W
R17	1010311-023		84.5	1%	1/10W
R18	1010311-023		84.5	1%	1/10W
C1	1006755-69	CAPACITOR	1.0	10%	35V
C2	1006755-69		1.0		35V
C3	1006755-45		.01		35V
C4	1006755-45		.01		35V
C5	1010393-037		4.7		50V
C6	1010317-1		0.31	1%	30V
Q1	1010376-1	TRANSISTOR	2N2060		
Q2	1010376-1	TRANSISTOR	2N2060		
P1	1010318-2	CONNECTOR			
TP1	1010292-1	TEST POINT			
TP2	1010292-1	TEST POINT			
CR1	1010761	SEMICONDUCTOR	IN270		
CR2	1010761	SEMICONDUCTOR	IN270		

REF DRAWING:
PIP PREAMPLIFIER ASSY 1007015
PIP PREAMPLIFIER ASSY 1007214

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS — ANGLES
± // ± // ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN M. Hughes DATE 30 Oct 62
CHECKED 12-19-62
APPROVAL S. C. Smith
APPROVAL 12-19-62
NASA APPROVAL 12-17-62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIP PREAMPLIFIER

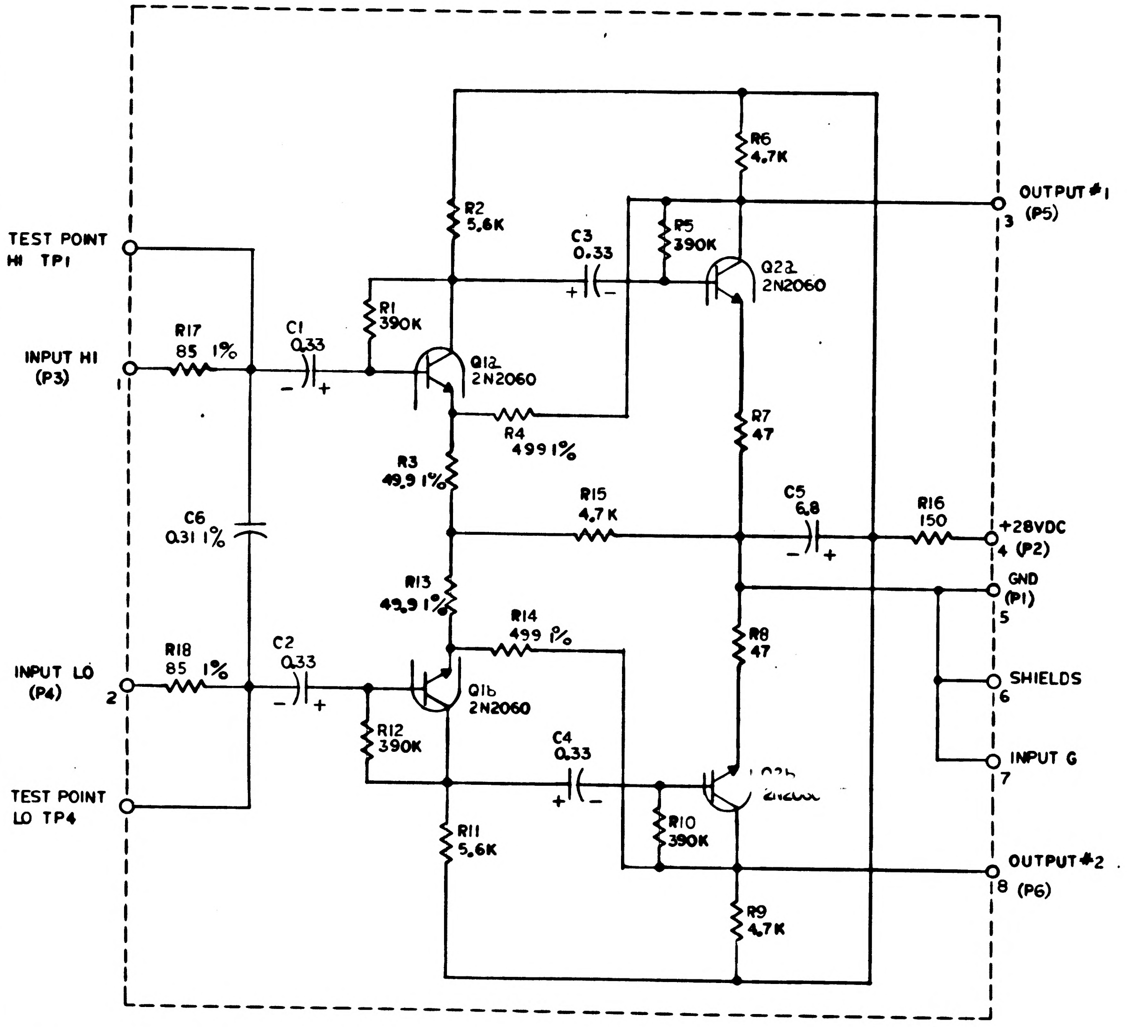
CODE IDENT NO.
SIZE D
NASA DRAWING NO 1010006
SCALE //
WT
SHEET 1 OF 1

1010006 D

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL


TEST POINT HI TP1
INPUT HI (P3)
1
R17 85 1%
C1 0.33
R1 390K
Q1a 2N2060
R2 5.6K
C3 0.33
R5 390K
Q2a 2N2060
R6 4.7K
OUTPUT #1
3 (P5)
R4 499 1%
R3 49.9 1%
R7 47
C6 0.31 1%
R15 4.7K
C5 6.8
R16 150
+28VDC
4 (P2)
GND (P1)
5
R13 49.9 1%
R14 499 1%
R8 47
INPUT LO (P4)
2
R18 85 1%
C2 0.33
Q1b 2N2060
SHIELDS
6
R12 390K
C4 0.33
Q2b
INPUT G
7
TEST POINT LO TP4
R11 5.6K
R10 390K
OUTPUT #2
8 (P6)
R9 4.7K

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR	390K	5%	1/4 W
R2	1006750-67		5.6K	5%	1/4 W
R3			49.9	1%	1/10 W
R4			499	1%	1/10 W
R5			390K	5%	1/4 W
R6	100750-65		4.7K	5%	
R7	100750-17		47		
R8	100750-17		47		
R9	100750-65		4.7K		
R10			390K		
R11	1006750-67		5.6K		
R12			390K		
R13			49.9	1%	1/10 W
R14			499	1%	1/10 W
R15	1006750-65		4.7K	5%	1/4 W
R16	1006750-29		150	5%	1/4 W
R17			85	1%	1/10W
R18			85	1%	1/10W
C1		CAPACITOR	0.33	10%	
C2					
C3					
C4					
C5	1006755-5		6.8		
C6			0.31	1%	
Q1		TRANSISTOR	2N2060		
Q2		TRANSISTOR	2N2060		
P1		CONNECTOR			
TP1		TEST POINT			
TP2		TEST POINT			

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00174 DATE

1010006

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
APPROVAL
APPROVAL 12-19-62
NASA APPROVAL 12-19-62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

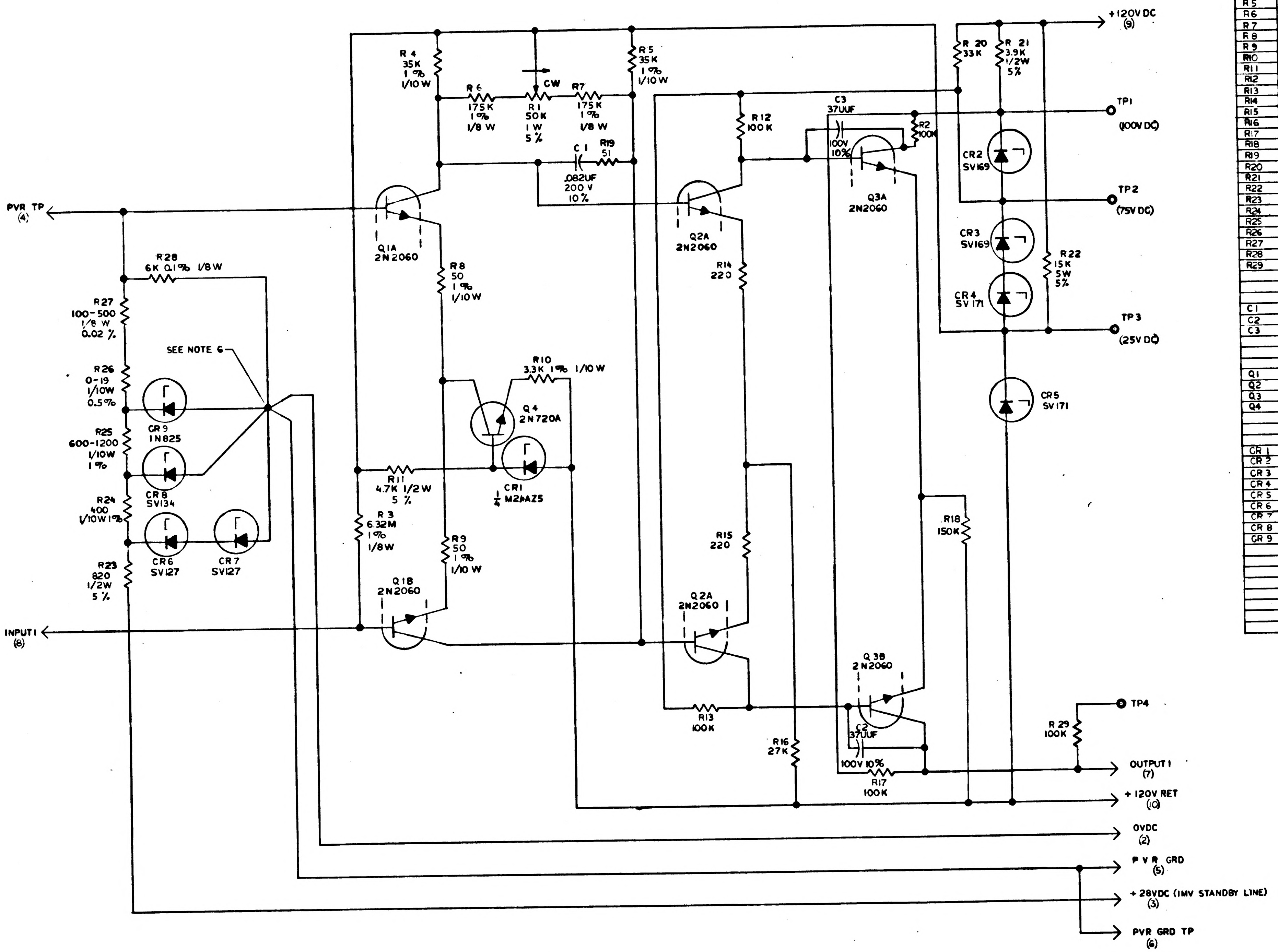
SCHEMATIC
PIP PREAMPLIFIER

CODE IDENT NO. SIZE D NASA DRAWING NO. 1010006
SCALE WT SHEET 1 OF

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00364	2-6-63	#3	WK


+120V DC
(9)
TP1
(100V DC)
TP2
(75V DC)
TP3
(25V DC)
TP4
R 4
35K
1 %
1/10 W
R 5
35K
1 %
1/10 W
R 6
175K
1 %
1/8 W
R 1
50K
1 W
5 %
CW
R7
175K
1 %
1/8 W
C 1
.082UF
200 V
10 %
R19
51
R 12
100 K
C3
37UUF
100V
10%
R2
100K
Q3A
2N2060
R 20
33K
R 21
3.9K
1/2W
5%
CR2
SV169
CR3
SV169
CR4
SV 171
R22
15K
5W
5%
CR5
SV171
PVR TP
(4)
Q1A
2N2060
Q2A
2N2060
R8
50
1 %
1/10 W
R14
220
R28
6K 0.1% 1/8W
R27
100-500
1/8 W
0.02 %
SEE NOTE 6
R26
0-19
1/10W
0.5%
CR9
1N825
R25
600-1200
1/10W
1 %
CR8
SV134
R24
400
1/10W 1%
CR6
SV127
CR7
SV127
R23
820
1/2W
5 %
R10
3.3K 1% 1/10 W
Q 4
2N720A
R11
4.7K 1/2 W
5 %
CR1
1/4 M2AAZ5
R 3
6.32M
1%
1/8W
R9
50
1 %
1/10 W
R15
220
R18
150K
Q1B
2N2060
Q2A
2N2060
INPUT1
(8)
Q 3B
2N2060
R13
100K
C2
37UUF
100V 10%
R16
27K
R17
100K
R 29
100K
OUTPUT1
(7)
+120V RET
(10)
0VDC
(2)
P V R GRD
(5)
+28VDC (IMV STANDBY LINE)
(3)
PVR GRD TP
(6)

REF.DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR,VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR,MF	100K	5%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35K	1%	1/10W
R5	↓ -39	↓	35K	1%	1/10W
R6	1010364-681	MF	175 K	1%	1/8W
R7	↓ -681	↓	175 K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	↓ -36	↓	3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	5%	1/2W
R12	1006750-80		100K	5%	1/4W
R13	↓ -80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	↓ -68		33K	↓ %	↓
R21	1006760-46	↓	3.9K	5%	1/2W
R22	1010399-49	WW	15 K	5%	5W
R23	1006760-30	MF	820	5%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-	↓	6 K	0.1%	1/8W
R29	1006750-80	↓ MF	100 K	5%	1/4W
C1	1010264-	CAP,MYLAR	.082UF	10%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	↓ CER	37UUF	10%	100V
Q1	1010376-1	TRTR 2N2060			
Q2	-1	2N2060			
Q3	↓ -1	2N2060			
Q4	1010357	↓ 2N720A			
CR1	1010280	DIODE, 1/4M2AAZ5			
CR2	1010257-1	1N769-2			
CR3	1010257-1	1N769-2			
CR4	1010257-2	1N769-3			
CR5	1010257-2	1N769-3			
CR6	1010258	1N763-3			
CR7	↓	1N763-3			
CR8	1010260	1N765-2			
CR9	1010259	↓ 1N825			

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. RESISTORS R26 AND R27 TO BE CHOSEN FOR PROPER OPERATION OF DC CONSTANT CURRENT SOURCE AFTER CONSTRUCTION OF THE SUB-MODULE
4. ALL RESISTORS 1/4W ± 5% UNLESS OTHERWISE SPECIFIED
5. PARTS LIST TO BE FOR REFERENCE ONLY
6. WIRING TO BE TO A SINGLE POINT AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 9OCT62
CHECKED
APPROVAL
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30Nov62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

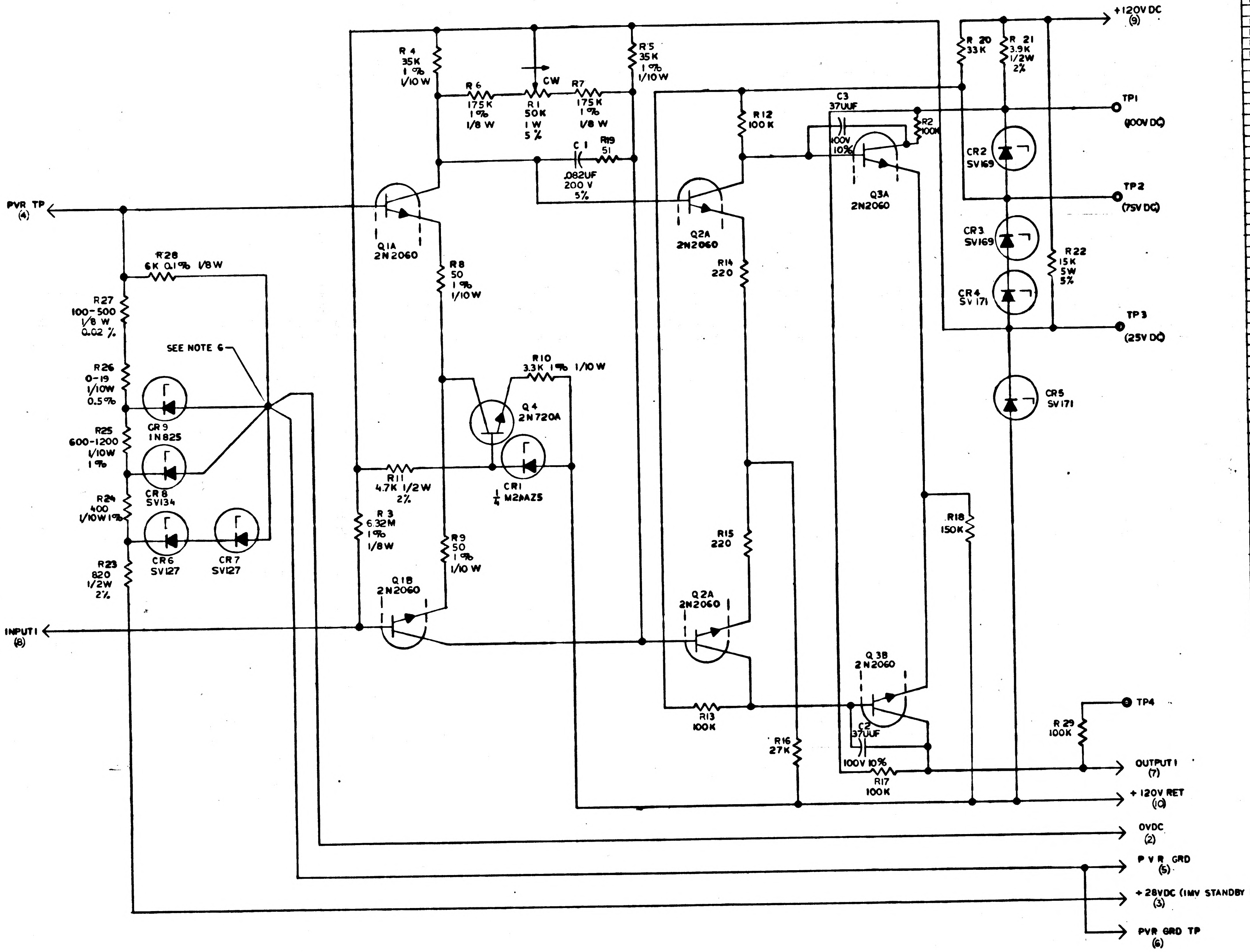
CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63	#33	WK
B	REVISED PER TDRR 01008	4-25-63	DT.	

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35K	1%	1/10W
R5	↓ -39	↓	35K	1%	1/10W
R6	1010364-681	MF	175 K	1%	1/8W
R7	↓ -681	↓	175 K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	↓ -36	↓	3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	↓ -80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	↓ -68		33K	↓%	↓
R21	1006760-46	↓	3.9K	2%	1/2W
R22	1010399-49	WW	15 K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22	↓	6 K	0.1%	1/8W
R29	1006750-80	↓ MF	100 K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	↓ CER	37UUF	10%	100V
Q1	1010376-1	TRTR 2N2060			
Q2	-1	2N2060			
Q3	↓ -1	2N2060			
Q4	1010357	↓ 2N720A			
CR1	1010280	DIODE, 1/4M2AAZ5			
CR2	1010257-1	IN769-2			
CR3	1010257-1	IN769-2			
CR4	1010257-2	IN769-3			
CR5	1010257-2	IN769-3			
CR6	1010258	IN763-3			
CR7	↓	IN763-3			
CR8	1010260	IN765-2			
CR9	1010259	↓ IN825			



PVR TP (4)
INPUT1 (8)
R27 100-500 1/8 W 0.02%
R28 6K 0.1% 1/8W
R26 0-19 1/10W 0.5%
R25 600-1200 1/10W 1%
R24 400 1/10W 1%
R23 820 1/2W 2%
CR9 IN825
CR8 SV134
CR6 SV127
CR7 SV127
SEE NOTE 6
R4 35K 1% 1/10W
R6 175K 1% 1/8 W
R1 50K 1 W 5%
CW
R7 175K 1% 1/8 W
R5 35K 1% 1/10W
C1 .082UF 200 V 5%
R19 51
Q1A 2N2060
R8 50 1% 1/10W
R10 3.3K 1% 1/10W
Q4 2N720A
R11 4.7K 1/2W 2%
CR1 1/4 M2AAZ5
R3 6.32M 1% 1/8W
R9 50 1% 1/10W
Q1B 2N2060
R12 100K
Q2A 2N2060
R14 220
R15 220
Q2A 2N2060
R13 100K
R16 27K
C3 37UUF 100V 10%
R2 100K
Q3A 2N2060
Q3B 2N2060
C2 37UUF 100V 10%
R17 100K
R18 150K
R20 33K
R21 3.9K 1/2W 2%
+120VDC (9)
TP1 (100V DC)
CR2 SV169
TP2 (75V DC)
CR3 SV169
CR4 SV171
R22 15K 5W 5%
TP3 (25V DC)
CR5 SV171
TP4
R29 100K
OUTPUT1 (7)
+120V RET (10)
OVDC (2)
P V R GRD (5)
+28VDC (1MV STANDBY LINE) (3)
PVR GRD TP (6)

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. RESISTORS R26 AND R27 TO BE CHOSEN FOR PROPER OPERATION OF DC CONSTANT CURRENT SOURCE AFTER CONSTRUCTION OF THE SUB-MODULE
4. ALL RESISTORS 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
5. PARTS LIST TO BE FOR REFERENCE ONLY
6. WIRING TO BE TO A SINGLE POINT AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

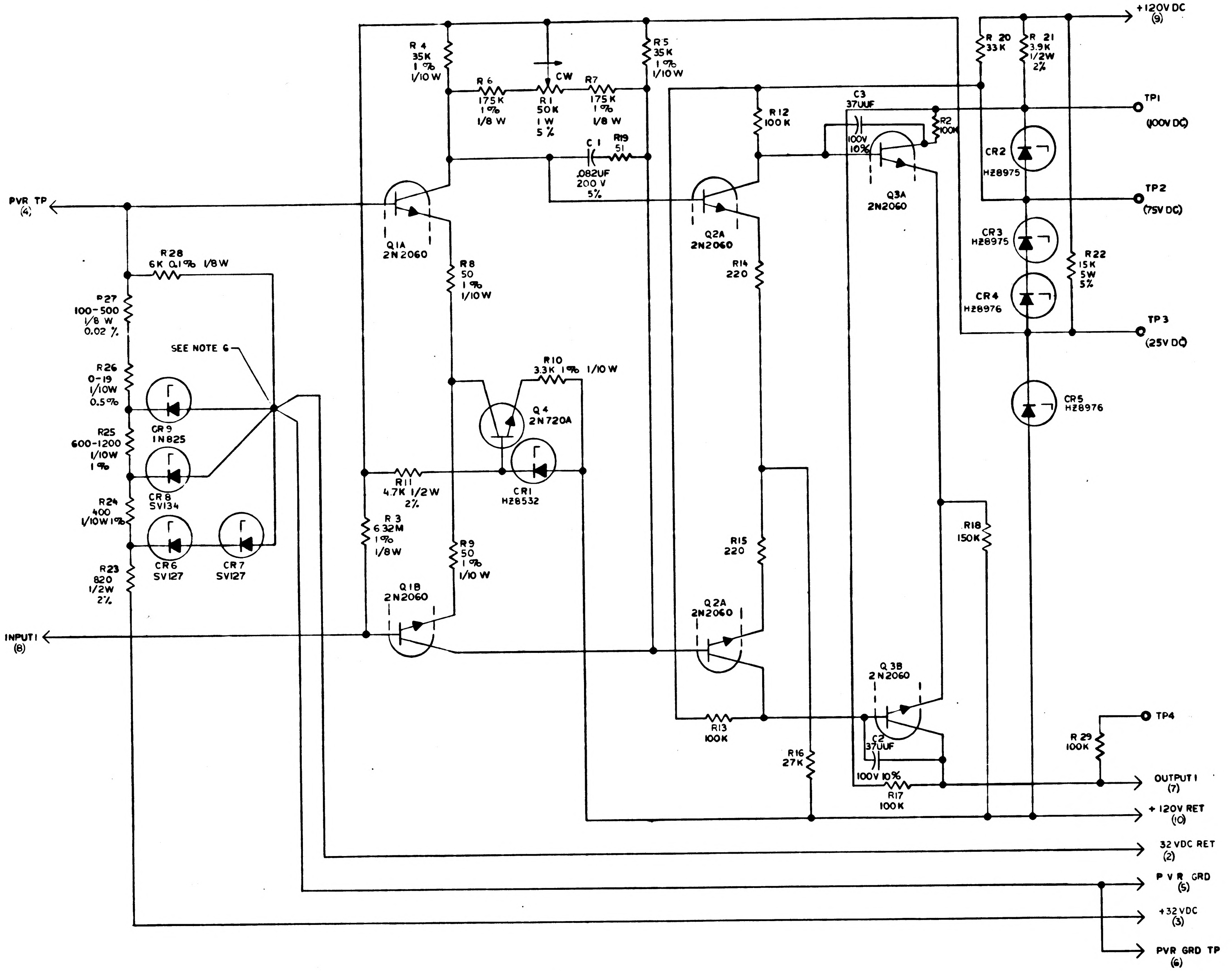
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN C. Hayward DATE 9 OCT 62
CHECKED
APPROVAL
APPROVAL 11-30-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1

REVISIONS CLASS B TDRR				
SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00364	2-6-63		WK
B	REVISED PER TDRR 01008		ST.	WK
C	REVISED PER TDRR 01313	5-20-63	RW	WK



PVR TP
(4)
INPUT 1
(8)
R4
35K
1%
1/10W
R5
35K
1%
1/10W
R6
175K
1%
1/8 W
CW
R1
50K
1 W
5%
R7
175K
1%
1/8 W
C1
R19
51
.082UF
200 V
5%
Q1A
2N2060
R8
50
1%
1/10W
R28
6K 0.1% 1/8W
R27
100-500
1/8 W
0.02 %
SEE NOTE 6
R26
0-19
1/10W
0.5%
R25
600-1200
1/10W
1%
R24
400
1/10W 1%
R23
820
1/2W
2%
CR9
1N825
CR8
SV134
CR6
SV127
CR7
SV127
R10
3.3K 1% 1/10 W
Q4
2N720A
R11
4.7K 1/2W
2%
CR1
HZ8532
R3
6.32M
1%
1/8W
R9
50
1%
1/10 W
Q1B
2N2060
R12
100K
Q2A
2N2060
R14
220
R15
220
Q2A
2N2060
R13
100K
R16
27K
C3
37UUF
100V
10%
R2
100K
Q3A
2N2060
R18
150K
Q3B
2N2060
C2
37UUF
100V 10%
R17
100K
R20
33K
R21
3.9K
1/2W
2%
CR2
HZ8975
CR3
HZ8975
CR4
HZ8976
CR5
HZ8976
R22
15K
5W
5%
R29
100K
+120V DC
(9)
TP1
(100V DC)
TP2
(75V DC)
TP3
(25V DC)
TP4
OUTPUT 1
(7)
+120V RET
(10)
32 VDC RET
(2)
P V R GRD
(5)
+32 VDC
(3)
PVR GRD TP
(6)

REF.DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR,VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR,MF	100K	2%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35 K	1%	1/10W
R5	↓ -39	↓	35 K	1%	1/10W
R6	1010364-681	MF	175 K	1%	1/8W
R7	↓ -681	↓	175 K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	↓ -36	↓	3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	↓ -80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	↓ -68		33K	↓%	↓
R21	1006760-46	↓	3.9K	2%	1/2W
R22	1010399-49	WW	15 K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22	↓	6 K	0.1%	1/8W
R29	1006750-80	↓ MF	100 K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	↓ CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	↓ -3	2N2060			
Q3	↓ -3	2N2060			
Q4	1010357	↓ 2N720A			
CR1	1010372-3	DIODE, HZ8532			
CR2	1010372-32	HZ8975			
CR3	-32	HZ8975			
CR4	-33	HZ8976			
CR5	-33	HZ8976			
CR6	1010258	IN763-3			
CR7	↓	IN763-3			
CR8	1010260	IN765-2			
CR9	1010259	↓ IN825			

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. RESISTORS R26 AND R27 TO BE CHOSEN FOR PROPER OPERATION OF DC CONSTANT CURRENT SOURCE AFTER CONSTRUCTION OF THE SUB-MODULE
4. ALL RESISTORS 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
5. PARTS LIST TO BE FOR REFERENCE ONLY
6. WIRING TO BE TO A SINGLE POINT AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 9OCT62
CHECKED
APPROVAL
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30Nov62

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

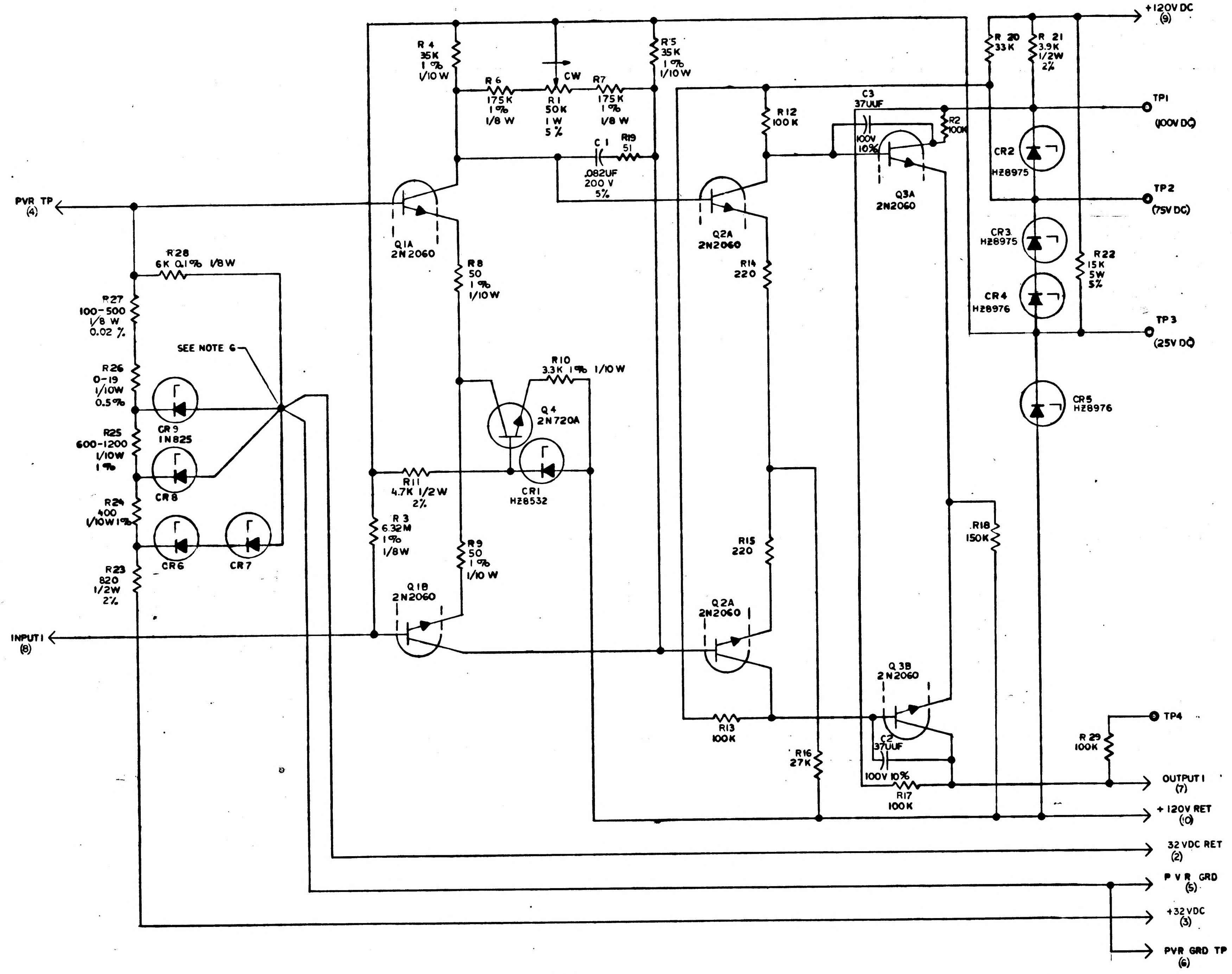
SCHEMATIC
DC DIFFERENTIAL AMPLIFIER &
PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010008
SCALE
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS CLASS B TDRR			
SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63	WK
B	REVISED PER TDRR 01008		WK
C	REVISED PER TDRR 01313	5-20-63	WK
D	REVISED PER TDRR 02342		WK

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35 K	1%	1/10W
R5	-39		35 K	1%	1/10W
R6	1010364-681	MF	175 K	1%	1/8W
R7	-681		175 K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	-36		3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33K	%	
R21	1006760-46		3.9K	2%	1/2W
R22	1010399-49	WW	15 K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22		6 K	0.1%	1/8W
R29	1006750-80	MF	100 K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357	2N720A			
CR1	1010372-3	DIODE, HZ8532			
CR2	1010372-32	HZ8975			
CR3	-32	HZ8975			
CR4	-33	HZ8976			
CR5	-33	HZ8976			
CR6	1010372-15	HZ8544			
CR7		HZ8544			
CR8	1010372-19	HZ8548			
CR9	1010259	IN825			



+120V DC (9)
TP1 (100V DC)
TP2 (75V DC)
TP3 (25V DC)
TP4
PVR TP (4)
INPUT I (8)
OUTPUT I (7)
+120V RET (0)
32 VDC RET (2)
PVR GRD (5)
+32VDC (3)
PVR GRD TP (6)
SEE NOTE 6
R1 50K 1W 5%
CW
R2 100K
R3 6.32M 1% 1/8W
R4 35K 1% 1/10W
R5 35K 1% 1/10W
R6 175K 1% 1/8W
R7 175K 1% 1/8W
R8 50 1% 1/10W
R9 50 1% 1/10W
R10 3.3K 1% 1/10W
R11 4.7K 1/2W 2%
R12 100K
R13 100K
R14 220
R15 220
R16 27K
R17 100K
R18 150K
R19 51
R20 33K
R21 3.9K 1/2W 2%
R22 15K 5W 5%
R23 820 1/2W 2%
R24 400 1/10W 1%
R25 600-1200 1/10W 1%
R26 0-19 1/10W 0.5%
R27 100-500 1/8W 0.02%
R28 6K 0.1% 1/8W
R29 100K
C1 .082UF 200V 5%
C2 37UUF 100V 10%
C3 37UUF 100V 10%
Q1A 2N2060
Q1B 2N2060
Q2A 2N2060
Q2A 2N2060
Q3A 2N2060
Q3B 2N2060
Q4 2N720A
CR1 HZ8532
CR2 HZ8975
CR3 HZ8975
CR4 HZ8976
CR5 HZ8976
CR6
CR7
CR8
CR9 1N825

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:

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MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 9OCT62
CHECKED
APPROVAL 11-21-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

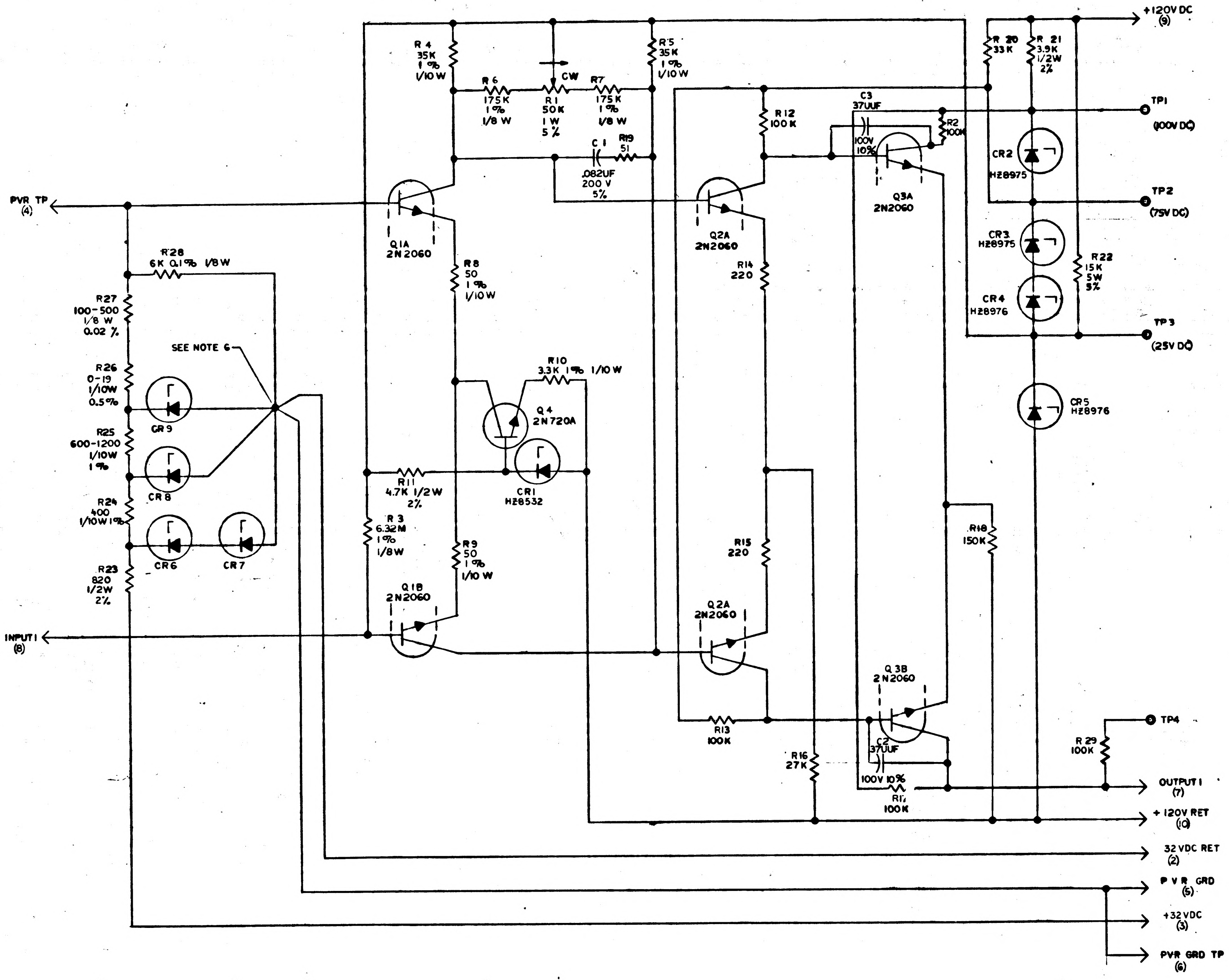
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	~~DRAWING~~ REVISED AND ~~UPGRADED~~ TO CLASS A PER TDRR 00384	2-6-63	683	WK
B	REVISED PER TDRR 01008	4-26-63	DT.	WK
C	REVISED PER TDRR 01313	5-20-63	RW	WK
D	REVISED PER TDPR 02342	8-21-63	JJ.M.	WK
E	REVISED PER TDRR 03314	7-23-63	WM	

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R 1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W.
R 3	1010374-126	CF	6.32M	1%	1/8W
R 4	1010377-39	WW	35K	1%	1/10W
R 5	-39		35 K	1%	1/10W
R 6	1010364-681	MF	175 K	1%	1/8 W
R 7	-681		175 K	1%	1/8 W
R 8	1010377-23	WW	50	1%	1/10 W
R 9	-23		50	1%	1/10 W
R10	-36		3.3K	1%	1/10 W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33 K	%	
R21	1006760-46		3.9K	2%	1/2 W
R22	1010399-49	WW	15 K	5%	5 W
R23	1006760-30	MF	820	2%	1/2 W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8 W
R28	1010254-22		6 K	0.1%	1/8 W
R29	1006750-80	MF	100 K	2%	1/4 W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357	2N720A			
CR 1	1010372-3	DIODE, HZ8532			
CR 2	1010372-32	HZ8975			
CR 3	-32	HZ8975			
CR 4	-33	HZ8976			
CR 5	-33	HZ8976			
CR 6	1010372-15	HZ8544			
CR 7		HZ8544			
CR 8	1010372-19	HZ8548			
CR 9	1008152				



R 4
35K
1%
1/10 W
R 6
175K
1%
1/8 W
CW
R 1
50K
1 W
5%
R7
175K
1%
1/8 W
R5
35K
1%
1/10W
C 1
.082UF
200 V
5%
R19
51
PVR TP
(4)
Q1A
2N2060
R28
6K 0.1% 1/8W
R27
100-500
1/8 W
0.02 %
SEE NOTE 6
R26
0-19
1/10W
0.5%
R25
600-1200
1/10W
1%
R24
400
1/10W 1%
R23
820
1/2W
2%
CR9
CR8
CR6
CR7
R8
50
1%
1/10W
R10
3.3K 1% 1/10W
Q4
2N720A
R11
4.7K 1/2W
2%
CR1
HZ8532
R 3
6.32M
1%
1/8W
R9
50
1%
1/10 W
Q1B
2N2060
INPUT I
(8)
Q2A
2N2060
R12
100K
R14
220
R15
220
Q2A
2N2060
R13
100K
R16
27K
C3
37UUF
100V
10%
R2
100K
Q3A
2N2060
Q3B
2N2060
C2
37UUF
100V 10%
R17
100K
R18
150K
R 20
33K
R 21
3.9K
1/2W
2%
CR2
HZ8975
CR3
HZ8975
CR4
HZ8976
CR5
HZ8976
R22
15K
5W
5%
+120V DC
(9)
TP1
(100V DC)
TP2
(75V DC)
TP3
(25V DC)
TP4
R 29
100K
OUTPUT I
(7)
+ 120V RET
(10)
32 VDC RET
(2)
P V R GRD
(5)
+32VDC
(3)
PVR GRD TP
(6)

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:

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MASTER

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LIST OF MATERIALS

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DWG NO.
CONTRACT
DRAWN CKaguma DATE 9OCT62
CHECKED
APPROVAL 11-29-62
APPROVAL 11-30-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30Nov62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1

1010008 F

INCHES
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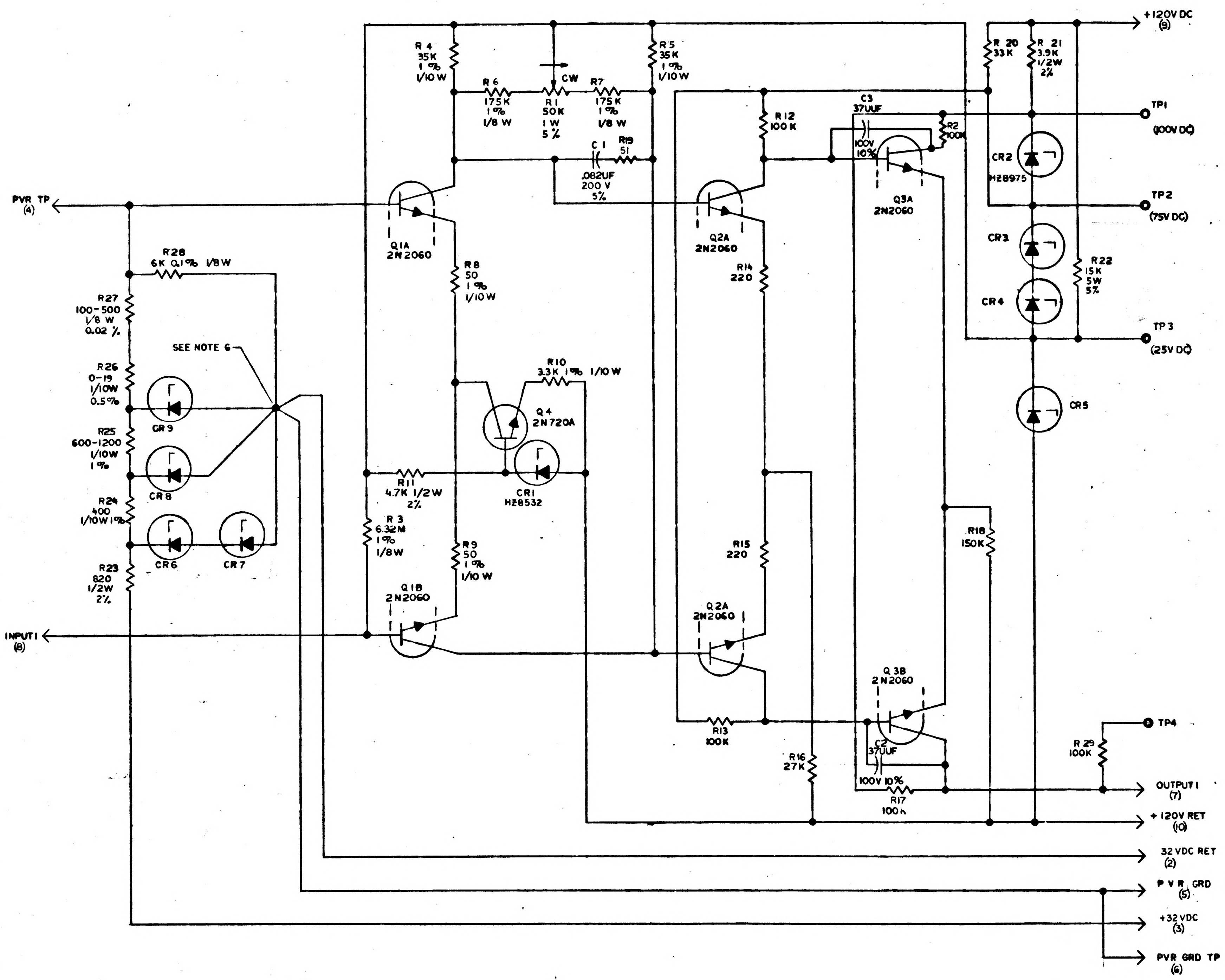
REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63	[illegible]	WK
B	REVISED PER TDRR 01008	4-26-63	[illegible]	WK
C	REVISED PER TDRR 01313	5-20-63	RW	WK
D	REVISED PER TDRR 02342	[illegible] 63	[illegible]	WK
E	REVISED PER TDRR 03314	7-24-63	[illegible]	[illegible]
F	REVISED PER TDRR 03311			WK

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R3	1010374-126	↓ CF	6.32M	1%	1/8W
R4	1010377-39	WW	35 K	1%	1/10W
R5	↓ -39	↓	35 K	1%	1/10W
R6	1010364-681	MF	175 K	1%	1/8W
R7	↓ -681	↓	175 K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	↓ -36	↓	3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	↓ -80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	↓ -68		33K	↓%	↓
R21	1006760-46	↓	3.9K	2%	1/2W
R22	1010399-49	WW	15 K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22	↓	6 K	0.1%	1/8W
R29	1006750-80	↓ MF	100 K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	↓ CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	↓ -3	2N2060			
Q4	1010357	↓ 2N720A			
CR1	1010372-3	DIODE, HZ8532			
CR2	1010372-32	HZ8975			
CR3	1010286-26				
CR4	-27				
CR5	↓ -27				
CR6	1010372-15	HZ8544			
CR7	↓	HZ8544			
CR8	1010372-19	HZ8548			
CR9	1008152	↓			


PVR TP (4)
INPUT1 (8)
R28 6K 0.1% 1/8W
R27 100-500 1/8 W 0.02 %
SEE NOTE 6
R26 0-19 1/10W 0.5%
CR9
R25 600-1200 1/10W 1%
CR8
R24 400 1/10W 1%
CR6
CR7
R23 820 1/2W 2%
R4 35K 1% 1/10 W
R6 175K 1% 1/8 W
CW
R1 50K 1 W 5 %
R7 175K 1% 1/8 W
R5 35K 1% 1/10 W
C1 .082UF 200 V 5%
R19 51
Q1A 2N2060
R8 50 1% 1/10W
R10 3.3K 1% 1/10 W
Q4 2N720A
R11 4.7K 1/2W 2%
CR1 HZ8532
R3 6.32M 1% 1/8W
R9 50 1% 1/10 W
Q1B 2N2060
R12 100K
Q2A 2N2060
R14 220
R15 220
Q2A 2N2060
R13 100K
R16 27K
C3 37UUF 100V 10%
R2 100K
Q3A 2N2060
R18 150K
Q3B 2N2060
C2 37UUF 100V 10%
R17 100K
R20 33K
R21 3.9K 1/2W 2%
CR2 HZ8975
CR3
CR4
CR5
R22 15K 5W 5%
R29 100K
+120V DC (9)
TP1 (100V DC)
TP2 (75V DC)
TP3 (25V DC)
TP4
OUTPUT1 (7)
+120V RET (10)
32 VDC RET (2)
P V R GRD (5)
+32 VDC (3)
PVR GRD TP (6)

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:

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MASTER

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CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN C. Nagurney DATE 9 OCT 62
CHECKED [illegible]
APPROVAL [illegible] 11-2[illegible]
APPROVAL [illegible] 11-30-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER &
PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010008
SCALE WT SHEET 1 OF 1

INCHES 0 1
PHOTOGRAPHIC SCALE ONLY

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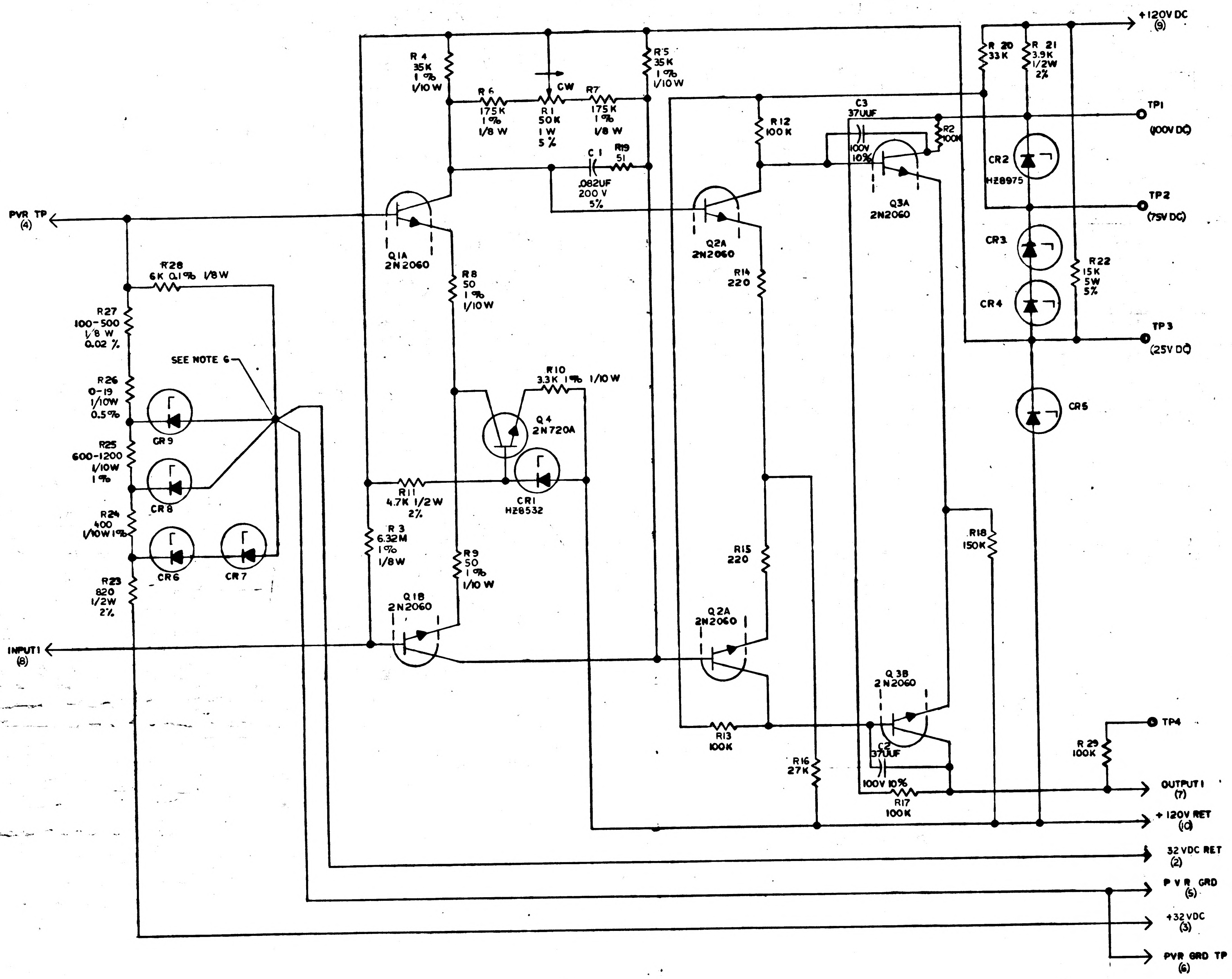
REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63	[illegible]	WK
B	REVISED PER TDRR 01008	[illegible]	[illegible]	WK
C	REVISED PER TDRR 01313	5-20-63	RW	WK
D	REVISED PER TDRR 02342	[illegible]-63	[illegible]	WK
E	REVISED PER TDRR 03314	[illegible]-63	[illegible]	[illegible]
F	REVISED PER TDRR 03311			WK
G	REVISED PER TDRR 06460	[illegible]64	[illegible]	WK

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R 1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R 3	1010374-126	CF	6.32M	1%	1/8W
R 4	1010377-39	WW	35 K	1%	1/10W
R 5	-39		35 K	1%	1/10W
R6	1010364-681	MF	175 K	1%	1/8W
R 7	-681		175 K	1%	1/8W
R 8	1010377-23	WW	50	1%	1/10W
R 9	-23		50	1%	1/10W
R10	-36		3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33K	%	
R21	1006760-46		3.9K	2%	1/2W
R22	1010399-49	WW	15 K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22		6 K	0.1%	1/8W
R29	1006750-80	MF	100 K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357-1	2N720A			
CR 1	1010372-3	DIODE, HZ8532			
CR 2	1010372-32	HZ8975			
CR 3	1010286-26				
CR 4	-27				
CR 5	-27				
CR 6	1010372-15	HZ8544			
CR 7		HZ8544			
CR 8	1010372-19	HZ8548			
CR 9	1008152				


+120V DC (9)
R 4 35K 1% 1/10W
R 5 35K 1% 1/10W
R 6 175K 1% 1/8 W
CW
R 1 50K 1 W 5%
R7 175K 1% 1/8 W
C 1 .082UF 200 V 5%
R19 51
R 20 33K
R 21 3.9K 1/2W 2%
C3 37UUF 100V 10%
R2 100K
R12 100K
TP1 (100V DC)
CR2 HZ8975
TP2 (75V DC)
CR3
CR4
R22 15K 5W 5%
TP 3 (25V DC)
CR5
PVR TP (4)
Q1A 2N2060
Q2A 2N2060
Q3A 2N2060
R28 6K 0.1% 1/8W
R8 50 1% 1/10W
R14 220
R27 100-500 1/8 W 0.02 %
SEE NOTE 6
R26 0-19 1/10W 0.5%
CR9
R10 3.3K 1% 1/10W
Q4 2N720A
R25 600-1200 1/10W 1%
CR8
R11 4.7K 1/2W 2%
CR1 HZ8532
R24 400 1/10W 1%
CR6
CR7
R 3 6.32M 1% 1/8W
R9 50 1% 1/10 W
R15 220
R18 150K
R23 820 1/2W 2%
Q1B 2N2060
Q2A 2N2060
INPUT1 (8)
Q 3B 2N2060
TP4
R13 100K
C2 37UUF 100V 10%
R 29 100K
R16 27K
R17 100K
OUTPUT1 (7)
+ 120V RET (10)
32 VDC RET (2)
P V R GRD (5)
+32 VDC (3)
PVR GRD TP (6)

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. RESISTORS R26 AND R27 TO BE CHOSEN FOR PROPER OPERATION OF DC CONSTANT CURRENT SOURCE AFTER CONSTRUCTION OF THE SUB-MODULE
4. ALL RESISTORS 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
5. PARTS LIST TO BE FOR REFERENCE ONLY
6. WIRING TO BE TO A SINGLE POINT AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN C. Hayward DATE 9 OCT 62
CHECKED [illegible]
APPROVAL [illegible] 11-28-62
APPROVAL [illegible] 11-30-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

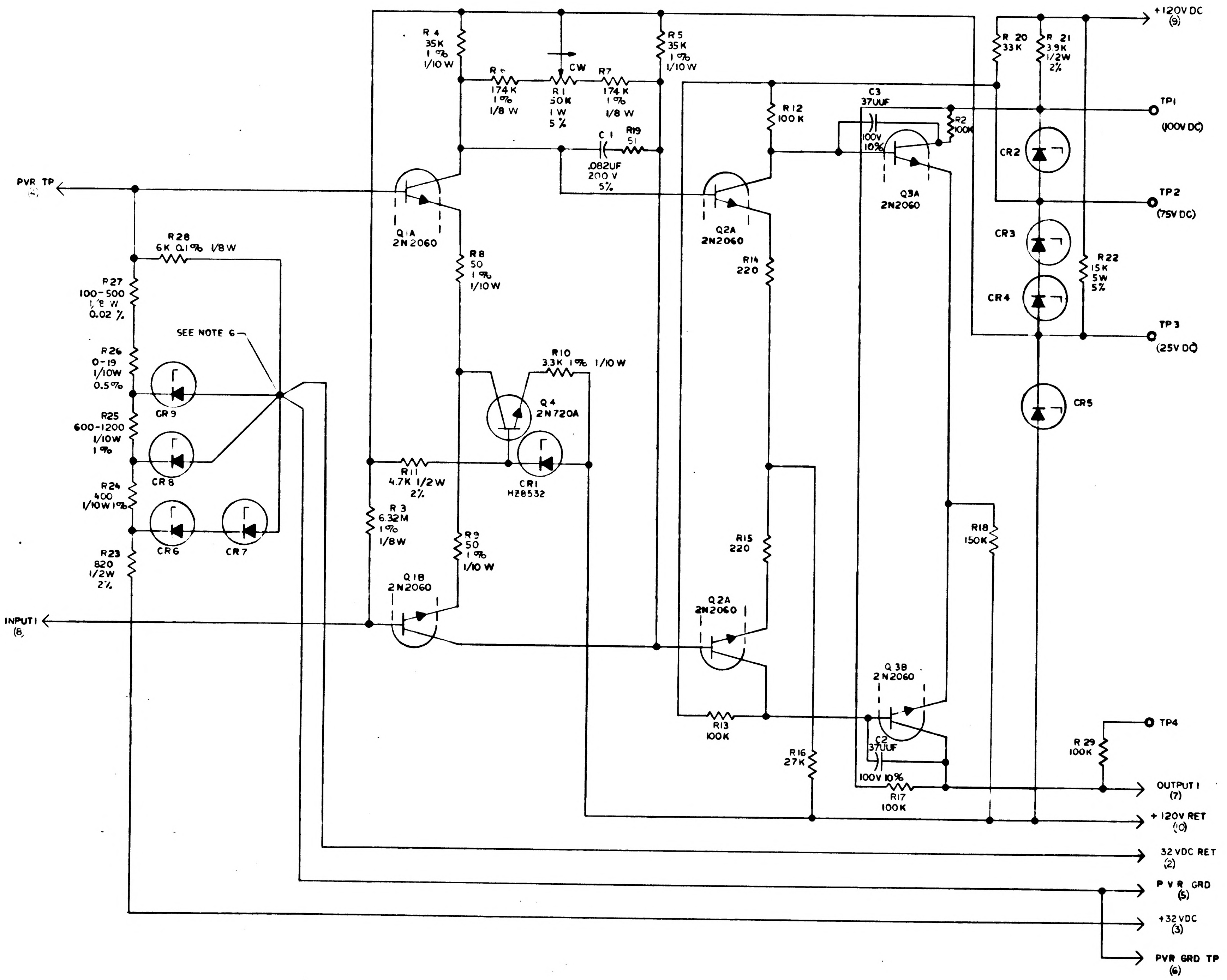
SCHEMATIC
DC DIFFERENTIAL AMPLIFIER &
PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010008
SCALE | WT | SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR			
SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00364	2-6-63	WK
B	REVISED PER TDRR 01008		D.T. WK
C	REVISED PER TDRR 01313	5-20-63	WK
D	REVISED PER TDRR 02342		WK
E	REVISED PER TDRR 03314		
F	REVISED PER TDRR 03311		WK
G	REVISED PER TDRR 06460		WK
H	REVISED PER TDRR 08071	11 MAY 64	



+120V DC (9)
TP1 (100V DC)
TP2 (75V DC)
TP3 (25V DC)
TP4
PVR TP (4)
INPUT1 (8)
OUTPUT1 (7)
+120V RET (10)
32 VDC RET (2)
PVR GRD (5)
+32VDC (3)
PVR GRD TP (6)
R4 35K 1% 1/10W
R5 35K 1% 1/10W
R6 174K 1% 1/8 W
R1 50K 1W 5%
CW
R7 174K 1% 1/8 W
C1 .082UF 200 V 5%
R19 51
Q1A 2N2060
Q1B 2N2060
R8 50 1% 1/10W
R9 50 1% 1/10 W
R10 3.3K 1% 1/10 W
Q4 2N720A
CR1 HZ8532
R11 4.7K 1/2W 2%
R3 6.32M 1% 1/8W
R28 6K 0.1% 1/8W
R27 100-500 1/8 W 0.02 %
SEE NOTE 6
R26 0-19 1/10W 0.5%
CR9
R25 600-1200 1/10W 1%
CR8
R24 400 1/10W 1%
CR6
CR7
R23 820 1/2W 2%
R12 100K
Q2A 2N2060
R14 220
R15 220
Q2A 2N2060
R13 100K
R16 27K
C3 37UUF 100V 10%
R2 100K
Q3A 2N2060
Q3B 2N2060
C2 37UUF 100V 10%
R17 100K
R18 150K
R20 33K
R21 3.9K 1/2W 2%
CR2
CR3
CR4
CR5
R22 15K 5W 5%
R29 100K

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35K	1%	1/10W
R5	-39		35K	1%	1/10W
R6	1010364-681	MF	174K	1%	1/8W
R7	-681		174K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	-36		3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33K	%	
R21	1006760-46		3.9K	2%	1/2W
R22	1010399-49	WW	15K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		1-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22		6K	0.1%	1/8W
R29	1006750-80	MF	100K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357-1	2N720A			
CR1	1010372-3	DIODE, HZ8532			
CR2	1010286-27				
CR3	1010286-26				
CR4	-27				
CR5	-26				
CR6	1010372-15	HZ8544			
CR7		HZ8544			
CR8	1010372-19	HZ8548			
CR9	1008152				

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:

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6. WIRING TO BE TO A SINGLE POINT AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 9 OCT 62
CHECKED
APPROVAL 11-20-62
APPROVAL 11-20-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER &
PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1

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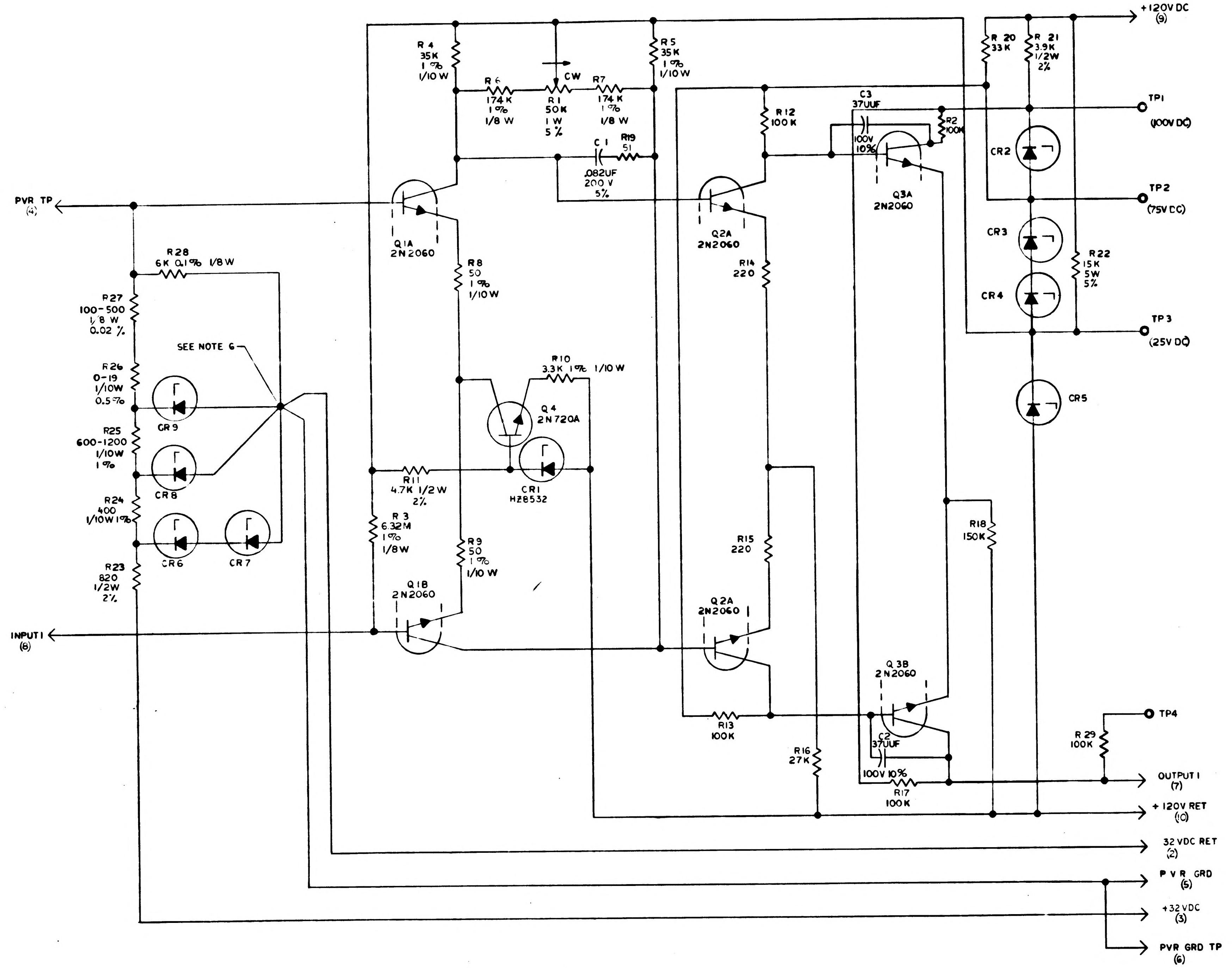
REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63	WK
B	REVISED PER TDRR 01008	4-25-63	ST. WK
C	REVISED PER TDRR 01313	5-20-63	RW WK
D	REVISED PER TDRR 02342	7-31-63	JJM WK
E	REVISED PER TDRR 03314	7-24-63	WM
F	REVISED PER TDRR 03311		WK
G	REVISED PER TDRR 06460	[illegible] 64	WK
H	REVISED PER TDRR 08071	11 MAY 64	[illegible]
J	REVISED PER TDRR 10910	21 JUL 64	[illegible]

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35K	1%	1/10W
R5	-39		35K	1%	1/10W
R6	1010364-681	MF	174K	1%	1/8W
R7	-681		174K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	-36		3.3K	1%	1/10W
R11	1006760-48	MF	4.7K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33K	%	
R21	1006760-46		3.9K	2%	1/2W
R22	1010399-49	WW	15K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		0-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22		6K	0.1%	1/8W
R29	1006750-80	MF	100K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357-1	2N720A			
CR1	1010372-3	DIODE, HZ8532			
CR2	1010286-27				
CR3	1010286 26				
CR4	-27				
CR5	-26				
CR6	1010372-15	HZ8544			
CR7		HZ8544			
CR8	1010372-19	HZ8548			
CR9	1008152				


R4 35K 1% 1/10W
R6 174K 1% 1/8W
CW
R1 50K 1W 5%
R7 174K 1% 1/8W
R5 35K 1% 1/10W
C1 .082UF 200V 5%
R19 51
PVR TP (4)
Q1A 2N2060
R28 6K 0.1% 1/8W
R8 50 1% 1/10W
R27 100-500 1/8W 0.02%
SEE NOTE 6
R26 0-19 1/10W 0.5%
CR9
R10 3.3K 1% 1/10W
Q4 2N720A
R25 600-1200 1/10W 1%
CR8
R11 4.7K 1/2W 2%
CR1 HZ8532
R24 400 1/10W 1%
CR6
CR7
R3 6.32M 1% 1/8W
R9 50 1% 1/10W
R23 820 1/2W 2%
Q1B 2N2060
INPUT1 (8)
Q2A 2N2060
R12 100K
C3 37UUF 100V 10%
R2 100K
Q3A 2N2060
R14 220
R15 220
R13 100K
Q3B 2N2060
C2 37UUF 100V 10%
R16 27K
R17 100K
R18 150K
+120V DC (9)
R20 33K
R21 3.9K 1/2W 2%
TP1 (100V DC)
CR2
TP2 (75V DC)
CR3
CR4
R22 15K 5W 5%
TP3 (25V DC)
CR5
TP4
R29 100K
OUTPUT1 (7)
+120V RET (10)
32VDC RET (2)
PVR GRD (5)
+32VDC (3)
PVR GRD TP (6)

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:

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3. RESISTORS R26 AND R27 TO BE CHOSEN FOR PROPER OPERATION OF DC CONSTANT CURRENT SOURCE AFTER CONSTRUCTION OF THE SUB-MODULE
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QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

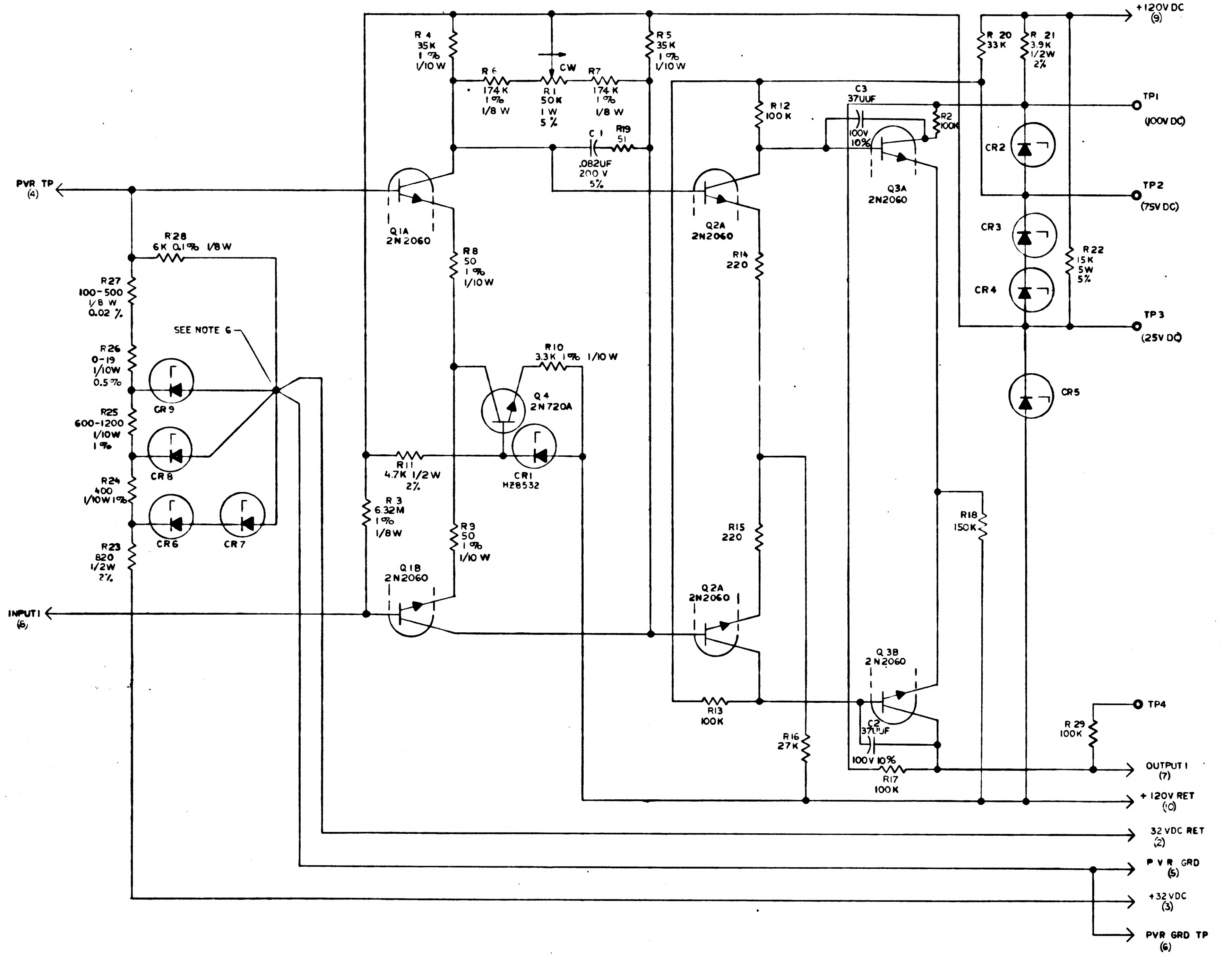
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN C Hagemann DATE 9 OCT 62
CHECKED [illegible]
APPROVAL [illegible] 11-28-62
APPROVAL D.A. [illegible] 11-29-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1


R 4
35K
1 %
1/10 W
R 6
174 K
1 %
1/8 W
CW
R 1
50K
1 W
5 %
R7
174 K
1 %
1/8 W
R 5
35 K
1 %
1/10 W
C 1
R19
51
.082UF
200 V
5%
PVR TP
(4)
Q1A
2N2060
R 8
50
1 %
1/10 W
R28
6K 0.1% 1/8W
R27
100-500
1/8 W
0.02 %
SEE NOTE 6
R26
0-19
1/10W
0.5%
CR 9
R25
600-1200
1/10W
1 %
CR 8
R24
400
1/10W 1%
CR6
CR7
R23
820
1/2W
2%
R10
3.3K 1% 1/10 W
Q 4
2N720A
R11
4.7K 1/2W
2%
CR1
HZ8532
R 3
6.32M
1%
1/8W
R9
50
1 %
1/10 W
Q1B
2N2060
INPUT1
(6)
R 12
100 K
C3
37UUF
100V
10%
R2
100K
Q3A
2N2060
Q2A
2N2060
R14
220
R15
220
Q 2A
2N2060
R13
100K
R16
27K
Q 3B
2 N2060
C2
37UUF
100V 10%
R17
100K
R18
150K
R 20
33K
R 21
3.9K
1/2W
2%
+120V DC
(9)
TP1
(100V DC)
CR2
TP2
(75V DC)
CR3
CR4
R22
15K
5W
5%
TP3
(25V DC)
CR5
TP4
R 29
100K
OUTPUT1
(7)
+ 120V RET
(10)
32 VDC RET
(2)
P V R GRD
(5)
+32 VDC
(3)
PVR GRD TP
(6)

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R 1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R 3	1010374-126	CF	6.32M	1 %	1/8 W
R 4	1010377-39	WW	35 K	1 %	1/10 W
R 5	↓ -39	↓	35 K	1 %	1/10 W
R6	1010364-681	MF	174 K	1 %	1/8 W
R 7	↓ -681	↓	174 K	1 %	1/8 W
R 8	1010377-23	WW	50	1 %	1/10 W
R 9	-23		50	1 %	1/10 W
R10	↓ -36	↓	3.3K	1 %	1/10 W
R11	1006760-48	MF	4.7K	2 %	1/2W
R12	1006750-80		100K	2 %	1/4W
R13	↓ -80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	↓ -68		33K	↓%	↓
R21	1006760-46	↓	3.9K	2%	1/2W
R22	1010399-49	WW	15 K	5%	5W
R23	1006760-30	MF	820	2%	1/2W
R24	1010377-25	WW	400	1 %	1/10W
R25	1010377 (NE)		600-1200	1 %	1/10W
R26	1010377 (NE)		0-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8 W
R28	1010254-22	↓	6 K	0.1 %	1/8 W
R29	1006750-80	↓ MF	100 K	2 %	1/4 W
C1	1010264-24	CAP, MYLAR	.082UF	5 %	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	↓ CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	↓ -3	2N2060			
Q4	1010357-1	↓ 2N720A			
CR 1	1010372-3	DIODE, HZ8532			
CR 2	1010830-27				
CR 3	-26				
CR 4	-27				
CR 5	1010830-26				
CR 6	1010372-15	HZ8544			
CR 7	↓	HZ8544			
CR 8	1010372-19	HZ8548			
CR 9	1008152	↓			

REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63		WK
B	REVISED PER TDRR 01008	4-25-63	DT.	WK
C	REVISED PER TDRR 01313	5-20-63	RW	WK
D	REVISED PER TDPR 02342	7-31-63	JJM	WK
E	REVISED PER TDRR 03314	9-24-63	WM	WK
F	REVISED PER TDRR 03311			WK
G	REVISED PER TDRR 06460	[illegible] 64		WK
H	REVISED PER TDRR 08071	11 MAY 64		
J	REVISED PER TDRR 1091C	[illegible]		
K	REVISED PER TDRR 18124	12 APR 65	NTO	EF

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. RESISTORS R26 AND R27 TO BE CHOSEN FOR PROPER OPERATION OF DC CONSTANT CURRENT SOURCE AFTER CONSTRUCTION OF THE SUB-MODULE
4. ALL RESISTORS 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
5. PARTS LIST TO BE FOR REFERENCE ONLY
6. WIRING TO BE TO A SINGLE POINT AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

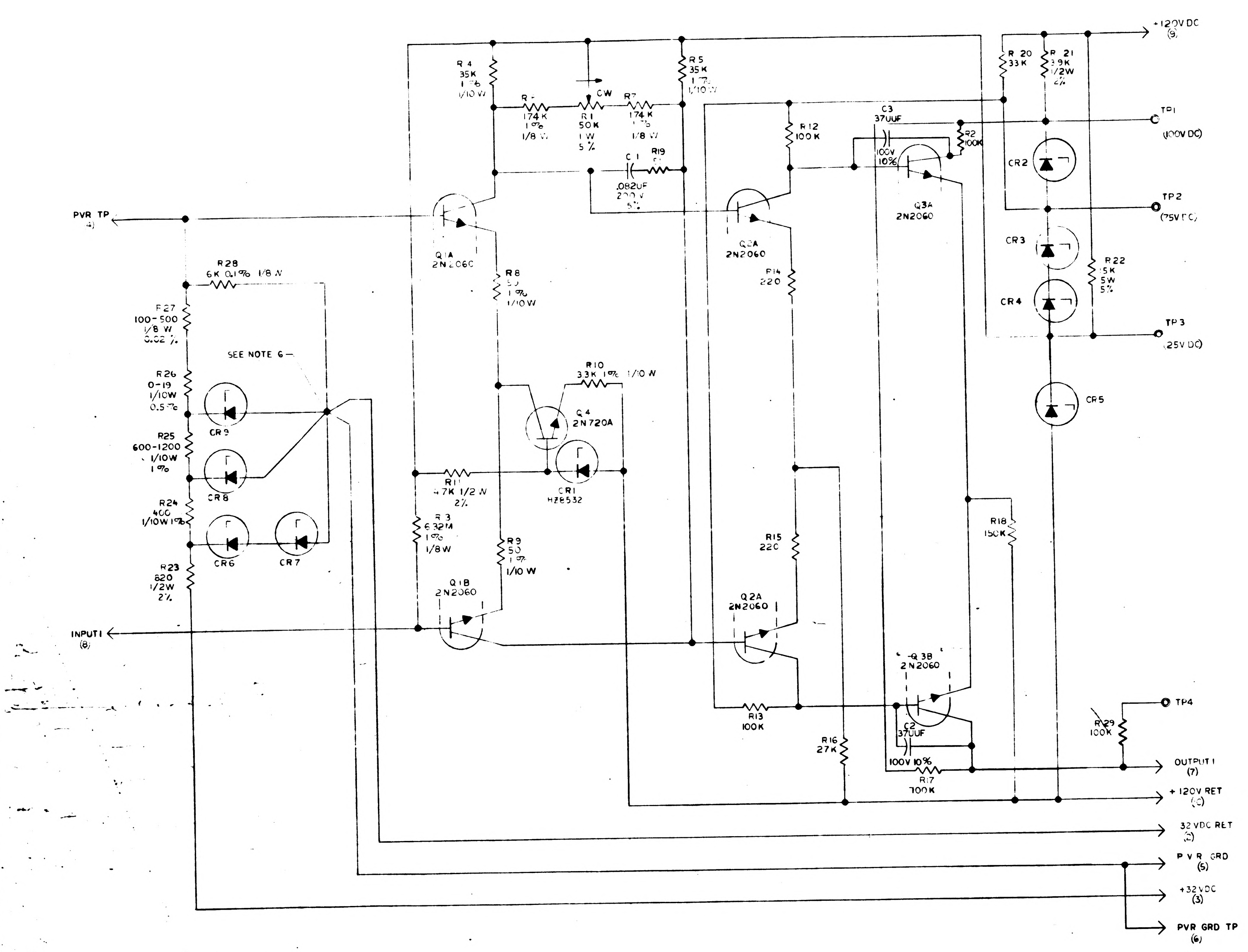
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN C. Maguire DATE 9 OCT 62
CHECKED
APPROVAL 11-20-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER &
PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1


+120VDC (9)
TP1 (100V DC)
TP2 (75V DC)
TP3 (25V DC)
TP4
R4 35K 1% 1/10W
R5 35K 1% 1/10W
R6 174K 1% 1/8W
R1 50K 1W 5%
CW
R7 174K 1% 1/8W
C1 .082UF 200V 5%
R19 51
R12 100K
C3 37UUF 100V 10%
R2 100K
R20 33K
R21 3.9K 1/2W 2%
CR2
CR3
CR4
CR5
R22 15K 5W 5%
PVR TP (4)
Q1A 2N2060
Q2A 2N2060
Q3A 2N2060
R8 50 1% 1/10W
R14 220
R28 6K 0.1% 1/8W
R27 100-500 1/8W 0.02%
SEE NOTE 6
R26 0-19 1/10W 0.5%
R25 600-1200 1/10W 1%
R24 400 1/10W 1%
R23 820 1/2W 2%
CR9
CR8
CR6
CR7
R10 33K 1% 1/10W
Q4 2N720A
R11 47K 1/2W 2%
CR1 HZ8532
R3 6.32M 1/8W
R9 50 1% 1/10W
Q1B 2N2060
R15 220
Q2A 2N2060
R18 150K
INPUT1 (8)
Q3B 2N2060
R13 100K
C2 37UUF 100V 10%
R17 100K
R16 27K
R29 100K
OUTPUT1 (7)
+120V RET (2)
32VDC RET (1)
PVR GRD (5)
+32VDC (3)
PVR GRD TP (6)

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR,VAR.	50K	5%	1W
R2	1006750-80	RESISTOR,MF	100K	2%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35K	1%	1/10W
R5	-39		35K	1%	1/10W
R6	1010364-681	MF	174K	1%	1/8W
R7	-681		174K	1%	1/8W
R8	1010377-23	WW	50	1%	1/10W
R9	-23		50	1%	1/10W
R10	-36		3.3K	1%	1/10W
R11	1006760-48	MF	47K	2%	1/2W
R12	1006750-80		100K	2%	1/4W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33K	%	
R21	1006760-46		3.9K	2%	1/2W
R22	1010399-49	WW	15K	5%	5W
R23	1006760-30	MF	820	[illegible]	1/2W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		0-19	0.5%	1/10W
R27	1010254-(NE)		100-500	0.02%	1/8W
R28	1010254-22		6K	0.1%	1/8W
R29	1006750-80	MF	100K	2%	1/4W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357-1	2N720A			
CR1	1010372-3	DIODE, HZ8532			
CR2	-32				
CR3	1010286-26				
CR4	-27				
CR5	-27				
CR6	1010372-15	HZ8544			
CR7		HZ8544			
CR8	1010372-19	HZ8548			
CR9	1008152				

REVISIONS CLASS B TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63		WK
B	REVISED PER TDRR 01008	4-25-63	DT.	WK
C	REVISED PER TDRR 01313	5-20-63		WK
D	REVISED PER TDRR 02342	7-31-63		WK
E	REVISED PER TDRR 03314			
F	REVISED PER TDRR 03311			WK
G	REVISED PER TDRR 06460			
H	REVISED PER TDRR 08071	11 MAY 64		
J	REVISED PER TDRR 10910	21 DEC 64		
K	REVISED PER TDRR 18124	12 APR 65	NTO	EF
L	REVISED PER TDRR 21491	13 AUG 65	DKD	

NOTES:

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QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

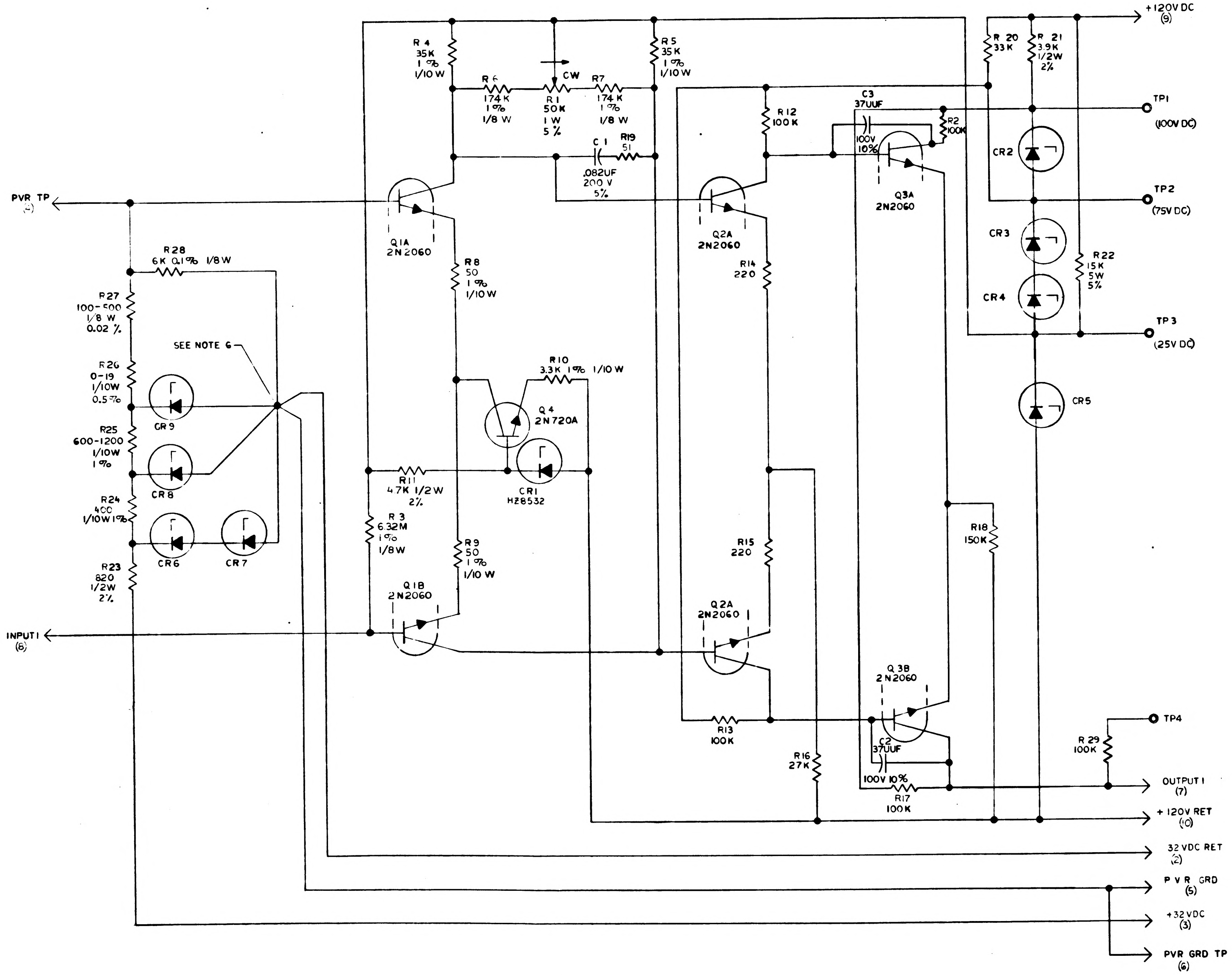
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 9 OCT 62
CHECKED
APPROVAL 11-29-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO | SIZE E | NASA DRAWING NO 1010008
SCALE | WT | SHEET 1 OF 1

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO


+120V DC (9)
R 4 35K 1% 1/10W
R5 35K 1% 1/10W
R6 174K 1% 1/8 W
CW
R1 50K 1W 5%
R7 174K 1% 1/8 W
C1 .082UF 200 V 5%
R19 51
R 20 33K
R 21 3.9K 1/2W 2%
TP1 (100V DC)
TP2 (75V DC)
TP3 (25V DC)
TP4
C3 37UUF 100V 10%
R2 100K
R12 100K
Q3A 2N2060
CR2
CR3
CR4
CR5
R22 15K 5W 5%
PVR TP (4)
Q1A 2N2060
Q2A 2N2060
R8 50 1% 1/10W
R14 220
R28 6K 0.1% 1/8W
R27 100-500 1/8 W 0.02%
SEE NOTE 6
R26 0-19 1/10W 0.5%
CR9
R25 600-1200 1/10W 1%
CR8
R24 400 1/10W 1%
CR6
CR7
R23 820 1/2W 2%
R10 3.3K 1% 1/10 W
Q4 2N720A
CR1 HZ8532
R11 4.7K 1/2W 2%
R3 6.32M 1% 1/8W
R9 50 1% 1/10 W
Q1B 2N2060
R15 220
Q2A 2N2060
R18 150K
INPUT1 (8)
Q3B 2N2060
R13 100K
C2 37UUF 100V 10%
R17 100K
R16 27K
R 29 100K
OUTPUT1 (7)
+120V RET (10)
32 VDC RET (2)
P V R GRD (5)
+32 VDC (3)
PVR GRD TP (6)

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R 1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R 3	1010374-126	CF	6.32M	1%	1/8 W
R 4	1010377-39	WW	35 K	1%	1/10 W
R 5	-39		35 K	1%	1/10 W
R 6	1010364-681	MF	174 K	1%	1/8 W
R 7	-681		174 K	1%	1/8 W
R 8	1010377-23	WW	50	1%	1/10 W
R 9	-23		50	1%	1/10 W
R10	-36		3.3K	1%	1/10 W
R11	1006760-48	MF	4.7K	2%	1/2 W
R12	1006750-80		100K	2%	1/4 W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33K	%	
R21	1006760-46		3.9K	2%	1/2 W
R22	1010399-49	WW	15 K	5%	5 W
R23	1006760-30	MF	820	2%	1/2 W
R24	1010377-25	WW	400	1%	1/10W
R25	1010377 (NE)		600-1200	1%	1/10W
R26	1010377 (NE)		0-19	0.5%	1/10W
R27	1010836-(NE)		100-500	0.02%	1/8 W
R28	1010836-22		6 K	0.1%	1/8 W
R29	1006750-80	MF	100 K	2%	1/4 W
C 1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010376-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357-1	2N720A			
CR 1	1010372-3	DIODE, HZ8532			
CR 2	1010830-27				
CR 3	-26				
CR 4	-27				
CR 5	1010830-26				
CR 6	1010372-15	HZ8544			
CR 7		HZ8544			
CR 8	1010372-19	HZ8548			
CR 9	1008152				

REVISIONS CLASS [illegible] TDRR

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00384	2-6-63	[illegible]	WK
B	REVISED PER TDRR 01008	4-25-63	DT.	WK
C	REVISED PER TDRR 01313	5-20-63	RW	WK
D	REVISED PER TDRR 02342	7-31-63	[illegible]	WK
E	REVISED PER TDRR 03314	[illegible]	[illegible]	[illegible]
F	REVISED PER TDRR 03311			WK
G	REVISED PER TDRR 06460	[illegible] 64	[illegible]	WK
H	REVISED PER TDRR 08071	MAY 64	[illegible]	J.E.G.
J	REVISED PER TDRR 109[illegible]	[illegible] 64	[illegible]	[illegible]
K	REVISED PER TDRR 1812	12 APR 65	NTO	[illegible]
L	REVISED PER TDRR 21491	[illegible] AUG 65	CKP	[illegible]
M	REVISED PER TDRR 21490	[illegible] AUG 65	LK	[illegible]

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

NOTES:
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QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

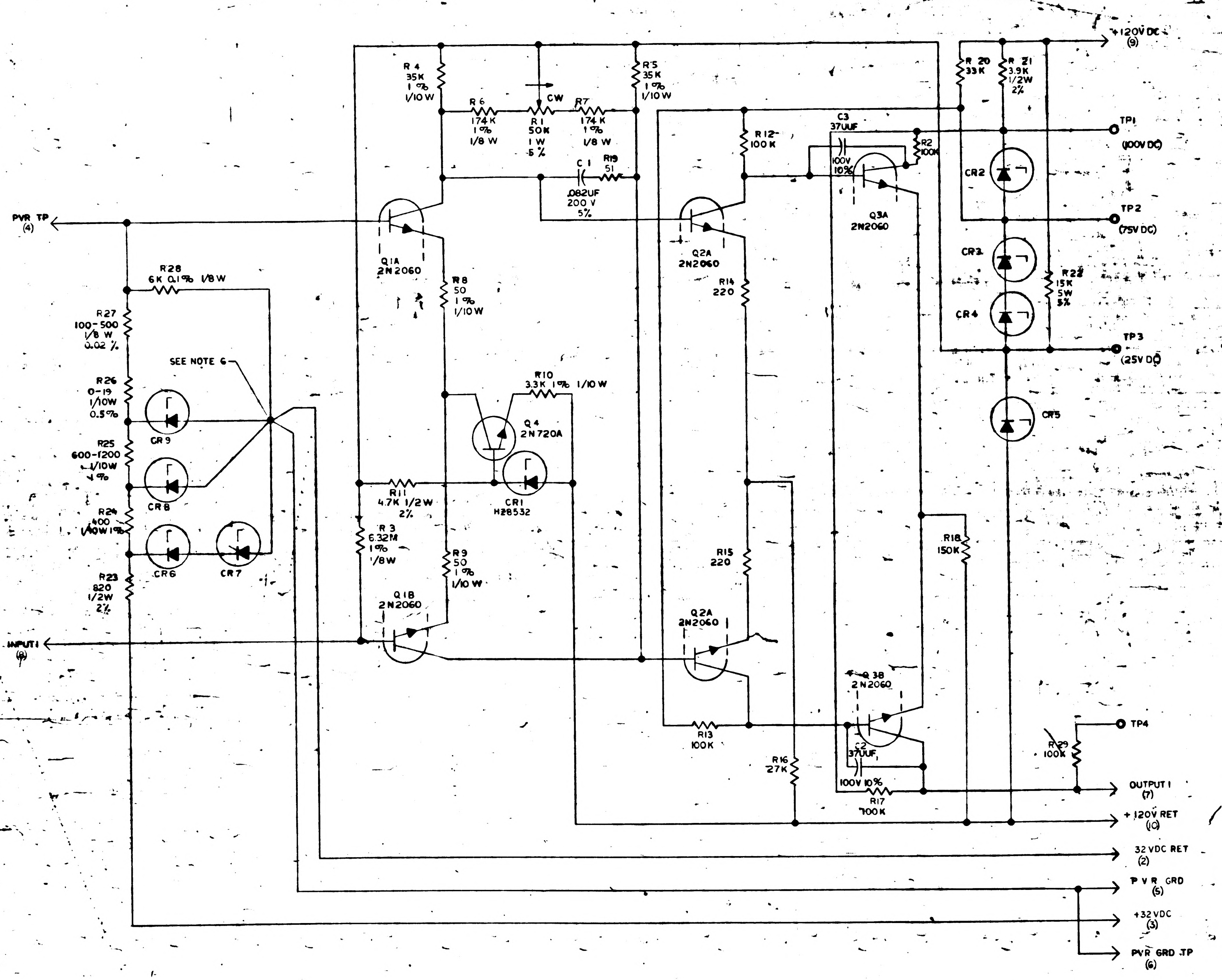
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN C. Magurno DATE 9 OCT 62
CHECKED [illegible]
APPROVAL [illegible] 11-28-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER &
PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010008
SCALE
WT
SHEET 1 OF 1


+120V DC (9)
TP1 (100V DC)
TP2 (75V DC)
TP3 (25V DC)
TP4
PVR TP (4)
INPUT1 (8)
OUTPUT1 (7)
+120V RET (10)
32 VDC RET (2)
PVR GRD (5)
+32 VDC (3)
PVR GRD TP (6)
R4 35K 1% 1/10W
R5 35K 1% 1/10W
R6 174K 1% 1/8W
R1 50K 1W 5%
CW
R7 174K 1% 1/8W
C1 .082UF 200V 5%
R19 51
Q1A 2N2060
Q1B 2N2060
Q2A 2N2060
Q3A 2N2060
Q3B 2N2060
R8 50 1% 1/10W
R9 50 1% 1/10W
R10 3.3K 1% 1/10W
Q4 2N720A
CR1 HZ8532
R11 4.7K 1/2W 2%
R3 6.32M 1% 1/8W
R28 6K 0.1% 1/8W
R27 100-500 1/8W 0.02%
SEE NOTE 6
R26 0-19 1/10W 0.5%
R25 600-1200 1/10W 1%
R24 400 1/10W 1%
R23 820 1/2W 2%
CR9
CR8
CR6
CR7
R12 100K
R14 220
R15 220
R13 100K
R16 27K
C3 37UUF 100V 10%
C2 37UUF 100V 10%
R2 100K
R17 100K
R18 150K
R20 33K
R21 3.9K 1/2W 2%
R22 15K 5W 5%
R29 100K
CR2
CR3
CR4
CR5

REF DWG: D.C. DIFF AMP ASSEMBLY 1007007

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010373-12	RESISTOR, VAR.	50 K	5%	1W
R2	1006750-80	RESISTOR, MF	100K	2%	1/4W
R3	1010374-126	CF	6.32M	1%	1/8W
R4	1010377-39	WW	35 K	1%	1/10 W
R5	-39		35 K	1%	1/10 W
R6	1010364-681	MF	174 K	1%	1/8 W
R7	-681		174 K	1%	1/8 W
R8	1010377-23	WW	50	1%	1/10 W
R9	-23		50	1%	1/10 W
R10	-36		3.3K	1%	1/10 W
R11	1006760-48	MF	4.7K	2%	1/2 W
R12	1006750-80		100K	2%	1/4 W
R13	-80		100K	%	
R14	1006750-16		220	%	
R15	-16		220	%	
R16	-66		27K	%	
R17	-80		100K	%	
R18	-84		150K	%	
R19	-1		51	%	
R20	-68		33K	%	
R21	1006760-46		3.9K	2%	1/2 W
R22	1010399-49	WW	15 K	5%	5 W
R23	1006760-30	MF	820	2%	1/2 W
R24	1010377-25	WW	400	1%	1/10 W
R25	1010377 (NE)		600-1200	1%	1/10 W
R26	1010377 (NE)		0-19	0.5%	1/10 W
R27	1010836-(NE)		100-500	0.02%	1/8 W
R28	1010836-22		6 K	0.1%	1/8 W
R29	1006750-80	MF	100 K	2%	1/4 W
C1	1010264-24	CAP, MYLAR	.082UF	5%	200V
C2	1006777-6	CER	37UUF	10%	100V
C3	1006777-6	CER	37UUF	10%	100V
Q1	1010378-3	TRTR 2N2060			
Q2	-3	2N2060			
Q3	-3	2N2060			
Q4	1010357-1	2N720A			
CR 1	1010372-3	DIODE, HZ8532			
CR 2	1008815-26	.4M24Z2			
CR 3	-26	.4M24Z2			
CR 4	-27	.4M26Z2			
CR 5	1010830-27	.4M26Z2			
CR 6	1010372-15	HZ8544			
CR 7		HZ8544			
CR 8	1010372-19	HZ8548			
CR 9	1008152				

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPDATED TO [illegible]	[illegible]	[illegible]
B	REVISED PER TDRR 01[illegible]	[illegible]	[illegible]
C	REVISED PER TDRR 02[illegible]	5-20-63	[illegible]
D	REVISED PER TDRR 025[illegible]	[illegible]	[illegible]
E	REVISED PER TDRR 033[illegible]	[illegible]	[illegible]
F	REVISED PER TDRR 03311		[illegible]
G	REVISED PER TDRR 06460	[illegible] 64	[illegible]
H	REVISED PER TDRR 08071	[illegible]	[illegible]
J	REVISED PER TDRR 10910	[illegible] JUL 64	JW
K	REVISED PER TDRR 18128	APR 65	HTO
L	REVISED PER TDRR 21[illegible]	13 AUG	[illegible]
M	REVISED PER TDRR 21490	[illegible] 65	[illegible]
N	REVISED PER TDRR 29747	[illegible]	[illegible]

NOTES:

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QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN C[illegible] DATE 2 OCT 62
CHECKED [illegible]
APPROVAL [illegible] 11-2-62
APPROVAL [illegible]
NASA APPROVAL [illegible] 11-2-62
MIT APPROVAL [illegible] 30 Nov 62

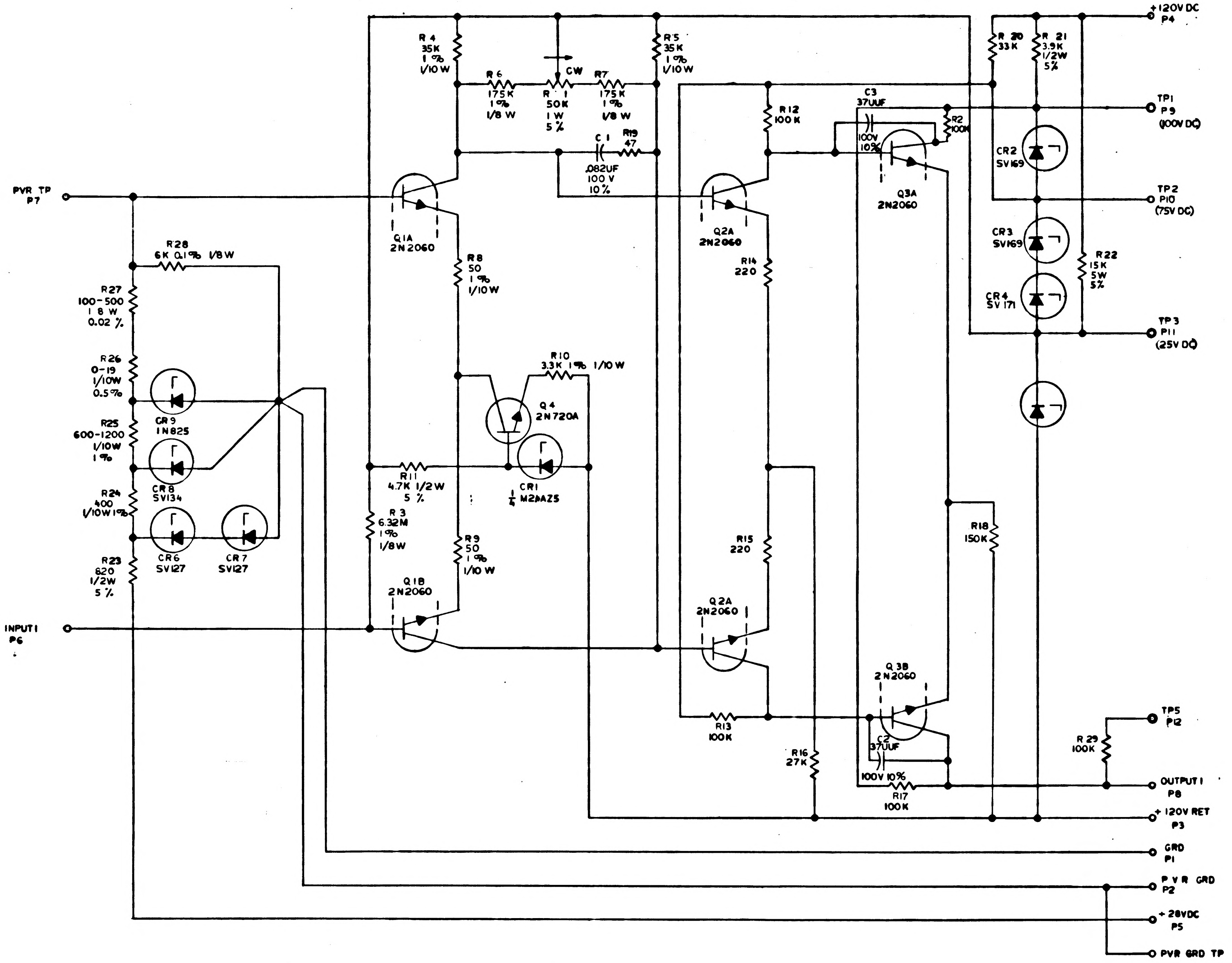
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC. DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE (OF DC CONSTANT CURRENT SOURCE)

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010008
SCALE | WT | SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


+120V DC
P4
R 4
35K
1 %
1/10 W
R 5
35 K
1 %
1/10 W
R 6
175 K
1 %
1/8 W
CW
R 1
50K
1 W
5 %
R7
175 K
1 %
1/8 W
C 1
.082UF
100 V
10 %
R19
47
R 20
33 K
R 21
3.9K
1/2W
5%
R 12
100 K
C3
37UUF
100V
10%
R2
100K
Q3A
2N2060
TP1
P9
(100V DC)
CR2
SV169
TP2
P10
(75V DC)
CR3
SV169
CR4
SV 171
R 22
15 K
5W
5%
TP 3
P11
(25V DC)
PVR TP
P7
Q1A
2N2060
Q2A
2N2060
R28
6K 0.1% 1/8W
R8
50
1 %
1/10W
R14
220
R27
100-500
1 8 W
0.02 %
R10
3.3K 1% 1/10 W
R26
0-19
1/10W
0.5%
Q 4
2N720A
CR 9
1N825
R25
600-1200
1/10W
1%
R11
4.7K 1/2W
5 %
CR1
1/4 M2AAZ5
CR 8
SV134
R24
400
1/10W 1%
R 3
6.32M
1%
1/8W
R9
50
1 %
1/10 W
R15
220
R18
150K
CR6
SV127
CR 7
SV127
R23
820
1/2W
5 %
Q1B
2N2060
Q2A
2N2060
INPUT 1
P6
Q 3B
2 N2060
TP5
P12
R13
100K
C2
37UUF
100V 10%
R 29
100K
R16
27K
R17
100K
OUTPUT 1
P8
+ 120V RET
P3
GRD
P1
P V R GRD
P2
+ 28VDC
P5
PVR GRD TP

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R 1		RESISTOR, VAR.	50 K	5%	1W
R2		RESISTOR, MF	100K	5%	1/4W
R 3		CF	6.32M	1%	1/8W
R 4		WW	35 K	1%	1/10 W
R 5			35 K	1%	1/10W
R6		MF	175 K	1%	1/8 W
R 7			175 K	1%	1/8 W
R 8		WW	50	1%	1/10 W
R 9			50	1%	1/10 W
R10			3.3K	1%	1/10 W
R11		MF	4.7K	5%	1/2W
R12			100K	5%	1/4W
R13			100K	%	
R14			220	%	
R15			220	%	
R16			27K	%	
R 7			100K	%	
R18			150K	%	
R19			47	%	
R20			33 K	%	
R21			3.9K	5%	1/2W
R22		WW	15 K	5%	5W
R23		MF	820	5%	1/2W
R24		WW	400	1%	1/10W
R25			600-1200	1%	1/10W
R26			1-19	0.5%	1/10W
R27			100-500	0.02%	1/8 W
R28			6 K	0.1%	1/8 W
R29		MF	100 K	5%	1/4 W
C1		CAP, MYLAR	.082UF	10%	100V
C2		CER	37UUF	10%	100V
C3		CER	37UUF	10%	100V
Q1		TRTR 2N2060			
Q2		2N2060			
Q3		2N2060			
Q4		2N720A			
CR 1		DIODE, 1/4M24AZ5			
CR 2		SV169			
CR 3		SV169			
CR 4		SV171			
CR 5		SV171			
CR 6		SV127			
CR 7		SV127			
CR 8		SV134			
CR 9		IN825			

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00125 DATE 11-30-62

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. RESISTORS R26 AND R27 TO BE CHOSEN FOR PROPER OPERATION OF DC CONSTANT CURRENT SOURCE AFTER CONSTRUCTION OF THE SUB-MODULE
4. ALL RESISTORS 1/4 W ± 5% UNLESS OTHERWISE SPECIFIED
5. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN C Haynes DATE 9 OCT 62
CHECKED
APPROVAL
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
DC DIFFERENTIAL AMPLIFIER & PRECISION VOLTAGE REFERENCE
(OF DC CONSTANT CURRENT SOURCE)

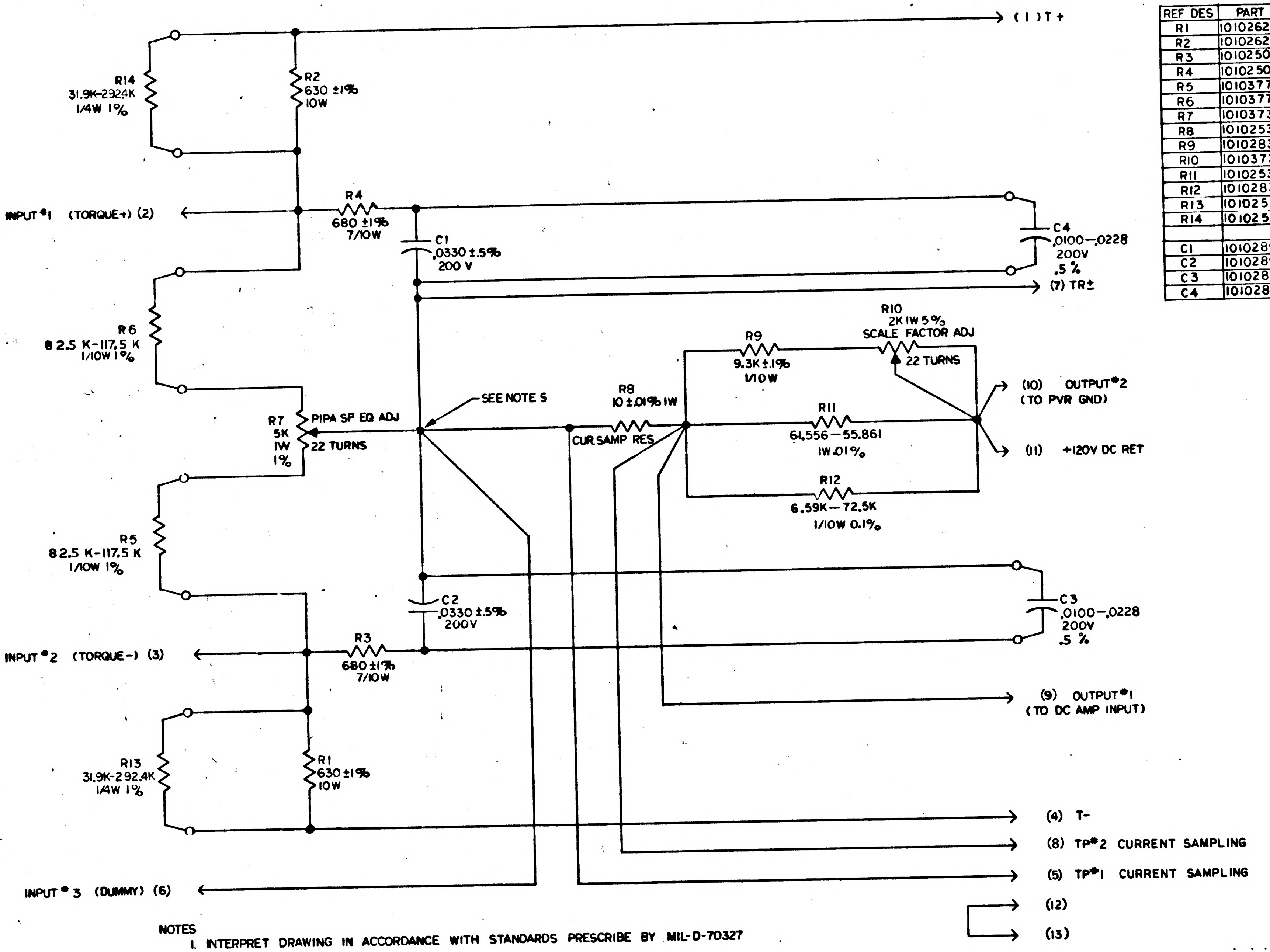
CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010008
SCALE
WT
SHEET 1 OF 1

1010008

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00385	2-6-63	JJS	WK


(1) T+
R14
31.9K-292.4K
1/4W 1%
R2
630 ±1%
10W
INPUT #1 (TORQUE+) (2)
R4
680 ±1%
7/10W
C1
.0330 ±.5%
200 V
C4
.0100—.0228
200V
.5 %
(7) TR±
R6
82.5 K-117.5 K
1/10W 1%
R10
2K 1W 5%
SCALE FACTOR ADJ
22 TURNS
R9
9.3K ±.1%
1/10W
(10) OUTPUT #2
(TO PVR GND)
R7
5K
1W
1%
PIPA SF EQ ADJ
22 TURNS
SEE NOTE 5
R8
10 ±.01% 1W
CUR SAMP RES
R11
61.556—55.861
1W .01%
(11) +120V DC RET
R12
6.59K—72.5K
1/10W 0.1%
R5
82.5 K-117.5 K
1/10W 1%
C2
.0330 ±.5%
200V
C3
.0100—.0228
200V
.5 %
INPUT #2 (TORQUE-) (3)
R3
680 ±1%
7/10W
(9) OUTPUT #1
(TO DC AMP INPUT)
R13
31.9K-292.4K
1/4W 1%
R1
630 ±1%
10W
(4) T-
(8) TP#2 CURRENT SAMPLING
(5) TP#1 CURRENT SAMPLING
INPUT #3 (DUMMY) (6)
(12)
(13)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262	RES, WW	630	±1%	10W
R2	1010262		630	±1%	10W
R3	1010250		680	±1%	.7 W
R4	1010250		680	±1%	.7 W
R5	1010377-(NE)	(NE)	82.5K-117.5K	1%	1/10W
R6	1010377-(NE)	↓ (NE)	82.5K-117.5K	1%	1/10W
R7	1010373-9	VAR	5K	1%	1W
R8	1010253	WW	10	±.01%	1W
R9	1010283	WW	9.3K	±.1%	1/10 W
R10	1010373-8	VAR	2K	5%	1W
R11	1010253- (NE)	WW (NE)	61.556-55.861	.01%	1W
R12	1010283- (NE)		6.59K-72.50K	0.1%	1/10W
R13	1010251- (NE)		31.9K-292.4K	1%	1/4 W
R14	1010251- (NE)	↓ ↓ ↓	31.9K-292.4K	1%	1/4 W
C1	1010289	CAP, PCLY	.0330	±.5%	200V
C2	1010289		.0330	±.5%	200 V
C3	1010289- (NE)	(NE)	.0100-.0228	±.5%	200V
C4	1010289- (NE)	↓ ↓ (NE)	.0100-.0228	±.5%	200V

REF DRAWING:
PIPA CALIBRATION ASSY 1007009

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. USE ONLY: R13 OR R14

3. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
4. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS
5. WIRING TO BE TO A SINGLE POINT AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN C.A. Pustz DATE 9 OCT 62
CHECKED R.V. Vasata
APPROVAL J.L. Sitomer 11-28-62
APPROVAL A. R. Test 11-29-62
NASA APPROVAL Jack Bagnard 11/30/62
MIT APPROVAL W. Kupfer 3 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIPA CALIBRATION MODULE
(τg COMPENSATION & SCALE FACTOR RESISTORS)

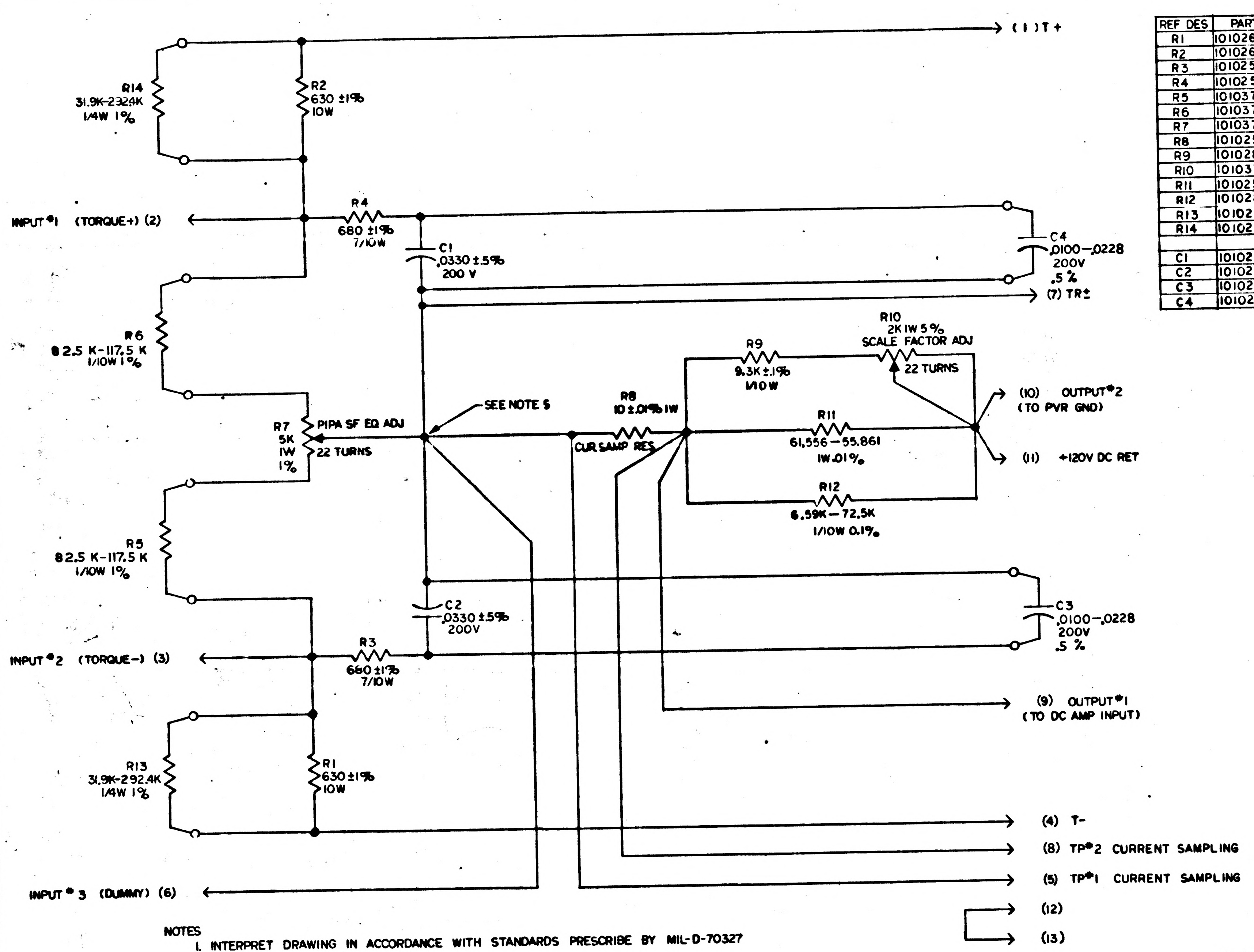
CODE IDENT NO. SIZE D NASA DRAWING NO. 1010009
SCALE — WT SHEET 1 OF 1

1010009 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00 385	2-6-63	JJS	WK
B	REVISED PER TDRR 01010	4-25-63	R.T.	WK


(1) T+
R14
31.9K-292.4K
1/4W 1%
R2
630 ±1%
10W
INPUT #1 (TORQUE+) (2)
R4
680 ±1%
7/10W
C1
.0330 ±.5%
200 V
C4
.0100-.0228
200V
.5 %
(7) TR±
R6
82.5 K-117.5 K
1/10W 1%
R10
2K 1W 5%
SCALE FACTOR ADJ
22 TURNS
R9
9.3K ±.1%
1/10W
(10) OUTPUT #2
(TO PVR GND)
R7
5K
1W
1%
PIPA SF EQ ADJ
22 TURNS
SEE NOTE 5
R8
10 ±.01% 1W
CUR SAMP RES
R11
61,556-55,861
1W .01%
(11) +120V DC RET
R12
6.59K-72.5K
1/10W 0.1%
R5
82.5 K-117.5 K
1/10W 1%
C2
.0330 ±.5%
200V
C3
.0100-.0228
200V
.5 %
INPUT #2 (TORQUE-) (3)
R3
680 ±1%
7/10W
(9) OUTPUT #1
(TO DC AMP INPUT)
R13
31.9K-292.4K
1/4W 1%
R1
630 ±1%
10W
(4) T-
(8) TP#2 CURRENT SAMPLING
INPUT # 3 (DUMMY) (6)
(5) TP#1 CURRENT SAMPLING
(12)
(13)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-2	RES, WW	630	±1%	10W
R2	1010262-2		630	±1%	10W
R3	1010250-1		680	±1%	.7 W
R4	1010250-1		680	±1%	.7 W
R5	1010377-(NE)	(NE)	82.5K-117.5K	1%	1/10W
R6	1010377-(NE)	(NE)	82.5K-117.5K	1%	1/10W
R7	1010373-9	VAR	5K	1%	1W
R8	1010253-12	WW	10	±.01%	1W
R9	1010283-18	WW	9.3K	±.1%	1/10 W
R10	1010373-8	VAR	2K	5%	1W
R11	1010253-(NE)	WW (NE)	61.556-55.861	.01%	1W
R12	1010283-(NE)		6.59K-72.50K	0.1%	1/10W
R13	1010251-(NE)		31.9K-292.4K	1%	1/4 W
R14	1010251-(NE)		31.9K-292.4K	1%	1/4 W
C1	1010289-18	CAP, POLY	.0330	±.5%	200V
C2	1010289-18		.0330	±.5%	200 V
C3	1010289-(NE)	(NE)	.0100-.0228	±.5%	200V
C4	1010289-(NE)	(NE)	.0100-.0228	±.5%	200V

REF DRAWING:
PIPA CALIBRATION ASSY 1007009

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. USE ONLY: R13 OR R14

3. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
4. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS
5. WIRING TO BE TO A SINGLE POINT AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN C.A. Bentz DATE 9 OCT 62
CHECKED R.V. Vasates
APPROVAL J.L. Stamm 11-28-62
APPROVAL A.R. Test 11-29-62
NASA APPROVAL Jack Bagnard 11/30/62
MIT APPROVAL W.Kupfer 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIPA CALIBRATION MODULE
(τg COMPENSATION & SCALE FACTOR RESISTORS)

CODE IDENT NO. SIZE D NASA DRAWING NO. 1010009
SCALE — WT SHEET 1 OF 1

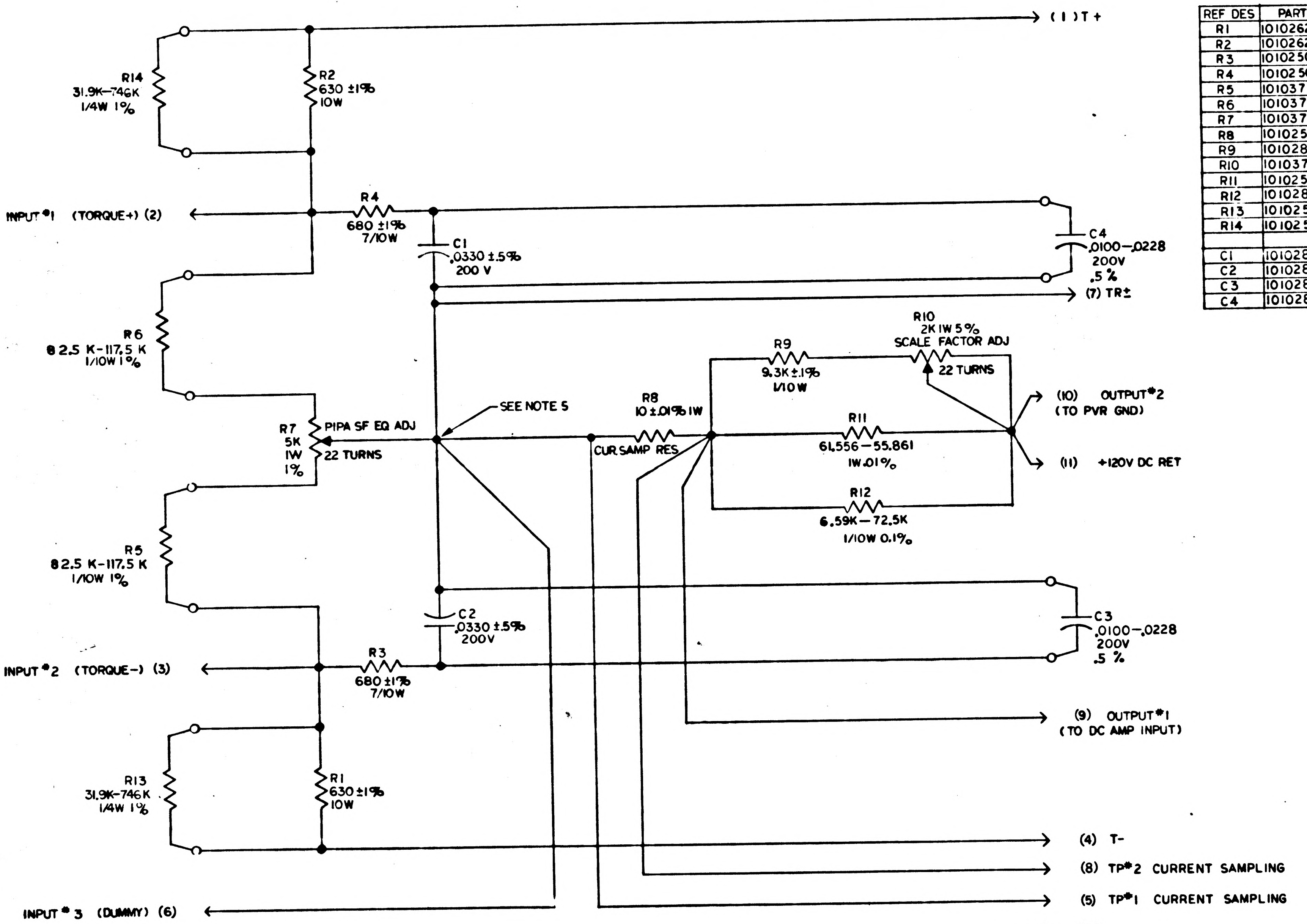
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00385	2-6-63	JJS	WK
B	REVISED PER TDRR 01010	4-25-63	R.T.	WK
C	REVISED PER TDRR 01402	6-24-63	RVV	WK

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-2	RES, WW	630	±1%	10W
R2	1010262-2		630	±1%	10W
R3	1010250-1		680	±1%	.7 W
R4	1010250-1		680	±1%	.7 W
R5	1010377-(NE)	(NE)	82.5K-117.5K	1%	1/10W
R6	1010377-(NE)	(NE)	82.5K-117.5K	1%	1/10W
R7	1010373-9	VAR	5K	1%	1W
R8	1010253-12	WW	10	±.01%	1W
R9	1010283-18	WW	9.3K	±.1%	1/10 W
R10	1010373-8	VAR	2K	5%	1W
R11	1010253- (NE)	WW (NE)	61.556-55.861	.01%	1W
R12	1010283- (NE)		6.59K-72.50K	0.1%	1/10W
R13	1010251- (NE)		31.9K-746K	1%	1/4 W
R14	1010251- (NE)		31.9K-746K	1%	1/4 W
C1	1010289-18	CAP, POLY	.0330	±.5%	200V
C2	1010289-18		.0330	±.5%	200 V
C3	1010289- (NE)	(NE)	.0100-.0228	±.5%	200V
C4	1010289- (NE)	(NE)	.0100-.0228	±.5%	200V


(1) T+
R14
31.9K-746K
1/4W 1%
R2
630 ±1%
10W
INPUT #1 (TORQUE+) (2)
R4
680 ±1%
7/10W
C1
.0330 ±.5%
200 V
C4
.0100-.0228
200V
.5 %
(7) TR±
R6
82.5 K-117.5 K
1/10W 1%
R9
9.3K ±.1%
1/10W
R10
2K 1W 5%
SCALE FACTOR ADJ
22 TURNS
(10) OUTPUT #2
(TO PVR GND)
SEE NOTE 5
R8
10 ±.01% 1W
R7
5K
1W
1%
PIPA SF EQ ADJ
22 TURNS
CUR SAMP RES
R11
61.556-55.861
1W .01%
(11) +120V DC RET
R12
6.59K-72.5K
1/10W 0.1%
R5
82.5 K-117.5 K
1/10W 1%
C2
.0330 ±.5%
200V
C3
.0100-.0228
200V
.5 %
INPUT #2 (TORQUE-) (3)
R3
680 ±1%
7/10W
(9) OUTPUT #1
(TO DC AMP INPUT)
R13
31.9K-746K
1/4W 1%
R1
630 ±1%
10W
(4) T-
(8) TP#2 CURRENT SAMPLING
(5) TP#1 CURRENT SAMPLING
INPUT # 3 (DUMMY) (6)
(12)
(13)

REF DRAWING:
PIPA CALIBRATION ASSY 1007009

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. USE ONLY: R13 OR R14
3. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
4. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS
5. WIRING TO BE TO A SINGLE POINT AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT

DRAWN C.A. Pustis DATE 9 OCT 62
CHECKED R.V. Vasata
APPROVAL J.L. Sitomer 11-20-62
APPROVAL A.R. Teft 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PIPA CALIBRATION MODULE
(tg COMPENSATION & SCALE FACTOR RESISTORS)

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010009
SCALE —
WT
SHEET 1 OF 1

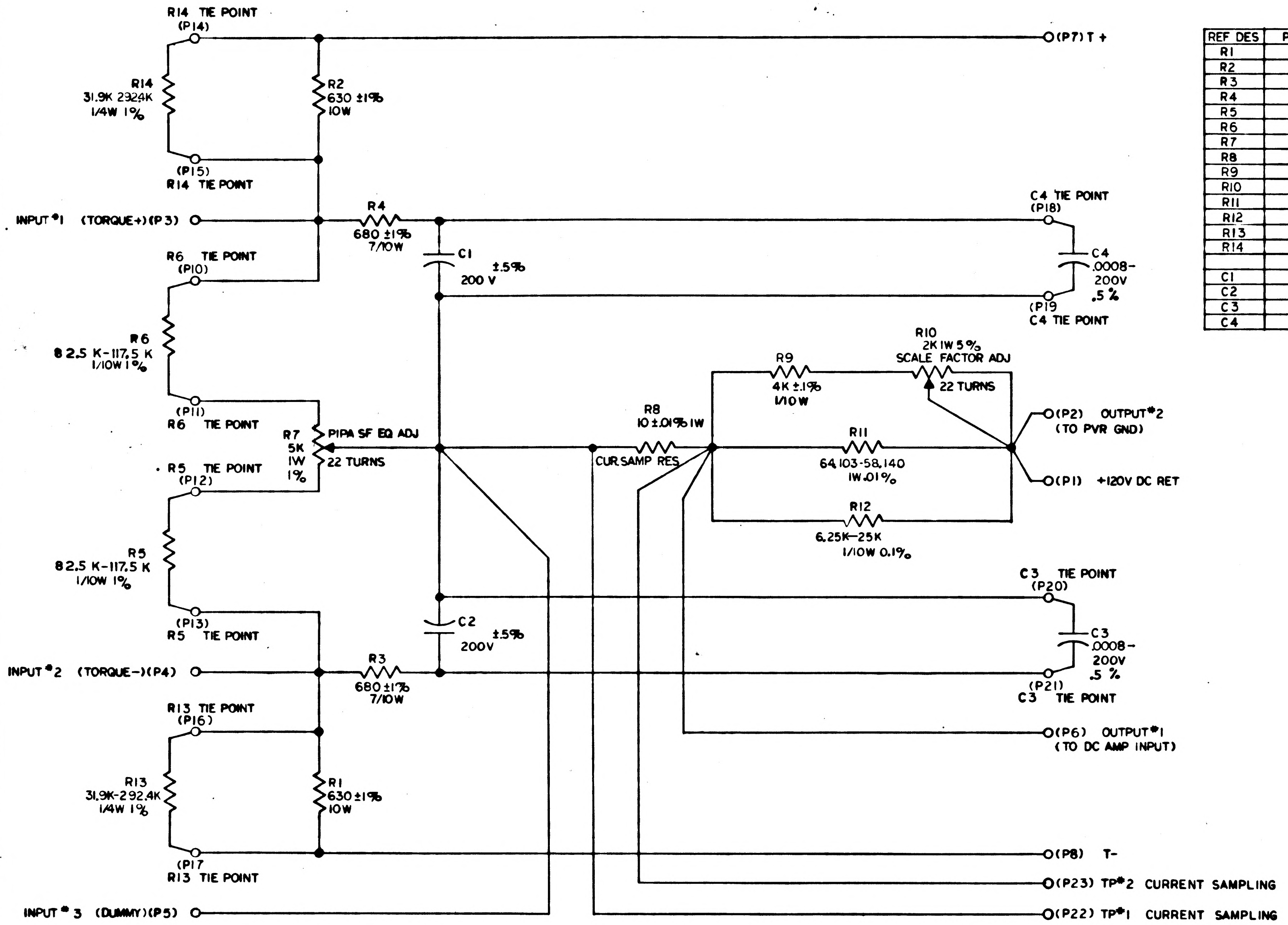
1010009

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL


R14 TIE POINT
(P14)
R14
31.9K 292.4K
1/4W 1%
R2
630 ±1%
10W
(P15)
R14 TIE POINT
(P7) T +
INPUT #1 (TORQUE+) (P3)
R4
680 ±1%
7/10W
C1
±.5%
200 V
C4 TIE POINT
(P18)
C4
.0008-
200V
.5%
(P19
C4 TIE POINT
R6 TIE POINT
(P10)
R6
82.5 K-117.5 K
1/10W 1%
(P11)
R6 TIE POINT
R7
5K
1W
1%
PIPA SF EQ ADJ
22 TURNS
R5 TIE POINT
(P12)
R5
82.5 K-117.5 K
1/10W 1%
(P13)
R5 TIE POINT
R8
10 ±.01% 1W
CUR SAMP RES
R9
4K ±.1%
1/10W
R10
2K 1W 5%
SCALE FACTOR ADJ
22 TURNS
R11
64.103-58.140
1W .01%
R12
6.25K-25K
1/10W 0.1%
(P2) OUTPUT #2
(TO PVR GND)
(P1) +120V DC RET
C3 TIE POINT
(P20)
C2
±.5%
200V
C3
.0008-
200V
.5%
(P21)
C3 TIE POINT
INPUT #2 (TORQUE-) (P4)
R3
680 ±1%
7/10W
R13 TIE POINT
(P16)
R13
31.9K-292.4K
1/4W 1%
R1
630 ±1%
10W
(P17
R13 TIE POINT
(P6) OUTPUT #1
(TO DC AMP INPUT)
(P8) T-
(P23) TP#2 CURRENT SAMPLING
INPUT #3 (DUMMY) (P5)
(P22) TP#1 CURRENT SAMPLING

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1		RES, WW	630	±1%	10W
R2			630	±1%	10W
R3			680	±1%	.7 W
R4			680	±1%	.7 W
R5		(NE)	82.5K-117.5K	1%	1/10W
R6		(NE)	82.5K-117.5K	1%	1/10W
R7		VAR	5K	1%	1W
R8		WW	10	±.01%	1W
R9		WW	4K	±.1%	1/10 W
R10		VAR	2K	5%	1W
R11		WW (NE)	64.103 58.140	.01%	1W
R12			6.25K-25K	0.1%	1/10W
R13			31.9K-292.4K	1%	1/4 W
R14			31.9K-292.4K	1%	1/4 W
C1		CAP, POLY		±.5%	200V
C2				±.5%	200 V
C3		(NE)		±.5%	200V
C4		(NE)		±.5%	200V

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00125 DATE 11-30-62

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. USE ONLY: R13 OR R14

3. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE EXPRESSED IN OHMS
4. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN C.A. Peretz DATE 9 OCT 62
CHECKED R.V. Varsat
APPROVAL J.L. Stamm 11-29-62
APPROVAL A.R. Fett 11-29-62
NASA APPROVAL Jack Bagnall 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

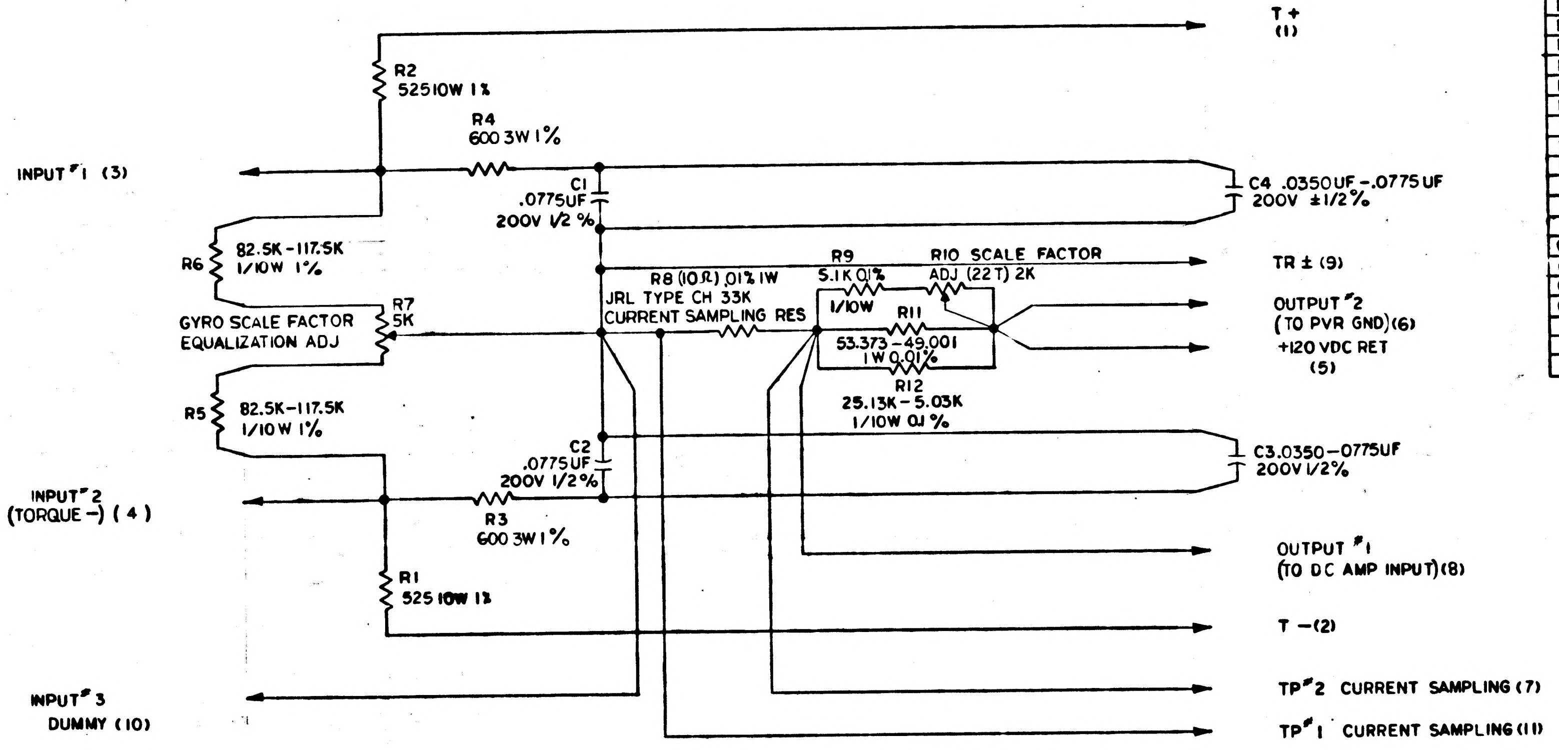
SCHEMATIC
PIPA CALIBRATION MODULE
(tq COMPENSATION & SCALE FACTOR RESISTORS)

CODE IDENT NO. SIZE D NASA DRAWING NO. 1010009
SCALE — WT SHEET 1 OF 1

1010009

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED & UPGRADED PER TD RR 01001	4-25-63	WK


T + (1)
R2
525 10W 1%
R4
600 3W 1%
INPUT #1 (3)
C1
.0775UF
200V 1/2 %
C4 .0350UF-.0775UF
200V ±1/2%
R6
82.5K-117.5K
1/10W 1%
R8 (10Ω) .01% 1W
JRL TYPE CH 33K
CURRENT SAMPLING RES
R9
5.1K 0.1%
1/10W
R10 SCALE FACTOR
ADJ (22T) 2K
TR ± (9)
GYRO SCALE FACTOR
EQUALIZATION ADJ
R7
5K
R11
53.373-49.001
1W 0.01%
R12
25.13K-5.03K
1/10W 0.1%
OUTPUT #2
(TO PVR GND)(6)
+120 VDC RET
(5)
R5
82.5K-117.5K
1/10W 1%
C2
.0775UF
200V 1/2%
C3 .0350-.0775UF
200V 1/2%
INPUT #2
(TORQUE −) (4)
R3
600 3W 1%
OUTPUT #1
(TO DC AMP INPUT)(8)
R1
525 10W 1%
T −(2)
INPUT #3
DUMMY (10)
TP #2 CURRENT SAMPLING (7)
TP #1 CURRENT SAMPLING (11)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-1	RESISTOR, WW	525	±1%	10W
R2	1010262-1		525	±1%	10W
R3	1010389-93		600	±1%	3W
R4	1010389-93		600	±1%	3W
R5	1010377-(NE)		82.5K-117.5K	±1%	1/10W
R6	1010377-(NE)		82.5K-117.5K	±1%	1/10W
R7	1010373-9	VAR	5K	5%	1W
R8	1010253-12	WW	10	.01%	1W
R9	1010283-17	WW	5.1K	0.1%	1/10W
R10	1010373-8	VAR	2K	5%	1W
R11	1010253-(NE)	WW	53.373-49.001	0.01%	1W
R12	1010283-(NE)	WW	25.13K-5.03K	0.1%	1/0W
C1	1010289-36	CAP, POLY	.0775UF	0.5%	200V
C2	1010289-36		.0775UF	0.5%	
C3	1010289-(NE)	(NE)	.0350UF-.0775UF	.5%	
C4	1010289-(NE)	(NE)	.0350UF-.0775UF	.5%	

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Voice DATE 10-10-62
CHECKED R V Vinecke
APPROVAL J S Sitomer 11-28-62
APPROVAL 11-28-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PULSE TORQUE GYRO
CALIBRATION MODULE
(TG COMPENSATION AND SCALE FACTOR RESISTORS)

CODE IDENT NO. SIZE D NASA DRAWING NO. 1010011
SCALE 1/1 WT SHEET 1 OF 1

D 1010011 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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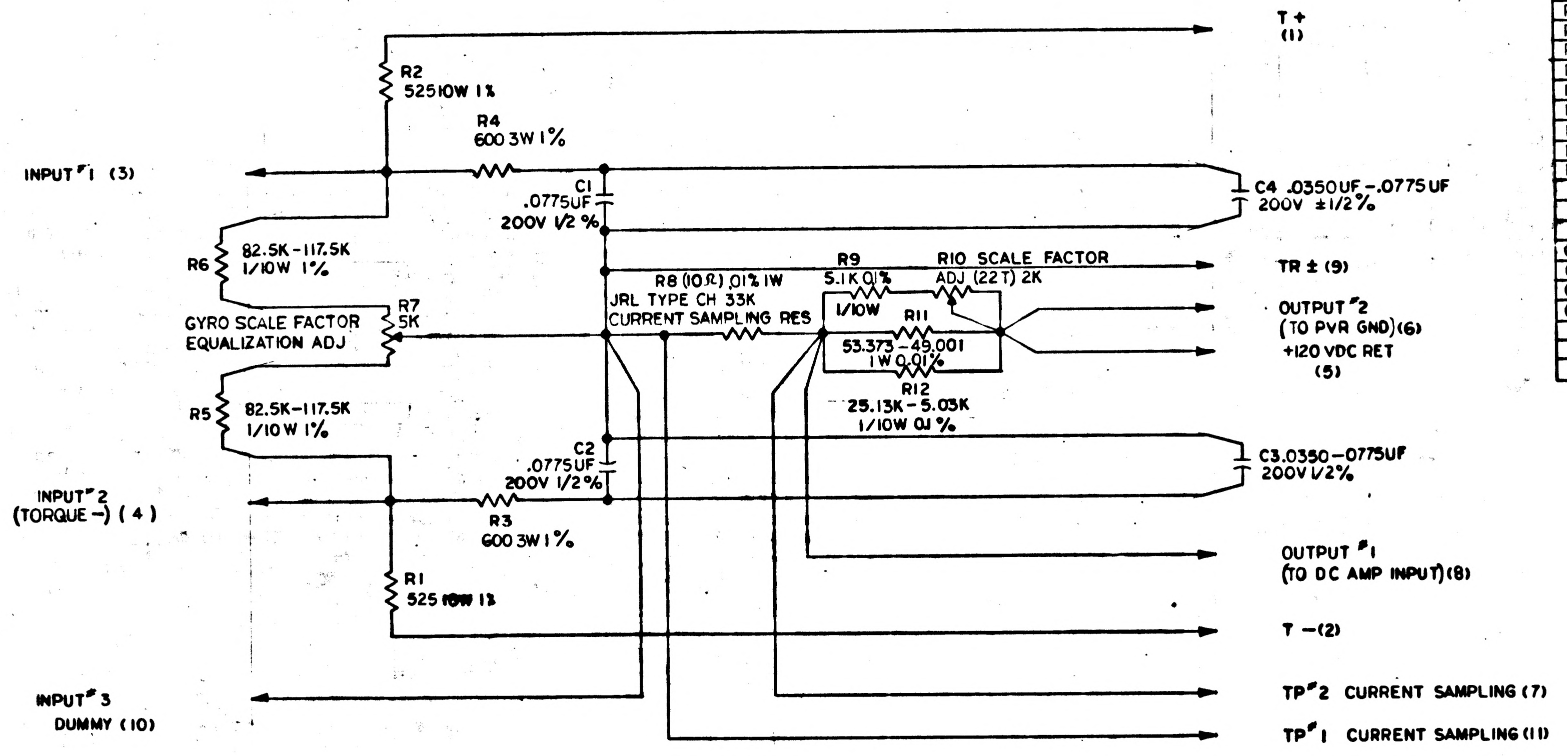
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED & UPGRADED PER TD RR 01001	4-25-63	WK
B	REVISED PER TDRR 03794	[illegible]	[illegible]

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-1	RESISTOR, WW	525	±1%	10W
R2	1010262-1		525	±1%	10W
R3	1010389-93		600	±1%	3W
R4	1010389-93		600	±1%	3W
R5	1010377-(NE)		53K-271K	±1%	1/10W
R6	1010377-(NE)		53K-271K	±1%	1/10W
R7	1010373-(NE)	VAR	5K-10K	5%	1W
R8	1010253-12	WW	10	.01%	1W
R9	1010283-17	WW	510K	0.1%	1/10W
R10	1010373-8	VAR	2K	5%	1W
R11	1010253-(NE)	WW	54770-49001	.01%	1W
R12	1010283-(NE)	WW	25.13K-5.03K	0.1%	1/0W
C1	1010289-36	CAP, POLY	.0775UF	0.5%	200V
C2	1010289-36		.0775UF	0.5%	
C3	1010289-(NE)	(NE)	.0350UF-.0775UF	.5%	
C4	1010289-(NE)	(NE)	.0350UF-.0775UF	.5%	



T +
(1)
R2
525 10W 1%
R4
600 3W 1%
INPUT #1 (3)
C1
.0775UF
200V 1/2 %
C4 .0350UF-.0775UF
200V ±1/2%
R6
82.5K-117.5K
1/10W 1%
R9
5.1K 0.1%
1/10W
R10 SCALE FACTOR
ADJ (22T) 2K
TR ± (9)
R8 (10Ω) .01% 1W
JRL TYPE CH 33K
CURRENT SAMPLING RES
R7
5K
GYRO SCALE FACTOR
EQUALIZATION ADJ
R11
53.373-49.001
1W 0.01%
OUTPUT #2
(TO PVR GND)(6)
+120 VDC RET
(5)
R12
25.13K-5.03K
1/10W 0.1%
R5
82.5K-117.5K
1/10W 1%
C2
.0775UF
200V 1/2%
C3 .0350-.0775UF
200V 1/2%
INPUT #2
(TORQUE -) (4)
R3
600 3W 1%
OUTPUT #1
(TO DC AMP INPUT)(8)
R1
525 10W 1%
T -(2)
INPUT #3
DUMMY (10)
TP #2 CURRENT SAMPLING (7)
TP #1 CURRENT SAMPLING (11)

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN a. Voce DATE 10-10-62
CHECKED
APPROVAL J. S. Sitarz 11-62
APPROVAL 11-62
NASA APPROVAL 4/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PULSE TORQUE GYRO CALIBRATION MODULE
(T.G. COMPENSATION AND SCALE FACTOR RESISTORS)

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010011
SCALE 1/1
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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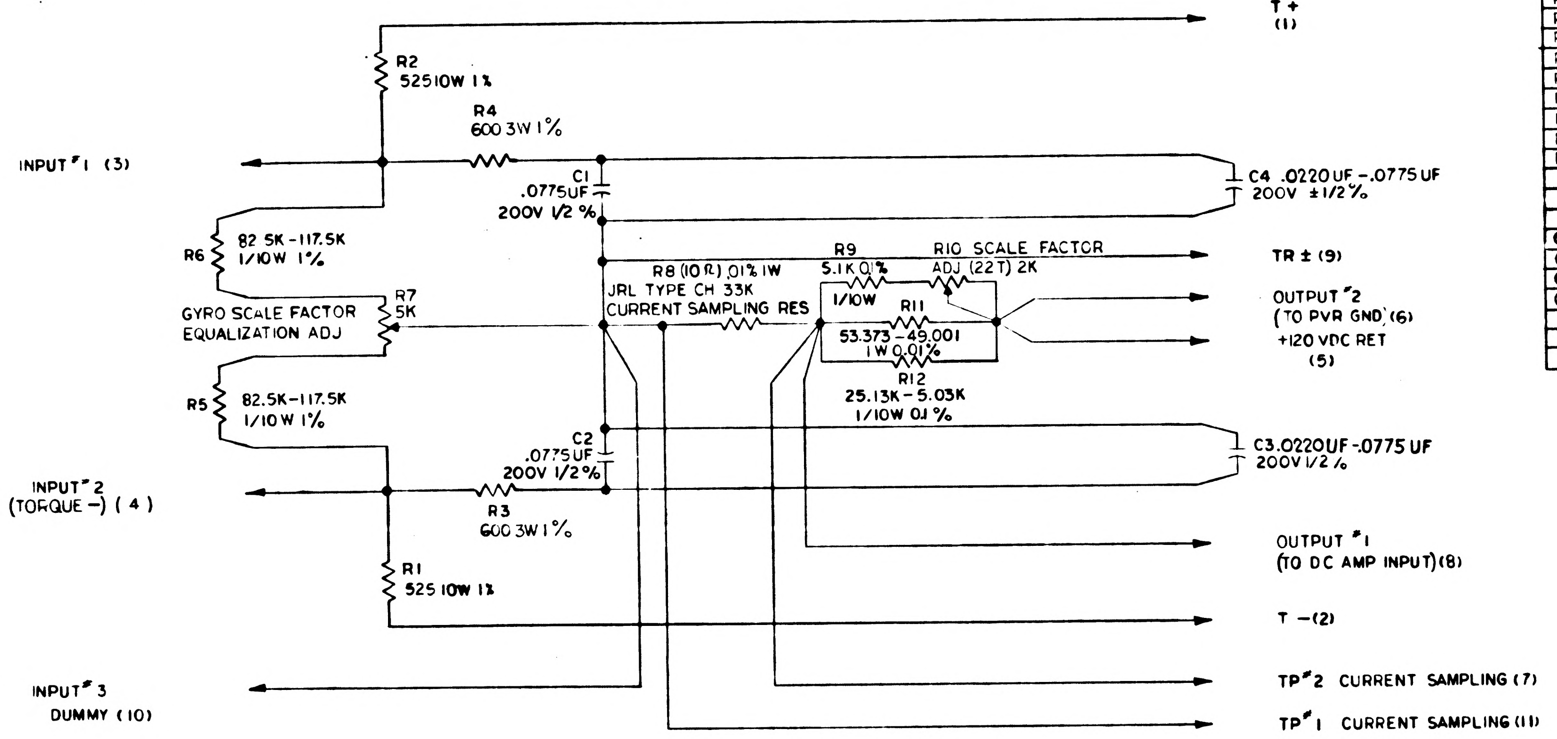
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED & UPGRADED PER TDRR 01001	4-25-63	WK.
B	REVISED PER TDRR 03704	10 16	
C	REVISED PER TDRR 14336	24 Nov 64	RL

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010262-1	RESISTOR, WW	525	±1%	10W
R2	1010262-1		525	±1%	10W
R3	1010389-93		600	±1%	3W
R4	1010389-93		600	±1%	3W
R5	1010377-(NE)		53K-271K	±1%	1/10W
R6	1010377-(NE)		53K-271K	±1%	1/10W
R7	1010373-(NE)	VAR	5K-10K	5%	1W
R8	1010253-12	WW	10	.01%	1W
R9	1010283-17	WW	510K	0.1%	1/10W
R10	1010373-8	VAR	2K	5%	1W
R11	1010253-(NE)	WW	54770-49001	.01%	1W
R12	1010283-(NE)	WW	25.13K-5.03K	0.1%	1/0W
C1	1010289-36	CAP, POLY	.0775UF	0.5%	200V
C2	1010289-36		.0775UF	0.5%	
C3	1010289-(NE)	(NE)	.0220 UF-.0775UF	.5%	
C4	1010289-(NE)	(NE)	.0220 UF-.0775UF	.5%	


T +
(1)
R2
525 10W 1%
R4
600 3W 1%
INPUT #1 (3)
C1
.0775UF
200V 1/2 %
C4 .0220UF -.0775UF
200V ±1/2%
R6
82.5K-117.5K
1/10W 1%
R9
5.1K 0.1%
1/10W
R10 SCALE FACTOR
ADJ (22T) 2K
TR ± (9)
R8 (10Ω) .01% 1W
JRL TYPE CH 33K
CURRENT SAMPLING RES
R7
5K
GYRO SCALE FACTOR
EQUALIZATION ADJ
R11
53.373-49.001
1W 0.01%
OUTPUT #2
(TO PVR GND) (6)
+120 VDC RET
(5)
R12
25.13K-5.03K
1/10W 0.1%
R5
82.5K-117.5K
1/10W 1%
C2
.0775UF
200V 1/2%
C3 .0220UF -.0775 UF
200V 1/2%
INPUT #2
(TORQUE −) (4)
R3
600 3W 1%
OUTPUT #1
(TO DC AMP INPUT) (8)
R1
525 10W 1%
T −(2)
INPUT #3
DUMMY (10)
TP #2 CURRENT SAMPLING (7)
TP #1 CURRENT SAMPLING (11)

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN a. Vorce DATE 10-10-62
CHECKED R V V[illegible]
APPROVAL J S S[illegible] 11-26-62
APPROVAL [illegible] 11-28-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 30 Nov

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

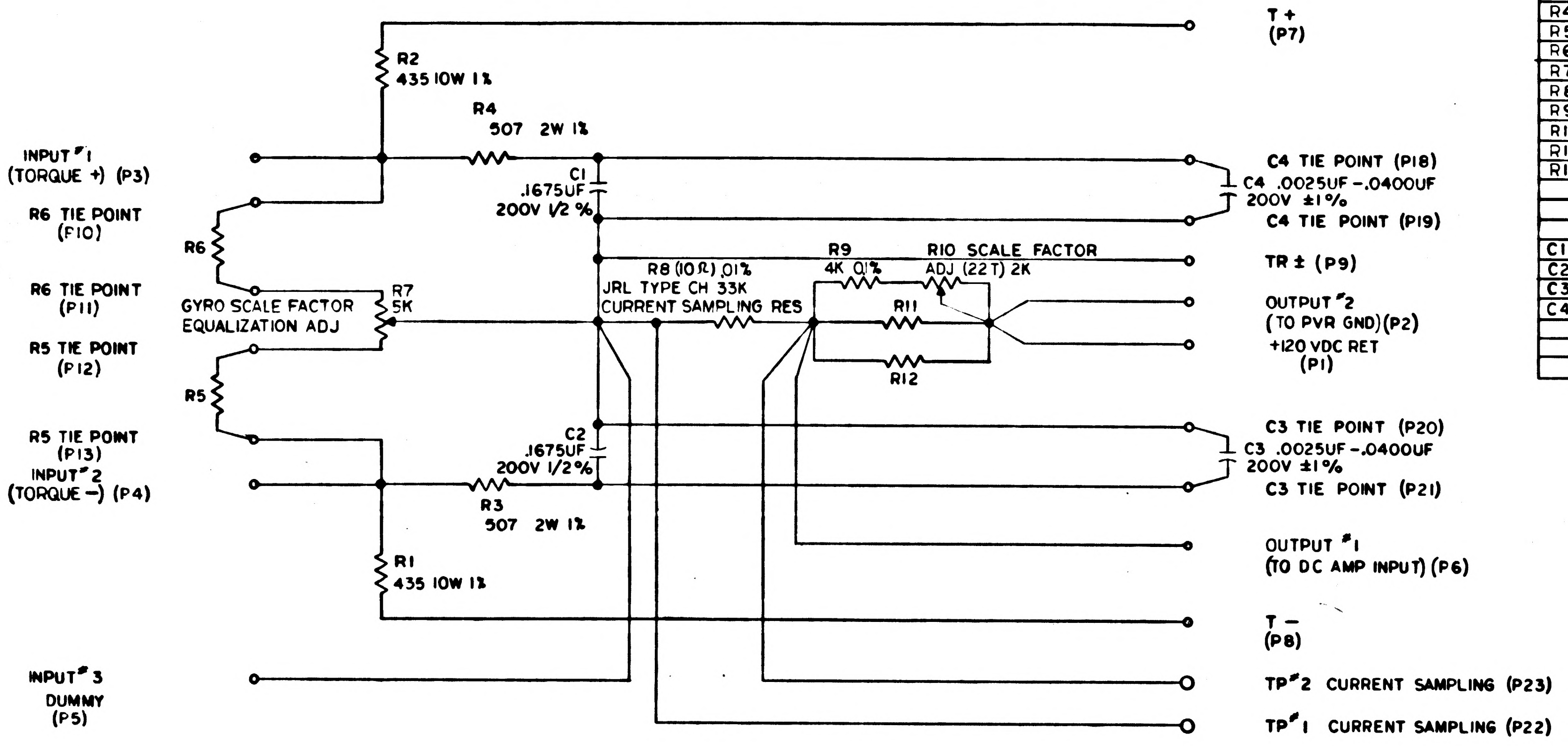
SCHEMATIC
PULSE TORQUE GYRO CALIBRATION MODULE
(T.G. COMPENSATION AND SCALE FACTOR RESISTORS)

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010011
SCALE 1/1
WT
SHEET 1 OF

D 1010011 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



T +
(P7)
R2
435 10W 1%
R4
507 2W 1%
INPUT #1
(TORQUE +) (P3)
C1
.1675UF
200V 1/2 %
C4 TIE POINT (P18)
C4 .0025UF -.0400UF
200V ±1%
C4 TIE POINT (P19)
R6 TIE POINT
(F10)
R6
R9
4K 0.1%
R10 SCALE FACTOR
ADJ (22T) 2K
TR ± (P9)
R8 (10Ω) .01%
JRL TYPE CH 33K
CURRENT SAMPLING RES
R6 TIE POINT
(P11)
GYRO SCALE FACTOR
EQUALIZATION ADJ
R7
5K
R11
OUTPUT #2
(TO PVR GND) (P2)
+120 VDC RET
(P1)
R5 TIE POINT
(P12)
R12
R5
C3 TIE POINT (P20)
C3 .0025UF -.0400UF
200V ±1%
C3 TIE POINT (P21)
R5 TIE POINT
(P13)
INPUT #2
(TORQUE –) (P4)
C2
.1675UF
200V 1/2%
R3
507 2W 1%
OUTPUT #1
(TO DC AMP INPUT) (P6)
R1
435 10W 1%
T –
(P8)
INPUT #3
DUMMY
(P5)
TP #2 CURRENT SAMPLING (P23)
TP #1 CURRENT SAMPLING (P22)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR, WW	435	±1%	10W
R2			435	±1%	10W
R3			507	±1%	2W
R4			507	±1%	2W
R5					
R6					
R7		VAR	5K	5%	1W
R8		WW	10	.01%	1W
R9		WW	4K	0.1%	1/0 W
R10		VAR	2K	5%	1W
R11		WW		0.01%	1W
R12		WW		0.1%	1/0 W
C1		CAP, POLY	.1675UF	0.5%	200V
C2			.1675UF	0.5%	
C3		(NE)	.0025-.0425UF	1%	
C4		(NE)	.0025-.0425UF	1%	

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00125 **DATE** 11-30-62

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS.
4. USE ONLY R5 OR R6.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Voce DATE 10-10-62
CHECKED R.V. Vierstra
APPROVAL J.S. Sitomer 11-28-62
APPROVAL A.R. Scott 11-28-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
PULSE TORQUE GYRO
CALIBRATION MODULE
(T.G. COMPENSATION AND SCALE FACTOR RESISTORS)

CODE IDENT NO. | SIZE D | NASA DRAWING NO. 1010011
SCALE 1/1 | WT | SHEET 1 OF 1

1010011

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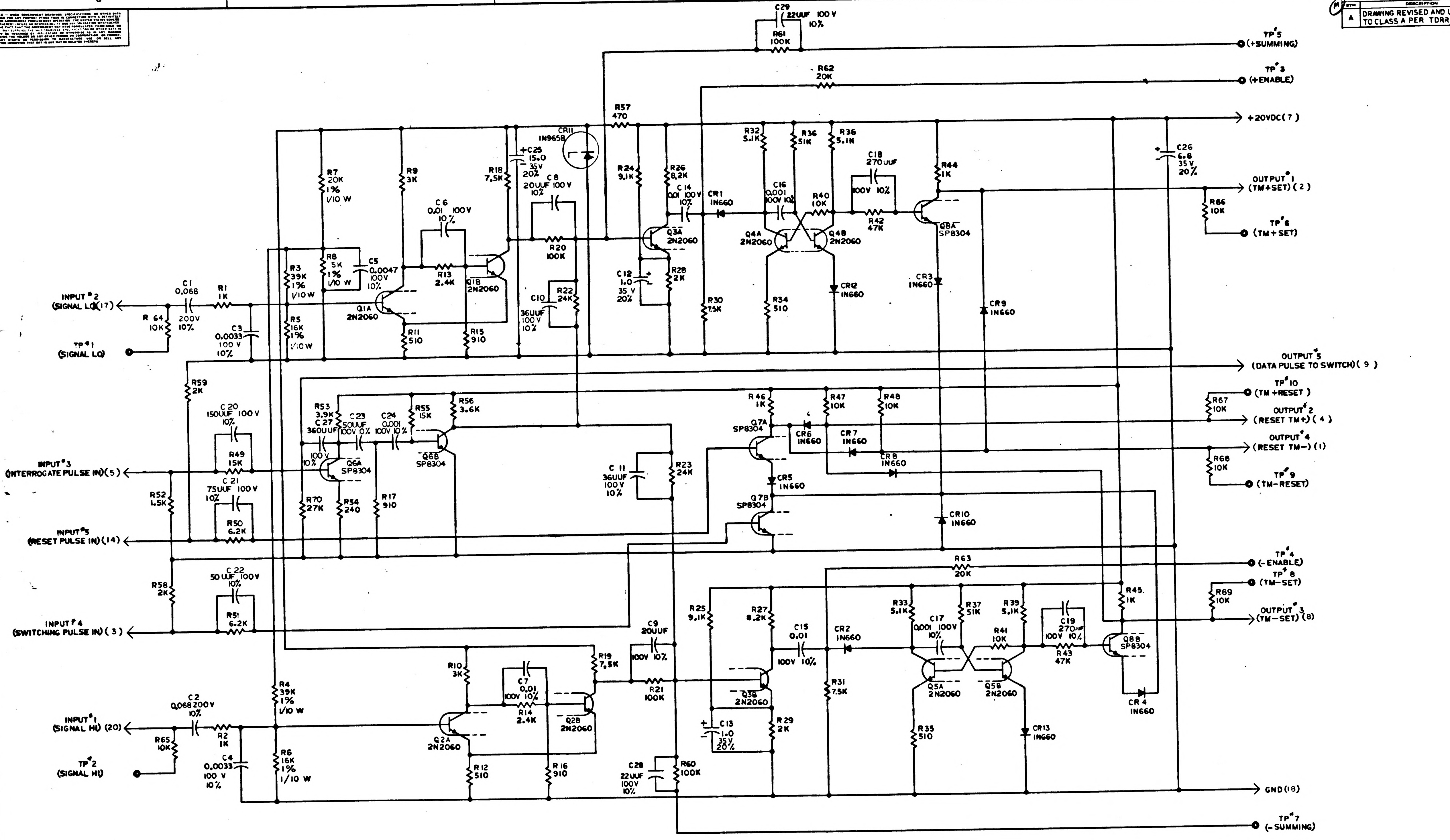
(M) SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS CLASS B TDRR 00125			
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	2063	JLS	VK


C29
22UUF 100 V
10%
R61
100K
TP#5
(+SUMMING)
R62
20K
TP#3
(+ENABLE)
R57
470
+20VDC (7)
CR11
1N965B
+C25
15.0
35 V
20%
C8
20UUF 100 V
10%
R18
7.5K
R9
3K
R7
20K
1%
1/10 W
C6
0.01 100 V
10%
R13
2.4K
Q1B
2N2060
R8
5K
1%
1/10 W
C5
0.0047
100 V
10%
R3
39K
1%
1/10W
Q1A
2N2060
R5
16K
1%
1/10W
R11
510
R15
910
R20
100K
C10
36UUF
100 V
10%
R22
24K
R24
9.1K
R26
8.2K
C14
.001 100 V
10%
CR1
1N660
Q3A
2N2060
C12
1.0
35 V
20%
R28
2K
R30
7.5K
R32
5.1K
R36
51K
R36
5.1K
C16
0.001
100 V 10%
R40
10K
Q4A
2N2060
Q4B
2N2060
R34
510
CR12
1N660
C18
270UUF
100V 10%
R42
47K
R44
1K
Q8A
SP8304
CR3
1N660
CR9
1N660
+C26
6.8
35 V
20%
OUTPUT#1
(TM+SET) (2)
R66
10K
TP#6
(TM+SET)
INPUT#2
(SIGNAL LO) (17)
C1
0.068
200V
10%
R1
1K
R64
10K
C3
0.0033
100 V
10%
TP#1
(SIGNAL LO)
OUTPUT#5
(DATA PULSE TO SWITCH) (9)
R59
2K
C20
150UUF 100 V
10%
R53
3.9K
C27
360UUF
100 V
10%
C23
500UUF
100V 10%
C24
0.001
100V 10%
R55
15K
R56
3.6K
Q6B
SP8304
Q6A
SP8304
R49
15K
C21
75UUF 100 V
10%
R50
6.2K
INPUT#3
(INTERROGATE PULSE IN) (5)
R52
1.5K
R70
27K
R54
240
R17
910
C11
36UUF
100 V
10%
R23
24K
INPUT#5
(RESET PULSE IN) (14)
R46
1K
R47
10K
R48
10K
Q7A
SP8304
CR6
1N660
CR7
1N660
CR8
1N660
CR5
1N660
Q7B
SP8304
CR10
1N660
TP#10
(TM+RESET)
R67
10K
OUTPUT#2
(RESET TM+) (4)
OUTPUT#4
(RESET TM−) (1)
R68
10K
TP#9
(TM−RESET)
C22
50UUF 100 V
10%
R51
6.2K
R58
2K
INPUT#4
(SWITCHING PULSE IN) (3)
R63
20K
TP#4
(−ENABLE)
TP#8
(TM−SET)
R69
10K
OUTPUT#3
(TM−SET) (8)
R45
1K
R25
9.1K
R27
8.2K
C15
0.01
100V 10%
CR2
1N660
R33
5.1K
R37
51K
R39
5.1K
C17
0.001 100 V
10%
R41
10K
C19
270UUF
100V 10%
R43
47K
Q8B
SP8304
CR4
1N660
C9
20UUF
100V 10%
R19
7.5K
R10
3K
C7
0.01
100V 10%
R14
2.4K
Q2B
2N2060
R21
100K
Q3B
2N2060
R29
2K
C13
1.0
35 V
20%
R31
7.5K
Q5A
2N2060
Q5B
2N2060
R35
510
CR13
1N660
INPUT#1
(SIGNAL HI) (20)
C2
0.068 200 V
10%
R2
1K
R65
10K
R4
39K
1%
1/10 W
Q2A
2N2060
R6
16K
1%
1/10 W
C4
0.0033
100 V
10%
TP#2
(SIGNAL HI)
R12
510
R16
910
C28
22UUF
100 V
10%
R60
100K
GND (18)
TP#7
(−SUMMING)

REF DWG: INTERROGATOR ASSEMBLY 1007019

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUBASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 5% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	LIST OF MATERIALS		

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DWG NO CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN W.F. Troy DATE 11-10-62 CHECKED R.V. Vasquez APPROVAL E.E. Stevens 11-29-62 APPROVAL D.R. Ford 11-29-62	SCHEMATIC INTERROGATOR
		HEAT TREATMENT	NASA APPROVAL 11-30-62	CODE IDENT NO / SIZE E / NASA DRAWING NO 1010013
NEXT ASSY	USED ON	FINAL FINISH	MIT APPROVAL 30 Nov 62	SCALE — / WT / SHEET 1 OF 2
APPLICATION				

1010013 A

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	2063	JJS	VK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±5%	1/4 W
R2	-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR W W	39K	±1%	1/10W
R4	-49		39K	±1%	1/10W
R5	-		16K	±1%	1/10W
R6	-		16K	±1%	1/10W
R7	-50		20K	±1%	1/10W
R8	↓ -51	↓	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	±5%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-49		5.1K		
R33	-49		5.1K		
R34	-25		510		
R35	-25		510		
R36	-73		51K		
R37	-73		51K		
R38	-49		5.1K		
R39	-49		5.1K		
R40	-56		10K		
R41	-56		10K		
R42	-72		47K		
R43	-72		47K		
R44	-32		1K		
R45	-32		1K		
R46	-32		1K		
R47	-56		10K		
R48	-56		10K		
R49	-60		15K		
R50	-51		6.2K		
R51	-51		6.2K		
R52	-36		1.5K		
R53	-46		3.9K		
R54	-17		240		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	-39		2K		
R59	-39		2K		
R60	-80		100K		
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	-56		10K		
R66	-56		10K		
R67	-56		10K		
R68	-56		10K		
R69	-56		10K		
R70	↓ -66	↓	27K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	.068	±10 %	200V
C2	1010264-23	↓	.068	±10 %	200V
C3	1006777-27	CAP CER	.0033	±10 %	100V
C4	-27		.0033	±10 %	100V
C5	-28		.0047	±10 %	100V
C6	-31		.01	±10 %	100V
C7	-31	↓	.01	±10 %	100V
C8	-2	CAP CER	20 uuf	±10 %	100V
C9	-2		20 uuf	±10 %	100V
C10	-5		36 uuf	±10 %	100V
C11	↓ -5	↓	36 uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±20 %	35 V
C13	1006755-69	↓	1.0	±20 %	35 V
C14	1006777-31	CAP CER	.01	±10 %	100V
C15	-31		.01	±10 %	100V
C16	-24		.001	±10 %	100V
C17	-24		.001	±10 %	100V
C18	-17		270 uuF	±10 %	100V
C19	-17		270 uuF	±10 %	100V
C20	-15		150 uuf	±20 %	35 V
C21	-11		75 uuf	±10 %	100V
C22	-8		50 uuf	±10 %	100V
C23	-8	↓	50 uuf	±10 %	100V
C24	↓ -24	CAP CER	.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±20%	35 V
C26	1006755-79	↓	6.8	±20%	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100 V
C28	-3		22 UUF	10%	100V
C29	↓ -3	↓	22 UUF	10%	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10	↓	↓			
CR11	1010286	DIODE IN965B			
CR12	1010385	DIODE IN660			
CR13	↓	↓			
Q1A	1010376-1	TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B	↓	↓			
Q6A	1010395	TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B	↓	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN C.R. Preston DATE 15 OCT 62
CHECKED
APPROVAL J.L. Sitomer 11-28-62
APPROVAL 11-29-62
NASA APPROVAL
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

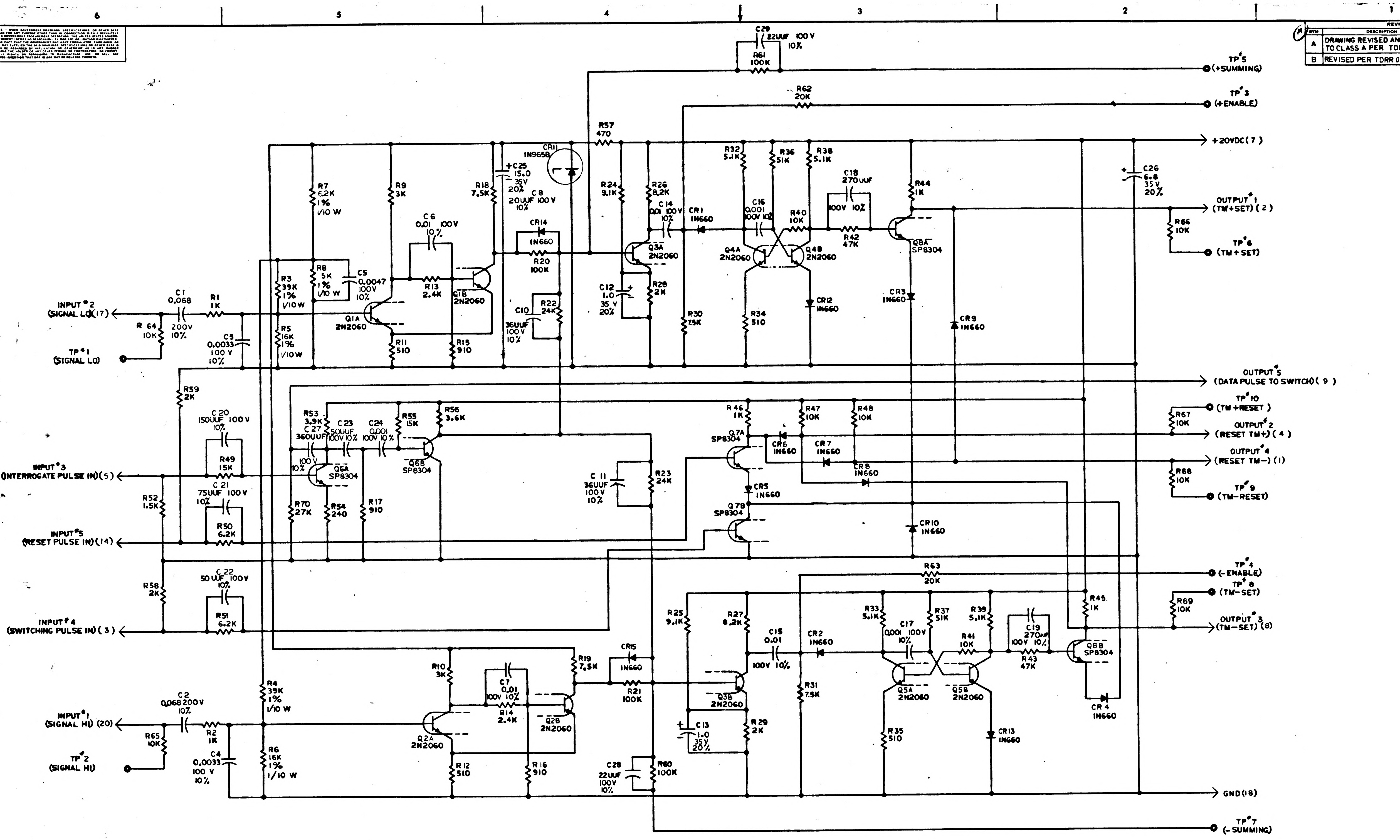
CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 2 OF 2

1010013 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

(M)

REVISIONS CLASS B TDRR 00125			
SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	3863	JLS LK
B	REVISED PER TDRR 00719		LK


C29 22UUF 100 V 10%
R61 100K
TP#5 (+SUMMING)
R62 20K
TP#3 (+ENABLE)
R57 470
+20VDC (7)
CR11 1N965B
+C25 15.0 35V 20%
C8 20UUF 100 V 10%
R7 6.2K 1% 1/10 W
R9 3K
R18 7.5K
C6 0.01 100V 10%
CR14 1N660
R20 100K
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
R3 39K 1% 1/10W
R13 2.4K
Q1B 2N2060
INPUT #2 (SIGNAL LO) (17)
C1 0.068 200V 10%
R1 1K
R64 10K
C3 0.0033 100 V 10%
R5 16K 1% 1/10W
Q1A 2N2060
R11 510
R15 910
C10 36UUF 100 V 10%
R22 24K
TP#1 (SIGNAL LO)
R24 9.1K
R26 8.2K
C14 0.01 100V 10%
CR1 1N660
Q3A 2N2060
C12 1.0 35 V 20%
R28 2K
R30 7.5K
R32 5.1K
R36 51K
R38 5.1K
C16 0.001 100V 10%
R40 10K
Q4A 2N2060
Q4B 2N2060
R34 510
CR12 1N660
C18 270UUF 100V 10%
R42 47K
R44 1K
Q8A SP8304
CR3 1N660
CR9 1N660
C26 6.8 35 V 20%
OUTPUT #1 (TM+SET) (2)
R66 10K
TP#6 (TM+SET)
OUTPUT #5 (DATA PULSE TO SWITCH) (9)
R59 2K
C20 150UUF 100 V 10%
R49 15K
INPUT #3 (INTERROGATE PULSE IN) (5)
C21 75UUF 100 V 10%
R52 1.5K
R50 6.2K
INPUT #5 (RESET PULSE IN) (14)
R53 3.9K
C27 360UUF 100 V 10%
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6A SP8304
Q6B SP8304
R70 27K
R54 240
R17 910
C11 36UUF 100 V 10%
R23 24K
R46 1K
R47 10K
R48 10K
Q7A SP8304
CR6 1N660
CR7 1N660
CR8 1N660
CR5 1N660
Q7B SP8304
CR10 1N660
TP#10 (TM+RESET)
R67 10K
OUTPUT #2 (RESET TM+) (4)
OUTPUT #4 (RESET TM−) (1)
R68 10K
TP#9 (TM−RESET)
R58 2K
C22 50UUF 100V 10%
R51 6.2K
INPUT #4 (SWITCHING PULSE IN) (3)
R63 20K
TP#4 (−ENABLE)
TP#8 (TM−SET)
R69 10K
OUTPUT #3 (TM−SET) (8)
R45 1K
R25 9.1K
R27 8.2K
C15 0.01 100V 10%
CR2 1N660
R33 5.1K
C17 0.001 100V 10%
R37 51K
R39 5.1K
R41 10K
C19 270UUF 100V 10%
R43 47K
Q8B SP8304
Q5A 2N2060
Q5B 2N2060
CR4 1N660
R31 7.5K
R35 510
CR13 1N660
Q3B 2N2060
R29 2K
C13 1.0 35V 20%
R10 3K
C7 0.01 100V 10%
R14 2.4K
R19 7.5K
CR15 1N660
R21 100K
Q2B 2N2060
Q2A 2N2060
R4 39K 1% 1/10 W
INPUT #1 (SIGNAL HI) (20)
C2 0.068 200V 10%
R2 1K
R65 10K
C4 0.0033 100 V 10%
R6 16K 1% 1/10 W
TP#2 (SIGNAL HI)
R12 510
R16 910
C28 22UUF 100V 10%
R60 100K
GND (18)
TP#7 (−SUMMING)

REF DWG: INTERROGATOR ASSEMBLY 1007019

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUBASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN W.F. Troy DATE 11-10-62
CHECKED
APPROVAL 11-27-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	2063		WK
B	REVISED PER TDRR 00719	4-3-63	DT	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±5%	1/4 W
R2	-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR W W	39K	±1%	1/10W
R4	-49		39K	±1%	1/10W
R5	-		16K	±1%	1/10W
R6	-		16K	±1%	1/10W
R7				±1%	1/10W
R8	↓ -51	↓	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	±5%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-49		5.1K		
R33	-49		5.1K		
R34	-25		510		
R35	-25		510		
R36	-73		51K		
R37	-73		51K		
R38	-49		5.1K		
R39	-49		5.1K		
R40	-56		10K		
R41	-56		10K		
R42	-72		47K		
R43	-72		47K		
R44	-32		1K		
R45	-32		1K		
R46	-32		1K		
R47	-56		10K		
R48	-56		10K		
R49	-60		15K		
R50	-51		6.2K		
R51	-51		6.2K		
R52	-36		1.5K		
R53	-46		3.9K		
R54	-17		240		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	-39		2K		
R59	-39		2K		
R60	-80		100K		
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	-56		10K		
R66	-56		10K		
R67	-56		10K		
R68	-56		10K		
R69	-56		10K		
R70	↓ -66	↓	27K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	.068	±10 %	200V
C2	1010264-23	↓	.068	±10 %	200V
C3	1006777-27	CAP CER	.0033	±10 %	100V
C4	-27		.0033	±10 %	100V
C5	-28		.0047	±10 %	100V
C6	-31		.01	±10 %	100V
C7	-31	↓	.01	±10 %	100V
C10	-5		36uuf	±10 %	100V
C11	↓ -5	↓	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±20%	35 V
C13	1006755-69	↓	1.0	±20 %	35 V
C14	1006777-31	CAP CER	.01	±10%	100V
C15	-31		.01	±10%	100V
C16	-24		.001	±10%	100V
C17	-24		.001	±10%	100V
C18	-17		270 uuf	±10 %	100V
C19	-17		270UUF	±10 %	100V
C20	-15		150 uuf	±20%	35 V
C21	-11		75 uuf	±10 %	100V
C22	-8		50uuf	±10 %	100V
C23	-8	↓	50uuf	±10 %	100V
C24	↓ -24	CAP CER	.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±20%	35V
C26	1006755-79	↓	6.8	±20%	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100V
C28	-3		22 UUF	10%	100V
C29	↓ -3	↓	22 UUF	10%	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10	↓	↓			
CR11	1010286	DIODE IN965B			
CR12	1010385	DIODE IN660			
CR13	↓	↓			
Q1A	1010376-1	TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B	↓	↓			
Q6A	1010395	TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B	↓	↓			
CR14	1010385	DIODE IN660			
CR15	↓	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN C.A. Baxter DATE 6 OCT 62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-28-62
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 2 OF 2

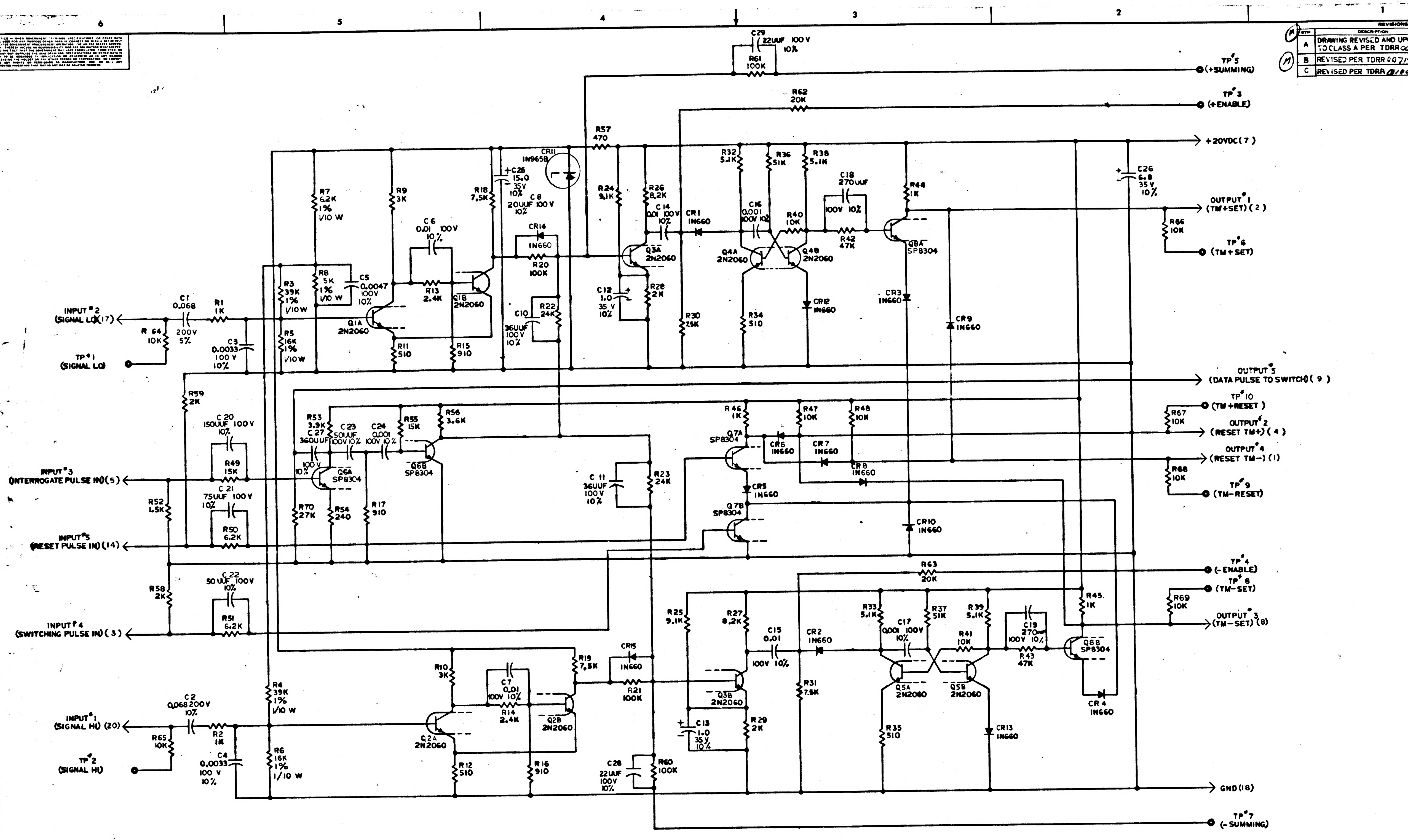
1010013 A

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 0125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	2063	JS	UK
B	REVISED PER TDRR 00719	[illegible]	[illegible]	UK
C	REVISED PER TDRR 01002	[illegible]	[illegible]	UK


C29
22UUF 100 V
10%
R61
100K
TP#5
(+SUMMING)
R62
20K
TP#3
(+ENABLE)
R57
470
+20VDC (7)
CR11
1N965B
+C25
15.0
35V
10%
C8
20UUF 100 V
10%
R7
6.2K
1%
1/10 W
R9
3K
R18
7.5K
R24
9.1K
R26
8.2K
C14
0.01 100V
10%
CR1
1N660
R32
5.1K
R36
51K
R38
5.1K
C16
0.001
100V 10%
R40
10K
C18
270UUF
100V 10%
R42
47K
R44
1K
C26
6.8
35V
10%
OUTPUT#1
(TM+SET) (2)
R66
10K
TP#6
(TM+SET)
C6
0.01 100V
10%
CR14
1N660
R20
100K
Q3A
2N2060
Q4A
2N2060
Q4B
2N2060
Q8A
SP8304
R3
39K
1%
1/10W
R8
5K
1%
1/10 W
C5
0.0047
100V
10%
R13
2.4K
Q1B
2N2060
C12
1.0
35 V
10%
R28
2K
CR3
1N660
CR12
1N660
CR9
1N660
INPUT#2
(SIGNAL LO) (17)
C1
0.068
R1
1K
R 64
10K
200V
5%
Q1A
2N2060
C10
36UUF
100V
10%
R22
24K
R30
7.5K
R34
510
TP#1
(SIGNAL LO)
C3
0.0033
100 V
10%
R5
16K
1%
1/10W
R11
510
R15
910
OUTPUT#5
(DATA PULSE TO SWITCH) (9)
R59
2K
C20
150UUF 100 V
10%
R53
3.9K
C27
360UUF
C23
50UUF
100V 10%
C24
0.001
100V 10%
R55
15K
R56
3.6K
R46
1K
R47
10K
R48
10K
TP#10
(TM+RESET)
R67
10K
OUTPUT#2
(RESET TM+) (4)
Q7A
SP8304
CR6
1N660
CR7
1N660
CR8
1N660
OUTPUT#4
(RESET TM−) (1)
R68
10K
TP#9
(TM−RESET)
INPUT#3
(INTERROGATE PULSE IN) (5)
R49
15K
100V
10%
Q6A
SP8304
Q6B
SP8304
C11
36UUF
100V
10%
R23
24K
CR5
1N660
C21
75UUF 100V
10%
R52
1.5K
R70
27K
R54
240
R17
910
Q7B
SP8304
CR10
1N660
INPUT#5
(RESET PULSE IN) (14)
R50
6.2K
R63
20K
TP#4
(−ENABLE)
TP#8
(TM−SET)
C22
50UUF 100V
10%
R58
2K
R45
1K
R69
10K
R25
9.1K
R27
8.2K
R33
5.1K
C17
0.001 100V
10%
R37
51K
R39
5.1K
C19
270UUF
100V 10%
OUTPUT#3
(TM−SET) (8)
INPUT#4
(SWITCHING PULSE IN) (3)
R51
6.2K
C15
0.01
100V 10%
CR2
1N660
R41
10K
R43
47K
Q8B
SP8304
R19
7.5K
CR15
1N660
R10
3K
C7
0.01
100V 10%
R21
100K
Q3B
2N2060
R31
7.5K
Q5A
2N2060
Q5B
2N2060
CR4
1N660
R4
39K
1%
1/10 W
R14
2.4K
Q2B
2N2060
INPUT#1
(SIGNAL HI) (20)
C2
0.068 200V
10%
R2
1K
R65
10K
Q2A
2N2060
C13
1.0
35V
10%
R29
2K
R35
510
CR13
1N660
TP#2
(SIGNAL HI)
C4
0.0033
100 V
10%
R6
16K
1%
1/10 W
R12
510
R16
910
C28
22UUF
100V
10%
R60
100K
GND (18)
TP#7
(−SUMMING)

REF DWG: INTERROGATOR ASSEMBLY 1007019

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUB ASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY
USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN W.F. Toy DATE 11-10-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 1 OF 2

1010013 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00282	2063	[illegible] WK
B	REVISED PER TDRR 00719	[illegible]	[illegible] WC
C	REVISED PER TDRR 01002	[illegible]	[illegible] WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR W W	39K	±1%	1/10 W
R4	-49		39K	±1%	1/10 W
R5	-105		16K	±1%	1/10 W
R6	-105		16K	±1%	1/10 W
R7	-106		6.2K	±1%	1/10 W
R8	↓ -51	↓	5K	±1%	1/10 W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-49		5.1K		
R33	-49		5.1K		
R34	-25		510		
R35	-25		510		
R36	-73		51K		
R37	-73		51K		
R38	-49		5.1K		
R39	-49		5.1K		
R40	-56		10K		
R41	-56		10K		
R42	-72		47K		
R43	-72		47K		
R44	-32		1K		
R45	-32		1K		
R46	-32		1K		
R47	-56		10K		
R48	-56		10K		
R49	-60		15K		
R50	-51		6.2K		
R51	-51		6.2K		
R52	-36		1.5K		
R53	-46		3.9K		
R54	-17		240		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	-39		2K		
R59	-39		2K		
R60	-80		100K		
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	-56		10K		
R66	-56		10K		
R67	-56		10K		
R68	-56		10K		
R69	-56		10K		
R70	↓ -66	↓	27K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	.068	±5 %	200V
C2	1010264-23	↓	.068	±10 %	200V
C3	1006777-27	CAP CER	.0033	±10 %	100V
C4	-27		.0033	±10 %	100V
C5	-28		.0047	±10 %	100V
C6	-31		.01	±10 %	100V
C7	-31	↓	.01	±10 %	100V
C10	-5		36uuf	±10 %	100V
C11	↓ -5	↓	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10 %	35 V
C13	1006755-69	↓	1.0	±10 %	35 V
C14	1006777-31	CAP CER	.01	±10 %	100V
C15	-31		.01	±10 %	100V
C16	-24		.001	±10 %	100V
C17	-24		.001	±10 %	100V
C18	-17		270 UUF	±10 %	100V
C19	-17		270UUF	±10 %	100V
C20	-15		150 uuf	±20%	35 V
C21	-11		75 uuf	±10 %	100V
C22	-8		50 uuf	±10 %	100V
C23	-8	↓	50 uuf	±10 %	100V
C24	↓ -24	CAP CER	.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±10 %	35V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100V
C28	-3		22 UUF	10 %	100V
C29	↓ -3	↓	22 UUF	10 %	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10	↓	↓			
CR11	1010286-9	DIODE IN965B			
CR12	1010385	DIODE IN660			
CR13	↓	↓			
Q1A	1010376-1	TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B	↓	↓			
Q6A	1010395	TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B	↓	↓			
CR14	1010385	DIODE IN660			
CR15	↓	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG. NO. CONTRACT

DRAWN C.A. Bente DATE 16 OCT 62
CHECKED [illegible]
APPROVAL [illegible] 11-21-62
APPROVAL [illegible] 11-21-62
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 2 OF 2

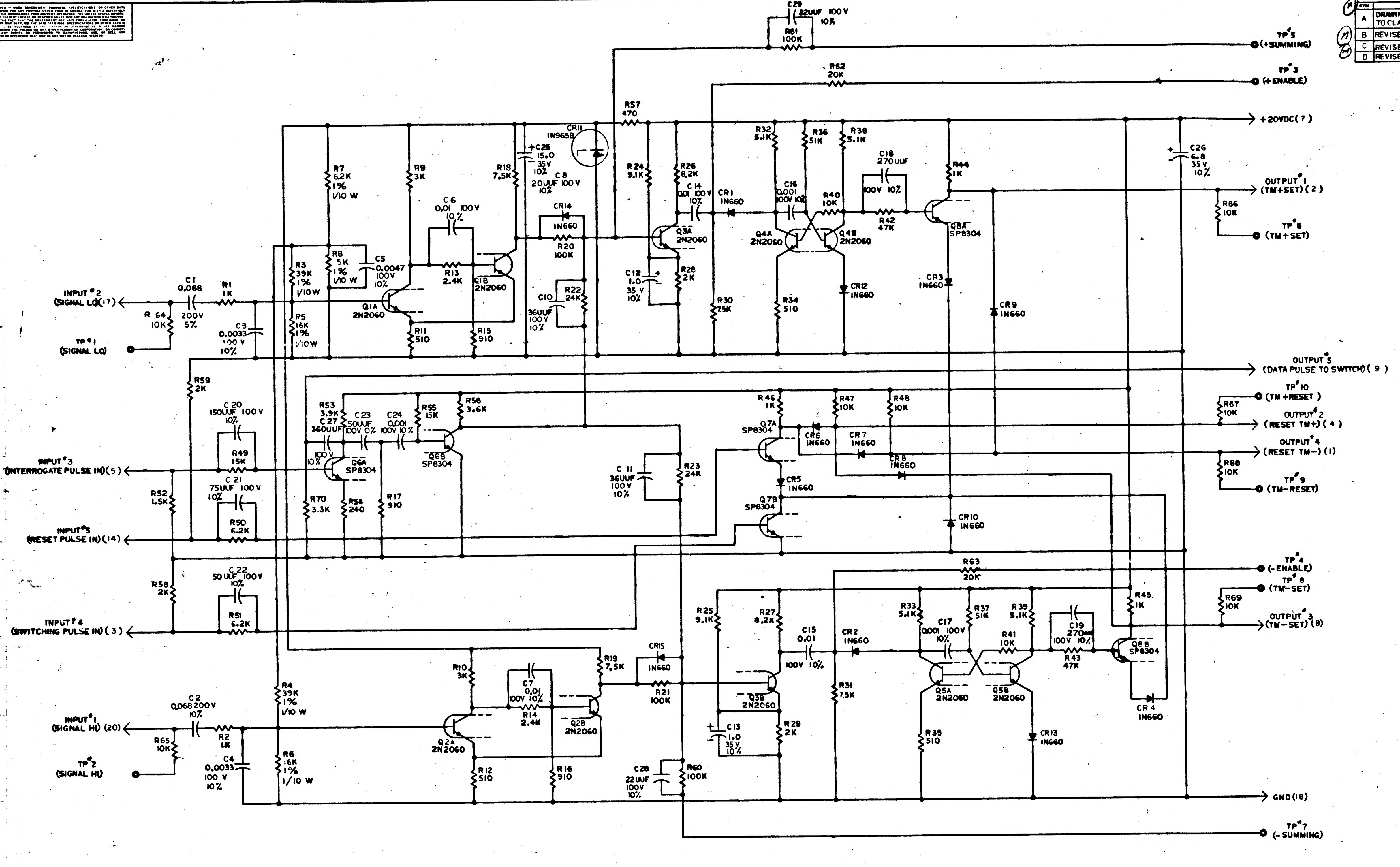
1010013 C

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	3063		UK
B	REVISED PER TDRR 00719			UK
C	REVISED PER TDRR 01002			UK
D	REVISED PER TDRR 03279			UK


C29 22UUF 100V 10%
R61 100K
TP#5 (+SUMMING)
R62 20K
TP#3 (+ENABLE)
R57 470
+20VDC (7)
CR11 IN965B
+C25 15.0 35V 10%
C8 20UUF 100V 10%
R7 6.2K 1% 1/10 W
R9 3K
R18 7.5K
R24 9.1K
R26 8.2K
C14 .01 100V 10%
CR1 IN660
R32 5.1K
R36 51K
R38 5.1K
C16 0.001 100V 10%
R40 10K
C18 270UUF 100V 10%
R42 47K
R44 1K
C26 6.8 35V 10%
OUTPUT#1 (TM+SET) (2)
R66 10K
TP#6 (TM+SET)
C6 0.01 100V 10%
CR14 IN660
R20 100K
Q3A 2N2060
Q4A 2N2060
Q4B 2N2060
Q8A SP8304
R3 39K 1% 1/10W
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
R13 2.4K
Q1B 2N2060
C10 36UUF 100V 10%
R22 24K
C12 1.0 35V 10%
R28 2K
CR12 IN660
CR3 IN660
CR9 IN660
INPUT#2 (SIGNAL LO) (17)
C1 0.068 200V 5%
R1 1K
R64 10K
C3 0.0033 100V 10%
R5 16K 1% 1/10W
Q1A 2N2060
R11 510
R15 910
R30 7.5K
R34 510
TP#1 (SIGNAL LO)
OUTPUT#5 (DATA PULSE TO SWITCH) (9)
R59 2K
C20 150UUF 100V 10%
R49 15K
R53 3.9K
C27 360UUF 100V 10%
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6B SP8304
Q6A SP8304
R46 1K
R47 10K
R48 10K
Q7A SP8304
CR6 IN660
CR7 IN660
CR8 IN660
TP#10 (TM+RESET)
R67 10K
OUTPUT#2 (RESET TM+) (4)
OUTPUT#4 (RESET TM−) (1)
R68 10K
TP#9 (TM−RESET)
INPUT#3 (INTERROGATE PULSE IN) (5)
C21 75UUF 100V 10%
R50 6.2K
R52 1.5K
R70 3.3K
R54 240
R17 910
C11 36UUF 100V 10%
R23 24K
CR5 IN660
Q7B SP8304
CR10 IN660
INPUT#5 (RESET PULSE IN) (14)
C22 50UUF 100V 10%
R51 6.2K
R58 2K
INPUT#4 (SWITCHING PULSE IN) (3)
R63 20K
TP#4 (−ENABLE)
TP#8 (TM−SET)
R45 1K
R69 10K
OUTPUT#3 (TM−SET) (8)
R25 9.1K
R27 8.2K
C15 0.01 100V 10%
CR2 IN660
R33 5.1K
C17 0.001 100V 10%
R37 51K
R39 5.1K
R41 10K
C19 270 100V 10%
R43 47K
Q8B SP8304
CR4 IN660
R10 3K
C7 0.01 100V 10%
R14 2.4K
R19 7.5K
CR15 IN660
R21 100K
Q3B 2N2060
R31 7.5K
Q5A 2N2060
Q5B 2N2060
CR13 IN660
R35 510
INPUT#1 (SIGNAL HI) (20)
C2 0.068 200V 10%
R2 1K
R4 39K 1% 1/10 W
Q2A 2N2060
Q2B 2N2060
R65 10K
C4 0.0033 100V 10%
R6 16K 1% 1/10 W
R12 510
R16 910
C13 1.0 35V 10%
R29 2K
C28 22UUF 100V 10%
R60 100K
TP#2 (SIGNAL HI)
GND (18)
TP#7 (−SUMMING)

REF DWG: INTERROGATOR ASSEMBLY 1007019

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUBASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
APPLICATION		MATERIAL
		HEAT TREATMENT
		FINAL FINISH

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS

DWG NO | CONTRACT

DRAWN W.F. Troy DATE 11-10-62

CHECKED

APPROVAL 11-23-62

APPROVAL 11-29-62

NASA APPROVAL

MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010013

SCALE — WT SHEET 1 OF 2

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REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	2-063	WK
B	REVISED PER TDRR 00719		WK
C	REVISED PER TDRR 01002		WK
D	REVISED PER TDRR 03279		WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	-32	↓	1K	↓	↓
R3	1010377 -49	RESISTOR W W	39K	±1%	1/10 W
R4	-49		39K	±1%	1/10 W
R5	-105		16K	±1%	1/10W
R6	-105		16K	±1%	1/10 W
R7	-106		6.2K	±1%	1/10 W
R8	↓ -51	↓	5K	±1%	1/10 W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-49		5.1K		
R33	-49		5.1K		
R34	-25		510		
R35	-25		510		
R36	-73		51K		
R37	-73		51K		
R38	-49		5.1K		
R39	-49		5.1K		
R40	-56		10K		
R41	-56		10K		
R42	-72		47K		
R43	-72		47K		
R44	-32		1K		
R45	-32		1K		
R46	-32		1K		
R47	-56		10K		
R48	-56		10K		
R49	-60		15K		
R50	-51		6.2K		
R51	-51		6.2K		
R52	-36		1.5K		
R53	-46		3.9K		
R54	-17		240		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	-39		2K		
R59	-39		2K		
R60	-80		100K		
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	-56		10K		
R66	-56		10K		
R67	-56		10K		
R68	-56		10K		
R69	-56		10K		
R70	↓ -44	↓	3.3K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	.068	±5 %	200V
C2	1010264-23	↓	.068	±10 %	200V
C3	1006777-27	CAP CER	.0033	±10 %	100V
C4	-27		.0033	±10 %	100V
C5	-28		.0047	±10 %	100V
C6	-31		.01	±10 %	100V
C7	-31	↓	.01	±10 %	100V
C10	-5		36uuf	±10 %	100V
C11	↓ -5	↓	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10 %	35 V
C13	1006755-69	↓	1.0	±10 %	35 V
C14	1006777-31	CAP CER	.01	±10%	100V
C15	-31		.01	±10%	100V
C16	-24		.001	±10%	100V
C17	-24		.001	±10%	100V
C18	-17		270 uuf	±10 %	100V
C19	-17		270UUF	±10 %	100V
C20	-15		150 uuf	±20%	35 V
C21	-11		75 uuf	±10 %	100V
C22	-8		50uuf	±10 %	100V
C23	-8	↓	50uuf	±10 %	100V
C24	↓ -24	CAP CER	.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±10 %	35 V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100V
C28	-3		22 UUF	10%	100V
C29	↓ -3	↓	22 UUF	10%	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10	↓	↓			
CR11	1010286-9	DIODE IN965B			
CR12	1010385	DIODE IN660			
CR13	↓	↓			
Q1A	1010376-1	TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B	↓	↓			
Q6A	1010395	TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B	↓	↓			
CR14	1010385	DIODE IN660			
CR15	↓	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

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APPROVAL 11-28-62
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MIT APPROVAL

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CODE IDENT NO. SIZE E NASA DRAWING NO. 1010013
SCALE — WT SHEET 2 OF 2

1010013 D

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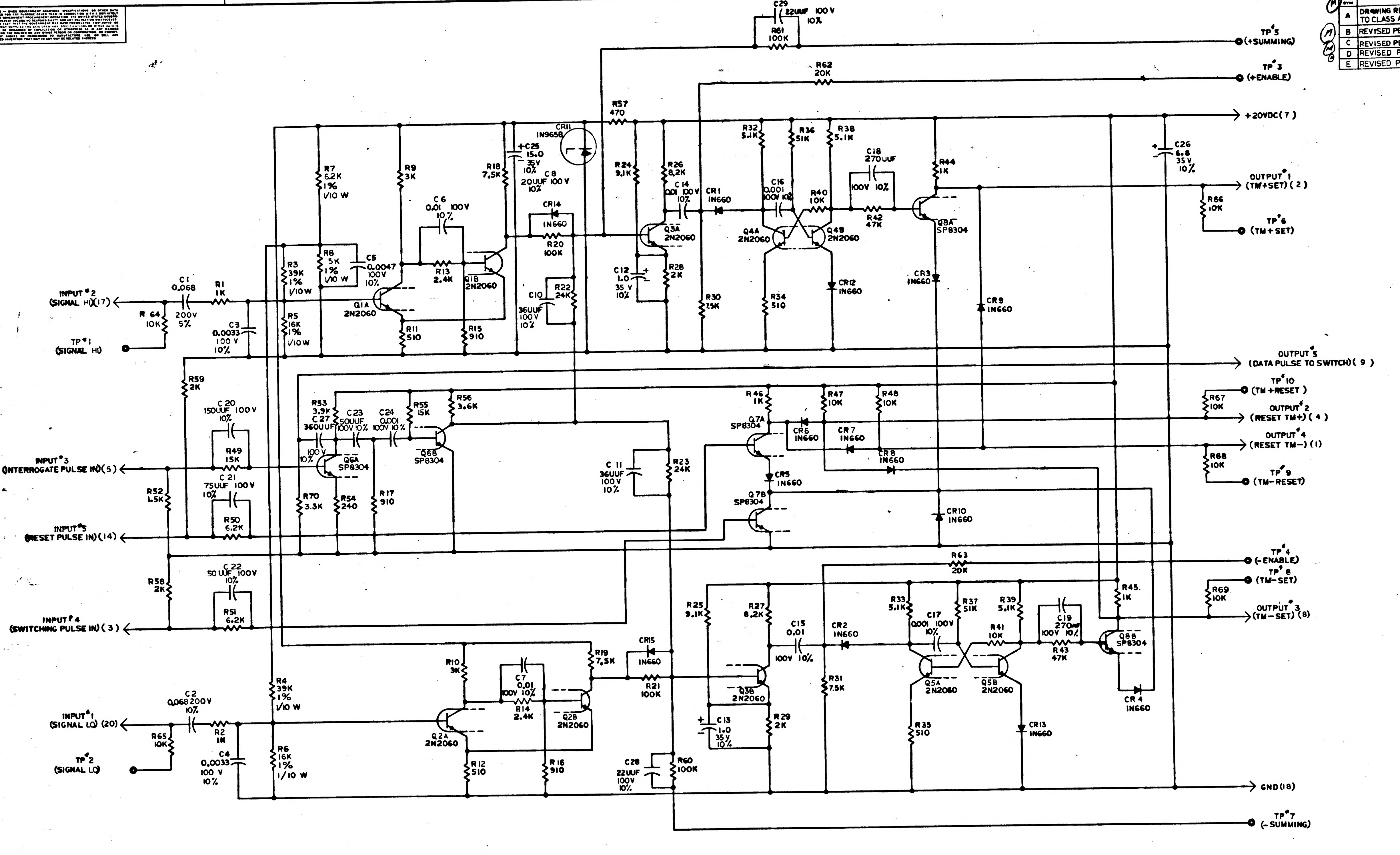
REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	3063	RS	VK
B	REVISED PER TDRR 00719		PT	VK
C	REVISED PER TDRR 01002		PT	VK
D	REVISED PER TDRR 03279		RV	VK
E	REVISED PER TDRR 04113			VK


C29 22UUF 100V 10%
R61 100K
TP#5 (+SUMMING)
R62 20K
TP#3 (+ENABLE)
R57 470
+20VDC (7)
CR11 1N9658
C25 15.0 35V 10%
C8 20UUF 100V 10%
R7 6.2K 1% 1/10 W
R9 3K
C6 0.01 100V 10%
R18 7.5K
CR14 1N660
R20 100K
C10 36UUF 100V 10%
R22 24K
R24 9.1K
R26 8.2K
C14 .001 100V 10%
CR1 1N660
Q3A 2N2060
C12 1.0 35V 10%
R28 2K
R30 7.5K
R32 5.1K
R36 51K
R38 5.1K
C16 0.001 100V 10%
R40 10K
Q4A 2N2060
Q4B 2N2060
R34 510
CR12 1N660
C18 270UUF 100V 10%
R42 47K
R44 1K
Q8A SP8304
CR3 1N660
CR9 1N660
C26 6.8 35V 10%
OUTPUT#1 (TM+SET) (2)
R66 10K
TP#6 (TM+SET)
R3 39K 1% 1/10W
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
R13 2.4K
Q1B 2N2060
Q1A 2N2060
R11 510
R15 910
R5 16K 1% 1/10W
INPUT#2 (SIGNAL HI) (17)
C1 0.068 200V 5%
R1 1K
R64 10K
C3 0.0033 100V 10%
TP#1 (SIGNAL HI)
OUTPUT#5 (DATA PULSE TO SWITCH) (9)
R59 2K
C20 150UUF 100V 10%
R49 15K
C21 75UUF 100V 10%
R50 6.2K
R52 1.5K
INPUT#3 (INTERROGATE PULSE IN) (5)
INPUT#5 (RESET PULSE IN) (14)
R53 3.9K
C27 360UUF 100V 10%
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6A SP8304
Q6B SP8304
R70 3.3K
R54 240
R17 910
C11 36UUF 100V 10%
R23 24K
R46 1K
R47 10K
R48 10K
Q7A SP8304
CR6 1N660
CR7 1N660
CR8 1N660
CR5 1N660
Q7B SP8304
CR10 1N660
TP#10 (TM+RESET)
R67 10K
OUTPUT#2 (RESET TM+) (4)
OUTPUT#4 (RESET TM−) (1)
R68 10K
TP#9 (TM−RESET)
C22 50UUF 100V 10%
R58 2K
R51 6.2K
INPUT#4 (SWITCHING PULSE IN) (3)
R63 20K
TP#4 (−ENABLE)
TP#8 (TM−SET)
R69 10K
OUTPUT#3 (TM−SET) (8)
R45 1K
R25 9.1K
R27 8.2K
C15 0.01 100V 10%
CR2 1N660
R33 5.1K
C17 0.001 100V 10%
R37 51K
R39 5.1K
R41 10K
C19 270UUF 100V 10%
R43 47K
Q8B SP8304
CR4 1N660
CR15 1N660
R19 7.5K
R21 100K
Q3B 2N2060
R29 2K
C13 1.0 35V 10%
R31 7.5K
Q5A 2N2060
Q5B 2N2060
R35 510
CR13 1N660
R10 3K
C7 0.01 100V 10%
R14 2.4K
Q2B 2N2060
Q2A 2N2060
R4 39K 1% 1/10 W
R6 16K 1% 1/10 W
INPUT#1 (SIGNAL LO) (20)
C2 0.068 200V 10%
R2 1K
R65 10K
C4 0.0033 100V 10%
TP#2 (SIGNAL LO)
R12 510
R16 910
C28 22UUF 100V 10%
R60 100K
GND (18)
TP#7 (−SUMMING)

REF DWG: INTERROGATOR ASSEMBLY 1007019

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUB ASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

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INTERROGATOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010013
SCALE — | WT | SHEET 1 OF 2

1010013

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REVISIONS CLASS E TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00283	2063	WK
B	REVISED PER TDRR 00719	4-3-63	WK
C	REVISED PER TDRR 01002	4-25-63	WK
D	REVISED PER TDRR 03279		WK
E	REVISED PER TDRR 04113		

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR WW	39K	±1%	1/10W
R4	-49		39K	±1%	1/10W
R5	-105		16K	±1%	1/10W
R6	-105		16K	±1%	1/10W
R7	-106		6.2K	±1%	1/10W
R8	↓ -51	↓	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-49		5.1K		
R33	-49		5.1K		
R34	-25		510		
R35	-25		510		
R36	-73		51K		
R37	-73		51K		
R38	-49		5.1K		
R39	-49		5.1K		
R40	-56		10K		
R41	-56		10K		
R42	-72		47K		
R43	-72		47K		
R44	-32		1K		
R45	-32		1K		
R46	-32		1K		
R47	-56		10K		
R48	-56		10K		
R49	-60		15K		
R50	-51		6.2K		
R51	-51		6.2K		
R52	-36		1.5K		
R53	-46		3.9K		
R54	-17		240		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	-39		2K		
R59	-39		2K		
R60	-80		100K		
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	-56		10K		
R66	-56		10K		
R67	-56		10K		
R68	-56		10K		
R69	-56		10K		
R70	↓ -44	↓	3.3K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	.068	±5 %	200V
C2	1010264-23	↓	.068	±10 %	200V
C3	1006777-27	CAP CER	.0033	±10 %	100V
C4	-27		.0033	±10 %	100V
C5	-28		.0047	±10 %	100V
C6	-31		.01	±10 %	100V
C7	-31	↓	.01	±10 %	100V
C10	-5		36uuf	±10 %	100V
C11	↓ -5	↓	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10 %	35 V
C13	1006755-69	↓	1.0	±10 %	35 V
C14	1006777-31	CAP CER	.01	±10 %	100V
C15	-31		.01	±10 %	100V
C16	-24		.001	±10 %	100V
C17	-24		.001	±10 %	100V
C18	-17		270 uuf	±10 %	100V
C19	-17		270uuf	±10 %	100V
C20	-15		150 uuf	±20%	35 V
C21	-11		75 uuf	±10 %	100V
C22	-8		50 uuf	±10 %	100V
C23	-8	↓	50 uuf	±10 %	100V
C24	↓ -24	CAP CER	.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±10 %	35 V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100 V
C28	-3		22 UUF	10%	100V
C29	↓ -3	↓	22 UUF	10%	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10	↓	↓			
CR11	1010286-9	DIODE IN965B			
CR12	1010385	DIODE IN660			
CR13	↓	↓			
Q1A	1010376-1	TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B	↓	↓			
Q6A	1010395	TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B	↓	↓			
CR14	1010385	DIODE IN660			
CR15	↓	↓			

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QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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APPROVAL 11-
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HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
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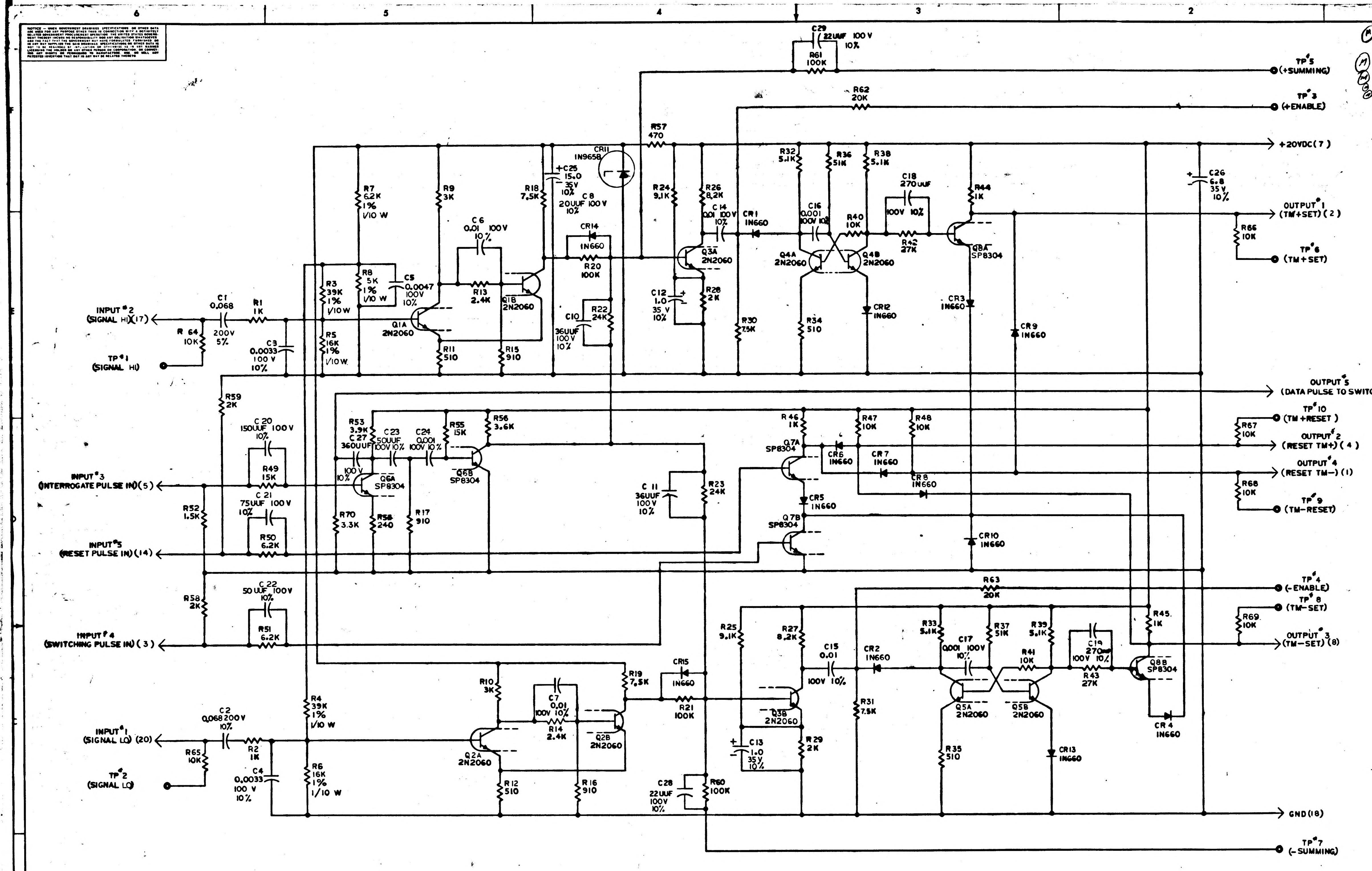
REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	3863	BS UK
B	REVISED PER TDRR 00719	4-3-63	UK
C	REVISED PER TDRR 01002	[illegible]	UK
D	REVISED PER TDRR 03279	18 SEP 63	RJ UK
E	REVISED PER TDRR 04113		UK
F	REVISED PER TDRR 05337	11-4-63	[illegible]



C29 22UUF 100V 10%
R61 100K
TP#5 (+SUMMING)
R62 20K
TP#3 (+ENABLE)
R57 470
+20VDC (7)
CR11 1N965B
+C25 15.0 35V 10%
C8 20UUF 100V 10%
R7 6.2K 1% 1/10 W
R9 3K
R18 7.5K
C6 0.01 100V 10%
CR14 1N660
R20 100K
R3 39K 1% 1/10W
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
R13 2.4K
Q1B 2N2060
C10 36UUF 100V 10%
R22 24K
INPUT#2 (SIGNAL HI) (17)
C1 0.068 200V 5%
R1 1K
R64 10K
TP#1 (SIGNAL HI)
C3 0.0033 100V 10%
R5 16K 1% 1/10W
Q1A 2N2060
R11 510
R15 910
R24 9.1K
R26 8.2K
C14 0.01 100V 10%
CR1 1N660
Q3A 2N2060
C12 1.0 35V 10%
R28 2K
R30 7.5K
R32 5.1K
R36 51K
R38 5.1K
C16 0.001 100V 10%
R40 10K
Q4A 2N2060
Q4B 2N2060
R34 510
CR12 1N660
C18 270UUF 100V 10%
R42 27K
R44 1K
Q8A SP8304
CR3 1N660
CR9 1N660
C26 6.8 35V 10%
OUTPUT#1 (TM+SET) (2)
R66 10K
TP#6 (TM+SET)
OUTPUT#5 (DATA PULSE TO SWITCH) (9)
TP#10 (TM+RESET)
R67 10K
OUTPUT#2 (RESET TM+) (4)
OUTPUT#4 (RESET TM−) (1)
R68 10K
TP#9 (TM−RESET)
R59 2K
C20 150UUF 100V 10%
R49 15K
R53 3.9K
C27 360UUF 100V 10%
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6B SP8304
Q6A SP8304
INPUT#3 (INTERROGATE PULSE IN) (5)
C21 75UUF 100V 10%
R50 6.2K
R52 1.5K
R70 3.3K
R58 240
R17 910
C11 36UUF 100V 10%
R23 24K
R46 1K
R47 10K
R48 10K
Q7A SP8304
CR6 1N660
CR7 1N660
CR8 1N660
CR5 1N660
Q7B SP8304
CR10 1N660
INPUT#5 (RESET PULSE IN) (14)
R58 2K
C22 50UUF 100V 10%
R51 6.2K
INPUT#4 (SWITCHING PULSE IN) (3)
R63 20K
TP#4 (−ENABLE)
TP#8 (TM−SET)
R45 1K
R69 10K
OUTPUT#3 (TM−SET) (8)
R25 9.1K
R27 8.2K
C15 0.01 100V 10%
CR2 1N660
R33 5.1K
C17 0.001 100V 10%
R37 51K
R39 5.1K
R41 10K
C19 270 100V 10%
R43 27K
Q8B SP8304
CR4 1N660
R10 3K
C7 0.01 100V 10%
R14 2.4K
R19 7.5K
CR15 1N660
R21 100K
Q3B 2N2060
Q2B 2N2060
R4 39K 1% 1/10 W
INPUT#1 (SIGNAL LO) (20)
C2 0.068 200V 10%
R2 1K
R65 10K
TP#2 (SIGNAL LO)
C4 0.0033 100V 10%
R6 16K 1% 1/10 W
Q2A 2N2060
R12 510
R16 910
C13 1.0 35V 10%
R29 2K
R31 7.5K
Q5A 2N2060
Q5B 2N2060
R35 510
CR13 1N660
C28 22UUF 100V 10%
R60 100K
GND (18)
TP#7 (−SUMMING)

REF DWG: INTERROGATOR ASSEMBLY 1007019

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUBASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN W.F. [illegible] DATE 11-10-62
CHECKED [illegible]
APPROVAL [illegible] 11-27-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 1 OF 2

1010013

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	2063	WK
B	REVISED PER TDRR 00719	4-3-63	WK
C	REVISED PER TDRR 01002	4-25-63	WK
D	REVISED PER TDRR 03279		WK
E	REVISED PER TDRR 0-113		WK
F	REVISED PER TDRR 05337	11-4-63	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	±2%	1/4 W
R2	-32	↓	1K	↓	↓
R3	1010377-49	RESISTOR W W	39K	±1%	1/10W
R4	-49		39K	±1%	1/10W
R5	-105		16K	±1%	1/10W
R6	-105		16K	±1%	1/10W
R7	-106		6.2K	±1%	1/10W
R8	↓ -51	↓	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	±2%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-49		5.1K		
R33	-49		5.1K		
R34	-25		510		
R35	-25		510		
R36	-73		51K		
R37	-73		51K		
R38	-49		5.1K		
R39	-49		5.1K		
R40	-56		10K		
R41	-56		10K		
R42	-66		27K		
R43	-66		27K		
R44	-32		1K		
R45	-32		1K		
R46	-32		1K		
R47	-56		10K		
R48	-56		10K		
R49	-60		15K		
R50	-51		6.2K		
R51	-51		6.2K		
R52	-36		1.5K		
R53	-46		3.9K		
R54	-17		240		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	-39		2K		
R59	-39		2K		
R60	-80		100K		
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10K		
R65	-56		10K		
R66	-56		10K		
R67	-56		10K		
R68	-56		10K		
R69	-56		10K		
R70	↓ -44	↓	3.3K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	.068	±5 %	200V
C2	1010264-23	↓	.068	±10 %	200V
C3	1006777-27	CAP CER	.0033	±10 %	100V
C4	-27		.0033	±10 %	100V
C5	-28		.0047	±10 %	100V
C6	-31		.01	±10 %	100V
C7	-31	↓	.01	±10 %	100V
C10	-5		36uuf	±10 %	100V
C11	↓ -5	↓	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	±10 %	35 V
C13	1006755-69	↓	1.0	±10 %	35 V
C14	1006777-31	CAP CER	.01	±10 %	100V
C15	-31		.01	±10 %	100V
C16	-24		.001	±10 %	100V
C17	-24		.001	±10 %	100V
C18	-17		270 uuf	±10 %	100V
C19	-17		270UUF	±10 %	100V
C20	-15		150 uuf	±20%	35 V
C21	-11		75 uuf	±10 %	100V
C22	-8		50uuf	±10 %	100V
C23	-8	↓	50uuf	±10 %	100V
C24	↓ -24	CAP CER	.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	±10 %	35 V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100 V
C28	-3		22 UUF	10%	100V
C29	↓ -3	↓	22 UUF	10%	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10	↓	↓			
CR11	1010286-9	DIODE IN965B			
CR12	1010385	DIODE IN660			
CR13	↓	↓			
Q1A	1010376-1	TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B	↓	↓			
Q6A	1010395	TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B	↓	↓			
CR14	1010385	DIODE IN660			
CR15	↓	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN C.A. Baxter DATE 16 OCT 62
CHECKED
APPROVAL J.L. Sitomer 11-21-62
APPROVAL
NASA APPROVAL 11/30/62
MIT APPROVAL 30

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 2 OF 2

1010013 F

INCHES
PHOTOGRAPHIC SCALE ONLY

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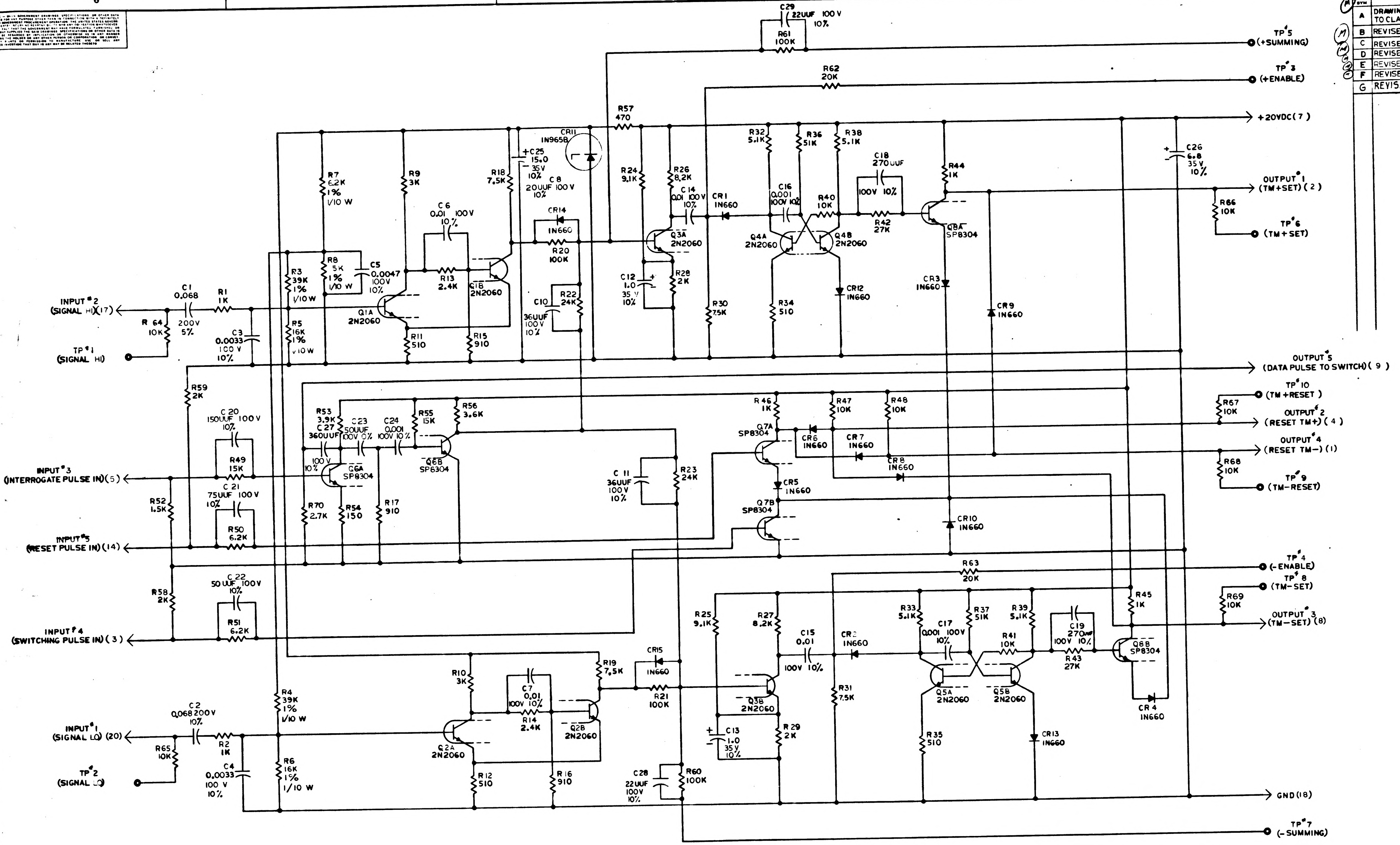
REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00383	2063	JS	WK
B	REVISED PER TDRR 00719	4-3-63	DT	WK
C	REVISED PER TDRR 01002	9-25-63	DT	WK
D	REVISED PER TDRR 03279	18SEP63	RV	WK
E	REVISED PER TDRR 04113			WK
F	REVISED PER TDRR 05337	11-4-63		
G	REVISED PER TDRR 14092	18 NOV 64	JV	



C29 22UUF 100V 10%
R61 100K
TP#5 (+SUMMING)
R62 20K
TP#3 (+ENABLE)
R57 470
+20VDC (7)
CR11 1N965B
C25 15.0 35V 10%
C8 20UUF 100V 10%
R7 6.2K 1% 1/10 W
R9 3K
R18 7.5K
C6 0.01 100V 10%
R13 2.4K
Q1B 2N2060
CR14 1N660
R20 100K
C10
R22 24K
36UUF 100V 10%
R3 39K 1% 1/10W
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
Q1A 2N2060
R11 510
R15 910
R5 16K 1% 1/10W
INPUT#2 (SIGNAL HI) (17)
C1 0.068 200V 5%
R1 1K
R 64 10K
C3 0.0033 100 V 10%
TP#1 (SIGNAL HI)
R24 9.1K
R26 8.2K
C14 0.01 100V 10%
CR1 1N660
Q3A 2N2060
C12 1.0 35V 10%
R28 2K
R30 7.5K
R32 5.1K
R36 51K
R38 5.1K
C16 0.001 100V 10%
R40 10K
C18 270UUF 100V 10%
R42 27K
Q4A 2N2060
Q4B 2N2060
R34 510
CR12 1N660
R44 1K
Q8A SP8304
CR3 1N660
CR9 1N660
C26 6.8 35V 10%
OUTPUT#1 (TM+SET) (2)
R66 10K
TP#6 (TM+SET)
OUTPUT#5 (DATA PULSE TO SWITCH) (9)
R59 2K
C20 150UUF 100V 10%
R49 15K
C21 75UUF 100V 10%
R50 6.2K
INPUT#3 (INTERROGATE PULSE IN) (5)
R52 1.5K
INPUT#5 (RESET PULSE IN) (14)
R53 3.9K
C27 360UUF 100V 10%
C23 500UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6A SP8304
Q6B SP8304
R70 2.7K
R54 150
R17 910
C11 36UUF 100V 10%
R23 24K
R46 1K
R47 10K
R48 10K
Q7A SP8304
CR6 1N660
CR7 1N660
CR8 1N660
CR5 1N660
Q7B SP8304
CR10 1N660
TP#10 (TM+RESET)
R67 10K
OUTPUT#2 (RESET TM+) (4)
OUTPUT#4 (RESET TM−) (1)
R68 10K
TP#9 (TM−RESET)
R58 2K
C22 50UUF 100V 10%
R51 6.2K
INPUT#4 (SWITCHING PULSE IN) (3)
R63 20K
TP#4 (−ENABLE)
TP#8 (TM−SET)
R25 9.1K
R27 8.2K
C15 0.01 100V 10%
CR2 1N660
R33 5.1K
R37 51K
R39 5.1K
C17 0.001 100V 10%
R41 10K
C19 270UUF 100V 10%
R43 27K
R45 1K
Q8B SP8304
CR4 1N660
R69 10K
OUTPUT#3 (TM−SET) (8)
R19 7.5K
CR15 1N660
R21 100K
R10 3K
C7 0.01 100V 10%
R14 2.4K
Q2B 2N2060
Q2A 2N2060
Q3B 2N2060
C13 1.0 35V 10%
R29 2K
R31 7.5K
Q5A 2N2060
Q5B 2N2060
R35 510
CR13 1N660
R4 39K 1% 1/10 W
R6 16K 1% 1/10 W
INPUT#1 (SIGNAL LO) (20)
C2 0.068 200V 10%
R2 1K
R65 10K
C4 0.0033 100 V 10%
TP#2 (SIGNAL LO)
R12 510
R16 910
C28 22UUF 100V 10%
R60 100K
GND (18)
TP#7 (−SUMMING)

REF DWG: INTERROGATOR ASSEMBLY 1007019

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUBASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
JOB NO
CONTRACT
DRAWN W.F. Troy DATE 10-10-62
CHECKED
APPROVAL 11-28-62
APPROVAL D.R. 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 1 OF 2

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 00125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00983	2663	WK
B	REVISED PER TDRR 00719	4-3-63	WK
C	REVISED PER TDRR 01002		WK
D	REVISED PER TDRR 03279		WK
E	REVISED PER TDRR 04[illegible]		WK
F	REVISED PER TDRR 05337	4-4-63	
G	REVISED PER TDRR 14[illegible]-2	18 NOV 64	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-32	RESISTOR MF	1K	± 2%	1/4 W
R2	-32	↓	1K	↓	↓
R3	1010377 -49	RESISTOR W W	39K	±1%	1/10W
R4	-49		39K	±1%	1/10W
R5	- 105		16K	±1%	1/10W
R6	- 105		16K	±1%	1/10W
R7	- 106		6.2K	±1%	1/10W
R8	↓ - 51	↓	5K	±1%	1/10W
R9	1006750-43	RESISTOR MF	3K	± 2%	1/4 W
R10	-43		3K		
R11	-25		510		
R12	-25		510		
R13	-41		2.4K		
R14	-41		2.4K		
R15	-31		910		
R16	-31		910		
R17	-31		910		
R18	-53		7.5K		
R19	-53		7.5K		
R20	-80		100K		
R21	-80		100K		
R22	-65		24K		
R23	-65		24K		
R24	-55		9.1K		
R25	-55		9.1K		
R26	-54		8.2K		
R27	-54		8.2K		
R28	-39		2K		
R29	-39		2K		
R30	-53		7.5K		
R31	-53		7.5K		
R32	-49		5.1K		
R33	-49		5.1K		
R34	-25		510		
R35	-25		510		
R36	-73		51K		
R37	-73		51K		
R38	-49		5.1K		
R39	-49		5.1K		
R40	-56		10K		
R41	-56		10K		
R42	-66		27K		
R43	-66		27K		
R44	-32		1K		
R45	-32		1K		
R46	-32		1K		
R47	-56		10K		
R48	-56		10K		
R49	-60		15K		
R50	-51		6.2K		
R51	-51		6.2K		
R52	-36		1.5K		
R53	-46		3.9K		
R54	-12		150		
R55	-60		15K		
R56	-45		3.6K		
R57	-24		470		
R58	-39		2K		
R59	-39		2K		
R60	-80		100K		
R61	-80		100K		
R62	-63		20K		
R63	-63		20K		
R64	-56		10 K		
R65	-56		10 K		
R66	-56		10 K		
R67	-56		10K		
R68	-56		10K		
R69	-56		10K		
R70	↓ -42	↓	2.7K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-23	CAP MYLAR	.068	± 5 %	200V
C2	1010264-23	↓	.068	±10 %	200V
C3	1006777-27	CAP CER	.0033	±10 %	100V
C4	-27		.0033	±10 %	100V
C5	-28		.0047	±10 %	100V
C6	-31		.01	±10 %	100V
C7	-31	↓	.01	±10 %	100V
C10	-5		36uuf	±10 %	100V
C11	↓ -5	↓	36uuf	±10 %	100V
C12	1006755-69	CAP TANT SOLID P	1.0	± 10 %	35 V
C13	1006755- 69	↓	1.0	± 10 %	35 V
C14	1006777- 31	CAP CER	.01	±10 %	100V
C15	-31		.01	±10 %	100V
C16	-24		.001	±10 %	100V
C17	-24		.001	±10 %	100V
C18	-17		270 uuf	±10 %	100V
C19	-17		270UUF	±10 %	100V
C20	-15		150 uuf	±20%	35 V
C21	-11		75 uuf	±10 %	100V
C22	-8		50uuf	±10 %	100V
C23	-8	↓	50uuf	±10 %	100V
C24	↓ -24	CAP CER	.001	±10 %	100V
C25	1006755-83	CAP TANT SOLID P	15	± 10 %	35 V
C26	1006755-79	↓	6.8	±10 %	35V
C27	1006777-19	CAP CER	360 uuf	±10 %	100 V
C28	-3		22 UUF	10 %	100V
C29	↓ -3	↓	22 UUF	10 %	100V
CR1	1010385	DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10	↓	↓			
CR11	1010286-9	DIODE IN965B			
CR12	1010385	DIODE IN660			
CR13	↓	↓			
Q1A	1010376-1	TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B	↓	↓			
Q6A	1010395	TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B	↓	↓			
CR14	1010385	DIODE IN660			
CR15	↓	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

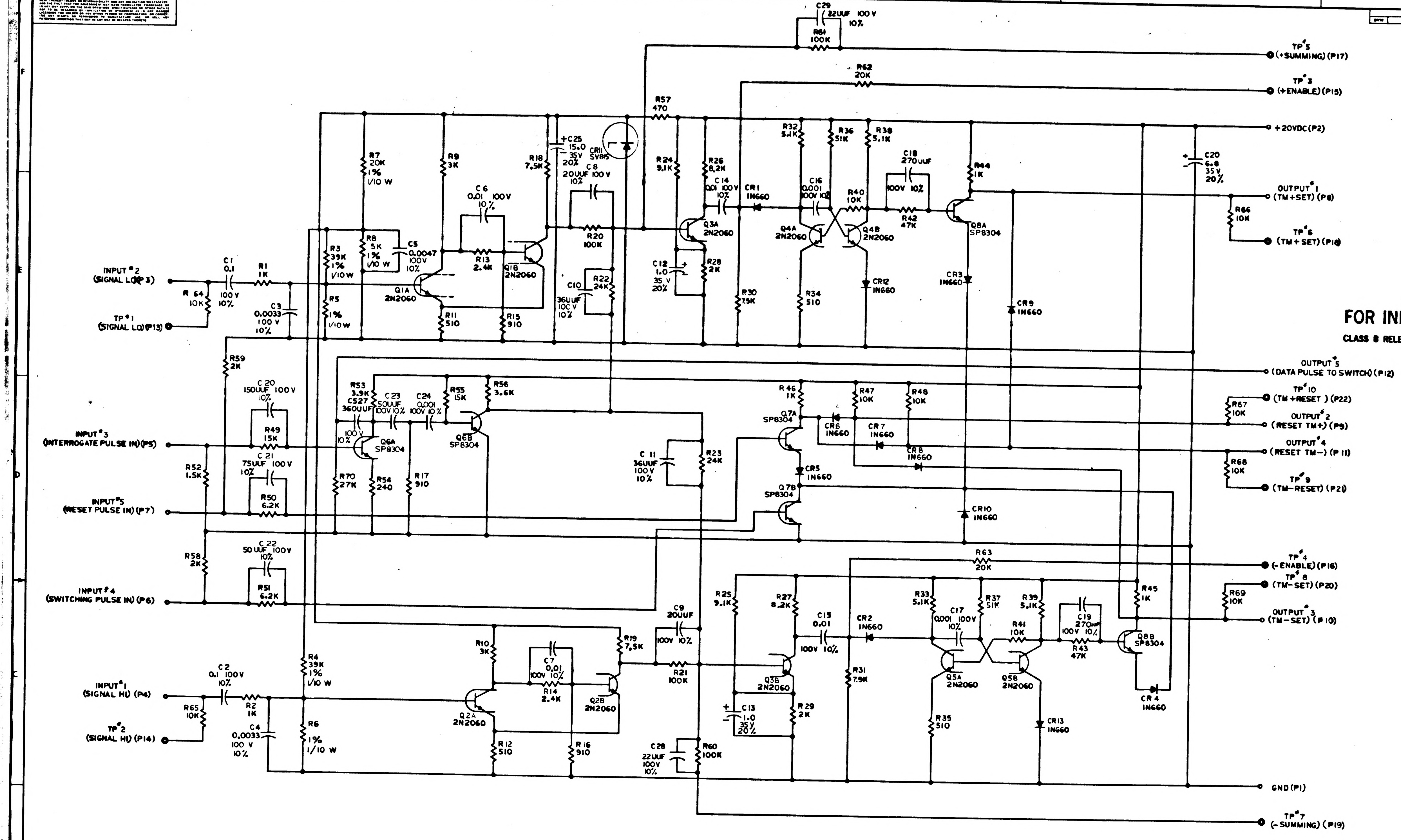
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN C.A. Brester DATE 16 OCT 62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO. SIZE E NASA DRAWING NO. 10:0013
SCALE — WT SHEET 2 OF 2


C29 22UUF 100 V 10%
R61 100K
TP#5 (+SUMMING) (P17)
R62 20K
TP#3 (+ENABLE) (P15)
R57 470
+20VDC (P2)
R7 20K 1% 1/10 W
R9 3K
R18 7.5K
C25 15.0 35V 20%
CR11 5V85
C8 20UUF 100 V 10%
R24 9.1K
R26 8.2K
C14 .001 100V 10%
CR1 1N660
R32 5.1K
R36 51K
R38 5.1K
C16 0.001 100V 10%
C18 270UUF 100V 10%
R40 10K
R42 47K
R44 1K
C20 6.8 35 V 20%
OUTPUT#1 (TM+SET) (P8)
R66 10K
TP#6 (TM+SET) (P18)
C6 0.01 100V 10%
R13 2.4K
Q1B 2N2060
R20 100K
Q3A 2N2060
Q4A 2N2060
Q4B 2N2060
Q8A SP8304
INPUT#2 (SIGNAL LO) (P3)
C1 0.1 100V 10%
R1 1K
R64 10K
TP#1 (SIGNAL LO) (P13)
C3 0.0033 100 V 10%
R3 39K 1% 1/10W
R8 5K 1% 1/10 W
C5 0.0047 100V 10%
Q1A 2N2060
R5 1% 1/10W
R11 510
R15 910
C10 36UUF 100 V 10%
R22 24K
C12 1.0 35 V 20%
R28 2K
R30 7.5K
R34 510
CR12 1N660
CR3 1N660
CR9 1N660
OUTPUT#5 (DATA PULSE TO SWITCH) (P12)
R59 2K
C20 150UUF 100 V 10%
R49 15K
R53 3.9K
C527 360UUF
C23 50UUF 100V 10%
C24 0.001 100V 10%
R55 15K
R56 3.6K
Q6B SP8304
Q6A SP8304
INPUT#3 (INTERROGATE PULSE IN) (P5)
R52 1.5K
C21 75UUF 100V 10%
R50 6.2K
INPUT#5 (RESET PULSE IN) (P7)
R70 27K
R54 240
R17 910
C11 36UUF 100 V 10%
R23 24K
R46 1K
Q7A SP8304
R47 10K
R48 10K
CR6 1N660
CR7 1N660
CR8 1N660
CR5 1N660
Q7B SP8304
CR10 1N660
TP#10 (TM+RESET) (P22)
R67 10K
OUTPUT#2 (RESET TM+) (P9)
OUTPUT#4 (RESET TM−) (P11)
R68 10K
TP#9 (TM−RESET) (P21)
R58 2K
C22 50UUF 100V 10%
R51 6.2K
INPUT#4 (SWITCHING PULSE IN) (P6)
R63 20K
TP#4 (−ENABLE) (P16)
TP#8 (TM−SET) (P20)
R69 10K
OUTPUT#3 (TM−SET) (P10)
R45 1K
R25 9.1K
R27 8.2K
C9 20UUF 100V 10%
C15 0.01 100V 10%
CR2 1N660
R33 5.1K
C17 .001 100V 10%
R37 51K
R39 5.1K
C19 270UUF 100V 10%
R41 10K
R43 47K
Q8B SP8304
CR4 1N660
R10 3K
C7 0.01 100V 10%
R14 2.4K
R19 7.5K
R21 100K
Q3B 2N2060
Q5A 2N2060
Q5B 2N2060
R31 7.5K
R4 39K 1% 1/10 W
Q2A 2N2060
Q2B 2N2060
INPUT#1 (SIGNAL HI) (P4)
C2 0.1 100V 10%
R2 1K
R65 10K
TP#2 (SIGNAL HI) (P14)
C4 0.0033 100 V 10%
R6 1% 1/10 W
R12 510
R16 910
C13 1.0 35V 20%
R29 2K
R35 510
CR13 1N660
C28 22UUF 100V 10%
R60 100K
GND (P1)
TP#7 (−SUMMING) (P19)

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00125 DATE 11-30-62

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PART DESIGNATION WITH THE SUB ASSEMBLY DESIGNATION.
5. ALL RESISTORS TO BE 1/4W ± 5% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
CONTRACT
DRAWN W.F. [illegible] DATE 10-10-62
CHECKED [illegible]
APPROVAL [illegible] 11-29-62
APPROVAL R.R. [illegible] 11-29-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —
WT
SHEET 1 OF 2

REVISIONS
SYM DESCRIPTION DATE APPROVAL

1010013

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR MF	1K	±5%	1/4 W
R2		↓	1K	↓	↓
R3		RESISTOR W W	30K	±1%	1/10W
R4			30K	±1%	1/10W
R5				±1%	1/10W
R6				±1%	1/10W
R7			20K	±1%	1/10W
R8		↓	5K	±1%	1/10W
R9		RESISTOR MF	3K	±5%	1/4 W
R10			3K		
R11			510		
R12			510		
R13			2.4K		
R14			2.4K		
R15			910		
R16			910		
R17			910		
R18			7.5K		
R19			7.5K		
R20			100K		
R21			100K		
R22			24K		
R23			24K		
R24			9.1K		
R25			9.1K		
R26			8.2K		
R27			8.2K		
R28			2K		
R29			2K		
R30			7.5K		
R31			7.5K		
R32			5.1K		
R33			5.1K		
R34			510		
R35			510		
R36			51K		
R37			51K		
R38			5.1K		
R39			5.1K		
R40			10K		
R41			10K		
R42			47K		
R43			47K		
R44			1K		
R45			1K		
R46			1K		
R47			10K		
R48			10K		
R49			15K		
R50			6.2K		
R51			6.2K		
R52			1.5K		
R53			3.9K		
R54			240		
R55			15K		
R56			3.6K		
R57			470		
R58			2K		
R59			2K		
R60			100K		
R61			100K		
R62			20K		
R63			20K		
R64			10K		
R65			10K		
R66			10K		
R67			10K		
R68			10K		
R69			10K		
R70		↓	27K	↓	↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1		CAP MYLAR	.1	±10 %	100V
C2			.1	±10 %	100V
C3			.0033	±10 %	100V
C4			.0033	±10 %	100V
C5			.0047	±10 %	100V
C6			.01	±10 %	100V
C7		↓	.01	±10 %	100V
C8		CAP CER	20uuf	±10 %	100V
C9			20uuf	±10 %	100V
C10			36uuf	±10 %	100V
C11		↓	36uuf	±10 %	100V
C12		CAP TANT SOLID P	1.0	±20%	35 V
C13		↓	1.0	±20%	35 V
C14		CAP MYLAR	.01	±10%	100V
C15			.01	±10%	100V
C16			.001	±10%	100V
C17		↓	.001	±10%	100V
C18		CAP CER	270uuf	±10%	100V
C19			270uuf	±10%	100V
C20			150uuf	±20%	35 V
C21			75uuf	±10%	100V
C22			50uuf	±10%	100V
C23		↓	50uuf	±10%	100V
C24		CAP MYLAR	.001	±10%	100V
C25		CAP TANT SOLID P	15	±20%	35V
C26		↓	6.8	±20%	35V
C27		CAP CER	360uuf	±10%	100V
C28			22 UUF	10%	100V
C29		↓	22 UUF	10%	100V
CR1		DIODE IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10		↓			
CR11		DIODE SV815			
CR12		DIODE IN660			
CR13		↓			
Q1A		TRANS 2N2060			
Q1B					
Q2A					
Q2B					
Q3A					
Q3B					
Q4A					
Q4B					
Q5A					
Q5B		↓			
Q6A		TRANS SP8304			
Q6B					
Q7A					
Q7B					
Q8A					
Q8B		↓			

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00125 DATE 11-30-62

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN C.A. Benton DATE 16 OCT 62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-30-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30/11/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

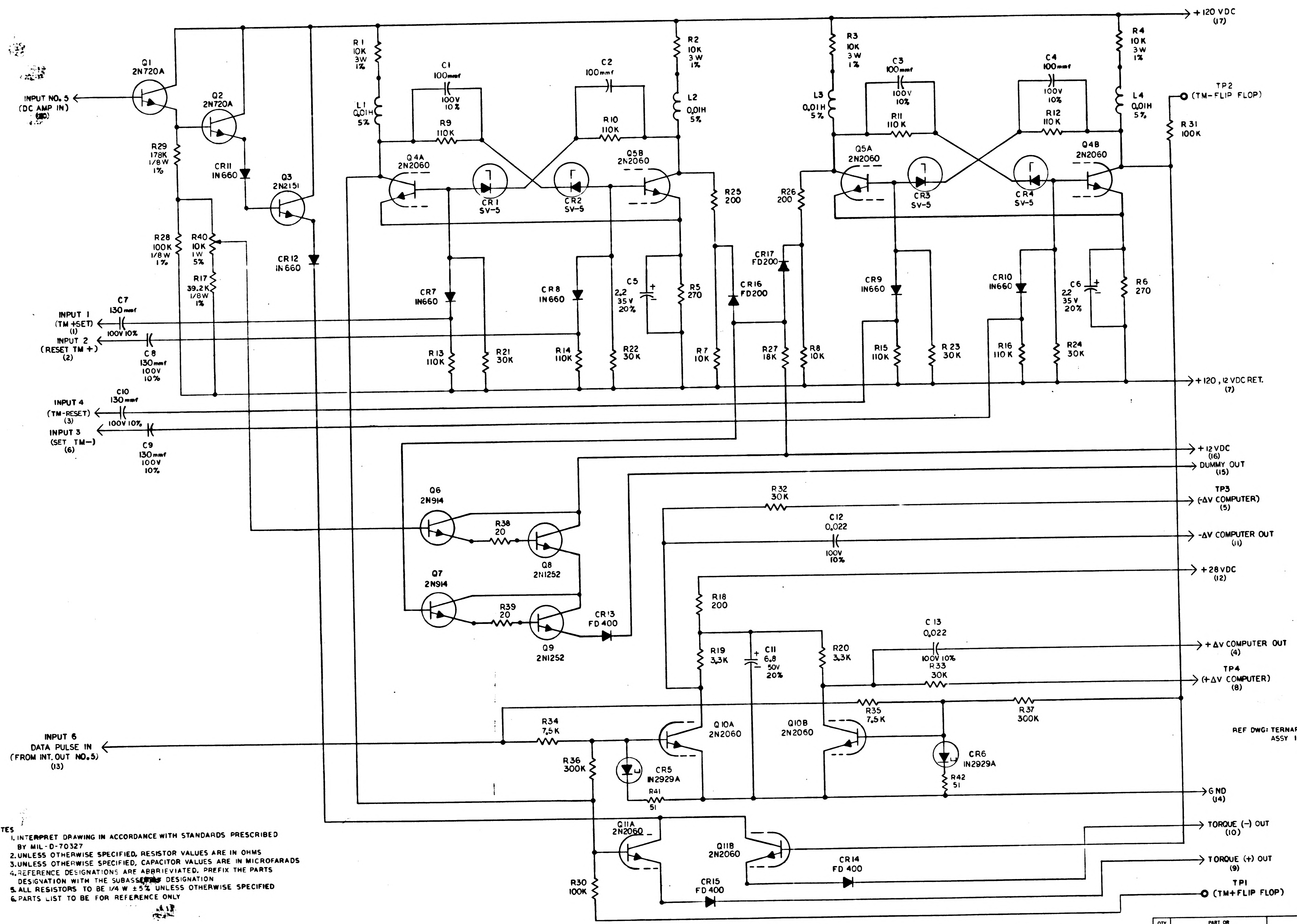
SCHEMATIC
INTERROGATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010013
SCALE —//—
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PEP TDRR 00382	2-6-63	6/8/3	WK


INPUT NO. 5
(DC AMP IN)
(18)
Q1
2N720A
Q2
2N720A
Q3
2N2151
R29
178K
1/8 W
1%
CR11
1N660
CR12
1N660
R28
100K
1/8 W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
INPUT 1
(TM +SET)
(1)
C7
130 mmf
100V 10%
INPUT 2
(RESET TM +)
(2)
C8
130 mmf
100V
10%
INPUT 4
(TM-RESET)
(3)
C10
130 mmf
100V 10%
INPUT 3
(SET TM−)
(6)
C9
130 mmf
100V
10%
R1
10K
3W
1%
L1
0.01H
5%
C1
100 mmf
100V
10%
R9
110K
Q4A
2N2060
CR1
SV-5
CR2
SV-5
C2
100 mmf
R10
110K
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
R25
200
CR7
1N660
CR8
1N660
C5
2.2
35V
20%
R5
270
CR16
FD200
CR17
FD200
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
R26
200
R27
18K
R8
10K
R3
10K
3W
1%
L3
0.01H
5%
C3
100 mmf
100V
10%
R11
110K
Q5A
2N2060
CR3
SV-5
CR4
SV-5
C4
100 mmf
100V
10%
R12
110K
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
TP2
(TM-FLIP FLOP)
R31
100K
CR9
1N660
CR10
1N660
C6
22
35V
20%
R6
270
R15
110K
R23
30K
R16
110K
R24
30K
+120 VDC
(17)
+120, 12 VDC RET.
(7)
+12 VDC
(16)
DUMMY OUT
(15)
Q6
2N914
R38
20
Q8
2N1252
Q7
2N914
R39
20
Q9
2N1252
CR13
FD400
R32
30K
TP3
(−ΔV COMPUTER)
(5)
C12
0.022
100V
10%
−ΔV COMPUTER OUT
(11)
+28 VDC
(12)
R18
200
R19
3.3K
C11
6.8
50V
20%
R20
3.3K
C13
0.022
100V 10%
+ΔV COMPUTER OUT
(4)
TP4
(+ΔV COMPUTER)
(8)
R33
30K
R35
7.5K
R37
300K
R34
7.5K
Q10A
2N2060
Q10B
2N2060
CR6
1N2929A
R42
51
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(13)
R36
300K
CR5
1N2929A
R41
51
GND
(14)
Q11A
2N2060
Q11B
2N2060
CR14
FD400
CR15
FD400
TORQUE (−) OUT
(10)
TORQUE (+) OUT
(9)
R30
100K
TP1
(TM+FLIP FLOP)

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ±5% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R. Bell DATE 10-24-62
CHECKED R V Quist
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH,

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010016
SCALE — | WT — | SHEET 1 OF 2

1010016 A

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REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00302	2-6-63	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389 –	RESISTOR WW	10K	1%	3W
R2	–		10K		
R3	–		10K		
R4	↓ –	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	27C	5%	1/4 W
R6	-18		270		
R7	-56		10K		
R8	-56		10K		
R9	-81		110K		
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364 -557		39.2K	1%	1/8 W
R18	1006750-15		200	5%	1/4 W
R19	-44		3.3K		
R20	-44		3.3K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364 -635		100K	1%	1/8 W
R29	1010364 -683		178K	↓	1/8 W
R30	1006750-80		100K	5%	1/4 W
R31	-80		100K		
R32	-67		30K		
R33	-67		30K		
R34	-53		7.5K		
R35	↓ -53	↓	7.5K		
R36	1010369 - 92	RESISTOR CC	300K		
R37	-92		300K		
R38	-148		20		
R39	↓ -148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750-1	RESISTOR MF	51	5%	1/4W
R42	↓ -1	↓	51		
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755 - 73	CAP TANT SOLID P	2.2 UF	±20%	35 V
C6	1006755 - 73	↓	2.2 UF	↓	↓
C7	1006777 -14	CAP CER	130UUF	10%	100 V
C8	-14		130 UUF		
C9	-14		130UUF		
C10	↓ -14		130 UUF	↓	↓
C11	1010393 –	CAP TANT SOLID P	6.8 UF	±20%	50 V
C12	1006777 -33	CAP CER	.022UF	±10%	100V
C13	1006777 -33	↓	.022UF	↓	100V
CR1	1010255	DIODE IN763-2			
CR2					
CR3					
CR4	↓	↓			
CR5	1010390	IN2929 A			
CR6	1010390	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
L1	1010388 –	COIL	.01 HY	±5%	75MA
L2					
L3					
L4	↓	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-1	TRANS 2N2060			
Q5	1010376-1	↓			
Q6	1010387	TRANS 2N914			
Q7	1010387	↓			
Q8	1010386	TRANS 2N1252			
Q9	1010386	↓			
Q10	1010376-1	TRANS 2N2060			
Q11	1010376-1	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 10-29-62
CHECKED RV
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

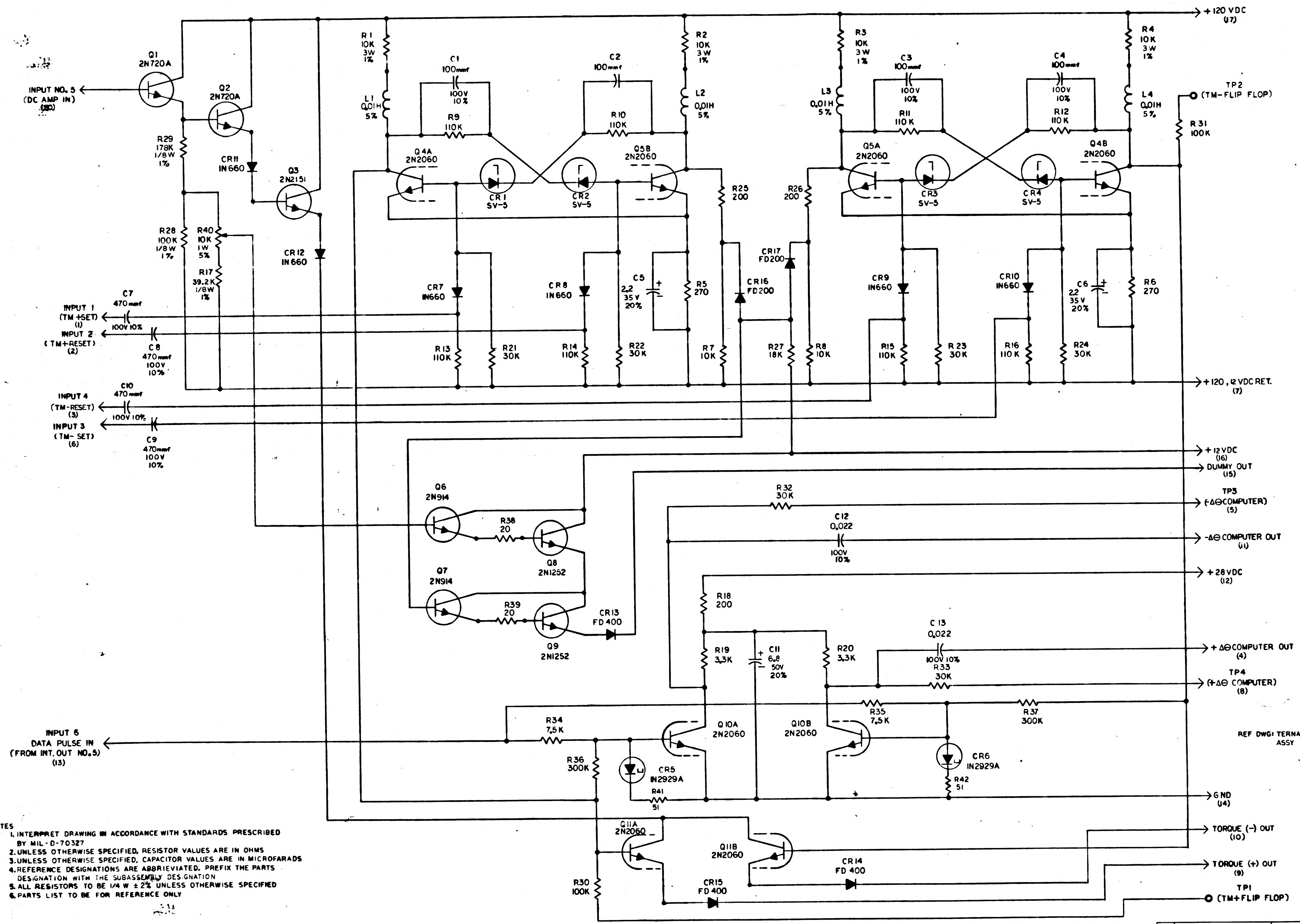
SCHEMATIC, TERNARY CURRENT SWITCH

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010016
SCALE // | WT | SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PEP TDRR 00382	2-6-63	LBS	
B	CHANGED PER TDRR 00716	4-3-63	DZ	



+120 VDC (17)
+120, 12 VDC RET. (7)
+12 VDC (16)
DUMMY OUT (15)
TP3 (-ΔΘ COMPUTER) (5)
-ΔΘ COMPUTER OUT (11)
+28 VDC (12)
+ΔΘ COMPUTER OUT (4)
TP4 (+ΔΘ COMPUTER) (8)
GND (14)
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)
TP1 (TM+FLIP FLOP)
TP2 (TM-FLIP FLOP)
INPUT NO. 5 (DC AMP IN) (30)
INPUT 1 (TM+SET) (1)
INPUT 2 (TM+RESET) (2)
INPUT 4 (TM-RESET) (3)
INPUT 3 (TM- SET) (6)
INPUT 6 DATA PULSE IN (FROM INT. OUT NO. 5) (13)
Q1 2N720A
Q2 2N720A
Q3 2N2151
Q4A 2N2060
Q5B 2N2060
Q5A 2N2060
Q4B 2N2060
Q6 2N914
Q7 2N914
Q8 2N1252
Q9 2N1252
Q10A 2N2060
Q10B 2N2060
Q11A 2N2060
Q11B 2N2060
R1 10K 3W 1%
R2 10K 3W 1%
R3 10K 3W 1%
R4 10K 3W 1%
L1 0.01H 5%
L2 0.01H 5%
L3 0.01H 5%
L4 0.01H 5%
C1 100mmf 100V 10%
C2 100mmf
C3 100mmf 100V 10%
C4 100mmf 100V 10%
R9 110K
R10 110K
R11 110K
R12 110K
CR1 SV-5
CR2 SV-5
CR3 SV-5
CR4 SV-5
R29 178K 1/8W 1%
CR11 1N660
CR12 1N660
R28 100K 1/8W 1%
R40 10K 1W 5%
R17 39.2K 1/8W 1%
C7 470mmf 100V 10%
C8 470mmf 100V 10%
C10 470mmf 100V 10%
C9 470mmf 100V 10%
CR7 1N660
CR8 1N660
CR9 1N660
CR10 1N660
C5 2.2 35V 20%
C6 22 35V 20%
R5 270
R6 270
R25 200
R26 200
CR16 FD200
CR17 FD200
R13 110K
R21 30K
R14 110K
R22 30K
R7 10K
R27 18K
R8 10K
R15 110K
R23 30K
R16 110K
R24 30K
R31 100K
R38 20
R39 20
CR13 FD 400
R32 30K
C12 0.022 100V 10%
R18 200
C11 6.8 50V 20%
R19 3.3K
R20 3.3K
C13 0.022 100V 10%
R33 30K
R35 7.5K
R37 300K
R34 7.5K
R36 300K
CR5 1N2929A
R41 51
CR6 1N2929A
R42 51
CR14 FD 400
CR15 FD 400
R30 100K

REF DWG: TERNARY CURRENT SWITCH ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

POSTED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN [illegible] DATE 10-24-62
CHECKED R V [illegible]
APPROVAL L L S [illegible] 11-23-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH,

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE —
WT —
SHEET 1 OF 2

1010016

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-5-63	JS	WK
B	CHANGED PER TDRR 00716	27		WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389 –	RESISTOR WW	10K	1%	3W
R2	–		10K		
R3	–		10K		
R4	↓ –	↓	10K	↓	↓
R5	1006750 -18	RESISTOR MF	270	5%	1/4 W
R6	-18		270		
R7	-56		10K		
R8	-56		10K		
R9	-81		110K		
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364 -557		39.2K	1%	1/8 W
R18	1006750 - 15		200	5%	1/4 W
R19	-44		3.3K		
R20	-44		3.3K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364 -635		100K	1%	1/8 W
R29	1010364 - 683		178K	↓	1/8 W
R30	1006750 - 80		100K	5%	1/4 W
R31	-80		100K		
R32	-67		30K		
R33	-67		30K		
R34	-53		7.5K		
R35	↓ -53	↓	7.5K		
R36	1010369 - 92	RESISTOR CC	300K		
R37	-92		300K		
R38	-148		20		
R39	↓ -148	↓	20	↓	↓
R40	1010373 - 10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750-1	RESISTOR MF	51	5%	1/4W
R42	↓ -1	↓	51		
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755 - 73	CAP TANT SOLID P	2.2 UF	±20%	35 V
C6	1006755 - 73	↓	2.2 UF	↓	↓
C7	1006777 - 20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393 –	CAP TANT SOLID P	6.8 UF	±20%	50 V
C12	1006777 -33	CAP CER	.022UF	±10%	100V
C13	1006777 -33	↓	.022UF	↓	100V
CR1	1010255	DIODE IN761-2			
CR2					
CR3					
CR4	↓	↓			
CR5	1010390	IN2929 A			
CR6	1010390	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
L1	1010388 –	COIL	.01 HY	±5%	75MA
L2					
L3					
L4	↓	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-1	TRANS 2N2060			
Q5	1010376-1	↓			
Q6	1010387	TRANS 2N914			
Q7	1010387	↓			
Q8	1010386	TRANS 2N1252			
Q9	1010386	↓			
Q10	1010376-1	TRANS 2N2060			
Q11	1010376-1	↓			

1010016 A

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN J. Cowley DATE 10-29-62
CHECKED R V [illegible]
APPROVAL J S Stone 11-23-62
APPROVAL A R [illegible] 11-29-62
NASA APPROVAL [illegible] 11-30-62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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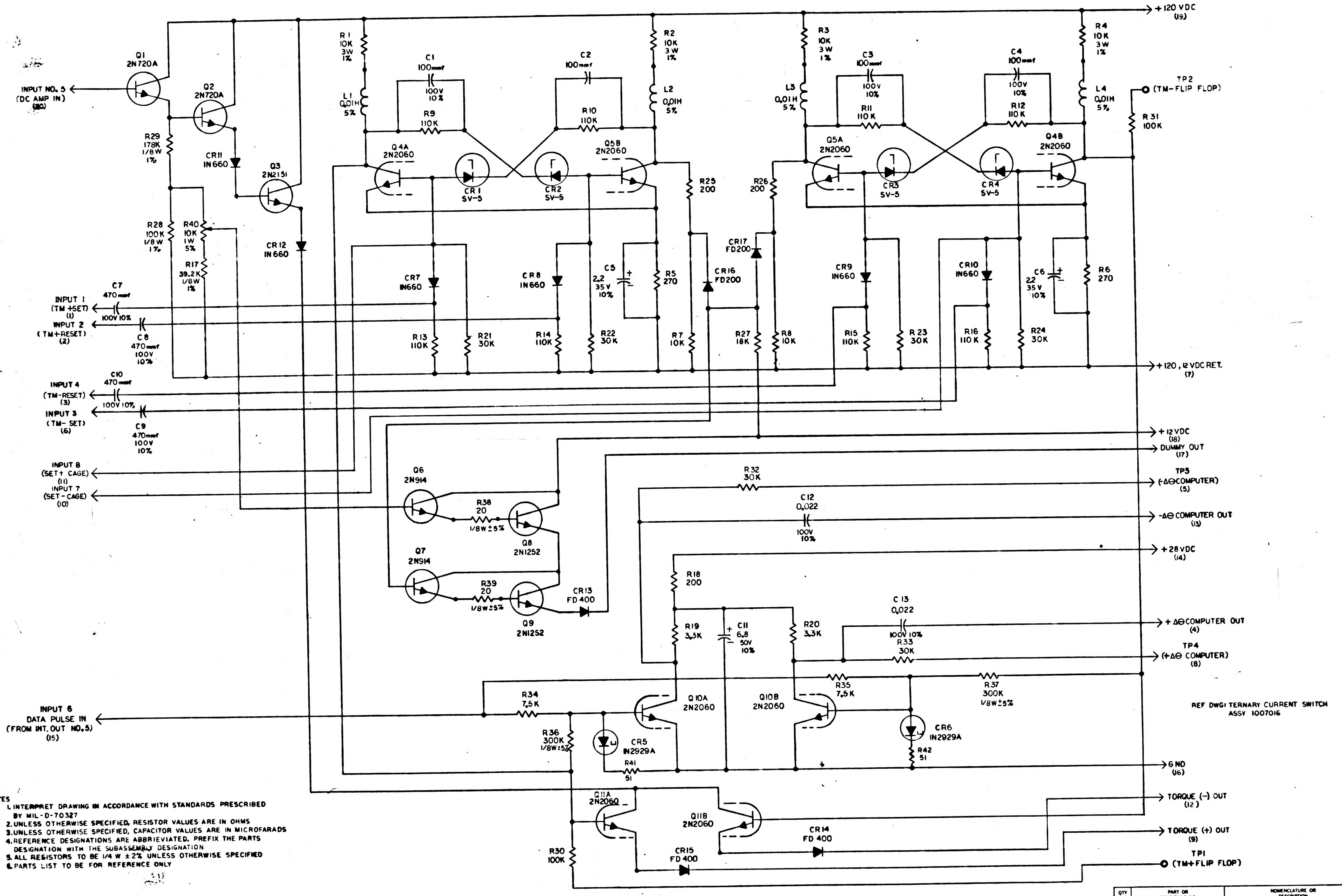
REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PEP TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718	4-3-63	D.Z.	
C	REVISED PER TDRR 01012		R.T.	


Q1
2N720A
INPUT NO. 5
(DC AMP IN)
(20)
Q2
2N720A
R29
178K
1/8W
1%
CR11
IN660
Q3
2N2151
CR12
IN660
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
INPUT 1
(TM +SET)
(1)
C7
470 mmf
100V 10%
INPUT 2
(TM+RESET)
(2)
C8
470 mmf
100V
10%
INPUT 4
(TM-RESET)
(3)
C10
470 mmf
100V 10%
INPUT 3
(TM- SET)
(6)
C9
470 mmf
100V
10%
R1
10K
3W
1%
L1
0.01H
5%
C1
100 mmf
100V
10%
R9
110K
Q4A
2N2060
CR1
SV-5
CR2
SV-5
C2
100 mmf
R10
110K
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
CR7
IN660
R13
110K
R21
30K
CR8
IN660
R14
110K
R22
30K
C5
2.2
35V
10%
R5
270
R7
10K
R25
200
CR16
FD200
CR17
FD200
R26
200
R27
18K
R8
10K
R3
10K
3W
1%
L3
0.01H
5%
C3
100 mmf
100V
10%
R11
110K
Q5A
2N2060
CR3
SV-5
CR4
SV-5
C4
100 mmf
100V
10%
R12
110K
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
CR9
IN660
R15
110K
R23
30K
CR10
IN660
R16
110K
R24
30K
C6
2.2
35V
10%
R6
270
R31
100K
TP2
(TM-FLIP FLOP)
+120 VDC
(19)
+120, 12 VDC RET.
(7)
+12 VDC
(18)
DUMMY OUT
(17)
INPUT 8
(SET+ CAGE)
(11)
INPUT 7
(SET - CAGE)
(10)
Q6
2N914
R38
20
1/8W ±5%
Q8
2N1252
Q7
2N914
R39
20
1/8W ±5%
Q9
2N1252
CR13
FD 400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
+28 VDC
(14)
R18
200
R19
3.3K
C11
6.8
50V
10%
R20
3.3K
C13
0.022
100V 10%
+ΔΘ COMPUTER OUT
(4)
R33
30K
TP4
(+ΔΘ COMPUTER)
(8)
R35
7.5K
R37
300K
1/8W ±5%
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(15)
R34
7.5K
R36
300K
1/8W ±5%
CR5
IN2929A
R41
51
Q10A
2N2060
Q10B
2N2060
CR6
IN2929A
R42
51
GND
(16)
Q11A
2N2060
Q11B
2N2060
CR14
FD 400
CR15
FD 400
R30
100K
TORQUE (-) OUT
(12)
TORQUE (+) OUT
(9)
TP1
(TM+FLIP FLOP)

REF DWG: TERNARY CURRENT SWITCH ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
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DRAWN DATE 10-24-62
CHECKED RV
APPROVAL 11-28-62
APPROVAL 11-28-62
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH.

CODE IDENT NO. — SIZE E — NASA DRAWING NO. 1010016
SCALE — WT — SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	JJS	
B	CHANGED PER TDRR 00716			
C	REVISED PER TDRR 01012			

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4W
R6	-18		270		
R7	-56		10K		
R8	-56		10K		
R9	-81		110K		
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364-557		39.2K	1%	1/8 W
R18	1006750-15		200	2%	1/4 W
R19	-44		3.3K		
R20	-44		3.3K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364-635		100K	1%	1/8 W
R29	1010364-683		178K	↓	1/8 W
R30	1006750-80		100K	2%	1/4 W
R31	-80		100K		
R32	-67		30K		
R33	-67		30K		
R34	-53		7.5K		
R35	↓ -53	↓	7.5K	↓	↓
R36	1010369-92	RESISTOR CC	300K	5%	1/8W
R37	-92		300K		
R38	-148		20		
R39	↓ -148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1W
R41	1006750-1	RESISTOR MF	51	2%	1/4W
R42	↓ -1	↓	51	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13	↓	100UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20	↓	470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010255	DIODE IN761-2			
CR2					
CR3					
CR4	↓	↓			
CR5	1010390	IN2929 A			
CR6	1010390	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
L1	1010388-39	INDUCTOR	.01 HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-1	TRANS 2N2060			
Q5	1010376-1	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010386	TRANS 2N1252			
Q9	1010386	↓			
Q10	1010376-1	TRANS 2N2060			
Q11	1010376-1	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO CONTRACT

DRAWN DATE 10-29-62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL

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HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH

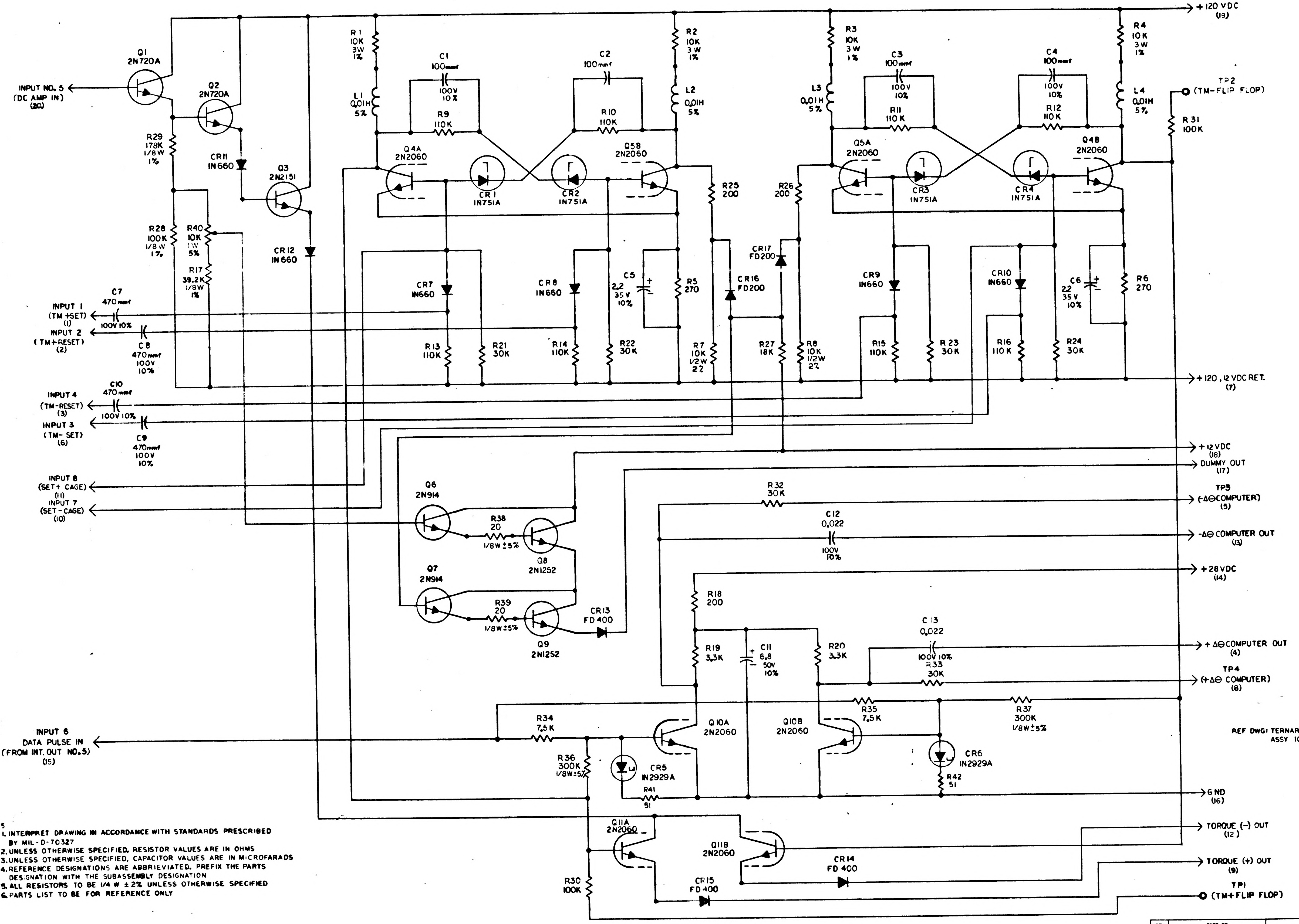
CODE IDENT NO. SIZE E NASA DRAWING NO. 1010016
SCALE // WT SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR '25

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PEP TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718	4-3-63	D.T.	
C	REVISED PER TDRR 01012	4-26-63	R.T.	
D	REVISED PER TDRR 01261	5-8-63	S.T.	



Q1
2N720A
INPUT NO. 5
(DC AMP IN)
(20)
Q2
2N720A
R29
178K
1/8W
1%
CR11
IN660
Q3
2N2151
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
CR12
IN660
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
110K
Q4A
2N2060
CR1
IN751A
C2
100mmf
R10
110K
CR2
IN751A
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
R25
200
CR7
IN660
CR8
IN660
C5
2.2
35V
10%
R5
270
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
1/2W
2%
CR16
FD200
CR17
FD200
R26
200
R27
18K
R8
10K
1/2W
2%
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
Q5A
2N2060
CR3
IN751A
C4
100mmf
100V
10%
R12
110K
CR4
IN751A
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
CR9
IN660
CR10
IN660
C6
2.2
35V
10%
R6
270
R15
110K
R23
30K
R16
110K
R24
30K
+120 VDC
(19)
TP2
(TM-FLIP FLOP)
R31
100K
+120, 12 VDC RET.
(7)
INPUT 1
(TM+SET)
(1)
C7
470mmf
100V 10%
INPUT 2
(TM+RESET)
(2)
C8
470mmf
100V
10%
INPUT 4
(TM-RESET)
(3)
C10
470mmf
100V 10%
INPUT 3
(TM-SET)
(6)
C9
470mmf
100V
10%
INPUT 8
(SET+ CAGE)
(11)
INPUT 7
(SET-CAGE)
(10)
+12 VDC
(18)
DUMMY OUT
(17)
Q6
2N914
R38
20
1/8W±5%
Q8
2N1252
Q7
2N914
R39
20
1/8W±5%
Q9
2N1252
CR13
FD400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
+28 VDC
(14)
R18
200
R19
3.3K
C11
6.8
50V
10%
R20
3.3K
C13
0.022
100V 10%
+ΔΘ COMPUTER OUT
(4)
R33
30K
TP4
(+ΔΘ COMPUTER)
(8)
R35
7.5K
R37
300K
1/8W±5%
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(15)
R34
7.5K
Q10A
2N2060
Q10B
2N2060
CR6
IN2929A
R42
51
R36
300K
1/8W±5%
CR5
IN2929A
R41
51
GND
(16)
Q11A
2N2060
Q11B
2N2060
CR14
FD400
TORQUE (-) OUT
(12)
TORQUE (+) OUT
(9)
R30
100K
CR15
FD400
TP1
(TM+FLIP FLOP)

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ±2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

1010016

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 10-24-62
CHECKED R.V.
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC.
TERNARY CURRENT SWITCH.

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE —
WT —
SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	JJS	
B	CHANGED PER TDRR 00716	OT		
C	REVISED PER TDRR 01012	4-25-63	OT	WK
D	REVISED PER TDRR 0126.1	5-15-63	OT	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389 - 80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750 - 18	RESISTOR MF	270	2%	1/4 W
R6	-18		270		↓
R7	-56		10K		1/2 W
R8	-56		10K		1/2 W
R9	-81		110K		1/4 W
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364 - 557		39.2K	1%	1/8 W
R18	1006750 - 15		200	2%	1/4 W
R19	-44		3.3K		
R20	-44		3.3K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364 - 635		100K	1%	1/8 W
R29	1010364 - 683		178K	↓	1/8 W
R30	1006750 - 80		100K	2%	1/4 W
R31	-80		100K		
R32	-67		30K		
R33	-67		30K		
R34	-53		7.5K		
R35	↓ -53	↓	7.5K	↓	↓
R36	1010369 - 92	RESISTOR CC	300K	5%	1/8 W
R37	-92		300K		
R38	-148		20		
R39	↓ -148	↓	20	↓	↓
R40	1010373 - 10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750 - 1	RESISTOR MF	51	2%	1/4W
R42	↓ -1	↓	51	↓	↓
C1	1006777 - 13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755 - 73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755 - 73	↓	2.2UF	↓	↓
C7	1006777 - 20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393 - 039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777 - 33	CAP CER	.022UF	±10%	100V
C13	1006777 - 33	↓	.022UF	↓	100V
CR1	1010462	DIODE IN751-A			
CR2					
CR3					
CR4	↓	↓			
CR5	1010390	IN2929 A			
CR6	1010390	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
L1	1010388 - 39	INDUCTOR	.01 HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-1	TRANS 2N2060			
Q5	1010376-1	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010386	TRANS 2N1252			
Q9	1010386	↓			
Q10	1010376-1	TRANS 2N2060			
Q11	1010376-1	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 10-29-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

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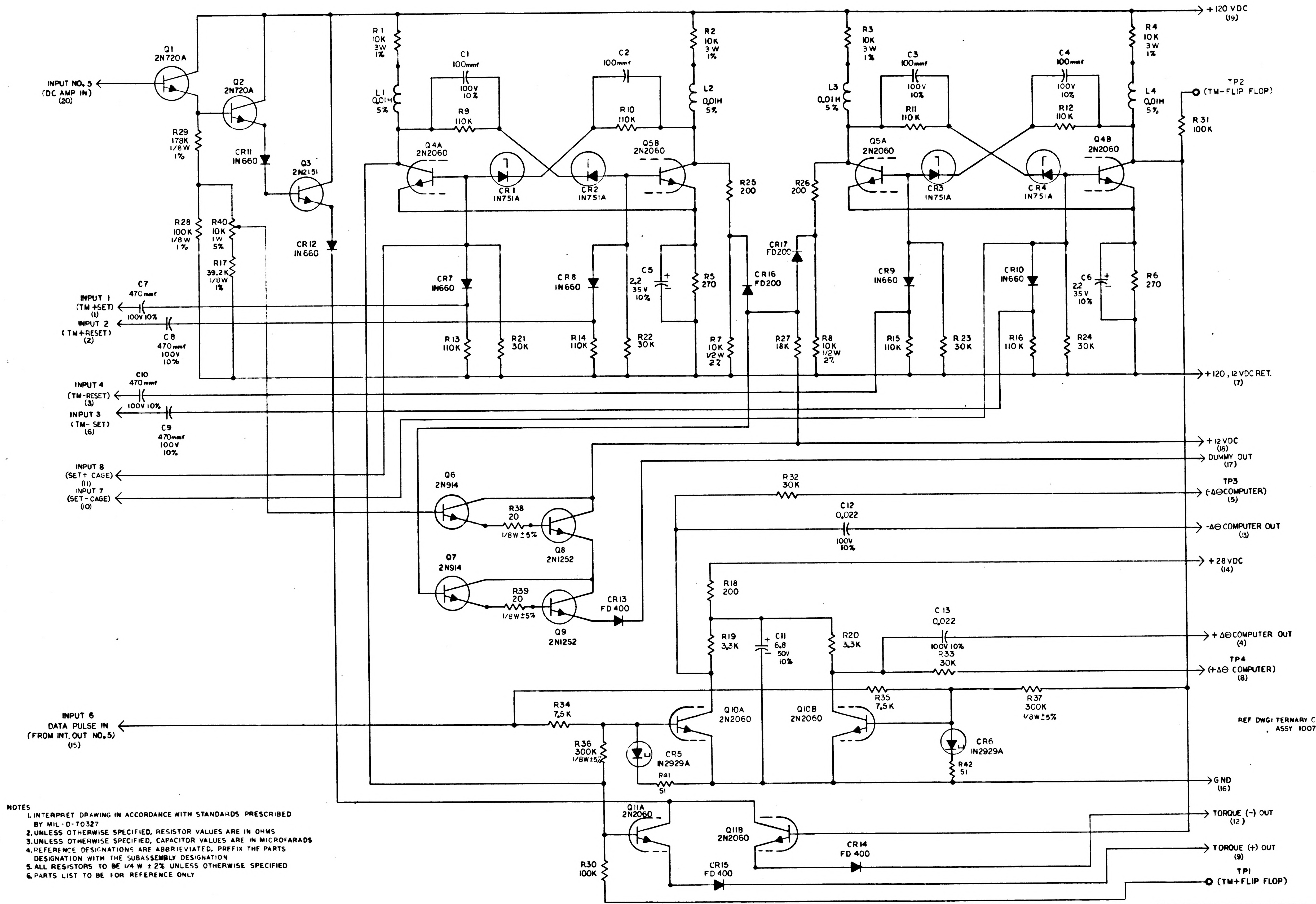
REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718	4-3-63	D.T.	
C	REVISED PER TDRR 01012		J.T.	
D	REVISED PER TDRR 01261	5-8-63	J.T.	
E	REVISED PER TDRR			



6
5
4
3
2
1
F
E
D
C
B
A
Q1
2N720A
Q2
2N720A
Q3
2N2151
INPUT NO. 5
(DC AMP IN)
(20)
R29
178K
1/8W
1%
CR11
IN660
CR12
IN660
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
C7
470mmf
100V 10%
INPUT 1
(TM+SET)
(1)
INPUT 2
(TM+RESET)
(2)
C8
470mmf
100V
10%
C10
470mmf
100V 10%
INPUT 4
(TM-RESET)
(3)
INPUT 3
(TM-SET)
(6)
C9
470mmf
100V
10%
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
110K
Q4A
2N2060
CR1
IN751A
CR2
IN751A
C2
100mmf
R10
110K
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
R25
200
R26
200
CR7
IN660
R13
110K
R21
30K
CR8
IN660
R14
110K
R22
30K
C5
2.2
35V
10%
R5
270
R7
10K
1/2W
2%
CR16
FD200
CR17
FD200
R27
18K
R8
10K
1/2W
2%
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
Q5A
2N2060
CR3
IN751A
CR4
IN751A
C4
100mmf
100V
10%
R12
110K
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
CR9
IN660
R15
110K
R23
30K
CR10
IN660
R16
110K
R24
30K
C6
2.2
35V
10%
R6
270
R31
100K
TP2
(TM-FLIP FLOP)
+120 VDC
(19)
+120, 12 VDC RET.
(7)
+12 VDC
(18)
DUMMY OUT
(17)
INPUT 8
(SET+CAGE)
(11)
INPUT 7
(SET-CAGE)
(10)
Q6
2N914
R38
20
1/8W±5%
Q8
2N1252
Q7
2N914
R39
20
1/8W±5%
Q9
2N1252
CR13
FD400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
+28 VDC
(14)
R18
200
R19
3.3K
C11
6.8
50V
10%
R20
3.3K
C13
0.022
100V 10%
R33
30K
+ΔΘ COMPUTER OUT
(4)
TP4
(+ΔΘ COMPUTER)
(8)
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(15)
R34
7.5K
R36
300K
1/8W±5%
CR5
IN2929A
R41
51
Q10A
2N2060
Q10B
2N2060
R35
7.5K
R37
300K
1/8W±5%
CR6
IN2929A
R42
51
GND
(16)
Q11A
2N2060
Q11B
2N2060
CR14
FD 400
CR15
FD 400
R30
100K
TORQUE (−) OUT
(12)
TORQUE (+) OUT
(9)
TP1
(TM+FLIP FLOP)

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ±2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN DATE 10-24-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH,

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE // WT // SHEET 1 OF 2

1010016

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REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	13S	
B	CHANGED PER TDRR 00716			
C	REVISED PER TDRR 01012		DT	
D	REVISED PER TDRR 0126.1	5-15-63	DT	
E	REVISED PER TDRR 01354	5-21-63		

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	-80		10K		
R5	1006750-18	RESISTOR MF	270	2%	1/4W
R6	-18		270		
R7	1006760-56		10K		1/2W
R8	-56		10K		1/2W
R9	1006750-81		110K		1/4W
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		
R16	-81		110K		1/4W
R17	1010364-557		39.2K	1%	1/8W
R18	1006750-15		200	2%	1/4W
R19	-44		3.3K		
R20	-44		3.3K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	-62		18K		
R28	1010364-635		100K	1%	1/8W
R29	1010364-683		178K		1/8W
R30	1006750-80		100K	2%	1/4W
R31	-80		100K		
R32	-67		30K		
R33	-67		30K		
R34	-53		7.5K		
R35	-53		7.5K		
R36	1010369-92	RESISTOR CC	300K	5%	1/8W
R37	-92		300K		
R38	-148		20		
R39	-148		20		
R40	1010373-10	RESISTOR (VAR)	10K	5%	1W
R41	1006750-1	RESISTOR MF	51	2%	1/4W
R42	-1		51		
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	-13		100 UUF		
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73		2.2 UF		
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	-20		470UUF		
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33		.022UF		100V
CR1	1010462	DIODE IN751-A			
CR2					
CR3					
CR4					
CR5	1010390	IN2929 A			
CR6	1010390				
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12					
CR13	1010394	FD400			
CR14					
CR15					
CR16	1010384	FD200			
CR17	1010384				
L1	1010388-39	INDUCTOR	.01HY	±5%	75MA
L2	-39				
L3	-39				
L4	-39				
Q1	1010357	TRANS 2N720A			
Q2	1010357				
Q3	1010269	TRANS 2N2151			
Q4	1010376-1	TRANS 2N2060			
Q5	1010376-1				
Q6	1006752	TRANS 2N914			
Q7	1006752				
Q8	1010386	TRANS 2N1252			
Q9	1010386				
Q10	1010376-1	TRANS 2N2060			
Q11	1010376-1				

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. Crowley DATE 10-29-62
CHECKED R.V.
APPROVAL J.S. 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 1962

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

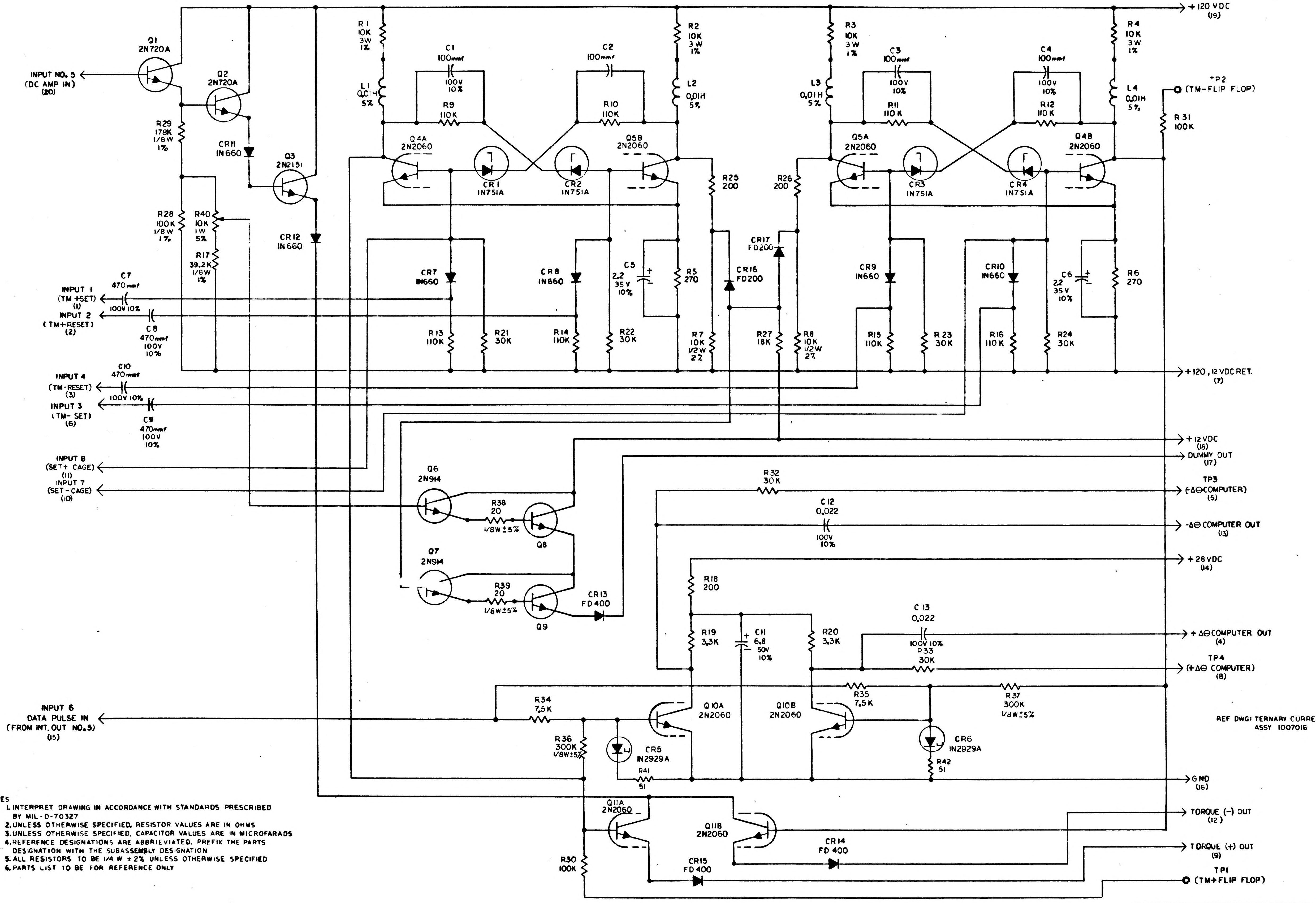
SCHEMATIC,
TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00716	4-3-63	D.T.	
C	REVISED PER TDRR 01012	4-26-63	D.T.	
D	REVISED PER TDRR 01261	5-8-63	D.T.	
E	REVISED PER TDRR [illegible]358	5-2[illegible]-63		
F	REVISED PER TDRR [illegible]	6-19-63		


Q1
2N720A
INPUT NO. 5
(DC AMP IN)
(20)
Q2
2N720A
R29
178K
1/8W
1%
CR11
IN660
Q3
2N2151
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
CR12
IN660
C7
470mmf
100V 10%
INPUT 1
(TM +SET)
(1)
INPUT 2
(TM+RESET)
(2)
C8
470mmf
100V
10%
C10
470mmf
100V 10%
INPUT 4
(TM-RESET)
(3)
INPUT 3
(TM-SET)
(6)
C9
470mmf
100V
10%
INPUT 8
(SET+ CAGE)
(11)
INPUT 7
(SET- CAGE)
(10)
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
110K
Q4A
2N2060
CR1
IN751A
C2
100mmf
R10
110K
CR2
IN751A
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
R25
200
CR7
IN660
CR8
IN660
C5
2.2
35V
10%
R5
270
CR16
FD200
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
1/2W
2%
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
Q5A
2N2060
CR3
IN751A
C4
100mmf
100V
10%
R12
110K
CR4
IN751A
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
R26
200
CR17
FD200
CR9
IN660
CR10
IN660
C6
22
35V
10%
R6
270
R27
18K
R8
10K
1/2W
2%
R15
110K
R23
30K
R16
110K
R24
30K
+120 VDC
(19)
TP2
(TM-FLIP FLOP)
R31
100K
+120, 12 VDC RET.
(7)
+12VDC
(18)
DUMMY OUT
(17)
Q6
2N914
R38
20
1/8W±5%
Q8
Q7
2N914
R39
20
1/8W±5%
Q9
CR13
FD400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
+28VDC
(14)
R18
200
R19
3.3K
C11
6.8
50V
10%
R20
3.3K
C13
0.022
100V 10%
R33
30K
+ΔΘ COMPUTER OUT
(4)
TP4
(+ΔΘ COMPUTER)
(8)
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(15)
R34
7.5K
Q10A
2N2060
Q10B
2N2060
R35
7.5K
R37
300K
1/8W±5%
R36
300K
1/8W±5%
CR5
IN2929A
R41
51
CR6
IN2929A
R42
51
GND
(16)
Q11A
2N2060
Q11B
2N2060
TORQUE (-) OUT
(12)
CR14
FD 400
TORQUE (+) OUT
(9)
R30
100K
CR15
FD 400
TP1
(TM+FLIP FLOP)

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN
DATE 10-24-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH,

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010016
SCALE —
WT —
SHEET 1 OF 2

1010016

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	JS	WK
B	CHANGED PER TDRR 00716	DT		WK
C	REVISED PER TDRR 01012	[illegible]	DT	WK
D	REVISED PER TDRR 0126.1	5-15-63	DT	WK
E	REVISED PER TDRR 01354	5-21-63	[illegible]	WK
F	REVISED PER TDRR [illegible]	6-19-63	[illegible]	WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80	↓	10K	↓	↓
R3	-80	↓	10K	↓	↓
R4	-80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4W
R6	↓ -18	↓	270	↓	↓
R7	1006760-56	↓	10K	↓	1/2W
R8	↓ -56	↓	10K	↓	1/2W
R9	1006750-81	↓	110K	↓	1/4W
R10	-81	↓	110K	↓	↓
R11	-81	↓	110K	↓	↓
R12	-81	↓	110K	↓	↓
R13	-81	↓	110K	↓	↓
R14	-81	↓	110K	↓	↓
R15	-81	↓	110K	↓	↓
R16	-81	↓	110K	↓	1/4W
R17	1010364-557	↓	39.2K	1%	1/8W
R18	1006750-15	↓	200	2%	1/4W
R19	-44	↓	3.3K	↓	↓
R20	-44	↓	3.3K	↓	↓
R21	-67	↓	30K	↓	↓
R22	-67	↓	30K	↓	↓
R23	-67	↓	30K	↓	↓
R24	-67	↓	30K	↓	↓
R25	-15	↓	200	↓	↓
R26	-15	↓	200	↓	↓
R27	-62	↓	18K	↓	↓
R28	1010364-635	↓	100K	1%	1/8W
R29	1010364-683	↓	178K	↓	1/8W
R30	1006750-80	↓	100K	2%	1/4W
R31	-80	↓	100K	↓	↓
R32	-67	↓	30K	↓	↓
R33	-67	↓	30K	↓	↓
R34	-53	↓	7.5K	↓	↓
R35	-53	↓	7.5K	↓	↓
R36	1010369-92	RESISTOR CC	300K	5%	1/8W
R37	-92	↓	300K	↓	↓
R38	-148	↓	20	↓	↓
R39	-148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1W
R41	1006750-1	RESISTOR MF	51	2%	1/4W
R42	↓ -1	↓	51	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13	↓	100UUF	↓	↓
C3	-13	↓	100UUF	↓	↓
C4	-13	↓	100 UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20	↓	470UUF	↓	↓
C9	-20	↓	470UUF	↓	↓
C10	-20	↓	470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010462	DIODE IN751-A			
CR2	↓	↓			
CR3	↓	↓			
CR4	↓	↓			
CR5	1010390	IN2929 A			
CR6	1010390	↓			
CR7	1010385	IN660			
CR8	↓	↓			
CR9	↓	↓			
CR10	↓	↓			
CR11	↓	↓			
CR12	↓	↓			
CR13	1010394	FD400			
CR14	↓	↓			
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
L1	1010388-39	INDUCTOR	.01HY	±5%	75MA
L2	-39	↓		↓	↓
L3	-39	↓		↓	↓
L4	↓ -39	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-1	TRANS 2N2060			
Q5	1010376-1	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
G10	1010376-1	TRANS 2N2060			
Q11	1010376-1	↓			

1010016

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN J. Cawley DATE 10-29-62
CHECKED RV [illegible]
APPROVAL J. E. [illegible] 11-25-62
APPROVAL D. A. [illegible] 11-29-62
NASA APPROVAL [illegible] 11-30-62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

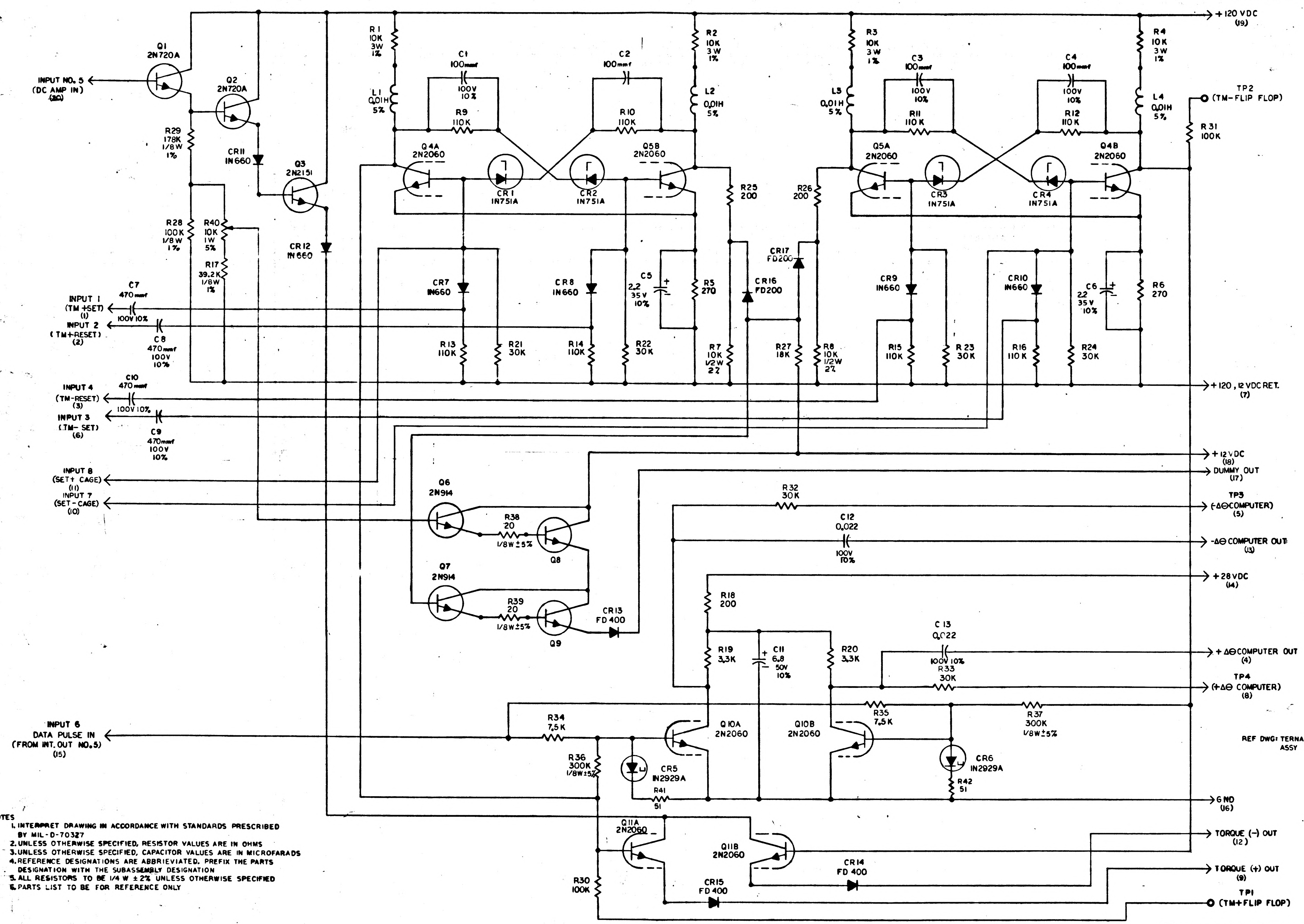
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PEP TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718	4-3-63	R.T.	
C	REVISED PER TDRR 01012		R.T.	
D	REVISED PER TDRR 01261	5-8-63		UK
E	REVISED PER TDRR 01354	5-21-63		UK
F	REVISED PER TDRR 01615		RPK	
G	REVISED PER TDRR 01868	7-2-63		



Q1
2N720A
Q2
2N720A
Q3
2N2151
INPUT NO. 5
(DC AMP IN)
(20)
R29
178K
1/8W
1%
CR11
IN660
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
CR12
IN660
INPUT 1
(TM +SET)
(1)
INPUT 2
(TM+RESET)
(2)
C7
470mmf
100V 10%
C8
470mmf
100V
10%
INPUT 4
(TM-RESET)
(3)
INPUT 3
(TM- SET)
(6)
C10
470mmf
100V 10%
C9
470mmf
100V
10%
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
110K
C2
100mmf
R10
110K
R2
10K
3W
1%
L2
0.01H
5%
Q4A
2N2060
Q5B
2N2060
CR1
IN751A
CR2
IN751A
R25
200
CR7
IN660
CR8
IN660
C5
2.2
35V
10%
R5
270
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
1/2W
2%
CR16
FD200
CR17
FD200
R26
200
R27
18K
R8
10K
1/2W
2%
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
C4
100mmf
100V
10%
R12
110K
R4
10K
3W
1%
L4
0.01H
5%
Q5A
2N2060
Q4B
2N2060
CR3
IN751A
CR4
IN751A
CR9
IN660
CR10
IN660
C6
2.2
35V
10%
R6
270
R15
110K
R23
30K
R16
110K
R24
30K
TP2
(TM-FLIP FLOP)
R31
100K
+120 VDC
(19)
+120, 12 VDC RET.
(7)
+12VDC
(18)
DUMMY OUT
(17)
INPUT 8
(SET+ CAGE)
(11)
INPUT 7
(SET- CAGE)
(10)
Q6
2N914
R38
20
1/8W ±5%
Q8
Q7
2N914
R39
20
1/8W ±5%
Q9
CR13
FD400
R32
30K
C12
0.022
100V
10%
TP3
(-ΔΘ COMPUTER)
(5)
-ΔΘ COMPUTER OUT
(13)
+28VDC
(14)
R18
200
R19
3.3K
C11
6.8
50V
10%
R20
3.3K
C13
0.022
100V 10%
R33
30K
+ΔΘ COMPUTER OUT
(4)
TP4
(+ΔΘ COMPUTER)
(8)
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO.5)
(15)
R34
7.5K
Q10A
2N2060
Q10B
2N2060
R35
7.5K
R37
300K
1/8W ±5%
R36
300K
1/8W ±5%
CR5
IN2929A
R41
51
CR6
IN2929A
R42
51
GND
(16)
Q11A
2N2060
Q11B
2N2060
CR14
FD 400
CR15
FD 400
R30
100K
TORQUE (-) OUT
(12)
TORQUE (+) OUT
(9)
TP1
(TM+FLIP FLOP)

REF DWG: TERNARY CURRENT SWITCH ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN DATE 10-24-62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-29-62
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH,

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE —
WT —
SHEET 1 OF 2

1010016

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	ES	WK
B	CHANGED PER TDRR 00716			WK
C	REVISED PER TDRR 01012		DT	WK
D	REVISED PER TDRR 0126.1	5-15-63	DT	WK
E	REVISED PER TDRR 01354	5-21-63		WK
F	REVISED PER TDRR 01616	6-19-63		WK
G	REVISED PER TDRR 01868	7-2-63		WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4W
R6	↓ -18		270		↓
R7	1006760-56		10K		1/2W
R8	↓ -56		10K		1/2W
R9	1006750-81		110K		1/4W
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4W
R17	1010364-557		39.2K	1%	1/8W
R18	1006750-15		200	2%	1/4W
R19	-44		3.3K		
R20	-44		3.3K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364-635		100K	1%	1/8W
R29	1010364-683		178K	↓	1/8W
R30	1006750-80		100K	2%	1/4W
R31	-80		100K		
R32	-67		30K		
R33	-67		30K		
R34	-53		7.5K		
R35	↓ -53	↓	7.5K	↓	↓
R36	1010369-92	RESISTOR CC	300K	5%	1/8W
R37	-92		300K		
R38	-148		20		
R39	↓ -148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1W
R41	1006750-1	RESISTOR MF	51	2%	1/4W
R42	↓ -1	↓	51	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010462	DIODE IN751-A			
CR2					
CR3					
CR4	↓	↓			
CR5	1010390	IN2929 A			
CR6	1010390	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
L1	1010388-39	INDUCTOR	.01HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN J. Cowley DATE 10-29-62
CHECKED R.V. Smith
APPROVAL J.S. Stone 11-28-62
APPROVAL A.R. 11-29-62
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010016
SCALE — | WT | SHEET 2 OF 2

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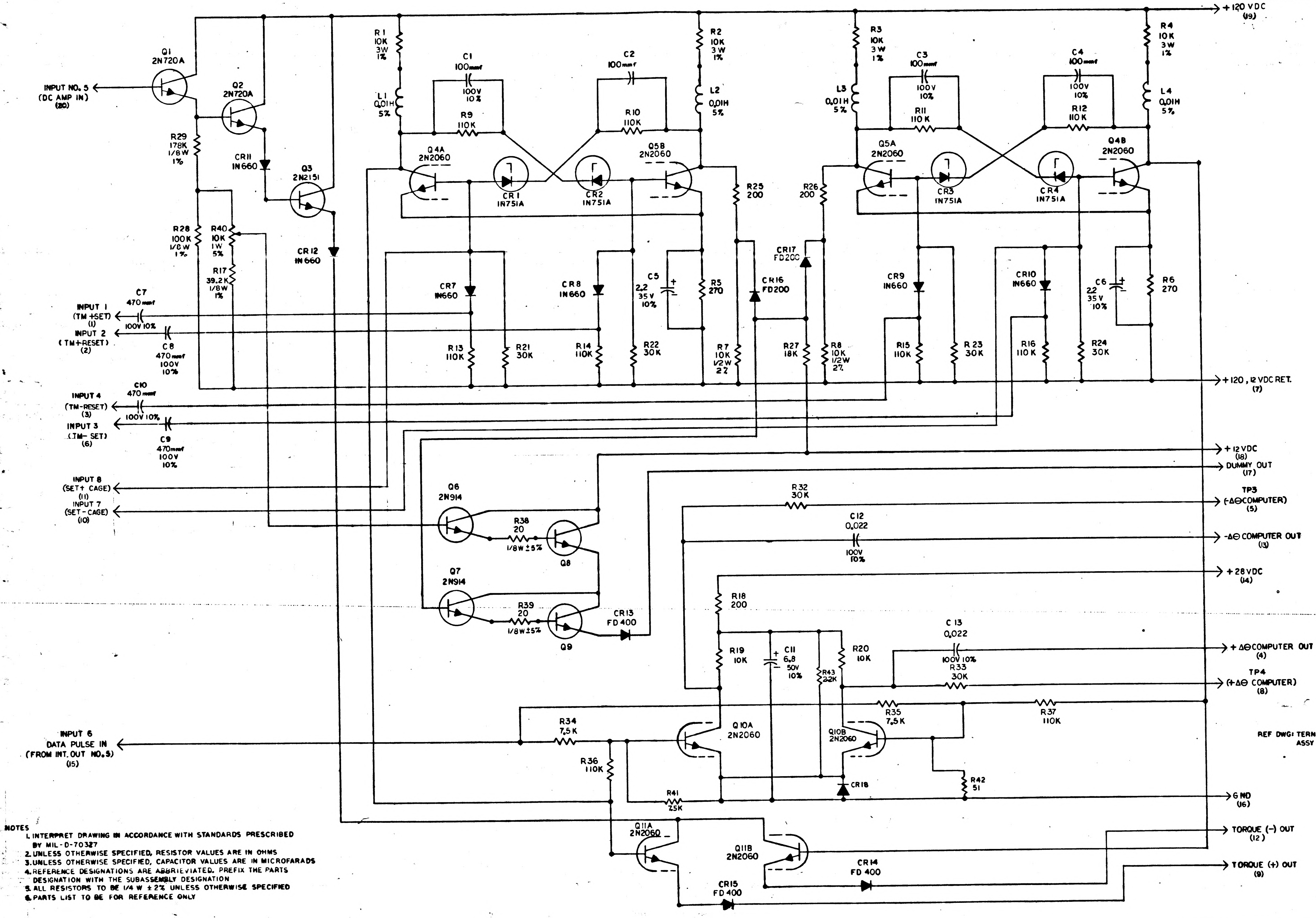
REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718	7-3-63		
C	REVISED PER TDRR 01012		R.T.	
D	REVISED PER TDRR 01261	5-8-63		
E	REVISED PER TDRR 01358	5-21-63		
F	REVISED PER TDRR 01616		RPK	
G	REVISED PER TDRR 01868	7-2-63		
H	REVISED PER TDRR 02167			


+120 VDC (19)
INPUT NO. 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R29 178K 1/8W 1%
CR11 IN660
CR12 IN660
R28 100K 1/8W 1%
R40 10K 1W 5%
R17 39.2K 1/8W 1%
R1 10K 3W 1%
L1 0.01H 5%
C1 100mmf 100V 10%
R9 110K
Q4A 2N2060
CR1 IN751A
C2 100mmf
R10 110K
CR2 IN751A
Q5B 2N2060
R2 10K 3W 1%
L2 0.01H 5%
R25 200
R26 200
CR16 FD200
CR17 FD200
R3 10K 3W 1%
L3 0.01H 5%
C3 100mmf 100V 10%
R11 110K
Q5A 2N2060
CR3 IN751A
C4 100mmf 100V 10%
R12 110K
CR4 IN751A
Q4B 2N2060
R4 10K 3W 1%
L4 0.01H 5%
CR7 IN660
CR8 IN660
C5 2.2 35V 10%
R5 270
CR9 IN660
CR10 IN660
C6 2.2 35V 10%
R6 270
INPUT 1 (TM+SET) (1)
C7 470mmf 100V 10%
INPUT 2 (TM+RESET) (2)
C8 470mmf 100V 10%
R13 110K
R21 30K
R14 110K
R22 30K
R7 10K 1/2W 2%
R27 18K
R8 10K 1/2W 2%
R15 110K
R23 30K
R16 110K
R24 30K
+120, 12 VDC RET. (7)
INPUT 4 (TM-RESET) (3)
C10 470mmf 100V 10%
INPUT 3 (TM-SET) (6)
C9 470mmf 100V 10%
+12 VDC (18)
DUMMY OUT (17)
INPUT 8 (SET+ CAGE) (11)
INPUT 7 (SET-CAGE) (10)
Q6 2N914
R38 20 1/8W ±5%
Q8
R32 30K
TP3 (-ΔΘ COMPUTER) (5)
C12 0.022 100V 10%
-ΔΘ COMPUTER OUT (13)
Q7 2N914
R39 20 1/8W ±5%
Q9
CR13 FD400
+28 VDC (14)
R18 200
C13 0.022 100V 10%
+ΔΘ COMPUTER OUT (4)
R19 10K
C11 6.8 50V 10%
R43 2.2K
R20 10K
R33 30K
TP4 (+ΔΘ COMPUTER) (8)
R35 7.5K
R37 110K
R34 7.5K
Q10A 2N2060
Q10B 2N2060
INPUT 6 DATA PULSE IN (FROM INT. OUT NO. 5) (15)
R36 110K
CR18
R42 51
R41 7.5K
GND (16)
Q11A 2N2060
Q11B 2N2060
TORQUE (-) OUT (12)
CR14 FD400
TORQUE (+) OUT (9)
CR15 FD400

REF DWG: TERNARY CURRENT SWITCH ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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APPROVAL 11-25-63
APPROVAL 11-30-63
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MANNED SPACECRAFT CENTER
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SCHEMATIC.
TERNARY CURRENT SWITCH.

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE // WT // SHEET 1 OF 2

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REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	[illegible]	WK
B	CHANGED PER TDRR 00716	[illegible]		WK
C	REVISED PER TDRR 01012	[illegible]	DT	WK
D	REVISED PER TDRR 01261	5-15-63	DT	WK
E	REVISED PER TDRR 01356	5-21-63	[illegible]	WK
F	REVISED PER TDRR 01616	6-10-63	[illegible]	WK
G	REVISED PER TDRR 01868	7-2-63	[illegible]	WK
H	REVISED PER TDRR 02167	[illegible]	[illegible]	WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4 W
R6	↓ -18		270		↓
R7	1006760-56		10K		1/2 W
R8	↓ -56		10K		1/2 W
R9	1006750-81		110K		1/4 W
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364-557		39.2K	1%	1/8 W
R18	1006750-15		200	2%	1/4 W
R19	-56		10K		
R20	-56		10K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364-635		100K	1%	1/8 W
R29	1010364-683		178K	↓	1/8 W
R32	1006750-67		30K	2%	1/4 W
R33	-67		30K		
R34	-53		7.5K		
R35	-53		7.5K		
R36	-81		110K		
R37	↓ -81		110K	↓	↓
R38	1010369-148	↓	20	5%	1/8 W
R39	↓ -148		20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1W
R41	1006750-53	RESISTOR MF	7.5K	2%	1/4W
R42	↓ -53	↓	7.5K	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010462	DIODE IN751-A			
CR2					
CR3					
CR4	↓	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
CR18	1010372-6				
L1	1010388-39	INDUCTOR	.01HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			
R43	1006750-40	RESISTOR	2.2K	2%	1/4 W

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DRAWN J. Cundy DATE 10-29-62
CHECKED R.V. [illegible]
APPROVAL J.L. Stone 11-28-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 11/30/62

MANNED SPACECRAFT CENTER
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SCHEMATIC, TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

1010016 H

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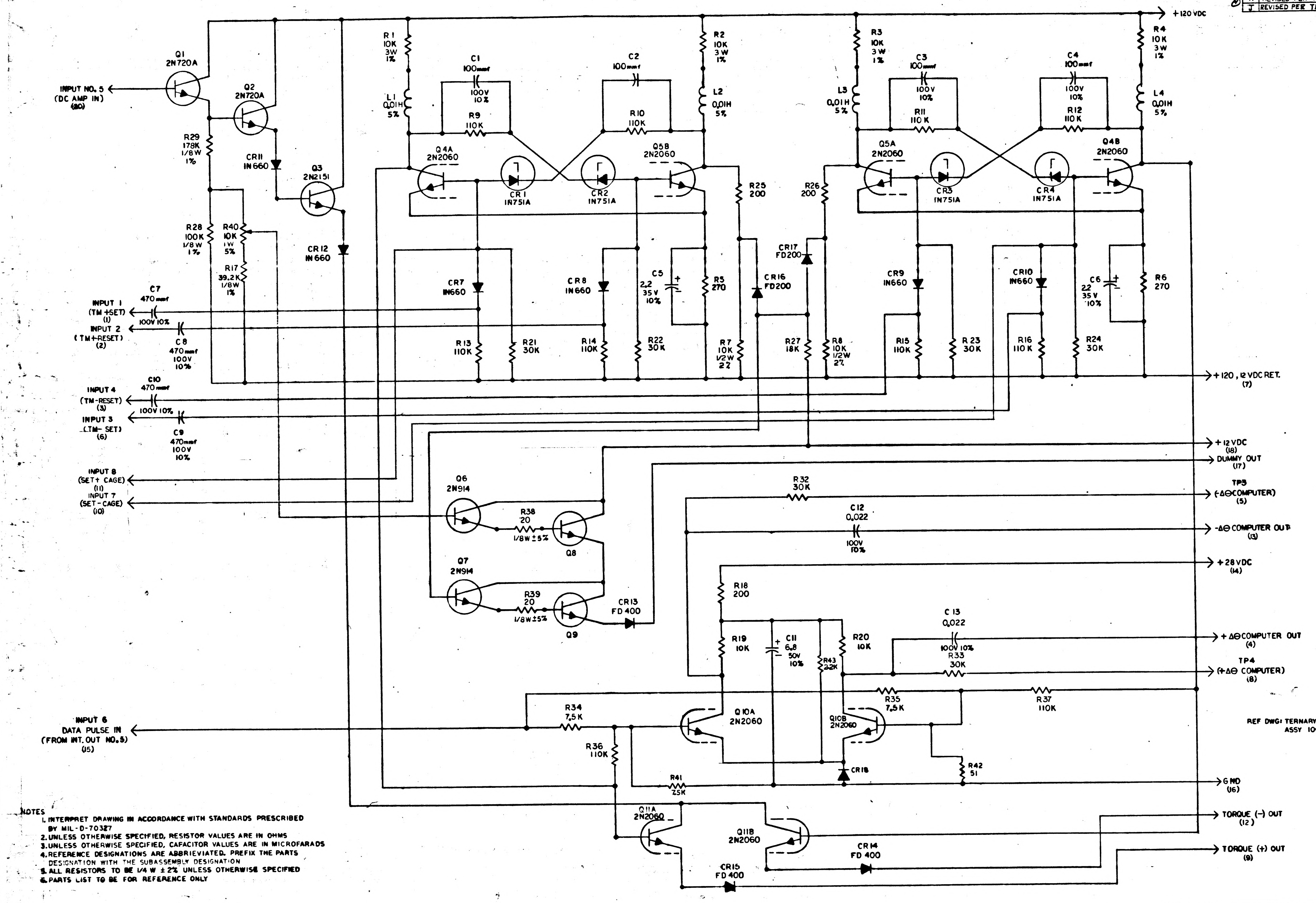
REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718	4-3-63	R.T.	
C	REVISED PER TDRR 01012	4-26-63	R.T.	
D	REVISED PER TDRR 01261	5-8-63		WK
E	REVISED PER TDRR 01358	5-21-63		WK
F	REVISED PER TDRR 01616	6-19-63	RPK	
G	REVISED PER TDRR 01268	7-2-63		WK
H	REVISED PER TDRR 02169	9-3-63		WK
J	REVISED PER TDRR 02878	9-24-63	RPK	


Q1
2N720A
INPUT NO. 5
(DC AMP IN)
(20)
Q2
2N720A
R29
178K
1/8W
1%
CR11
IN660
Q3
2N2151
CR12
IN660
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
110K
Q4A
2N2060
CR1
IN751A
CR2
IN751A
C2
100mmf
R10
110K
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
R25
200
R26
200
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
Q5A
2N2060
CR3
IN751A
CR4
IN751A
C4
100mmf
100V
10%
R12
110K
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
+120 VDC
CR7
IN660
CR8
IN660
C5
2.2
35V
10%
R5
270
CR16
FD200
CR17
FD200
CR9
IN660
CR10
IN660
C6
2.2
35V
10%
R6
270
INPUT 1
(TM +SET)
(1)
C7
470mmf
100V 10%
INPUT 2
(TM+RESET)
(2)
C8
470mmf
100V
10%
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
1/2W
2%
R27
18K
R8
10K
1/2W
2%
R15
110K
R23
30K
R16
110K
R24
30K
+120, 12 VDC RET.
(7)
INPUT 4
(TM-RESET)
(3)
C10
470mmf
100V 10%
INPUT 3
(TM-SET)
(6)
C9
470mmf
100V
10%
+12VDC
(18)
DUMMY OUT
(17)
INPUT 8
(SET+ CAGE)
(11)
INPUT 7
(SET-CAGE)
(10)
Q6
2N914
R38
20
1/8W ±5%
Q8
Q7
2N914
R39
20
1/8W ±5%
Q9
CR13
FD400
R32
30K
TP5
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
+28VDC
(14)
R18
200
R19
10K
C11
6.8
50V
10%
R43
2.2K
R20
10K
C13
0.022
100V 10%
+ΔΘ COMPUTER OUT
(4)
R33
30K
TP4
(+ΔΘ COMPUTER)
(8)
R35
7.5K
R37
110K
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(15)
R34
7.5K
Q10A
2N2060
Q10B
2N2060
R36
110K
CR18
R42
51
R41
7.5K
GND
(16)
Q11A
2N2060
Q11B
2N2060
TORQUE (-) OUT
(12)
CR14
FD 400
CR15
FD 400
TORQUE (+) OUT
(9)

REF DWG: TERNARY CURRENT SWITCH ASSY 1007016

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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DO NOT SCALE THIS DRAWING
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DRAWN DATE 10-24-62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-28-62
NASA APPROVAL 11/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
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SCHEMATIC,
TERNARY CURRENT SWITCH,

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010016
SCALE — | WT — | SHEET 1 OF 2

1010016

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REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4 W
R6	↓ -18		270		↓
R7	1006760-56		10K		1/2 W
R8	↓ -56		10K		1/2 W
R9	1006750-81		110K		1/4 W
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364 -557		39.2K	1%	1/8 W
R18	1006750-15		200	2%	1/4 W
R19	-56		10K		
R20	-56		10K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364-635		100K	1%	1/8 W
R29	1010364-683		178K	↓	1/8 W
R32	1006750-67		30K	2%	1/4 W
R33	-67		30K		
R34	-53		7.5K		
R35	-53		7.5K		
R36	-81		110K		
R37	↓ -81		110K	↓	↓
R38	1010369 -148		20	5%	1/8 W
R39	↓ -148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750-53	RESISTOR MF	7.5K	2%	1/4W
R42	↓ -53	↓	7.5K	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755 -73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755 -73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393 -039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777 -33	CAP CER	.022UF	±10%	100V
C13	1006777 -33	↓	.022UF	↓	100V
CR1	1010462	DIODE 1N751-A			
CR2					
CR3					
CR4	↓	↓			
CR7	1010385	1N660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
CR18	1010372-6				
L1	1010388-39	INDUCTOR	.01 HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			
R43	1006760-40	RESISTOR	2.2K	2%	1/4 W

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00716			
C	REVISED PER TDRR 01012			
D	REVISED PER TDRR 0126.1			
E	REVISED PER TDRR 01354	5-21-63		
F	REVISED PER TDRR 01616			
G	REVISED PER TDRR 01868			
H	REVISED PER TDRR 02161			
J	REVISED PER TDRR 02878			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
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MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN J. Cowley DATE 12-28-62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-29-62
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH.

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010016
SCALE // WT SHEET 2 OF 2

1010016

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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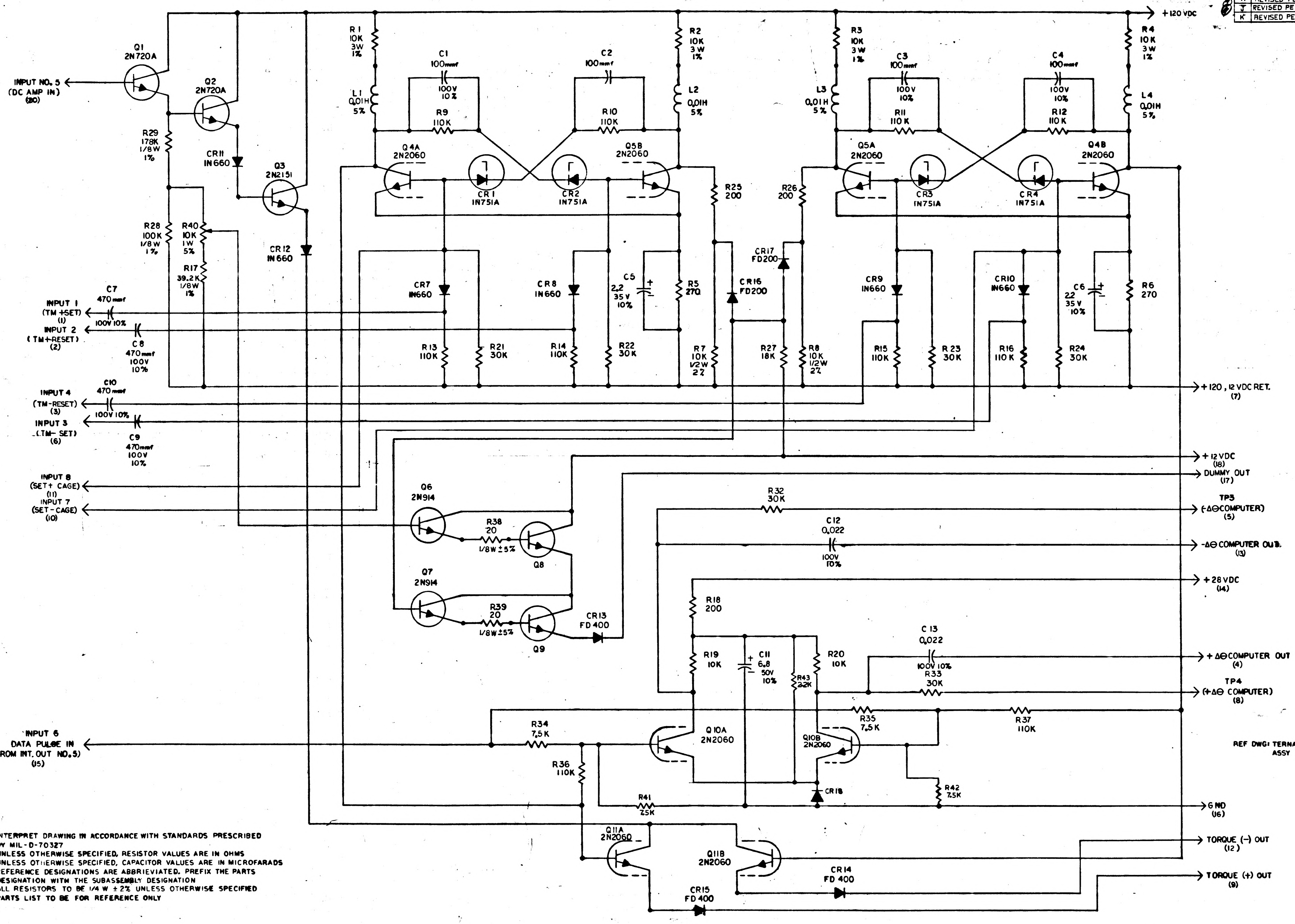
REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PEP TDRR 00382	2-6-63	[illegible]	WK
B	CHANGED PER TDRR 00718	4-3-63	R.R.	WK
C	REVISED PER TDRR 01012	4-26-63	R.T.	WK
D	REVISED PER TDRR 01261	5-8-63	R.T.	WK
E	REVISED PER TDRR 01358	5-21-63	[illegible]	WK
F	REVISED PER TDRR 01616	6-19-63	RPK	WK
G	REVISED PER TDRR 01868	7-2-63	J.J.M.	WK
H	REVISED PER TDRR 02169	9-3-63	[illegible]	WK
J	REVISED PER TDRR 02878	9-24-63	RPK	[illegible]
K	REVISED PER TDRR 04126	[illegible] 63	[illegible]	[illegible]


+120 VDC
Q1
2N720A
INPUT NO. 5
(DC AMP IN)
(20)
Q2
2N720A
R29
178K
1/8W
1%
CR11
IN660
Q3
2N2151
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
CR12
IN660
C7
470mmf
100V 10%
INPUT 1
(TM +SET)
(1)
INPUT 2
(TM+RESET)
(2)
C8
470mmf
100V
10%
INPUT 4
(TM-RESET)
(3)
C10
470mmf
100V 10%
INPUT 3
(TM- SET)
(6)
C9
470mmf
100V
10%
INPUT 8
(SET+ CAGE)
(11)
INPUT 7
(SET-CAGE)
(10)
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
110K
Q4A
2N2060
CR1
IN751A
C2
100mmf
R10
110K
CR2
IN751A
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
R25
200
CR7
IN660
CR8
IN660
C5
2.2
35V
10%
R5
270
CR16
FD200
CR17
FD200
R26
200
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
1/2W
2%
R27
18K
R8
10K
1/2W
2%
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
Q5A
2N2060
CR3
IN751A
C4
100mmf
100V
10%
R12
110K
CR4
IN751A
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
CR9
IN660
CR10
IN660
C6
2.2
35V
10%
R6
270
R15
110K
R23
30K
R16
110K
R24
30K
+120, 12 VDC RET.
(7)
+12 VDC
(18)
DUMMY OUT
(17)
Q6
2N914
R38
20
1/8W ±5%
Q8
Q7
2N914
R39
20
1/8W ±5%
Q9
CR13
FD 400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
+28 VDC
(14)
R18
200
R19
10K
C11
6.8
50V
10%
R43
2.2K
R20
10K
C13
0.022
100V 10%
+ΔΘ COMPUTER OUT
(4)
R33
30K
TP4
(+ΔΘ COMPUTER)
(8)
R35
7.5K
R37
110K
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(15)
R34
7.5K
Q10A
2N2060
Q10B
2N2060
R36
110K
CR18
R42
7.5K
R41
7.5K
GND
(16)
Q11A
2N2060
Q11B
2N2060
TORQUE (-) OUT
(12)
CR14
FD 400
TORQUE (+) OUT
(9)
CR15
FD 400

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN [illegible] DATE 10-24-62
CHECKED [illegible]
APPROVAL [illegible] 11-29-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH,

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE —
WT —
SHEET 1 OF 2

1010016

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REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389 -80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	-80		10K		
R5	1006750 -18	RESISTOR MF	270	2%	1/4 W
R6	-18		270		
R7	1006760 -56		10K		1/2 W
R8	-56		10K		1/2 W
R9	1006750 -81		110K		1/4 W
R10	-81		110K		
R11	-81		110K		
R12	-81		110K		
R13	-81		110K		
R14	-81		110K		
R15	-81		110K		
R16	-81		110K		1/4 W
R17	1010364 -557		39.2K	1%	1/8 W
R18	1006750 -15		200	2%	1/4 W
R19	-56		10K		
R20	-56		10K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	-62		18K		
R28	1010364 -635		100K	1%	1/8 W
R29	1010364 -683		178K		1/8 W
R32	1006750 -67		30K	2%	1/4 W
R33	-67		30K		
R34	-53		7.5K		
R35	-53		7.5K		
R36	-81		110K		
R37	-81		110K		
R38	1010369 -148		20	5%	1/8 W
R39	-148		20		
R40	1010373 -10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750 -53	RESISTOR MF	7.5K	2%	1/4W
R42	-53		7.5K		
C1	1006777 -13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	-13		100 UUF		
C5	1006755 -73	CAP TANT SOLID P	2.2 UF	± 10%	35 V
C6	1006755 -73		2.2 UF		
C7	1006777 -20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	-20		470UUF		
C11	1010393 -039	CAP TANT SOLID P	6.8 UF	± 10%	50 V
C12	1006777 -33	CAP CER	.022UF	±10%	100V
C13	1006777 -33		.022UF		100V
CR1	1010462	DIODE IN751-A			
CR2					
CR3					
CR4					
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12					
CR13	1010394	FD400			
CR14					
CR15					
CR16	1010384	FD200			
CR17	1010384				
CR18	1010372-6				
L1	1010388 -39	INDUCTOR	.01 HY	±5%	75MA
L2	-39				
L3	-39				
L4	-39				
Q1	1010357	TRANS 2N720A			
Q2	1010357				
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4				
Q6	1006752	TRANS 2N914			
Q7	1006752				
Q8	1010600	TRANSISTOR			
Q9	1010600				
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4				
R43	1006750-40	RESISTOR	2.2 K	2%	1/4 W

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00716			
C	REVISED PER TDRR 01012			
D	REVISED PER TDRR 0126.1	5-15-63		
E	REVISED PER TDRR 01358	5-21-63		
F	REVISED PER TDRR 01616	6-19-63		
G	REVISED PER TDRR 01868			
H	REVISED PER TDRR 02167			
J	REVISED PER TDRR 02878			
K	REVISED PER TDRR 04126			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
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DRAWN J. Gundy DATE 10-29-62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

1010016 K

INCHES
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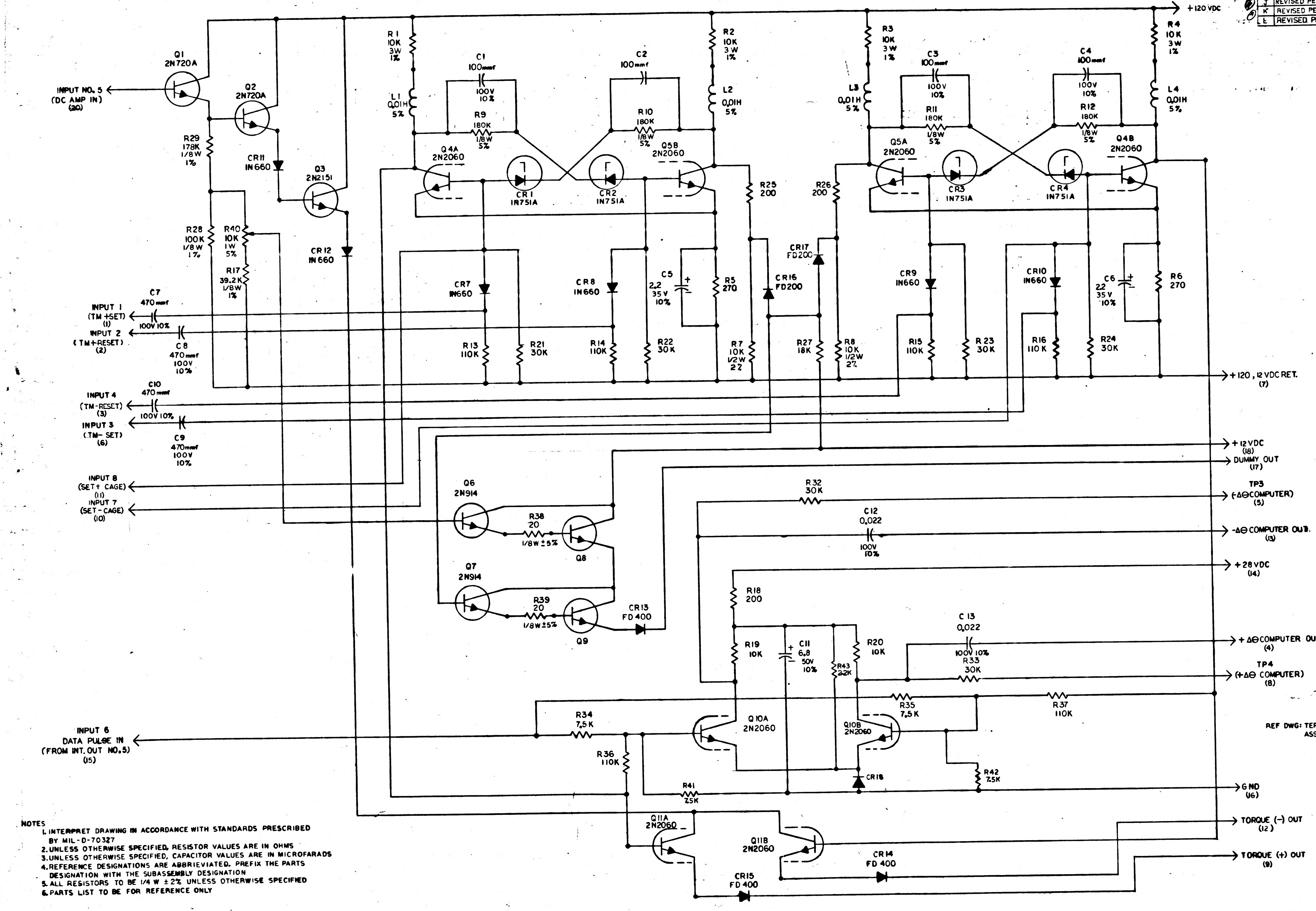
REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718	4-3-63		
C	REVISED PER TDRR 01012			
D	REVISED PER TDRR 01261	5-8-63		
E	REVISED PER TDRR 01358	5-21-63		
F	REVISED PER TDRR 01615	6-19-63	EPK	
G	REVISED PER TDRR 01868	7-2-63		
H	REVISED PER TDRR 02169			
J	REVISED PER TDRR 02878		EPK	
K	REVISED PER TDRR 04126	OCT 63		
L	REVISED PER TDRR 05277	17 DEC 63		


+120 VDC
Q1
2N720A
Q2
2N720A
Q3
2N2151
INPUT NO. 5
(DC AMP IN)
(20)
R29
178K
1/8W
1%
CR11
IN660
CR12
IN660
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39.2K
1/8W
1%
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
180K
1/8W
5%
Q4A
2N2060
CR1
IN751A
C2
100mmf
R10
180K
1/8W
5%
Q5B
2N2060
CR2
IN751A
R2
10K
3W
1%
L2
0.01H
5%
R25
200
R26
200
CR17
FD200
CR16
FD200
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
180K
1/8W
5%
Q5A
2N2060
CR3
IN751A
C4
100mmf
100V
10%
R12
180K
1/8W
5%
Q4B
2N2060
CR4
IN751A
R4
10K
3W
1%
L4
0.01H
5%
CR7
IN660
CR8
IN660
C5
2.2
35V
10%
R5
270
CR9
IN660
CR10
IN660
C6
2.2
35V
10%
R6
270
INPUT 1
(TM +SET)
(1)
C7
470mmf
100V 10%
INPUT 2
(TM+RESET)
(2)
C8
470mmf
100V
10%
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
1/2W
2%
R27
18K
R8
10K
1/2W
2%
R15
110K
R23
30K
R16
110K
R24
30K
+120, 12 VDC RET.
(7)
INPUT 4
(TM-RESET)
(3)
C10
470mmf
100V 10%
INPUT 3
(TM-SET)
(6)
C9
470mmf
100V
10%
+12VDC
(18)
DUMMY OUT
(17)
INPUT 8
(SET+ CAGE)
(11)
INPUT 7
(SET-CAGE)
(10)
Q6
2N914
R38
20
1/8W ±5%
Q8
Q7
2N914
R39
20
1/8W ±5%
Q9
CR13
FD400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT.
(13)
+28VDC
(14)
R18
200
R19
10K
C11
6.8
50V
10%
R43
2.2K
R20
10K
C13
0.022
100V 10%
+ΔΘ COMPUTER OUT
(4)
R33
30K
TP4
(+ΔΘ COMPUTER)
(8)
R35
7.5K
R37
110K
R34
7.5K
Q10A
2N2060
Q10B
2N2060
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO.5)
(15)
R36
110K
CR18
R42
7.5K
R41
7.5K
GND
(16)
Q11A
2N2060
Q11B
2N2060
TORQUE (-) OUT
(12)
TORQUE (+) OUT
(9)
CR14
FD 400
CR15
FD 400

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO
CONTRACT
DRAWN DATE 10-24-62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-28-62
NASA APPROVAL 11/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH.

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE —
WT —
SHEET 1 OF 2

1010016

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389 -80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750 -18	RESISTOR MF	270	2%	1/4 W
R6	↓ -18		270		↓
R7	1006760 -56		10K		1/2 W
R8	↓ -56		10K	↓	1/2 W
R9	1010369 - 87		180K	5%	1/8 W
R10	-87		180K		
R11	-87		180K		
R12	↓ -87		180K	↓	↓
R13	1006750 -81		110K	2%	1/4W
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364 -557		39.2K	1%	1/8 W
R18	1006750 - 15		200	2%	1/4 W
R19	-56		10K		
R20	-56		10K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	- 67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364 -635		100K	1%	1/8 W
R29	1010364 -683		178K	↓	1/8 W
R32	1006750 - 67		30K	2%	1/4 W
R33	- 67		30K		
R34	- 53		7.5K		
R35	- 53		7.5K		
R36	- 81		110K		
R37	↓ - 81		110K	↓	↓
R38	1010369 - 148		20	5%	1/8 W
R39	↓ - 148	↓	20	↓	↓
R40	1010373 - 10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750 - 53	RESISTOR MF	7.5K	2%	1/4W
R42	↓ - 53	↓	7.5 K	↓	↓
C1	1006777 -13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755 - 73	CAP TANT SOLID P	2.2 UF	± 10%	35 V
C6	1006755 - 73	↓	2.2 UF	↓	↓
C7	1006777 -20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393 -039	CAP TANT SOLID P	6.8 UF	± 10%	50 V
C12	1006777 -33	CAP CER	.022UF	±10%	100V
C13	1006777 -33	↓	.022UF	↓	100V
CR1	1010462	DIODE IN751-A			
CR2					
CR3					
CR4	↓	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD 400			
CR14					
CR15	↓	↓			
CR16	1010384	FD 200			
CR17	1010384	↓			
CR18	1010372-6				
L1	1010388 -39	INDUCTOR	.01 HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357	TRANS 2N720A			
Q2	1010357	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			
R43	1006750-40	RESISTOR	2.2 K	2%	1/4 W

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		WR
B	CHANGED PER TDRR 00716			WR
C	REVISED PER TDRR 01012			WR
D	REVISED PER TDRR 0126.1	5-15-63		WR
E	REVISED PER TDRR 01358	5-21-63		WR
F	REVISED PER TDRR 01616			WR
G	REVISED PER TDRR 01868			WR
H	REVISED PER TDRR 02167			WR
J	REVISED PER TDRR 02878			
K	REVISED PER TDRR 04126			
L	REVISED PER TDRR 05277			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 10-29-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

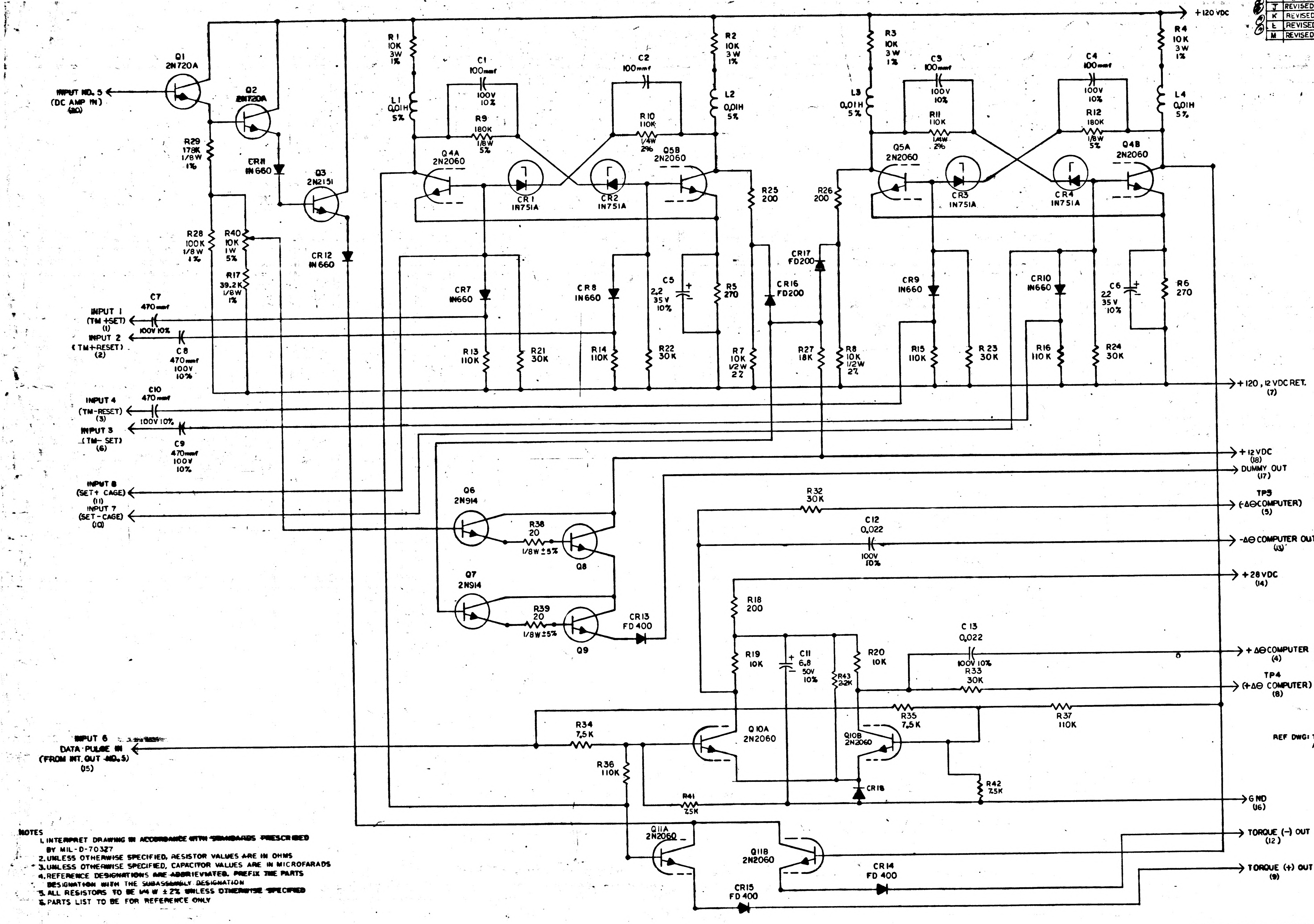
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS II TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PEP TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00718			
C	REVISED PER TDRR 01012			
D	REVISED PER TDRR 01261	5-8-63		
E	REVISED PER TDRR 01358	5-21-63		
F	REVISED PER TDRR 016165		RPK	
G	REVISED PER TDRR 01868	7-2-63		
H	REVISED PER TDRR 02169			
J	REVISED PER TDRR 02878			
K	REVISED PER TDRR 04126			
L	REVISED PER TDRR 05277			
M	REVISED PER TDRR 06638			



+120 VDC
Q1 2N720A
Q2 2N720A
Q3 2N2151
INPUT NO. 5 (DC AMP IN) (20)
R29 178K 1/8W 1%
CR11 IN660
CR12 IN660
R28 100K 1/8W 1%
R40 10K 1W 5%
R17 39.2K 1/8W 1%
C7 470mmf 100V 10%
INPUT 1 (TM+SET) (1)
INPUT 2 (TM+RESET) (2)
C8 470mmf 100V 10%
INPUT 4 (TM-RESET) (3)
C10 470mmf 100V 10%
INPUT 3 (TM-SET) (6)
C9 470mmf 100V 10%
INPUT 8 (SET+CAGE) (11)
INPUT 7 (SET-CAGE) (10)
R1 10K 3W 1%
C1 100mmf 100V 10%
L1 0.01H 5%
R9 180K 1/8W 5%
Q4A 2N2060
CR1 1N751A
C2 100mmf
R10 110K 1/4W 2%
Q5B 2N2060
CR2 1N751A
R2 10K 3W 1%
L2 0.01H 5%
R25 200
CR7 IN660
CR8 IN660
C5 2.2 35V 10%
R5 270
CR16 FD200
CR17 FD200
R13 110K
R21 30K
R14 110K
R22 30K
R7 10K 1/2W 2%
R26 200
R27 18K
R8 10K 1/2W 2%
R3 10K 3W 1%
L3 0.01H 5%
C3 100mmf 100V 10%
R11 110K 1/4W 2%
Q5A 2N2060
CR3 1N751A
C4 100mmf 100V 10%
R12 180K 1/8W 5%
CR4 1N751A
Q4B 2N2060
R4 10K 3W 1%
L4 0.01H 5%
CR9 IN660
CR10 IN660
C6 22 35V 10%
R6 270
R15 110K
R23 30K
R16 110K
R24 30K
+120, 12 VDC RET. (7)
+12 VDC (18)
DUMMY OUT (17)
Q6 2N914
R38 20 1/8W ±5%
Q8
Q7 2N914
R39 20 1/8W ±5%
Q9
CR13 FD 400
R32 30K
TP5 (-ΔΘ COMPUTER) (5)
C12 0.022 100V 10%
-ΔΘ COMPUTER OUT (13)
+28 VDC (14)
R18 200
R19 10K
C11 6.8 50V 10%
R43 3.2K
R20 10K
C13 0.022 100V 10%
+ΔΘ COMPUTER OUT (4)
R33 30K
TP4 (+ΔΘ COMPUTER) (8)
R35 7.5K
R37 110K
INPUT 6 DATA PULSE IN (FROM INT. OUT NO. 5) (15)
R34 7.5K
Q10A 2N2060
Q10B 2N2060
R36 110K
CR18
R42 7.5K
R41 7.5K
GND (16)
Q11A 2N2060
Q11B 2N2060
TORQUE (-) OUT (12)
CR14 FD 400
TORQUE (+) OUT (9)
CR15 FD 400
REF DWG: TERNARY CURRENT SWITCH ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DATE 10-24-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH.

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010016
SCALE — | WT — | SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	LJS	[illegible]
B	CHANGED PER TDRR 00716	[illegible]		WK
C	REVISED PER TDRR 01012	[illegible]	BT	WK
D	REVISED PER TDRR 01261	5-15-63	BT	[illegible]
E	REVISED PER TDRR 01358	5-21-63	[illegible]	WK
F	REVISED PER TDRR 01616	6-10-63	[illegible]	WK
G	REVISED PER TDRR 01868	7-2-63	[illegible]	[illegible]
H	REVISED PER TDRR 02167	[illegible]	[illegible]	[illegible]
J	REVISED PER TDRR 02898	[illegible]	[illegible]	[illegible]
K	REVISED PER TDRR 04126	[illegible]	[illegible]	WK
L	REVISED PER TDRR 05277	[illegible]	[illegible]	WK
M	REVISED PER TDRR 06638	[illegible]	[illegible]	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4 W
R6	↓ -18		270		↓
R7	1006760-56		10K		1/2 W
R8	↓ -56		10K	↓	1/2 W
R9	1010369-87		180K	5%	1/8 W
R10	1006750-81		110K	2%	1/4W
R11	1006750-81		110K	2%	1/4W
R12	1010369-87		180K	5%	1/8W
R13	1006750-81		110K	2%	1/4W
R14	-81		110K		↓
R15	-81		110K		
R16	↓ -81		110K	↓	1/4 W
R17	1010364-557		39.2K	1%	1/8 W
R18	1006750-15		200	2%	1/4 W
R19	-56		10K		
R20	-56		10K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364-635		100K	1%	1/8 W
R29	1010364-683		178K	↓	1/8 W
R32	1006750-67		30K	2%	1/4 W
R33	-67		30K		
R34	-53		7.5K		
R35	-53		7.5K		
R36	-81		110K		
R37	↓ -81		110K	↓	↓
R38	1010369 -148	↓	20	5%	1/8 W
R39	↓ -148		20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750-53	RESISTOR MF	7.5K	2%	1/4W
R42	↓ -53	↓	7.5K	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010462-6	DIODE IN751-A			
CR2	-6				
CR3	-6				
CR4	↓ -6	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
CR18	1010372-6				
L1	1010388-39	INDUCTOR	.01 HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357-1	TRANS 2N720A			
Q2	1010357-1	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			
R43	1006750-40	RESISTOR	2.2K	2%	1/4 W

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN J. Cawley DATE 10-29-62
CHECKED R.V. [illegible]
APPROVAL J. L. Stone 11-23-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible] 11-30-62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE // WT
SHEET 2 OF 2

1010016 M

INCHES
0 1 2
PHOTOGRAPHING SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	-80		10K		
R3	-80		10K		
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4W
R6	↓ -18		270		↓
R7	1006760-56		10K		1/2W
R8	↓ -56		10K	↓	1/2W
R9	1010369-87		180K	5%	1/8W
R10	1006750-81		110K	2%	1/4W
R11	1006750-81		110K	2%	1/4W
R12	1010369-87		180K	5%	1/8W
R13	1006750-81		110K	2%	1/4W
R14	-81		110K		
R15	-81		110K		↓
R16	↓ -81		110K	↓	1/4W
R17	1010364-557		39.2K	1%	1/8W
R18	1006750-15		200	2%	1/4W
R19	-56		10K		
R20	-56		10K		
R21	-67		30K		
R22	-67		30K		
R23	-67		30K		
R24	-67		30K		
R25	-15		200		
R26	-15		200		
R27	↓ -62		18K	↓	↓
R28	1010364-635		100K	1%	1/8W
R29	1010364-683		178K	↓	1/8W
R32	1006750-67		30K	2%	1/4W
R33	-67		30K		
R34	-53		7.5K		
R35	↓ -53	↓	7.5K	↓	↓
~~R36~~	~~-81~~		~~110K~~		
~~R37~~	~~-81~~		~~110K~~		
R38	1010369-148	RESISTOR MF	20	5%	1/8W
R39	↓ -148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	[illegible]
R41	1006750-53	RESISTOR MF	7.5K	2%	1/4W
R42	↓ -53	↓	7.5K	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	-13		100UUF		
C3	-13		100UUF		
C4	↓ -13		100 UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	-20		470UUF		
C9	-20		470UUF		
C10	↓ -20		470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010462-6	DIODE IN751-A			
CR2	-6				
CR3	-6				
CR4	↓ -6	↓			
CR7	1010385	IN660			
CR8					
CR9					
CR10					
CR11					
CR12	↓	↓			
CR13	1010394	FD400			
CR14					
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
CR18	1010372-6				
L1	1010388-39	INDUCTOR	.01 HY	±5%	75MA
L2	-39				
L3	-39				
L4	↓ -39	↓		↓	↓
Q1	1010357-1	TRANS 2N720A			
Q2	1010357-1	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			
R43	1006750-40	RESISTOR	2.2K	2%	1/4W

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00716			
C	REVISED PER TDRR 01012		ST	WK
D	REVISED PER TDRR 01261			
E	REVISED PER TDRR 01354	5-21-63		WK
F	REVISED PER TDRR [illegible]			WK
G	REVISED PER TDRR 01868			
H	REVISED PER TDRR 02167			
J	REVISED PER TDRR 02878			
K	REVISED PER TDRR 04126			WK
L	REVISED PER TDRR 05277			WK
M	REVISED PER TDRR 06638			
N	REVISED PER TDRR-16835	3-MAR-65	B.	

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — // DECIMALS — // ANGLES — //
DO NOT SCALE THIS DRAWING
MATERIAL — //
HEAT TREATMENT — //
FINAL FINISH — //

MIT
INSTRUMENTATION LAB
Cambridge Mass

DRAWN DATE 10-29-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11-30-62
MIT APPROVAL 30 Nov 62

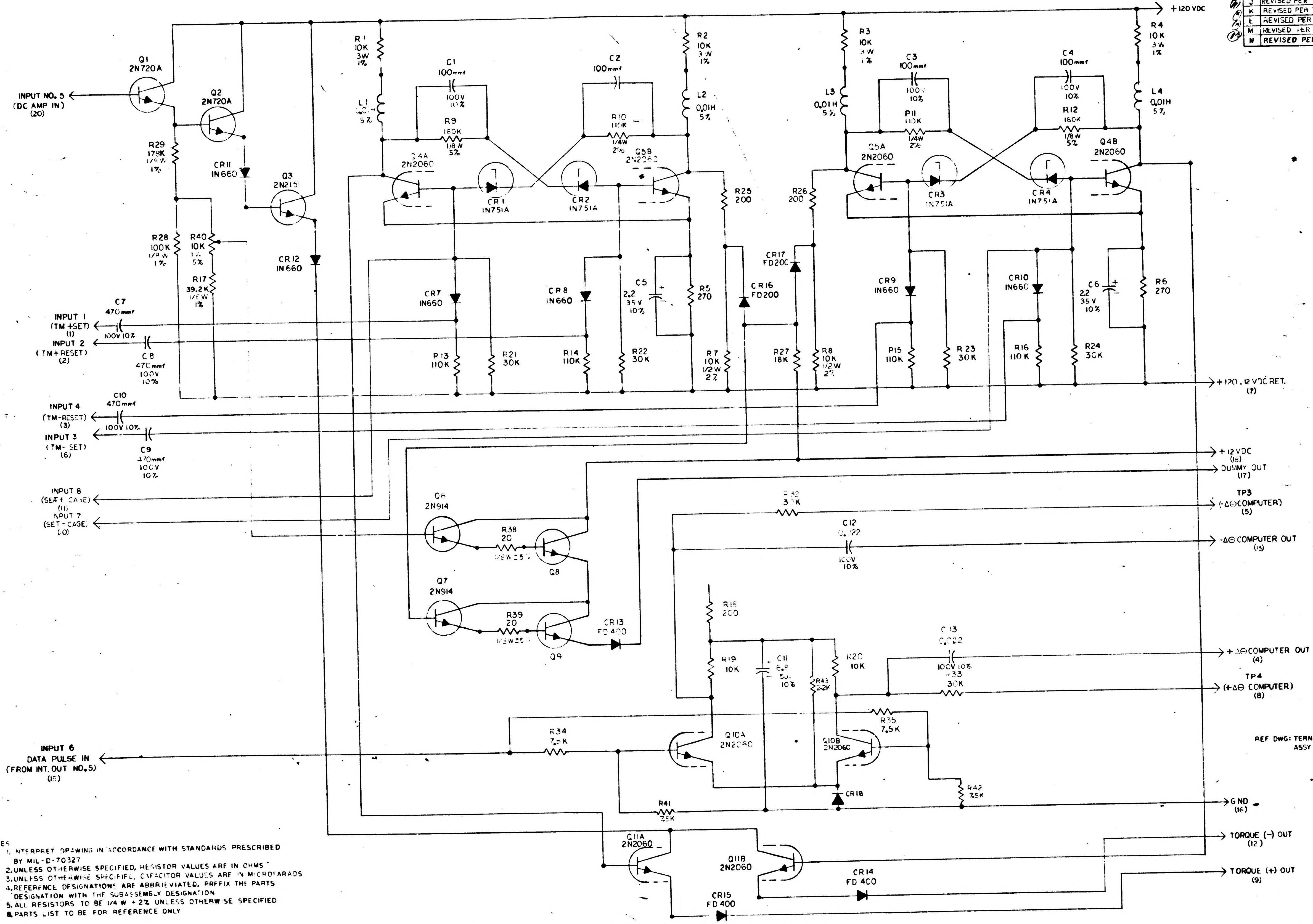
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010016
SCALE //
WT
SHEET 2 OF 2

1010016 N

SYM	DESCRIPTION	DATE	APPROVAL	
	REVISIONS CLASS B TDRR 125			
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63		
B	CHANGED PER TDRR 00716	4-3-63		
C	REVISED PER TDRR 01012			
D	REVISED PER TDRR 01261	5-8-63		
E	REVISED PER TDRR 01354	5-21-63		
F	REVISED PER TDRR 01416		EPK	
G	REVISED PER TDRR 01868	7-2-63		
H	REVISED PER TDRR 02167			
J	REVISED PER TDRR 02478			
K	REVISED PER TDRR 04126			
L	REVISED PER TDRR 05277			
M	REVISED PER TDRR 06638			
N	REVISED PER TDRR 16835	3-MAR-65		


+120 VDC
INPUT NO. 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R29 178K 1/2 W 1%
CR11 IN660
CR12 IN660
R28 100K 1/2 W 1%
R40 10K 5%
R17 39.2K 1/2 W 1%
R1 10K 3W 1%
L1 0.01H 5%
C1 100mmf 100V 10%
R9 160K 1/8 W 5%
Q4A 2N2060
CR1 IN751A
CR2 IN751A
C2 100mmf
R10 110K 1/4W 2%
Q5B 2N2060
R2 10K 3W 1%
L2 0.01H 5%
R25 200
R26 200
R3 10K 3W 1%
L3 0.01H 5%
C3 100mmf 100V 10%
R11 110K 1/4W 2%
Q5A 2N2060
CR3 IN751A
CR4 IN751A
C4 100mmf 100V 10%
R12 180K 1/8W 5%
Q4B 2N2060
R4 10K 3W 1%
L4 0.01H 5%
CR7 IN660
CR8 IN660
C5 2.2 35V 10%
R5 270
CR16 FD200
CR17 FD200
CR9 IN660
CR10 IN660
C6 22 35V 10%
R6 270
INPUT 1 (TM +SET) (1)
C7 470mmf 100V 10%
INPUT 2 (TM+RESET) (2)
C8 470mmf 100V 10%
R13 110K
R21 30K
R14 110K
R22 30K
R7 10K 1/2W 2%
R27 18K
R8 10K 1/2W 2%
R15 110K
R23 30K
R16 110K
R24 30K
+120, 12 VDC RET. (7)
INPUT 4 (TM-RESET) (3)
C10 470mmf 100V 10%
INPUT 3 (TM- SET) (6)
C9 470mmf 100V 10%
+12 VDC (16)
DUMMY OUT (17)
INPUT 8 (SET + CASE) (11)
INPUT 7 (SET - CASE) (10)
Q6 2N914
R38 20 1/2W 5%
Q8
Q7 2N914
R39 20 1/2W 5%
Q9
CR13 FD400
R32 30K
C12 0.0022 100V 10%
TP3 (-ΔΘ COMPUTER) (5)
-ΔΘ COMPUTER OUT (13)
R18 200
R19 10K
C11 6.8 50V 10%
R43 22K
R20 10K
C13 0.0022 100V 10%
R33 30K
+ΔΘ COMPUTER OUT (4)
TP4 (+ΔΘ COMPUTER) (8)
INPUT 6 DATA PULSE IN (FROM INT. OUT NO.5) (15)
R34 7.5K
Q10A 2N2060
Q10B 2N2060
R35 7.5K
R42 7.5K
CR18
R41 7.5K
GND (16)
Q11A 2N2060
Q11B 2N2060
CR14 FD 400
CR15 FD 400
TORQUE (-) OUT (12)
TORQUE (+) OUT (9)

REF DWG: TERNARY CURRENT SWITCH ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W + 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE 10-24-62
CHECKED
APPROVAL
APPROVAL 11-20-62
NASA APPROVAL
MIT APPROVAL

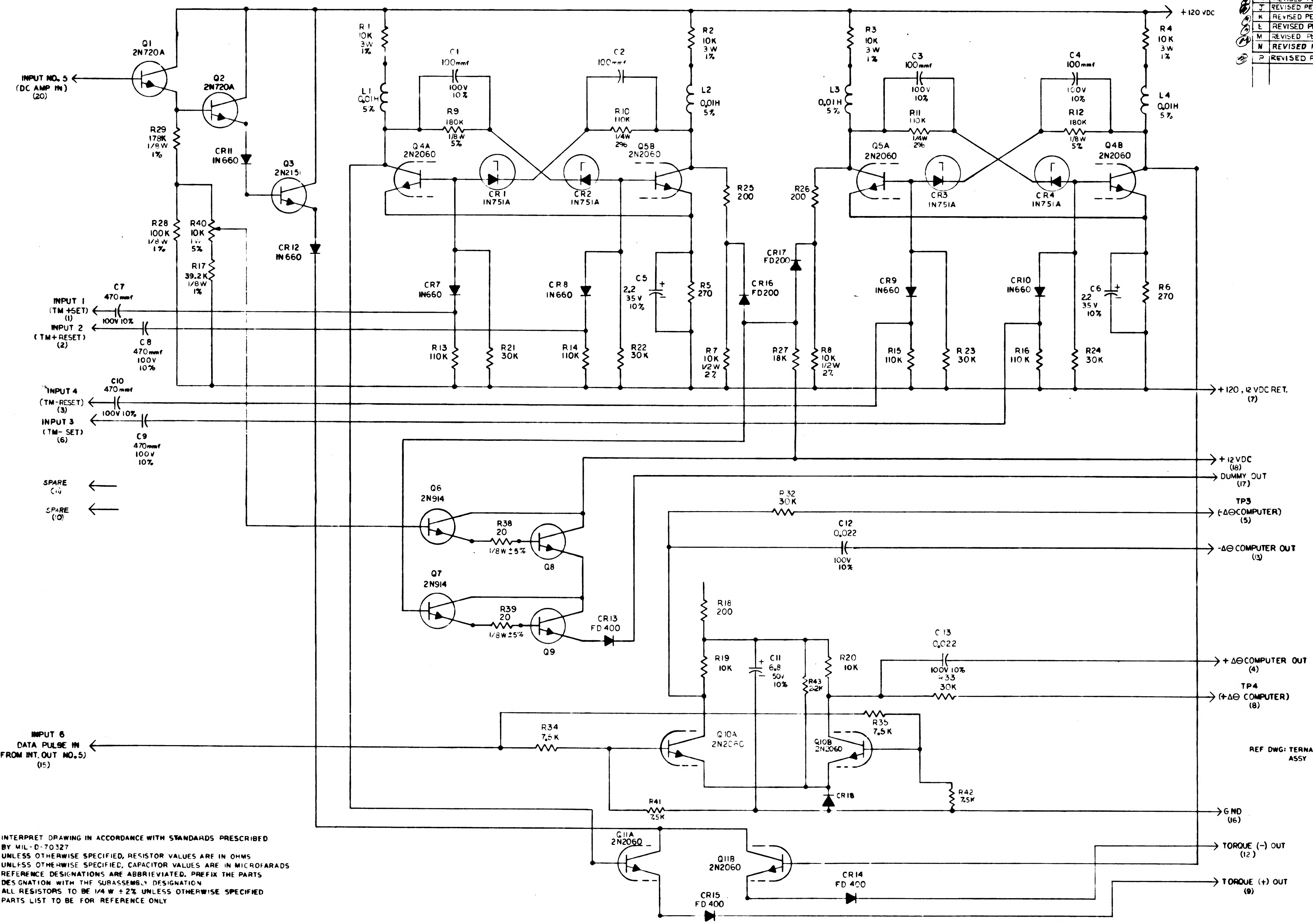
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010016
SCALE —
WT —
SHEET 1 OF 2

1010016 N

REVISIONS CLASS B TDRR 125			
SYM	DESCRIPTION	DATE	APPROVAL
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR [illegible]	2-6-63	
B	CHANGED PER TDRR 00718	4-3-63	
C	REVISED PER TDRR 01012	4-25-63	
D	REVISED PER TDRR 01261	5-8-63	
E	REVISED PER TDRR 01358	5-21-63	
F	REVISED PER TDRR 01616	[illegible]	
G	REVISED PER TDRR 01868	[illegible]	
H	REVISED PER TDRR 02167	[illegible]	
J	REVISED PER TDRR 02678	[illegible]	
K	REVISED PER TDRR 04126	[illegible]	
L	REVISED PER TDRR 05277	[illegible]	
M	REVISED PER TDRR [illegible]	[illegible]	
N	REVISED PER TDRR 16835	[illegible]	B.
P	REVISED PER TDRR 16831	[illegible]	


+120 VDC
Q1
2N720A
INPUT NO. 5
(DC AMP IN)
(20)
Q2
2N720A
R29
178K
1/8W
1%
CR11
IN660
Q3
2N2151
CR12
IN660
R28
100K
1/8 W
1%
R40
10K
1%
5%
R17
39.2K
1/8W
1%
INPUT 1
(TM+SET)
(1)
C7
470mmf
100V 10%
INPUT 2
(TM+RESET)
(2)
C8
470mmf
100V
10%
INPUT 4
(TM-RESET)
(3)
C10
470mmf
100V 10%
INPUT 3
(TM-SET)
(6)
C9
470mmf
100V
10%
SPARE
(14)
SPARE
(10)
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
180K
1/8W
5%
Q4A
2N2060
CR1
IN751A
CR2
IN751A
C2
100mmf
R10
110K
1/4W
2%
Q5B
2N2060
R2
10K
3W
1%
L2
0.01H
5%
R25
200
CR7
IN660
CR8
IN660
C5
2.2
35V
10%
R5
270
CR16
FD200
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
1/2W
2%
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
1/4W
2%
Q5A
2N2060
CR3
IN751A
CR4
IN751A
C4
100mmf
100V
10%
R12
180K
1/8W
5%
Q4B
2N2060
R4
10K
3W
1%
L4
0.01H
5%
R26
200
CR17
FD200
CR9
IN660
CR10
IN660
C6
22
35V
10%
R6
270
R27
18K
R8
10K
1/2W
2%
R15
110K
R23
30K
R16
110K
R24
30K
+120, 12 VDC RET.
(7)
+12 VDC
(18)
DUMMY OUT
(17)
Q6
2N914
R38
20
1/8W ±5%
Q8
Q7
2N914
R39
20
1/8W ±5%
Q9
CR13
FD 400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
R18
200
R19
10K
C11
6.8
50V
10%
R43
2.2K
R20
10K
C13
0.022
100V 10%
R33
30K
+ΔΘ COMPUTER OUT
(4)
TP4
(+ΔΘ COMPUTER)
(8)
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 5)
(15)
R34
7.5K
Q10A
2N2060
Q10B
2N2060
R35
7.5K
CR18
R42
7.5K
R41
7.5K
GND
(16)
Q11A
2N2060
Q11B
2N2060
CR15
FD 400
CR14
FD 400
TORQUE (-) OUT
(12)
TORQUE (+) OUT
(9)

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
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6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS — DECIMALS — ANGLES
± — // — // — //
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
Cambridge Mass
DWG NO — CONTRACT
DRAWN [illegible] DATE 10-24-62
CHECKED [illegible]
APPROVAL [illegible] -25-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
TERNARY CURRENT SWITCH,

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010016
SCALE —//—	WT	SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR W W	10K	1%	3W
R2	↓ -80	↓	10K	↓	↓
R3	↓ -80	↓	10K	↓	↓
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4 W
R6	↓ -18		270	↓	↓
R7	1006760-56		10K	↓	1/2 W
R8	↓ -56		10K	↓	1/2 W
R9	1010369-87		180K	5%	1/8 W
R10	1006750-81		110K	2%	1/4W
R11	1006750-81		110K	2%	1/4W
R12	1010369-87		180K	5%	1/8W
R13	1006750-81		110K	2%	1/4W
R14	↓ -81		110K	↓	↓
R15	↓ -81		110K	↓	↓
R16	↓ -81		110K	↓	1/4 W
R17	1010364-557		39.2K	1%	1/8 W
R18	1006750-15		200	2%	1/4 W
R19	↓ -56		10K	↓	↓
P20	↓ -56		10K	↓	↓
P21	↓ -67		30K	↓	↓
R22	↓ -67		30K	↓	↓
R23	↓ -67		30K	↓	↓
R24	↓ -67		30K	↓	↓
R25	↓ -15		200	↓	↓
R26	↓ -15		200	↓	↓
R27	↓ -62		18K	↓	↓
R28	1010364-635		[illegible]K	1%	1/8 W
R29	1010364-683		178K	↓	1/8 W
R32	1006750-67		30K	2%	1/4 W
R33	↓ -67		30K	↓	↓
R34	↓ -53		7.5K	↓	↓
R35	↓ -53		7.5K	↓	↓
~~R36~~	~~-81~~		~~110K~~		
~~R37~~	~~-81~~		~~110K~~		
R38	1010369-148	RESISTOR MF	20	5%	1/8 W
R39	↓ -148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	[illegible]
R41	1006750-53	RESISTOR MF	7.5K	2%	1/4W
R42	↓ -53	↓	7.5K	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	↓ -13	↓	100UUF	↓	↓
C3	↓ -13	↓	100UUF	↓	↓
C4	↓ -13	↓	100UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	↓ -20	↓	470UUF	↓	↓
C9	↓ -20	↓	470UUF	↓	↓
C10	↓ -20	↓	470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010462-6	DIODE IN751-A			
CR2	↓ -6	↓			
CR3	↓ -6	↓			
CR4	↓ -6	↓			
CR7	1010385	IN660			
CR8	↓	↓			
CR9	↓	↓			
CR10	↓	↓			
CR11	↓	↓			
CR12	↓	↓			
CR13	1010394	FD400			
CR14	↓	↓			
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
CR18	1010372-6				
-					
L1	1010388-39	INDUCTOR	.01 HY	±5%	75MA
L2	↓ -39	↓		↓	↓
L3	↓ -39	↓		↓	↓
L4	↓ -39	↓		↓	↓
Q1	1010357-1	TRANS 2N720A			
Q2	1010357-1	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1006752	TRANS 2N914			
Q7	1006752	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			
R43	1006750-40	RESISTOR	2.2K	2%	1/4 W

REVISIONS CLASS B TDRR [illegible]

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	[illegible]	[illegible]
B	CHANGED PER TDRR 00716	[illegible]		[illegible]
C	REVISED PER TDRR 01012	[illegible]	[illegible]	[illegible]
D	REVISED PER TDRR 01261	5-15-[illegible]	[illegible]	[illegible]
E	REVISED PER TDRR 01358	5-21-63	[illegible]	WK
F	REVISED PER TDRR [illegible]	[illegible]	[illegible]	WK
G	REVISED PER TDRR 01868	[illegible]	[illegible]	WK
H	REVISED PER TDRR 02167	[illegible]	[illegible]	WK
J	REVISED PER TDRR 02878	[illegible]	[illegible]	N
K	REVISED PER TDRR 04126	[illegible]	[illegible]	WK
L	REVISED PER TDRR 05277	[illegible]	[illegible]	WK
M	REVISED PER TDRR 06638	[illegible]	[illegible]	
N	REVISED PER TDRR-16835	[illegible]	[illegible]	[illegible]
P	REVISED PER TDRR-16831	5-[illegible]	[illegible]	[illegible]

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN J. [illegible] DATE 10-29-62
CHECKED [illegible]
APPROVAL [illegible] 11-25-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible] 11-30-62
MIT APPROVAL [illegible] 30 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

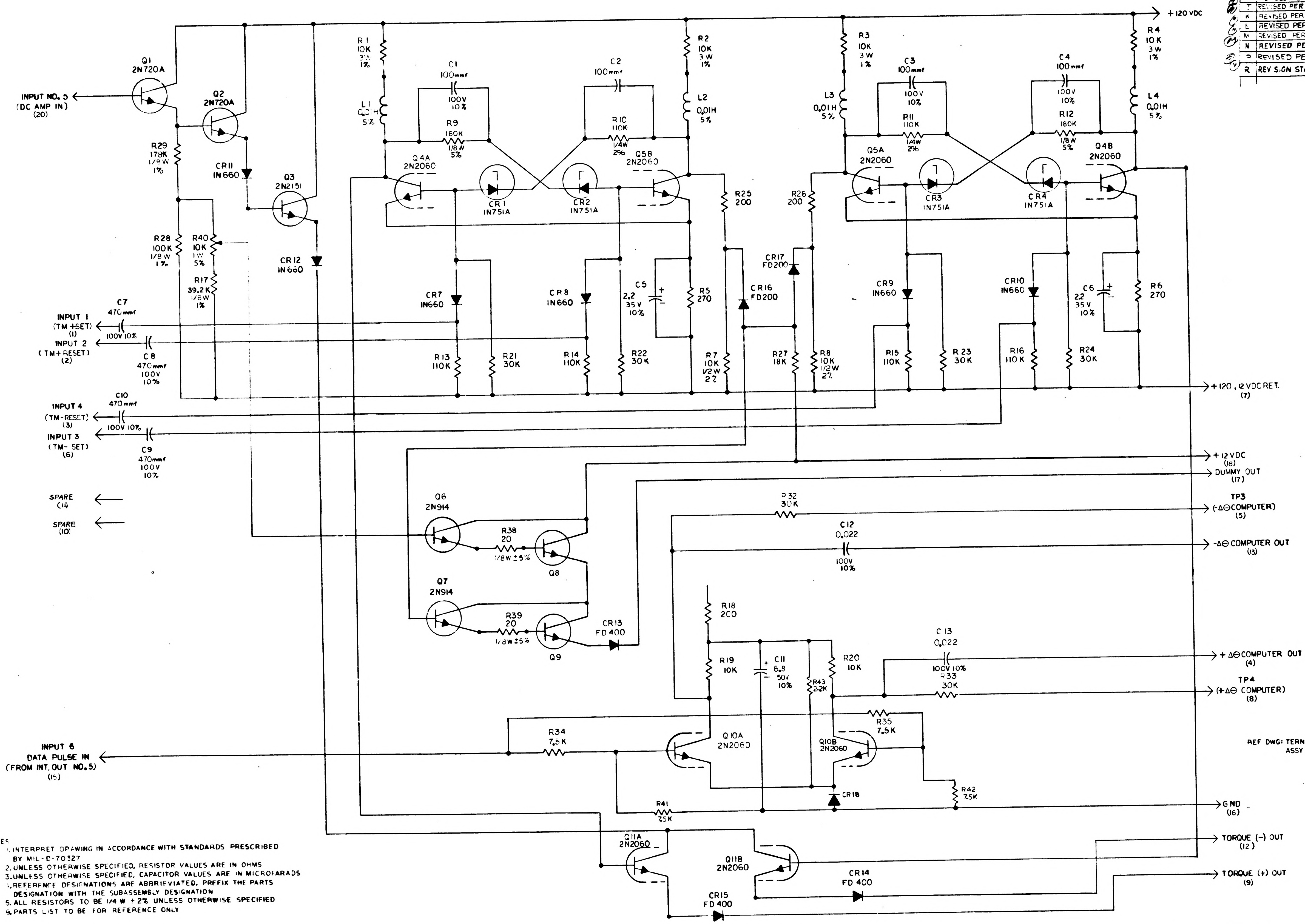
SCHEMATIC,
TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS CLASS B TDRR 125

SYM	DESCRIPTION	DATE	APPROVAL
A	DRA[illegible] REVISED AND UPGRADED T[illegible] PER TDRR [illegible]882	2-6-63	
B	CHANGED PER TDRR 00716	4-3-63	
C	REVISED PER TDRR 01012	4-25-63	J.T.
D	REVISED PER TDRR 01261	5-8-63	J.T.
E	REVISED PER TDRR 01354	5-21-63	
F	REVISED PER TDRR [illegible]	[illegible]	RPK
G	REVISED PER TDRR 01868	7-2-63	
H	REVISED PER TDRR [illegible]	[illegible]	
J	REVISED PER TDRR [illegible]	[illegible]	
K	REVISED PER TDRR [illegible]4126	[illegible]	RPK
L	REVISED PER TDRR 05277	[illegible]	
M	REVISED PER TDRR [illegible]638	[illegible]	
N	REVISED PER TDRR 16835	[illegible]	B.
P	REVISED PER TDRR [illegible]683	[illegible]	
R	REVISION STATUS CHANGED	[illegible]	


+120 VDC
Q1
2N720A
INPUT NO. 5
(DC AMP IN)
(20)
Q2
2N720A
R29
178K
1/8 W
1%
CR11
IN660
Q3
2N2151
R28
100K
1/8 W
1%
R40
10K
1 W
5%
R17
39.2K
1/8 W
1%
CR12
IN660
C7
470 mmf
100V 10%
INPUT 1
(TM +SET)
(1)
INPUT 2
(TM + RESET)
(2)
C8
470 mmf
100V
10%
INPUT 4
(TM-RESET)
(3)
C10
470 mmf
100V 10%
INPUT 3
(TM- SET)
(6)
C9
470 mmf
100V
10%
SPARE
(11)
SPARE
(10)
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
180K
1/8 W
5%
Q4A
2N2060
CR1
IN751A
CR2
IN751A
C2
100mmf
R10
110K
1/4W
2%
Q5B
2N2060
R2
10K
3 W
1%
L2
0.01H
5%
R25
200
CR7
IN660
R13
110K
R21
30K
CR8
IN660
R14
110K
R22
30K
C5
2.2
35 V
10%
R5
270
R7
10K
1/2W
2%
CR16
FD200
CR17
FD200
R27
18K
R26
200
R8
10K
1/2W
2%
R3
10K
3 W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
1/4W
2%
Q5A
2N2060
CR3
IN751A
CR4
IN751A
C4
100mmf
100V
10%
R12
180K
1/8W
5%
Q4B
2N2060
R4
10K
3 W
1%
L4
0.01H
5%
CR9
IN660
R15
110K
R23
30K
CR10
IN660
R16
110K
R24
30K
C6
2.2
35 V
10%
R6
270
+120, 12 VDC RET.
(7)
+12 VDC
(18)
DUMMY OUT
(17)
Q6
2N914
R38
20
1/8W ±5%
Q8
Q7
2N914
R39
20
1/8W ±5%
Q9
CR13
FD 400
R32
30K
TP3
(-ΔΘ COMPUTER)
(5)
C12
0.022
100V
10%
-ΔΘ COMPUTER OUT
(13)
R18
200
R19
10K
C11
6.8
50V
10%
R43
2.2K
R20
10K
C13
0.022
100V 10%
+ΔΘ COMPUTER OUT
(4)
R33
30K
TP4
(+ΔΘ COMPUTER)
(8)
R34
7.5K
Q10A
2N2060
Q10B
2N2060
R35
7.5K
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO.5)
(15)
CR18
R42
7.5K
R41
7.5K
GND
(16)
Q11A
2N2060
Q11B
2N2060
TORQUE (-) OUT
(12)
CR14
FD 400
TORQUE (+) OUT
(9)
CR15
FD 400

REF DWG: TERNARY CURRENT SWITCH
ASSY 1007016

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN P. Dell DATE 10-24-62
CHECKED
APPROVAL -23-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH,

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 1 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010389-80	RESISTOR WW	10K	1%	3W
R2	↓ -80	↓	10K	↓	↓
R3	↓ -80	↓	10K	↓	↓
R4	↓ -80	↓	10K	↓	↓
R5	1006750-18	RESISTOR MF	270	2%	1/4W
R6	↓ -18	↓	270	↓	↓
R7	1006760-56	↓	10K	↓	1/2 W
R8	↓ -56	↓	10K	↓	1/2 W
R9	1010369-87	↓	180K	5%	1/8 W
R10	1006750-81	↓	110K	2%	1/4W
R11	1006750-81	↓	110K	2%	1/4W
R12	1010369-87	↓	180K	5%	1/8W
R13	1006750-81	↓	110K	2%	1/4W
R14	↓ -81	↓	110K	↓	↓
R15	↓ -81	↓	110K	↓	↓
R16	↓ -81	↓	110K	↓	1/4 W
R17	1010364-557	↓	39.2K	1%	1/8 W
R18	1006750-15	↓	200	2%	1/4 W
R19	↓ -56	↓	10K	↓	↓
R20	↓ -56	↓	10K	↓	↓
R21	↓ -67	↓	30K	↓	↓
R22	↓ -67	↓	30K	↓	↓
R23	↓ -67	↓	30K	↓	↓
R24	↓ -67	↓	30K	↓	↓
R25	↓ -15	↓	200	↓	↓
R26	↓ -15	↓	200	↓	↓
R27	↓ -62	↓	18K	↓	↓
R28	1010364-635	↓	[illegible]K	1%	1/8 W
R29	1010364-683	↓	178K	↓	1/8 W
		↓			
		↓			
R32	1006750-67	↓	30K	2%	1/4 W
R33	↓ -67	↓	30K	↓	↓
R34	↓ -53	↓	7.5K	↓	↓
R35	↓ -53	↓	7.5K	↓	↓
~~R36~~	~~-81~~		~~110K~~		
~~R37~~	~~-81~~		~~110K~~		
R38	1010369-148	RESISTOR MF	20	5%	1/8 W
R39	↓ -148	↓	20	↓	↓
R40	1010373-10	RESISTOR (VAR)	10K	5%	1 W
R41	1006750-53	RESISTOR MF	7.5K	2%	1/4W
R42	↓ -53	↓	7.5 K	↓	↓
C1	1006777-13	CAP CER	100UUF	10%	100 V
C2	↓ -13	↓	100UUF	↓	↓
C3	↓ -13	↓	100UUF	↓	↓
C4	↓ -13	↓	100 UUF	↓	↓
C5	1006755-73	CAP TANT SOLID P	2.2 UF	±10%	35 V
C6	1006755-73	↓	2.2 UF	↓	↓
C7	1006777-20	CAP CER	470UUF	10%	100 V
C8	↓ -20	↓	470UUF	↓	↓
C9	↓ -20	↓	470UUF	↓	↓
C10	↓ -20	↓	470UUF	↓	↓
C11	1010393-039	CAP TANT SOLID P	6.8 UF	±10%	50 V
C12	1006777-33	CAP CER	.022UF	±10%	100V
C13	1006777-33	↓	.022UF	↓	100V
CR1	1010462-6	DIODE IN751-A			
CR2	↓ -6	↓			
CR3	↓ -6	↓			
CR4	↓ -6	↓			
CR7	1010385	IN660			
CR8	↓	↓			
CR9	↓	↓			
CR10	↓	↓			
CR11	↓	↓			
CR12	↓	↓			
CR13	1010394	FD400			
CR14	↓	↓			
CR15	↓	↓			
CR16	1010384	FD200			
CR17	1010384	↓			
CR18	1010372-6				
L1	1010388-39	INDUCTOR	.01 HY	±5%	75MA
L2	↓ -39	↓		↓	↓
L3	↓ -39	↓		↓	↓
L4	↓ -39	↓		↓	↓
Q1	1010357-1	TRANS 2N720A			
Q2	1010357-1	↓			
Q3	1010269	TRANS 2N2151			
Q4	1010376-4	TRANS 2N2060			
Q5	1010376-4	↓			
Q6	1010966-1	TRANS 2N914			
Q7	1010966-1	↓			
Q8	1010600	TRANSISTOR			
Q9	1010600	↓			
Q10	1010376-4	TRANS 2N2060			
Q11	1010376-4	↓			
R43	1006750-40	RESISTOR	2.2K	2%	1/4 W

REVISIONS CLASS B TDRR [illegible]

SYM	DESCRIPTION	DATE	APPROVAL	
A	DRAWING REVISED AND UPGRADED TO CLASS A PER TDRR 00382	2-6-63	[illegible]	[illegible]
B	CHANGED PER TDRR 00716	[illegible]		[illegible]
C	REVISED PER TDRR 01012	[illegible]	[illegible]	WK
D	REVISED PER TDRR 01261	5-15-63	[illegible]	[illegible]
E	REVISED PER TDRR 01354	5-21-63	[illegible]	WK
F	REVISED PER TDRR 01616	6-19-63	RPK	WK
G	REVISED PER TDRR 01868	7-7-63	[illegible]	WK
H	REVISED PER TDRR 02167	7-31-63	[illegible]	WK
J	REVISED PER TDRR 02878	6-24-63	[illegible]	N
K	REVISED PER TDRR 04126	30 Oct 63	[illegible]	WK
L	REVISED PER TDRR 05277	17 Dec [illegible]	[illegible]	WK
M	REVISED PER TDRR 06638	[illegible]	[illegible]	
N	REVISED PER TDRR-16835	3-[illegible]-65	3	[illegible]
P	REVISED PER TDRR-16831	3-[illegible]	[illegible]	[illegible]
R	REVISED PER TDRR 21279	31 J[illegible] 65	[illegible]	R[illegible]

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. Crowley DATE 10 29 62
CHECKED R V [illegible]
APPROVAL [illegible] 11-23-62
APPROVAL [illegible] 11-29-62
NASA APPROVAL [illegible] 11/30/62
MIT APPROVAL [illegible] 30 Nov 62

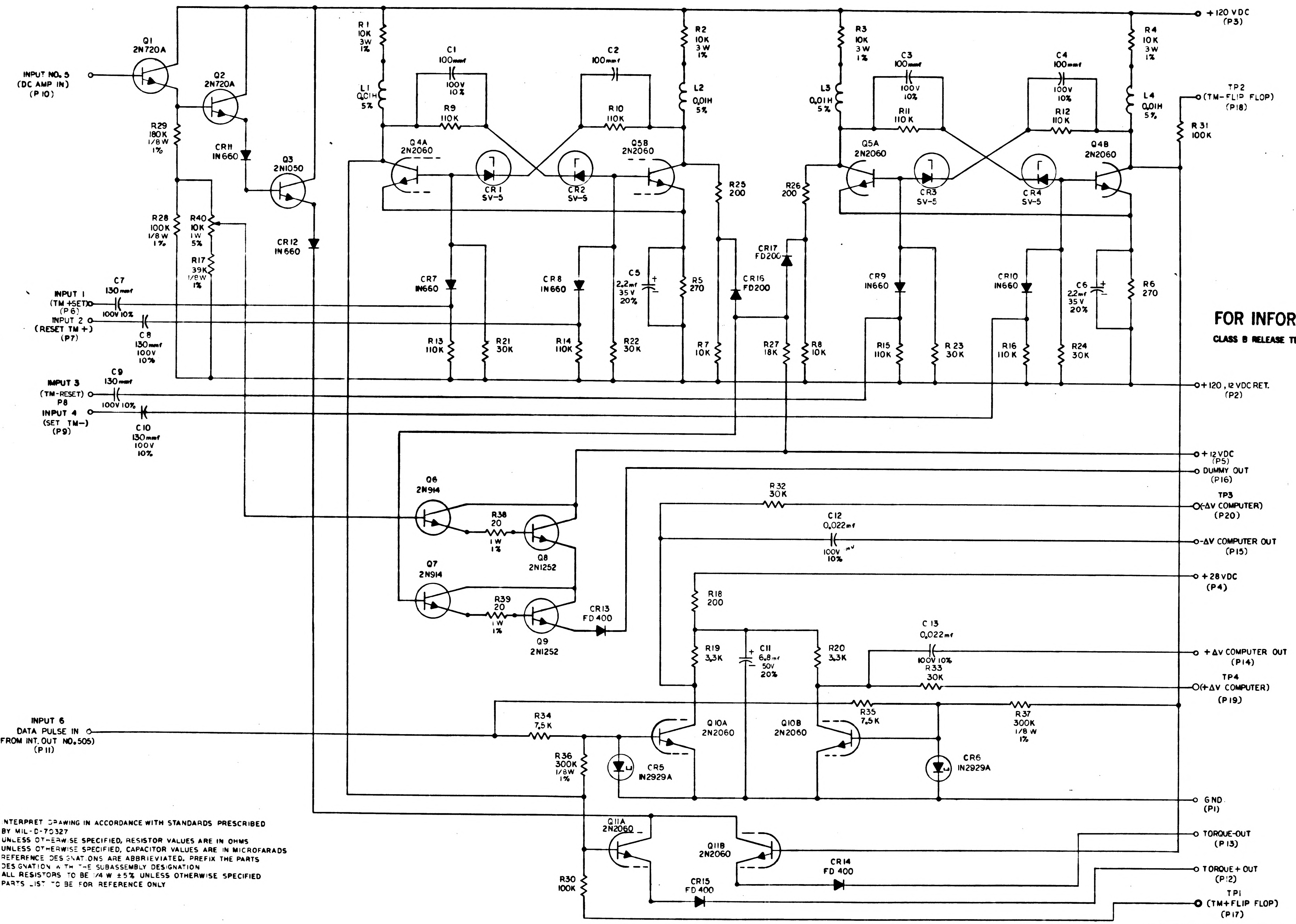
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010016
SCALE //
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


INPUT NO. 5
(DC AMP IN)
(P 10)
Q1
2N720A
Q2
2N720A
R29
180K
1/8W
1%
CR11
IN660
Q3
2N1050
R28
100K
1/8W
1%
R40
10K
1W
5%
R17
39K
1/8W
1%
CR12
IN660
INPUT 1
(TM +SET)
(P6)
C7
130mmf
100V 10%
INPUT 2
(RESET TM +)
(P7)
C8
130mmf
100V
10%
INPUT 3
(TM-RESET)
P8
C9
130mmf
100V 10%
INPUT 4
(SET TM—)
(P9)
C10
130mmf
100V
10%
R1
10K
3W
1%
L1
0.01H
5%
C1
100mmf
100V
10%
R9
110K
C2
100mmf
R10
110K
R2
10K
3W
1%
L2
0.01H
5%
Q4A
2N2060
CR1
SV-5
CR2
SV-5
Q5B
2N2060
R25
200
CR7
IN660
CR8
IN660
C5
2.2mf
35V
20%
R5
270
CR16
FD200
R13
110K
R21
30K
R14
110K
R22
30K
R7
10K
R3
10K
3W
1%
L3
0.01H
5%
C3
100mmf
100V
10%
R11
110K
C4
100mmf
100V
10%
R12
110K
R4
10K
3W
1%
L4
0.01H
5%
Q5A
2N2060
CR3
SV-5
CR4
SV-5
Q4B
2N2060
R26
200
CR17
FD200
CR9
IN660
CR10
IN660
C6
2.2mf
35V
20%
R6
270
R27
18K
R8
10K
R15
110K
R23
30K
R16
110K
R24
30K
R31
100K
+120 VDC
(P3)
TP2
(TM-FLIP FLOP)
(P18)
+120, 12 VDC RET.
(P2)
+12 VDC
(P5)
DUMMY OUT
(P16)
Q6
2N914
R38
20
1W
1%
Q8
2N1252
Q7
2N914
R39
20
1W
1%
Q9
2N1252
CR13
FD 400
R32
30K
C12
0.022mf
100V
10%
TP3
(-ΔV COMPUTER)
(P20)
-ΔV COMPUTER OUT
(P15)
+28 VDC
(P4)
R18
200
R19
3.3K
C11
6.8mf
50V
20%
R20
3.3K
C13
0.022mf
100V 10%
R33
30K
+ΔV COMPUTER OUT
(P14)
TP4
(+ΔV COMPUTER)
(P19)
INPUT 6
DATA PULSE IN
(FROM INT. OUT NO. 505)
(P 11)
R34
7.5K
R36
300K
1/8W
1%
CR5
IN2929A
Q10A
2N2060
Q10B
2N2060
R35
7.5K
R37
300K
1/8 W
1%
CR6
IN2929A
GND
(P1)
Q11A
2N2060
Q11B
2N2060
R30
100K
CR15
FD 400
CR14
FD 400
TORQUE-OUT
(P13)
TORQUE + OUT
(P12)
TP1
(TM+FLIP FLOP)
(P17)

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4 W ±5% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 00125 DATE 11-30-62

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 10-24-62
CHECKED
APPROVAL 11-28-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH,

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE —
WT —
SHEET 1 OF 2

1010016

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR WW	10K	1%	3W
R2			10K		
R3			10K		
R4		↓	10K	↓	↓
R5		RESISTOR MF	270	5%	1/4 W
R6			270		
R7			10K		
R8			10K		
R9			110K		
R10			110K		
R11			110K		
R12			110K		
R13			110K		
R14			110K		
R15			110K		↓
R16			110K	↓	1/4 W
R17			39K	1%	1/8 W
R18			200	5%	1/4 W
R19			3.3K		
R20			3.3K		
R21			30K		
R22			30K		
R23			30K		
R24			30K		
R25			200		
R26			200		
R27			18K	↓	↓
R28			100K	1%	1/8 W
R29			180K	↓	1/8 W
R30			100K	5%	1/4 W
R31			100K		
R32			30K		
R33			30K		
R34			7.5K		
R35		↓	7.5K		
R36		RESISTOR CC	300K		
R37			300K		
R38			20		
R39		↓	20	↓	↓
R40		RESISTOR (VAR)	10K	5%	1 W
C1		CAP CER	100 UUF	10%	100 V
C2			100 UUF		
C3			100 UUF		
C4			100 UUF	↓	↓
C5		CAP TANT SOLID P	2.2 UF	±20%	35 V
C6		↓	2.2 UF	↓	↓
C7		CAP CER	130 UUF	10%	100 V
C8			130 UUF		
C9			130 UUF		
C10			130 UUF	↓	↓
C11		CAP TANT SOLID P	6.8 UF	±20%	50 V
C12			.022 UF	±10%	35 V
C13		↓	.022 UF	↓	35 V
CR1		DIODE SV-5			
CR2					
CR3					
CR4		↓			
CR5		IN2929 A			
CR6		↓			
CR7		IN660			
CR8					
CR9					
CR10					
CR11					
CR12		↓			
CR13		FD400			
CR14					
CR15		↓			
CR16		FD200			
CR17		↓			
L1		COIL	.01 HY	±5%	75MA
L2					
L3					
L4		↓		↓	↓
Q1		TRANS 2N720A			
Q2		↓			
Q3		TRANS 2N1050			
Q4		TRANS 2N2060			
Q5		↓			
Q6		TRANS 2N914			
Q7		↓			
Q8		TRANS 2N1252			
Q9		↓			
Q10		TRANS 2N2060			
Q11		↓			

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00125 DATE 11-30-62

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. Cawley DATE 10-29-62
CHECKED
APPROVAL 11-23-62
APPROVAL 11-29-62
NASA APPROVAL 11/30/62
MIT APPROVAL 30/11/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, TERNARY CURRENT SWITCH

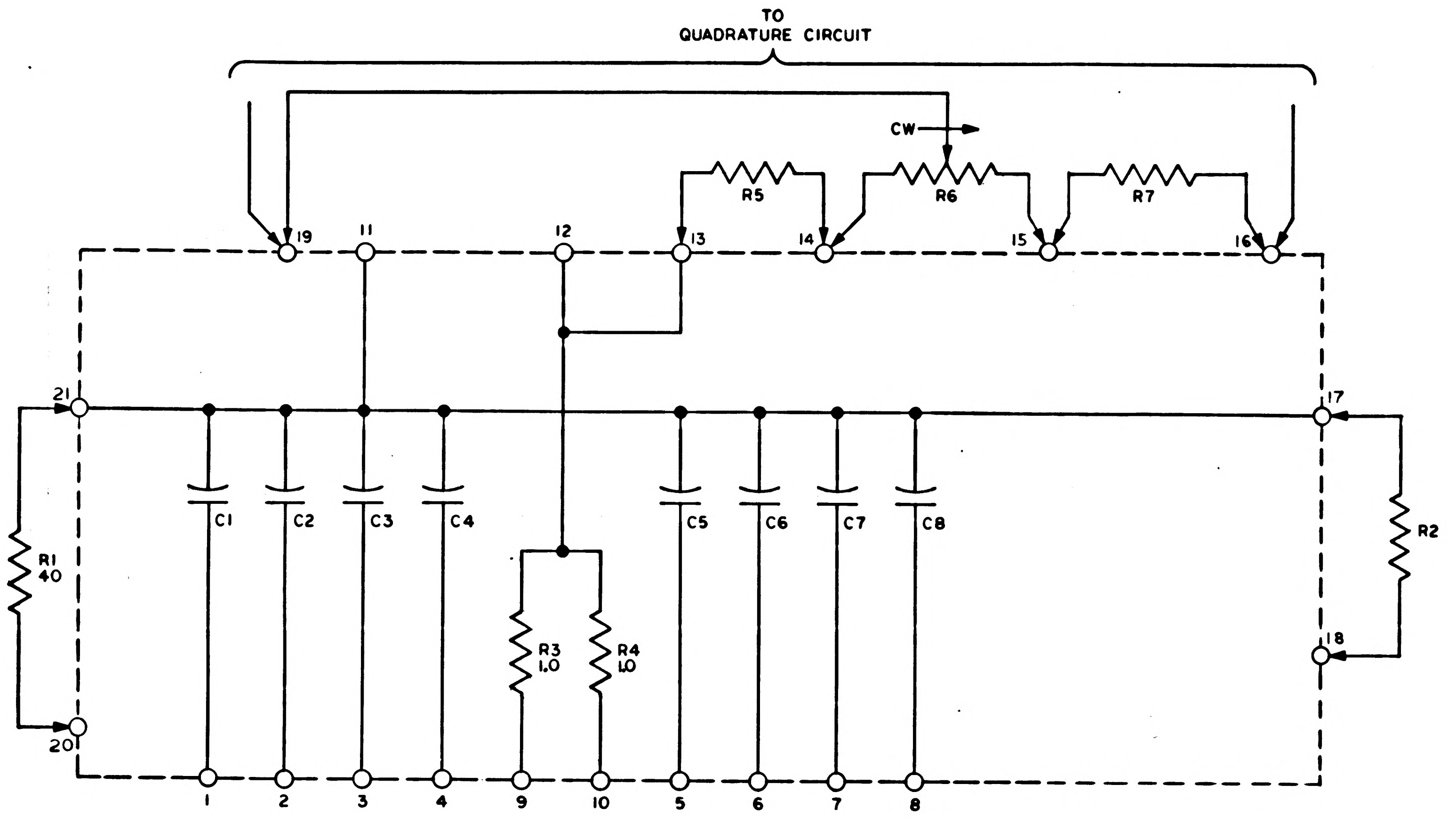
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010016
SCALE //
WT
SHEET 2 OF 2

1010016

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00176	12-19-62	J.C.N.

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR	40		
R2		↓			
R3		↓	1.0		
R4		↓	1.0		
R5		↓			
R6		VAR			
R7		↓			
C1		SEE NOTE 4			
C2		↓			
C3		↓			
C4		↓			
C5		↓			
C6		↓			
C7		↓			
C8		↓			



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00123 DATE 11-26-62

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. RESISTOR VALUES ARE EXPRESSED IN OHMS.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
4. POLYSTYRENE CAPACITORS, MATCHED SETS OF EIGHT, ±.5 % TOLERANCE ABOUT THE NOMINAL VALUE WITH .5 % MAX SPREAD OF CAPACITANCE IN THE MATCHED SET OF CAPACITORS. CAPACITANCE TO BE MEASURED AT 112°F ± 2°F.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN Ken Healy DATE 11-14-62
CHECKED 11-26-62
APPROVAL 11-26-62
APPROVAL J.E. 11-26-62
NASA APPROVAL 11-28-62
MIT APPROVAL 28 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, SUSFENSION & QUADRATURE COMPENSATION NETWORK (16 PIP TYPE 2D1)

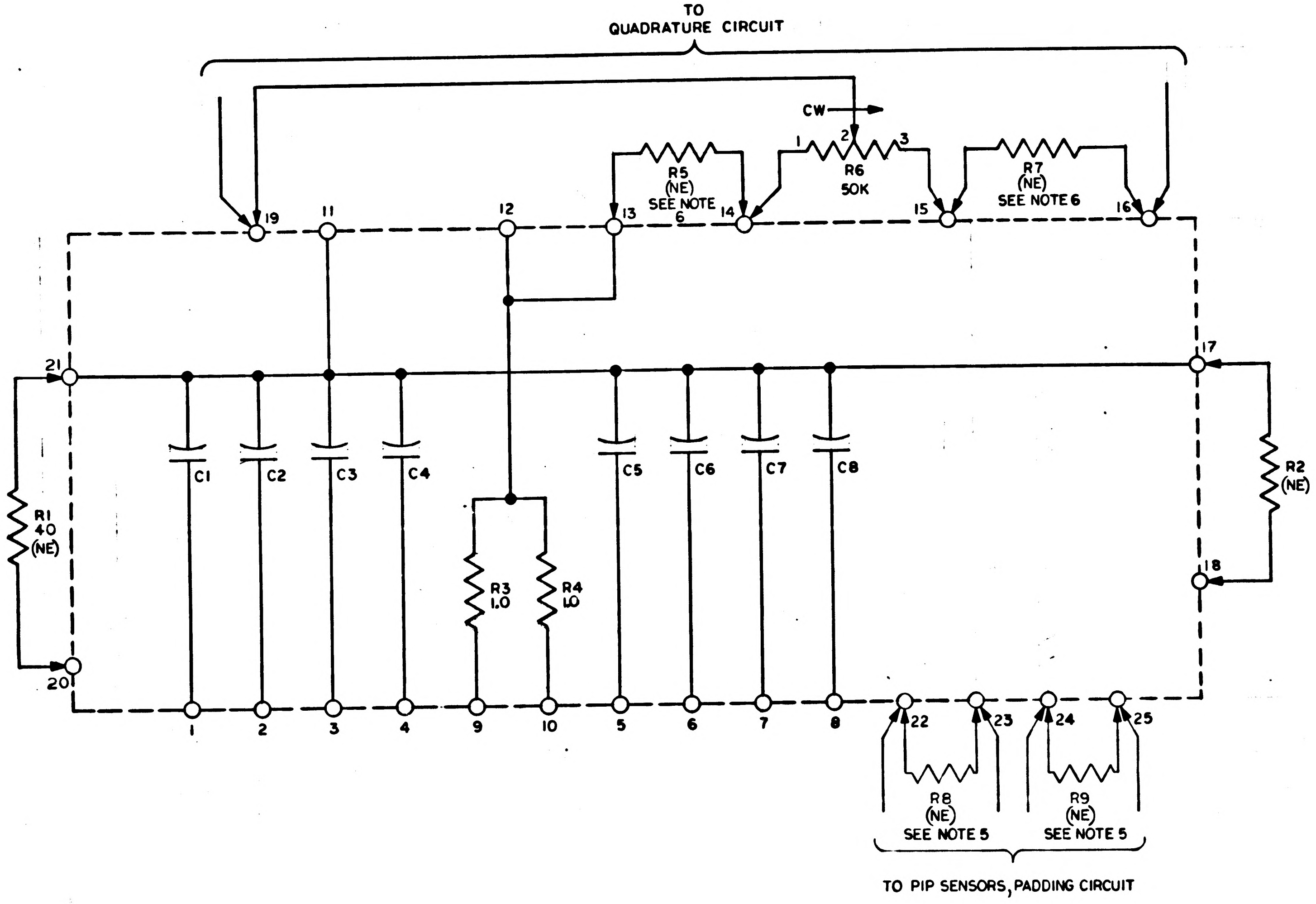
CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010017
SCALE #
WT
SHEET 1 OF 1

1010017 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00123

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00176	12-19-62	J.C.J.
B	REVISED AND UPGRADED TO CLASS A PER TDRR 00379	2/7/63	J.C.J. 2-11-63 WK.



REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
R1	1010251-	RESISTOR	40	±1 %	1/4W
R2	1010251-			±1 %	1/4W
R3	1010377-		1.0	±1 %	1/10W
R4	1010377-		1.0	±1 %	1/10W
R5	1010377-			±1 %	1/10W
R6	1010373-	VAR	50K	±5 %	1/2 W
R7	1010377-			±1 %	1/10W
C1		SEE NOTE 4			
C2					
C3					
C4					
C5					
C6					
C7					
C8					
R8	1010330	SEE NOTE 5		±.1%	.07W
R9	1010330	SEE NOTE 5		±.1%	.07W

R8 & R9 SELECTION CHART

	10.0		14.2		18.4
	10.2		14.4		18.6
	10.4		14.6		18.8
	10.6		14.8		19.0
	10.8		15.0		19.2
	11.0		15.2		19.4
	11.2		15.4		19.6
	11.4		15.6		19.8
	11.6		15.8		20.0
	11.8		16.0		
	12.0		16.2		
	12.2		16.4		
	12.4		16.6		
	12.6		16.8		
	12.8		17.0		
	13.0		17.2		
	13.2		17.4		
	13.4		17.6		
	13.6		17.8		
	13.8		18.0		
	14.0		18.2		

C1-C8 SELECTION CHART

1	0.0631 uf
2	0.0638 uf
3	0.0645 uf
4	0.0652 uf
5	0.0659 uf
6	0.0666 uf
7	0.0673 uf
8	0.0680 uf
9	0.0687 uf
10	0.0694 uf
11	0.0701 uf

R5 & R7 SELECTION CHART

	1.0 K
	22.5K
	45.0K
	67.5K
	90.0K
	112.0K
	134.5K
	157.0K
	179.5K
	202.5K
	225.0K

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. RESISTOR VALUES ARE EXPRESSED IN OHMS.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
4. POLYSTYRENE CAPACITORS, MATCHED SETS OF EIGHT, ±.5 % TOLERANCE ABOUT THE NOMINAL VALUE WITH .5 % MAX SPREAD OF CAPACITANCE IN THE MATCHED SET OF CAPACITORS. CAPACITANCE TO BE MEASURED AT 112°F ± 2° F. EXTENDED FOIL CONST.
OUTSIDE FOIL TO BE COMMON CONNECTION. SEE CHART FOR VALUES
BURN IN, 50 HRS ON INDIVIDUAL UNITS @ 65°C @ RATED VOLTAGE
150 HRS AS MATCHED SETS OF EIGHT @ 65°C @ RATED VOLTAGE
RETEST @ 25°C @ TWICE RATED VOLTAGE FOR MINIMUM OF 1 MINUTE FOR DIELECTRIC BREAKDOWN. D.C. WORKING VOLTAGE, 100 VOLTS. D.C. TEST VOLTAGE, 200 VOLTS. UNITS SHALL MEET PERFORMANCE REQUIREMENTS OF MIL-C-19978, CHAR P. INSULATION RESISTANCE 200 K MEGOHMS MIN. @ 25°C
. T.C. -120 PPM/°C, ±20 PPM/°C FROM -55°C TO +65°C
. DF. LESS THAN 0.1 % @ 25°C MEASURED @ 1.0 KC. SELECT VALUES FROM CHART
5. SELECT R8 & R9 FROM SELECTION CHART
6. SELECT R5 AND R7 FROM SELECTION CHART

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Ken Healy DATE 11-14-62
CHECKED 11-26-62
APPROVAL J.C. Smith 11-26-62
APPROVAL J.L. Stone 11-26-62
NASA APPROVAL 11-26-62
MIT APPROVAL 11-26-62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

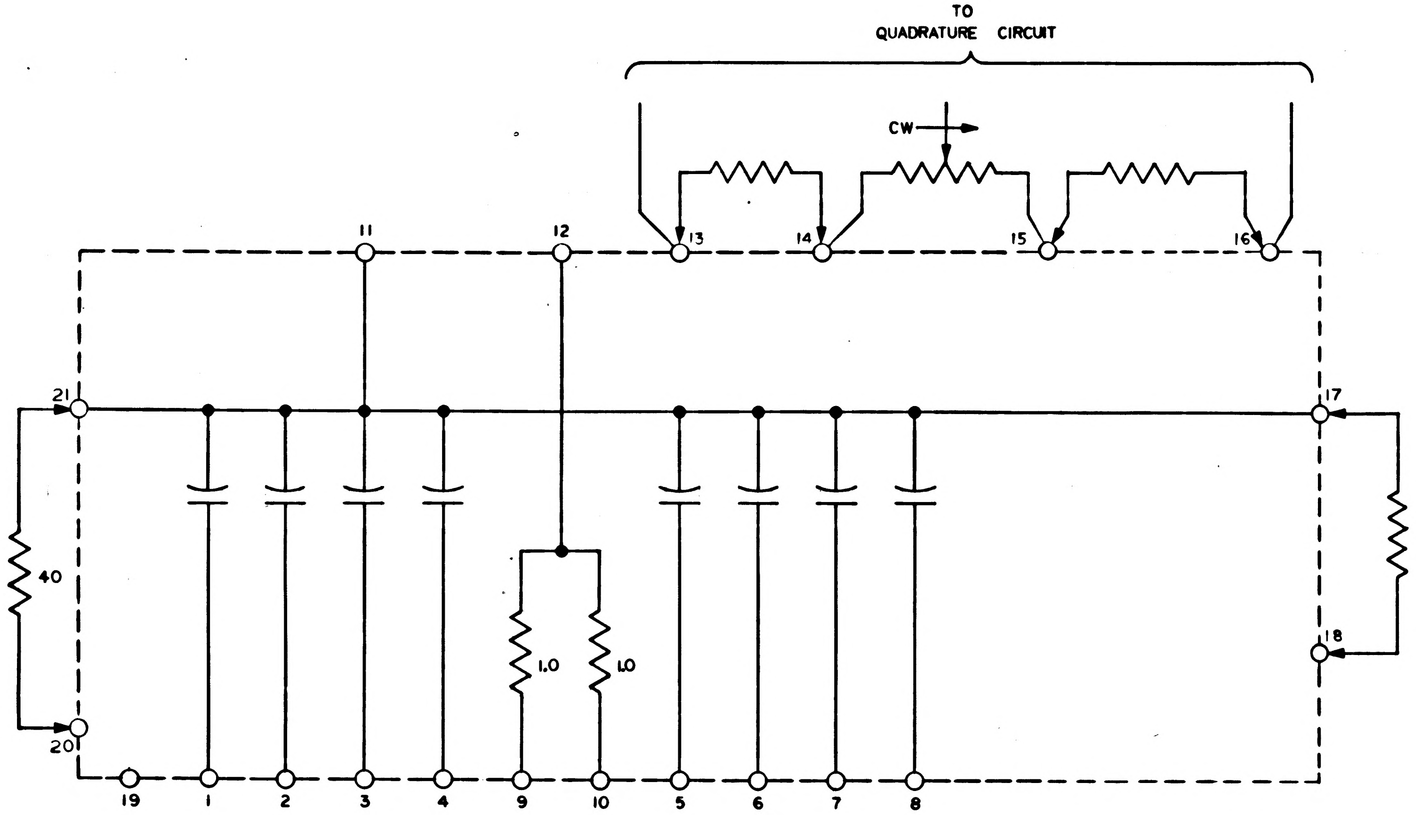
SCHEMATIC, SUSPENSION & QUADRATURE COMPENSATION NETWORK (16 PIP TYPE 2DI)

CODE IDENT NO. SIZE D NASA DRAWING NO. 1010017
SCALE # WT SHEET 1 OF 1

1010017 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00123 DATE 11-26-62

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. RESISTOR VALUES ARE EXPRESSED IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 11-14-62
CHECKED 11-26-62
APPROVAL 11-26-62
APPROVAL 11-26-62
NASA APPROVAL 11/28/62
MIT APPROVAL 26 Nov 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, SUSPENSION & QUADRATURE COMPENSATION NETWORK (16 PIP TYPE 2DI)

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010017
SCALE #
WT
SHEET 1 OF 1

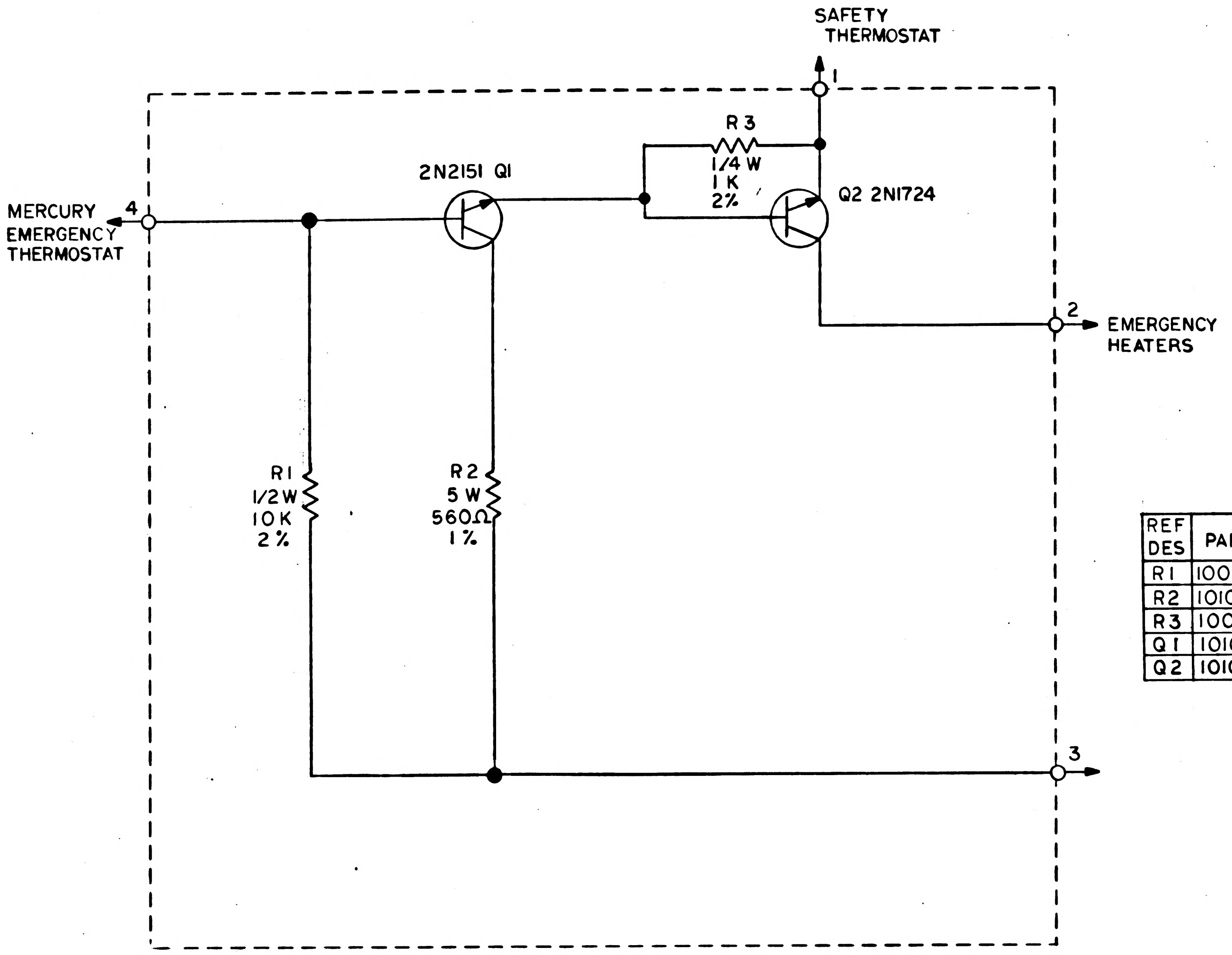
1010017

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 6100101

REVISIONS CLASS B TDRR 00174

SYM	DESCRIPTION	DATE	APPROVAL
A	UPGRADED CLASS A RELEASE PER TDRR 00414	2-7-63	B.K.



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006760-56	RESISTOR	10K	2%	1/2W
R2	1010325	RESISTOR	560Ω	1%	5W
R3	1006750-32	RESISTOR	1 K	2%	1/4 W
Q1	1010269	TRANSISTOR	2N2151		
Q2	1010273	TRANSISTOR	2N1724		

NOTE:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 12-5-62
CHECKED 12-19-62
APPROVAL L.C. Smith 12-19-62
APPROVAL B. Katz 12-19-62
NASA APPROVAL 12-19-62
MIT APPROVAL 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

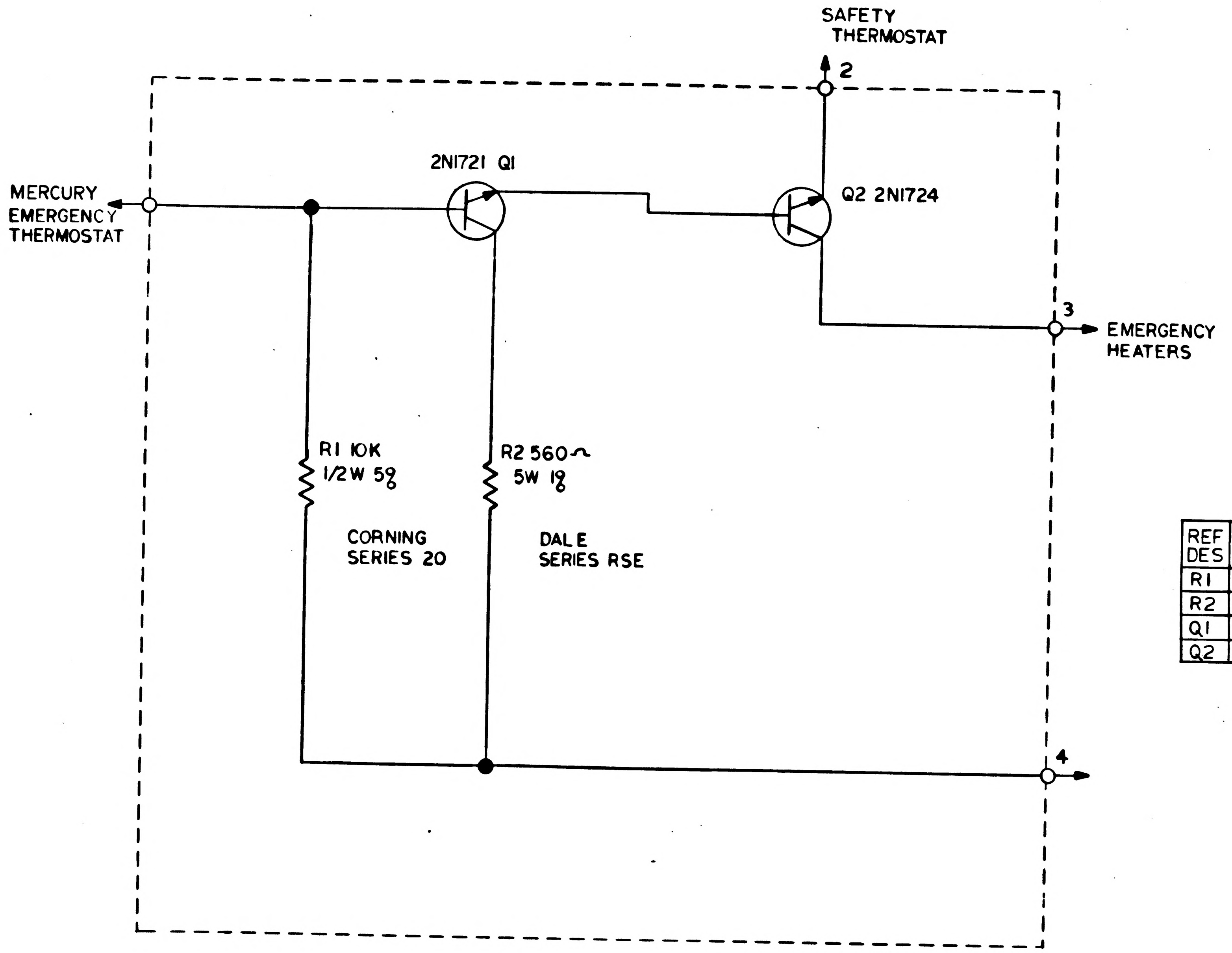
SCHEMATIC
EMERGENCY HEATERS CONTROL MODULE

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010019
SCALE
WT
SHEET OF

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

6100101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00174 DATE

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR	10 K	5%	1/2W
R2		RESISTOR	560Ω	1%	5W
Q1		TRANSISTOR	2N1721		
Q2		TRANSISTOR	2N1724		

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN DATE 12-5-62
CHECKED 12-19-62
APPROVAL L.C. Smith 12-19-62
APPROVAL B. Katz 12-19-62

NASA APPROVAL W.J. Rhine 12-19-62

MIT APPROVAL 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

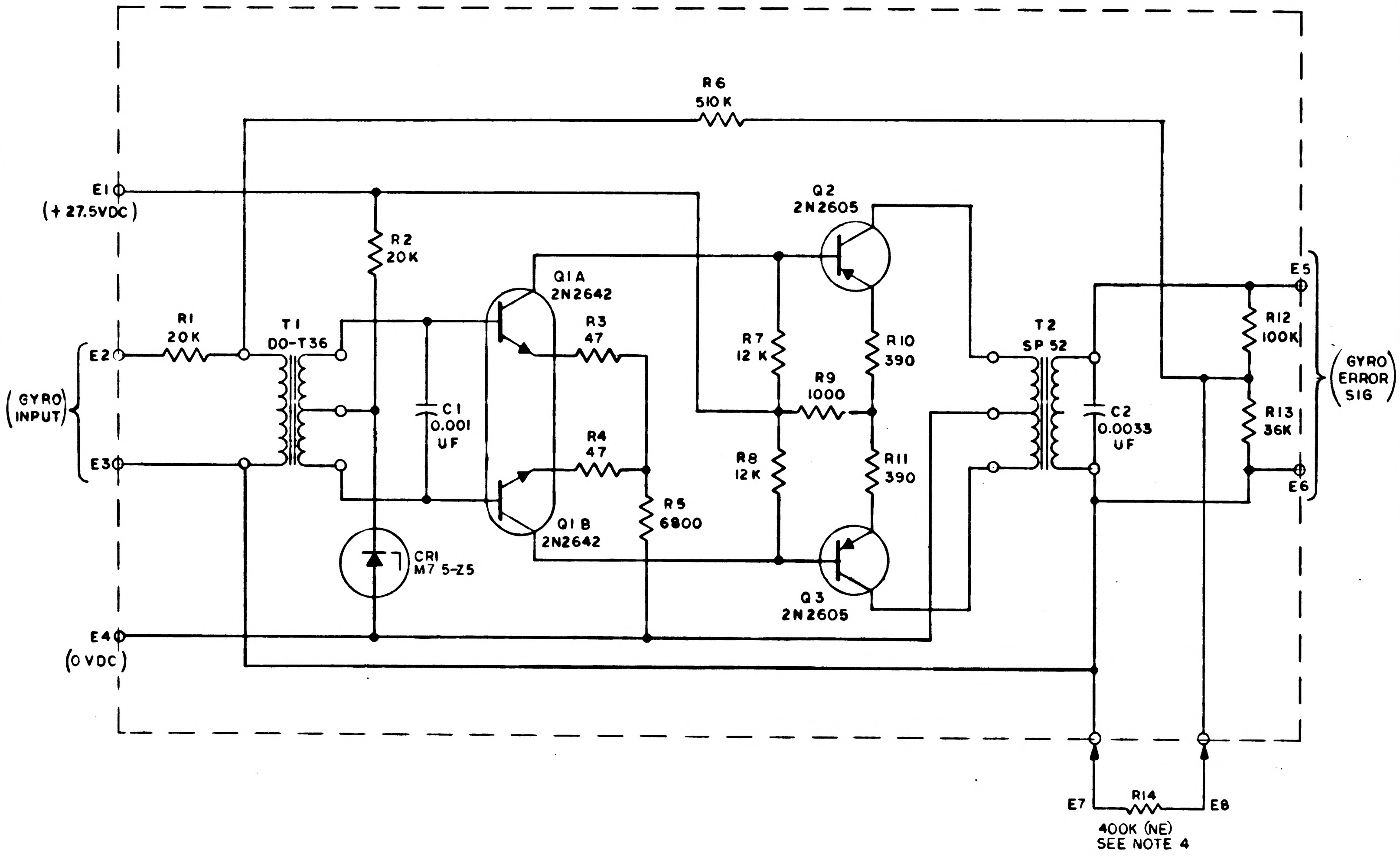
SCHEMATIC
EMERGENCY HEATERS CONTROL MODULE

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010019
SCALE
WT
SHEET OF

1010019

NOTICE — WHEN GOVERNMENT DRAWINGS SPECIFICATIONS OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER. AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE USE. OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TDRR 00188	REVISIONS		12-20-62
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00228	-4-62	A.K. WK


R6
510 K
E1
(+ 27.5VDC)
R2
20K
Q2
2N2605
Q1A
2N2642
R3
47
R1
20 K
T1
DO-T36
R7
12 K
R9
1000
R10
390
T2
SP 52
E5
R12
100K
(GYRO ERROR SIG)
E2
(GYRO INPUT)
C1
0.001
UF
R4
47
R8
12 K
R11
390
C2
0.0033
UF
R13
36K
E3
E6
Q1 B
2N2642
R5
6800
CR1
M7 5-Z5
Q3
2N2605
E4
(0 VDC)
E7
R14
E8
400K (NE)
SEE NOTE 4

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1		RESISTOR	20K		1/2 W
R 2		↓	20K		↓
R 3			47		
R 4			47		
R 5			6800		
R 6			510K		
R 7			12K		
R 8			12K		
R 9			1000		
R 10			390		
R 11			390		
R 12			100K		
R 13			36K		
R 14			SEE NOTE		
C 1		CAPACITOR	0.001		
C 2		↓	0.0033		
Q 1		TRANSISTOR			
Q 2		↓			
Q 3					
T 1		TRANSFORMER			
T 2		↓			
CR1		DIODE			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE (VALUE LATER)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Q. Di Leo DATE 27 NOV 62
CHECKED M. Kramer
APPROVAL M. Kramer
APPROVAL
NASA APPROVAL W J Rhine 12-20-62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
IRIG PRE-AMPLIFIER

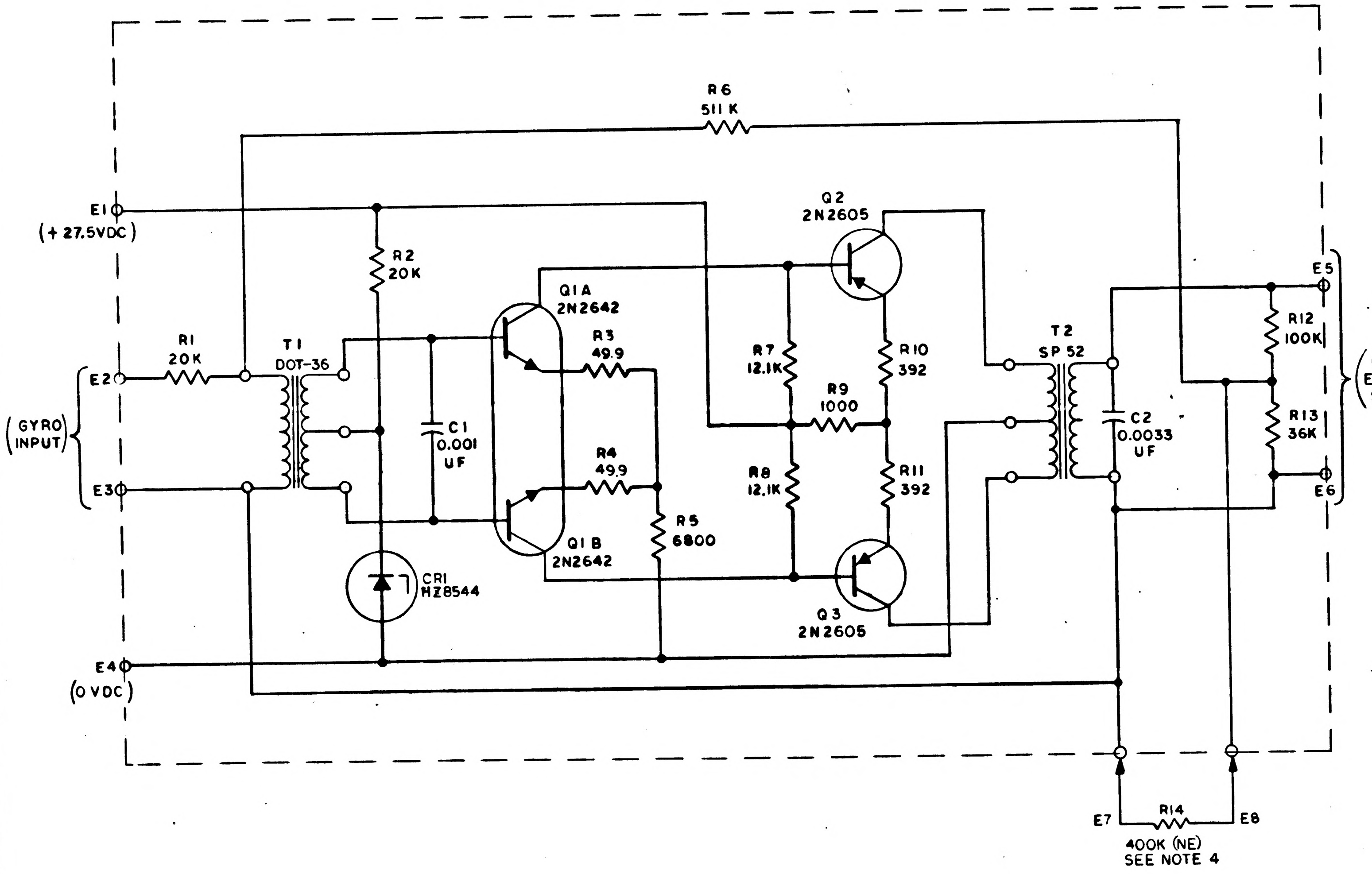
CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010021
SCALE
WT
SHEET OF

1010021 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TDRR 00188 12-20-62

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00228	[illegible]	WK
B	REVISED PER TDRR 00291	[illegible]	WK


R6
511 K
E1
(+27.5VDC)
R2
20K
Q2
2N2605
Q1A
2N2642
R1
20K
T1
DOT-36
R3
49.9
E2
(GYRO INPUT)
C1
0.001
UF
R7
12.1K
R9
1000
R10
392
T2
SP 52
E5
R12
100K
(GYRO ERROR SIG)
R13
36K
C2
0.0033
UF
E6
E3
R4
49.9
R8
12.1K
R11
392
R5
6800
Q1B
2N2642
CR1
HZ8544
Q3
2N2605
E4
(0VDC)
E7
R14
E8
400K (NE)
SEE NOTE 4

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-63	RESISTOR	20K	5%	1/4W
R2	1006750-63	↓	20K	5%	↓
R3	1010363-1	↓	49.9	1%	↓
R4	1010363-1	↓	49.9	1%	↓
R5	1006750-52	↓	6800	5%	↓
R6	1010363-771	↓	511K	1%	↓
R7	1010363-459	↓	12.1K	1%	↓
R8	1010363-459	↓	12.1K	1%	↓
R9	10106750-32	↓	1000	5%	↓
R10	1010363-173	↓	392	1%	↓
R11	1010363-173	↓	392	1%	↓
R12	1006750-80	↓	100K	5%	↓
R13	1006750-69	↓	36K	5%	↓
R14	100363	↓	SEE NOTE	1%	↓
C1	100359	CAPACITOR	0.001	20%	200V
C2	100359	↓	0.0033	20%	200V
Q1	1010252	TRANSISTOR			
Q2	1010266	↓			
Q3	1010266	↓			
T1	1010324	TRANSFORMER	DOT-36		
T2	1010291	↓	SP-52		
CR1	1010372	DIODE	HZ8544	5%	7.5V
	1010318	CONNECTOR			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE (VALUE LATER)

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN A. Di Leo DATE 27 NOV 62
CHECKED M. Kramer 11 Dec 62
APPROVAL M. Kramer 11 Dec 62
APPROVAL
NASA APPROVAL W J Rhine 12-20-62
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

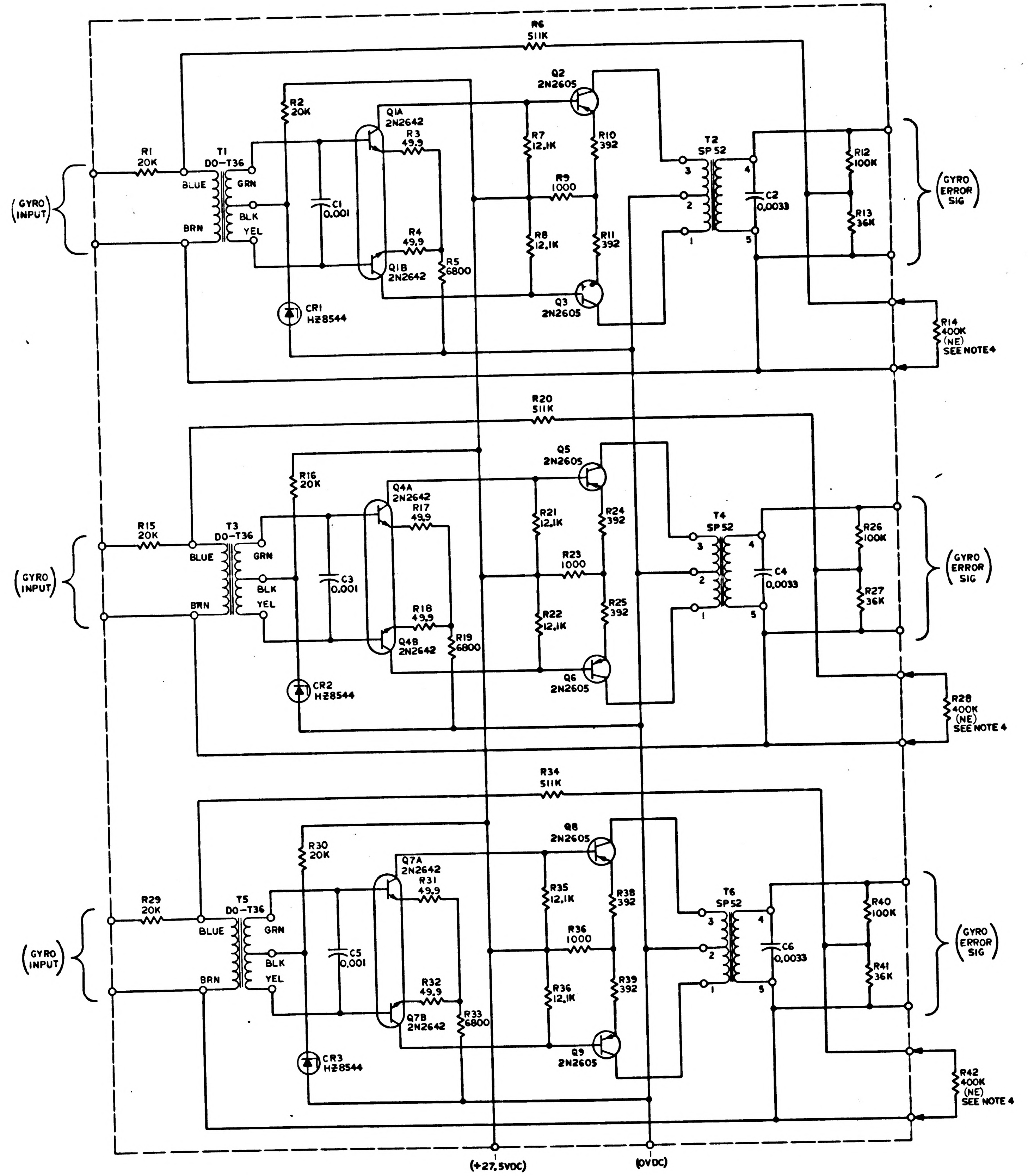
SCHEMATIC,
IRIG PRE-AMPLIFIER

CODE IDENT NO. | SIZE D | NASA DRAWING NO. 1010021
SCALE | WT | SHEET OF

1010021 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED AND REDRAWN PER TDRR 00351	6FEB63	


R6
511K
Q2
2N2605
R2
20K
Q1A
2N2642
R3
49.9
R7
12.1K
R10
392
T2
SP52
R1
20K
T1
DO-T36
BLUE
GRN
BLK
YEL
BRN
(GYRO INPUT)
C1
0.001
R9
1000
R12
100K
C2
0.0033
(GYRO ERROR SIG)
R4
49.9
R8
12.1K
R11
392
R13
36K
Q1B
2N2642
R5
6800
Q3
2N2605
CR1
HZ8544
R14
400K
(NE)
SEE NOTE 4
R20
511K
Q5
2N2605
R16
20K
Q4A
2N2642
R17
49.9
R21
12.1K
R24
392
T4
SP52
R15
20K
T3
DO-T36
BLUE
GRN
BLK
YEL
BRN
(GYRO INPUT)
C3
0.001
R23
1000
R26
100K
C4
0.0033
(GYRO ERROR SIG)
R18
49.9
R22
12.1K
R25
392
R27
36K
Q4B
2N2642
R19
6800
Q6
2N2605
CR2
HZ8544
R28
400K
(NE)
SEE NOTE 4
R34
511K
Q8
2N2605
R30
20K
Q7A
2N2642
R31
49.9
R35
12.1K
R38
392
T6
SP52
R29
20K
T5
DO-T36
BLUE
GRN
BLK
YEL
BRN
(GYRO INPUT)
C5
0.001
R36
1000
R40
100K
C6
0.0033
(GYRO ERROR SIG)
R32
49.9
R36
12.1K
R39
392
R41
36K
Q7B
2N2642
R33
6800
Q9
2N2605
CR3
HZ8544
R42
400K
(NE)
SEE NOTE 4
1
2
3
4
5
(+27.5VDC)
(0VDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-63	RESISTOR	20K	5%	1/4 W
R2	1006750-63		20K	5%	
R3	1010363-1		49.9	1%	
R4	1010363-1		49.9	1%	
R5	1006750-52		6800	5%	
R6	1010363-771		511K	1%	
R7	1010363-459		12.1K	1%	
R8	1010363-459		12.1K	1%	
R9	1006750-32		1000	5%	
R10	1010363-173		392	1%	
R11	1010363-173		392	1%	
R12	1006750-80		100K	5%	
R13	1006750-69		36K	5%	
R14	1010363-		SEE NOTE 4	1%	
R15	1006750-63		20K	5%	
R16	1006750-63		20K	5%	
R17	1010363-1		49.9	1%	
R18	1010363-1		49.9	1%	
R19	1006750-52		6800	5%	
R20	1010363-771		511K	1%	
R21	1010363-459		12.1K	1%	
R22	1010363-459		12.1K	1%	
R23	1006750-32		1000	5%	
R24	1010363-173		392	1%	
R25	1010363-173		392	1%	
R26	1006750-80		100K	5%	
R27	1006750-69		36K	5%	
R28	1010363-		SEE NOTE 4	1%	
R29	1006750-63		20K	5%	
R30	1006750-63		20K	5%	
R31	1010363-1		49.9	1%	
R32	1010363-1		49.9	1%	
R33	1006750-52		6800	5%	
R34	1010363-771		511K	1%	
R3	10363-459		12.1K	1%	
R3	10363-459		12.1K	1%	
R37	1006750-32		1000	5%	
R3	1010363-173		392	1%	
R39	1010363-173		392	1%	
R40	1006750-80		100K	5%	
R41	1006750-69		36K	5%	
R42	1010363-	RESISTOR	SEE NOTE 4	1%	1/4 W
C1	1010359-	CAPACITOR	0.001	20%	200V
C2	1010359-		0.0033		
C3	1010359-		0.001		
C4	1010359-		0.0033		
C5	1010359-		0.001		
C6	1010359-	CAPACITOR	0.0033	20%	200V
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010266		2N2605		
Q3	1010266		2N2605		
Q4	1010252		2N2642		
Q5	1010266		2N2605		
Q6	1010266		2N2605		
Q7	1010252		2N2642		
Q8	1010266		2N2605		
Q9	1010266	TRANSISTOR	2N2605		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010291		SP-52		
T3	1010324		DO-T36		
T4	1010291		SP-52		
T5	1010324		DO-T36		
T6	1010291	TRANSFORMER	SP-52		
CR1	1010372	DIODE	HZ8544	5%	7.5V
CR2	1010372	DIODE	HZ8544	5%	7.5V
CR3	1010372	DIODE	HZ8544	5%	7.5V
—	1010318	CONNECTOR			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE (VALUE LATER)

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN W.F. Troy DATE 1-29-63
CHECKED 1-29-63
APPROVAL L.C. Smith 1-29-63
APPROVAL M. Kramer 1-31-63
NASA APPROVAL 6Feb63
MIT APPROVAL 6Feb63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IRIG PRE-AMPLIFIER
(3 IN 1 MODULE)

CODE IDENT NO. | SIZE E | NASA DRAWING NO 1010021
SCALE —//— | WT —//— | SHEET 1 OF 1

1010021 C

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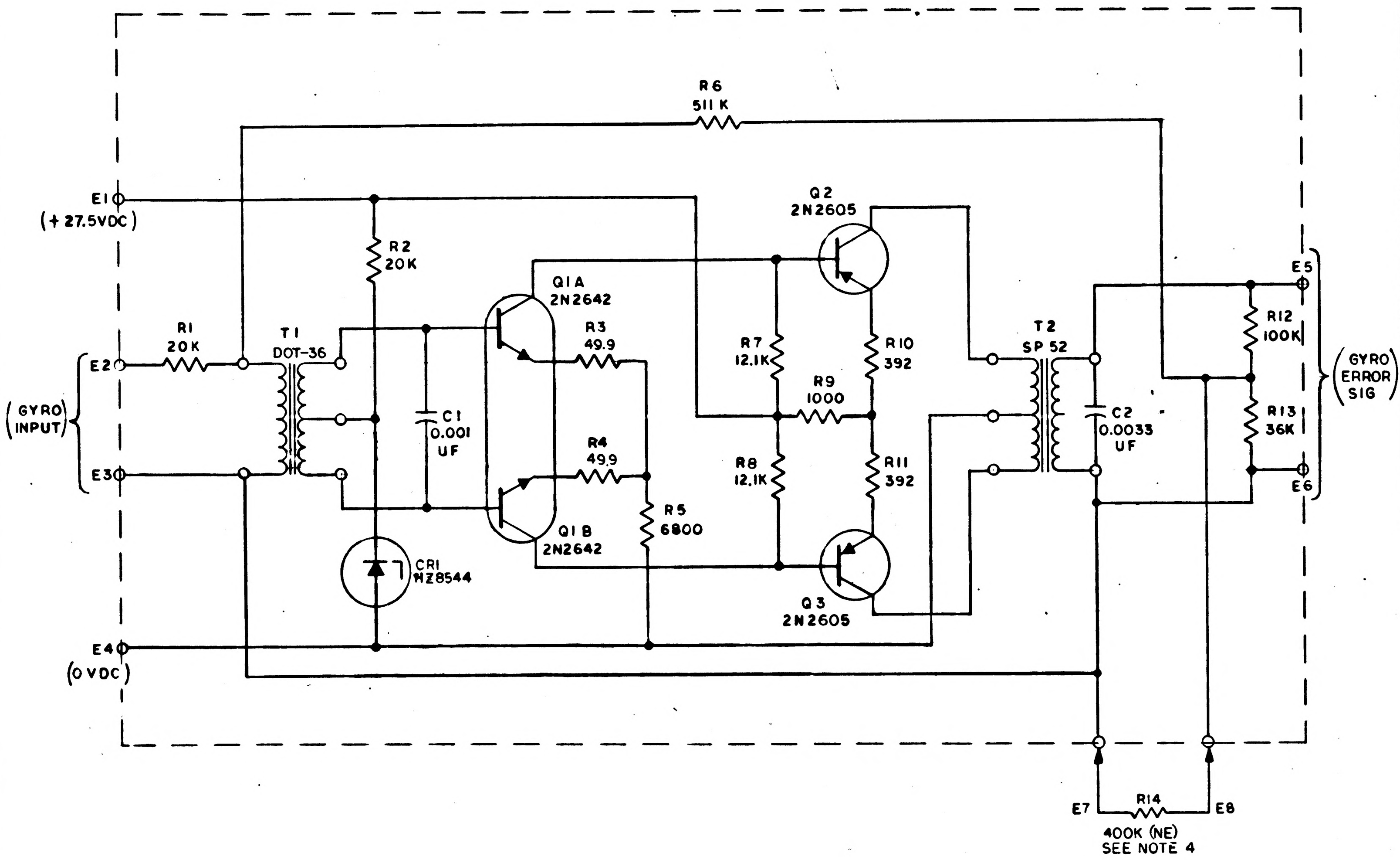
TDRR 00188 REVISIONS 12-20-62

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED PER TDRR 00228	-4-63	M.K	WK
B	REVISED PER TDRR 00291	1-23-63	M.K.	WK
C	NO CHANGES THIS DRAWING			WK
D	OBSOLETE PER TDRR 01188	8/[illegible]	M.K	WK



REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-63	RESISTOR	20K	5%	1/4W
R2	1006750-63		20K	5%	
R3	1010363-1		49.9	1%	
R4	1010363-1		49.9	1%	
R5	1006750-52		6800	5%	
R6	1010363-771		511K	1%	
R7	1010363-459		12.1K	1%	
R8	1010363-459		12.1K	1%	
R9	10106750-32		1000	5%	
R10	1010363-173		392	1%	
R11	1010363-173		392	1%	
R12	1006750-80		100K	5%	
R13	1006750-69		36K	5%	
R14	100363		SEE NOTE	1%	
C1	100359	CAPACITOR	0.001	20%	200V
C2	100359		0.0033	20%	200V
Q1	1010252	TRANSISTOR			
Q2	1010266				
Q3	1010266				
T1	1010324	TRANSFORMER	DOT-36		
T2	1010291		SP-52		
CR1	1010372	DIODE	HZ8544	5%	7.5V
	1010318	CONNECTOR			

OBSOLETE

SEE NEW REDRAW E SIZE
1010021 REV E

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE (VALUE LATER)

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Di Leo DATE 27 NOV 62
CHECKED M. Kramer 11 Dec 62
APPROVAL M. Kramer 11 Dec 62
APPROVAL
NASA APPROVAL W J Rhine 12-20-62
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
IRIG PRE-AMPLIFIER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010021
SCALE
WT
SHEET OF

1010021 D

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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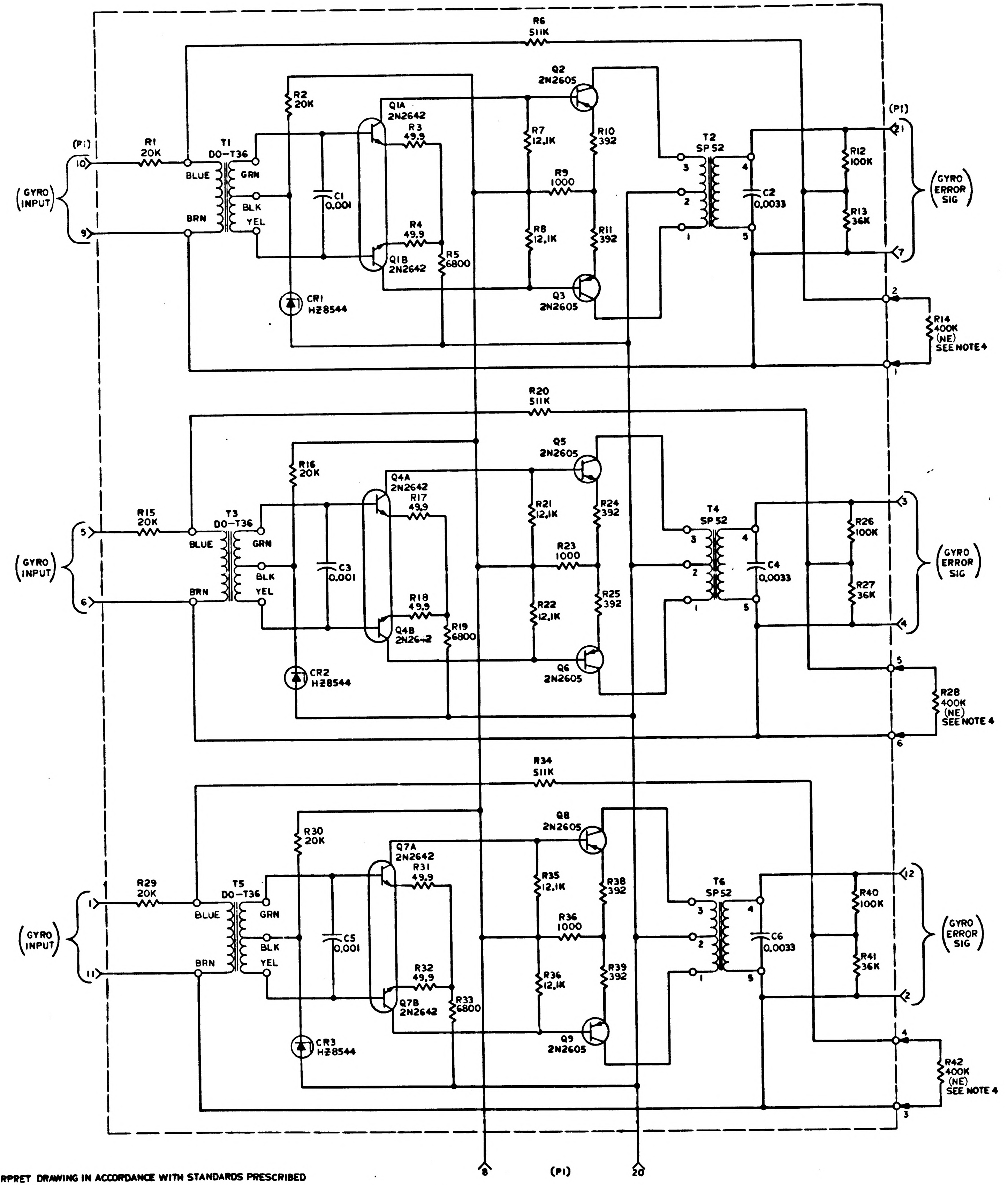
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED AND REDRAWN PER TDRR 00351	6 FEB 63	
E	RELEASED PER TDRR 01188		


R6
511K
Q2
2N2605
R2
20K
Q1A
2N2642
R3
49.9
(P1)
R1
20K
T1
DO-T36
10
BLUE
GRN
(GYRO INPUT)
C1
0.001
BLK
YEL
BRN
9
R7
12.1K
R10
392
R9
1000
T2
SP52
3
4
2
1
5
C2
0.0033
R12
100K
R13
36K
(P1)
1
(GYRO ERROR SIG)
7
R4
49.9
R8
12.1K
R11
392
Q1B
2N2642
R5
6800
CR1
HZ8544
Q3
2N2605
2
R14
400K
(NE)
SEE NOTE 4
1
R20
511K
Q5
2N2605
R16
20K
Q4A
2N2642
R17
49.9
R15
20K
T3
DO-T36
5
BLUE
GRN
(GYRO INPUT)
C3
0.001
BLK
YEL
BRN
6
R21
12.1K
R24
392
R23
1000
T4
SP52
3
4
2
1
5
C4
0.0033
R26
100K
R27
36K
3
(GYRO ERROR SIG)
4
R18
49.9
R22
12.1K
R25
392
Q4B
2N2642
R19
6800
CR2
HZ8544
Q6
2N2605
5
R28
400K
(NE)
SEE NOTE 4
6
R34
511K
Q8
2N2605
R30
20K
Q7A
2N2642
R31
49.9
R29
20K
T5
DO-T36
1
BLUE
GRN
(GYRO INPUT)
C5
0.001
BLK
YEL
BRN
11
R35
12.1K
R38
392
R36
1000
T6
SP52
3
4
2
1
5
C6
0.0033
R40
100K
R41
36K
12
(GYRO ERROR SIG)
2
R32
49.9
R36
12.1K
R39
392
Q7B
2N2642
R33
6800
CR3
HZ8544
Q9
2N2605
4
R42
400K
(NE)
SEE NOTE 4
3
8
(P1)
20

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14, R28, AND R42 TO BE SELECTED BY ELECTRICAL TEST AT ASSEMBLY.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-63	RESISTOR	20K	5%	1/4 W
R2	1006750-63		20K	5%	
R3	1010363-1		49.9	1%	
R4	1010363-1		49.9	1%	
R5	1006750-52		6800	5%	
R6	1010363-771		511K	1%	
R7	1010363-459		12.1K	1%	
R8	1010363-459		12.1K	1%	
R9	1006750-32		1000	5%	
R10	1010363-173		392	1%	
R11	1010363-173		392	1%	
R12	1006750-80		100K	5%	
R13	1006750-69		36K	5%	
R14	1010363-		SEE NOTE 4	1%	
R15	1006750-63		20K	5%	
R16	1006750-63		20K	5%	
R17	1010363-1		49.9	1%	
R18	1010363-1		49.9	1%	
R19	1006750-52		6800	5%	
R20	1010363-771		511K	1%	
R21	1010363-459		12.1K	1%	
R22	1010363-459		12.1K	1%	
R23	1006750-32		1000	5%	
R24	1010363-173		392	1%	
R25	1010363-173		392	1%	
R26	1006750-80		100K	5%	
R27	1006750-69		36K	5%	
R28	1010363-		SEE NOTE 4	1%	
R29	1006750-63		20K	5%	
R30	1006750-63		20K	5%	
R31	1010363-1		49.9	1%	
R32	1010363-1		49.9	1%	
R33	1006750-52		6800	5%	
R34	1010363-771		511K	1%	
R35	1010363-459		12.1K	1%	
R36	1010363-459		12.1K	1%	
R37	1006750-32		1000	5%	
R38	1010363-173		392	1%	
R39	1010363-173		392	1%	
R40	1006750-80		100K	5%	
R41	1006750-69		36K	5%	
R42	1010363-	RESISTOR	SEE NOTE 4	1%	1/4 W
C1	1010359-17	CAPACITOR	0.001	20%	200V
C2	1010359-23		0.0033		
C3	1010359-17		0.001		
C4	1010359-23		0.0033		
C5	1010359-17		0.001		
C6	1010359-23	CAPACITOR	0.0033	20%	200V
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010266		2N2605		
Q3	1010266		2N2605		
Q4	1010252		2N2642		
Q5	1010266		2N2605		
Q6	1010266		2N2605		
Q7	1010252		2N2642		
Q8	1010266		2N2605		
Q9	1010266	TRANSISTOR	2N2605		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010291		SP-52		
T3	1010324		DO-T36		
T4	1010291		SP-52		
T5	1010324		DO-T36		
T6	1010291	TRANSFORMER	SP-52		
CR1	1010372	DIODE	HZ8544	5%	7.5V
CR2	1010372	DIODE	HZ8544	5%	7.5V
CR3	1010372	DIODE	HZ8544	5%	7.5V
—	1010318-4	CONNECTOR			

THIS DRAWING REPLACES D SIZE 1010021 REV D

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN W.F. Tracy DATE 1/29/63
CHECKED D. Greenwood 1-29-63
APPROVAL L.C. Smith 1-29-63
APPROVAL M. Kramer 1-31-63
NASA APPROVAL 6-3-63
MIT APPROVAL W. Nye 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IRIG PRE-AMPLIFIER (3 IN 1 MODULE)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010021
SCALE —//— WT —//— SHEET 1 OF 1

1010021

INCHES
PHOTOGRAPHIC SCALE ONLY

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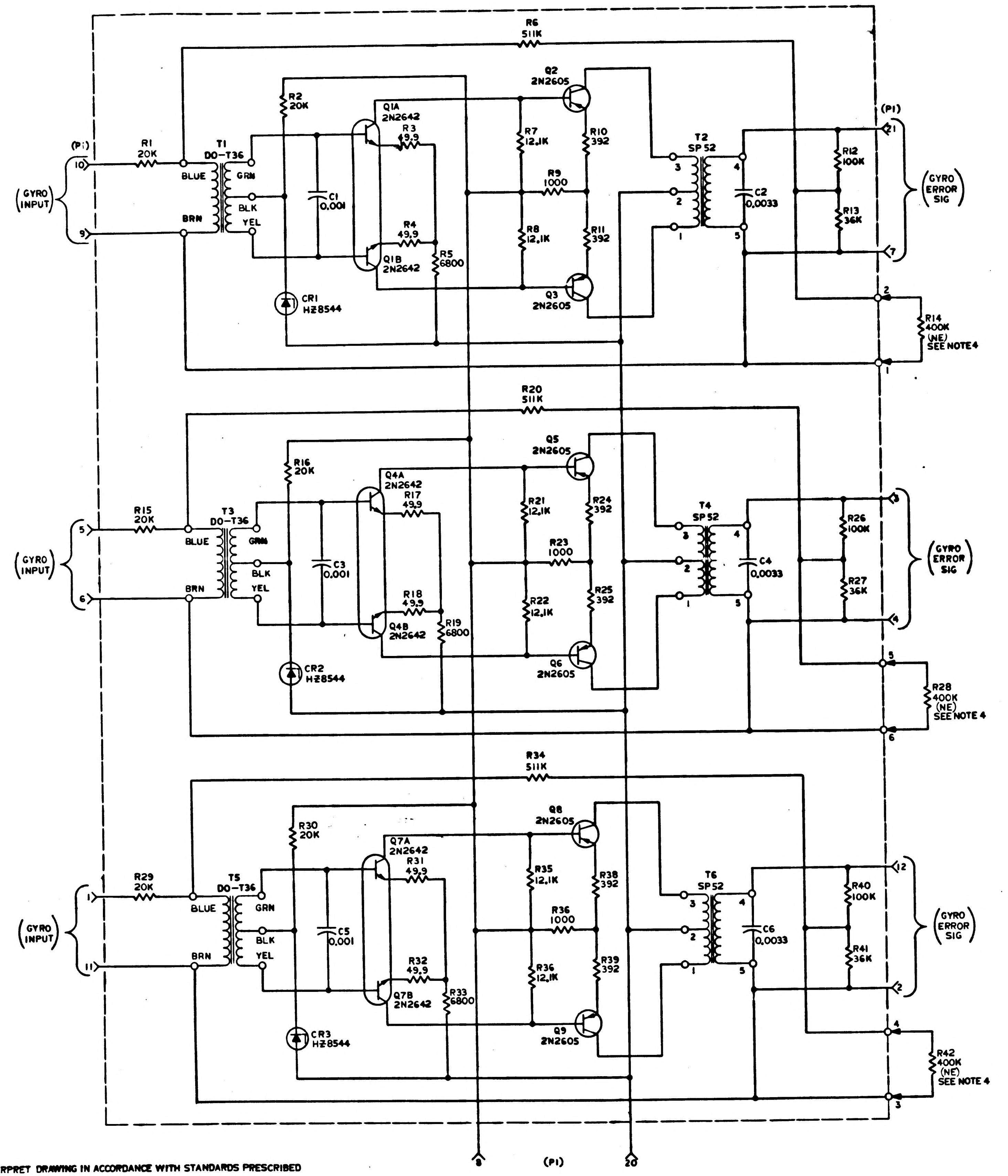
SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED AND REDRAWN PER TDRR 20351	6 FEB 63	
E	RELEASED PER TDRR 01188	8 [illegible]	
F	REVISED PER TDRR 02724	[illegible]-21-63	


(P1)
10
9
(GYRO INPUT)
R1 20K
T1 DO-T36
BLUE
GRN
BLK
BRN
YEL
R2 20K
Q1A 2N2642
R3 49.9
C1 0.001
R4 49.9
Q1B 2N2642
R5 6800
CR1 HZ8544
R6 511K
Q2 2N2605
R7 12.1K
R8 12.1K
R9 1000
R10 392
R11 392
Q3 2N2605
T2 SP52
C2 0.0033
R12 100K
R13 36K
(P1)
21
7
(GYRO ERROR SIG)
2
R14 400K (NE) SEE NOTE 4
1
R20 511K
5
6
(GYRO INPUT)
R15 20K
T3 DO-T36
R16 20K
Q4A 2N2642
R17 49.9
C3 0.001
R18 49.9
Q4B 2N2642
R19 6800
CR2 HZ8544
Q5 2N2605
R21 12.1K
R22 12.1K
R23 1000
R24 392
R25 392
Q6 2N2605
T4 SP52
C4 0.0033
R26 100K
R27 36K
3
4
(GYRO ERROR SIG)
5
R28 400K (NE) SEE NOTE 4
6
R34 511K
1
11
(GYRO INPUT)
R29 20K
T5 DO-T36
R30 20K
Q7A 2N2642
R31 49.9
C5 0.001
R32 49.9
Q7B 2N2642
R33 6800
CR3 HZ8544
Q8 2N2605
R35 12.1K
R36 12.1K
R36 1000
R38 392
R39 392
Q9 2N2605
T6 SP52
C6 0.0033
R40 100K
R41 36K
12
2
(GYRO ERROR SIG)
4
R42 400K (NE) SEE NOTE 4
3
8
(P1)
20

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-63	RESISTOR	20K	5%	1/4 W
R2	1006750-63		20K	5%	
R3	1010363-1		49.9	1%	
R4	1010363-1		49.9	1%	
R5	1006750-52		6800	5%	
R6	1010363-771		511 K	1%	
R7	1010363-459		12.1K	1%	
R8	1010363-459		12.1K	1%	
R9	1006750-32		1000	5%	
R10	1010363-173		392	1%	
R11	1010363-173		392	1%	
R12	1006750-80		100K	5%	
R13	1006750-69		36K	5%	
R14	1010363-		SEE NOTE 4	1%	
R15	1006750-63		20K	5%	
R16	1006750-63		20K	5%	
R17	1010363-1		49.9	1%	
R18	1010363-1		49.9	1%	
R19	1006750-52		6800	5%	
R20	1010363-771		511 K	1%	
R21	1010363-459		12.1K	1%	
R22	1010363-459		12.1K	1%	
R23	1006750-32		1000	5%	
R24	1010363-173		392	1%	
R25	1010363-173		392	1%	
R26	1006750-80		100K	5%	
R27	1006750-69		36K	5%	
R28	1010363-		SEE NOTE 4	1%	
R29	1006750-63		20K	5%	
R30	1006750-63		20K	5%	
R31	1010363-1		49.9	1%	
R32	1010363-1		49.9	1%	
R33	1006750-52		6800	5%	
R34	1010363-771		511K	1%	
R35	1010363-459		12.1K	1%	
R36	1010363-459		12.1K	1%	
R37	1006750-32		1000	5%	
R38	1010363-173		392	1%	
R39	1010363-173		392	1%	
R40	1006750-80		100K	5%	
R41	1006750-69		36K	5%	
R42	1010363-	RESISTOR	SEE NOTE 4	1%	1/4 W
C1	1010359-17	CAPACITOR	0.001	20%	200V
C2	1010359-23		0.0033		
C3	1010359-17		0.001		
C4	1010359-23		0.0033		
C5	1010359-17		0.001		
C6	1010359-23	CAPACITOR	0.0033	20%	200V
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010266		2N2605		
Q3	1010266		2N2605		
Q4	1010252		2N2642		
Q5	1010266		2N2605		
Q6	1010266		2N2605		
Q7	1010252		2N2642		
Q8	1010266		2N2605		
Q9	1010266	TRANSISTOR	2N2605		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010291-1		SP-52		
T3	1010324		DO-T36		
T4	1010291-1		SP-52		
T5	1010324		DO-T36		
T6	1010291-1	TRANSFORMER	SP-52		
CR1	1010372	DIODE	HZ8544	5%	7.5V
CR2	1010372	DIODE	HZ8544	5%	7.5V
CR3	1010372	DIODE	HZ8544	5%	7.5V
P1	1010472-2	CONNECTOR			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14, R28, AND R42 TO BE SELECTED BY ELECTRICAL TEST AT ASSEMBLY.

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APPROVAL [illegible] 1-31-63
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1010021 E

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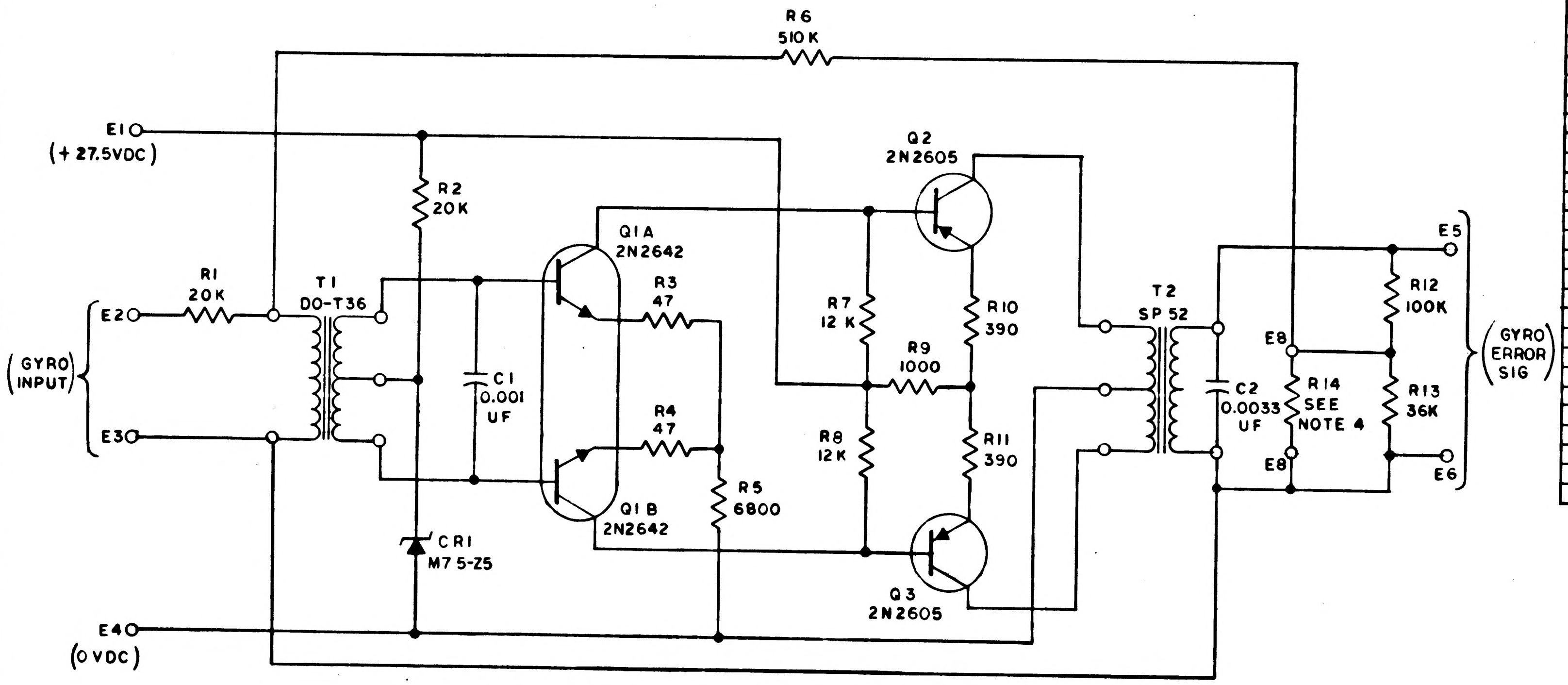
TDRR 00188

REVISIONS		-20-62	
SYM	DESCRIPTION	DATE	APPROVAL


R6
510 K
E1
(+27.5VDC)
R2
20K
Q2
2N2605
Q1A
2N2642
R1
20K
T1
DO-T36
E2
(GYRO INPUT)
E3
R3
47
C1
0.001
UF
R7
12 K
R9
1000
R10
390
T2
SP 52
E5
E8
R12
100K
(GYRO ERROR SIG)
C2
0.0033
UF
R14
SEE
NOTE 4
R13
36K
E8
E6
R4
47
R8
12K
R11
390
R5
6800
Q1 B
2N2642
CR1
M7 5-Z5
Q3
2N2605
E4
(0 VDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR	20K		1/2 W
R2			20K		
R3			47		
R4			47		
R5			6800		
R6			510K		
R7			12K		
R8			12K		
R9			1000		
R10			390		
R11			390		
R12			100K		
R13			36K		
R14		↓	SEE NOTE		↓
C1		CAPACITOR	0.001		
C2		↓	0.0003		
Q1		TRANSISTOR			
Q2					
Q3		↓			
T1		TRANSFORMER			
T2		↓			
CR1		DIODE			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST (NOMINAL VALUE 400K)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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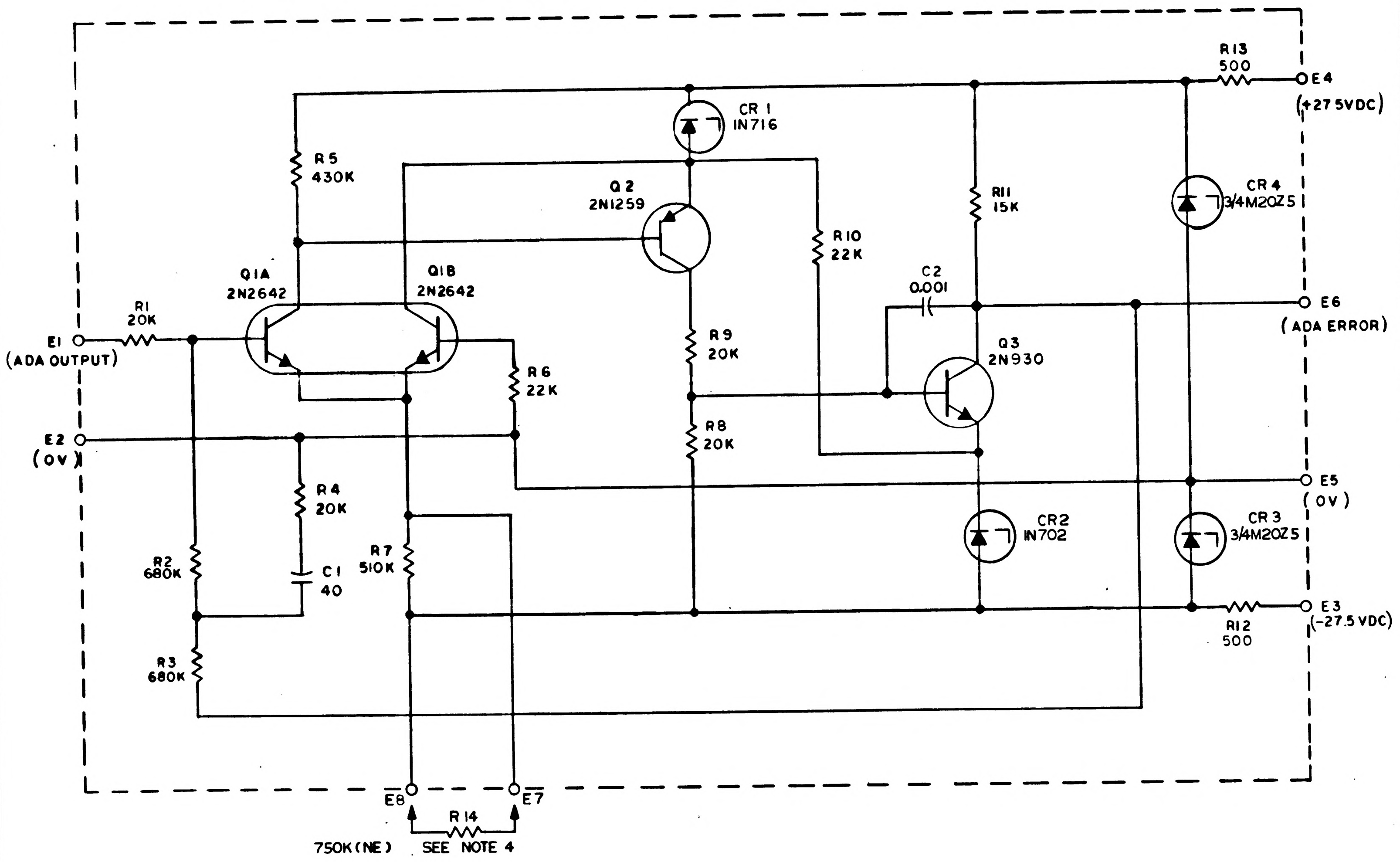
TDRR 00188 REVISIONS 12-20-62

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 0022	1/4/63	M.K.



R13
500
E4
(+27.5VDC)
CR 1
IN716
R5
430K
Q 2
2N1259
R10
22K
R11
15K
CR 4
3/4M20Z5
Q1A
2N2642
Q1B
2N2642
C2
0.001
E6
(ADA ERROR)
R1
20K
E1
(ADA OUTPUT)
R9
20K
Q3
2N930
R6
22K
E2
(OV)
R8
20K
R4
20K
E5
(OV)
CR2
IN702
CR 3
3/4M20Z5
R2
680K
C1
40
R7
510K
E3
(-27.5VDC)
R12
500
R3
680K
E8
E7
R 14
750K (NE)
SEE NOTE 4

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR	20K	± 1%	1/8 W
R2			680K		
R3			680K		
R4			20K		
R5			430K	± 5%	1/4W
R6			22K		
R7			510K		
R8			20K		
R9			20K		
R10			22K		
R11			15K		
R12			500		3 W
R13			500		3 W
R14			SEE NOTE		
C1		CAPACITOR	40UF	±20%	15VNP
C2		CAPACITOR	0.001UF	±10%	200V
CR1		DIODE			
CR2					
CR3					
CR4					
Q1		TRANSISTOR			
Q2					
Q3					

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE (VALUE LATER)

MAS1

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CODE IDENT NO. | SIZE D | NASA DRAWING NO. 1010022
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1010022 A

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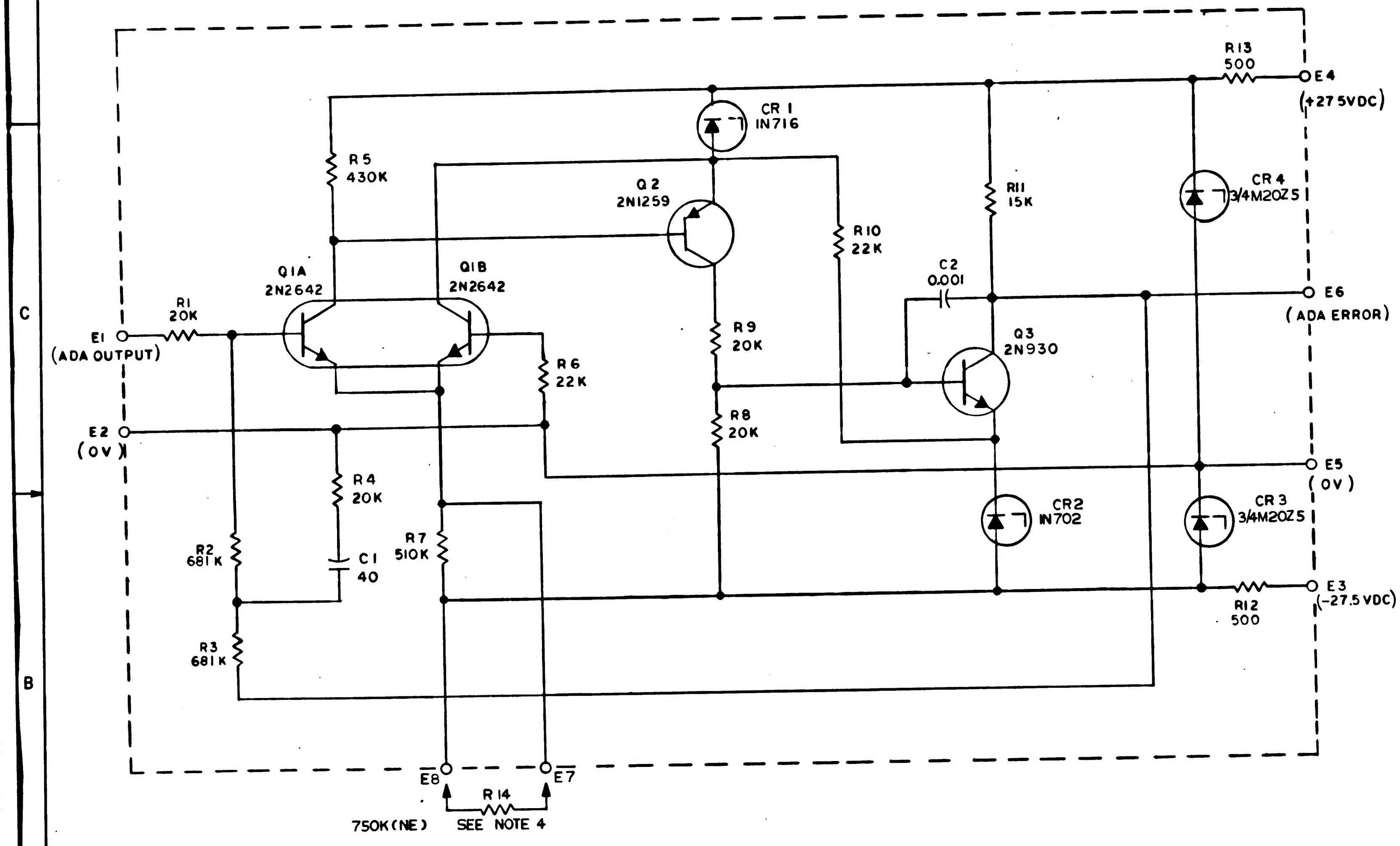
TDRR 00188 REVISIONS 12-20-62

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00227	1-4-63	M.K WK
B	REVISED PER TDRR 00292	1-23-63	M.K WK


R13
500
E4
(+27.5VDC)
CR 1
IN716
R5
430K
Q2
2N1259
R10
22K
R11
15K
CR4
3/4M20Z5
C2
0.001
Q1A
2N2642
Q1B
2N2642
R9
20K
Q3
2N930
E6
(ADA ERROR)
E1
(ADA OUTPUT)
R1
20K
R6
22K
R8
20K
E2
(0V)
E5
(0V)
R4
20K
CR2
IN702
CR3
3/4M20Z5
R2
681K
C1
40
R7
510K
E3
(-27.5 VDC)
R12
500
R3
681K
E8
E7
R14
750K(NE)
SEE NOTE 4

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	± 1%	1/8 W
R2	1010321-		681 K		1/4 W
R3	1010321-		681 K		1/4 W
R4	1010364-501		20K		1/8 W
R5	1010369-96		430K	± 5%	1/4W
R6	1006750-64		22K		
R7	1010369-98		510K		
R8	1006750-63		20K		
R9	1006750-63		20K		
R10	1006750-64		22K		
R11	1006750-60		15K		
R12	1010312 —		500		2 W
R13	1010312 —		500		2 W
R14	1010369—		SEE NOTE		1/4 W
C1	1010320-	CAPACITOR	40UF	±20%	15VNP
C2	1006777-	CAPACITOR	0.001UF	±10%	100V
CR1	1010372-	DIODE	HZ8549		
CR2	1010372-		HZ8530		
CR3	1010265-		IN3027B		
CR4	1010265-		IN3027B		
Q1	1010252-	TRANSISTOR	2N2642		
Q2	1010396-		2N1259		
Q3	1010397-		2N930		

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE (VALUE LATER)

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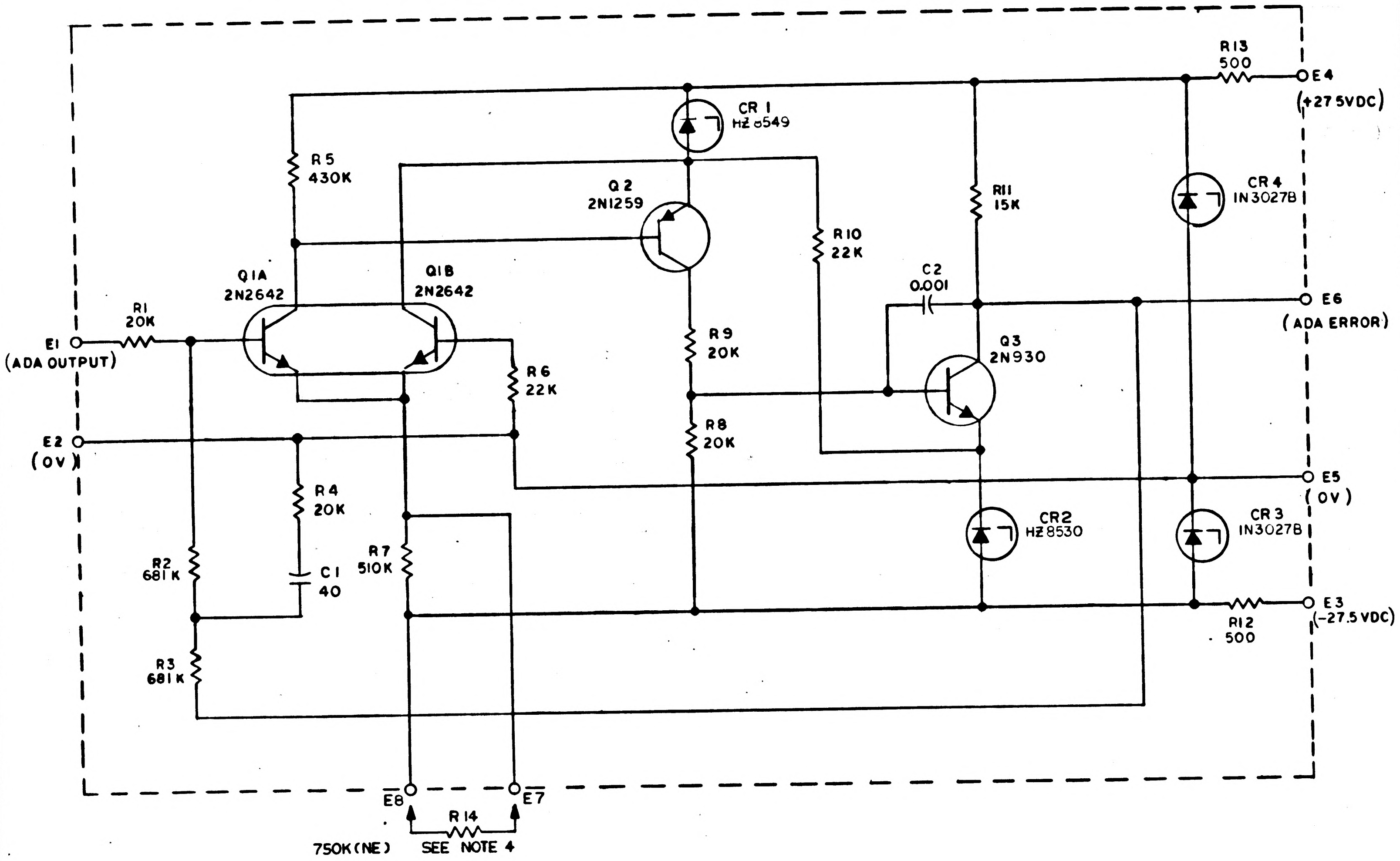
TDRR 00188 REVISIONS 12-20-62

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00227	1/4/63	M.K. WK
B	REVISED PER TDRR 00292	1-23-63	WK
C	REVISED PER TDRR 01182	5-2-63	S.S.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	±1%	1/8 W
R2	1010321-398		681 K		1/4 W
R3	1010321-398		681 K		1/4 W
R4	1010364-501		20K		1/8 W
R5	1010369-96		430K	±5%	1/4W
R6	1006750-64		22K	±2%	
R7	1010369-98		510K	±5%	
R8	1006750-63		20K	±2%	
R9	1006750-63		20K		
R10	1006750-64		22K		
R11	1006750-60		15K		
R12	1010312-030		500	±5%	2 W
R13	1010312-030		500		2 W
R14	1010369		SEE NOTE		1/4 W
C1	1010320-1	CAPACITOR	40UF	±20%	15VNP
C2	1006777-24	CAPACITOR	0.001UF	±10%	100V
CR1	1010372-20	DIODE	HZ8549	±5%	200MW
CR2	1010372-1		HZ8530		200MW
CR3	1010265-12		IN3027B		1W
CR4	1010265-12		IN3027B		1W
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010396		2N1259		
Q3	1010397		2N930		



NOTES:

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2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE SELECTED FROM CHART

R 14	
1010369-94	360K
-95	390K
-96	430K
-97	470K
-98	510K
-99	560K
-100	620K
-101	680K
-102	750K
-103	820K
-104	910K
-105	1000K
-106	1100K
-107	1200K
-108	1300K
-109	1500K

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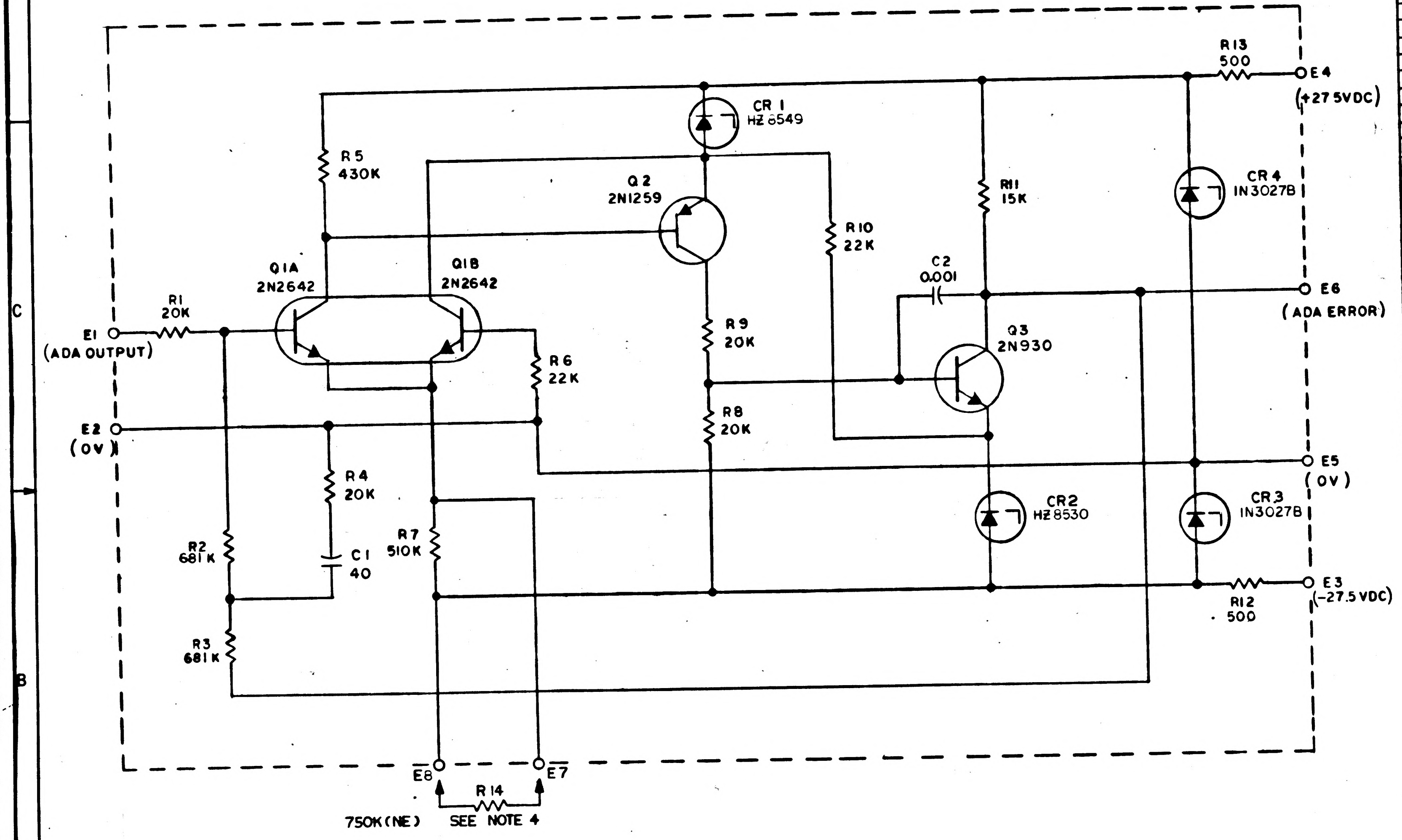
TDRR 00188 — REVISIONS — 12-20-62

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED PER TDRR 00227	1/4/63	M.K.	WK
B	REVISED PER TDRR 00292	1-23-63	M.K.	WK
C	REVISED PER TDRR 01182	5-2-63	S.S.	WK
D	REVISED PER TDRR 01410	5-29-63		WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	± 1%	1/8 W
R2	1010321-398		681 K		1/4 W
R3	1010321-398		681 K		1/4 W
R4	1010364-501		20K		1/8 W
R5	1010369-96		430K	± 5%	1/4W
R6	1006750-64		22K	± 2%	
R7	1010369-98		510K	± 5%	
R8	1006750-63		20K	± 2%	
R9	1006750-63		20K		
R10	1006750-64		22K		
R11	1006750-60		15K		
R12	1010312 -030		500	± 5%	2 W
R13	1010312 -030		500		2 W
R14	1010369		SEE NOTE		1/4 W
C1	1010320- 13	CAPACITOR	40UF	±20%	15VNP
C2	1006777-24	CAPACITOR	0.001UF	±10%	100V
CR1	1010372- 20	DIODE	HZ8549	± 5%	200MW
CR2	1010372- 1		HZ8530		200MW
CR3	1010265- 12		IN3027B		IW
CR4	1010265- 12		IN3027B		IW
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010396		2N1259		
Q3	1010397		2N930		



R 14	
1010369-94	360K
-95	390K
-96	430K
-97	470K
-98	510K
-99	560K
-100	620K
-101	680K
-102	750K
-103	820K
-104	910K
-105	1000K
-106	1100K
-107	1200K
-108	1300K
-109	1500K

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE SELECTED FROM CHART

MASTER

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TDRR 00188 REVISIONS 12-20-62

SYM	DESCRIPTION	DATE	APPROVAL
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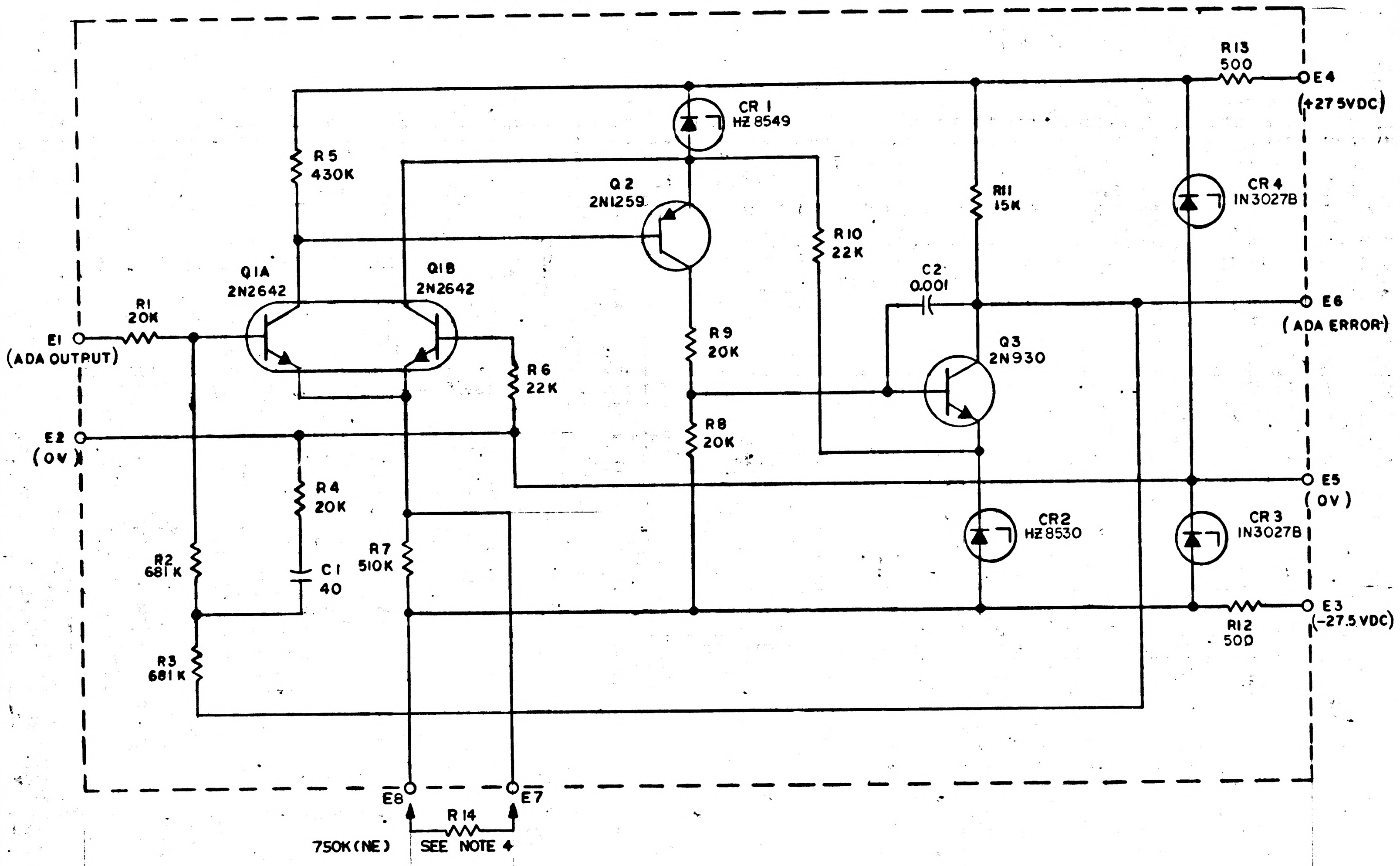
B	REVISED PER TDRR 00292	1-23-63	M.K. WK
C	REVISED PER TDRR 01182	5-2-63	S.C.S. WK
D	REVISED PER TDRR 01410	6-29-63	WK
E	REVISED PER TDRR 05327	2-9-63	



REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	± 1%	1/8 W
R2	1010321-398		681 K		1/4 W
R3	1010321-398		681 K		1/4 W
R4	1010364-501		20K	↓	1/8 W
R5	1010369-96		430K	± 5%	1/4W
R6	1006750-64		22K	± 2%	
R7	1010369-98		510K	± 5%	
R8	1006750-63		20K	± 2%	
R9	1006750-63		20K		
R10	1006750-64		22K		
R11	1006750-60		15K	↓	↓
R12	1010312-030		500	± 5%	2 W
R13	1010312-030		500		2 W
R14	1010369	↓	SEE NOTE	↓	1/4 W
C1	1010320-13	CAPACITOR	40UF	±20%	15VNP
C2	1006777-24	CAPACITOR	0.001UF	±10%	100V
CR1	1010372-20	DIODE	HZ8549	± 5%	200MW
CR2	1010372-1		HZ8530		200MW
CR3	1010265-12		1N3027 B		1W
CR4	1010265-12		1N3027 B	↓	1W
		↓			
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010345		2N2303		
Q3	1010397	↓	2N930		

R 14	
1010369-94	360K
-95	390K
-96	430K
-97	470K
-98	510K
-99	560K
-100	620K
-101	680K
-102	750K
-103	820K
-104	910K
-105	1000K
-106	1100K
-107	1200K
-108	1300K
-109	1500K

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE SELECTED FROM CHART

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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DWG. NO. CONTRACT
DRAWN A. L. Manini DATE 15 Oct 62
CHECKED M. Kramer 11 Dec 62
APPROVAL M. Kramer 11 Dec 62
APPROVAL
NASA APPROVAL W J Rhine 12-20-62
MIT APPROVAL 20 Dec 62

MANNED SPACECRAFT CENTER
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SCHEMATIC,
ADA PRE-AMPLIFIER

CODE IDENT NO. SIZE D NASA DRAWING NO. 1010022
SCALE WT SHEET OF

1010022 E

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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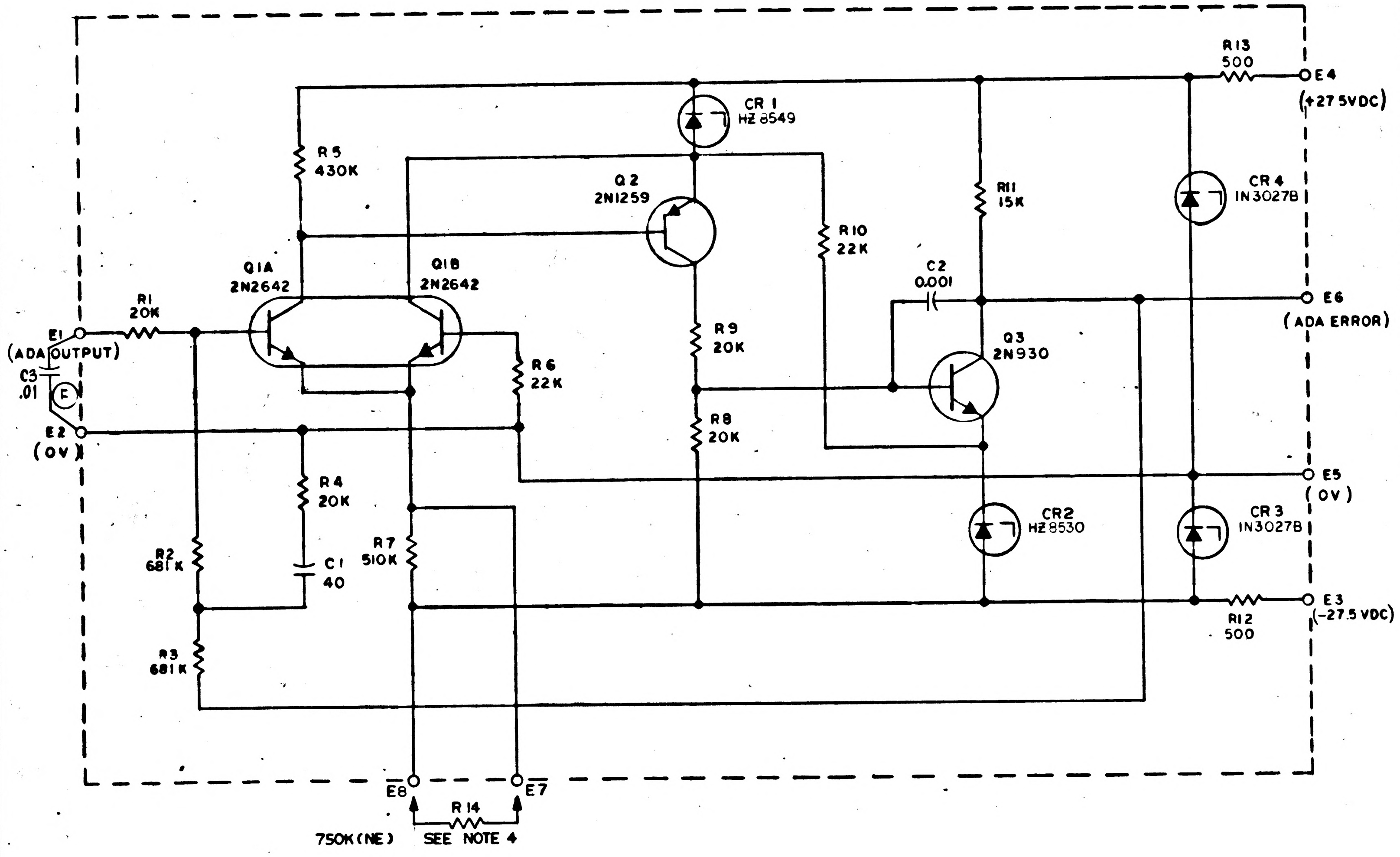
TDRR 00188 REVISIONS 12-20-62

SYM	DESCRIPTION	DATE	APPROVAL	
A	REVISED PER TDRR 00227	1/4/63	M.K	W/C
B	REVISED PER TDRR 00292	1-23-63	M.K.	WR
C	REVISED PER TDRR 01182	5-2-63	S.C.S	WR
D	REVISED PER TDRR 01410	6-29-63	[illegible]	WR
E	REVISED PER TDRR 05327	12-9-63	[illegible]	[illegible]
F	REVISED PER TDRR 08496	6-2-64	RS	AU

REF DES	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010364-501	RESISTOR	20K	± 1%	1/8 W
R2	1010321-398		681 K		1/4 W
R3	1010321-398		681 K		1/4 W
R4	1010364-501		20K		1/8 W
R5	1010369-96		430K	± 5%	1/4 W
R6	1006750-64		22K	± 2%	
R7	1010369-98		510K	± 5%	
R8	1006750-63		20K	± 2%	
R9	1006750-63		20K		
R10	1006750-64		22K		
R11	1006750-60		15K		
R12	1010312-030		500	± 5%	2 W
R13	1010312-030		500		2 W
R14	1010369		SEE NOTE		1/4 W
C1	1010320-13	CAPACITOR	40UF	±20%	15VNP
C2	1006777-24	CAPACITOR	0.001UF	±10%	100V
C3	1010359-29	CAPACITOR	.01 UF	±10%	200V
CR1	1010372-20	DIODE	HZ8549	± 5%	200MW
CR2	1010372-1		HZ8530		200MW
CR3	1010265-12		IN3027 B		1W
CR4	1010265-12		IN3027 B		1W
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010345		2N2303		
Q3	1010397		2N930		



R 14		
1010369-94		360K
	-95	390K
	-96	430K
	-97	470K
	-98	510K
	-99	560K
	-100	620K
	-101	680K
	-102	750K
	-103	820K
	-104	910K
	-105	1000K
	-106	1100K
	-107	1200K
	-108	1300K
	-109	1500K

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R14 TO BE SELECTED FROM CHART

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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APPROVAL M. Kramer 11 Dec 62
APPROVAL
NASA APPROVAL W. J. Rhine 12-20-62
MIT APPROVAL 20 Dec 62

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CODE IDENT NO. SIZE D NASA DRAWING NO. 1010022
SCALE WT SHEET OF

1010022 F

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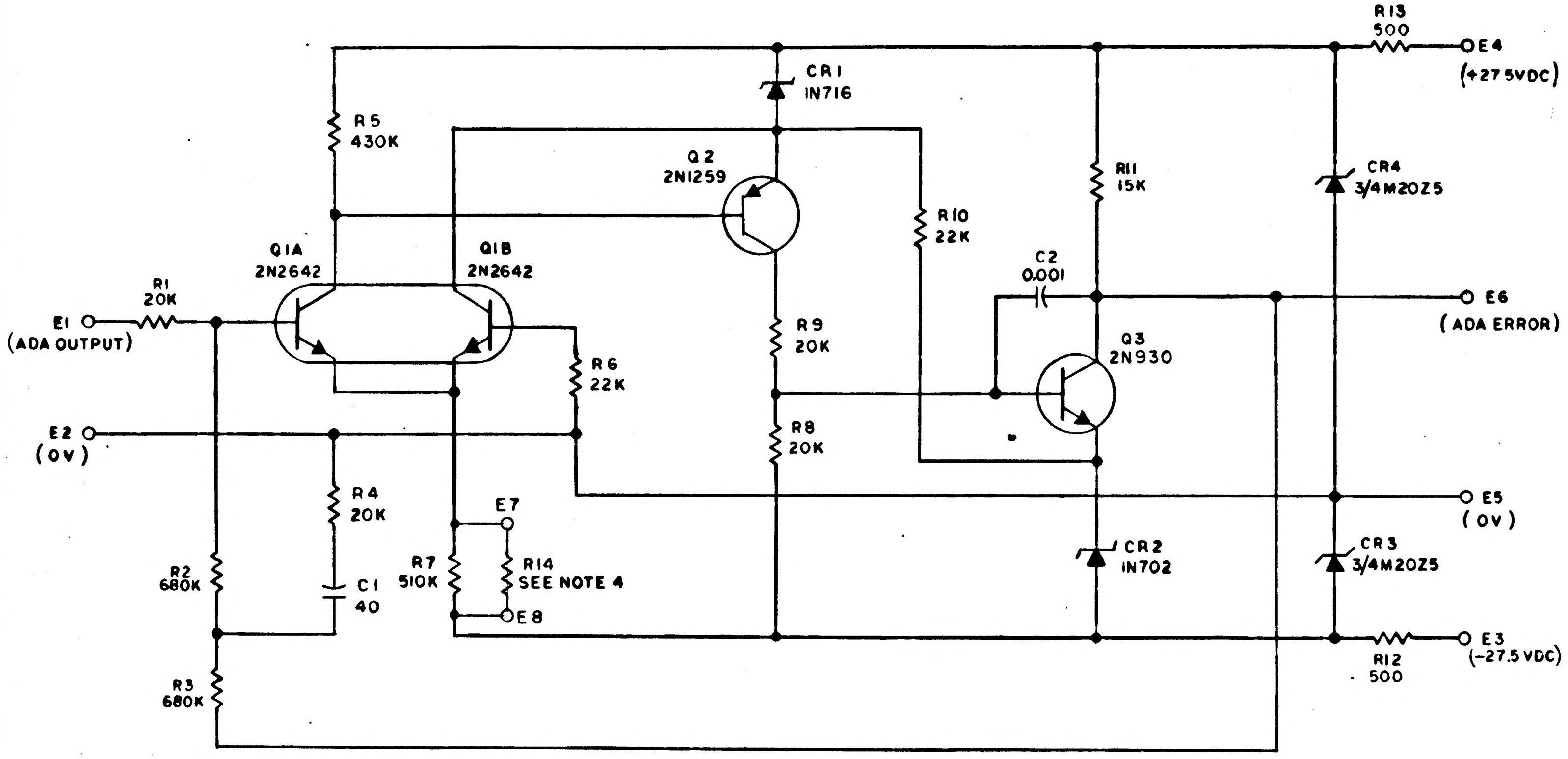
TDRR 00188	REVISIONS	-23-62	
SYM	DESCRIPTION	DATE	APPROVAL


R13
500
E4
(+27.5VDC)
CR1
1N716
R5
430K
Q2
2N1259
R10
22K
R11
15K
CR4
3/4M20Z5
C2
0.001
Q1A
2N2642
Q1B
2N2642
R1
20K
E1
(ADA OUTPUT)
R9
20K
E6
(ADA ERROR)
Q3
2N930
R6
22K
E2
(0V)
R8
20K
E5
(0V)
R4
20K
E7
R14
SEE NOTE 4
CR2
1N702
CR3
3/4M20Z5
R2
680K
C1
40
R7
510K
E8
E3
(-27.5VDC)
R12
500
R3
680K

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR	20K	±1%	1/8 W
R2			680K		
R3			680K		
R4			20K		
R5			430K	±5%	1/4W
R6			22K		
R7			510K		
R8			20K		
R9			20K		
R10			22K		
R11			15K		
R12			500		3W
R13			500		3W
R14			SEE NOTE		
C1		CAPACITOR	40UF	±20%	15VNP
C2		CAPACITOR	0.001UF	±10%	200V
CR1		DIODE			
CR2					
CR3					
CR4					
Q1		TRANSISTOR			
Q2					
Q3					

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST (NOMINAL VALUE 750 K)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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APPROVAL M. Kramer 11 Dec 62
APPROVAL
NASA APPROVAL W. J. Rhine 12-20-62
MIT APPROVAL 20 Dec 62

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CODE IDENT NO.	SIZE	NASA DRAWING NO.
	D	1010022
SCALE	WT	SHEET OF

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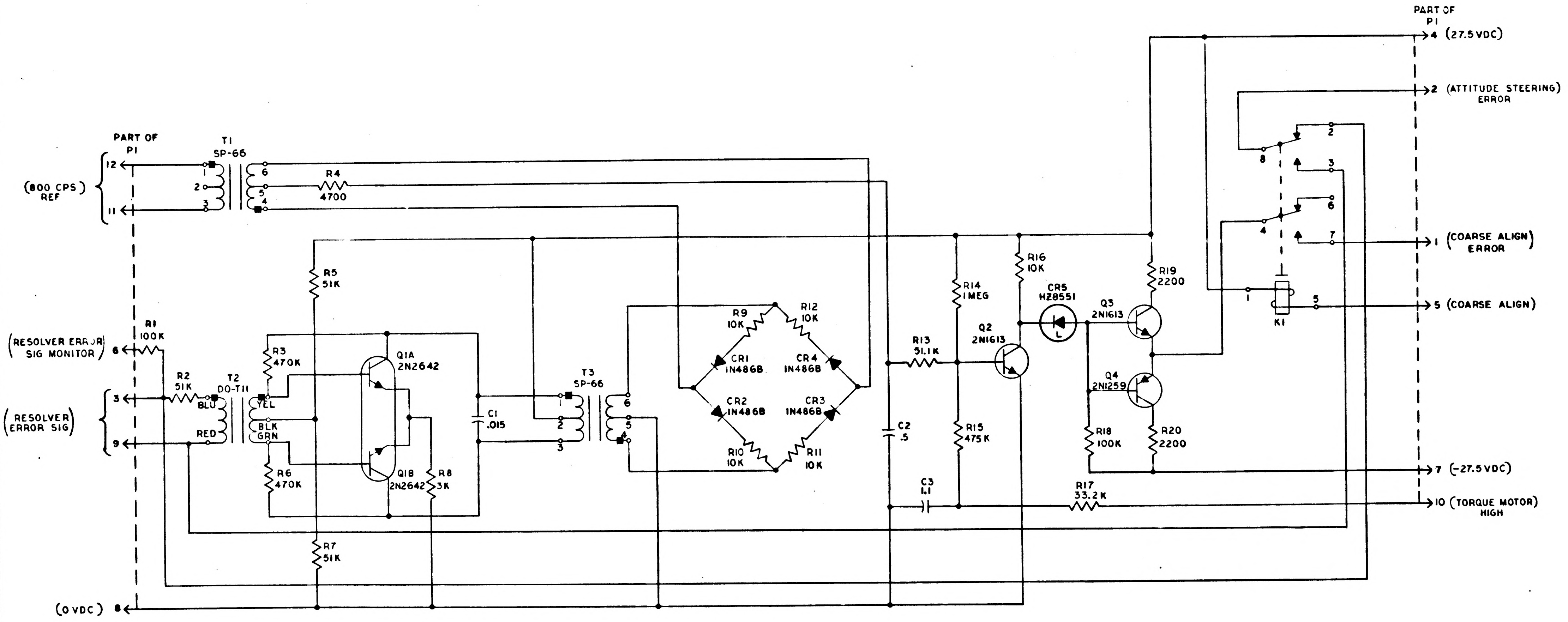
REVISIONS TDRR 00359

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01367	14 Apr 63	M. K.


PART OF P1
12
11
(800 CPS) REF
T1
SP-66
1
2
3
6
5
4
R4
4700
(RESOLVER ERROR SIG MONITOR)
6
R1
100K
(RESOLVER ERROR SIG)
3
9
R2
51K
T2
DO-T11
BLU
RED
YEL
BLK
GRN
R3
470K
R5
51K
Q1A
2N2642
Q1B
2N2642
R6
470K
R8
3K
R7
51K
C1
.015
T3
SP-66
(0 VDC) 8
R9
10K
R12
10K
CR1
1N486B
CR4
1N486B
CR2
1N486B
CR3
1N486B
R10
10K
R11
10K
C2
.5
R13
51.1K
R14
1MEG
R15
475K
C3
1.1
R16
10K
Q2
2N1613
CR5
HZ8551
L
Q3
2N1613
Q4
2N1259
R18
100K
R19
2200
R20
2200
R17
33.2K
K1
PART OF P1
4 (27.5 VDC)
2 (ATTITUDE STEERING) ERROR
1 (COARSE ALIGN) ERROR
5 (COARSE ALIGN)
7 (-27.5 VDC)
10 (TORQUE MOTOR) HIGH

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-80	RESISTOR	100K	±2%	1/4W
R2	1006750-73	↓	51K	±2%	1/4W
R3	1010369-97	↓	470K	±5%	1/8W
R4	1006750-48	↓	4700	±2%	1/4W
R5	1006750-73	↓	51K	±2%	1/4W
R6	1010369-97	↓	470K	±5%	1/8W
R7	1006750-73	↓	51K	±2%	1/4W
R8	1006750-43	↓	3K	±2%	1/4W
R9	1010364-443	↓	10K	±1%	1/8W
R10	1010364-443	↓	10K	↓	↓
R11	1010364-443	↓	10K	↓	↓
R12	1010364-443	↓	10K	↓	↓
R13	1010364-579	↓	51.1K	↓	↓
R14	1010369-105	↓	1 MEG	±5%	1/8W
R15	1010364-765	↓	475K	±1%	1/8W
R16	1006750-56	↓	10K	±2%	1/4W
R17	1010364-543	↓	33.2K	±1%	1/8W
R18	1006750-80	↓	100K	±2%	1/4W
R19	1010278-71	↓	2200	±5%	1/2W
R20	1010278-71	↓	2200	±5%	1/2W
C1	1010264-15	CAPACITOR	0.015	±5%	200VDC
C2	1010279-228	↓	.5	±10%	35VDC
C3	1010279-232	↓	1.1	±10%	35VDC
CR1	1010392	DIODE	1N486B		250MW
CR2	↓	↓	↓		↓
CR3	↓	↓	↓		↓
CR4	↓	↓	↓		↓
CR5	1010372-22	↓	HZ8551		200MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010270	↓	2N1613		
Q3	1010270	↓	2N1613		
Q4	1010396-001	↓	2N1259		
T1	1010329	TRANSFORMER	SP-66		
T2	1010326	↓	DO-T11		
T3	1010329	↓	SP-66		
K1	1010353-1	RELAY			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ‡ DECIMALS ± ‡ ANGLES ± ‡
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN J. Brigham DATE 1-17-63
CHECKED [illegible]
APPROVAL M. Kramer 2-6-63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
GIMBAL COARSE
ALIGN AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010023
SCALE —
WT
SHEET 1 OF 1

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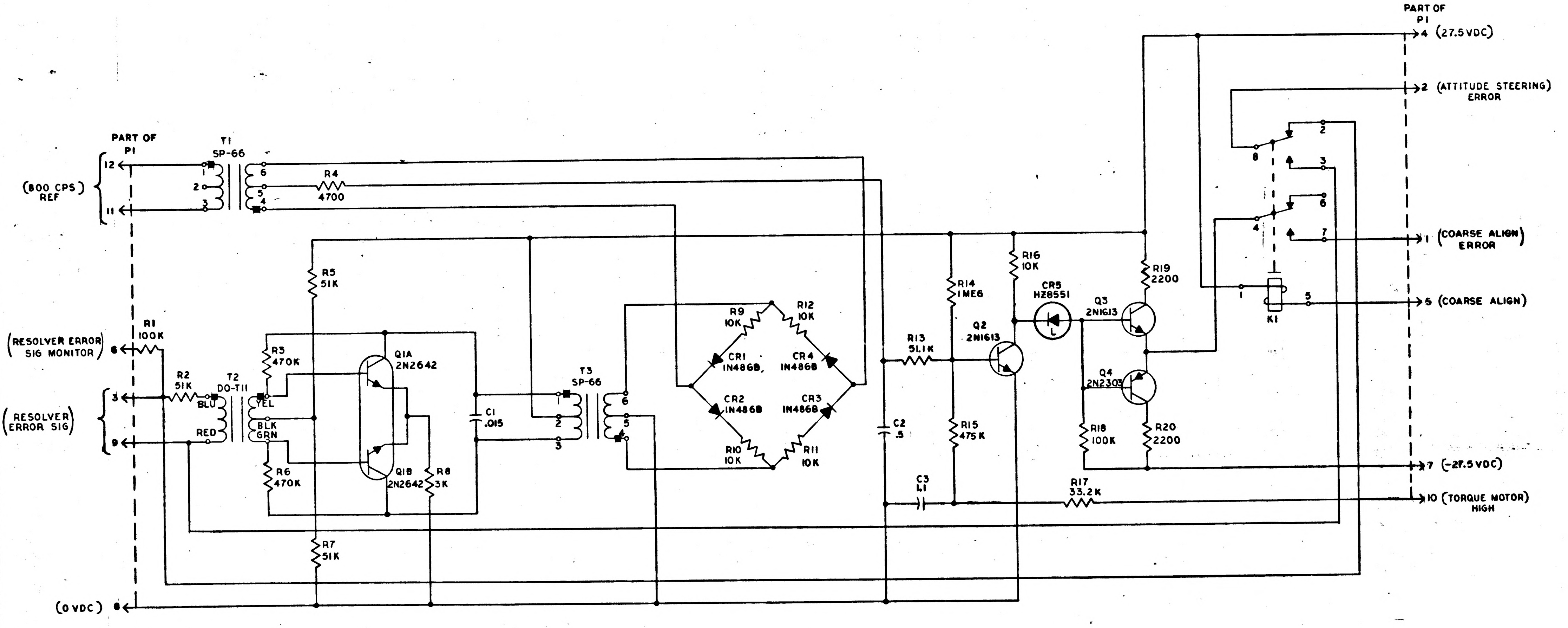
REVISIONS TDRR 00353

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01367	9 Apr 63	M. K.
B	REVISED PER TDRR 05327	12-9-63	


PART OF P1
T1 SP-66
12
11
1
2
3
6
5
4
(800 CPS) REF
R4 4700
R5 51K
R1 100K
(RESOLVER ERROR SIG MONITOR) 6
R2 51K
T2 DO-T11
BLU
RED
YEL
BLK GRN
3
9
(RESOLVER ERROR SIG)
R3 470K
R6 470K
Q1A 2N2642
Q1B 2N2642
R8 3K
R7 51K
C1 .015
T3 SP-66
1
2
3
6
5
R9 10K
R12 10K
CR1 1N486B
CR4 1N486B
CR2 1N486B
CR3 1N486B
R10 10K
R11 10K
C2 .5
R13 51.1K
R14 1MEG
R15 475K
C3 1.1
Q2 2N1613
R16 10K
CR5 HZ8551
Q3 2N1613
Q4 2N2303
R18 100K
R19 2200
R20 2200
R17 33.2K
K1
1
2
3
4
5
6
7
8
PART OF P1
4 (27.5 VDC)
2 (ATTITUDE STEERING) ERROR
1 (COARSE ALIGN) ERROR
5 (COARSE ALIGN)
7 (-27.5 VDC)
10 (TORQUE MOTOR) HIGH
(0 VDC) 8

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-80	RESISTOR	100K	±2%	1/4W
R2	1006750-73	↓	51K	±2%	1/4W
R3	1010369-97		470K	±5%	1/8W
R4	1006750-48		4700	±2%	1/4W
R5	1006750-73		51K	±2%	1/4W
R6	1010369-97		470K	±5%	1/8W
R7	1006750-73		51K	±2%	1/4W
R8	1006750-43		3K	±2%	1/4W
R9	1010364-443		10K	±1%	1/8W
R10	1010364-443		10K	↓	↓
R11	1010364-443		10K		
R12	1010364-443		10K		
R13	1010364-579		51.1K		
R14	1010369-105		1 MEG	±5%	1/8W
R15	1010364-765		475K	±1%	1/8W
R16	1006750-56		10K	±2%	1/4W
R17	1010364-543		33.2K	±1%	1/8W
R18	1006750-80		100K	±2%	1/4W
R19	1010278-71		2200	±5%	1/2W
R20	1010278-71		2200	±5%	1/2W
C1	1010264-15	CAPACITOR	0.015	±5%	200VDC
C2	1010279-228	↓	.5	±10%	35VDC
C3	1010279-232		1.1	±10%	35VDC
CR1	1010392	DIODE	1N486B		250MW
CR2	↓	↓	↓		↓
CR3					
CR4					
CR5	1010372-22		HZ8551		200MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010270	↓	2N1613		
Q3	1010270		2N1613		
Q4	1010345		2N2303		
T1	1010329	TRANSFORMER	SP-66		
T2	1010326	↓	DO-T11		
T3	1010329		SP-66		
K1	1010353-1	RELAY			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
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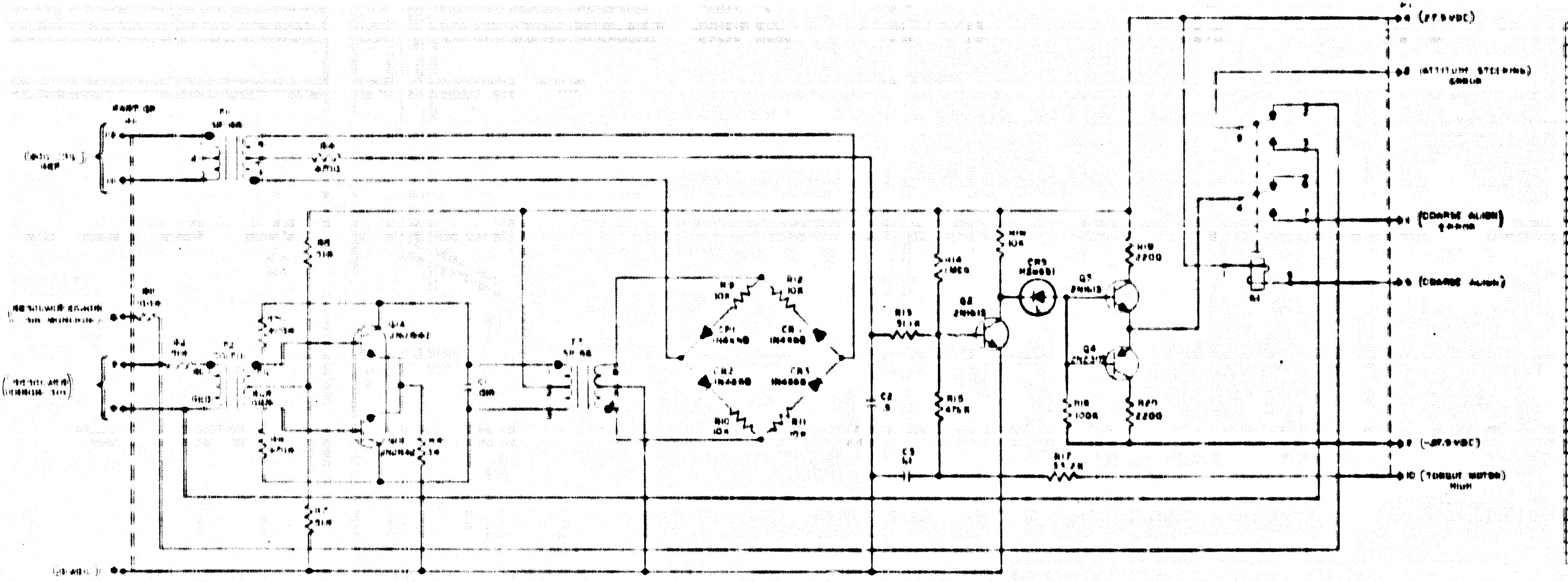
DRAWN J. Brigham DATE 1-17-63
CHECKED
APPROVAL M. Kramer 2-6-63
APPROVAL
NASA APPROVAL 6 Feb 63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
GIMBAL COARSE ALIGN AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010023
SCALE —
WT
SHEET 1 OF 1


PART OF P1
T2
(27.5VDC)
(ATTITUDE STEERING) ERROR
(COARSE ALIGN) SIGNAL
(COARSE ALIGN)
(-27.5VDC)
(TORQUE MOTOR) HIGH
RESOLVER ERROR
(RESOLVER ERROR)
(GROUND)
R4
R5
R7
R8
R9 10K
R10 10K
R11 10K
R12 10K
R13 51.1K
R14 1MEG
R15 47.5K
R16 10K
R17 51.1K
R18 100K
R19 2200
R20 2200
CR1 1N486B
CR2 1N486B
CR3 1N486B
CR4 1N486B
CR5
C1
C2 .5
C3
Q1A
Q1B
Q2 2N1613
Q3 2N1613
Q4
T1
T3
K1

[illegible]	PART NO.	DESCRIPTION	VALUE	[illegible]	[illegible]
C1	[illegible]	CAPACITOR	[illegible]	[illegible]	[illegible]
T1	[illegible]	TRANSFORMER	[illegible]		
T2	[illegible]		[illegible]		
T3	[illegible]		[illegible]		
K1	[illegible]	RELAY			

NOTES:

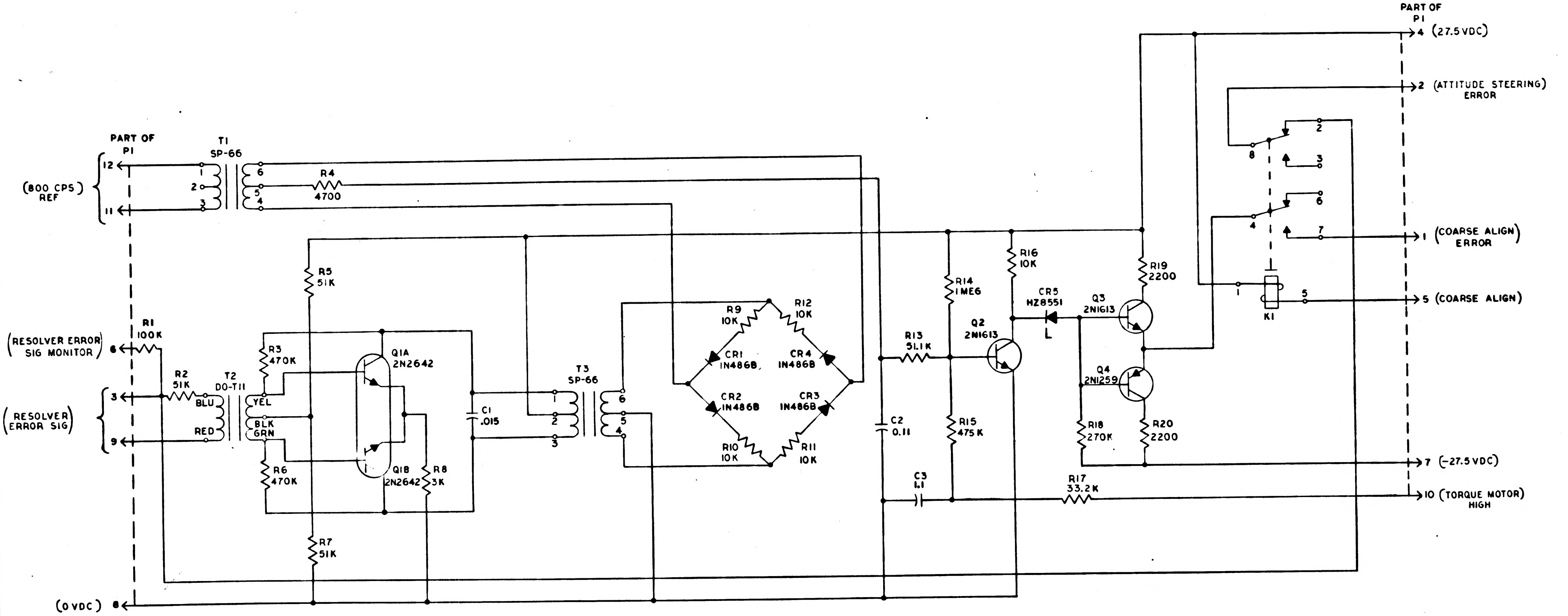
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

SCHEMATIC
GIMBAL COARSE
ALIGN AMPLIFIER

E 1010023

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TORR00353			
SYM	DESCRIPTION	DATE	APPROVAL


PART OF P1
4 (27.5 VDC)
2 (ATTITUDE STEERING) ERROR
1 (COARSE ALIGN) ERROR
5 (COARSE ALIGN)
7 (-27.5 VDC)
10 (TORQUE MOTOR) HIGH
PART OF P1
T1 SP-66
(800 CPS) REF
12
11
R4 4700
R5 51K
(RESOLVER ERROR SIG MONITOR) 6
R1 100K
R2 51K
T2 DO-T11
BLU
YEL
BLK
GRN
RED
(RESOLVER) ERROR SIG)
3
9
R3 470K
Q1A 2N2642
Q1B 2N2642
R6 470K
R8 3K
R7 51K
C1 .015
T3 SP-66
R9 10K
R12 10K
CR1 1N486B
CR4 1N486B
CR2 1N486B
CR3 1N486B
R10 10K
R11 10K
C2 0.11
C3 1.1
R13 51.1K
R14 1MEG
R15 475K
R16 10K
Q2 2N1613
CR5 HZ8551
Q3 2N1613
Q4 2N1259
R18 270K
R19 2200
R20 2200
R17 33.2K
K1
(0 VDC) 8

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-80	RESISTOR	100K	5%	1/4W
R2	1006750-73		51K		1/4W
R3	1010369-97		470K		1/8W
R4	1006750-48		4700		1/4W
R5	1006750-73		51K		1/4W
R6	1010369-97		470K		1/8W
R7	1006750-73		51K		1/4W
R8	1006750-43		3K		1/4W
R9	1010364-443		10K	1%	1/8W
R10	1010364-443		10K		
R11	1010364-443		10K		
R12	1010364-443		10K		
R13	1010364-579		51.1K		
R14	1010369-105		1 MEG	5%	1/8W
R15	1010364-765		475K	1%	1/8W
R16	1006750-56		10K	5%	1/4W
R17	1010364-543		33.2K	1%	1/8W
R18	1010369-91		270K	5%	1/8W
R19	1010278-		2200		1W
R20	1010278-		2200		1W
C1	1010378-15	CAPACITOR	0.015	10%	200VDC
C2	1010279-		0.11		50VDC
C3	1010279-		1.1		35VDC
CR1	1010392	DIODF	1N486B		
CR2					
CR3					
CR4					
CR5	1010372-22		HZ8551		
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010270		2N1613		
Q3	1010270		2N1613		
Q4	1010396		2N1259		
T1	1010329	TRANSFORMER	SP-66		
T2	1010326		DO-T11		
T3	1010329		SP-66		
K1	1010353-1	RELAY			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN J. Brighton DATE 1-17-63
CHECKED J. Shumaghe
APPROVAL M. Kramer 2-6-63
APPROVAL
NASA APPROVAL 6 Oct 63
MIT APPROVAL W Kupfer 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC GIMBAL COARSE ALIGN AMPLIFIER

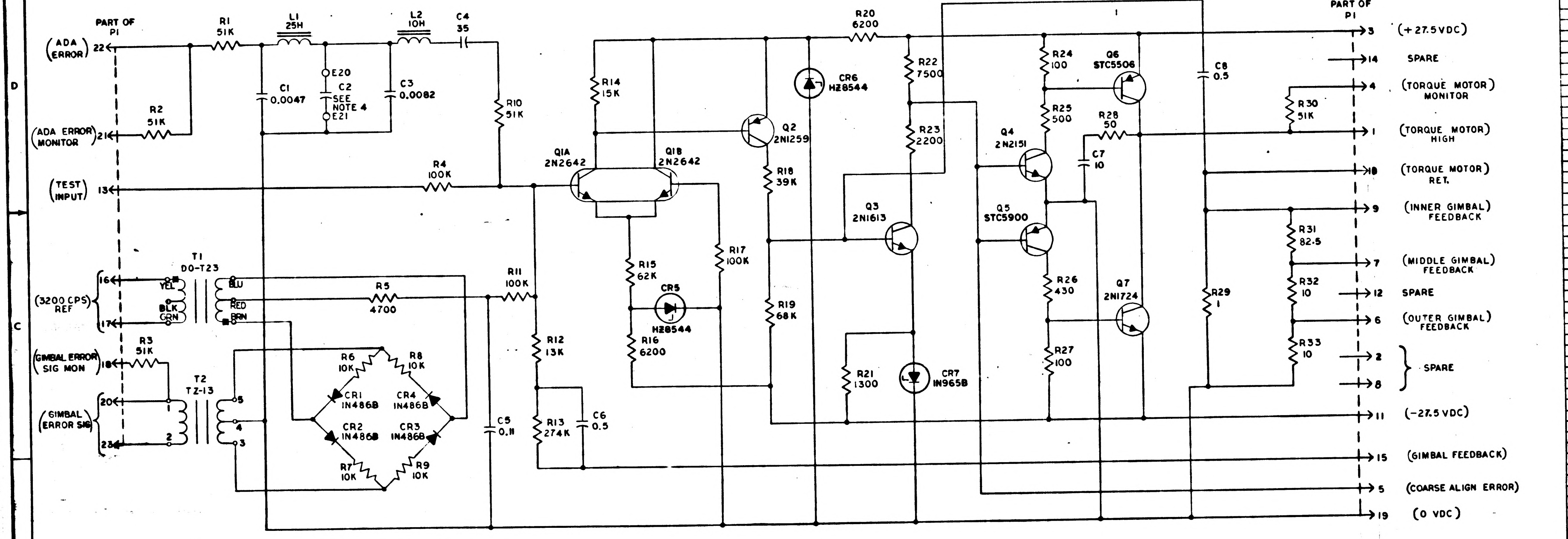
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010023
SCALE
WT
SHEET 1 OF 1

F 1010023

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00353

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00983	8 Mar 63	


PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF 16 17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20 23
R1 51K
R2 51K
R3 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
E20
E21
C3 0.0082
R10 51K
R4 100K
T1 DO-T23
YEL BLK GRN BLU RED BRN
R5 4700
R11 100K
T2 TZ-13
R6 10K
R8 10K
CR1 IN486B
CR4 IN486B
CR2 IN486B
CR3 IN486B
R7 10K
R9 10K
C5 0.11
R12 13K
R13 274K
C6 0.5
Q1A 2N2642
Q1B 2N2642
R14 15K
R15 62K
R16 6200
CR5 HZ8544
R17 100K
Q2 2N1259
R18 39K
R19 68K
R20 6200
CR6 HZ8544
R22 7500
R23 2200
Q3 2N1613
R21 1300
CR7 IN965B
R24 100
Q6 STC5506
R25 500
Q4 2N2151
R28 50
C7 10
Q5 STC5900
R26 430
Q7 2N1724
R27 100
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
3 (+27.5VDC)
14 SPARE
4 (TORQUE MOTOR) MONITOR
1 (TORQUE MOTOR) HIGH
10 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
12 SPARE
6 (OUTER GIMBAL) FEEDBACK
2 8 SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
19 (0 VDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73		51K		
R3	-73		51K		
R4	-80		100K		
R5	-48		4700		
R6	1010364-443		10K	±1%	1/8 W
R7	-		10K	±1%	1/8 W
R8	-		10K	±1%	1/8 W
R9	-		10K	±1%	1/8 W
R10	1006750-73		51K	±2%	1/4W
R11	1010364-635		100K	±1%	1/8W
R12	-465		13K		
R13	-719		274K		
R14	1006750-60		15K	±2%	1/4W
R15	-75		62K		
R16	-51		6200		
R17	-80		100K		
R18	-70		39K		
R19	-76		68K		
R20	-51		6200		
R21	1006760-35		1300		1/2W
R22	1006750-53		7500		1/4W
R23	1006750-40		2200		1/4W
R24	1010278-39		100	±5%	1/2W
R25	1010399-31		500	±5%	5W
R26	1010389-47		430	±1%	3W
R27	1010278-39		100	±5%	1/2W
R28	1010399-16		50	±5%	5W
R29	1010389-		1	±1%	3W
R30	1006750-73		51K	±2%	1/4W
R31	1010364-43		82.5	±1%	1/8W
R32	1010377-66		10	±.5%	1/10W
R33	1010377-66		10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-		SEE NOTE 4		
C3	-12		.0082		
C4	1010320-		35	+75,-15%	35VDC
C5	1010279-220		.11	±10%	35VDC
C6	1010279-009		0.5	±10%	6VDC
C7	1010320-		10	+75,-15%	50VDC
C8	1010279-228		0.5	±10%	35VDC
L1	1010277-009	REACTOR	25H		
L2	1010277-008	REACTOR	10H		
CR1	1010392	DIODE	IN486B		250MW
CR2	1010392				
CR3	1010392				
CR4	1010392				
CR5	1010372-15		HZ8544		200MW
CR6	1010372-15		HZ8544		200MW
CR7	1010286-9		IN965B		400MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010396-001		2N1259		
Q3	1010270		2N1613		
Q4	1010269-1		2N2151		
Q5	1010437		STC5900		
Q6	1010271		STC5506		
Q7	1010273		2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010327	TRANSFORMER	TZ-13		

NOTES:
1.-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2.-UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3.-UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4.-VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED IN 6 VALUES RANGING FROM .001 TO .0027 .

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 1-21-63
CHECKED
APPROVAL 2-6-63
APPROVAL
NASA APPROVAL 6-26-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
GIMBAL SERVO
AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010024
SCALE
WT
SHEET 1 OF 1

MASTER

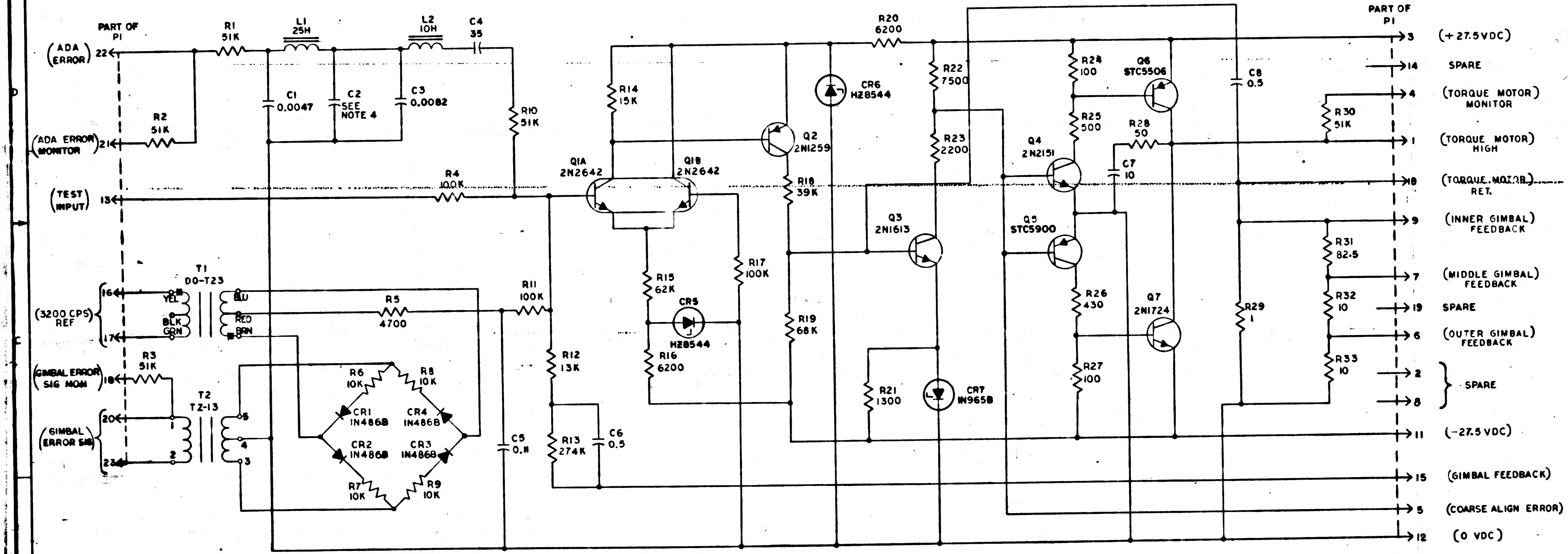
INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00353

Ⓜ

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00983	3 APR 63	M. K
B	REVISED PER TDRR 01448		J.JA.
C	REVISED PER TDRR 01448	6-6-63	A K.B


PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF
16
17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG)
20
23
R1 51K
R2 51K
R3 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R10 51K
R4 100K
T1 D0-T23
YEL
BLK
GRN
BLU
RED
BRN
R5 4700
T2 T2-13
1
2
5
4
3
R6 10K
R8 10K
CR1 1N486B
CR4 1N486B
CR2 1N486B
CR3 1N486B
R7 10K
R9 10K
C5 0.11
R11 100K
R12 13K
R13 274K
C6 0.5
R14 15K
Q1A 2N2642
Q1B 2N2642
R15 62K
CR5 HZ8544
R16 6200
R17 100K
Q2 2N1259
R18 39K
R19 68K
CR6 HZ8544
R20 6200
R22 7500
R23 2200
Q3 2N1613
R21 1300
CR7 1N965B
R24 100
Q6 STC5506
R25 500
Q4 2N2151
R28 50
C7 10
Q5 STC5900
R26 430
Q7 2N1724
R27 100
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
3 (+27.5VDC)
14 SPARE
4 (TORQUE MOTOR) MONITOR
1 (TORQUE MOTOR) HIGH
18 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
19 SPARE
6 (OUTER GIMBAL) FEEDBACK
2
8
SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73		51K		
R3	-73		51K		
R4	-80		100K		
R5	-48		4700		
R6	1010364-443		10K	±1%	1/8W
R7	-		10K	±1%	1/8W
R8	-		10K	±1%	1/8W
R9	-		10K	±1%	1/8W
R10	1006750-73		51K	±2%	1/4W
R11	1010364-635		100K	±1%	1/8W
R12	-465		13K		
R13	-719		274K		
R14	1006750-60		15K	±2%	1/4W
R15	-75		62K		
R16	-51		6200		
R17	-80		100K		
R18	-70		39K		
R19	-76		68K		
R20	-51		6200		
R21	1006760-35		1300		1/2W
R22	1006750-53		7500		1/4W
R23	1006750-40		2200		1/4W
R24	1010278-39		100	±5%	1/2W
R25	1010399-31		500	±5%	5W
R26	1010389-47		430	±1%	3W
R27	1010278-39		100	±5%	1/2W
R28	1010399-16		50	±5%	5W
R29	1010389-94		1	±1%	3W
R30	1006750-73		51K	±2%	1/4W
R31	1010364-43		82.5	±1%	1/8W
R32	1010377-66		10	±.5%	1/10W
R33	1010377-66		10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-		SEE NOTE 4		
C3	-12		.0082		
C4	1010320-11		35	+75,-15%	25VDC
C5	1010279-220		.11	±10%	35VDC
C6	1010279-009		0.5	±10%	6VDC
C7	1010320-6		10	+50,-15%	50VDC
C8	1010279-228		0.5	±10%	35VDC
L1	1010277-009	REACTOR	25H		
L2	1010277-008	REACTOR	10H		
CR1	1010392	DIODE	1N486B		250MW
CR2	1010392				
CR3	1010392				
CR4	1010392				
CR5	1010372-15		HZ8544		200MW
CR6	1010372-15		HZ8544		200MW
CR7	1010286-9		1N965B		400MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010396-001		2N1259		
Q3	1010270		2N1613		
Q4	1010269-1		2N2151		
Q5	1010437		STC5900		
Q6	1010271		STC5506		
Q7	1010273-1		2N1724		
T1	1010328	TRANSFORMER	D0-T23		
T2	1010327	TRANSFORMER	T2-13		

C2	
1010264-1	.001
-2	.0012
-3	.0015
-4	.0018
-5	.0022
-6	.0027

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN J. Bughan DATE 1-21-63
CHECKED
APPROVAL M. Kramer 2-6-63
APPROVAL
NASA APPROVAL
6-3-63
MIT APPROVAL W. 6-6-63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC GIMBAL SERVO AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010024
SCALE
WT
SHEET 1 OF 1

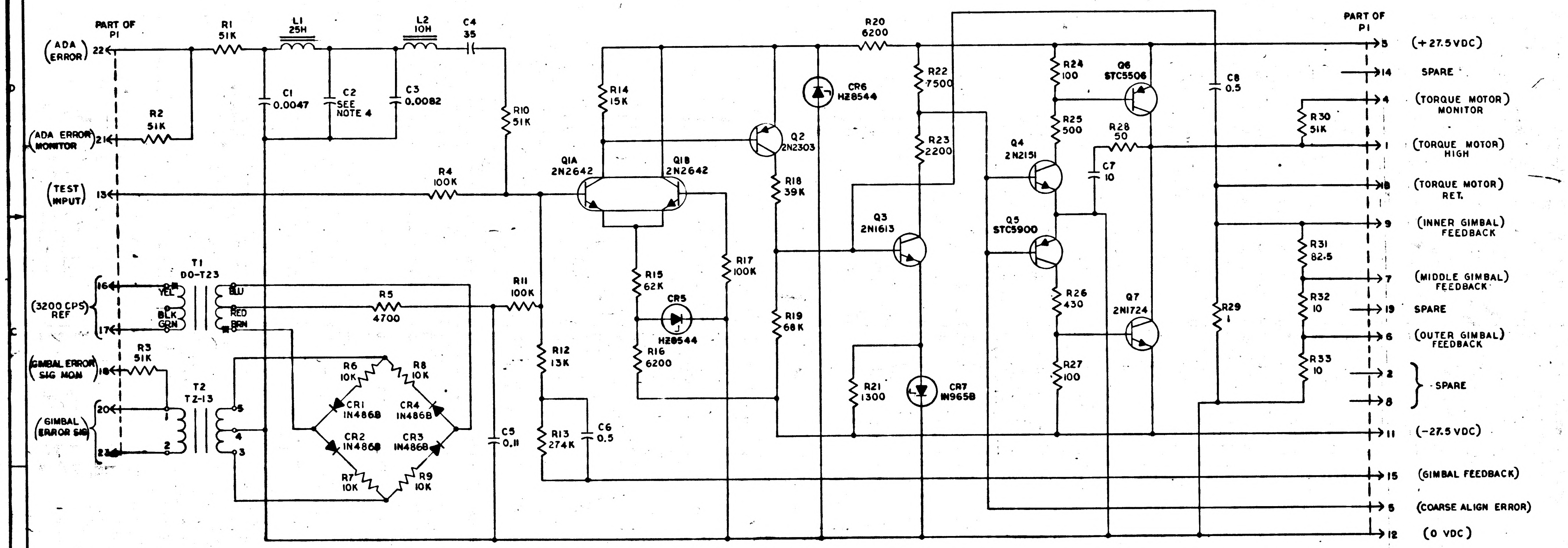
MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00358

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00983	8 MAR 63	M. KSM
B	REVISED PER TDRR 01448		J.J.M.
C	REVISED PER TDRR 01448	6-6-63	8A KB
D	REVISED PER TDRR 05327	2-9-63	


PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS REF) 16 17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20 23
R1 51K
R2 51K
R3 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R10 51K
R4 100K
T1 DO-T23
YEL
BLK
GRN
BLU
RED
BRN
R5 4700
T2 TZ-13
1 2 5 4 3
R6 10K
R8 10K
CR1 1N486B
CR4 1N486B
CR2 1N486B
CR3 1N486B
R7 10K
R9 10K
C5 0.11
R11 100K
R12 13K
R13 274K
C6 0.5
R14 15K
Q1A 2N2642
Q1B 2N2642
R15 62K
CR5 HZ8544
R16 6200
R17 100K
Q2 2N2303
R18 39K
R19 68K
R20 6200
CR6 HZ8544
R22 7500
R23 2200
Q3 2N1613
R21 1300
CR7 1N965B
R24 100
Q6 STC5506
R25 500
Q4 2N2151
R28 50
C7 10
Q5 STC5900
R26 430
R27 100
Q7 2N1724
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
3 (+27.5 VDC)
14 SPARE
4 (TORQUE MOTOR MONITOR)
1 (TORQUE MOTOR HIGH)
10 (TORQUE MOTOR RET.)
9 (INNER GIMBAL FEEDBACK)
7 (MIDDLE GIMBAL FEEDBACK)
19 SPARE
6 (OUTER GIMBAL FEEDBACK)
2
8
SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73		51K		
R3	-73		51K		
R4	-80		100K		
R5	-48		4700		
R6	1010364-443		10K	±1%	1/8W
R7	-		10K	±1%	1/8W
R8	-		10K	±1%	1/8W
R9	-		10K	±1%	1/8W
R10	1006750-73		51K	±2%	1/4W
R11	1010364-635		100K	±1%	1/8W
R12	-465		13K		
R13	-719		274K		
R14	1006750-60		15K	±2%	1/4W
R15	-75		62K		
R16	-51		6200		
R17	-80		100K		
R18	-70		39K		
R19	-76		68K		
R20	-51		6200		
R21	1006760-35		1300		1/2W
R22	1006750-53		7500		1/4W
R23	1006750-40		2200		1/4W
R24	1010278-39		100	±5%	1/2W
R25	1010399-31		500	±5%	5W
R26	1010389-47		430	±1%	3W
R27	1010278-39		100	±5%	1/2W
R28	1010399-16		50	±5%	5W
R29	1010389-94		1	±1%	3W
R30	1006750-73		51K	±2%	1/4W
R31	1010364-43		82.5	±1%	1/8W
R32	1010377-66		10	±.5%	1/10W
R33	1010377-66		10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-		SEE NOTE 4		
C3	-12		.0082		
C4	1010320-11		35	+75,-15%	25VDC
C5	1010279-220		.11	±10%	35VDC
C6	1010279-009		0.5	±10%	6VDC
C7	1010320-6		10	+50,-15%	50VDC
C8	1010279-228		0.5	±10%	35VDC
L1	1010277-009	REACTOR	25H		
L2	1010277-008	REACTOR	10H		
CR1	1010392	DIODE	IN486B		250MW
CR2	1010392				
CR3	1010392				
CR4	1010392				
CR5	1010372-15		HZ8544		200MW
CR6	1010372-15		HZ8544		200MW
CR7	1010286-9		IN965B		400MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010345		2N2303		
Q3	1010270		2N1613		
Q4	1010269-1		2N2151		
Q5	1010437		STC5900		
Q6	1010271		STC5506		
Q7	1010273-1		2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010327	TRANSFORMER	TZ-13		

C2	
1010264-1	.001
-2	.0012
-3	.0015
-4	.0018
-5	.0022
-6	.0027

NOTES:
1.-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2.-UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3.-UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4.-VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN J. Bughm DATE 1-21-63
CHECKED
APPROVAL M. Kramer 2-6-63
APPROVAL
NASA APPROVAL
6 Feb 63
MIT APPROVAL 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
GIMBAL SERVO
AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010024
SCALE
WT
SHEET 1 OF 1

1010024 - D

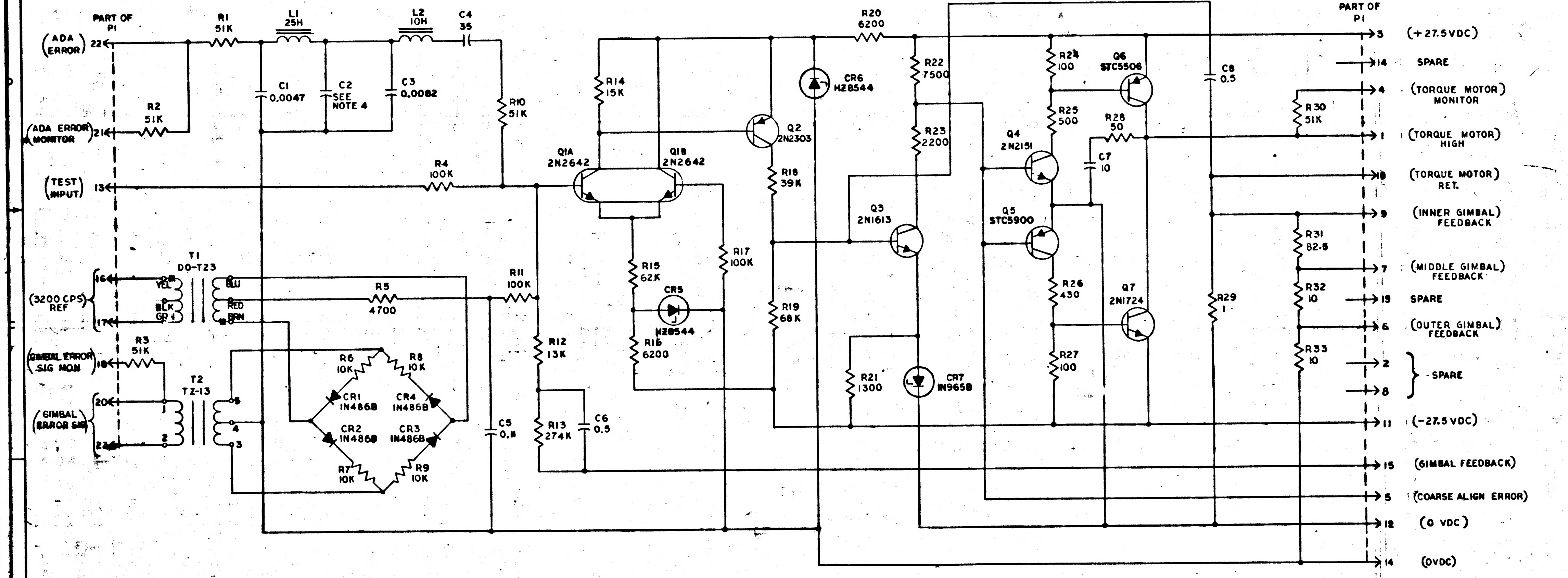
MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 80358

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00983	8 AR 63	M.
B	REVISED PER TDRR 01448		J.J.
C	REVISED PER TDRR 01448	6-6-63	8A R.B.
D	REVISED PER TDRR 05327	12-9-63	
E	REVISED PER TDRR 06271	64	


PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF 16 17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20 23
R1 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R2 51K
R10 51K
R4 100K
T1 DO-T23
YEL BLK GRN BLU RED BRN
R5 4700
R11 100K
R3 51K
T2 TZ-13
1 2 5 4 3
R6 10K
R8 10K
CR1 1N486B
CR4 1N486B
CR2 1N486B
CR3 1N486B
R7 10K
R9 10K
C5 0.11
R12 13K
R13 274K
C6 0.5
Q1A 2N2642
Q1B 2N2642
R14 15K
Q2 2N2303
R15 62K
CR5 HZ8544
R16 6200
R17 100K
R18 39K
R19 68K
R20 6200
CR6 HZ8544
R22 7500
R23 2200
Q3 2N1613
R21 1300
CR7 1N965B
R24 100
R25 500
Q4 2N2151
Q5 STC5900
Q6 STC5506
R28 50
C7 10
R26 430
Q7 2N1724
R27 100
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
3 (+27.5VDC)
14 SPARE
4 (TORQUE MOTOR) MONITOR
1 (TORQUE MOTOR) HIGH
10 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
19 SPARE
6 (OUTER GIMBAL) FEEDBACK
2 8 SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)
14 (0VDC)

REFDES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73		51K		
R3	-73		51K		
R4	-80		100K		
R5	-48		4700		
R6	1010364-443		10K	±1%	1/8W
R7	-		10K	±1%	1/8W
R8	-		10K	±1%	1/8W
R9	-		10K	±1%	1/8W
R10	1006750-73		51K	±2%	1/4W
R11	1010364-635		100K	±1%	1/8W
R12	-465		13K		
R13	-719		274K		
R14	1006750-60		15K	±2%	1/4W
R15	-75		62K		
R16	-51		6200		
R17	-80		100K		
R18	-70		39K		
R19	-76		68K		
R20	-51		6200		
R21	1006760-35		1300		1/2W
R22	1006750-53		7500		1/4W
R23	1006750-40		2200		1/4W
R24	1010278-39		100	±5%	1/2W
R25	1010399-31		500	±5%	5W
R26	1010389-47		430	±1%	3W
R27	1010278-39		100	±5%	1/2W
R28	1010399-16		50	±5%	5W
R29	1010389-94		1	±1%	3W
R30	1006750-73		51K	±2%	1/4W
R31	1010364-43		82.5	±1%	1/8W
R32	1010377-66		10	±.5%	1/10W
R33	1010377-66		10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-		SEE NOTE 4		
C3	-12		.0082		
C4	1010320-11		35	[illegible]	25VDC
C5	1010279-220		.11	±10%	35VDC
C6	1010279-009		0.5	±10%	6VDC
C7	1010320-6		10	+50-15%	50VDC
C8	1010279-228		0.5	±10%	35VDC
L1	1010277-009	REACTOR	25H		
L2	1010277-008	REACTOR	10H		
CR1	1010392	DIODE	1N486B		250MW
CR2	1010392				
CR3	1010392				
CR4	1010392				
CR5	1010372-15		HZ8544		200MW
CR6	1010372-15		HZ8544		200MW
CR7	1010286-9		1N965B		400MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010345		2N2303		
Q3	1010270		2N1613		
Q4	1010269-1		2N2151		
Q5	1010437		STC5900		
Q6	1010271		STC5506		
Q7	1010273-1		2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010327	TRANSFORMER	TZ-13		

C2	
1010264-1	.001
-2	.0012
-3	.0015
-4	.0018
-5	.0022
-6	.0027

NOTES:
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3-UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4-VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN J. Bugher DATE 1-21-63
CHECKED
APPROVAL M. Kramer 2-6-63
APPROVAL
NASA APPROVAL 6-3-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

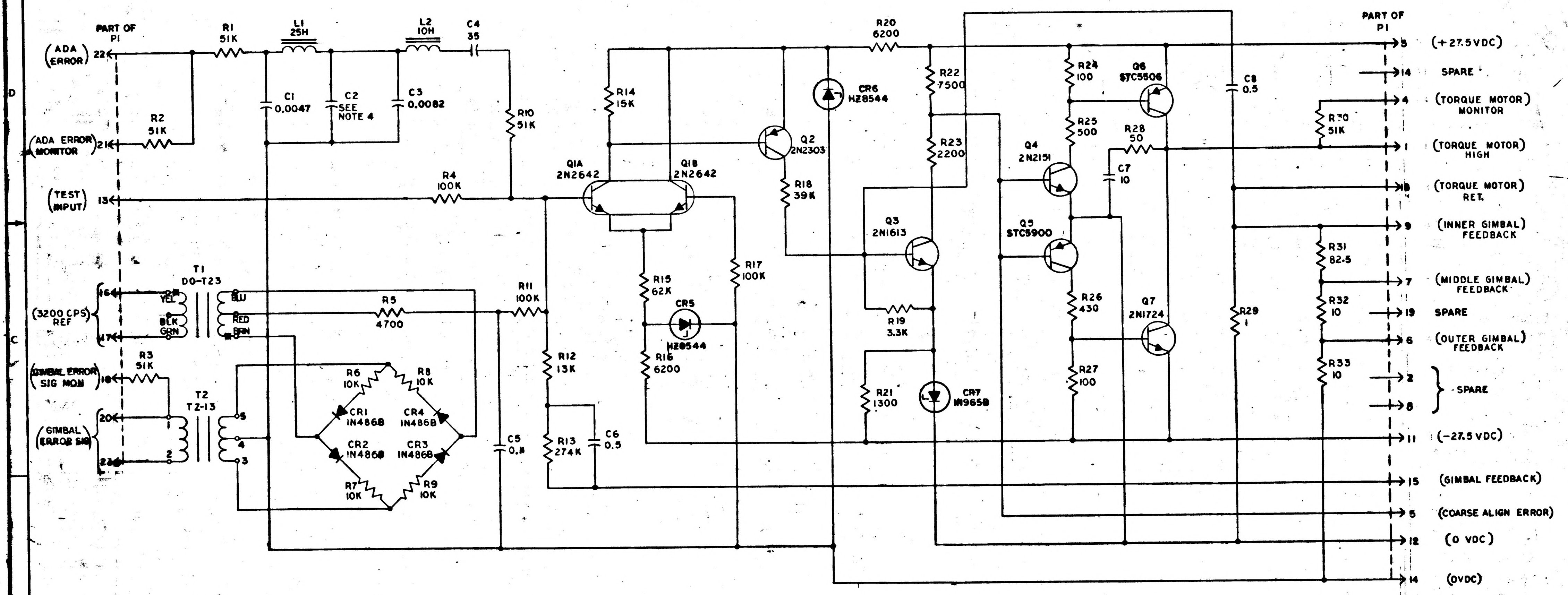
SCHEMATIC GIMBAL SERVO AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010024
SCALE
WT
SHEET 1 OF 1

1010024 F

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 80358		
A	REVISED PER TDRR 00983		
B	REVISED PER TDRR 01448		
C	REVISED PER TDRR 01448	6-6-63	K.B.
D	REVISED PER TDRR 05327	12-9-63	
E	REVISED PER TDRR 06271		
F	REVISED PER TDRR 06893		



PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF 16, 17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20, 23
R1 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R2 51K
R10 51K
R4 100K
T1 DO-T23
YEL
BLK
GRN
BLU
RED
BRN
R5 4700
R11 100K
R3 51K
T2 TZ-13
R6 10K
R8 10K
CR1 1N486B
CR4 1N486B
CR2 1N486B
CR3 1N486B
R7 10K
R9 10K
C5 0.11
R12 13K
R13 274K
C6 0.5
R14 15K
Q1A 2N2642
Q1B 2N2642
R15 62K
CR5 HZ8544
R16 6200
R17 100K
R20 6200
CR6 HZ8544
Q2 2N2303
R18 39K
R22 7500
R23 2200
Q3 2N1613
R19 3.3K
R21 1300
CR7 1N965B
R24 100
R25 500
Q4 2N2151
Q5 STC5900
R26 430
R27 100
Q6 STC5506
R28 50
C7 10
Q7 2N1724
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
5 (+27.5VDC)
14 SPARE
4 (TORQUE MOTOR) MONITOR
1 (TORQUE MOTOR) HIGH
10 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
19 SPARE
6 (OUTER GIMBAL) FEEDBACK
2
8
SPARE
11 (-27.5VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)
14 (0VDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73	↓	51K	↓	↓
R3	-73	↓	51K	↓	↓
R4	-80	↓	100K	↓	↓
R5	-48	↓	4700	↓	↓
R6	1010364-443	↓	10K	±1%	1/8W
R7	-	↓	10K	±1%	1/8W
R8	-	↓	10K	±1%	1/8W
R9	-	↓	10K	±1%	1/8W
R10	1006750-73	↓	51K	±2%	1/4W
R11	1010364-635	↓	100K	±1%	1/8W
R12	-465	↓	13K	↓	↓
R13	-719	↓	274K	↓	↓
R14	1006750-60	↓	15K	±2%	1/4W
R15	-75	↓	62K	↓	↓
R16	-51	↓	6200	↓	↓
R17	-80	↓	100K	↓	↓
R18	-70	↓	39K	↓	↓
R19	-44	↓	3.3K	↓	↓
R20	-51	↓	6200	↓	↓
R21	1006760-35	↓	1300	↓	1/2W
R22	1006750-53	↓	7500	↓	1/4W
R23	1006750-40	↓	2200	↓	1/4W
R24	1010278-39	↓	100	±5%	1/2W
R25	1010399-31	↓	500	±5%	5W
R26	1010389-47	↓	430	±1%	3W
R27	1010278-39	↓	100	±5%	1/2W
R28	1010399-16	↓	50	±5%	5W
R29	1010389-94	↓	1	±1%	3W
R30	1006750-73	↓	51K	±2%	1/4W
R31	1010364-43	↓	82.5	±1%	1/8W
R32	1010377-66	↓	10	±.5%	1/10W
R33	1010377-66	↓	10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-	↓	SEE NOTE 4	↓	↓
C3	-12	↓	[illegible]	↓	↓
C4	1010320-11	↓	35	[illegible]	25VDC
C5	1010279-220	↓	.11	±10%	35VDC
C6	101027[illegible]-009	↓	0.5	±10%	6VDC
C7	1010320-6	↓	10	[illegible]	50VDC
C8	1010279-228	↓	0.5	±10%	35VDC
L1	1010277-009	REACTOR	25H		
L2	1010277-008	REACTOR	10H		
CR1	1010392	DIODE	1N486B		250MW
CR2	1010392	↓	↓		↓
CR3	1010392	↓	↓		↓
CR4	1010392	↓	↓		↓
CR5	1010372-15	↓	HZ8544		200MW
CR6	1010372-15	↓	HZ8544		200MW
CR7	1010286-9	↓	1N965B		400MW
Q1	1010252-001	TRANSISTOR	2N2642		
Q2	1010345	↓	2N2303		
Q3	1010270	↓	2N1613		
Q4	1010269-1	↓	2N2151		
Q5	1010437	↓	STC5900		
Q6	1010271	↓	STC5506		
Q7	1010273-1	↓	2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010327	TRANSFORMER	TZ-13		

C2	
1010264-1	.001
-2	.0012
-3	.0015
-4	.0018
-5	.0022
-6	.0027

NOTES:

1.-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

2.-UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS

3.-UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

4.-VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN J. Bugham DATE 1-21-63
CHECKED
APPROVAL N. Kramer 2-6-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC GIMBAL SERVO AMPLIFIER

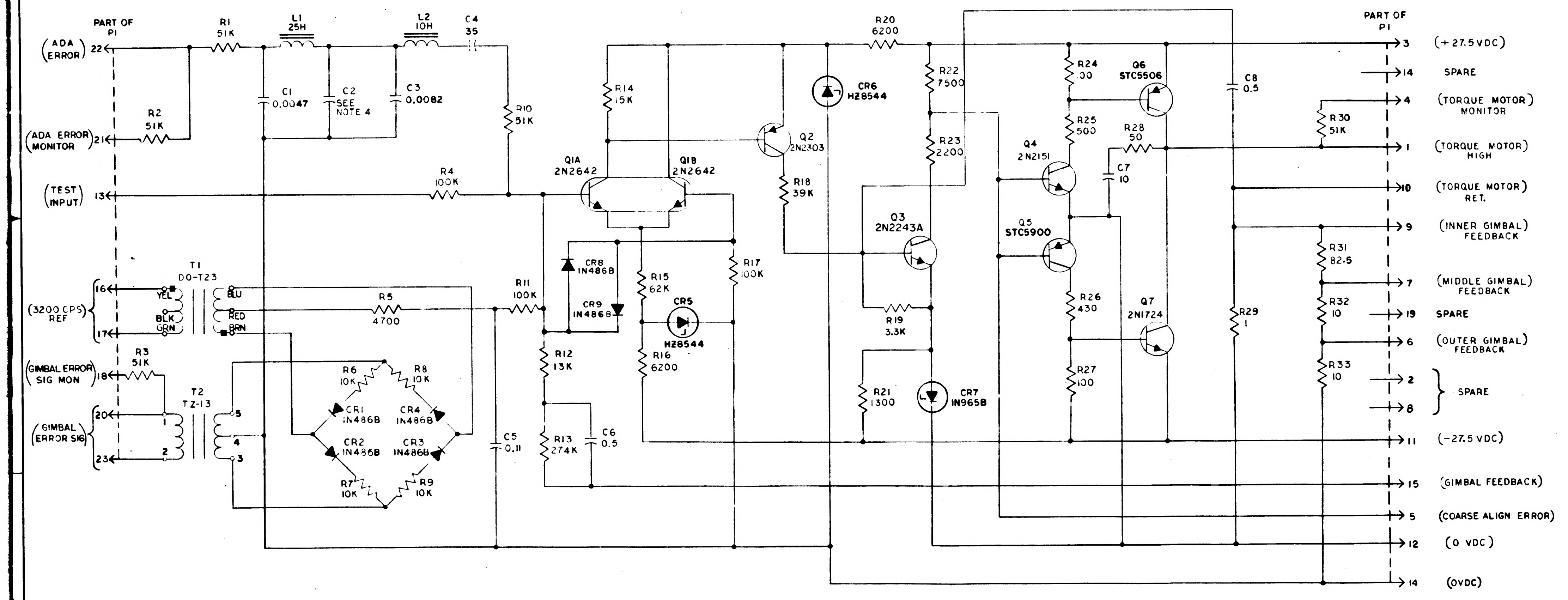
CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010024
SCALE | WT | SHEET 1 OF

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00353

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00983	8 APR 63	KUK
B	REVISED PER TDRR 01448		J.J.M.
C	REVISED PER TDRR 01448	6-6-63	PKB
D	REVISED PER TDRR 05327	12-9-63	
E	REVISED PER TDRR 06271		
F	REVISED PER TDRR 06893		
G	REVISED PER TDRR 11638	28 AUG 64	


PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF
16
17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG)
20
23
R1 51K
L1 25H
L2 10H
C4 35
R2 51K
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R10 51K
R4 100K
T1 DO-T23
YEL
BLK
GRN
BLU
RED
BRN
R5 4700
R3 51K
T2 TZ-13
1
2
5
4
3
R6 10K
R8 10K
CR1 IN486B
CR4 IN486B
CR2 IN486B
CR3 IN486B
R7 10K
R9 10K
C5 0.11
R11 100K
R12 13K
R13 274K
C6 0.5
Q1A 2N2642
Q1B 2N2642
R14 15K
CR8 IN486B
CR9 IN486B
R15 62K
CR5 HZ8544
R16 6200
R17 100K
Q2 2N2303
R18 39K
CR6 HZ8544
R20 6200
R22 7500
R23 2200
Q3 2N2243A
R19 3.3K
R21 1300
CR7 IN965B
R24 .00
R25 500
Q4 2N2151
Q5 STC5900
R26 430
R27 100
Q6 STC5506
R28 50
C7 10
Q7 2N1724
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
3 (+27.5VDC)
14 SPARE
4 (TORQUE MOTOR) MONITOR
1 (TORQUE MOTOR) HIGH
10 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
19 SPARE
6 (OUTER GIMBAL) FEEDBACK
2
8
SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)
14 (OVDC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	↓ -73	↓	51K	↓	↓
R3	↓ -73	↓	51K	↓	↓
R4	↓ -80	↓	100K	↓	↓
R5	↓ -48	↓	4700	↓	↓
R6	1010364-443	↓	10K	±1%	1/8W
R7	↓ - ↓	↓	10K	±1%	1/8W
R8	↓ - ↓	↓	10K	±1%	1/8W
R9	↓ - ↓	↓	10K	±1%	1/8W
R10	1006750-73	↓	51K	±2%	1/4W
R11	1010364-635	↓	100K	±1%	1/8W
R12	↓ -465	↓	13K	↓	↓
R13	↓ -719	↓	274K	↓	↓
R14	1006750-60	↓	15K	±2%	1/4W
R15	↓ -75	↓	62K	↓	↓
R16	↓ -51	↓	6200	↓	↓
R17	↓ -80	↓	100K	↓	↓
R18	↓ -70	↓	39K	↓	↓
R19	↓ -44	↓	3.3K	↓	↓
R20	↓ -51	↓	6200	↓	
R21	1006760-35	↓	1300	↓	1/2W
R22	1006750-53	↓	7500	↓	1/4W
R23	1006750-40	↓	2200	↓	1/4W
R24	1010278-39	↓	100	±5%	1/2W
R25	1010399-31	↓	500	±5%	5W
R26	1010389-47	↓	430	±1%	3W
R27	1010278-39	↓	100	±5%	1/2W
R28	1010399-16	↓	50	±5%	5W
R29	1010389-94	↓	1	±1%	3W
R30	1006750-73	↓	51K	±2%	1/4W
R31	1010364-43	↓	82.5	±1%	1/8W
R32	1010377-66	↓	10	±.5%	1/10W
R33	1010377-66	↓	10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	↓ -	↓	SEE NOTE 4	↓	↓
C3	↓ -12	↓	.0082	↓	↓
C4	1010320-11	↓	35	+75,-15%	25VDC
C5	1010279-220	↓	.11	±10%	35VDC
C6	1010279-9	↓	0.5	±10%	6VDC
C7	1010320-6	↓	10	+50,-15%	50VDC
C8	1010279-228	↓	0.5	±10%	35VDC
L1	1010277-9	REACTOR	25H		
L2	1010277-8	REACTOR	10H		
CR1	1010392-1	DIODE	IN486B		250MW
CR2	1010392-1	↓	↓		↓
CR3	1010392-1	↓	↓		↓
CR4	1010392-1	↓	↓		↓
CR5	1010372-15	↓	HZ8544		200MW
CR6	1010372-15	↓	HZ8544		200MW
CR7	1010286-9	↓	IN965B		400MW
CR8	1010392-1	↓	IN486B		250MW
CR9	1010392-1	↓	IN486B		250MW
Q1	1010252-1	TRANSISTOR	2N2642		
Q2	1010345-1	↓	2N2303		
Q3	1010270	↓	2N2243A		
Q4	1010269-1	↓	2N2151		
Q5	1010437	↓	STC5900		
Q6	1010271	↓	STC5506		
Q7	1010273-1	↓	2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010327	TRANSFORMER	TZ-13		

C2	
1010264-1	.001
-2	.0012
-3	.0015
-4	.0018
-5	.0022
↓ -6	.0027

NOTES:
1.-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2.-UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3.-UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4.-VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. Bugden DATE 1-21-63
CHECKED S. Shewczyk
APPROVAL M. Kramer 2-6-63
APPROVAL
NASA APPROVAL 6-3-63
MIT APPROVAL 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

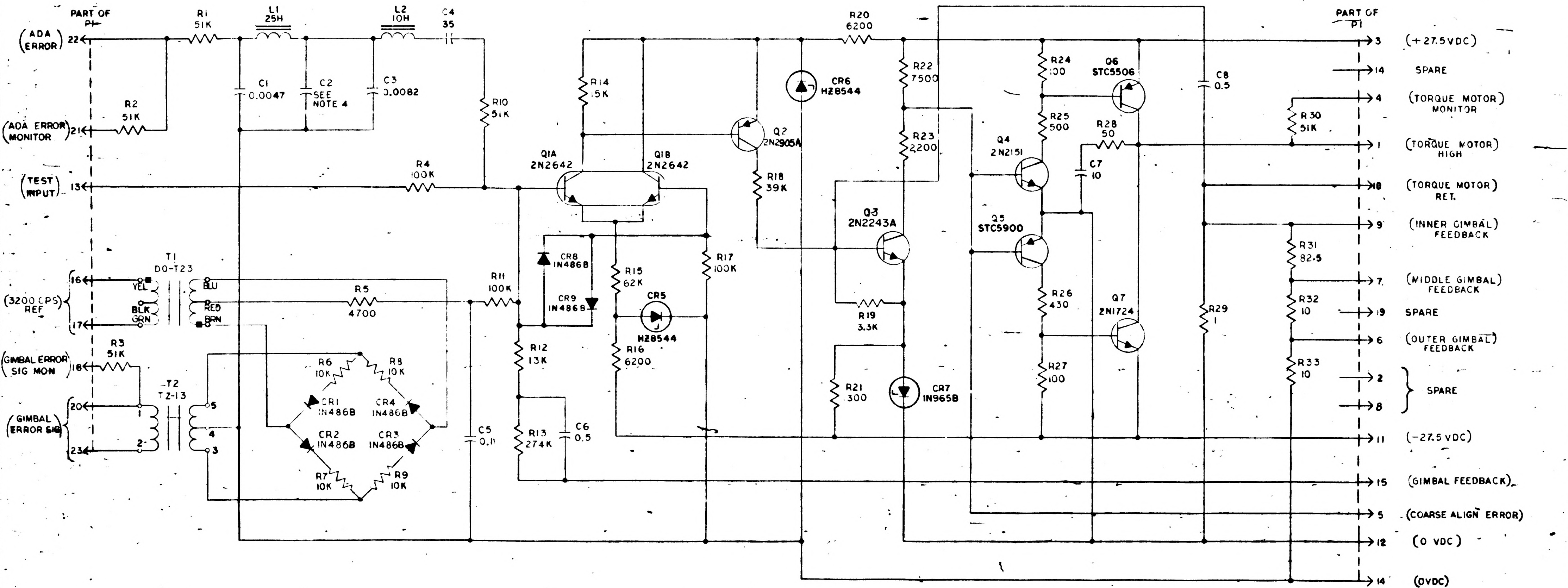
SCHEMATIC GIMBAL SERVO AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010024
SCALE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 80358

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00983	8 MAR 63	
B	REVISED PER TDRR 01448		J.J.H.
C	REVISED PER TDRR 01448	6-6-63	
D	REVISED PER TDRR 05327	12-9-63	
E	REVISED PER TDRR 06271		
F	REVISED PER TDRR 06893		
G	REVISED PER TDRR 11638	28 AUG 64	
H	REVISED PER TDRR 29751	28 JUN 68	


PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS REF) 16 17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20 23
R1 51K
R2 51K
R3 51K
L1 25H
L2 10H
C4 35
C1 0.0047
C2 SEE NOTE 4
C3 0.0082
R10 51K
R4 100K
T1 DO-T23
YEL BLK GRN BLU RED BRN
R5 4700
T2 TZ-13
1 2 5 4 3
R6 10K
R8 10K
CR1 1N486B
CR4 1N486B
CR2 1N486B
CR3 1N486B
R7 10K
R9 10K
C5 0.11
R11 100K
R12 13K
R13 274K
C6 0.5
R14 15K
Q1A 2N2642
Q1B 2N2642
CR8 1N486B
CR9 1N486B
R15 62K
CR5 HZ8544
R16 6200
R17 100K
Q2 2N2905A
R18 39K
R20 6200
CR6 HZ8544
R22 7500
R23 2200
Q3 2N2243A
R19 3.3K
R21 300
CR7 1N965B
R24 100
Q6 STC5506
R25 500
Q4 2N2151
R28 50
C7 10
Q5 STC5900
R26 430
Q7 2N1724
R27 100
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
3 (+27.5VDC)
14 SPARE
4 (TORQUE MOTOR MONITOR)
1 (TORQUE MOTOR HIGH)
18 (TORQUE MOTOR RET.)
9 (INNER GIMBAL FEEDBACK)
7 (MIDDLE GIMBAL FEEDBACK)
19 SPARE
6 (OUTER GIMBAL FEEDBACK)
2 8 SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
12 (0 VDC)
14 (0VDC)

REFDES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	±2%	1/4W
R2	-73		51K		
R3	-73		51K		
R4	-80		100K		
R5	-48		4700		
R6	1010364-443		10K	±1%	1/8 W
R7	-		10K	±1%	1/8 W
R8	-		10K	±1%	1/8 W
R9	-		10K	±1%	1/8 W
R10	1006750-73		51K	±2%	1/4W
R11	1010364-635		100K	±1%	1/8W
R12	-465		13K		
R13	-719		274K		
R14	1006750-60		15K	±2%	1/4W
R15	-75		62K		
R16	-51		6200		
R17	-80		100K		
R18	-70		39K		
R19	-44		3.3K		
R20	-51		6200		
R21	1006760-35		1300		1/2W
R22	1006750-53		7500		1/4W
R23	1006750-40		2200		1/4W
R24	1010278-39		100	±5%	1/2W
R25	1010399-31		500	±5%	5W
R26	1010389-47		430	±1%	3W
R27	1010278-39		100	±5%	1/2W
R28	1010399-16		50	±5%	5W
R29	1010389-94		1	±1%	3W
R30	1006750-73		51K	±2%	1/4W
R31	1010364-43		82.5	±1%	1/8W
R32	1010377-66		10	±.5%	1/10W
R33	1010377-66		10	±.5%	1/10W
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	-		SEE NOTE 4		
C3	-12		.0082		
C4	1010320-11		35	+75,-15%	25VDC
C5	1010279-220		.11	±10%	35VDC
C6	1010279-9		0.5	±10%	6VDC
C7	1010320-6		10	+50,-15%	50VDC
C8	1010279-228		0.5	±10%	35VDC
L1	1010277-9	REACTOR	25H		
L2	1010277-8	REACTOR	10H		
CR1	1010392-1	DIODE	1N486B		250MW
CR2	1010392-1				
CR3	1010392-1				
CR4	1010392-1				
CR5	1010372-15		HZ8544		200MW
CR6	1010372-15		HZ8544		200MW
CR7	1010286-9		1N965B		400MW
CR8	1010392-1		1N486B		250MW
CR9	1010392-1		1N486B		250MW
Q1	1010252-1	TRANSISTOR	2N2642		
Q2	1008813-1		2N2905A		
Q3	1010270		2N2243A		
Q4	1010269-1		2N2151		
Q5	1010437		STC5900		
Q6	1010271		STC5506		
Q7	1010273-1		2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010327	TRANSFORMER	TZ-13		

C2	
1010264-1	.001
-2	.0012
-3	.0015
-4	.0018
-5	.0022
-6	.0027

NOTES:

1- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2- UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3- UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4- VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED FROM TABLE

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. Brydon DATE 1-21-63
CHECKED
APPROVAL M. Bramer 2-6-63
APPROVAL
NASA APPROVAL 6-3-63
MIT APPROVAL

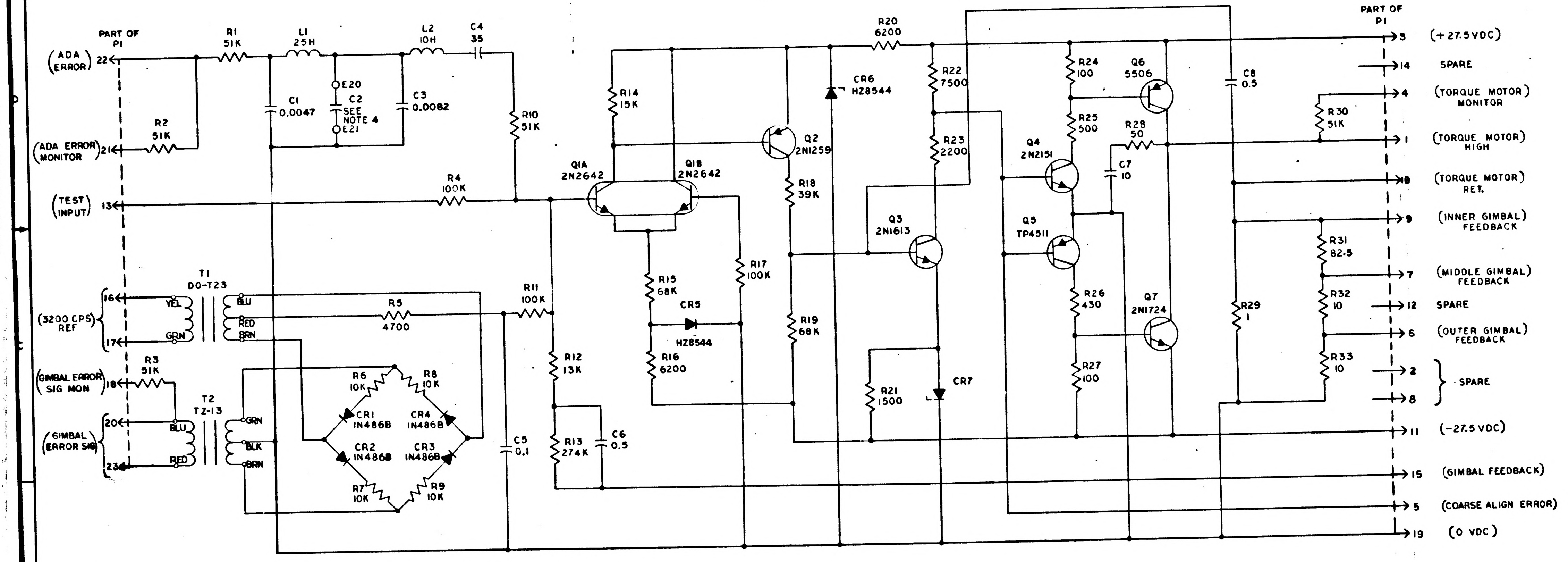
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC GIMBAL SERVO AMPLIFIER

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010024
SCALE
WT
SHEET 1 OF

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TORR 00353			
SYM	DESCRIPTION	DATE	APPROVAL


PART OF P1
(ADA ERROR) 22
(ADA ERROR MONITOR) 21
(TEST INPUT) 13
(3200 CPS) REF 16 17
(GIMBAL ERROR SIG MON) 18
(GIMBAL ERROR SIG) 20 23
R1 51K
L1 25H
L2 10H
C4 35
C1 0.0047
E20
C2 SEE NOTE 4
E21
C3 0.0082
R2 51K
R10 51K
R4 100K
T1 DO-T23
YEL
GRN
BLU
RED
BRN
R5 4700
R3 51K
T2 TZ-13
BLU
RED
GRN
BLK
BRN
R6 10K
R8 10K
CR1 IN486B
CR4 IN486B
CR2 IN486B
CR3 IN486B
R7 10K
R9 10K
C5 0.1
R11 100K
R12 13K
R13 274K
C6 0.5
Q1A 2N2642
Q1B 2N2642
R14 15K
R15 68K
CR5
HZ8544
R16 6200
R17 100K
Q2 2N1259
R18 39K
R19 68K
R20 6200
CR6 HZ8544
R22 7500
R23 2200
Q3 2N1613
R21 1500
CR7
R24 100
R25 500
Q4 2N2151
Q5 TP4511
Q6 5506
R28 50
C7 10
R26 430
R27 100
Q7 2N1724
C8 0.5
R29 1
R30 51K
R31 82.5
R32 10
R33 10
PART OF P1
3 (+27.5VDC)
14 SPARE
4 (TORQUE MOTOR) MONITOR
1 (TORQUE MOTOR) HIGH
10 (TORQUE MOTOR) RET.
9 (INNER GIMBAL) FEEDBACK
7 (MIDDLE GIMBAL) FEEDBACK
12 SPARE
6 (OUTER GIMBAL) FEEDBACK
2
8
SPARE
11 (-27.5 VDC)
15 (GIMBAL FEEDBACK)
5 (COARSE ALIGN ERROR)
19 (0 VDC)

REFDES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTOR	51K	5%	1/4W
R2	-73	↓	51K	↓	↓
R3	-73	↓	51K	↓	↓
R4	-80	↓	100K	↓	↓
R5	-48	↓	4700	↓	↓
R6	1010364-443	↓	10K	1%	1/8W
R7	-	↓	10K	1%	1/8W
R8	-	↓	10K	1%	1/8W
R9	-	↓	10K	1%	1/8W
R10	1006750-73	↓	51K	5%	1/4W
R11	1010364-635	↓	100K	1%	1/8W
R12	-465	↓	13K	↓	↓
R13	-719	↓	274K	↓	↓
R14	1006750-60	↓	15K	5%	1/4W
R15	-76	↓	68K	↓	↓
R16	-51	↓	6200	↓	↓
R17	-80	↓	100K	↓	↓
R18	-70	↓	39K	↓	↓
R19	-76	↓	68K	↓	↓
R20	-51	↓	6200	↓	
R21	1006760-36	↓	1500	↓	1/2W
R22	1006750-53	↓	7500	↓	1/4W
R23	1006750-40	↓	2200	↓	1/4W
R24	1010278-	↓	100	↓	1W
R25	1010389-	↓	500	1%	3W
R26	1010389-	↓	430	1%	3W
R27	1010278-	↓	100	5%	1W
R28	1010389-	↓	50	1%	3W
R29	1010389-	↓	1	1%	3W
R30	1006750-73	↓	51K	5%	1/4W
R31	1010364-43	↓	82.5	1%	1/8W
R32	1010377-66	↓	10	.5%	1/10W
R33	1010377-66	↓	10	.5%	1/10W
C1	1010264-	CAPACITOR	0.0047	10%	200VDC
C2	-	↓	SEE NOTE 4—		↓
C3	-	↓	.0082	10%	↓
C4	1010320-	↓	35	↓	35VDC
C5	1010279-	↓	.11	↓	50VDC
C6	1010279-	↓	0.5	↓	6VDC
C7	1010320-	↓	10	↓	50VDC
C8	1010279-	↓	0.5	↓	50VDC
L1	1010277-009	REACTOR	25H		
L2	1010277-008	REACTOR	10H		
CR1	1010392	DIODE	IN486-B		
CR2	1010392	↓	↓		
CR3	1010392	↓	↓		
CR4	1010392	↓	↓		
CR5	1010372-15	↓	HZ8544		
CR6	1010372-15	↓	HZ8544		
CR7	1010286-	↓			
Q1	1010252	TRANSISTOR	2N2642		
Q2	1010396	↓	2N1259		
Q3	1010270	↓	2N1613		
Q4	1010269	↓	2N2151		
Q5	1010272	↓	TP4511		
Q6	1010271	↓	5506		
Q7	1010273	↓	2N1724		
T1	1010328	TRANSFORMER	DO-T23		
T2	1010327	TRANSFORMER	TZ-13		

NOTES:

1- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2- UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3- UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4- VALUE TO BE DETERMINED BY ELECTRICAL TEST. COMPONENT TO BE SUPPLIED IN 6 VALUES RANGING FROM .001 TO .0027 .

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 1-2-63
CHECKED
APPROVAL 2-6-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

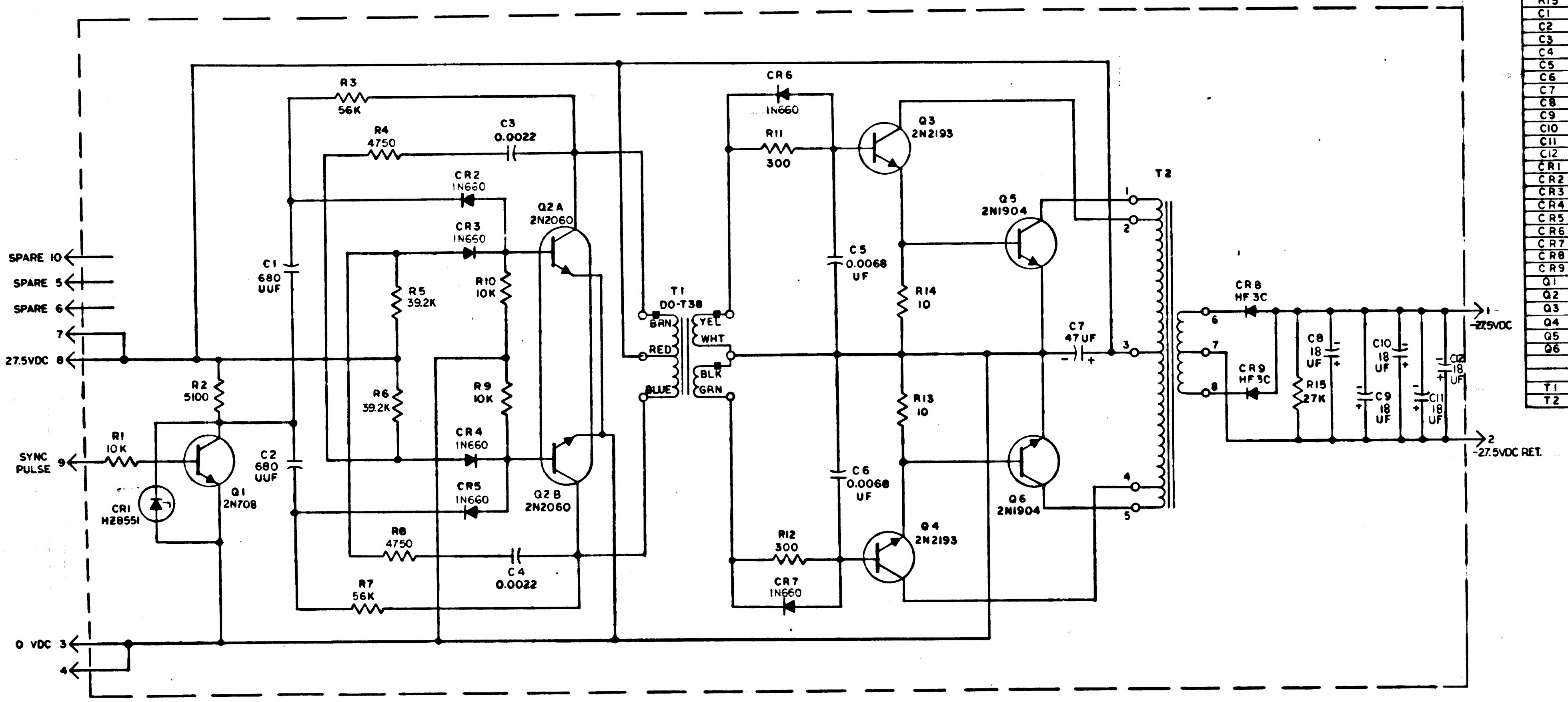
SCHEMATIC GIMBAL SERVO AMPLIFIER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010024
SCALE WT SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00255

SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED PER TDRR 00883		



SPARE 10
SPARE 5
SPARE 6
7
27.5VDC 8
SYNC PULSE 9
0 VDC 3
4
R1 10K
CR1 HZ8551
Q1 2N708
R2 5100
R3 56K
R4 4750
C3 0.0022
CR2 1N660
CR3 1N660
Q2A 2N2060
C1 680 UUF
R5 39.2K
R10 10K
R6 39.2K
R9 10K
C2 680 UUF
CR4 1N660
CR5 1N660
Q2B 2N2060
R8 4750
C4 0.0022
R7 56K
T1 DO-T38
BRN
RED
BLUE
YEL
WHT
BLK
GRN
CR6 1N660
R11 300
Q3 2N2193
C5 0.0068 UF
C6 0.0068 UF
R12 300
CR7 1N660
Q4 2N2193
Q5 2N1904
R14 10
R13 10
Q6 2N1904
C7 47UF
T2
1
2
3
4
5
6
7
8
CR8 HF3C
CR9 HF3C
C8 18 UF
C9 18 UF
C10 18 UF
C11 18 UF
C12 18 UF
R15 27K
1 -27.5VDC
2 -27.5VDC RET.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	±2%	1/4W
R2	-49		5100		
R3	-74		56K		
R4	1010364-381		4750	±1%	1/8W
R5	1010363-557		39.2K		1/4W
R6	1010363-557		39.2K		
R7	1006750-74		56K	±2%	
R8	1010364-381		4750	±1%	1/8W
R9	1006750-56		10K	±2%	1/4W
R10	-56		10K		
R11	-19		300		
R12	-19		300		
R13	1010369-141		10	±5%	1/8W
R14	1010369-141		10	±5%	1/8W
R15	1006750-66		27K	±2%	1/4W
C1	1010410-13	CAPACITOR	680UUF	±2%	300VDC
C2	1010410-13		680UUF	±2%	300VDC
C3	1010316-40		0.0022	±1%	200VDC
C4	1010316-40		0.0022	±1%	200VDC
C5	1006777-30		0.0068	±10%	100VDC
C6	1006777-30		0.0068		100VDC
C7	1006789-002		47		50VDC
C8	1010438		18		
C9			18		
C10			18		
C11			18		
C12			18		
CR1	1010372-22	DIODE	HZ8551	±5%	200MW
CR2	1010385		1N660		250MW
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010322-001		HF3C		
CR9	1010322-001		HF3C		
Q1	1006752	TRANSISTOR	2N708		
Q2	1010376-4		2N2060		
Q3	1010398-3		2N2193		
Q4	1010398-3		2N2193		
Q5	1010319		2N1904		
Q6	1010319		2N1904		
T1	1010323	TRANSFORMER	DO-T38		
T2	1010339				

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN A. D. Lee DATE 21NOV63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 11/1/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY
-28VDC

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010025
SCALE
WT
SHEET OF

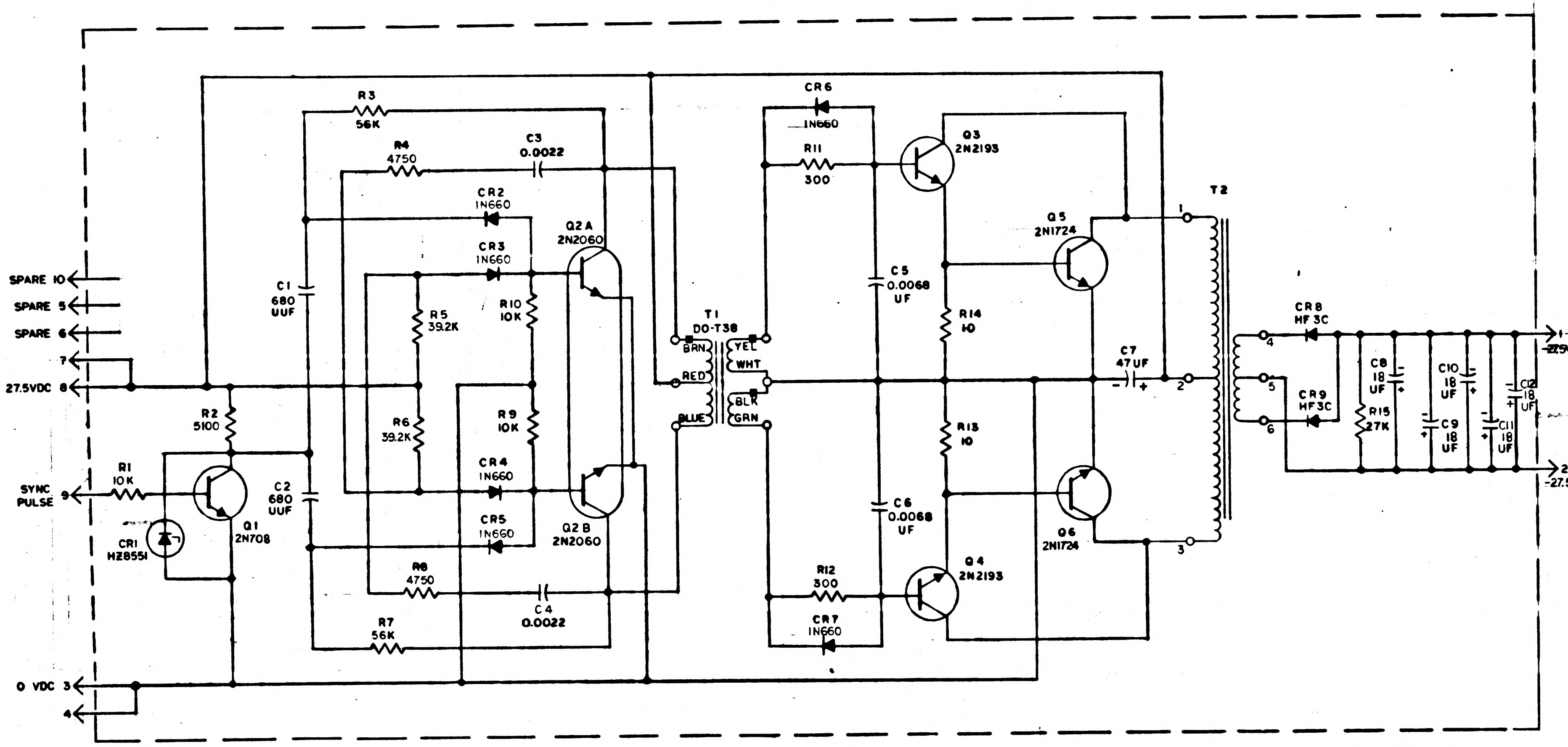
1010025

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00255

SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED PER TDRR 00883		
B	CHANGED PER TDRR 01543	2 JUN 68	



SPARE 10
SPARE 5
SPARE 6
7
27.5VDC 8
SYNC PULSE 9
0 VDC 3
4
R1 10K
CR1 HZ8551
Q1 2N708
R2 5100
C1 680 UUF
C2 680 UUF
R3 56K
R4 4750
C3 0.0022
CR2 1N660
CR3 1N660
R5 39.2K
R6 39.2K
R10 10K
R9 10K
CR4 1N660
CR5 1N660
Q2A 2N2060
Q2B 2N2060
R8 4750
C4 0.0022
R7 56K
T1 DO-T38
BRN
RED
BLUE
YEL
WHT
BLK
GRN
CR6 1N660
R11 300
C5 0.0068 UF
C6 0.0068 UF
R12 300
CR7 1N660
Q3 2N2193
Q4 2N2193
R14 10
R13 10
Q5 2N1724
Q6 2N1724
C7 47UF
T2
1
2
3
4
5
6
CR8 HF3C
CR9 HF3C
C8 18 UF
R15 27K
C9 18 UF
C10 18 UF
C11 18 UF
C12 18 UF
1 -27.5VDC
2 -27.5VDC RET.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	±2%	1/4W
R2	-49		5100		
R3	-74		56K		
R4	1010364-381		4750	±1%	1/8W
R5	1010363-557		39.2K		1/4W
R6	1010363-557		39.2K		
R7	1006750-74		56K	±2%	
R8	1010364-381		4750	±1%	1/8W
R9	1006750-56		10K	±2%	1/4W
R10	-56		10K		
R11	-19		300		
R12	-19		300		
R13	1010369-141		10	±5%	1/8W
R14	1010369-141		10	±5%	1/8W
R15	1006750-66		27K	±2%	1/4W
C1	1010410-13	CAPACITOR	680UUF	±2%	300VDC
C2	1010410-13		680UUF	±2%	300VDC
C3	1010316-40		0.0022	±1%	200VDC
C4	1010316-40		0.0022	±1%	200VDC
C5	1006777-30		0.0068	±10%	100VDC
C6	1006777-30		0.0068		100VDC
C7	1006789-002		47		50VDC
C8	1010438-1		18		
C9			18		
C10			18		
C11			18		
C12			18		
CR1	1010372-[illegible]	DIODE	HZ8551	±5%	200MW
CR2	1010385		1N660		250MW
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010322-001		HF3C		
CR9	1010322-001		HF3C		
Q1	1006752	TRANSISTOR	2N708		
Q2	1010376-4		2N2060		
Q3	1010398-2		2N2193		
Q4	1010398-2		2N2193		
Q5	1010273-2		2N1724		
Q6			2N1724		
T1	1010325	TRANSFORMER	DO-T38		
T2	1010339				

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY
-28VDC

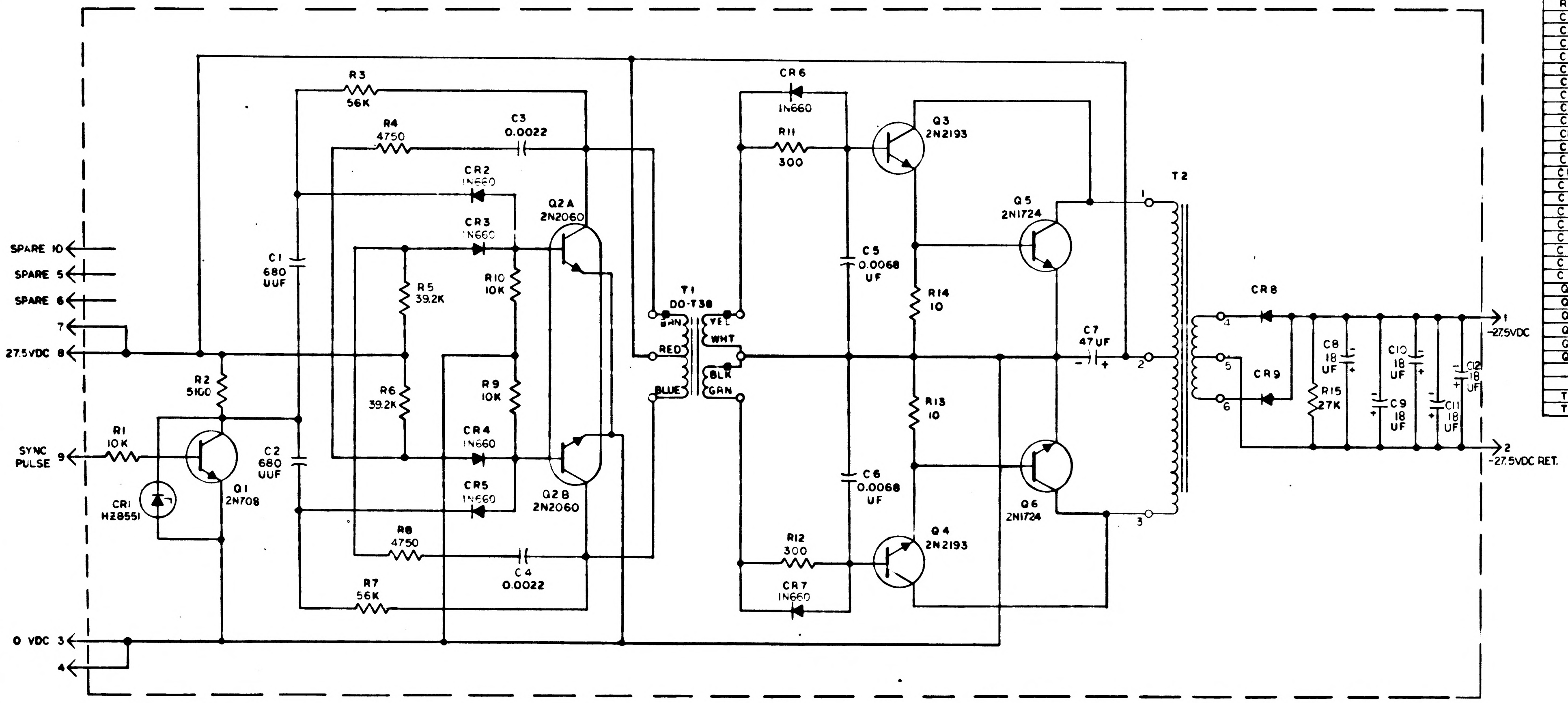
CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010025

SCALE WT SHEET OF

1010025

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS		TDRR 00255	
SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED PER TDRR 00883		M. K. W.K.
B	CHANGED PER TDRR 01543		M.K.
C	REVISED PER TDRR 18099	12 APR -5	HTO



SPARE 10
SPARE 5
SPARE 6
7
27.5VDC 8
SYNC PULSE 9
0 VDC 3
4
R1 10K
CR1 HZ8551
Q1 2N708
R2 5100
C1 680 UUF
C2 680 UUF
R3 56K
R4 4750
C3 0.0022
CR2 1N660
CR3 1N660
R5 39.2K
R6 39.2K
R10 10K
R9 10K
Q2A 2N2060
Q2B 2N2060
CR4 1N660
CR5 1N660
R8 4750
C4 0.0022
R7 56K
T1 DO-T38
BRN
RED
BLUE
YEL
WHT
BLK
GRN
CR6 1N660
R11 300
Q3 2N2193
C5 0.0068 UF
R14 10
R13 10
C6 0.0068 UF
R12 300
CR7 1N660
Q4 2N2193
Q5 2N1724
Q6 2N1724
C7 47UF
T2
1
2
3
4
5
6
CR8
CR9
C8 18 UF
R15 27K
C9 18 UF
C10 18 UF
C11 18 UF
C12 18 UF
1 -27.5VDC
2 -27.5VDC RET.

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	± 2%	1/4W
R2	-49		5100		
R3	↓ -74		56K	↓	↓
R4	1010364-381		4750	± 1%	1/8W
R5	1010363-557		39.2K		1/4W
R6	1010363-557		39.2K	↓	
R7	1006750-74		56K	±2%	↓
R8	1010364-381		4750	± 1%	1/8W
R9	1006750-56		10K	±2%	1/4W
R10	-56		10K		
R11	-19		300		
R12	↓ -19		300	↓	↓
R13	1010369-141		10	± 5%	1/8W
R14	1010369-141		10	± 5%	1/8W
R15	1006750-66	↓	27K	± 2%	1/4W
C1	1010410-13	CAPACITOR	680UUF	± 2%	300VDC
C2	1010410-13		680UUF	± 2%	300VDC
C3	1010316-40		0.0022	± 1%	200VDC
C4	1010316-40		0.0022	± 1%	200VDC
C5	1006777-30		0.0068	±10%	100VDC
C6	1006777-30		0.0068		100VDC
C7	1006789-002		47		50VDC
C8	1010438-1		18		
C9			18		
C10			18		
C11			18		
C12	↓	↓	8	↓	↓
CR1	1010372-22	DIODE	HZ8551	± 5%	200MW
CR2	1010385		1N660		250MW
CR3					
CR4					
CR5					
CR6					
CR7	↓		↓		↓
CR8	1010777-1				
CR9	1010777-1	↓			
Q1	1006752	TRANSISTOR	2N708		
Q2	1010376-4		2N2060		
Q3	1010398-2		2N2193		
Q4	1010398-2		2N2193		
Q5	1010273-2		2N1724		
Q6		↓	2N1724		
T1	1010323	TRANSFORMER	DO-T38		
T2	1010339	↓			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN A. D. Lee DATE 21NOV
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 11/16/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

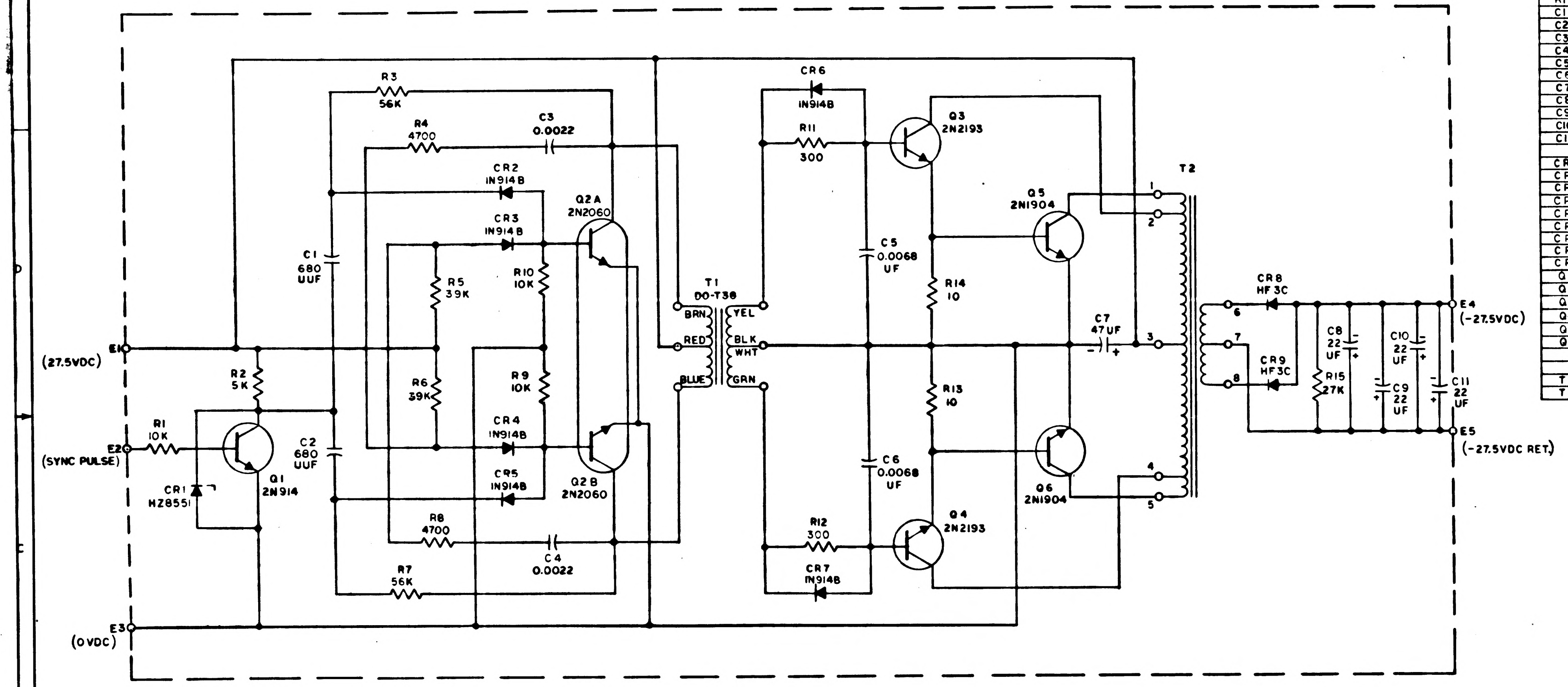
SCHEMATIC,
POWER SUPPLY
-28VDC

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010025
SCALE
WT
SHEET OF

1010025 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00255			
SYM	DESCRIPTION	DATE	APPROVAL


E1
(27.5VDC)
E2
(SYNC PULSE)
E3
(0VDC)
R1
10K
R2
5K
CR1
HZ8551
Q1
2N914
C1
680
UUF
C2
680
UUF
R3
56K
R4
4700
C3
0.0022
CR2
1N914B
CR3
1N914B
Q2A
2N2060
R5
39K
R10
10K
R6
39K
R9
10K
CR4
1N914B
CR5
1N914B
Q2B
2N2060
R8
4700
C4
0.0022
R7
56K
T1
DO-T38
BRN
RED
BLUE
YEL
BLK
WHT
GRN
CR6
1N914B
R11
300
C5
0.0068
UF
C6
0.0068
UF
R12
300
CR7
1N914B
Q3
2N2193
Q4
2N2193
R14
10
R13
10
Q5
2N1904
Q6
2N1904
C7
47UF
T2
1
2
3
4
5
6
7
8
CR8
HF3C
CR9
HF3C
C8
22
UF
R15
27K
C9
22
UF
C10
22
UF
C11
22
UF
E4
(-27.5VDC)
E5
(-27.5VDC RET.)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1		RESISTOR	10K	±5%	1/4W
R2			5K		
R3			56K	↓	
R4			4700	±1%	
R5			39K		
R6			39K	↓	
R7			56K	±5%	
R8			4700	±1%	
R9			10K	±5%	
R10			10K		
R11			300		
R12			300		
R13			10		
R14			10		
R15		↓	27K	↓	↓
C1		CAPACITOR	680UUF	±5%	
C2			680UUF	±5%	
C3			0.0022	±1%	200V
C4			0.0022	±1%	200V
C5			0.0068	±10%	100V
C6			0.0068		100V
C7			47		35V
C8			22		
C9			22		
C10			22		
C11		↓	22	↓	↓
CR1		DIODE			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9		↓			
Q1		TRANSISTOR			
Q2					
Q3					
Q4					
Q5					
Q6		↓			
T1		TRANSFORMER			
T2		↓			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN A. D. Lee DATE 21NOV
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 11/26/63
MIT APPROVAL D. Hoag

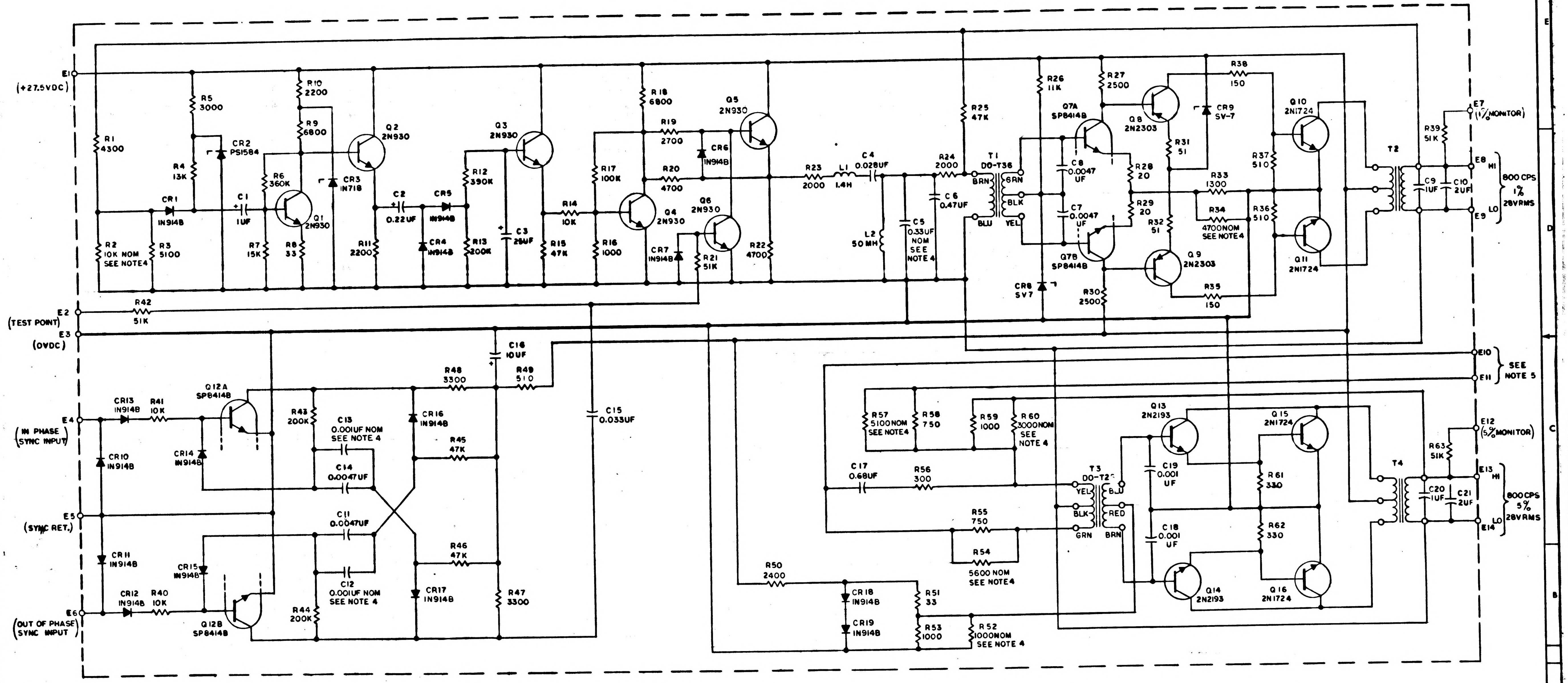
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, POWER SUPPLY -28VDC

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010025
SCALE
WT
SHEET OF

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

SYM	DESCRIPTION	DATE	APPROVAL
TDRR 00303	REVISIONS 30 JAN 1963		


E1
(+27.5VDC)
R1
4300
R5
3000
R4
13K
CR2
PS1584
CR1
IN914B
C1
1UF
R2
10K NOM
SEE NOTE 4
R3
5100
R6
360K
R7
15K
R8
33
Q1
2N930
R10
2200
R9
6800
CR3
IN718
Q2
2N930
R11
2200
C2
0.22UF
CR5
IN914B
CR4
IN914B
R12
390K
R13
200K
C3
25UF
Q3
2N930
R15
47K
R14
10K
R17
100K
R16
1000
R18
6800
R19
2700
R20
4700
CR6
IN914B
Q4
2N930
CR7
IN914B
R21
51K
Q5
2N930
Q6
2N930
R22
4700
R23
2000
L1
1.4H
C4
0.028UF
L2
50MH
C5
0.33UF
NOM
SEE
NOTE 4
R24
2000
C6
0.47UF
R25
47K
T1
DO-T36
BRN
GRN
BLK
YEL
BLU
R26
11K
R27
2500
Q7A
SP8414B
C8
0.0047
UF
C7
0.0047
UF
Q7B
SP8414B
CR8
SV7
R30
2500
Q8
2N2303
CR9
SV-7
R31
51
R28
20
R29
20
R32
51
Q9
2N2303
R33
1300
R34
4700NOM
SEE NOTE 4
R38
150
R35
150
R37
510
R36
510
Q10
2N1724
Q11
2N1724
T2
C9
1UF
C10
2UF
R39
51K
E7
(1% MONITOR)
E8
HI
E9
LO
800 CPS
1%
28VRMS
E2
(TEST POINT)
R42
51K
E3
(OVDC)
C16
10UF
R48
3300
R49
510
C15
0.033UF
E4
(IN PHASE
SYNC INPUT)
CR13
IN914B
R41
10K
Q12A
SP8414B
CR14
IN914B
CR10
IN914B
R43
200K
C13
0.001UF NOM
SEE NOTE 4
C14
0.0047UF
CR16
IN914B
R45
47K
E5
(SYNC RET.)
C11
0.0047UF
C12
0.001UF NOM
SEE NOTE 4
R46
47K
CR11
IN914B
CR15
IN914B
CR17
IN914B
R47
3300
E6
(OUT OF PHASE
SYNC INPUT)
CR12
IN914B
R40
10K
Q12B
SP8414B
R44
200K
E10
E11
SEE
NOTE 5
R57
5100NOM
SEE NOTE4
R58
750
R59
1000
R60
3000NOM
SEE
NOTE 4
C17
0.68UF
R56
300
T3
DO-T2
YEL
BLU
BLK
RED
GRN
BRN
R55
750
R54
5600 NOM
SEE NOTE4
Q13
2N2193
C19
0.001
UF
C18
0.001
UF
Q14
2N2193
Q15
2N1724
R61
330
R62
330
Q16
2N1724
T4
C20
1UF
C21
2UF
R63
51K
E12
(5% MONITOR)
E13
HI
E14
LO
800CPS
5%
28VRMS
R50
2400
CR18
IN914B
CR19
IN914B
R51
33
R53
1000
R52
1000NOM
SEE NOTE 4

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PERSCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST
5. CONNECT E8 TO E10 FOR CDU AND E8 TO E11 FOR SEXTANT CONNECTIONS TO BE MADE IN THE CONNECTOR
6. CONNECT 800 CPS LO TO OVDC AT ONE POINT ONLY AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN A. De Leo DATE 2-14-62
CHECKED Manuel Kramer 11 Jan 63
APPROVAL Manuel Kramer 11 Jan 63
APPROVAL
NASA APPROVAL William J. Rhine 1-30-63
MIT APPROVAL W. Hopps 30 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

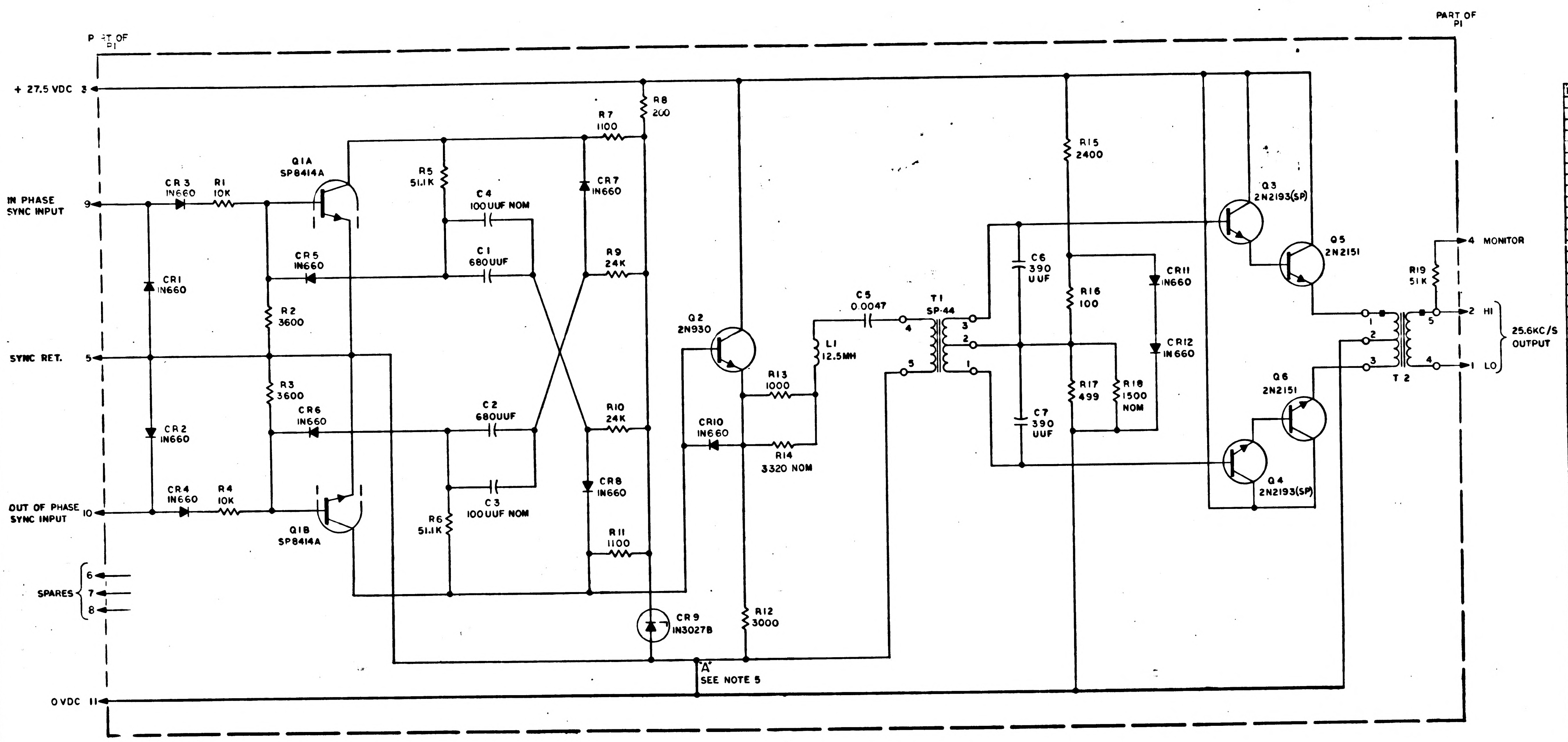
SCHEMATIC,
POWER SUPPLY, 800 CPS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010027
SCALE
WT
SHEET 1 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TDRR 00664

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED PER TDRR 00543	68	WR


PART OF P1
+ 27.5 VDC 3
IN PHASE SYNC INPUT 9
SYNC RET. 5
OUT OF PHASE SYNC INPUT 10
SPARES 6 7 8
0 VDC 11
CR3 IN660
R1 10K
CR4 IN660
R4 10K
CR1 IN660
CR2 IN660
Q1A SP8414A
Q1B SP8414A
CR5 IN660
CR6 IN660
R2 3600
R3 3600
R5 51.1K
R6 51.1K
C4 100UUF NOM
C1 680UUF
C2 680UUF
C3 100UUF NOM
R7 1100
R8 200
CR7 IN660
R9 24K
R10 24K
CR8 IN660
R11 1100
CR9 IN3027B
Q2 2N930
CR10 IN660
R13 1000
R14 3320 NOM
R12 3000
'A' SEE NOTE 5
L1 12.5MH
C5 0.0047
T1 SP-44
4 5 3 2 1
C6 390 UUF
C7 390 UUF
R15 2400
R16 100
R17 499
R18 1500 NOM
CR11 IN660
CR12 IN660
Q3 2N2193(SP)
Q4 2N2193(SP)
Q5 2N2151
Q6 2N2151
R19 51K
T2
1 2 3 4 5
PART OF P1
4 MONITOR
2 HI
1 LO
25.6KC/S OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	± 2%	1/4 W
R2	1006750-45		3600		
R3	1006750-45		3600		
R4	1006750-56		10K	↓	↓
R5	1010364-579		51.1K	± 1%	1/8 W
R6	1010364-579		51.1K	± 1%	1/8 W
R7	1006760-33		1100	± 2%	1/2 W
R8	1010312-022		200	± 5%	2W
R9	1006750-65		24K	± 2%	1/4 W
R10	1006750-65		24K		1/4 W
R11	1006760-33		1100		1/2 W
R12	1006750-43		3000	↓	1/4 W
R13	1010364-251		1000	± 1%	1/8 W
R14	1010364		SEE NOTE 4	± 1%	1/8 W
R15	1010278-72		2400	± 5%	1/2W
R16	1006750-8		100	± 2%	1/4 W
R17	1010364-193		499	± 1%	1/8 W
R18	1010364		SEE NOTE 4	± 1%	1/8 W
R19	1006750-73	↓	51K	± 2%	1/4 W
C1	1010410-13	CAPACITOR	680UUF	± 2%	300V
C2	1010410-13		680UUF		300V
C3	1010409		SEE NOTE 4		
C4	1010409		SEE NOTE 4		
C5	1006793-023		0.0047		300V
C6	1010410-7		390 UUF	↓	500V
C7	1010410-7	↓	390 UUF	± 2%	500V
L1	1010309-4	COIL	12.5MH		
CR1	1010385	DIODE	IN660		
CR2					
CR3					
CR4					
CR5					
CR6					
CR7			↓		
CR8	↓		IN660		
CR9	1010265-12		IN3027B		
CR10	1010385		IN660		
CR11					
CR12	↓	↓	↓		
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010397		2N930		
Q3	1010398-002		2N2193(SP)		
Q4	1010398-002		2N2193(SP)		
Q5	1010269-1		2N2151		
Q6	1010269-1	↓	2N2151		
T1	1010291-2	TRANSFORMER	SP-44		
T2	1010422	↓			

R14		R18		C3 AND C4-uuf	
1010364-295	1690	1010364-227	750	1010409-18	51
↑ -299	1780	↑ -231	787	↑ -19	56
-303	1870	-237	845	-20	62
-307	1960	-241	887	-21	68
-313	2100	-245	931	-22	75
-317	2210	-249	976	-23	82
-321	2320	-255	1050	-24	91
-325	2430	-259	1100	-25	100
-329	2550	-263	1150	-26	110
-333	2670	-267	1210	-27	120
-339	2870	-271	1270	-28	130
-343	3010	-277	1370	-29	150
-347	3160	-281	1430	-30	160
-351	3320	-285	1500	↓ -31	180
-355	3480	-289	1580	1010409-32	200
-359	3650	-293	1650		
-363	3830	-297	1740		
-367	4020	-301	1820		
-371	4220	-305	1910		
-375	4420	-309	2000		
-379	4640	-313	2100		
↓ -383	4870	↓ -317	2210		
1010364-387	5110	1010364-321	2320		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. THE VALUE OF R14, R18, C3 & C4 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT POINT 'A' TO OVDC AT ONE POINT ONLY AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE
CHECKED M. Kramer 25 Mar 63
APPROVAL M. Kramer 26 Mar 63
APPROVAL
NASA APPROVAL 5-27-63
MIT APPROVAL 27 Mar 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

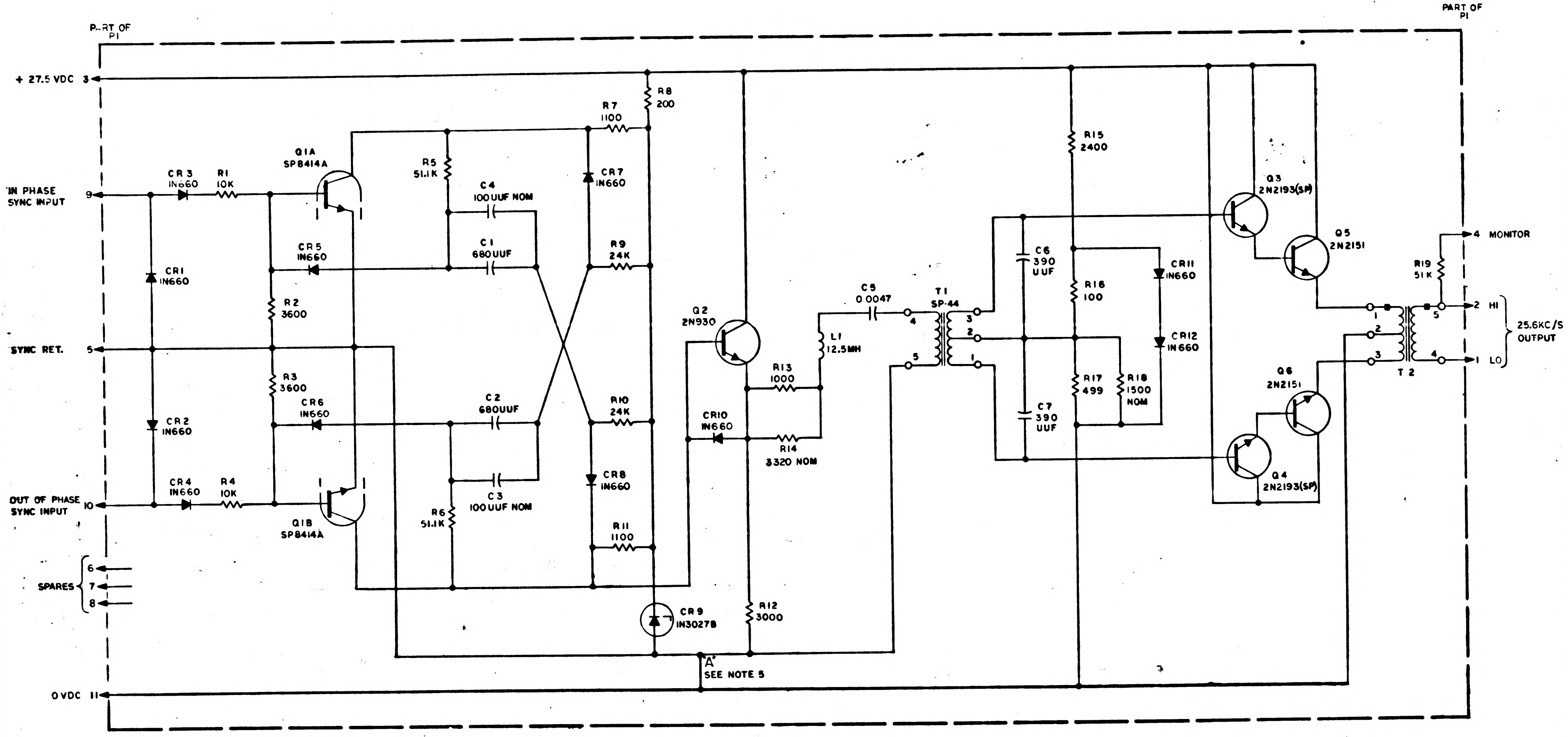
SCHEMATIC, POWER SUPPLY, 25.6KC/S

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010029
SCALE —
WT —
SHEET 1 OF 1

1010029

INCHES
PHOTOGRAPHIC SCALE ONLY

TDRR 00667	REVISIONS		
SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED PER TDRR 00643	17-[illegible]-63	WR
B	REVISED PER TDRR 01540	6-6-63	WK MMB



PART OF P1
+ 27.5 VDC 3
IN PHASE SYNC INPUT 9
SYNC RET. 5
OUT OF PHASE SYNC INPUT 10
SPARES 6 7 8
OVDC 11
CR3 IN660
R1 10K
CR1 IN660
CR2 IN660
CR4 IN660
R4 10K
Q1A SP8414A
Q1B SP8414A
CR5 IN660
CR6 IN660
R2 3600
R3 3600
R5 51.1K
R6 51.1K
C4 100UUF NOM
C1 680UUF
C2 680UUF
C3 100UUF NOM
R7 1100
R8 200
CR7 IN660
R9 24K
R10 24K
CR8 IN660
R11 1100
CR9 IN3027B
Q2 2N930
CR10 IN660
R13 1000
R14 3320 NOM
R12 3000
'A' SEE NOTE 5
L1 12.5MH
C5 0.0047
T1 SP-44
4 5 3 2 1
C6 390 UUF
C7 390 UUF
R15 2400
R16 100
R17 499
R18 1500 NOM
CR11 IN660
CR12 IN660
Q3 2N2193(SP)
Q4 2N2193(SP)
Q5 2N2151
Q6 2N2151
T2
1 2 3 4 5
R19 51K
PART OF P1
4 MONITOR
2 HI
1 LO
25.6KC/S OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	± 2%	1/4 W
R2	1006750-45		3600		
R3	1006750-45		3600		
R4	1006750-56		10K		
R5	1010364-579		51.1K	± 1%	1/8 W
R6	1010364-579		51.1K	± 1%	1/8 W
R7	1006760-33		1100	± 2%	1/2 W
R8	1010312-022		200	± 5%	2W
R9	1006750-65		24K	± 2%	1/4 W
R10	1006750-65		24K		1/4 W
R11	1006760-33		1100		1/2 W
R12	1006750-43		3000		1/4 W
R13	1010364-251		1000	± 1%	1/8 W
R14	1010364		SEE NOTE 4	± 1%	1/8 W
R15	1010278-72		2400	± 5%	1/2 W
R16	1006750-8		100	± 2%	1/4 W
R17	1010364-193		499	± 1%	1/8 W
R18	1010364		SEE NOTE 4	± 1%	1/8 W
R19	1006750-73		51K	± 2%	1/4 W
C1	1010410-13	CAPACITOR	680UUF	± 2%	300V
C2	1010410-13		680UUF		300V
C3	1010409		SEE NOTE 4		
C4	1010409		SEE NOTE 4		
C5	1006793-023		0.0047		300V
C6	1010410-7		390 UUF		500V
C7	1010410-7		390 UUF	± 2%	500V
L1	1010309-4	COIL	12.5MH		
CR1	1010385	DIODE	IN660		
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8			IN660		
CR9	1010265-12		IN3027B		
CR10	1010385		IN660		
CR11					
CR12					
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010397		2N930		
Q3	1010398-4		2N2193(SP)		
Q4			2N2193(SP)		
Q5	1010269-2		2N2151		
Q6			2N2151		
T1	1010291-2	TRANSFORMER	SP-44		
T2	1010422				

R14		R18		C3 AND C4-uuf	
1010364-295	1690	1010364-227	750	1010409-18	51
-299	1780	-231	787	-19	56
-303	1870	-237	845	-20	62
-307	1960	-241	887	-21	68
-313	2100	-245	931	-22	75
-317	2210	-249	976	-23	82
-321	2320	-255	1050	-24	91
-325	2430	-259	1100	-25	100
-329	2550	-263	1150	-26	110
-333	2670	-267	1210	-27	120
-339	2870	-271	1270	-28	130
-343	3010	-277	1370	-29	150
-347	3160	-281	1430	-30	160
-351	3320	-285	1500	-31	180
-355	3480	-289	1580	1010409-32	200
-359	3650	-293	1650		
-363	3830	-297	1740		
-367	4020	-301	1820		
-371	4220	-305	1910		
-375	4420	-309	2000		
-379	4640	-313	2100		
-383	4870	-317	2210		
1010364-387	5110	1010364-321	2320		

NOTES:
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2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. THE VALUE OF R14, R18, C3 & C4 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT POINT 'A' TO OVDC AT ONE POINT ONLY AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO. CONTRACT
DRAWN [illegible] DATE [illegible]
CHECKED M. Kramer 25 [illegible]
APPROVAL M. Kramer [illegible]
APPROVAL
NASA APPROVAL [illegible] 3-27-63
MIT APPROVAL [illegible] 27 [illegible] 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY, 25.6KC/S

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010029
SCALE — WT — SHEET 1 OF 1

1010029

INCHES
PHOTOGRAPHIC SCALE ONLY

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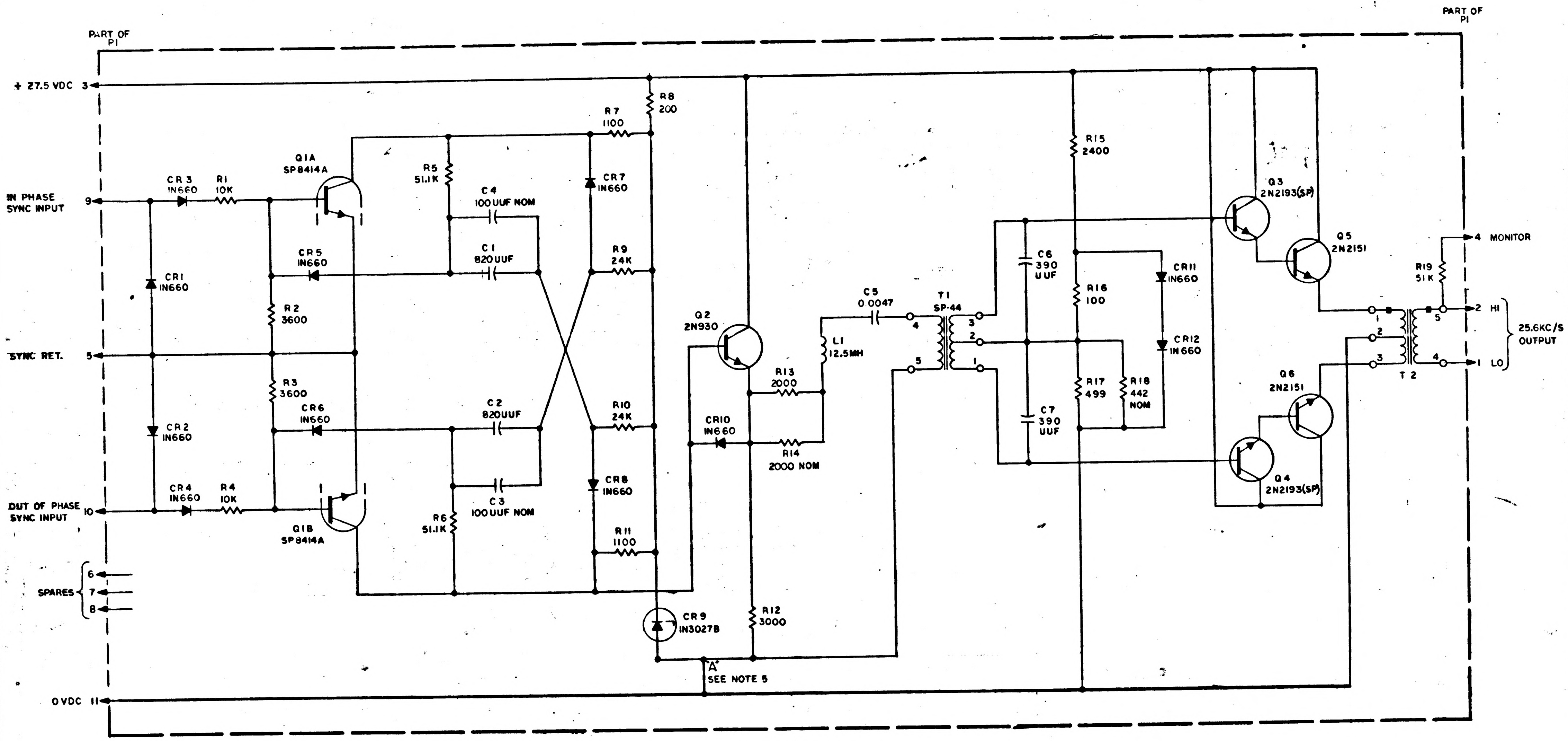
TDRR 00664

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED PER TDRR 00143	17 [illegible] 63	WK
B	REVISED PER TDRR 01540	6-6-63	WK
C	REVISED PER TDRR 06637	[illegible] 64	[illegible]


PART OF P1
PART OF P1
+ 27.5 VDC 3
IN PHASE SYNC INPUT 9
SYNC RET. 5
OUT OF PHASE SYNC INPUT 10
SPARES 6 7 8
OVDC 11
CR3 IN660
R1 10K
CR1 IN660
CR2 IN660
CR4 IN660
R4 10K
Q1A SP8414A
Q1B SP8414A
CR5 IN660
CR6 IN660
R2 3600
R3 3600
R5 51.1K
R6 51.1K
C4 100UUF NOM
C1 820UUF
C2 820UUF
C3 100UUF NOM
R7 1100
R8 200
CR7 IN660
R9 24K
R10 24K
CR8 IN660
R11 1100
Q2 2N930
CR9 IN3027B
CR10 IN660
R13 2000
R14 2000 NOM
R12 3000
'A' SEE NOTE 5
C5 0.0047
L1 12.5MH
T1 SP-44
R15 2400
C6 390 UUF
C7 390 UUF
R16 100
R17 499
R18 442 NOM
CR11 IN660
CR12 IN660
Q3 2N2193(SP)
Q4 2N2193(SP)
Q5 2N2151
Q6 2N2151
R19 51K
T2
4 MONITOR
2 HI
1 LO
25.6KC/S OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	± 2%	1/4 W
R2	1006750-45		3600		
R3	1006750-45		3600		
R4	1006750-56		10K		
R5	1010364-579		51.1K	± 1%	1/8 W
R6	1010364-579		51.1K	± 1%	1/8 W
R7	1006760-33		1100	± 2%	1/2 W
R8	1010312-022		200	± 5%	2W
R9	1006750-65		24K	± 2%	1/4 W
R10	1006750-65		24K		1/4 W
R11	1006760-33		1100		1/2 W
R12	1006750-43		3000		1/4 W
R13	1010364-309		2000	± 1%	1/8 W
R14	1010364		SEE NOTE 4	± 1%	1/8 W
R15	1010278-72		2400	± 5%	1/2W
R16	1006750-8		100	± 2%	1/4 W
R17	1010364-193		499	± 1%	1/8 W
R18	1010364		SEE NOTE 4	± 1%	1/8 W
R19	1006750-73		51K	± 2%	1/4 W
C1	1010410-15	CAPACITOR	820UUF	± 2%	300V
C2	1010410-15		820UUF		300V
C3	1010409		SEE NOTE 4		
C4	1010409		SEE NOTE 4		
C5	1006793-023		0.0047		300V
C6	1010410-7		390 UUF		500V
C7	1010410-7		390 UUF	± 2%	500V
L1	1010309-4	COIL	12.5MH		
CR1	1010385	DIODE	IN660		
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8			IN660		
CR9	1010265-12		IN3027B		
CR10	1010385		IN660		
CR11					
CR12					
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010397		2N930		
Q3	1010398-4		2N2193(SP)		
Q4			2N2193(SP)		
Q5	1010269-2		2N2151		
Q6			2N2151		
T1	1010291-2	TRANSFORMER	SP-44		
T2	1010422				

R14		R18		C3 AND C4-uuf-	
1010364-413	6980	1010364-459	12100	1010409-18	51
-401	6040	-381	4750	-19	56
-389	5230	-327	2490	-20	62
-379	4640	-295	1690	-21	68
-369	4120	-271	1270	-22	75
-359	3650	-251	1000	-23	82
-351	3320	-237	845	-24	91
-343	3010	-223	715	-25	100
-335	2740	-211	619	-26	110
-325	2430	-201	549	-27	120
-317	2210	-191	487	-28	130
-309	2000	-183	442	-29	150
-301	1820	-175	402	-30	160
-293	1650	-169	374	-31	180
-283	1470	-163	384	1010409-32	200
-275	1330	-157	324		
-267	1210	-151	301		
-259	1100	-145	280		
-249	976	-139	261		
-239	866	-133	243		
-229	768	-129	232		
-217	665	-125	221		
1010364-205	576	1010364-121	210		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. THE VALUE OF R14, R18, C3 & C4 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT POINT 'A' TO OVDC AT ONE POINT ONLY AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN [illegible] DATE [illegible]
CHECKED M. Kramer 25 Mar 63
APPROVAL M. Kramer 25 Mar 63
APPROVAL
NASA APPROVAL [illegible] 3-27-63
MIT APPROVAL [illegible] 27 Mar 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY, 25.6KC/S

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010029
SCALE — WT — SHEET 1 OF 1

1010029 C

INCHES
PHOTOGRAPHIC SCALE ONLY

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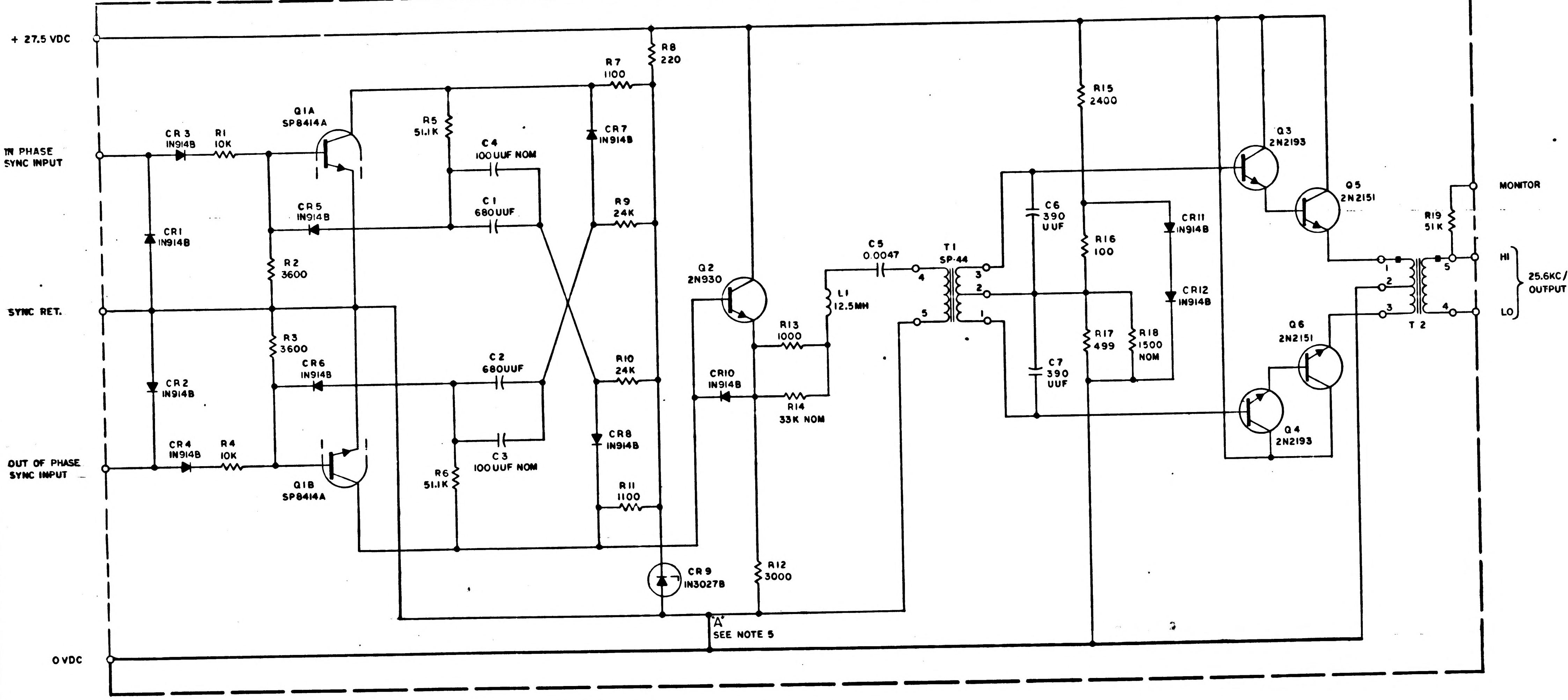
TPRR 00664

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


+ 27.5 VDC
IN PHASE SYNC INPUT
SYNC RET.
OUT OF PHASE SYNC INPUT
0 VDC
CR3 IN914B
R1 10K
CR1 IN914B
CR2 IN914B
CR4 IN914B
R4 10K
Q1A SP8414A
Q1B SP8414A
CR5 IN914B
CR6 IN914B
R2 3600
R3 3600
R5 51.1K
R6 51.1K
C4 100UUF NOM
C1 680UUF
C2 680UUF
C3 100UUF NOM
R7 1100
R8 220
CR7 IN914B
R9 24K
R10 24K
CR8 IN914B
R11 1100
CR9 IN3027B
Q2 2N930
CR10 IN914B
R13 1000
R14 33K NOM
R12 3000
'A' SEE NOTE 5
L1 12.5MH
C5 0.0047
T1 SP-44
4
5
3
2
1
C6 390 UUF
C7 390 UUF
R15 2400
R16 100
R17 499
R18 1500 NOM
CR11 IN914B
CR12 IN914B
Q3 2N2193
Q4 2N2193
Q5 2N2151
Q6 2N2151
R19 51K
T2
MONITOR
HI
LO
25.6KC/S OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	± 5%	1/4 W
R2	1006750-45	↓	3600	↓	↓
R3	1006750-45	↓	3600	↓	↓
R4	1006750-56	↓	10K	↓	↓
R5	1010364-579	↓	51.1K	± 1%	1/8 W
R6	1010364-579	↓	51.1K	± 1%	1/8 W
R7	1006760-33	↓	1100	± 5%	1/2 W
R8	1010278-47	↓	220	↓	1 W
R9	1006750-65	↓	24K	↓	1/4 W
R10	1006750-65	↓	24K	↓	1/4 W
R11	1006760-33	↓	1100	↓	1/2 W
R12	1006750-43	↓	3000	↓	1/4 W
R13	1010364-251	↓	1000	↓	1/8 W
R14	1010364	↓	SEE NOTE	↓	1/8 W
R15	1010278-72	↓	2400	↓	1 W
R16	1006750-8	↓	100	± 5%	1/4 W
R17	1010364-193	↓	499	± 1%	1/8 W
R18	1010364	↓	SEE NOTE	± 1%	1/8 W
R19	1006750-73	↓	51K	± 5%	1/4 W
C1	1010410-13	CAPACITOR	680UUF	± 2%	300V
C2	1010410-13	↓	680UUF	↓	300V
C3	1010409	↓	SEE NOTE	↓	500V
C4	1010409	↓	SEE NOTE	↓	500V
C5	1006793-007	↓	0.0047	↓	300V
C6	1010410-7	↓	390 UUF	↓	500V
C7	1010410-7	↓	390 UUF	± 2%	500V
L1		COIL	12.5MH		
CR1		DIODE	IN914B		
CR2		↓	↓		
CR3		↓	↓		
CR4		↓	↓		
CR5		↓	↓		
CR6		↓	↓		
CR7		↓	↓		
CR8		↓	IN914B		
CR9	1010265-12	↓	IN3027B		
CR10		↓	IN914B		
CR11		↓	↓		
CR12		↓	↓		
Q1		TRANSISTOR	SP8414A		
Q2	1010397	↓	2N930		
Q3	1010398	↓	2N2193		
Q4	1010398	↓	2N2193		
Q5	1010269	↓	2N2151		
Q6	1010269	↓	2N2151		
T1	1010421	TRANSFORMER	SP-44		
T2	1010422	↓			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. THE VALUE OF R14, R18, C3 & C4 TO BE DETERMINED BY ELECTRICAL TEST
5. CONNECT POINT 'A' TO 0VDC AT ONE POINT ONLY AS SHOWN.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN [illegible] DATE [illegible]
CHECKED M. Kramer 25 Mar 63
APPROVAL M. Kramer 25 Mar 63
APPROVAL
NASA APPROVAL [illegible] 3-27-63
MIT APPROVAL [illegible] 27 Mar 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY, 25.6KC/S

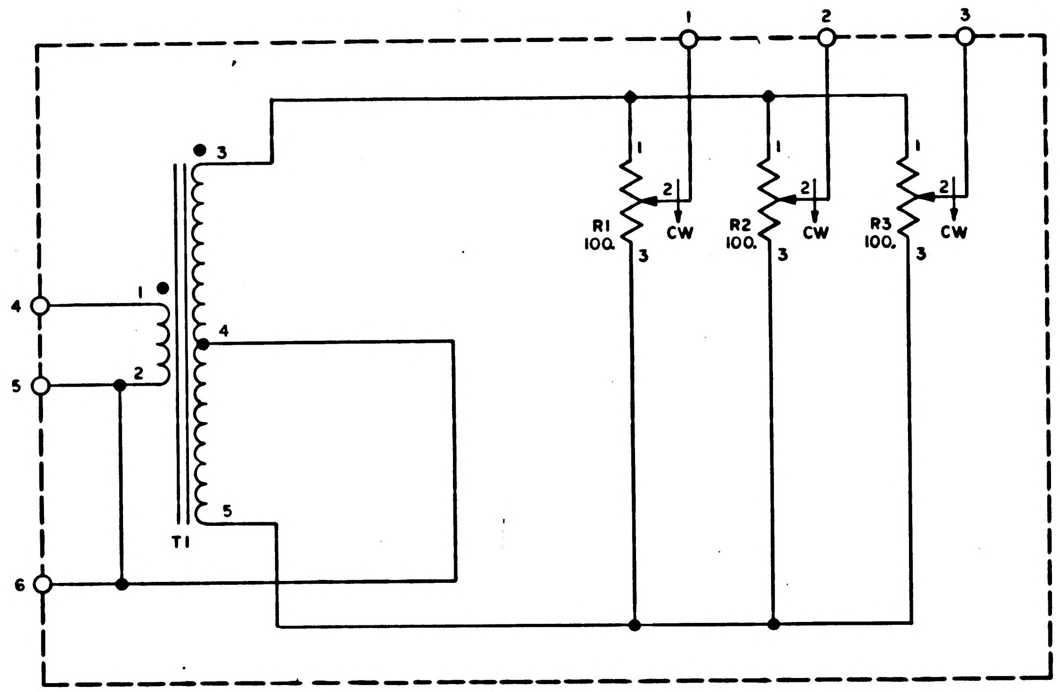
CODE IDENT NO
SIZE E
NASA DRAWING NO 1010029
SCALE — WT — SHEET 1 OF 1

1010029

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 00174

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED AND UPGRADED TO CLASS A PER TDRR 00581	2-1-63	LCL



REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
R1	1010360-2	RESISTOR, VAR	100	±10%	1.5 W
R2	↓	↓ ↓	↓	↓	↓
R3					
T1	1010333	TRANSFORMER			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. RESISTOR VALUES ARE EXPRESSED IN OHMS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Ken Healy DATE 12-13-62
CHECKED 12-17-62
APPROVAL L.C. Smith 12-17-62
APPROVAL R.J. 12-17-62
NASA APPROVAL W.J. 12-16-62
MIT APPROVAL 19 Dec 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
PRECISION RESOLVER
ALIGNMENT

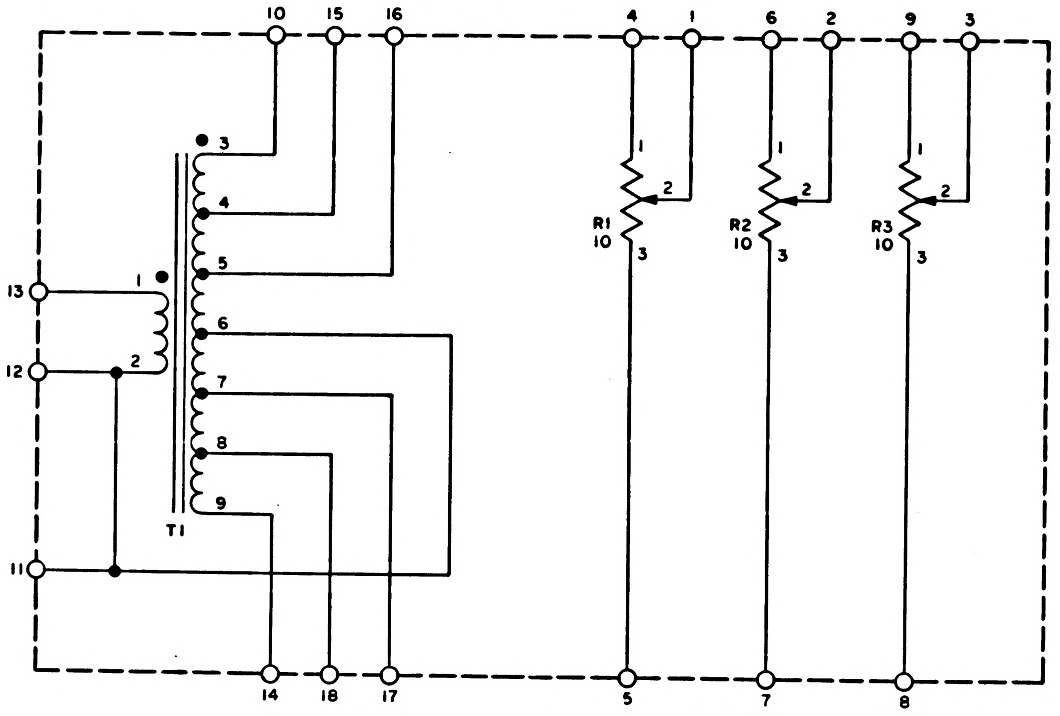
CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010031
SCALE #
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010031

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00174 DATE

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL	RATING
R1	1010360	RESISTOR, VAR	10		
R2	↓	↓ ↓	↓		
R3					
T1	1010381	TRANSFORMER			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. RESISTOR VALUES ARE EXPRESED IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN Ken Healy DATE 12-13-62
CHECKED O. D. Timmons 12-17-62
APPROVAL L. C. Smith 12-17-62
APPROVAL R. J. Tessier 12-17-62
NASA APPROVAL W. J. Rhine 12-19-62
MIT APPROVAL W. Kupfer 19 Dec 62

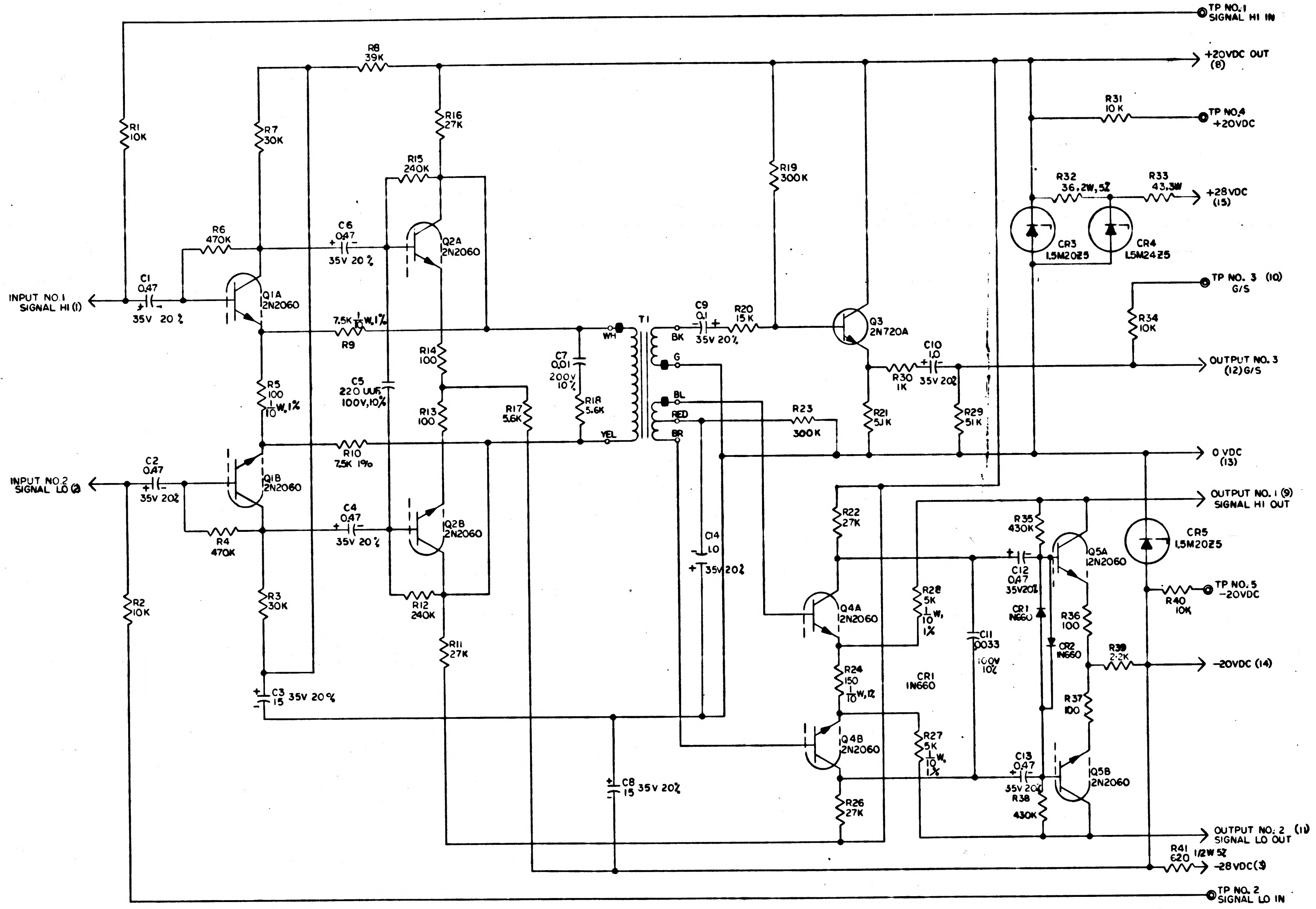
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, PRECISION RESOLVER ALIGNMENT

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010031
SCALE #
WT
SHEET 1 OF 1

1010031

REVISIONS TDRR 00381			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00723	4-2-63	01 WR



INPUT NO.1 SIGNAL HI (1)
INPUT NO.2 SIGNAL LO (2)
R1 10K
R2 10K
C1 0.47 35V 20%
C2 0.47 35V 20%
R6 470K
R4 470K
R7 30K
R3 30K
R5 100 1/10 W, 1%
Q1A 2N2060
Q1B 2N2060
C3 15 35V 20%
R8 39K
C6 0.47 35V 20%
C4 0.47 35V 20%
7.5K 1/10 W, 1%
R9
R10 7.5K 1%
C5 220 UUF 100V, 10%
R16 27K
R15 240K
Q2A 2N2060
Q2B 2N2060
R14 100
R13 100
R12 240K
R11 27K
R17 5.6K
C7 0.01 200V 10%
R18 5.6K
C8 15 35V 20%
T1
WH
YEL
BK
G
BL
RED
BR
C9 0.1 35V 20%
R20 15K
R19 300K
Q3 2N720A
R30 1K
C10 1.0 35V 20%
R21 51K
R29 51K
R23 300K
C14 1.0 35V 20%
R22 27K
Q4A 2N2060
R24 150 1/10 W, 1%
Q4B 2N2060
R26 27K
R28 5K 1/10 W, 1%
R27 5K 1/10 W, 1%
C11 .0033 100V 10%
CR1 1N660
R35 430K
C12 0.47 35V 20%
CR1 1N660
CR2 1N660
Q5A 2N2060
R36 100
R37 100
C13 0.47 35V 20%
R38 430K
Q5B 2N2060
R39 2.2K
R31 10K
R32 36, 2W, 5%
R33 43, 3W
CR3 1.5M20Z5
CR4 1.5M24Z5
CR5 1.5M20Z5
R34 10K
R40 10K
R41 620 1/2W 5%
TP NO.1 SIGNAL HI IN
+20VDC OUT (8)
TP NO.4 +20VDC
+28VDC (15)
TP NO. 3 (10) G/S
OUTPUT NO. 3 (12) G/S
0 VDC (13)
OUTPUT NO. 1 (9) SIGNAL HI OUT
TP NO. 5 -20VDC
-20VDC (14)
OUTPUT NO. 2 (11) SIGNAL LO OUT
-28VDC (3)
TP NO. 2 SIGNAL LO IN

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1006750-56	RESISTOR	10K		
R2	-56		10K		
R3	↓ -67		30K		
R4	1010369 -97		470K		
R5	1010377 -		100	1%	1/10W
R6	1010369 -97		470K		
R7	1006750 -67		30K		
R8	↓ -70		39K		
R9	1010377 -		7.5K	1%	1/10 W
R10	↓ -		7.5K	1%	1/10 W
R11	1006750 -66		27K		
R12	1010369 -90		240K		
R13	1006750 -8		100		
R14	↓ -8		100		
R15	1010369 -90		240K		
R16	1006750 -66		27K		
R17	-50		5.6K		
R18	↓ -50		5.6K		
R19	1010369 -92		300K		
R20	1006750 -60		15K		
R21	-49		51K		
R22	↓ -66		27K		
R23	1010369 -92		300K		
R24	1010377 -		150	1%	1/10 W
R26	1006750 -66		27K		
R27	1010377 -51		5K	1%	1/10 W
R28	↓ -51		5K	1%	1/10 W
R29	1006750 -73		51K		
R30	-32		1K		
R31	↓ -56		10K		
R32	1010312 -		36	5%	2W
R33	1010389 -		43		3W
R34	1006750 -56		10K		
R35	1010369 -96		430K		
R36	1006750 - 8		100		
R37	↓ - 8		100		
R38	1010369 -96		430K		
R39	1006750 -40		2.2K		
R40	↓ -56		10K		
R41	1006760 -	↓	620	5%	1/2W
C1	1006755 -65	CAPACITOR	0.47	20%	35V
C2	-65		0.47	20%	35V
C3	-83		15	20%	35V
C4	↓ -65		0.47	20%	35V
C5	1006777 -16		220 UUF	10%	100V
C6	1006755 -65		0.47	20%	35V
C7	1010264 -		0.01	5%	200V
C8	1006755 -83		15	20%	35V
C9	-57		0.1	20%	35V
C10	↓ -69		1.0	20%	35V
C11	1006777 -27		.0033	10%	100V
C12	1006755 -65		0.47	20%	35V
C13	↓ -65		0.47	20%	35V
C14	1006755 -69	↓	1.0	20%	35V
CR1	1010385 -	1N660			
CR2	↓	↓			
CR3	1010290 -	1.5M20Z5			
CR4	1010290 -	1.5M24Z5			
CR5	1010290 -	1.5M20Z5			
Q1	1010376 -1	2N2060			
Q2	↓	↓			
Q3	1010357 -	2N720A			
Q4	1010376 -1	2N2060			
Q5	↓ -1	↓			
T1	1010335	TRANSFORMER			

NOTES-

1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE 1/4 W. ± 2%.

3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

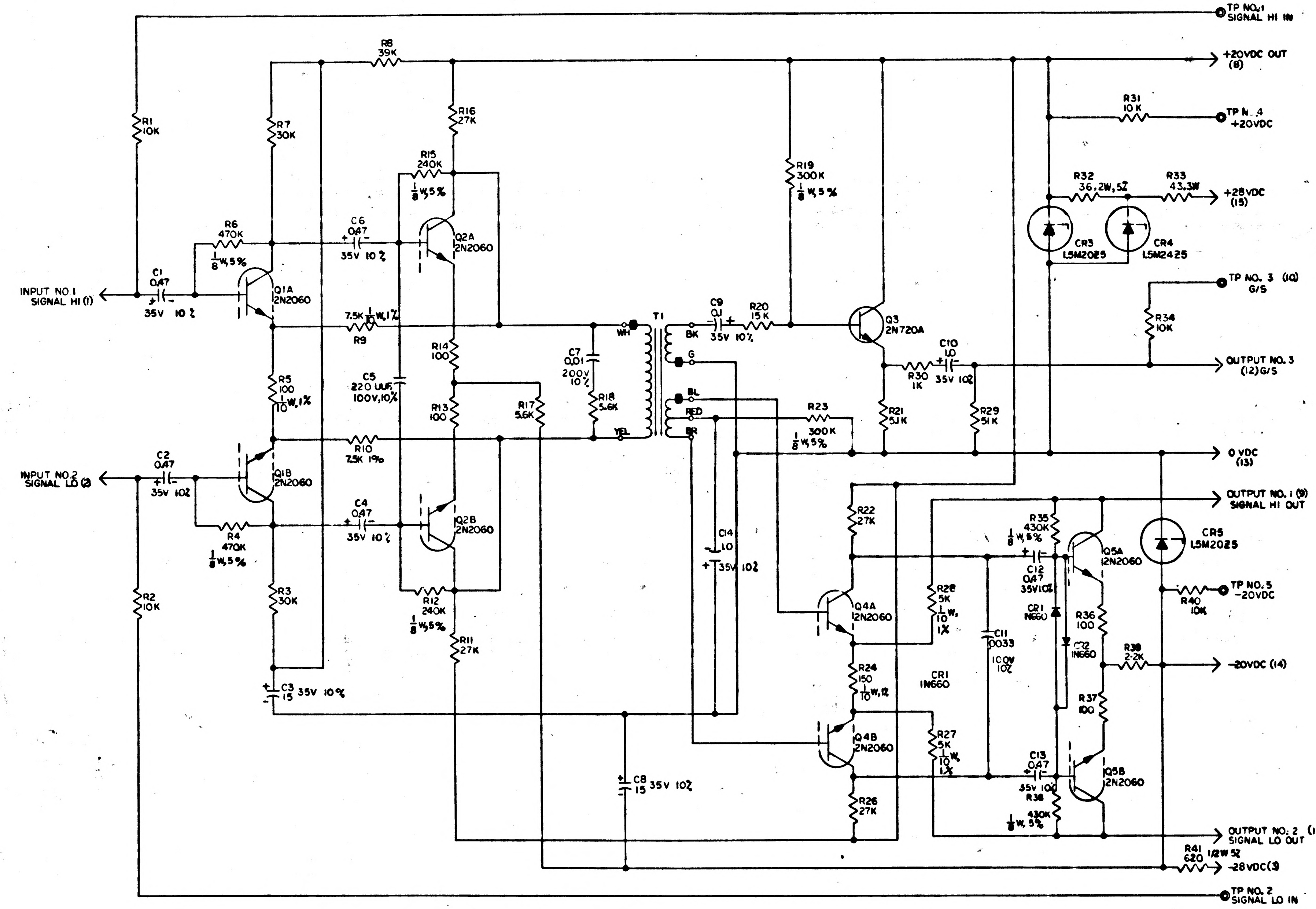
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL	DRAWN Mahoney DATE 12-27-62 CHECKED APPROVAL A.L. Sitomer 2/7/63 APPROVAL	AC DIFFERENTIAL AMPLIFIER G/S OUTPUT
		HEAT TREATMENT	NASA APPROVAL W.J. Rhine 2-13-63	CODE IDENT NO. SIZE E NASA DRAWING NO. 1010032
		FINAL FINISH	MIT APPROVAL W. Hoag 13 Feb 63	SCALE WT SHEET 1 OF 1

1010032 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00381

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00723	4-2-63	DT WK
B	REVISED PER TDRR 01004	6-25-63	DT WK


TP NO. 1
SIGNAL HI IN
+20VDC OUT
(8)
R8
39K
R31
10 K
TP NO. 4
+20VDC
R1
10K
R7
30K
R16
27K
R15
240K
1/8 W, 5%
R19
300K
1/8 W, 5%
R32
36, 2W, 5%
R33
43, 3W
+28VDC
(15)
R6
470K
1/8 W, 5%
C6
0.47
35V 10%
Q2A
2N2060
CR3
1.5M2025
CR4
1.5M2425
INPUT NO. 1
SIGNAL HI (1)
C1
0.47
35V 10%
Q1A
2N2060
TP NO. 3 (10)
G/S
7.5K 1/10 W, 1%
R9
T1
C9
0.1
35V 10%
R20
15 K
Q3
2N720A
R34
10K
WH
BK
G
C10
1.0
35V 10%
R14
100
C7
0.01
200V
10%
R30
1K
OUTPUT NO. 3
(12) G/S
C5
220 UUF
100V, 10%
R5
100
1/10 W, 1%
R13
100
R17
5.6K
R18
5.6K
BL
RED
BR
YEL
R23
300K
1/8 W, 5%
R21
51K
R29
51K
0 VDC
(13)
INPUT NO. 2
SIGNAL LO (2)
C2
0.47
35V 10%
R10
7.5K 1%
Q1B
2N2060
OUTPUT NO. 1 (9)
SIGNAL HI OUT
C4
0.47
35V 10%
Q2B
2N2060
R4
470K
1/8 W, 5%
R22
27K
R35
430K
1/8 W, 5%
Q5A
2N2060
CR5
1.5M2025
C14
1.0
35V 10%
C12
0.47
35V 10%
R2
10K
R3
30K
R12
240K
1/8 W, 5%
Q4A
2N2060
R28
5K
1/10 W, 1%
CR1
1N660
TP NO. 5
-20VDC
R40
10K
C11
.0033
100V
10%
R36
100
CR2
1N660
R11
27K
R39
2.2K
-20VDC (14)
C3
15 35V 10%
R24
150
1/10 W, 1%
CR1
1N660
R37
100
Q4B
2N2060
R27
5K
1/10 W, 1%
C13
0.47
35V 10%
Q5B
2N2060
C8
15 35V 10%
R38
430K
1/8 W, 5%
R26
27K
OUTPUT NO. 2 (11)
SIGNAL LO OUT
R41
620 1/2W 5%
-28VDC (3)
TP NO. 2
SIGNAL LO IN

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1006750-56	RESISTOR	10K	2%	1/4 W
R2	-56		10K	2%	1/4 W
R3	↓ -67		30K	2%	1/4 W
R4	1010369 -97		470K	5%	1/8 W
R5	1010377 -107		100	1%	1/10W
R6	1010369 -97		470K	5%	1/8 W
R7	1006750 -67		30K	2%	1/4 W
R8	↓ -70		39K	2%	1/4 W
R9	1010377 -109		7.5K	1%	1/10 W
R10	↓ -109		7.5K	1%	1/10 W
R11	1006750 -66		27K	2%	1/4 W
R12	1010369 -90		240K	5%	1/8 W
R13	1006750 -8		100	2%	1/4 W
R14	↓ -8		100	2%	1/4 W
R15	1010369 -90		240K	5%	1/8 W
R16	1006750 -66		27K	2%	1/4 W
R17	-50		5.6K	2%	1/4 W
R18	↓ -50		5.6K	2%	1/4 W
R19	1010369 -92		300K	5%	1/8 W
R20	1006750 -60		15K	2%	1/4 W
R21	-49		51K	2%	1/4 W
R22	↓ -66		27K	2%	1/4 W
R23	1010369 -92		300K	5%	1/8 W
R24	1010377 -108		150	1%	1/10 W
R26	1006750 -66		27K	2%	1/4 W
R27	1010377 -51		5K	1%	1/10 W
R28	↓ -51		5K	1%	1/10 W
R29	1006750 -73		51K	2%	1/4 W
R30	-32		1K	2%	1/4 W
R31	↓ -56		10K	2%	1/4 W
R32	1010312 -033		36	5%	2W
R33	1010389 -92		43	1%	3W
R34	1006750 -56		10K	2%	1/4 W
R35	1010369 -96		430K	5%	1/8 W
R36	1006750 -8		100	2%	1/4 W
R37	↓ -8		100	2%	1/4 W
R38	1010369 -96		430K	5%	1/8 W
R39	1006750 -40		2.2K	2%	1/4 W
R40	↓ -56		10K	2%	1/4 W
R41	1006760 -27	↓	620	5%	1/2W
C1	1006755 -65	CAPACITOR	0.47	10%	35V
C2	-65		0.47	10%	35V
C3	-83		15	10%	35V
C4	↓ -65		0.47	10%	35V
C5	1006777 -16		220 UUF	10%	100V
C6	1006755 -65		0.47	10%	35V
C7	1010264 -013		0.01	5%	200V
C8	1006755 -83		15	10%	35V
C9	-57		0.1	10%	35V
C10	↓ -69		1.0	10%	35V
C11	1006777 -27		.0033	10%	100V
C12	1006755 -65		0.47	10%	35V
C13	↓ -65		0.47	10%	35V
C14	1006755 -69	↓	1.0	10%	35V
CR1	1010385	1N660			
CR2	↓	↓			
CR3	1010290 - 1	1.5M2025			
CR4	1010290 - 2	1.5M2425			
CR5	1010290 - 1	1.5M2025			
Q1	1010376 -1	2N2060			
Q2	↓	↓			
Q3	1010357	2N720A			
Q4	1010376 -1	2N2060			
Q5	↓ -1	↓			
T1	1010335	TRANSFORMER			

NOTES-

1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W. ± 2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.

1010032 B

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN Mahoney DATE 12-27-62
CHECKED
APPROVAL 2/1/63
APPROVAL
NASA APPROVAL 2-13-63
MIT APPROVAL 13 Feb 63

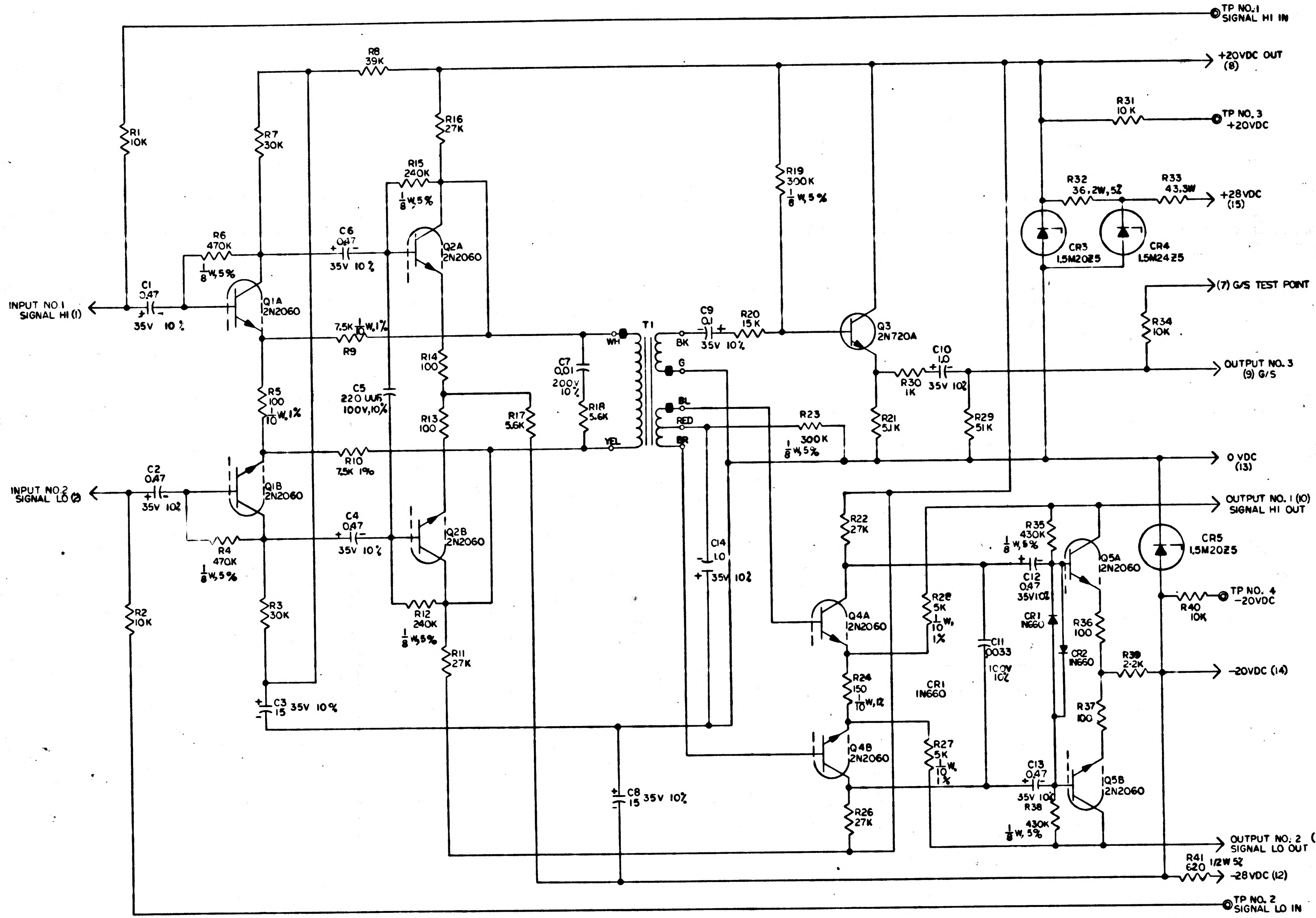
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
AC DIFFERENTIAL AMPLIFIER
G/S OUTPUT

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010032
SCALE | WT | SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 00381			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00723	-2-63	WK
B	REVISED PER TDRR 01004	-25-63	DT WK
C	REVISED PER TDRR 01544	6-8-	WKC


TP NO. 1 SIGNAL HI IN
+20VDC OUT (8)
TP NO. 3 +20VDC
+28VDC (15)
(7) G/S TEST POINT
OUTPUT NO. 3 (9) G/S
0 VDC (13)
OUTPUT NO. 1 (10) SIGNAL HI OUT
TP NO. 4 -20VDC
-20VDC (14)
OUTPUT NO. 2 (11) SIGNAL LO OUT
-28VDC (12)
TP NO. 2 SIGNAL LO IN
INPUT NO 1 SIGNAL HI (1)
INPUT NO 2 SIGNAL LO (2)
R1 10K
R2 10K
R3 30K
R4 470K 1/8 W, 5%
R5 100 1/10 W, 1%
R6 470K 1/8 W, 5%
R7 30K
R8 39K
R9 7.5K 1/10 W, 1%
R10 7.5K 1%
R11 27K
R12 240K 1/8 W, 5%
R13 100
R14 100
R15 240K 1/8 W, 5%
R16 27K
R17 5.6K
R18 5.6K
R19 300K 1/8 W, 5%
R20 15K
R21 51K
R22 27K
R23 300K 1/8 W, 5%
R24 150 1/10 W, 1%
R26 27K
R27 5K 1/10 W, 1%
R28 5K 1/10 W, 1%
R29 51K
R30 1K
R31 10K
R32 36, 2W, 5%
R33 43, 3W
R34 10K
R35 430K 1/8 W, 5%
R36 100
R37 100
R38 430K 1/8 W, 5%
R39 2.2K
R40 10K
R41 620 1/2W 5%
C1 0.47 35V 10%
C2 0.47 35V 10%
C3 15 35V 10%
C4 0.47 35V 10%
C5 220 UUF 100V, 10%
C6 0.47 35V 10%
C7 0.01 200V 10%
C8 15 35V 10%
C9 0.1 35V 10%
C10 1.0 35V 10%
C11 .0033 100V 10%
C12 0.47 35V 10%
C13 0.47 35V 10%
C14 1.0 35V 10%
CR1 IN660
CR2 IN660
CR3 1.5M2025
CR4 1.5M2425
CR5 1.5M2025
Q1A 2N2060
Q1B 2N2060
Q2A 2N2060
Q2B 2N2060
Q3 2N720A
Q4A 2N2060
Q4B 2N2060
Q5A 2N2060
Q5B 2N2060
T1
WH
YEL
BK
G
BL
RED
BR

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1006750-56	RESISTOR	10K	2%	1/4 W
R2	-56		10K	2%	1/4 W
R3	-67		30K	2%	1/4 W
R4	1010369 -97		470K	5%	1/8 W
R5	1010377 -107		100	1%	1/10W
R6	1010369 -97		470K	5%	1/8 W
R7	1006750 -67		30K	2%	1/4 W
R8	-70		39K	2%	1/4 W
R9	1010377 -109		7.5K	1%	1/10 W
R10	-109		7.5K	1%	1/10 W
R11	1006750 -66		27K	2%	1/4 W
R12	1010369 -90		240K	5%	1/8 W
R13	1006750 -8		100	2%	1/4 W
R14	-8		100	2%	1/4 W
R15	1010369 -90		240K	5%	1/8 W
R16	1006750 -66		27K	2%	1/4 W
R17	-50		5.6K	2%	1/4 W
R18	-50		5.6K	2%	1/4 W
R19	1010369 -92		300K	5%	1/8 W
R20	1006750 -60		15K	2%	1/4 W
R21	-49		51K	2%	1/4 W
R22	-66		27K	2%	1/4 W
R23	1010369 -92		300K	5%	1/8 W
R24	1010377 -108		150	1%	1/10 W
R26	1006750 -66		27K	2%	1/4 W
R27	1010377 -51		5K	1%	1/10 W
R28	-51		5K	1%	1/10 W
R29	1006750 -73		51K	2%	1/4W
R30	-32		1K	2%	1/4W
R31	-56		10K	2%	1/4W
R32	1010312 -033		36	5%	2W
R33	1010389 -92		43	1%	3W
R34	1006750 -56		10K	2%	1/4W
R35	1010369 -96		430K	5%	1/8 W
R36	1006750 - 6		100	2%	1/4W
R37	- 8		100	2%	1/4W
R38	1010369 -96		430K	5%	1/8 W
R39	1006750 -40		2.2K	2%	1/4W
R40	-56		10K	2%	1/4W
R41	1006760 -27		620	5%	1/2W
C1	1006755 -65	CAPACITOR	0.47	10%	35V
C2	-65		0.47	10%	35V
C3	-83		15	10%	35V
C4	-65		0.47	10%	35V
C5	1006777 -16		220 UUF	10%	100V
C6	1006755 -65		0.47	10%	35V
C7	1010264 -013		0.01	5%	200V
C8	1006755 -83		15	10%	35V
C9	-57		0.1	10%	35V
C10	-69		1.0	10%	35V
C11	1006777 -27		.0033	10%	100V
C12	1006755 -65		0.47	10%	35V
C13	-65		0.47	10%	35V
C14	1006755 -69		1.0	10%	35V
CR1	1010385	IN660			
CR2					
CR3	1010290 - 1	1.5M2025			
CR4	1010290 - 2	1.5M2425			
CR5	1010290 - 1	1.5M2025			
Q1	1010376 -1	2N2060			
Q2					
Q3	1010357	2N720A			
Q4	1010376 -1	2N2060			
Q5	-1				
T1	1010335	TRANSFORMER			

NOTES-

1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W. ± 2%.

3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN Mahoney DATE 12-27-62
CHECKED
APPROVAL 2/5/63
APPROVAL
NASA APPROVAL 3-13-63
MIT APPROVAL 13 F 63

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

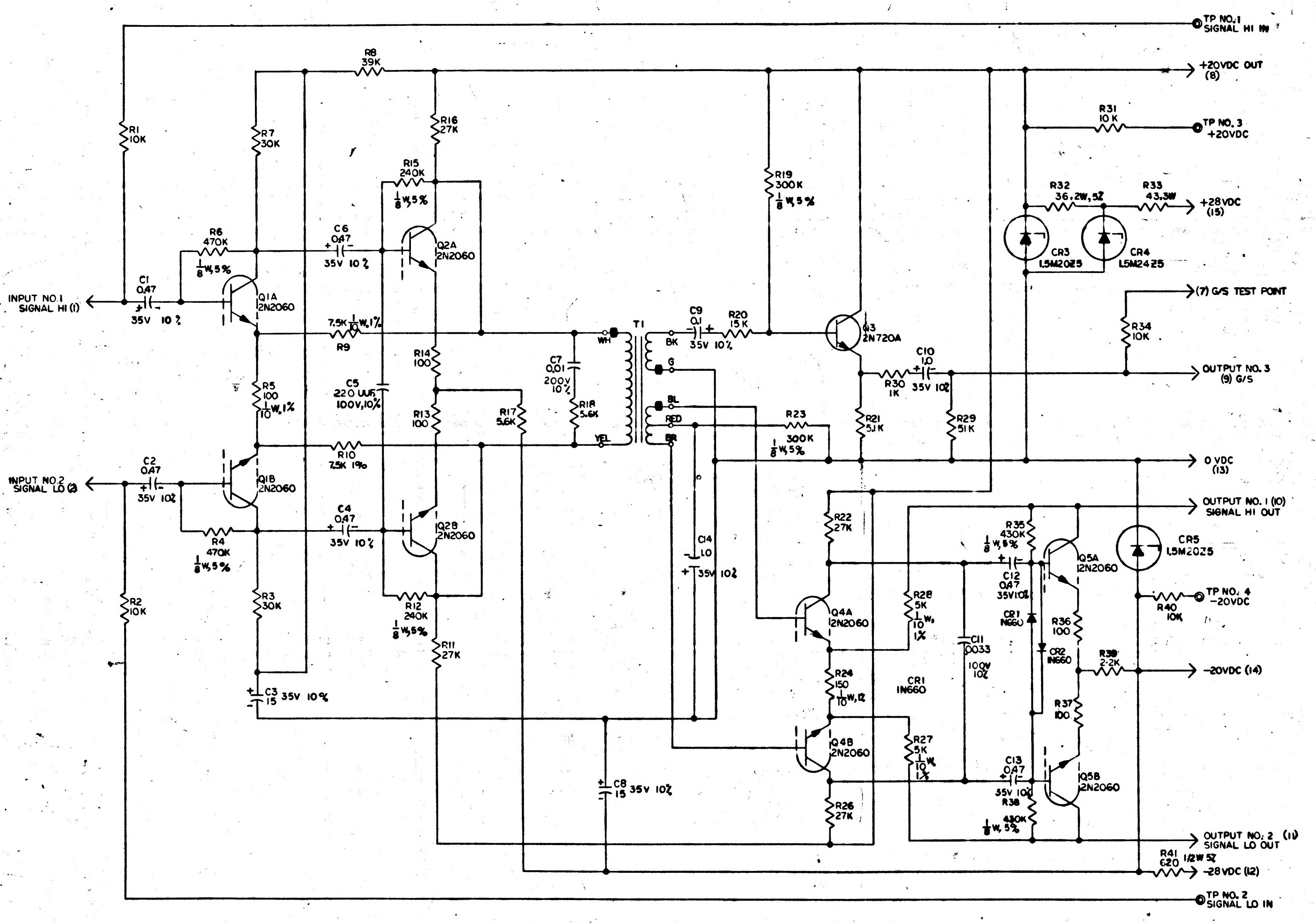
SCHEMATIC
AC DIFFERENTIAL AMPLIFIER
G/S OUTPUT

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010032
SCALE —	WT	SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00381

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00723	1-2-63	DT WK
B	REVISED PER TDRR 01004	1-25-63	DT WK
C	REVISED PER TDRR 01544	6-10-63	RAK WK
D	REVISED PER TDRR 06640	20 FEB	WK


TP NO.1
SIGNAL HI IN
R8
39K
+20VDC OUT
(8)
R1
10K
R7
30K
R16
27K
R31
10 K
TP NO. 3
+20VDC
R15
240K
1/8 W,5%
R19
300K
1/8 W,5%
R32
36, 2W, 5%
R33
43, 3W
+28VDC
(15)
R6
470K
1/8 W,5%
C6
0.47
35V 10%
Q2A
2N2060
CR3
1.5M2025
CR4
1.5M2425
INPUT NO.1
SIGNAL HI (1)
C1
0.47
35V 10%
Q1A
2N2060
(7) G/S TEST POINT
7.5K 1/10 W, 1%
R9
T1
WH
BK
G
BL
RED
BR
YEL
C9
0.1
35V 10%
R20
15 K
Q3
2N720A
R34
10K
C10
1.0
35V 10%
R30
1K
OUTPUT NO. 3
(9) G/S
R14
100
C7
0.01
200V
10%
R5
100
1/10 W, 1%
C5
220 UUF
100V, 10%
R13
100
R17
5.6K
R18
5.6K
R21
5.1K
R29
51K
R23
300K
1/8 W, 5%
R10
7.5K 1%
0 VDC
(13)
INPUT NO.2
SIGNAL LO (2)
C2
0.47
35V 10%
Q1B
2N2060
OUTPUT NO. 1 (10)
SIGNAL HI OUT
R22
27K
R35
430K
1/8 W, 5%
C4
0.47
35V 10%
Q2B
2N2060
Q5A
2N2060
CR5
1.5M2025
R4
470K
1/8 W, 5%
C14
1.0
35V 10%
C12
0.47
35V 10%
R3
30K
R12
240K
1/8 W, 5%
Q4A
2N2060
R28
5K
1/10 W,
1%
C11
.0033
100V
10%
CR1
1N660
CR2
1N660
R36
100
R40
10K
TP NO. 4
-20VDC
R2
10K
R11
27K
R38
2.2K
-20VDC (14)
R24
150
1/10 W, 1%
CR1
1N660
C3
15 35V 10%
R37
100
Q4B
2N2060
R27
5K
1/10 W,
1%
C13
0.47
35V 10%
R38
430K
1/8 W, 5%
Q5B
2N2060
C8
15 35V 10%
R26
27K
OUTPUT NO. 2 (11)
SIGNAL LO OUT
R41
620 1/2W 5%
-28VDC (12)
TP NO. 2
SIGNAL LO IN

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1006750-56	RESISTOR	10K	2%	1/4 W
R2	↓ -56	↓	10K	2%	1/4 W
R3	↓ -67	↓	30K	2%	1/4 W
R4	1010369 -97	↓	470K	5%	1/8 W
R5	1010377 -107	↓	100	1%	1/10W
R6	1010369 -97	↓	470K	5%	1/8 W
R7	1006750 -67	↓	30K	2%	1/4 W
R8	↓ -70	↓	39K	2%	1/4 W
R9	1010377 -109	↓	7.5K	1%	1/10 W
R10	↓ -109	↓	7.5K	1%	1/10 W
R11	1006750 -66	↓	27K	2%	1/4 W
R12	1010369 -90	↓	240K	5%	1/8 W
R13	1006750 -8	↓	100	2%	1/4 W
R14	↓ -8	↓	100	2%	1/4 W
R15	1010369 -90	↓	240K	5%	1/8 W
R16	1006750 -66	↓	27K	2%	1/4 W
R17	↓ -50	↓	5.6K	2%	1/4 W
R18	↓ -50	↓	5.6K	2%	1/4 W
R19	1010369 -92	↓	300K	5%	1/8 W
R20	1006750 -60	↓	15K	2%	1/4 W
R21	↓ -49	↓	5.1K	2%	1/4 W
R22	↓ -66	↓	27K	2%	1/4 W
R23	1010369 -92	↓	300K	5%	1/8 W
R24	1010377 -108	↓	150	1%	1/10 W
		↓			
R26	1006750 -66	↓	27K	2%	1/4 W
R27	1010377 -51	↓	5K	1%	1/10 W
R28	↓ -51	↓	5K	1%	1/10 W
R29	1006750 -73	↓	51K	2%	1/4W
R30	↓ -32	↓	1K	2%	1/4W
R31	↓ -56	↓	10K	2%	1/4W
R32	1010312 -033	↓	36	5%	2W
R33	1010389 -92	↓	43	1%	3W
R34	1006750 -56	↓	10K	2%	1/4W
R35	1010369 -96	↓	430K	5%	1/8W
R36	1006750 - 8	↓	100	2%	1/4W
R37	↓ - 8	↓	100	2%	1/4W
R38	1010369 -96	↓	430K	5%	1/8W
R39	1006750 -40	↓	2.2K	2%	1/4W
R40	↓ -56	↓	10K	2%	1/4W
R41	1006760 -27	↓	620	5%	1/2W
C1	1006755 -65	CAPACITOR	0.47	10%	35V
C2	↓ -65	↓	0.47	10%	35V
C3	↓ -83	↓	15	10%	35V
C4	↓ -65	↓	0.47	10%	35V
C5	1006777 -16	↓	220 UUF	10%	100V
C6	1006755 -65	↓	0.47	10%	35V
C7	1010264 -013	↓	0.01	5%	200V
C8	1006755 -83	↓	15	10%	35V
C9	↓ -57	↓	0.1	10%	35V
C10	↓ -69	↓	1.0	10%	35V
C11	1006777 -27	↓	.0033	10%	100V
C12	1006755 -65	↓	0.47	10%	35V
C13	↓ -65	↓	0.47	10%	35V
C14	1006755 -69	↓	1.0	10%	35V
CR1	1010385	1N660			
CR2	↓	↓			
CR3	1010290 - 1	1.5M2025			
CR4	1010290 - 2	1.5M2425			
CR5	1010290 - 1	1.5M2025			
Q1	1010376 -2	2N2060			
Q2	↓ -2	↓			
Q3	1010357 -1	2N720A			
Q4	1010376 -1	2N2060			
Q5	↓ -1	↓			
T1	1010335	TRANSFORMER			

NOTES-

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MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Mahoney DATE 12-27-62
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APPROVAL
APPROVAL
NASA APPROVAL 2-13-63
MIT APPROVAL 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
AC DIFFERENTIAL AMPLIFIER
G/S OUTPUT

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010032
SCALE —
WT
SHEET 1 OF 1

1010032 D

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REVISIONS TDRR 00381

SYM	DESCRIPTION	DATE	APPROVAL
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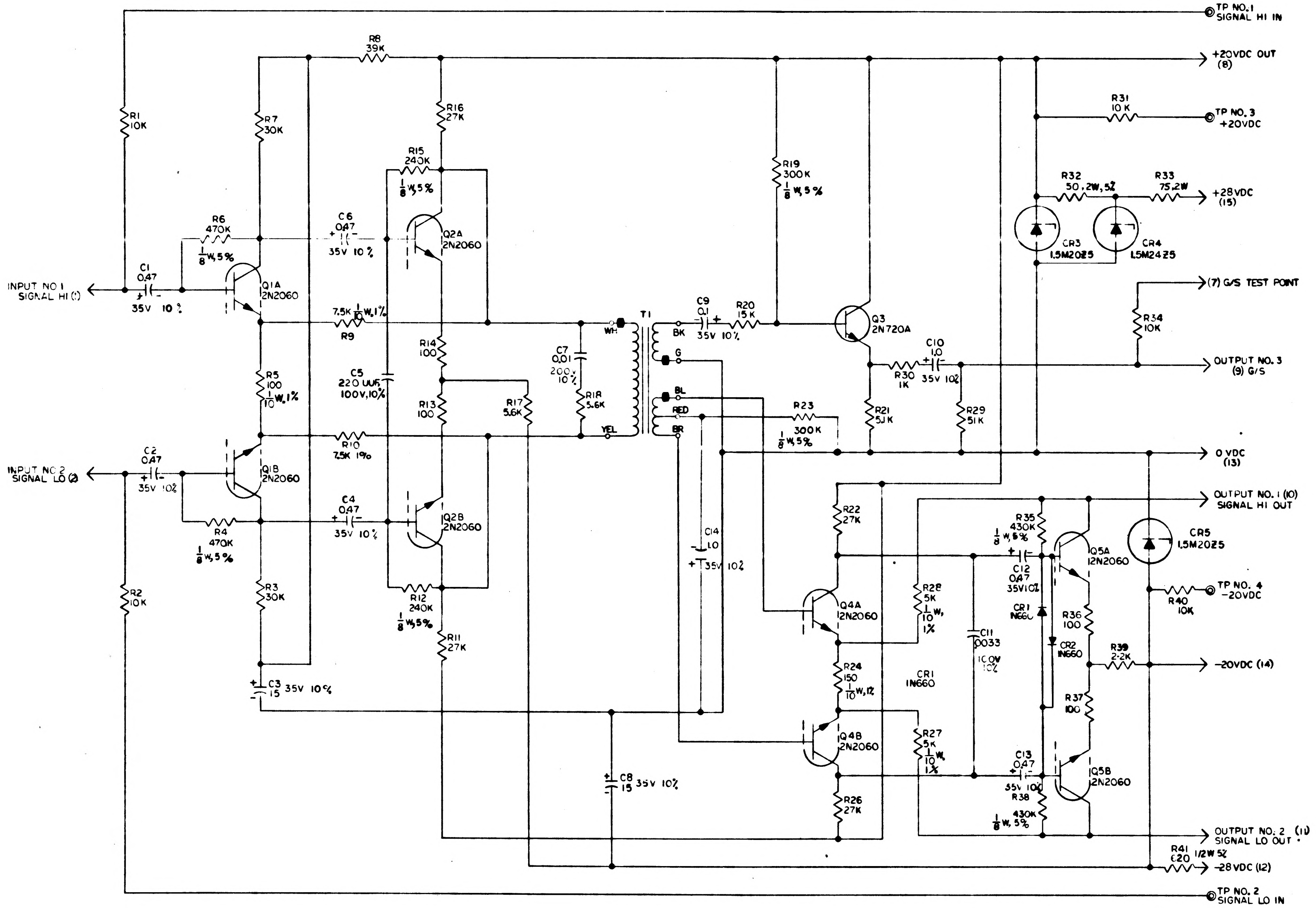
B	REVISED PER TDRR 01004	4-25-63	DT WK
C	REVISED PER TDRR 01544	6-10-63	2A WB
D	REVISED PER TDRR 06640	[illegible]	WC
E	REVISED PER TDRR 07274	1 APR 64	SWB



TP NO. 1 SIGNAL HI IN
+20VDC OUT (8)
TP NO. 3 +20VDC
+28VDC (15)
(7) G/S TEST POINT
OUTPUT NO. 3 (9) G/S
0 VDC (13)
OUTPUT NO. 1 (10) SIGNAL HI OUT
TP NO. 4 -20VDC
-20VDC (14)
OUTPUT NO. 2 (11) SIGNAL LO OUT
-28VDC (12)
TP NO. 2 SIGNAL LO IN
INPUT NO 1 SIGNAL HI (1)
INPUT NO 2 SIGNAL LO (2)
R1 10K
R2 10K
R3 30K
R4 470K 1/8 W, 5%
R5 100 1/10 W, 1%
R6 470K 1/8 W, 5%
R7 30K
R8 39K
R9 7.5K 1/10 W, 1%
R10 7.5K 1%
R11 27K
R12 240K 1/8 W, 5%
R13 100
R14 100
R15 240K 1/8 W, 5%
R16 27K
R17 5.6K
R18 5.6K
R19 300K 1/8 W, 5%
R20 15K
R21 5.1K
R22 27K
R23 300K 1/8 W, 5%
R24 150 1/10 W, 1%
R26 27K
R27 5K 1/10 W, 1%
R28 5K 1/10 W, 1%
R29 51K
R30 1K
R31 10K
R32 50, 2W, 5%
R33 75, 2W
R34 10K
R35 430K 1/8 W, 5%
R36 100
R37 100
R38 430K 1/8 W, 5%
R39 2.2K
R40 10K
R41 620 1/2W 5%
C1 0.47 35V 10%
C2 0.47 35V 10%
C3 15 35V 10%
C4 0.47 35V 10%
C5 220 UUF 100V, 10%
C6 0.47 35V 10%
C7 0.01 200V 10%
C8 15 35V 10%
C9 0.1 35V 10%
C10 1.0 35V 10%
C11 .0033 100V 10%
C12 0.47 35V 10%
C13 0.47 35V 10%
C14 1.0 35V 10%
CR1 1N660
CR2 1N660
CR3 1.5M20Z5
CR4 1.5M24Z5
CR5 1.5M20Z5
Q1A 2N2060
Q1B 2N2060
Q2A 2N2060
Q2B 2N2060
Q3 2N720A
Q4A 2N2060
Q4B 2N2060
Q5A 2N2060
Q5B 2N2060
T1
WH
YEL
BK
G
BL
RED
BR

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1006750-56	RESISTOR	10K	2%	1/4 W
R2	↓ -56	↓	10K	2%	1/4 W
R3	↓ -67		30K	2%	1/4 W
R4	1010369 -97		470K	5%	1/8 W
R5	1010377 -107		100	1%	1/10W
R6	1010369 -97		470K	5%	1/8 W
R7	1006750 -67		30K	2%	1/4 W
R8	↓ -70		39K	2%	1/4 W
R9	1010377 -109		7.5K	1%	1/10 W
R10	↓ -109		7.5K	1%	1/10 W
R11	1006750 -66		27K	2%	1/4 W
R12	1010369 -90		240K	5%	1/8 W
R13	1006750 -8		100	2%	1/4 W
R14	↓ -8		100	2%	1/4 W
R15	1010369 -90		240K	5%	1/8 W
R16	1006750 -66		27K	2%	1/4 W
R17	-50		5.6K	2%	1/4 W
R18	↓ -50		5.6K	2%	1/4 W
R19	1010369 -92		300K	5%	1/8 W
R20	1006750 -60		15K	2%	1/4 W
R21	-49		5.1K	2%	1/4 W
R22	↓ -66		27K	2%	1/4 W
R23	1010369 -92		300K	5%	1/8 W
R24	1010377 -108		150	1%	1/10 W
R26	1006750 -66		27K	2%	1/4 W
R27	1010377 -51		5K	1%	1/10 W
R28	↓ -51		5K	1%	1/10 W
R29	1006750 -73		51K	2%	1/4W
R30	-32		1K	2%	1/4W
R31	↓ -56		10K	2%	1/4W
R32	1010312 -14		50	5%	2W
R33	1010312 -16		75	5%	2W
R34	1006750 -56		10K	2%	1/4W
R35	1010369 -96		430K	5%	1/8W
R36	1006750 - 8		100	2%	1/4W
R37	↓ - 8		100	2%	1/4W
R38	1010369 -96		430K	5%	1/8W
R39	1006750 -40		2.2K	2%	1/4W
R40	↓ -56		10K	2%	1/4W
R41	1006760 -27	↓	620	5%	1/2W
C1	1006755 -65	CAPACITOR	0.47	10%	35V
C2	-65	↓	0.47	10%	35V
C3	-83		15	10%	35V
C4	↓ -65		0.47	10%	35V
C5	1006777 -16		220 UUF	10%	100V
C6	1006755 -65		0.47	10%	35V
C7	1010264 -013		0.01	5%	200V
C8	1006755 -83		15	10%	35V
C9	-57		0.1	10%	35V
C10	↓ -69		1.0	10%	35V
C11	1006777 -27		.0033	10%	100V
C12	1006755 -65		0.47	10%	35V
C13	↓ -65		0.47	10%	35V
C14	1006755 -69	↓	1.0	10%	35V
CR1	1010385	1N660			
CR2	↓	↓			
CR3	1010290 - 1	1.5M20Z5			
CR4	1010290 - 2	1.5M24Z5			
CR5	1010290 - 1	1.5M20Z5			
Q1	1010376 -2	2N2060			
Q2	↓ -2	↓			
Q3	1010357 -1	2N720A			
Q4	1010376 -1	2N2060			
Q5	↓ -1	↓			
T1	1010335	TRANSFORMER			

NOTES-

1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W, ± 2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
Contract NAS 9-497

DRAWN Mahoney DATE 12-27-62
CHECKED
APPROVAL 2/2/63
APPROVAL
NASA APPROVAL 2-13-63
MIT APPROVAL 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

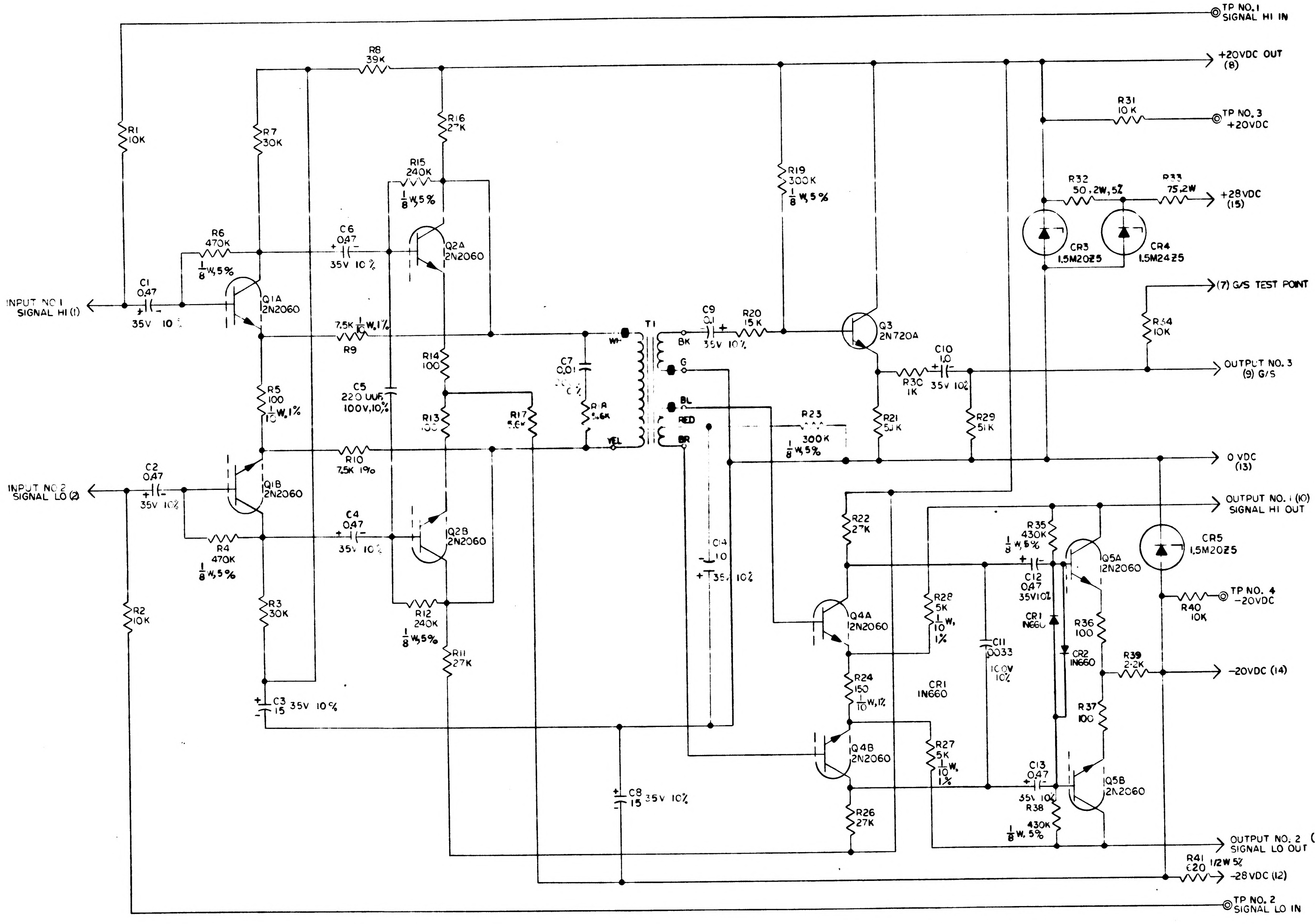
SCHEMATIC
AC DIFFERENTIAL AMPLIFIER
G/S OUTPUT

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010032
SCALE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00381

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00723	3-2-63	DT WK
B	REVISED PER TDRR 01004	4-25-63	DT WK
C	REVISED PER TDRR 01544	6-0-63	RAK
D	REVISED PER TDRR 06640	[illegible]	[illegible]
E	REVISED PER TDRR 07274	APR 64	JWP EF
F	REVISED PER TDRR 16832	4 MAR 65	JJJ EF


TP NO. 1
SIGNAL HI IN
R8
39K
+20VDC OUT
(8)
R1
10K
R7
30K
R16
27K
R31
10K
TP NO. 3
+20VDC
R15
240K
1/8 W, 5%
R19
300K
1/8 W, 5%
R32
50, 2W, 5%
R33
75, 2W
+28VDC
(15)
R6
470K
1/8 W, 5%
C6
0.47
35V 10%
Q2A
2N2060
CR3
1.5M20Z5
CR4
1.5M24Z5
(7) G/S TEST POINT
INPUT NO. 1
SIGNAL HI (1)
C1
0.47
35V 10%
Q1A
2N2060
7.5K 1/10 W, 1%
R9
T1
WH
BK
G
BL
RED
BR
YEL
C9
0.1
35V 10%
R20
15K
Q3
2N720A
R34
10K
C10
1.0
35V 10%
R30
1K
OUTPUT NO. 3
(9) G/S
R14
100
C7
0.01
R18
5.6K
C5
220 UUF
100V, 10%
R5
100
1/10 W, 1%
R13
100
R17
5.6K
R23
300K
1/8 W, 5%
R21
51K
R29
51K
R10
7.5K 1%
0 VDC
(13)
INPUT NO. 2
SIGNAL LO (2)
C2
0.47
35V 10%
Q1B
2N2060
OUTPUT NO. 1 (10)
SIGNAL HI OUT
R22
27K
R35
430K
1/8 W, 5%
CR5
1.5M20Z5
R4
470K
1/8 W, 5%
C4
0.47
35V 10%
Q2B
2N2060
C14
10
35V 10%
C12
0.47
35V 10%
Q5A
2N2060
TP NO. 4
-20VDC
R40
10K
R2
10K
R3
30K
R12
240K
1/8 W, 5%
R11
27K
Q4A
2N2060
R28
5K
1/10 W, 1%
CR1
1N660
CR2
1N660
R36
100
C11
.0033
100V
10%
R39
2.2K
-20VDC (14)
R24
150
1/10 W, 1%
CR1
1N660
R37
100
C3
15 35V 10%
Q4B
2N2060
R27
5K
1/10 W, 1%
C13
0.47
35V 10%
Q5B
2N2060
R38
430K
1/8 W, 5%
C8
15 35V 10%
R26
27K
OUTPUT NO. 2 (11)
SIGNAL LO OUT
R41
620 1/2W 5%
-28VDC (12)
TP NO. 2
SIGNAL LO IN

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1006750-56	RESISTOR	10K	2%	1/4 W
R2	↓ -56	↓	10K	2%	1/4 W
R3	↓ -67	↓	30K	2%	1/4 W
R4	1010369 -97	↓	470K	5%	1/8 W
R5	1010377 -107	↓	100	1%	1/10W
R6	1010369 -97	↓	470K	5%	1/8 W
R7	1006750 -67	↓	30K	2%	1/4 W
R8	↓ -70	↓	39K	2%	1/4 W
R9	1010377 -109	↓	7.5K	1%	1/10 W
R10	↓ -109	↓	7.5K	1%	1/10 W
R11	1006750 -66	↓	27K	2%	1/4 W
R12	1010369 -90	↓	240K	5%	1/8 W
R13	1006750 -8	↓	100	2%	1/4 W
R14	↓ -8	↓	100	2%	1/4 W
R15	1010369 -90	↓	240K	5%	1/8 W
R16	1006750 -66	↓	27K	2%	1/4 W
R17	↓ -50	↓	5.6K	2%	1/4 W
R18	↓ -50	↓	5.6K	2%	1/4 W
R19	1010369 -92	↓	300K	5%	1/8 W
R20	1006750 -60	↓	15K	2%	1/4 W
R21	↓ -49	↓	5.1K	2%	1/4 W
R22	↓ -66	↓	27K	2%	1/4 W
R23	1010369 -92	↓	300K	5%	1/8 W
R24	1010377 -108	↓	150	1%	1/10 W
		↓			
R26	1006750 -66	↓	27K	2%	1/4 W
R27	1010377 -51	↓	5K	1%	1/10 W
R28	↓ -51	↓	5K	1%	1/10 W
R29	1006750 -73	↓	51K	2%	1/4 W
R30	↓ -32	↓	1K	2%	1/4 W
R31	↓ -56	↓	10K	2%	1/4 W
R32	1010312 -14	↓	50	5%	2W
R33	1010312 -16	↓	75	5%	2W
R34	1006750 -56	↓	10K	2%	1/4 W
R35	1010369 -96	↓	430K	5%	1/8 W
R36	1006750 -8	↓	100	2%	1/4 W
R37	↓ -8	↓	100	2%	1/4 W
R38	1010369 -96	↓	430K	5%	1/8 W
R39	1006750 -40	↓	2.2K	2%	1/4 W
R40	↓ -56	↓	10K	2%	1/4 W
R41	1006760 -27	↓	620	5%	1/2 W
C1	1006755 -65	CAPACITOR	0.47	10%	35V
C2	↓ -65	↓	0.47	10%	35V
C3	↓ -83	↓	15	10%	35V
C4	↓ -65	↓	0.47	10%	35V
C5	1006777 -16	↓	220 UUF	10%	100V
C6	1006755 -65	↓	0.47	10%	35V
C7	1010264 -013	↓	0.01	5%	200V
C8	1006755 -83	↓	15	10%	35V
C9	↓ -57	↓	0.1	10%	35V
C10	↓ -69	↓	1.0	10%	35V
C11	1006777 -27	↓	.0033	10%	100V
C12	1006755 -65	↓	0.47	10%	35V
C13	↓ -65	↓	0.47	10%	35V
C14	1006755 -69	↓	1.0	10%	35V
CR1	1010385	1N660			
CR2	↓	↓			
CR3	1010831-001	1.5M20Z5			
CR4	1010831-002	1.5M24Z5			
CR5	1010831-001	1.5M20Z5			
Q1	1010376 -2	2N2060			
Q2	↓ -2	↓			
Q3	1010357 -1	2N720A			
Q4	1010376 -1	2N2060			
Q5	↓ -1	↓			
T1	1010335	TRANSFORMER			

NOTES-
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$ W, ± 2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
Contract NAS 9-497

DRAWN Mahoney DATE 12-27-62
CHECKED
APPROVAL 2/7/63
APPROVAL
NASA APPROVAL 2-13-63
MIT APPROVAL 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

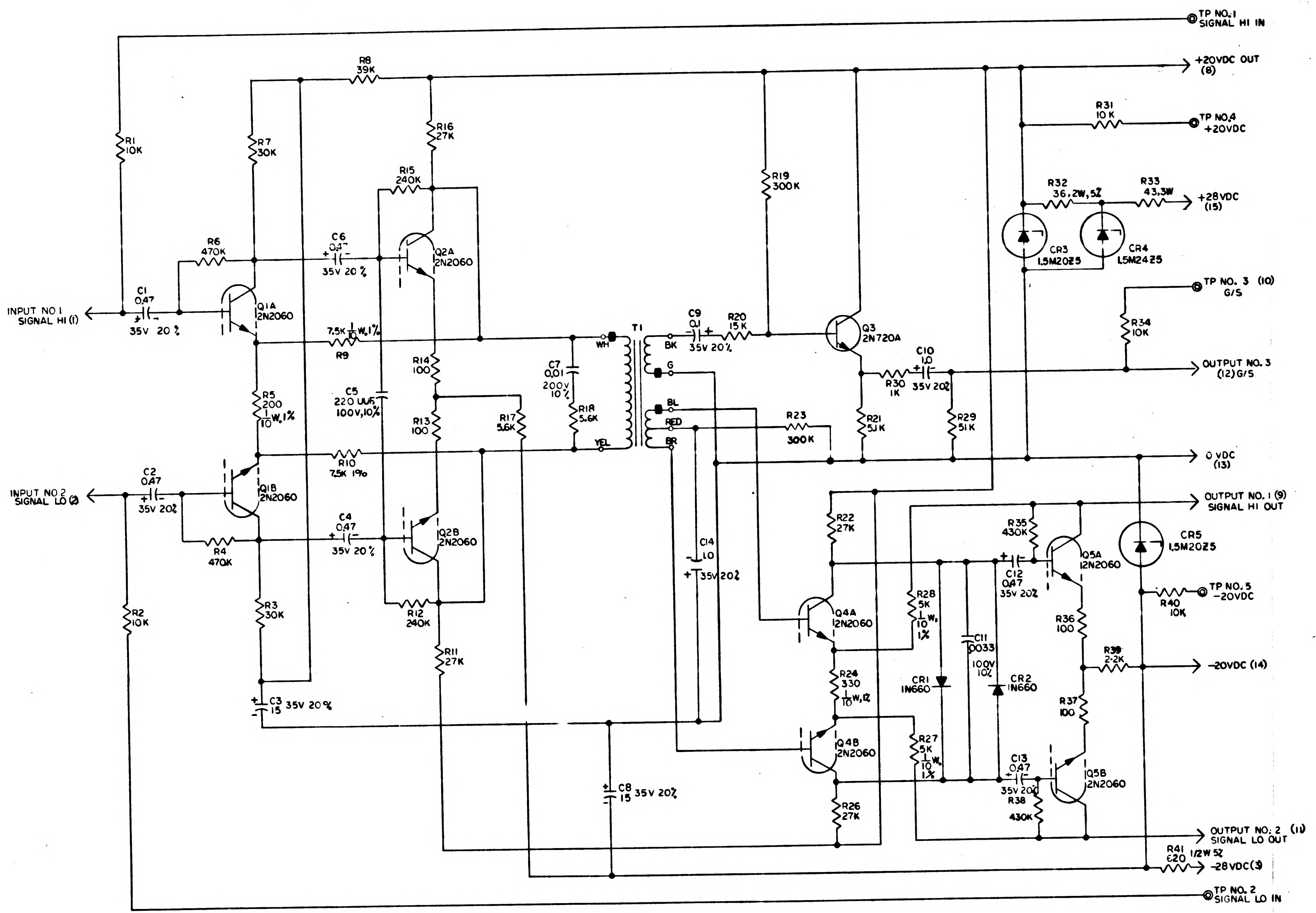
SCHEMATIC
AC DIFFERENTIAL AMPLIFIER
G/S OUTPUT

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010032
SCALE
W
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TURR 0038

SYM	DESCRIPTION	DATE	APPROVAL


TP NO.1 SIGNAL HI IN
+20VDC OUT (8)
R8 39K
R31 10 K
TP NO.4 +20VDC
R16 27K
R1 10K
R7 30K
R19 300K
R15 240K
R32 36, 2W, 5%
R33 43, 3W
+28VDC (15)
R6 470K
C6 0.47 35V 20%
Q2A 2N2060
CR3 1.5M20Z5
CR4 1.5M24Z5
TP NO. 3 (10) G/S
C1 0.47 35V 20%
INPUT NO.1 SIGNAL HI (1)
Q1A 2N2060
C9 0.1 35V 20%
R20 15 K
Q3 2N720A
R34 10K
7.5K 1/10 W, 1% R9
T1
WH
BK
G
C10 1.0 35V 20%
R30 1K
OUTPUT NO. 3 (12) G/S
R14 100
C7 0.01 200V 10%
C5 220 UUF, 100V, 10%
R5 200 1/10 W, 1%
R13 100
R17 5.6K
R18 5.6K
BL
RED
BR
YEL
R23 300K
R21 5.1K
R29 51K
R10 7.5K 1%
0 VDC (13)
C2 0.47 35V 20%
INPUT NO.2 SIGNAL LO (2)
Q1B 2N2060
OUTPUT NO. 1 (9) SIGNAL HI OUT
C4 0.47 35V 20%
Q2B 2N2060
R4 470K
R22 27K
R35 430K
Q5A 2N2060
CR5 1.5M20Z5
C14 1.0 35V 20%
C12 0.47 35V 20%
R28 5K 1/10 W, 1%
Q4A 2N2060
TP NO.5 -20VDC
R40 10K
R12 240K
R36 100
R2 10K
R3 30K
C11 .0033 100V 10%
R39 2.2K
-20VDC (14)
R11 27K
CR1 1N660
CR2 1N660
R24 330 1/10 W, 1%
C3 15 35V 20%
R37 100
R27 5K 1/10 W, 1%
Q4B 2N2060
C13 0.47 35V 20%
Q5B 2N2060
C8 15 35V 20%
R38 430K
R26 27K
OUTPUT NO. 2 (11) SIGNAL LO OUT
R41 620 1/2W 5%
-28VDC (3)
TP NO. 2 SIGNAL LO IN

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1006750-56	RESISTOR	10K		
R2	-56	↓	10K		
R3	↓ -67		30K		
R4	1010369 -97		470K		
R5	1010377 -		200	1%	1/10W
R6	1010369 -97		470K		
R7	1006750 -67		30K		
R8	↓ -70		39K		
R9	1010377 -		7.5K	1%	1/10 W
R10	↓ -		7.5K	1%	1/10 W
R11	1006750 -66		27K		
R12	1010369 -90		240K		
R13	1006750 -8		100		
R14	↓ -8		100		
R15	1010369 -90		240K		
R16	1006750 -66		27K		
R17	-50		5.6K		
R18	↓ -50		5.6K		
R19	1010369 -92		300K		
R20	1006750 -60		15K		
R21	-49		5.1K		
R22	↓ -66		27K		
R23	1010369 -92		300K		
R24	1010377 -		330	1%	1/10 W
R26	1006750 -66		27K		
R27	1010377 -51		5K	1%	1/10 W
R28	↓ -51		5K	1%	1/10 W
R29	1006750 -73		51K		
R30	-32		1K		
R31	↓ -56		10K		
R32	1010312 -		36	5%	2W
R33	1010389 -		43		3W
R34	1006750 -56		10K		
R35	1010369 -96		430K		
R36	1006750 - 8		100		
R37	↓ - 8		100		
R38	1010369 -96		430K		
R39	1006750 -40		2.2K		
R40	↓ -56		10K		
R41	1006760 -	↓	620	5%	1/2W
C1	1006755 -65	CAPACITOR	0.47	20%	35V
C2	-65		0.47	20%	35V
C3	-83		15	20%	35V
C4	↓ -65		0.47	20%	35V
C5	1006777 -16		220 UUF	10%	100V
C6	1006755 -65		0.47	20%	35V
C7	1010264 -		0.01	5%	200V
C8	1006755 -83		15	20%	35V
C9	-57		0.1	20%	35V
C10	↓ -69		1.0	20%	35V
C11	1006777 -27		.0033	10%	100V
C12	1006755 -65		0.47	20%	35V
C13	↓ -65		0.47	20%	35V
C14	1006755 -69	↓	1.0	20%	35V
CR1	1010385 -	1N660			
CR2	↓	↓			
CR3	1010290 -	1.5M20Z5			
CR4	1010290 -	1.5M24Z5			
CR5	1010290 -	1.5M20Z5			
Q1	1010376 -1	2N2060			
Q2	↓	↓			
Q3	1010357 -	2N720A			
Q4	1010376 -1	2N2060			
Q5	↓ -1	↓			
T1	1010335	TRANSFORMER			

NOTES-

1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$ W. ± 5%.

3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN Mahoney DATE 12-27-62
CHECKED
APPROVAL A L Sitomer 2/1/63
APPROVAL
NASA APPROVAL 2-13-63
MIT APPROVAL 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

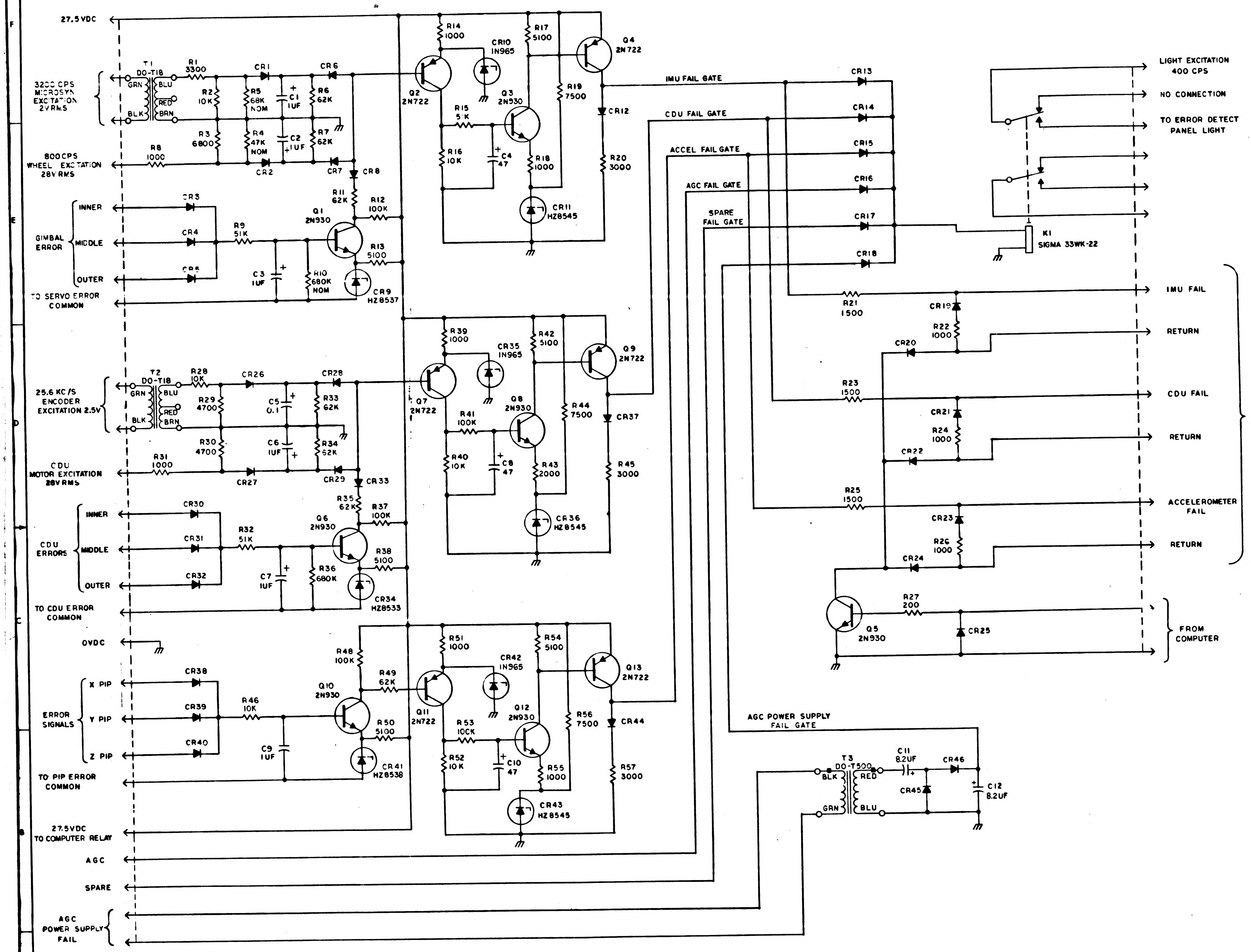
AC DIFFERENTIAL AMPLIFIER
G/S OUTPUT

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010032
SCALE
WT
SHEET 1 OF 1

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01187	5-8-63	A.K. WK

REVISIONS TDRR 00842

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


27.5VDC
T1 DO-T18
GRN
BLU
RED
BRN
BLK
3200 CPS MICROSYN EXCITATION 2V RMS
R1 3300
R2 10K
R3 6800
R4 47K NOM
R5 68K NOM
C1 1UF
C2 1UF
R6 62K
R7 62K
CR1
CR2
CR6
CR7
CR8
800CPS WHEEL EXCITATION 28V RMS
R8 1000
GIMBAL ERROR
INNER
MIDDLE
OUTER
CR3
CR4
CR5
R9 51K
C3 1UF
R10 680K NOM
Q1 2N930
R11 62K
R12 100K
R13 5100
CR9 HZ8537
TO SERVO ERROR COMMON
R14 1000
CR10 IN965
Q2 2N722
R15 51K
R16 10K
C4 47
Q3 2N930
R17 5100
R18 1000
CR11 HZ8545
R19 7500
Q4 2N722
CR12
R20 3000
25.6 KC/S ENCODER EXCITATION 2.5V
T2 DO-T18
R28 10K
R29 4700
R30 4700
CR26
CR27
CR28
CR29
C5 0.1
C6 1UF
R33 62K
R34 62K
CR33
CDU MOTOR EXCITATION 28V RMS
R31 1000
CDU ERRORS
CR30
CR31
CR32
R32 51K
C7 1UF
R36 680K
Q6 2N930
R35 62K
R37 100K
R38 5100
CR34 HZ8533
TO CDU ERROR COMMON
R39 1000
CR35 IN965
Q7 2N722
R41 100K
R40 10K
C8 47
Q8 2N930
R42 5100
R43 2000
CR36 HZ8545
R44 7500
Q9 2N722
CR37
R45 3000
OVDC
ERROR SIGNALS
X PIP
Y PIP
Z PIP
CR38
CR39
CR40
R46 10K
C9 1UF
Q10 2N930
R48 100K
R49 62K
R50 5100
CR41 HZ8538
TO PIP ERROR COMMON
R51 1000
CR42 IN965
Q11 2N722
R53 10CK
R52 10K
C10 47
Q12 2N930
R54 5100
R55 1000
CR43 HZ8545
R56 7500
Q13 2N722
CR44
R57 3000
27.5VDC TO COMPUTER RELAY
AGC
SPARE
AGC POWER SUPPLY FAIL
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
SPARE FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
K1 SIGMA 33WK-22
LIGHT EXCITATION 400 CPS
NO CONNECTION
TO ERROR DETECT PANEL LIGHT
R21 1500
CR19
R22 1000
CR20
R23 1500
CR21
R24 1000
CR22
R25 1500
CR23
R26 1000
CR24
IMU FAIL
RETURN
CDU FAIL
RETURN
ACCELEROMETER FAIL
RETURN
TO AGC
Q5 2N930
R27 200
CR25
FROM COMPUTER
AGC POWER SUPPLY FAIL GATE
T3 DO-T500
BLK
GRN
RED
BLU
C11 8.2UF
CR45
CR46
C12 8.2UF

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN A. D. Lao DATE 3 APR 63
CHECKED Manuel Kramer 15 Apr 63
APPROVAL Manuel Kramer 15 Apr 63
APPROVAL
NASA APPROVAL Jack Bennett 4/17/63
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010033
SCALE —
WT —
SHEET 1 OF 2

1010033 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 01187	5.8.63	M.K. WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4 W
R2	-56		10K		
R3	-52		6800		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	-32		1000		
R9	1006750-73		51K	±2%	1/4 W
R10	1010369		SEE NOTE	±5%	1/8 W
R11	1006750-75		62K	±2%	1/4 W
R12	-80		100K		
R13	1006750-49		5100		1/4 W
R14	1006760-32		1000		1/2 W
R15	1006750-73		51K		1/4 W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	-36		1500		
R22	-32		1000		
R23	-36		1500		
R24	-32		1000		
R25	-36		1500		
R26	-32		1000		
R27	1006750-15		200		1/4 W
R28	1006760-56		10K		1/2 W
R29	1006750-48		4700		1/4 W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	-75		62K		
R35	1006750-75		62K	±2%	1/4 W
R36	1010369-101		680K	±5%	1/8 W
R37	1006750-80		100K	±2%	1/4 W
R38	1006750-49		5100		1/4 W
R39	1006760-32		1000		1/2 W
R40	1006750-56		10K		1/4 W
R41	-80		100K		
R42	-49		5100		
R43	-39		2000		
R44	1006750-53		7500		1/4 W
R45	1006760-43		3000		1/2 W
R46	1006750-56		10K	±2%	1/4 W
R47	DELETED		—	—	—
R48	1006750-80		100K	±2%	1/4 W
R49	-75		62K		1/4 W
R50	1006750-49		5100		1/4 W
R51	1006760-32		1000		1/2 W
R52	1006750-56		10K		1/4 W
R53	-80		100K		
R54	-49		5100		
R55	-32		1000		
R56	1006750-53		7500		1/4 W
R57	1006760-43		3000	±2%	1/2 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
C11	-80		8.2		
C12	1006755-80		8.2	±10%	35VDC
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32					
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39					
CR40	1010385		IN 660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW
CR45					
CR46					

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1010397		2N930		
Q6	1010397		2N930		
Q7	1010285		2N722		
Q8	1010397		2N930		
Q9	1010285		2N722		
Q10	1010397		2N930		
Q11	1010285		2N722		
Q12	1010397		2N930		
Q13	1010285		2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
T3	1010466		DO-T500		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750-68	33K	1006750-64	22 K	1010369-93	330 K
-69	36K	-65	24 K	-94	360 K
-70	39K	-66	27 K	-95	390 K
-71	43K	-67	30 K	-96	430 K
-72	47K	-68	33 K	-97	470 K
-73	51 K	-69	36 K	-98	510 K
-74	56K	-70	39 K	-99	560 K
-75	62K	-71	43 K	-100	620 K
-76	68K	-72	47 K	-101	680 K
-77	75K	-73	51 K	-102	750 K
-78	82K	-74	56 K	-103	820 K
-79	91 K	-75	62 K	-104	910 K
-80	100K	-76	68 K	-105	1 MEG
-81	110K	-77	75 K	—	—
1006750-82	120K	1006750-78	82 K	1010369-106	1.1 MEG

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN Q. D. Lee DATE 8 APR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

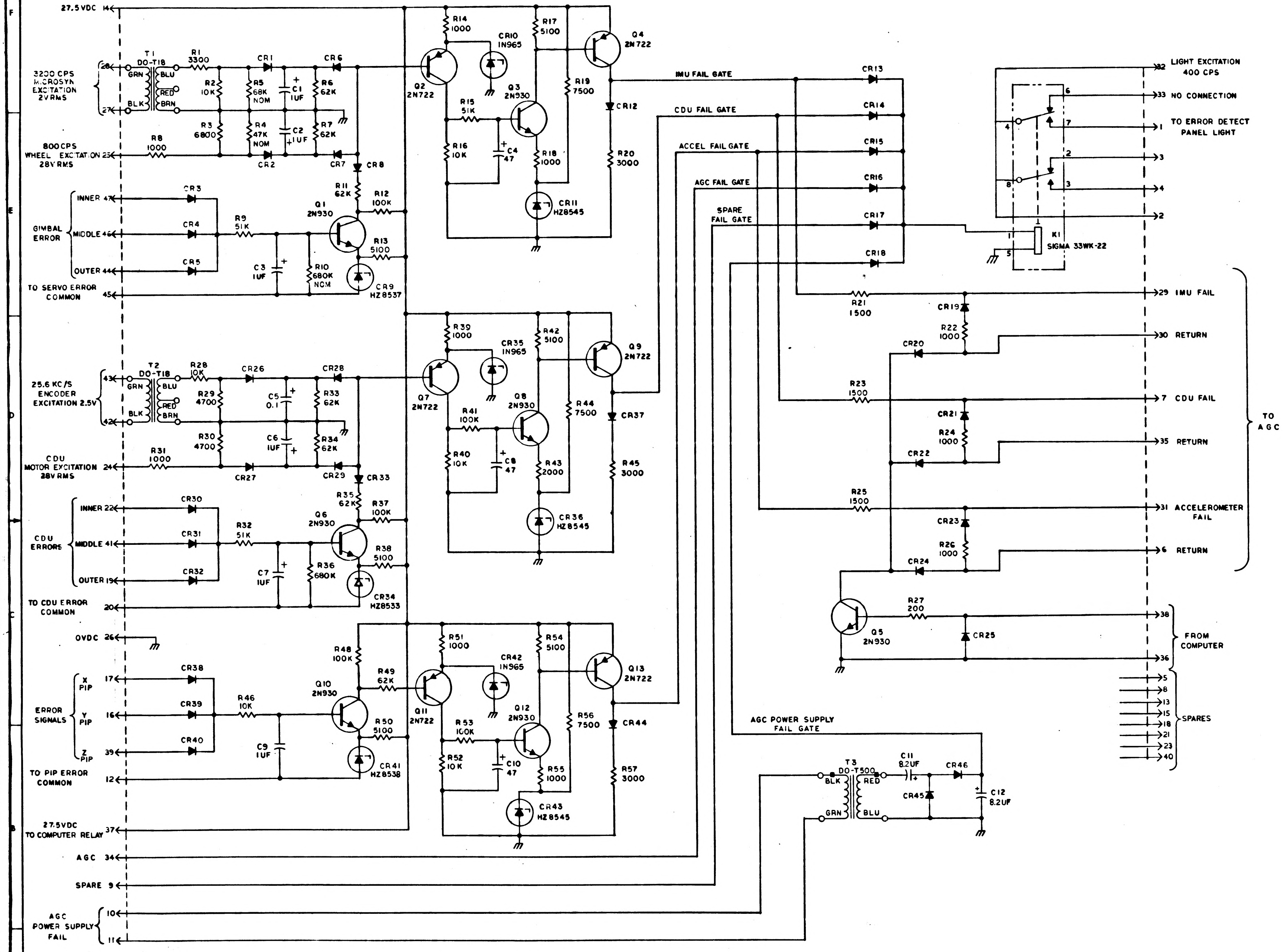
CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010033
SCALE —	WT —	SHEET 2 OF 2

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

		REVISIONS TDRR 00842		
	SYM	DESCRIPTION	DATE	APPROVAL
(M)	A	REVISED PER TDRR 01189	5-8-63	A.R. WK
(M)	B	REVISED PER TDRR 01616	6-17-63	JJA. WK


6
5
4
3
2
1
F
E
D
C
B
A
27.5VDC 14
3200 CPS MICROSYN EXCITATION 2V RMS
28
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
R2 10K
R3 6800
R5 68K NOM
R4 47K NOM
C1 1UF
C2 1UF
R6 62K
R7 62K
CR1
CR2
CR6
CR7
CR8
800 CPS WHEEL EXCITATION 25
28V RMS
R8 1000
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
C3 1UF
R10 680K NOM
Q1 2N930
R11 62K
R12 100K
R13 5100
CR9 HZ8537
TO SERVO ERROR COMMON 45
R14 1000
CR10 1N965
Q2 2N722
R15 51K
Q3 2N930
R16 10K
C4 47
R17 5100
R18 1000
CR11 HZ8545
Q4 2N722
R19 7500
CR12
R20 3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
SPARE FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
GRN
BLK
BLU
RED
BRN
R28 10K
CR26
CR28
R29 4700
R30 4700
C5 0.1
C6 1UF
R33 62K
R34 62K
CDU MOTOR EXCITATION 24
28V RMS
R31 1000
CR27
CR29
CR33
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
C7 1UF
R36 680K
Q6 2N930
R35 62K
R37 100K
R38 5100
CR34 HZ8533
TO CDU ERROR COMMON 20
R39 1000
CR35 1N965
Q7 2N722
R41 100K
Q8 2N930
R40 10K
C8 47
R42 5100
R43 2000
CR36 HZ8545
Q9 2N722
R44 7500
CR37
R45 3000
OVDC 26
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
TO PIP ERROR COMMON 12
R48 100K
Q10 2N930
R49 62K
R50 5100
CR41 HZ8538
R51 1000
Q11 2N722
CR42 1N965
R53 100K
Q12 2N930
R52 10K
C10 47
R54 5100
R55 1000
CR43 HZ8545
Q13 2N722
R56 7500
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
SPARE 9
AGC POWER SUPPLY FAIL
10
11
AGC POWER SUPPLY FAIL GATE
T3 DO-T500
BLK
GRN
RED
BLU
C11 8.2UF
CR46
CR45
C12 8.2UF
K1 SIGMA 33WK-22
1
2
3
4
5
6
7
8
32 LIGHT EXCITATION 400 CPS
33 NO CONNECTION
1 TO ERROR DETECT PANEL LIGHT
3
4
2
R21 1500
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 1500
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 1500
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N930
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
SPARES

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE 1N660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN A. D. Loo DATE 3 APR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL WKupfer 17 Jun 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE —
WT —
SHEET 1 OF 2

1010033 B

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 01167	5-4-63	MC WK
B	REVISED PER TDRR 01614	6-18-63	JSM WK

(M)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4W
R2	-51		1600		
R3	-45		3600		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	↓ -32		1000	↓	↓
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8W
R11	1006750-75		62K	±2%	1/4W
R12	↓ -80		100K		↓
R13	1006750-49		5100		1/4W
R14	1006760-32		1000		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	-36		1500		
R22	-32		1000		
R23	-36		1500		
R24	-32		1000		
R25	-36		1500		
R26	↓ -32		1000		↓
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	↓ -75		62K	↓	↓
R35	1006750-75		62K	±2%	1/4W
R36	1010369 -101		680K	±5%	1/8W
R37	1006750-80		100K	±2%	1/4W
R38	1006750-49		5100		1/4W
R39	1006760-32		1000		1/2W
R40	1006750-56		10K		1/4W
R41	-80		100K		
R42	-49		5100		
R43	↓ -39		2000		↓
R44	1006750-53		7500		1/4W
R45	1006760-43		3000	↓	1/2W
R46	1006750-56		10K	±2%	1/4W
R47	DELETED		——	——	——
R48	1006750-80		100K	±2%	1/4W
R49	↓ -75		62K		1/4W
R50	1006750-49		5100		1/4W
R51	1006760-32		1000		1/2W
R52	1006750-56		10K		1/4W
R53	-80		100K		
R54	-49		5100		
R55	↓ -32		1000		↓
R56	1006750-53		7500	↓	1/4W
R57	1006760-43	↓	3000	±2%	1/2W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
C11	↓ -80		8.2	↓	↓
C12	1006755-80	↓	8.2	±10%	35VDC
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7	↓		↓		↓
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	↓		↓		↓
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39	↓		↓		↓
CR40	1010385		IN 660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW
CR45					
CR46	↓	↓	↓		↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1010397		2N930		
Q6	1010397		2N930		
Q7	1010285		2N722		
Q8	1010397		2N930		
Q9	1010285		2N722		
Q10	1010397		2N930		
Q11	1010285		2N722		
Q12	1010397	↓	2N930		
Q13	1010285		2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
T3	1010466	↓	DO-T500		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 -45	3.6K	1006750 -60	15K	1010369 -93	330K
-46	3.9K	-61	16K	-94	360K
-47	4.3K	-62	18K	-95	390K
-48	4.7K	-63	20K	-96	430K
-49	5.1K	-64	22K	-97	470K
-50	5.6K	-65	24K	-98	510K
-51	6.2K	-66	27K	-99	560K
-52	6.8K	-67	30K	-100	620K
-53	7.5K	-68	33K	-101	680K
-54	8.2K	-69	36K	-102	750K
-55	9.1K	-70	39K	-103	820K
-56	10K	-71	43K	-104	910K
-57	11K	-72	47K	-105	1MEG
-58	12K	-73	51K	↓ – –	——
-59	13K	-74	56K	1010369 -106	1.1MEG
-60	15K	-75	62K		
-61	16K	-76	68K		
-62	18K	↓ -77	75K		
-63	20K	1006750 -78	82K		
64	22K				
-65	24K				
-66	27K				
-67	30K				
-68	33K				
-69	36K				
-70	39K				
↓ -71	43K				
1006750 72	47K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN A. D. Lee DATE 8 APR 63
CHECKED Manuel Kramer 8 May 63
APPROVAL Manuel Kramer 8 May 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 8 May 63

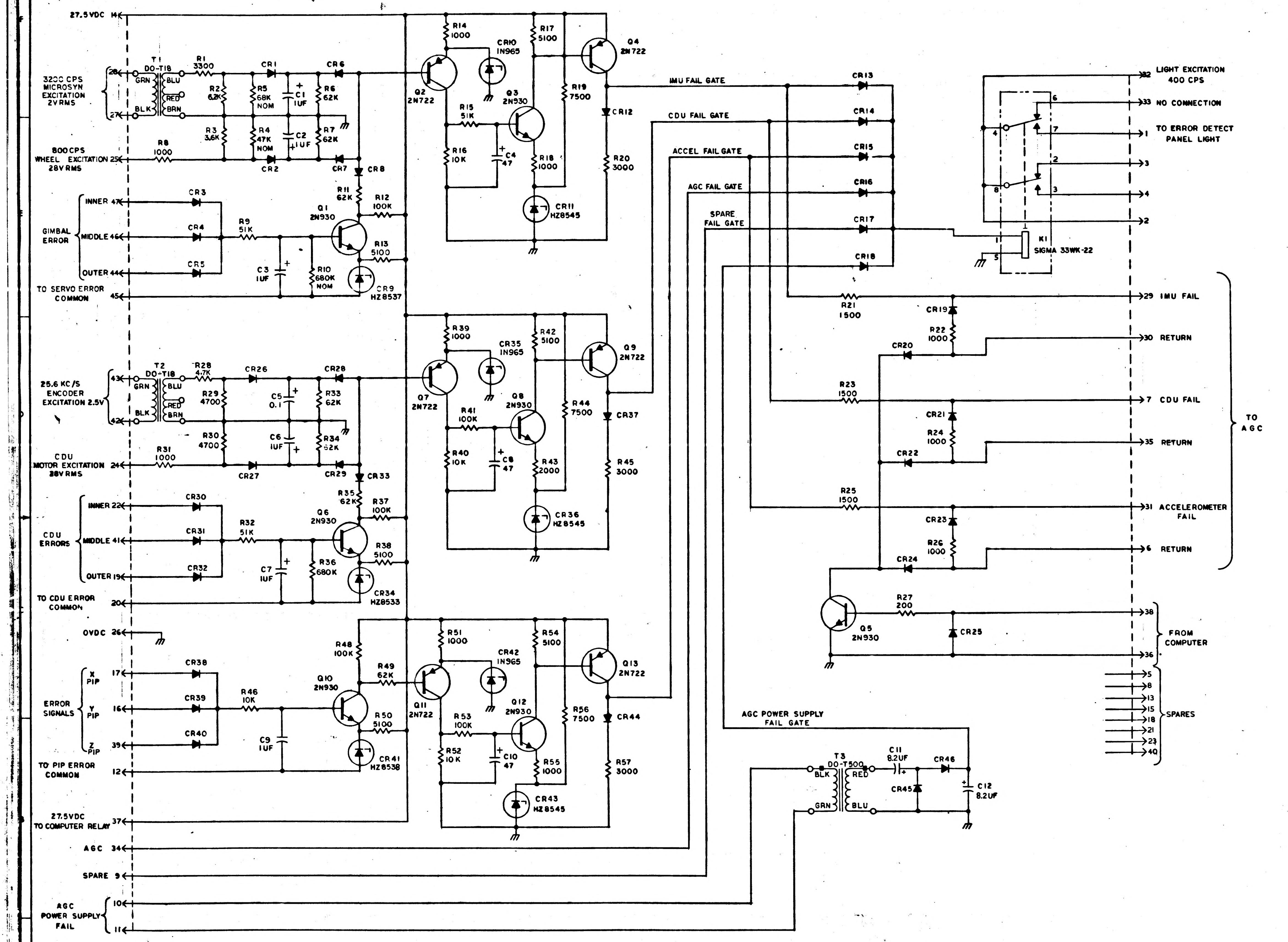
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE —
WT —
SHEET 2 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 00842		
A	REVISED PER TDRR 01187	5-8-63	MR WK
B	REVISED PER TDRR 01616	6-19-63	TJR WK
C	REVISED PER TDRR 01849	7-2-63	JJA WK



27.5VDC 14
3200 CPS MICROSYN EXCITATION 2V RMS
28
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
CR1
CR6
R2 6.2K
R5 68K NOM
C1 1UF
R6 62K
R3 3.6K
R4 47K NOM
C2 1UF
R7 62K
800 CPS WHEEL EXCITATION 28V RMS 25
R8 1000
CR2
CR7
CR8
R11 62K
R12 100K
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
Q1 2N930
R13 5100
C3 1UF
R10 680K NOM
CR9 HZ8537
TO SERVO ERROR COMMON 45
R14 1000
CR10 1N965
Q2 2N722
R15 51K
R16 10K
Q3 2N930
C4 47
R17 5100
R18 1000
CR11 HZ8545
Q4 2N722
R19 7500
CR12
R20 3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
SPARE FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
K1 SIGMA 33WK-22
LIGHT EXCITATION 400 CPS 32
NO CONNECTION 33
TO ERROR DETECT PANEL LIGHT 1
3
4
2
R21 1500
29 IMU FAIL
CR19
R22 1000
CR20
30 RETURN
R23 1500
7 CDU FAIL
CR21
R24 1000
CR22
35 RETURN
R25 1500
31 ACCELEROMETER FAIL
CR23
R26 1000
CR24
6 RETURN
TO AGC
Q5 2N930
R27 200
CR25
38
36
FROM COMPUTER
5 8 13 15 18 21 23 40
SPARES
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
R28 4.7K
CR26
CR28
R29 4700
C5 0.1
R33 62K
R30 4700
C6 1UF
R34 62K
CDU MOTOR EXCITATION 28V RMS 24
R31 1000
CR27
CR29
CR33
R35 62K
R37 100K
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
Q6 2N930
R38 5100
C7 1UF
R36 680K
CR34 HZ8533
TO CDU ERROR COMMON 20
R39 1000
CR35 1N965
Q7 2N722
R41 100K
R40 10K
Q8 2N930
C8 47
R42 5100
R43 2000
CR36 HZ8545
Q9 2N722
R44 7500
CR37
R45 3000
0VDC 26
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
TO PIP ERROR COMMON 12
R48 100K
Q10 2N930
R49 62K
R50 5100
CR41 HZ8538
R51 1000
CR42 1N965
Q11 2N722
R53 100K
R52 10K
Q12 2N930
C10 47
R54 5100
R55 1000
CR43 HZ8545
Q13 2N722
R56 7500
CR44
R57 3000
AGC POWER SUPPLY FAIL GATE
T3 DO-T500
BLK
GRN
RED
BLU
C11 8.2UF
CR46
CR45
C12 8.2UF
27.5VDC TO COMPUTER RELAY 37
AGC 34
SPARE 9
AGC POWER SUPPLY FAIL
10
11

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT

DRAWN A. DiLao DATE 3 APR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE — WT — SHEET 1 OF 2

1010033 C

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 01187	5-8-63	RK WK
B	REVISED PER TDRR 01614	6-18-63	JJM WK
C	REVISED PER TDRR 01849	7-2-63	JJM WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4 W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	-32		1000		
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEENOTE	±5%	1/8 W
R11	1006750-75		62K	±2%	1/4 W
R12	-80		100K		
R13	1006750-49		5100		1/4W
R14	1006760-32		1000		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	-36		1500		
R22	-32		1000		
R23	-36		1500		
R24	-32		1000		
R25	-36		1500		
R26	-32		1000		
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	-75		62K		
R35	1006750-75		62K	±2%	1/4 W
R36	1010369 -101		680K	±5%	1/8 W
R37	1006750 -80		100K	±2%	1/4 W
R38	1006750 -49		5100		1/4 W
R39	1006760 -32		1000		1/2 W
R40	1006750 -56		10K		1/4 W
R41	-80		100K		
R42	-49		5100		
R43	-39		2000		
R44	1006750 -53		7500		1/4 W
R45	1006760 -43		3000		1/2 W
R46	1006750 -56		10K	±2%	1/4 W
R47	DELETED		—	—	—
R48	1006750 -80		100K	±2%	1/4 W
R49	-75		62K		1/4 W
R50	1006750 -49		5100		1/4 W
R51	1006760 -32		1000		1/2 W
R52	1006750 -56		10K		1/4 W
R53	-80		100K		
R54	-49		5100		
R55	-32		1000		
R56	1006750 -53		7500		1/4 W
R57	1006760 -43		3000	±2%	1/2 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
C11	-80		8.2		
C12	1006755-80		8.2	±10%	35VDC
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32					
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39					
CR40	1010385		IN 660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW
CR45					
CR46					

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1010397		2N930		
Q6	1010397		2N 930		
Q7	1010285		2N 722		
Q8	1010397		2N930		
Q9	1010285		2N 722		
Q10	1010397		2N 930		
Q11	1010285		2N 722		
Q12	1010397		2N 930		
Q13	1010285		2N 722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
T3	1010466		DO-T500		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 45	3.6 K	1006750 - 60	15 K	1010369 - 93	330 K
- 46	3.9 K	- 61	16 K	- 94	360 K
- 47	4.3 K	- 62	18 K	- 95	390 K
- 48	4.7 K	- 63	20 K	- 96	430 K
- 49	5.1 K	- 64	22 K	- 97	470 K
- 50	5.6 K	- 65	24 K	- 98	510 K
- 51	6.2 K	- 66	27 K	- 99	560 K
- 52	6.8 K	- 67	30 K	-100	620 K
- 53	7.5 K	- 68	33 K	-101	680 K
- 54	8.2 K	- 69	36 K	-102	750 K
- 55	9.1 K	- 70	39 K	-103	820 K
- 56	10 K	- 71	43 K	-104	910 K
- 57	11 K	- 72	47 K	-105	1 MEG
- 58	12 K	- 73	51 K	—	—
- 59	13 K	- 74	56 K	1010369 -106	1.1 MEG
- 60	15 K	- 75	62 K		
- 61	16 K	- 76	68 K		
- 62	18 K	- 77	75 K		
- 63	20 K	1006750 - 78	82 K		
- 64	22 K				
- 65	24 K				
- 66	27 K				
- 67	30 K				
- 68	33 K				
- 69	36 K				
- 70	39 K				
- 71	43 K				
1006750 - 72	47 K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN A. D. Lee DATE 5 MAY 63
CHECKED Manuel Kramer 5 May 63
APPROVAL Manuel Kramer 5 May 63
APPROVAL
NASA APPROVAL Jack Brennan
MIT APPROVAL W. Kupfer 8 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, FAILURE INDICATOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010033
SCALE — | WT — | SHEET 2 OF 2

MASTER

1010033 C

INCHES
PHOTOGRAPHIC SCALE ONLY

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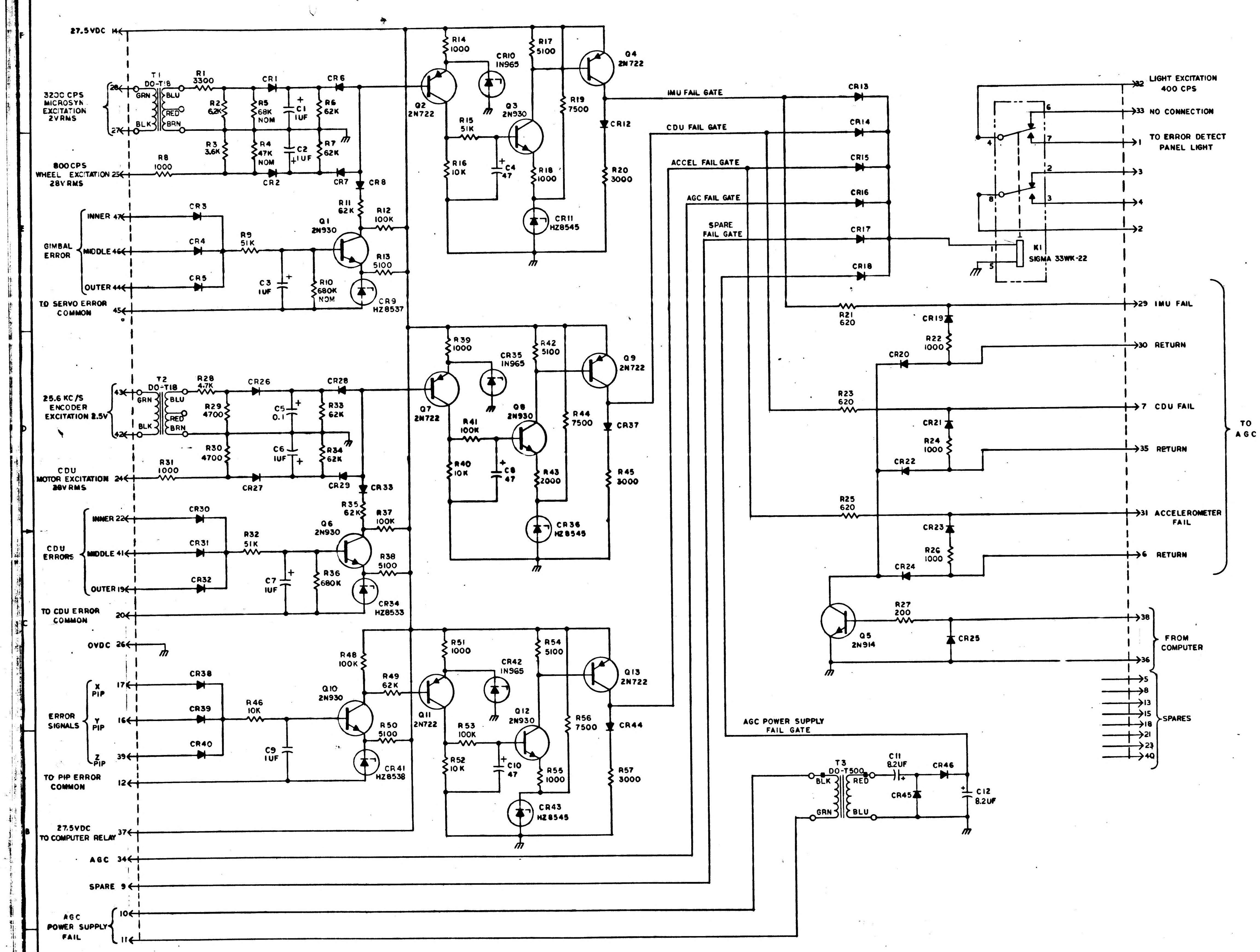
	REVISIONS TDRR 00842		
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01187	5-8-63	WK
B	REVISED PER TDRR 01614	6-17-63	WK
C	REVISED PER TDRR 01849	7-3-63	WK
D	REVISED PER TDRR 02163	7-24-63	WK


27.5VDC 14
3200 CPS MICROSYN EXCITATION 2VRMS
26
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
CR1
CR6
R2 6.2K
R5 68K NOM
C1 1UF
R6 62K
R3 3.6K
R4 47K NOM
C2 1UF
R7 62K
800CPS WHEEL EXCITATION 28VRMS 25
R8 1000
CR2
CR7
CR8
R14 1000
CR10 1N965
R17 5100
Q4 2N722
Q2 2N722
Q3 2N930
R15 51K
R19 7500
CR12
R16 10K
C4 47
R18 1000
R20 3000
CR11 HZ8545
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
Q1 2N930
R11 62K
R12 100K
R13 5100
C3 1UF
R10 680K NOM
CR9 HZ8537
TO SERVO ERROR COMMON 45
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
SPARE FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
32 LIGHT EXCITATION 400 CPS
33 NO CONNECTION
1 TO ERROR DETECT PANEL LIGHT
3
4
2
K1 SIGMA 33WK-22
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
SPARES
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
R28 4.7K
CR26
CR28
R29 4700
C5 0.1
R33 62K
R30 4700
C6 1UF
R34 62K
CDU MOTOR EXCITATION 28VRMS 24
R31 1000
CR27
CR29
CR33
R39 1000
CR35 1N965
R42 5100
Q9 2N722
Q7 2N722
Q8 2N930
R41 100K
R44 7500
CR37
R40 10K
C8 47
R43 2000
R45 3000
CR36 HZ8545
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
Q6 2N930
R35 62K
R37 100K
R38 5100
C7 1UF
R36 680K
CR34 HZ8533
TO CDU ERROR COMMON 20
OVDC 26
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
Q10 2N930
R48 100K
R49 62K
R50 5100
CR41 HZ8538
TO PIP ERROR COMMON 12
R51 1000
CR42 1N965
R54 5100
Q13 2N722
Q11 2N722
Q12 2N930
R53 100K
R56 7500
CR44
R52 10K
C10 47
R55 1000
R57 3000
CR43 HZ8545
27.5VDC TO COMPUTER RELAY 37
AGC 34
SPARE 9
AGC POWER SUPPLY FAIL 10 11
AGC POWER SUPPLY FAIL GATE
T3 DO-T500
C11 8.2UF
CR46
CR45
C12 8.2UF

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN A. DiLeo DATE 3 APR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, FAILURE INDICATOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010033
SCALE — | WT — | SHEET 1 OF 2

1010033 D

INCHES
PHOTOGRAPHIC SCALE ONLY

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 01187	5-8-63	MK WK
B	REVISED PER TDRR 01614	6-18-63	WK
C	REVISED PER TDRR 01849	7-2-63	WK
D	REVISED PER TDRR 02163	7-20-63	WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4 W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	↓ -32		1000	↓	↓
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8 W
R11	1006750-75		62K	±2%	1/4 W
R12	↓ -80		100K		↓
R13	1006750-49		5100		1/4 W
R14	1006760-32		1000		1/2 W
R15	1006750-73		51K		1/4 W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	-27		620		
R22	-32		1000		
R23	-27		620		
R24	-32		1000		
R25	-27		620		
R26	↓ -32		1000		↓
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	↓ -75		62K	↓	↓
R35	1006750-75		62K	±2%	1/4 W
R36	1010369 -101		680K	±5%	1/8 W
R37	1006750 -80		100K	±2%	1/4 W
R38	1006750-49		5100		1/4 W
R39	1006760-32		1000		1/2 W
R40	1006750-56		10K		1/4 W
R41	-80		100K		
R42	-49		5100		
R43	↓ -39		2000		↓
R44	1006750 -53		7500		1/4 W
R45	1006760 -43		3000	↓	1/2 W
R46	1006750 -56		10K	±2%	1/4 W
R47	DELETED		——	——	——
R48	1006750 -80		100K	±2%	1/4 W
R49	↓ -75		62K		1/4 W
R50	1006750 -49		5100		1/4 W
R51	1006760 -32		1000		1/2 W
R52	1006750 -56		10K		1/4 W
R53	-80		100K		
R54	-49		5100		
R55	↓ -32		1000		↓
R56	1006750 -53		7500	↓	1/4 W
R57	1006760 -43	↓	3000	±2%	1/2 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
C11	↓ -80		8.2	↓	↓
C12	1006755-80	↓	8.2	±10%	35VDC
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7	↓		↓		↓
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	↓		↓		↓
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39	↓		↓		↓
CR40	1010385		IN660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW
CR45					
CR46	↓	↓	↓		↓

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1006750		2N914		
Q6	1010397		2N930		
Q7	1010285		2N722		
Q8	1010397		2N930		
Q9	1010285		2N722		
Q10	1010397		2N930		
Q11	1010285		2N722		
Q12	1010397	↓	2N930		
Q13	1010285		2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
T3	1010466	↓	DO-T500		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 45	3.6 K	1006750 - 60	15 K	1010369 - 93	330 K
- 46	3.9 K	- 61	16 K	- 94	360 K
- 47	4.3 K	- 62	18 K	- 95	390 K
- 48	4.7 K	- 63	20 K	- 96	430 K
- 49	5.1 K	- 64	22 K	- 97	470 K
- 50	5.6 K	- 65	24 K	- 98	510 K
- 51	6.2 K	- 66	27 K	- 99	560 K
- 52	6.8 K	- 67	30 K	-100	620 K
- 53	7.5 K	- 68	33 K	-101	680 K
- 54	8.2 K	- 69	36 K	-102	750 K
- 55	9.1 K	- 70	39 K	-103	820 K
- 56	10 K	- 71	43 K	-104	910 K
- 57	11 K	- 72	47 K	-105	1 MEG
- 58	12 K	- 73	51 K	↓ — —	——
- 59	13 K	- 74	56 K	1010369 -106	1.1 MEG
- 60	15 K	- 75	62 K		
- 61	16 K	- 76	68 K		
- 62	18 K	↓ - 77	75 K		
- 63	20 K	1006750 - 78	82 K		
- 64	22 K				
- 65	24 K				
- 66	27 K				
- 67	30 K				
- 68	33 K				
- 69	36 K				
- 70	39 K				
↓ - 71	43 K				
1006750 - 72	47 K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO CONTRACT
DRAWN A. D. Lee DATE [illegible]
CHECKED Manuel Kramer [illegible]
APPROVAL Manuel Kramer [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 8 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE — WT — SHEET 2 OF 2

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

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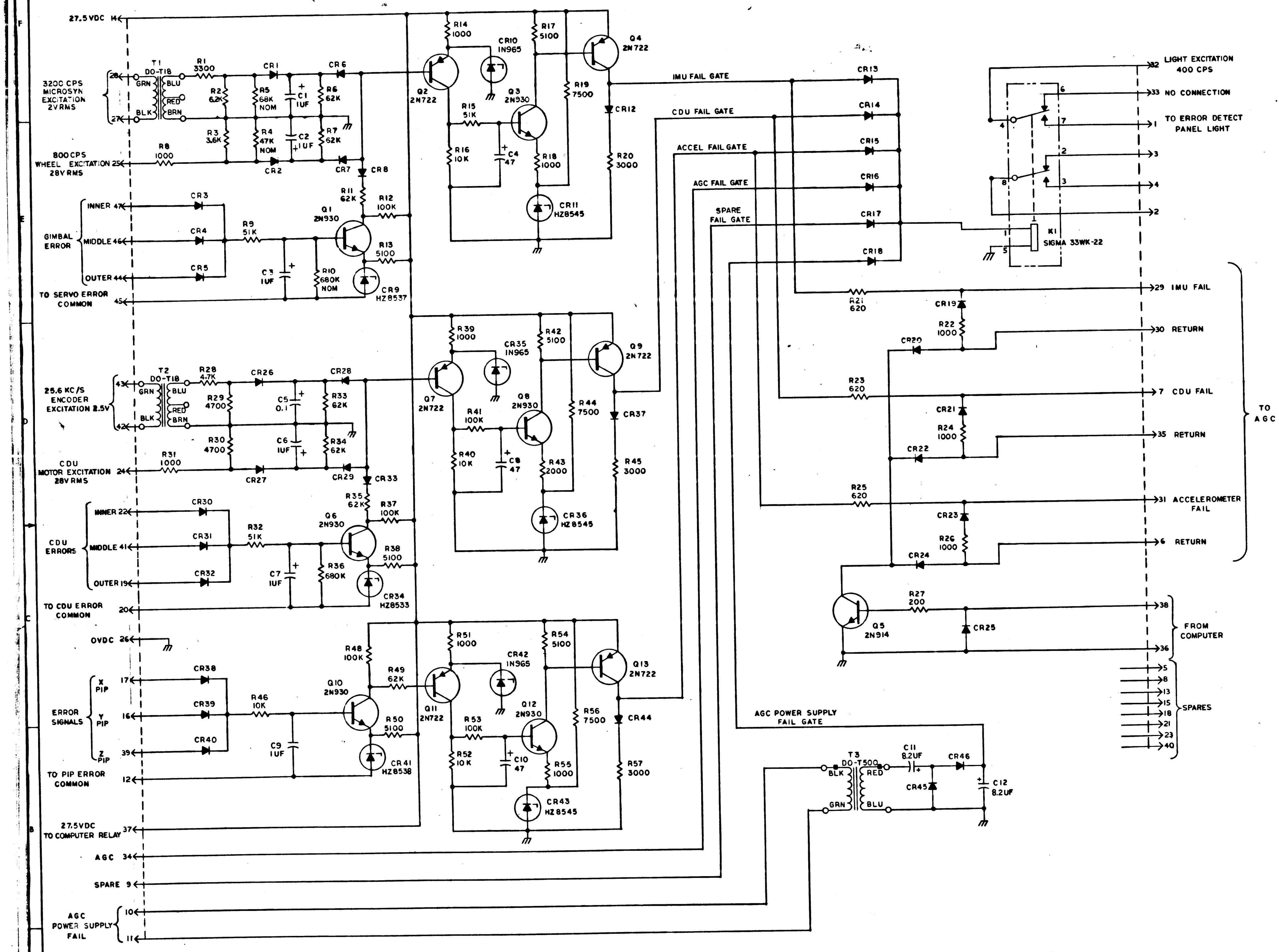
REVISIONS TDRR 0084

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01187	5-8-63	RK WK
B	REVISED PER TDRR 01614	6-19-63	JJA. WK
C	REVISED PER TDRR 01849	7-3-63	JJA WK
D	REVISED PER TDRR 02163	7-24-63	JJA WK
E	REVISED PER TDRR 02456	8-7-63	JJA WK


27.5VDC 14
3200 CPS MICROSYN EXCITATION 2VRMS
28
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
CR1
CR6
R2 6.2K
R5 68K NOM
C1 1UF
R6 62K
R3 3.6K
R4 47K NOM
C2 1UF
R7 62K
800CPS WHEEL EXCITATION 25
28VRMS
R8 1000
CR2
CR7
CR8
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
C3 1UF
R10 680K NOM
R11 62K
R12 100K
Q1 2N930
R13 5100
CR9 HZ8537
TO SERVO ERROR COMMON 45
R14 1000
CR10 1N965
Q2 2N722
R15 51K
Q3 2N930
C4 47
R16 10K
R17 5100
R18 1000
CR11 HZ8545
Q4 2N722
R19 7500
CR12
R20 3000
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
R28 4.7K
CR26
CR28
R29 4700
C5 0.1
R33 62K
R30 4700
C6 1UF
R34 62K
CDU MOTOR EXCITATION 24
28V RMS
R31 1000
CR27
CR29
CR33
R35 62K
R37 100K
Q6 2N930
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
C7 1UF
R36 680K
R38 5100
CR34 HZ8533
TO CDU ERROR COMMON 20
R39 1000
CR35 1N965
Q7 2N722
R41 100K
Q8 2N930
R40 10K
C8 47
R42 5100
R43 2000
CR36 HZ8545
Q9 2N722
R44 7500
CR37
R45 3000
0VDC 26
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
R48 100K
Q10 2N930
R49 62K
R50 5100
CR41 HZ8538
TO PIP ERROR COMMON 12
R51 1000
CR42 1N965
Q11 2N722
R53 100K
Q12 2N930
R52 10K
C10 47
R54 5100
R55 1000
CR43 HZ8545
Q13 2N722
R56 7500
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
SPARE 9
AGC POWER SUPPLY FAIL
10
11
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
SPARE FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
K1 SIGMA 33WK-22
1
5
6
7
4
2
8
3
LIGHT EXCITATION 400 CPS 32
NO CONNECTION 33
TO ERROR DETECT PANEL LIGHT 1
3
4
2
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
SPARES
AGC POWER SUPPLY FAIL GATE
T3 DO-T500
BLK
GRN
RED
BLU
C11 8.2UF
CR46
CR45
C12 8.2UF

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT

DRAWN A. D. Leo DATE 3 APR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE — WT — SHEET 1 OF 2

1010033 F

INCHES 0 1 2
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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 01187	5-8-63	WK
B	REVISED PER TDRR 01614	6-19-63	WK
C	REVISED PER TDRR 01849	7-2-63	WK
D	REVISED PER TDRR 02163	9-20-63	WK
E	REVISED PER TDRR 02456	8-7-63	WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	-32		1000		
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8W
R11	1006750-75		62K	±2%	1/4W
R12	-80		100K		
R13	1006750-49		5100		1/4W
R14	1006760-32		1000		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	-27		620		
R22	-32		1000		
R23	-27		620		
R24	-32		1000		
R25	-27		620		
R26	-32		1000		
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	-75		62K		
R35	1006750 -75		62K	±2%	1/4W
R36	1010369 -101		680K	±5%	1/8W
R37	1006750 -80		100K	±2%	1/4W
R38	1006750 -49		5100		1/4W
R39	1006760 -32		1000		1/2W
R40	1006750 -56		10K		1/4W
R41	-80		100K		
R42	-49		5100		
R43	-39		2000		
R44	1006750 -53		7500		1/4W
R45	1006760 -43		3000		1/2W
R46	1006750 -56		10K	±2%	1/4W
R47	DELETED		—	—	—
R48	1006750 -80		100K	±2%	1/4W
R49	-75		62K		1/4W
R50	1006750 -49		5100		1/4W
R51	1006760 -32		1000		1/2W
R52	1006750 -56		10K		1/4W
R53	-80		100K		
R54	-49		5100		
R55	-32		1000		
R56	1006750 -53		7500		1/4W
R57	1006760 -43		3000	±2%	1/2W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
C11	-80		8.2		
C12	1006755-80		8.2	±10%	35VDC
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32					
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39					
CR40	1010385		IN660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW
CR45					
CR46					

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1006752		2N914		
Q6	1010397		2N930		
Q7	1010285		2N722		
Q8	1010397		2N930		
Q9	1010285		2N722		
Q10	1010397		2N930		
Q11	1010285		2N722		
Q12	1010397		2N930		
Q13	1010285		2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
T3	1010466		DO-T500		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 45	3.6K	1006750 - 60	15K	1010369 - 93	330K
- 46	3.9K	- 61	16K	- 94	360K
- 47	4.3K	- 62	18K	- 95	390K
- 48	4.7K	- 63	20K	- 96	430K
- 49	5.1K	- 64	22K	- 97	470K
- 50	5.6K	- 65	24K	- 98	510K
- 51	6.2K	- 66	27K	- 99	560K
- 52	6.8K	- 67	30K	-100	620K
- 53	7.5K	- 68	33K	-101	680K
- 54	8.2K	- 69	36K	-102	750K
- 55	9.1K	- 70	39K	-103	820K
- 56	10K	- 71	43K	-104	910K
- 57	11K	- 72	47K	-105	1 MEG
- 58	12K	- 73	51K	— —	—
- 59	13K	- 74	56K	1010369 -106	1.1 MEG
- 60	15K	- 75	62K		
- 61	16K	- 76	68K		
- 62	18K	- 77	75K		
- 63	20K	1006750 - 78	82K		
- 64	22K				
- 65	24K				
- 66	27K				
- 67	30K				
- 68	33K				
- 69	36K				
- 70	39K				
- 71	43K				
1006750 - 72	47K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
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HEAT TREATMENT
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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT

DRAWN A. D. Lee DATE [illegible]
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL
MIT APPROVAL 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010033

SCALE — WT — SHEET 2 OF 2

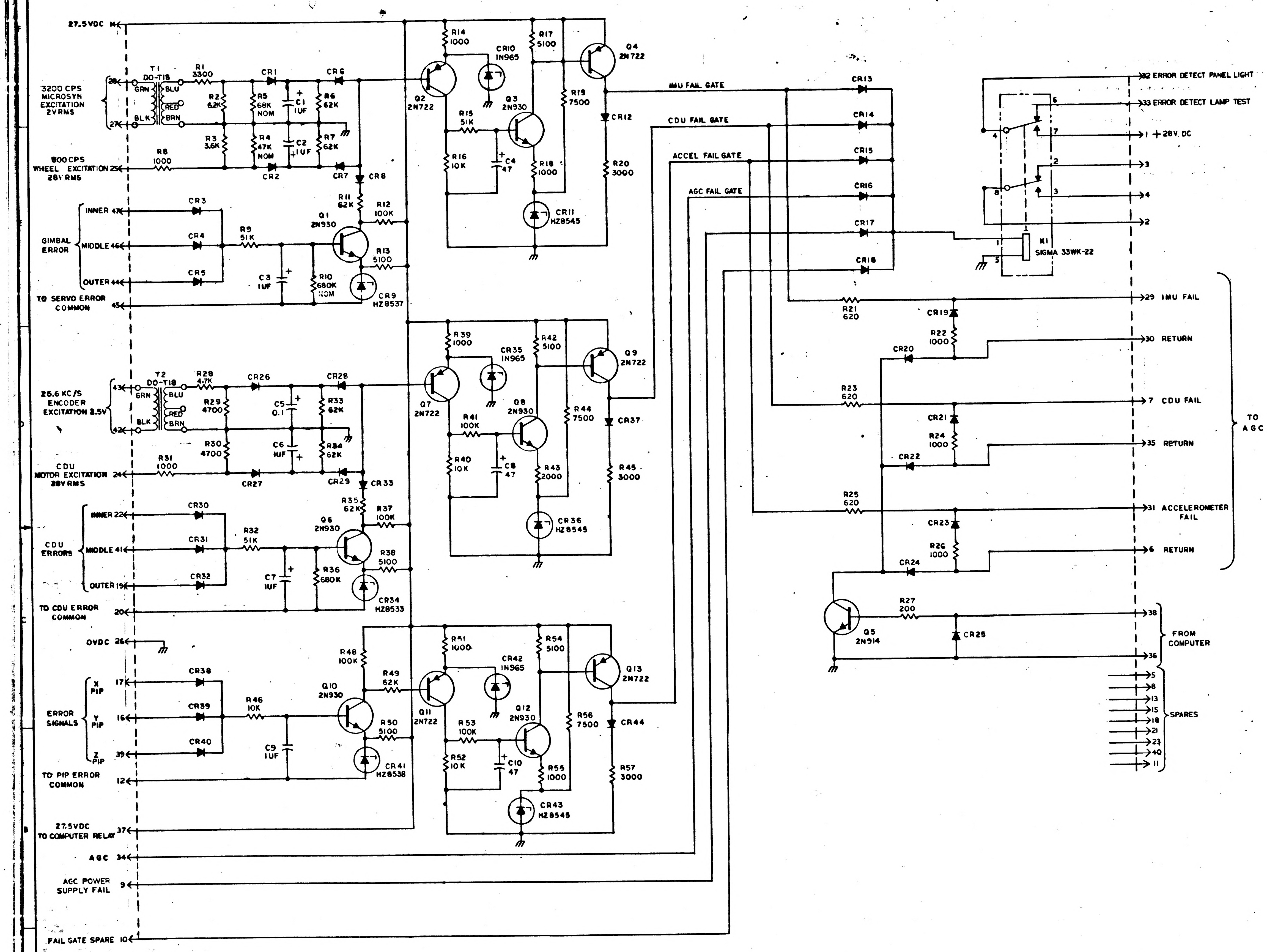
1010033 E

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01187	5-8-63	[illegible] WK
B	REVISED PER TDRR 01614	6-17-63	[illegible] WK
C	REVISED PER TDRR 01849	7-2-63	[illegible] WK
D	REVISED PER TDRR 02163	7-[illegible]-63	[illegible] WK
E	REVISED PER TDRR 02456	8-7-63	[illegible] WK
F	REVISED PER TDRR 03282	9-18-63	[illegible] WK

REVISIONS TDRR 00942


27.5VDC 14
3200 CPS MICROSYN EXCITATION 2V RMS
28
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
R2 62K
R3 3.6K
R5 68K NOM
R4 47K NOM
C1 1UF
C2 1UF
R6 62K
R7 62K
CR1
CR6
CR2
CR7
CR8
800CPS WHEEL EXCITATION 28V RMS 25
R8 1000
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
C3 1UF
R10 680K NOM
Q1 2N930
R11 62K
R12 100K
R13 5100
CR9 HZ8537
TO SERVO ERROR COMMON 45
R14 1000
CR10 1N965
Q2 2N722
R15 51K
R16 10K
C4 47
Q3 2N930
R17 5100
R18 1000
R19 7500
CR11 HZ8545
Q4 2N722
CR12
R20 3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
1 + 28V DC
3
4
2
K1 SIGMA 33WK-22
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
R28 4.7K
R29 4700
R30 4700
C5 0.1
C6 1UF
R33 62K
R34 62K
CR26
CR28
CR27
CR29
CR33
CDU MOTOR EXCITATION 28V RMS 24
R31 1000
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
C7 1UF
R36 680K
Q6 2N930
R35 62K
R37 100K
R38 5100
CR34 HZ8533
TO CDU ERROR COMMON 20
R39 1000
CR35 1N965
Q7 2N722
R41 100K
R40 10K
C8 47
Q8 2N930
R42 5100
R43 2000
R44 7500
CR36 HZ8545
Q9 2N722
CR37
R45 3000
OVDC 26
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
C9 1UF
Q10 2N930
R48 100K
R49 62K
R50 5100
CR41 HZ8538
TO PIP ERROR COMMON 12
R51 1000
CR42 1N965
Q11 2N722
R53 100K
R52 10K
C10 47
Q12 2N930
R54 5100
R55 1000
R56 7500
CR43 HZ8545
Q13 2N722
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
FAIL GATE SPARE 10
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
11
SPARES

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. Di Lao DATE 3 APR 63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE —
WT —
SHEET 1 OF 2

1010033 F

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS				
SYM	DESCRIPTION	DATE	APPROVAL	
A	INITIAL RELEASE CLASS A PER TDRR 01187	5-8-63	[illegible]	WK
B	REVISED PER TDRR 01614	6-18-63	[illegible]	WK
C	REVISED PER TDRR 01849	7-2-63	[illegible]	WK
D	REVISED PER TDRR 02163	8-20-63	[illegible]	WK
E	REVISED PER TDRR 02456	9-7-63	[illegible]	WK
F	REVISED PER TDRR 03262	9/18/63	[illegible]	WK

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	-32		1000		
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8W
R11	1006750-75		62K	±2%	1/4W
R12	-80		100K		
R13	1006750-49		5100		1/4W
R14	1006760-32		1000		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	-27		620		
R22	-32		1000		
R23	-27		620		
R24	-32		1000		
R25	-27		620		
R26	-32		1000		
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	-75		62K		
R35	1006750-75		62K	±2%	1/4W
R36	1010369 -101		680K	±5%	1/8W
R37	1006750 -80		100K	±2%	1/4W
R38	1006750-49		5100		1/4W
R39	1006760-32		1000		1/2W
R40	1006750-56		10K		1/4W
R41	-80		100K		
R42	-49		5100		
R43	-39		2000		
R44	1006750 -53		7500		1/4W
R45	1006760 -43		3000		1/2W
R46	1006750 -56		10K	±2%	1/4W
R47	DELETED		—	—	—
R48	1006750 -80		100K	±2%	1/4W
R49	-75		62K		1/4W
R50	1006750 -49		5100		1/4W
R51	1006760 -32		1000		1/2W
R52	1006750 -56		10K		1/4W
R53	-80		100K		
R54	-49		5100		
R55	-32		1000		
R56	1006750 -53		7500		1/4W
R57	1006760 -43		3000	±2%	1/2W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32					
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39					
CR40	1010385		IN660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1006752		2N914		
Q6	1010397		2N930		
Q7	1010285		2N722		
Q8	1010397		2N930		
Q9	1010285		2N722		
Q10	1010397		2N930		
Q11	1010285		2N722		
Q12	1010397		2N930		
Q13	1010285		2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750 - 15	3.6K	1006750 - 60	15K	1010369 - 93	330K
- 46	3.9K	- 61	16K	- 94	360K
- 47	4.3K	- 62	18K	- 95	390K
- 48	4.7K	- 63	20K	- 96	430K
- 49	5.1K	- 64	22K	- 97	470K
- 50	5.6K	- 65	24K	- 98	510K
- 51	6.2K	- 66	27K	- 99	560K
- 52	6.8K	- 67	30K	-100	620K
- 53	7.5K	- 68	33K	-101	680K
- 54	8.2K	- 69	36K	-102	750K
- 55	9.1K	- 70	39K	-103	820K
- 56	10K	- 71	43K	-104	910K
- 57	11K	- 72	47K	-105	1MEG
- 58	12K	- 73	51K	—	—
- 59	13K	- 74	56K	1010369 - 106	1.1MEG
- 60	15K	- 75	62K		
- 61	16K	- 76	68K		
- 62	18K	- 77	75K		
- 63	20K	1006750 - 78	82K		
- 64	22K				
- 65	24K				
- 66	27K				
- 67	30K				
- 68	33K				
- 69	36K				
- 70	39K				
- 71	43K				
1006750 - 72	47K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN Q. D. Lea DATE [illegible]
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

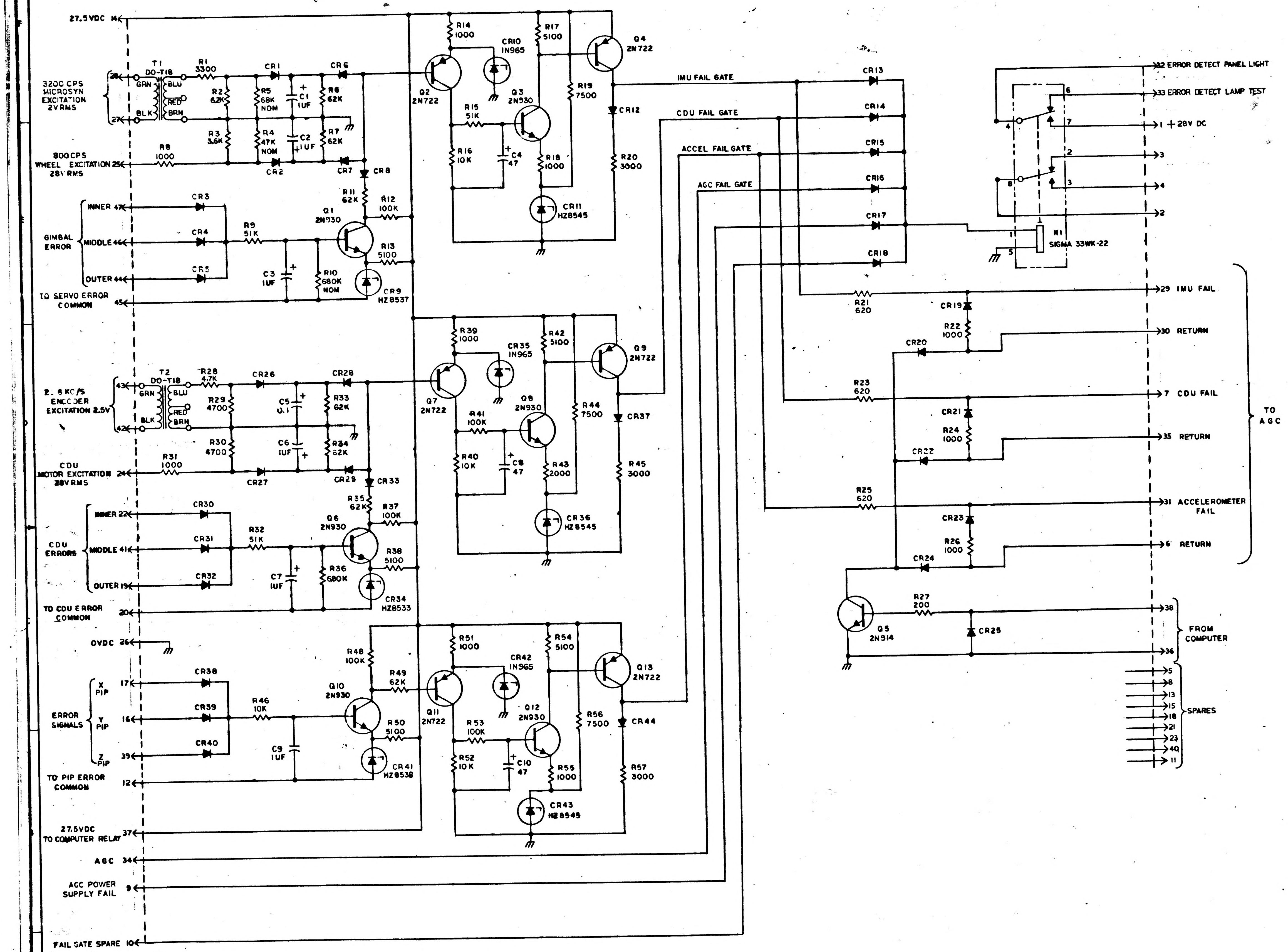
SCHEMATIC, FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE —
WT —
SHEET 2 OF 2

MASTER

INCHES
0
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 00842		
A	REVISED PER TDRR 01189	5-8-63	WK
B	REVISED PER TDRR 01616	6-17-63	WK
C	REVISED PER TDRR 01849	7-2-63	WK
D	REVISED PER TDRR 02163	7-24-63	WK
E	REVISED PER TDRR 02456	8-7-63	WK
F	REVISED PER TDRR 03282	9-18-63	WK
G	REVISED PER TDRR 03941	10-14-63	


27.5VDC 14
3200 CPS MICROSYN EXCITATION 2VRMS
800CPS WHEEL EXCITATION 28V RMS 25
GIMBAL ERROR INNER 47 MIDDLE 46 OUTER 44
TO SERVO ERROR COMMON 45
2.6KC/S ENCODER EXCITATION 2.5V 43 42
CDU MOTOR EXCITATION 28VRMS 24
CDU ERRORS INNER 22 MIDDLE 41 OUTER 19
TO CDU ERROR COMMON 20
OVDC 26
ERROR SIGNALS X PIP 17 Y PIP 16 Z PIP 39
TO PIP ERROR COMMON 12
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
FAIL GATE SPARE 10
T1 DO-T18
T2 DO-T18
Q1 2N930
Q2 2N722
Q3 2N930
Q4 2N722
Q5 2N914
Q6 2N930
Q7 2N722
Q8 2N930
Q9 2N722
Q10 2N930
Q11 2N722
Q12 2N930
Q13 2N722
CR10 1N965
CR35 1N965
CR42 1N965
CR11 HZ8545
CR36 HZ8545
CR43 HZ8545
CR9 HZ8537
CR34 HZ8533
CR41 HZ8538
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
K1 SIGMA 33WK-22
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
1 +28V DC
29 IMU FAIL
30 RETURN
7 CDU FAIL
35 RETURN
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
38 36 FROM COMPUTER
5 8 13 15 18 21 23 40 11 SPARES

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE 1N660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN A. D. Lao DATE 3 APR 63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE — WT — SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL	
A	INITIAL RELEASE CLASS A PER TDRR 01187	5-8-63		WK
B	REVISED PER TDRR 01616	6-18-63		WK
C	REVISED PER TDRR 01849	7-2-63		WK
D	REVISED PER TDRR 02163	9-20-63		WK
E	REVISED PER TDRR 02456	8-7-63		WK
F	REVISED PER TDRR 03282	9/18/63		WK
6	REVISED PER TDRR 03941	10-14-63		

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	-32		1000		
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8W
R11	1006750-75		62K	±2%	1/4W
R12	-80		100K		
R13	1006750-49		5100		1/4W
R14	1006760-32		1000		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	1010604-3		620		
R22	1006750-32		1000		
R23	1010604-3		620		
R24	1006750-32		1000		
R25	1010604-3		620		
R26	1006750-32		1000		
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	-75		62K		
R35	1006750-75		62K	±2%	1/4W
R36	1010369-101		680K	±5%	1/8W
R37	1006750-80		100K	±2%	1/4W
R38	1006750-49		5100		1/4W
R39	1006760-32		1000		1/2W
R40	1006750-56		10K		1/4W
R41	-80		100K		
R42	-49		5100		
R43	-39		2000		
R44	1006750-53		7500		1/4W
R45	1006760-43		3000		1/2W
R46	1006750-56		10K	±2%	1/4W
R47	DELETED		—	—	—
R48	1006750-80		100K	±2%	1/4W
R49	-75		62K		1/4W
R50	1006750-49		5100		1/4W
R51	1006760-32		1000		1/2W
R52	1006750-56		10K		1/4W
R53	-80		100K		
R54	-49		5100		
R55	-32		1000		
R56	1006750-53		7500		1/4W
R57	1006760-43		3000	±2%	1/2W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32					
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39					
CR40	1010385		IN660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285		2N722		
Q3	1010397		2N930		
Q4	1010285		2N722		
Q5	1006752		2N914		
Q6	1010397		2N930		
Q7	1010285		2N722		
Q8	1010397		2N930		
Q9	1010285		2N722		
Q10	1010397		2N930		
Q11	1010285		2N722		
Q12	1010397		2N930		
Q13	1010285		2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750-45	3.6K	1006750-60	15K	1010369-93	330K
-46	3.9K	-61	16K	-94	360K
-47	4.3K	-62	18K	-95	390K
-48	4.7K	-63	20K	-96	430K
-49	5.1K	-64	22K	-97	470K
-50	5.6K	-65	24K	-98	510K
-51	6.2K	-66	27K	-99	560K
-52	6.8K	-67	30K	-100	620K
-53	7.5K	-68	33K	-101	680K
-54	8.2K	-69	36K	-102	750K
-55	9.1K	-70	39K	-103	820K
-56	10K	-71	43K	-104	910K
-57	11K	-72	47K	-105	1MEG
-58	12K	-73	51K	—	—
-59	13K	-74	56K	1010369-106	1.1MEG
-60	15K	-75	62K		
-61	16K	-76	68K		
-62	18K	-77	75K		
-63	20K	1006750-78	82K		
-64	22K				
-65	24K				
-66	27K				
-67	30K				
-68	33K				
-69	36K				
-70	39K				
-71	43K				
1006750-72	47K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE —
WT —
SHEET 2 OF 2

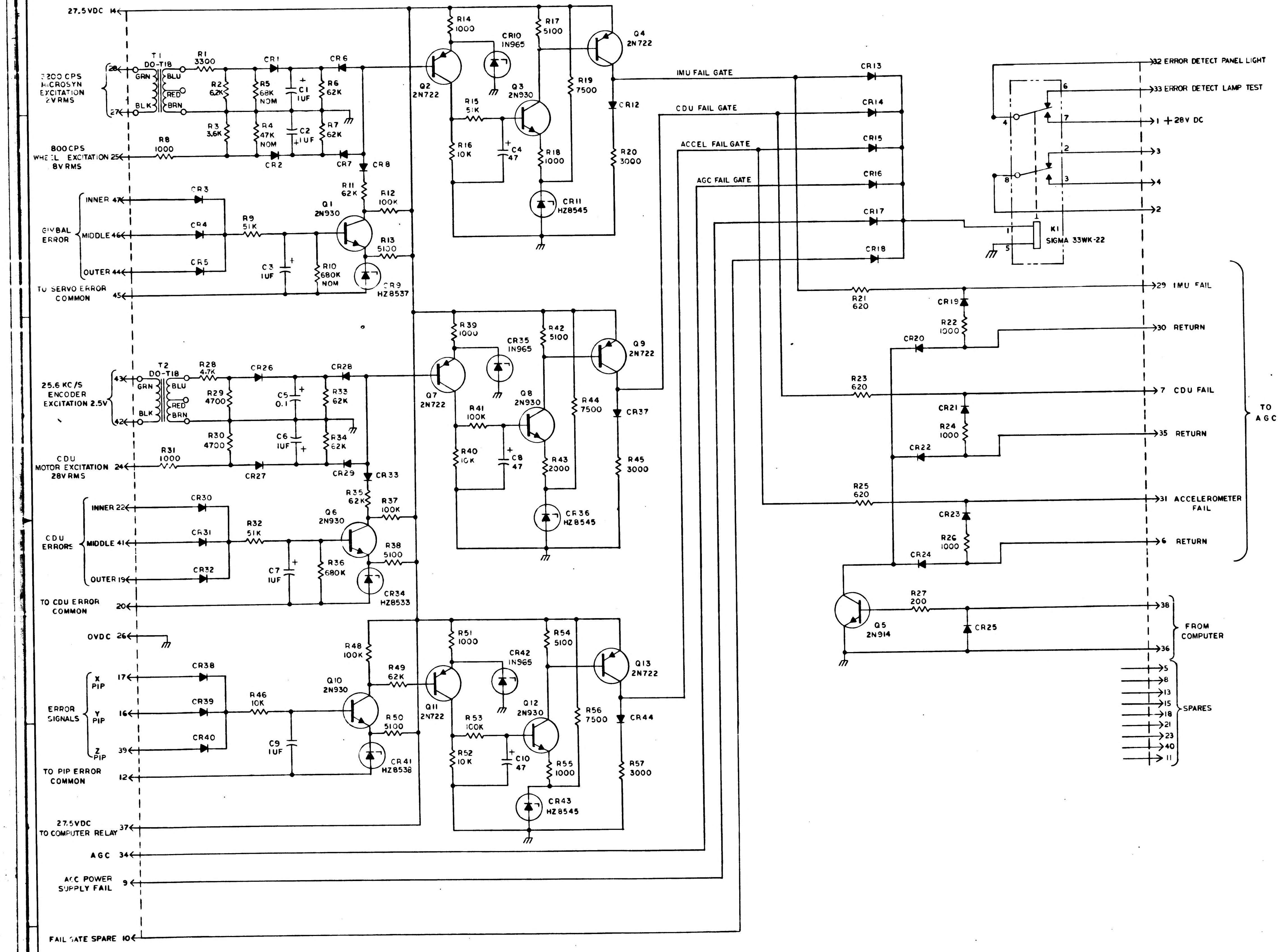
MASTER

1010033

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS	TDRR 00		
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01187	5-8-63	WK
B	REVISED PER TDRR 01614	6-18-63	WK
C	REVISED PER TDRR 01849	7-2-63	WK
D	REVISED PER TDRR 02163	7-26-63	WK
E	REVISED PER TDRR 02456	8-7-63	WK
F	REVISED PER TDRR 03282	[illegible]	WK
G	REVISED PER TDRR 03941	[illegible]	[illegible]
H	REVISION STATUS CHANGED	3 JUL 65	[illegible]


6
5
4
3
2
1
27.5VDC 14
T1 DO-T18
GRN
BLU
RED
BRN
BLK
R1 3300
CR1
CR6
2 28
27
7200 CPS MICROSYN EXCITATION 2VRMS
R2 6.2K
R5 68K NOM
C1 1UF
R6 62K
R3 3.6K
R4 47K NOM
C2 1UF
R7 62K
800CPS WHEEL EXCITATION 25
8VRMS
R8 1000
CR2
CR7
CR8
R14 1000
CR10 1N965
R17 5100
Q4 2N722
Q2 2N722
R15 51K
Q3 2N930
R19 7500
CR12
R16 10K
C4 47
R18 1000
R20 3000
CR11 HZ8545
INNER 47
MIDDLE 46
OUTER 44
GIMBAL ERROR
CR3
CR4
CR5
R9 51K
R11 62K
R12 100K
Q1 2N930
R13 5100
C3 1UF
R10 680K NOM
CR9 HZ8537
TO SERVO ERROR COMMON 45
T2 DO-T18
R28 4.7K
CR26
CR28
25.6 KC/S ENCODER EXCITATION 2.5V 43
42
R29 4700
C5 0.1
R33 62K
R30 4700
C6 1UF
R34 62K
CDU MOTOR EXCITATION 24
28VRMS
R31 1000
CR27
CR29
CR33
R39 1000
CR35 1N965
R42 5100
Q9 2N722
Q7 2N722
R41 100K
Q8 2N930
R44 7500
CR37
R40 10K
C8 47
R43 2000
R45 3000
CR36 HZ8545
INNER 22
MIDDLE 41
OUTER 19
CDU ERRORS
CR30
CR31
CR32
R32 51K
R35 62K
R37 100K
Q6 2N930
R38 5100
C7 1UF
R36 680K
CR34 HZ8533
TO CDU ERROR COMMON 20
0VDC 26
R51 1000
R54 5100
CR42 1N965
Q13 2N722
R48 100K
R49 62K
X PIP 17
Y PIP 16
Z PIP 39
ERROR SIGNALS
CR38
CR39
CR40
R46 10K
Q10 2N930
Q11 2N722
R53 100K
Q12 2N930
R56 7500
CR44
R50 5100
C9 1UF
CR41 HZ8538
R52 10K
C10 47
R55 1000
R57 3000
CR43 HZ8545
TO PIP ERROR COMMON 12
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
FAIL GATE SPARE 10
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
6
7
1 +28V DC
4
2
3
8
K1 SIGMA 33WK-22
5
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
11
SPARES

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE 1N660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN R. D. Lee DATE 1 APR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL Jack Barnard 4/17/63
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE —
WT —
SHEET 1 OF 2

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 01187	5-8-63	M.K.
B	REVISED PER TDRR 01614	6-18-63	
C	REVISED PER TDRR 01849	7-2-63	
D	REVISED PER TDRR 02163	7-20-63	
E	REVISED PER TDRR 02456	8-7-63	
F	REVISED PER TDRR 03262		
G	REVISED PER TDRR 03941		
H	REVISED PER TDRR 2.279	3 JUL 65	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4W
R2	↓ -51	↓	6.2K	↓	↓
R3	↓ -45	↓	3.6K	↓	↓
R4	↓	↓	SEE NOTE	↓	↓
R5	↓	↓	SEE NOTE	↓	↓
R6	↓ -75	↓	62K	↓	↓
R7	↓ -75	↓	62K	↓	↓
R8	↓ -32	↓	1000	↓	↓
R9	1006750-73	↓	51K	±2%	1/4W
R10	1010369	↓	SEE NOTE	±5%	1/8W
R11	1006750-75	↓	62K	±2%	1/4W
R12	↓ -80	↓	100K	↓	↓
R13	1006750-49	↓	5100	↓	1/4W
R14	1006760-32	↓	1000	↓	1/2W
R15	1006750-73	↓	51K	↓	1/4W
R16	↓ -56	↓	10K	↓	↓
R17	↓ -49	↓	5100	↓	↓
R18	↓ -32	↓	1000	↓	↓
R19	↓ -53	↓	7500	↓	↓
R20	↓ -43	↓	3000	↓	↓
R21	1010604-3	↓	620	↓	↓
R22	1006750-32	↓	1000	↓	↓
R23	1010604-3	↓	620	↓	↓
R24	1006750-32	↓	1000	↓	↓
R25	1010604-3	↓	620	↓	↓
R26	1006750-32	↓	1000	↓	↓
R27	1006750-15	↓	200	↓	1/4W
R28	1006760-48	↓	4700	↓	1/2W
R29	1006750-48	↓	4700	↓	1/4W
R30	↓ -48	↓	4700	↓	↓
R31	↓ -32	↓	1000	↓	↓
R32	↓ -73	↓	51K	↓	↓
R33	↓ -75	↓	62K	↓	↓
R34	↓ -75	↓	62K	↓	↓
R35	1006750-75	↓	62K	±2%	1/4W
R36	1010369-101	↓	680K	±5%	1/8W
R37	1006750-80	↓	100K	±2%	1/4W
R38	1006750-49	↓	5100	↓	1/4W
R39	1006760-32	↓	1000	↓	1/2W
R40	1006750-56	↓	10K	↓	1/4W
R41	↓ -80	↓	100K	↓	↓
R42	↓ -49	↓	5100	↓	↓
R43	↓ -39	↓	2000	↓	↓
R44	1006750-53	↓	7500	↓	1/4W
R45	1006760-43	↓	3000	↓	1/2W
R46	1006750-56	↓	10K	±2%	1/4W
R47	DELETED	↓	—	—	—
R48	1006750-80	↓	100K	±2%	1/4W
R49	↓ -75	↓	62K	↓	1/4W
R50	1006750-49	↓	5100	↓	1/4W
R51	1006760-32	↓	1000	↓	1/2W
R52	1006750-56	↓	10K	↓	1/4W
R53	↓ -80	↓	100K	↓	↓
R54	↓ -49	↓	5100	↓	↓
R55	↓ -32	↓	1000	↓	↓
R56	1006750-53	↓	7500	↓	1/4W
R57	1006760-43	↓	3000	±2%	1/2W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	↓ -69	↓	1	↓	↓
C3	↓ -69	↓	1	↓	↓
C4	↓ -89	↓	47	↓	↓
C5	↓ -57	↓	0.1	↓	↓
C6	↓ -69	↓	1	↓	↓
C7	↓ -69	↓	1	↓	↓
C8	↓ -89	↓	47	↓	↓
C9	↓ -69	↓	1	↓	↓
C10	↓ -89	↓	47	↓	↓
CR1	1010385	DIODE	IN660		250MW
CR2	↓	↓	↓		↓
CR3	↓	↓	↓		↓
CR4	↓	↓	↓		↓
CR5	↓	↓	↓		↓
CR6	↓	↓	↓		↓
CR7	↓	↓	↓		↓
CR8	1010385	↓	IN660		250MW
CR9	1010372-8	↓	HZ8537	±5%	200MW
CR10	1010286-009	↓	IN965	±5%	400MW
CR11	1010372-16	↓	HZ8545	±5%	200MW
CR12	1010385	↓	IN660		250MW
CR13	↓	↓	↓		↓
CR14	↓	↓	↓		↓
CR15	↓	↓	↓		↓
CR16	↓	↓	↓		↓
CR17	↓	↓	↓		↓
CR18	↓	↓	↓		↓
CR19	↓	↓	↓		↓
CR20	↓	↓	↓		↓
CR21	↓	↓	↓		↓
CR22	↓	↓	↓		↓
CR23	↓	↓	↓		↓
CR24	↓	↓	↓		↓
CR25	↓	↓	↓		↓
CR26	↓	↓	↓		↓
CR27	↓	↓	↓		↓
CR28	↓	↓	↓		↓
CR29	↓	↓	↓		↓
CR30	↓	↓	↓		↓
CR31	↓	↓	↓		↓
CR32	↓	↓	↓		↓
CR33	1010385	↓	IN660		250MW
CR34	1010372-4	↓	HZ8533	±5%	200MW
CR35	1010286-009	↓	IN965	±5%	400MW
CR36	1010372-16	↓	HZ8545	±5%	200MW
CR37	1010385	↓	IN660		250MW
CR38	↓	↓	↓		↓
CR39	↓	↓	↓		↓
CR40	1010385	↓	IN 660		250MW
CR41	1010372-9	↓	HZ8538	±5%	200MW
CR42	1010286-009	↓	IN965	±5%	400MW
CR43	1010372-16	↓	HZ8545	±5%	200MW
CR44	1010385	↓	IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1010285	↓	2N722		
Q3	1010397	↓	2N930		
Q4	1010285	↓	2N722		
Q5	1010966-1	↓	2N914		
Q6	1010397	↓	2N930		
Q7	1010285	↓	2N722		
Q8	1010397	↓	2N930		
Q9	1010285	↓	2N722		
Q10	1010397	↓	2N930		
Q11	1010285	↓	2N722		
Q12	1010397	↓	2N930		
Q13	1010285	↓	2N722		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467	↓	DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750-45	3.6K	1006750-60	15K	1010369-93	330K
↓ -46	3.9K	↓ -61	16K	↓ -94	360K
↓ -47	4.3K	↓ -62	18K	↓ -95	390K
↓ -48	4.7K	↓ -63	20K	↓ -96	430K
↓ -49	5.1K	↓ -64	22K	↓ -97	470K
↓ -50	5.6K	↓ -65	24K	↓ -98	510K
↓ -51	6.2K	↓ -66	27K	↓ -99	560K
↓ -52	6.8K	↓ -67	30K	↓ -100	620K
↓ -53	7.5K	↓ -68	33K	↓ -101	680K
↓ -54	8.2K	↓ -69	36K	↓ -102	750K
↓ -55	9.1K	↓ -70	39K	↓ -103	820K
↓ -56	10K	↓ -71	43K	↓ -104	910K
↓ -57	11K	↓ -72	47K	↓ -105	1MEG
↓ -58	12K	↓ -73	51K	↓ - —	——
↓ -59	13K	↓ -74	56K	1010369-106	1.1MEG
↓ -60	15K	↓ -75	62K		
↓ -61	16K	↓ -76	68K		
↓ 62	18K	↓ -77	75K		
↓ -63	20K	1006750-78	82K		
↓ 64	22K				
↓ 65	24K				
↓ 66	27K				
↓ 67	30K				
↓ 68	33K				
↓ 69	36K				
↓ 70	39K				
↓ 71	43K				
1006750 72	47K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO — CONTRACT
DRAWN R. D. Lee DATE 8 APR 63
CHECKED Manuel Kramer 3 May 63
APPROVAL Manuel Kramer 3 May 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 8 May 63

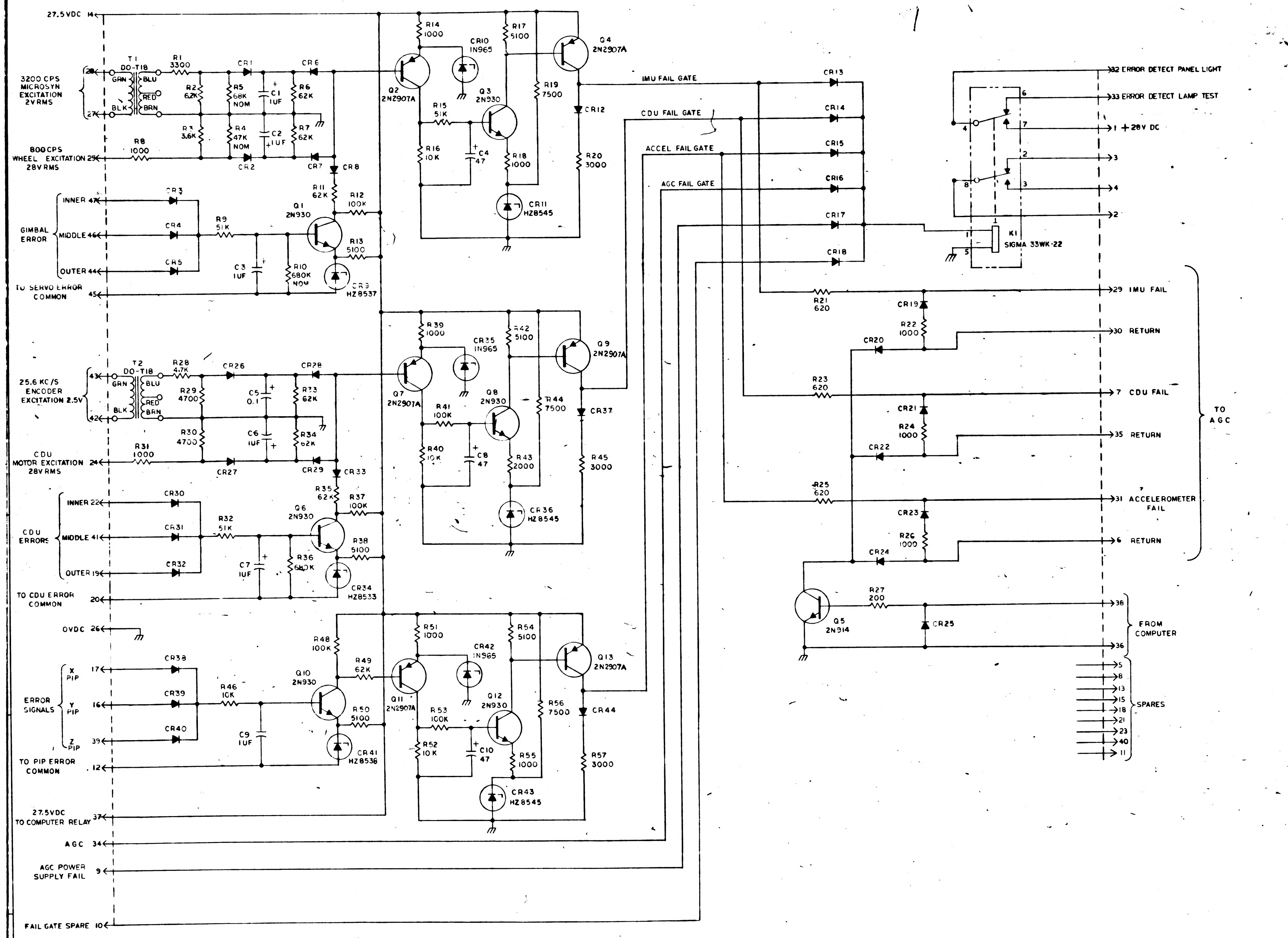
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE INDICATOR

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010033
SCALE — WT — SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

		REVISIONS TDRR 00[illegible]		
	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED PER TDRR 01187	5-8-63	[illegible] WR
	B	REVISED PER TDRR 01616	6-19-63	[illegible] WK
M	C	REVISED PER. TDRR 01849.	7-23-63	[illegible] WK
	D	REVISED PER TDRR 02163	[illegible]-63	[illegible] WK
	E	REVISED PER TDRR 02456	9-7-63	[illegible] WK
	F	REVISED PER TDRR 03282	[illegible]-63	[illegible] WK
	G	REVISED PER TDRR 03941	[illegible]	[illegible]
M	H	REVISION STATUS CHANGED	31 JUL 65	[illegible] RWH
	J	REVISED PER TDRR 29751	[illegible] 66	[illegible]



6
5
4
3
2
27.5VDC 14
3200 CPS MICROSYN EXCITATION 2V RMS
28
27
T1 DO-T18
GRN
BLK
BLU
RED
BRN
R1 3300
R2 62K
R3 3.6K
R4 47K NOM
R5 68K NOM
C1 1UF
C2 1UF
R6 62K
R7 62K
CR1
CR2
CR6
CR7
CR8
800 CPS WHEEL EXCITATION 25
28V RMS
R8 1000
R14 1000
CR10 1N965
R17 5100
Q4 2N2907A
Q2 2N2907A
R15 51K
Q3 2N930
R16 10K
C4 47
R18 1000
CR11 HZ8545
R19 7500
CR12
R20 3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
32 ERROR DETECT PANEL LIGHT
33 ERROR DETECT LAMP TEST
1 +28V DC
3
4
2
K1 SIGMA 33WK-22
GIMBAL ERROR
INNER 47
MIDDLE 46
OUTER 44
CR3
CR4
CR5
R9 51K
Q1 2N930
R11 62K
R12 100K
R13 5100
C3 1UF
R10 680K NOM
CR9 HZ8537
TO SERVO ERROR COMMON 45
R21 620
CR19
R22 1000
CR20
29 IMU FAIL
30 RETURN
R23 620
CR21
R24 1000
CR22
7 CDU FAIL
35 RETURN
R25 620
CR23
R26 1000
CR24
31 ACCELEROMETER FAIL
6 RETURN
TO AGC
Q5 2N914
R27 200
CR25
38
36
FROM COMPUTER
5
8
13
15
18
21
23
40
11
SPARES
25.6 KC/S ENCODER EXCITATION 2.5V
43
42
T2 DO-T18
R28 4.7K
R29 4700
R30 4700
CR26
CR27
CR28
CR29
C5 0.1
C6 1UF
R33 62K
R34 62K
CDU MOTOR EXCITATION 24
28V RMS
R31 1000
CR33
R39 1000
CR35 1N965
R42 5100
Q9 2N2907A
Q7 2N2907A
R41 100K
Q8 2N930
R40 10K
C8 47
R43 2000
CR36 HZ8545
R44 7500
CR37
R45 3000
CDU ERRORS
INNER 22
MIDDLE 41
OUTER 19
CR30
CR31
CR32
R32 51K
Q6 2N930
R35 62K
R37 100K
R38 5100
C7 1UF
R36 680K
CR34 HZ8533
TO CDU ERROR COMMON 20
OVDC 26
ERROR SIGNALS
X PIP 17
Y PIP 16
Z PIP 39
CR38
CR39
CR40
R46 10K
Q10 2N930
R48 100K
R49 62K
R50 5100
C9 1UF
CR41 HZ8536
TO PIP ERROR COMMON 12
R51 1000
CR42 1N965
R54 5100
Q13 2N2907A
Q11 2N2907A
R53 100K
Q12 2N930
R52 10K
C10 47
R55 1000
CR43 HZ8545
R56 7500
CR44
R57 3000
27.5VDC TO COMPUTER RELAY 37
AGC 34
AGC POWER SUPPLY FAIL 9
FAIL GATE SPARE 10

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST
6. COMPONENTS TO BE SUPPLIED PER TABLE ON SHEET 2

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN A. D. Lao DATE 3 APR 63
CHECKED Manuel Kramer [illegible]
APPROVAL Manuel Kramer [illegible] 63
APPROVAL
NASA APPROVAL [illegible] 4/17/63
MIT APPROVAL [illegible] 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
FAILURE, INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010033
SCALE —
WT —
SHEET 1 OF 2

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	INITIAL RELEASE CLASS A PER TDRR 01187		
B	REVISED PER TDRR 01614	5-18-63	
C	REVISED PER TDRR 01849	7-2	
D	REVISED PER TDRR 02163		
E	REVISED PER TDRR 02456		
F	REVISED PER TDRR 03282		
G	REVISED PER TDRR 03944		
H	REVISED PER TDRR 21279	31 JUL 65	ELP RWH
J	REVISED PER TDRR 29761	28 JUN 66	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-44	RESISTOR	3300	±2%	1/4W
R2	-51		6.2K		
R3	-45		3.6K		
R4			SEE NOTE		
R5			SEE NOTE		
R6	-75		62K		
R7	-75		62K		
R8	-32		1000		
R9	1006750-73		51K	±2%	1/4W
R10	1010369		SEE NOTE	±5%	1/8W
R11	1006750-75		62K	±2%	1/4W
R12	-80		100K		
R13	1006750-49		5100		1/4W
R14	1006760-32		1000		1/2W
R15	1006750-73		51K		1/4W
R16	-56		10K		
R17	-49		5100		
R18	-32		1000		
R19	-53		7500		
R20	-43		3000		
R21	1010604-3		620		
R22	1006750-32		1000		
R23	1010604-3		620		
R24	1006750-32		1000		
R25	1010604-3		620		
R26	1006750-32		1000		
R27	1006750-15		200		1/4W
R28	1006760-48		4700		1/2W
R29	1006750-48		4700		1/4W
R30	-48		4700		
R31	-32		1000		
R32	-73		51K		
R33	-75		62K		
R34	-75		62K		
R35	1006750-75		62K	±2%	1/4W
R36	1010369-101		680K	±5%	1/8W
R37	1006750-80		100K	±2%	1/4W
R38	1006750-49		5100		1/4W
R39	1006760-32		1000		1/2W
R40	1006750-56		10K		1/4W
R41	-80		100K		
R42	-49		5100		
R43	-39		2000		
R44	1006750-53		7500		1/4W
R45	1006760-43		3000		1/2W
R46	1006750-56		10K	±2%	1/4W
R47	DELETED		—	—	—
R48	1006750-80		100K	±2%	1/4W
R49	-75		62K		1/4W
R50	1006750-49		5100		1/4W
R51	1006760-32		1000		1/2W
R52	1006750-56		10K		1/4W
R53	-80		100K		
R54	-49		5100		
R55	-32		1000		
R56	1006750-53		7500		1/4W
R57	1006760-43		3000	±2%	1/2W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1006755-69	CAPACITOR	1	±10%	35VDC
C2	-69		1		
C3	-69		1		
C4	-89		47		
C5	-57		0.1		
C6	-69		1		
C7	-69		1		
C8	-89		47		
C9	-69		1		
C10	-89		47		
CR1	1010385	DIODE	IN660		250MW
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8	1010385		IN660		250MW
CR9	1010372-8		HZ8537	±5%	200MW
CR10	1010286-009		IN965	±5%	400MW
CR11	1010372-16		HZ8545	±5%	200MW
CR12	1010385		IN660		250MW
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32					
CR33	1010385		IN660		250MW
CR34	1010372-4		HZ8533	±5%	200MW
CR35	1010286-009		IN965	±5%	400MW
CR36	1010372-16		HZ8545	±5%	200MW
CR37	1010385		IN660		250MW
CR38					
CR39					
CR40	1010385		IN660		250MW
CR41	1010372-9		HZ8538	±5%	200MW
CR42	1010286-009		IN965	±5%	400MW
CR43	1010372-16		HZ8545	±5%	200MW
CR44	1010385		IN660		250MW

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
Q1	1010397	TRANSISTOR	2N930		
Q2	1008814-1		2N2907A		
Q3	1010397		2N930		
Q4	1008814-1		2N2907A		
Q5	1010966-1		2N914		
Q6	1010397		2N930		
Q7	1008814-1		2N2907A		
Q8	1010397		2N930		
Q9	1008814-1		2N2907A		
Q10	1010397		2N930		
Q11	1008814-1		2N2907A		
Q12	1010397		2N930		
Q13	1008814-1		2N2907A		
T1	1010467	TRANSFORMER	DO-T18		
T2	1010467		DO-T18		
K1	1010353-4	RELAY			

R4		R5		R10	
1006750-45	3.6K	1006750-60	15K	1010369-93	330K
-46	3.9K	-61	16K	-94	360K
-47	4.3K	-62	18K	-95	390K
-48	4.7K	-63	20K	-96	430K
-49	5.1K	-64	22K	-97	470K
-50	5.6K	-65	24K	-98	510K
-51	6.2K	-66	27K	-99	560K
-52	6.8K	-67	30K	-100	620K
-53	7.5K	-68	33K	-101	680K
-54	8.2K	-69	36K	-102	750K
-55	9.1K	-70	39K	-103	820K
-56	10K	-71	43K	-104	910K
-57	11K	-72	47K	-105	1MEG
-58	12K	-73	51K	—	—
-59	13K	-74	56K	1010369-106	1.1MEG
-60	15K	-75	62K		
-61	16K	-76	68K		
-62	18K	-77	75K		
-63	20K	1006750-78	82K		
64	22K				
-65	24K				
66	27K				
-67	30K				
-68	33K				
-69	36K				
70	39K				
71	43K				
1006750 72	47K				

REVISION A THIS SHEET ADDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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DO NOT SCALE THIS DRAWING
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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT

DRAWN A. D. DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

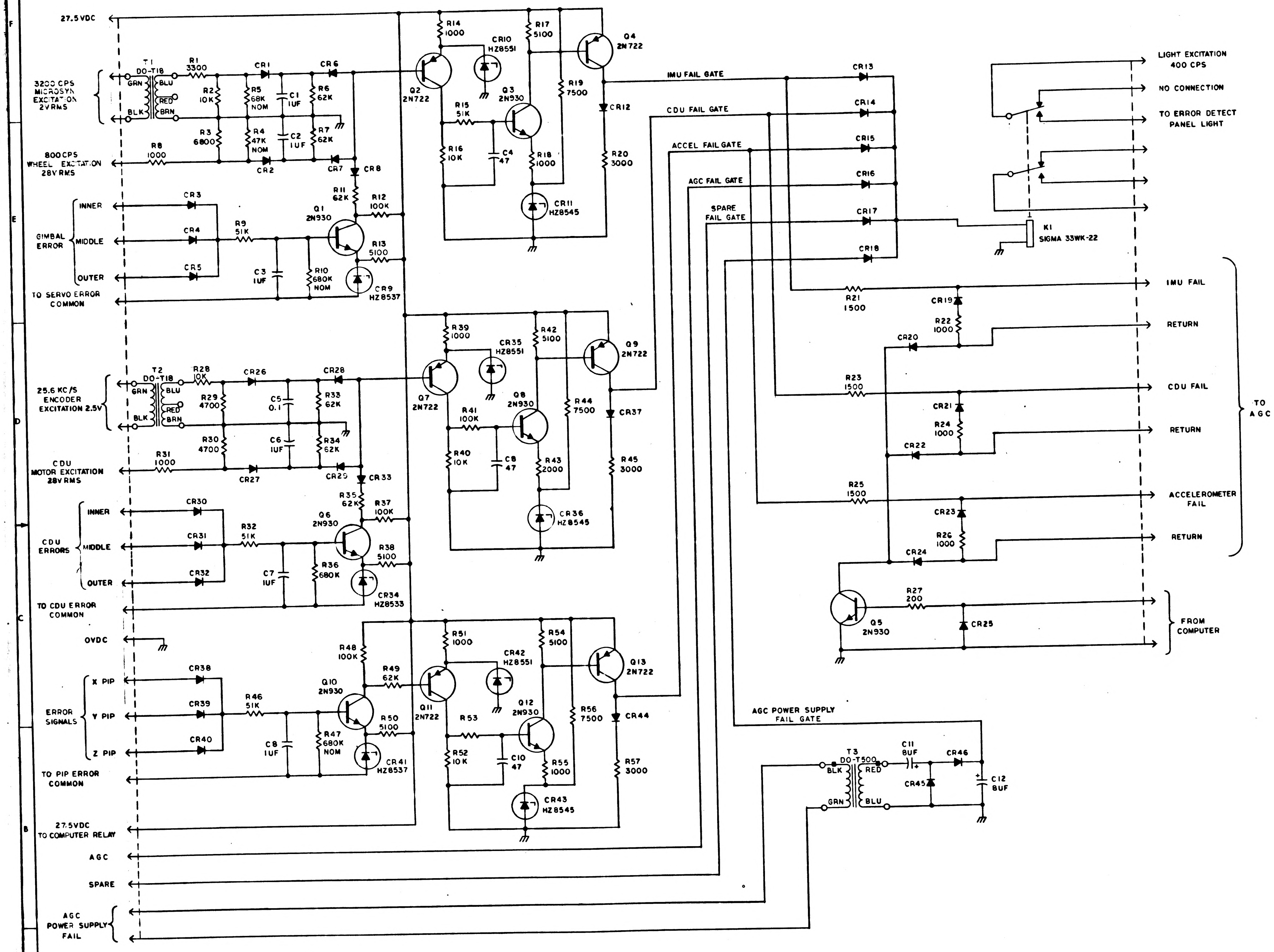
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, FAILURE INDICATOR

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010033
SCALE —	WT —	SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS		TQRR 00842	
SYM	DESCRIPTION	DATE	APPROVAL


27.5 VDC
3200 CPS
MICROSYN
EXCITATION
2V RMS
T1
DO-T18
GRN
BLK
BLU
RED
BRN
R1
3300
R2
10K
R3
6800
R5
68K
NOM
R4
47K
NOM
C1
1UF
C2
1UF
R6
62K
R7
62K
CR1
CR6
CR2
CR7
CR8
800 CPS
WHEEL EXCITATION
28V RMS
R8
1000
GIMBAL
ERROR
INNER
MIDDLE
OUTER
CR3
CR4
CR5
R9
51K
C3
1UF
R10
680K
NOM
R11
62K
R12
100K
R13
5100
Q1
2N930
CR9
HZ8537
TO SERVO ERROR
COMMON
R14
1000
CR10
HZ8551
R17
5100
Q4
2N722
Q2
2N722
R15
51K
Q3
2N930
R19
7500
R16
10K
C4
47
R18
1000
CR11
HZ8545
CR12
R20
3000
IMU FAIL GATE
CDU FAIL GATE
ACCEL FAIL GATE
AGC FAIL GATE
SPARE
FAIL GATE
CR13
CR14
CR15
CR16
CR17
CR18
LIGHT EXCITATION
400 CPS
NO CONNECTION
TO ERROR DETECT
PANEL LIGHT
K1
SIGMA 33WK-22
R21
1500
CR19
R22
1000
CR20
IMU FAIL
RETURN
R23
1500
CR21
R24
1000
CR22
CDU FAIL
RETURN
R25
1500
CR23
R26
1000
CR24
ACCELEROMETER
FAIL
RETURN
TO
AGC
Q5
2N930
R27
200
CR25
FROM
COMPUTER
25.6 KC/S
ENCODER
EXCITATION 2.5V
T2
DO-T18
GRN
BLK
BLU
RED
BRN
R28
10K
R29
4700
R30
4700
CR26
CR28
C5
0.1
C6
1UF
R33
62K
R34
62K
CDU
MOTOR EXCITATION
28V RMS
R31
1000
CR27
CR29
CR33
R39
1000
CR35
HZ8551
R42
5100
Q9
2N722
Q7
2N722
R41
100K
Q8
2N930
R44
7500
CR37
R40
10K
C8
47
R43
2000
CR36
HZ8545
R45
3000
CDU
ERRORS
INNER
MIDDLE
OUTER
CR30
CR31
CR32
R32
51K
C7
1UF
R35
62K
R37
100K
Q6
2N930
R36
680K
R38
5100
CR34
HZ8533
TO CDU ERROR
COMMON
OVDC
ERROR
SIGNALS
X PIP
Y PIP
Z PIP
CR38
CR39
CR40
R46
51K
C8
1UF
R47
680K
NOM
R48
100K
R49
62K
Q10
2N930
R50
5100
CR41
HZ8537
TO PIP ERROR
COMMON
R51
1000
CR42
HZ8551
R54
5100
Q13
2N722
Q11
2N722
R53
Q12
2N930
R56
7500
CR44
R52
10K
C10
47
R55
1000
CR43
HZ8545
R57
3000
AGC POWER SUPPLY
FAIL GATE
T3
DO-T500
BLK
GRN
RED
BLU
C11
8UF
CR46
CR45
C12
8UF
27.5VDC
TO COMPUTER RELAY
AGC
SPARE
AGC
POWER SUPPLY
FAIL

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. UNLESS OTHERWISE NOTED ALL DIODES ARE IN660
5. ALL NOMINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN A. D. Lao DATE 3 APR 63
CHECKED Manuel Kramer 15 Apr 63
APPROVAL Manuel Kramer 15 Apr 63
APPROVAL
NASA APPROVAL Jack Barnard 4/17/63
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, FAILURE INDICATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010033
SCALE —
WT —
SHEET 1 OF 2

1010033

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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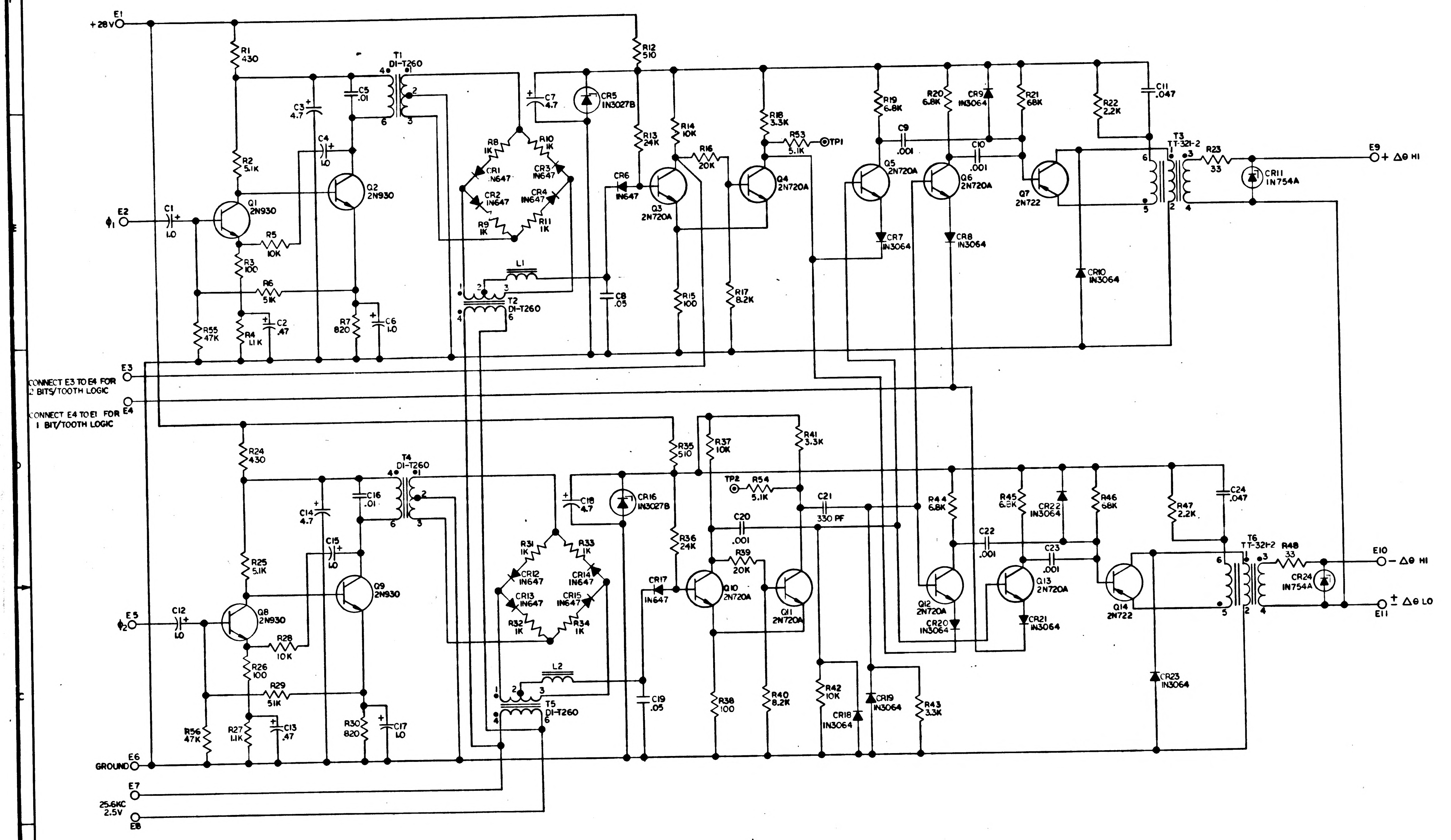
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	W.L.



E1
+28V
R1 430
T1 DI-T260
C3 4.7
C5 .01
C7 4.7
CR5 1N3027B
R12 510
C4 1.0
R2 5.1K
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
E2
ϕ_1
C1 1.0
Q1 2N930
Q2 2N930
R5 10K
R3 100
R6 51K
R4 1.1K
C2 .47
R7 820
C6 1.0
R55 47K
L1
T2 DI-T260
C8 .05
CR6 1N647
R13 24K
R14 10K
R16 20K
Q3 2N720A
R18 3.3K
R53 5.1K
TP1
Q4 2N720A
R15 100
R17 8.2K
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
R22 2.2K
C11 .047
C9 .001
C10 .001
Q5 2N720A
Q6 2N720A
Q7 2N722
CR7 1N3064
CR8 1N3064
CR10 1N3064
T3 TT-321-2
R23 33
CR11 1N754A
E9
+ Δθ HI
E3
CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
E4
R24 430
T4 DI-T260
C14 4.7
C16 .01
C18 4.7
CR16 1N3027B
R35 510
R37 10K
R41 3.3K
TP2
R54 5.1K
C21 330 PF
C20 .001
R39 20K
C15 1.0
R25 5.1K
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
E5
ϕ_2
C12 1.0
Q8 2N930
Q9 2N930
R28 10K
R26 100
R29 51K
R27 1.1K
C13 .47
R30 820
C17 1.0
R56 47K
L2
T5 DI-T260
C19 .05
CR17 1N647
R36 24K
Q10 2N720A
Q11 2N720A
R38 100
R40 8.2K
R42 10K
CR18 1N3064
CR19 1N3064
R43 3.3K
R44 6.8K
R45 6.8K
CR22 1N3064
R46 68K
R47 2.2K
C24 .047
C22 .001
C23 .001
Q12 2N720A
Q13 2N720A
Q14 2N722
CR20 1N3064
CR21 1N3064
CR23 1N3064
T6 TT-321-2
R48 33
CR24 1N754A
E10
– Δθ HI
E11
± Δθ LO
E6
GROUND
E7
25.6KC 2.5V
E8

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN THENO DATE 1-15-63
CHECKED G. Cushman 1-23-63
APPROVAL E Miller 1-28-63
APPROVAL
NASA APPROVAL W.J. Rollins 1-28-63
MIT APPROVAL 1-23-63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
ENCODER
ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034 A
SCALE
WT
SHEET 1 OF 2

1010034 A

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		REVISIONS		
M	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 00481	2-28-63	WK

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49		5.1 K	2	1/4 W
R3	1010364-60		100	1	1/8 W
R4	1006750-33		1.1 K	2	1/4 W
R5	1010364-444		10 K	1	1/8 W
R6	1006750-73		51 K	2	1/4 W
R7	1006750-30		820	2	1/4 W
R8	1010364-252		1 K	1	1/8 W
R9			1 K		
R10			1 K		
R11	↓ ↓		1 K	↓	↓
R12	1010278		510	5	1 W
R13	1006750 - 65		24 K	2	1/4 W
R14	-56		10 K		
R15	-8		100		
R16	-63		20 K		
R17	↓ -54		8.2 K		↓
R18	1006760 -44		3.3 K		1/2 W
R19	1006750 - 52		6.8 K		1/4 W
R20	-52		6.8 K		
R21	-52		6.8 K		
R22	↓ -40		2.2 K	↓	
R23	1010368 -13		33	5	
R24	10106750 -23		430	2	
R25	↓ -49		5.1 K	↓	↓
R26	1010364 - 60		100	1	1/8 W
R27	1006750 - 33		1.1 K	2	1/4 W
R28	1010364 - 444		10 K	1	1/8 W
R29	1006750 - 73		51 K	2	1/4 W
R30	1006750 - 30		820	2	1/4 W
R31	1010364 - 252		1 K	1	1/8 W
R32			1 K		
R33			1 K		
R34	↓ ↓		1 K	↓	↓
R35	1010278		510	5	1 W
R36	-65		24 K	2	1/4 W
R37	-56		10 K		
R38	-8		100		
R39	-63		20 K		
R40	↓ -54		8.2 K		↓
R41	1006760 -44		3.3 K		1/2 W
R42	1006750 -56		10 K		1/4 W
R43	-44		3.3 K		
R44	52		6.8 K		
R45			6.8 K		
R46	↓		6.8 K		
R47	-40		2.2 K	↓	
R48	1010368 —13		33	5	↓
~~R49~~					
~~R50~~					
~~R51~~					
~~R52~~					
R53	10106750 -49		5.1 K	5	1/4 W
R54	↓		5.1 K		
R55	-72		47 K		
R56	↓ -72	↓	47 K	↓	↓
T1	1010366	TRANSFORMER			
T2	1010366				
[illegible]	1010344-2				
[illegible]	1010366				
T5	1010366				
T6	1010344-2	↓			

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35 V
C2	1006755-65		0.47		35 V
C3	1010393 - 37		4.7		50 V
C4	1006755-69		1.0	↓	35 V
C5	1010359 -29		.01	20	200 V
C6	1006755-69		1.0	10	35 V
C7	1010393 —37		4.7		50 V
C8	1010279-216		.05	↓	35 V
C9	1010359 - 17		.001	20	200 V
C10	1010359 - 17		.001	20	200 V
C11	1010375 - 21		.047	10	50 V
C12	1006755 - 69		1.0		35 V
C13	1006755 - 65		0.47		35 V
C14	1010393 - 37		4.7		50 V
C15	1006755 - 69		1.0	↓	35 V
C16	1010359 - 29		.01	20	200 V
C17	1006755 - 69		1.0	10	35 V
C18	1010393 - 37		4.7		50 V
C19	1010279-216		.05	↓	35 V
C20	1010359 - 17		.001	20	200 V
C21	-11		330 PF		
C22	1010359 - 17		.001		
C23	↓ ↓		↓	↓	↓
C24	1010375 - 21	↓	.047	10	50 V
CR1	1010362-2	DIODE			400 V
CR2					
CR3					
CR4	↓ ↓	↓			↓
CR5	1010265-12	DIODE,(ZENER)		5	20 V
CR6	1010362-2	DIODE			400 V
CR7	1010370				50 V
CR8					
CR9					
CR10	↓	↓			↓
CR11	1010286-001	DIODE (ZENER)		5	6.8 V
CR12	1010362 - 2	DIODE			400 V
CR13					
CR14					
CR15	↓ ↓	↓			↓
CR16	1010265-12	DIODE,(ZENER)		5	20 V
CR17	1010362 - 2	DIODE			400 V
CR18	1010370				50 V
CR19					
CR20					
CR21					
CR22					
CR23	↓	↓			↓
CR24	1010286-001	DIODE (ZENER)		5	6.8 V
L1	1010309	COIL	20 MH		
L2	1010309	COIL	20 MH		
Q1	1010397	TRANSISTOR			
Q2	1010397				
Q3	1010357				
Q4					
Q5					
Q6	↓				
Q7	1010285				
Q8	1010397				
Q9	1010397				
Q10	1010357				
Q11					
Q12					
Q13	↓				
Q14	1010285	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
	LIST OF MATERIALS	

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R SHARP DATE 1-15-63
CHECKED 1-23-63
APPROVAL John E Miller 1-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034 A
SCALE
WT
SHEET 2 OF 2

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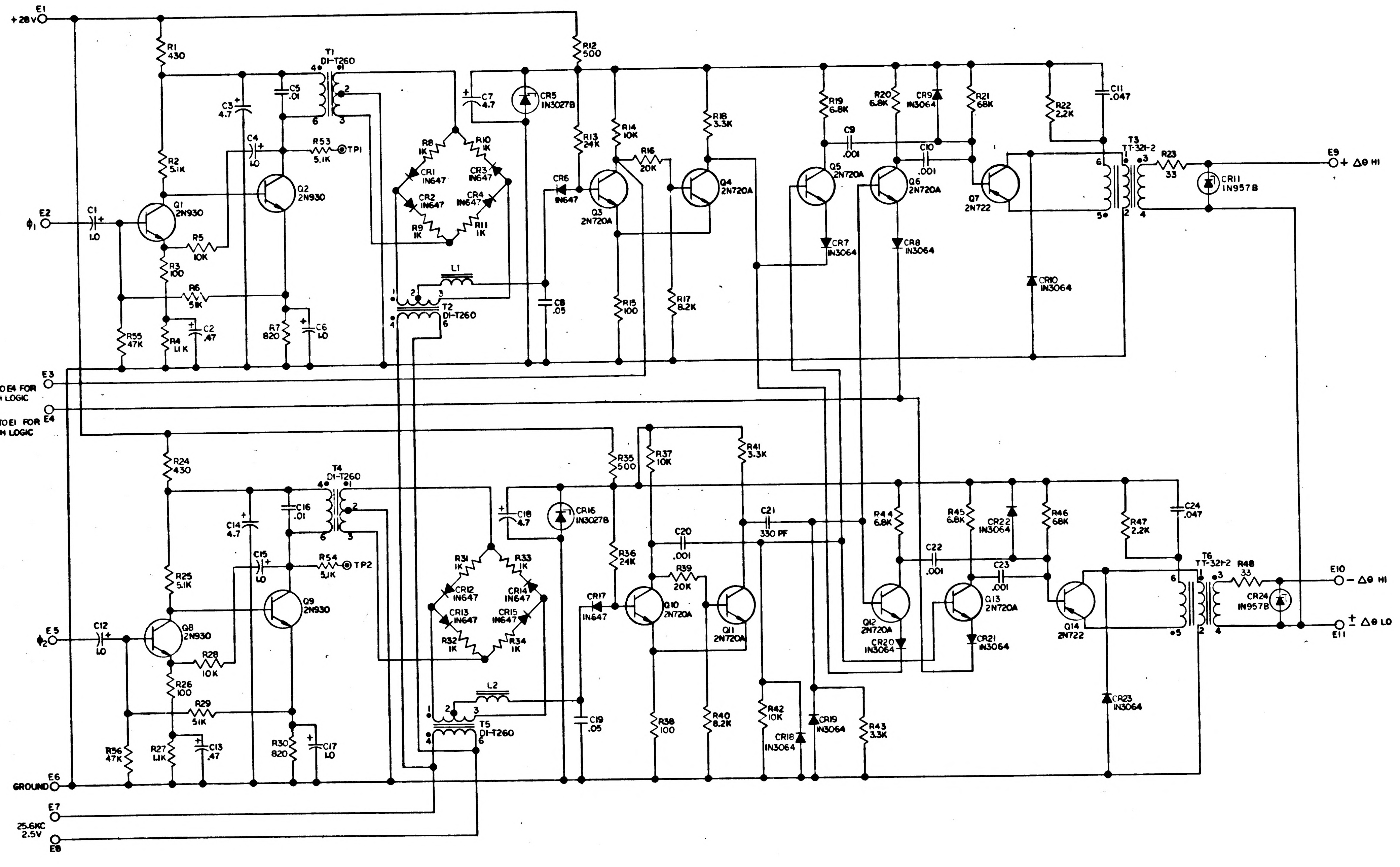
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	WR
B	REVISED PER TDRR 01116	5-1-63	WH

M


E1
+28V
R1 430
C3 4.7
C5 .01
T1 DI-T260
C4 1.0
R53 5.1K
TP1
R2 5.1K
Q1 2N930
Q2 2N930
E2
ϕ_1
C1 1.0
R5 10K
R3 100
R6 51K
R55 47K
R4 1.1K
C2 .47
R7 820
C6 1.0
C7 4.7
CR5 1N3027B
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
L1
T2 DI-T260
C8 .05
R12 500
CR6 1N647
R13 24K
R14 10K
R16 20K
Q3 2N720A
Q4 2N720A
R18 3.3K
R15 100
R17 8.2K
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
R22 2.2K
C11 .047
C9 .001
C10 .001
Q5 2N720A
Q6 2N720A
Q7 2N722
CR7 1N3064
CR8 1N3064
CR10 1N3064
T3 TT-321-2
R23 33
CR11 1N957B
E9
+ Δθ HI
E3
CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
E4
CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
R24 430
T4 DI-T260
C14 4.7
C16 .01
C15 1.0
R54 5.1K
TP2
R25 5.1K
Q8 2N930
Q9 2N930
E5
ϕ_2
C12 1.0
R28 10K
R26 100
R29 51K
R56 47K
R27 1.1K
C13 .47
R30 820
C17 1.0
C18 4.7
CR16 1N3027B
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
L2
T5 DI-T260
C19 .05
CR17 1N647
R35 500
R36 24K
R37 10K
R41 3.3K
C20 .001
R39 20K
C21 330 PF
Q10 2N720A
Q11 2N720A
R38 100
R40 8.2K
R42 10K
CR18 1N3064
CR19 1N3064
R43 3.3K
R44 6.8K
R45 6.8K
CR22 1N3064
R46 68K
R47 2.2K
C24 .047
C22 .001
C23 .001
Q12 2N720A
Q13 2N720A
Q14 2N722
CR20 1N3064
CR21 1N3064
CR23 1N3064
T6 TT-321-2
R48 33
CR24 1N957B
E10
– Δθ HI
E11
± Δθ LO
E6
GROUND
E7
25.6KC 2.5V
E8

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN THENO DATE 1-15-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-28-63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL 1-23-63

MANNED SPACECRAFT CENTER
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SCHEMATIC,
ENCODER
ELECTRONICS

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010034 B
SCALE WT SHEET 1 OF 2

1010034 B

INCHES 0 1
PHOTOGRAPHIC SCALE ONLY

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	SYM	DESCRIPTION	DATE	APPR
M		REVISIONS		
A	A	REVISED TDRR 00481	2-20-63	
A	B	REVISED PER [illegible] 08116	5-1-63	
M				

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49	↓	5.1 K	2	1/4 W
R3	1010364-60	↓	100	1	1/8 W
R4	1006750-33	↓	1.1 K	2	1/4 W
R5	1010364-444	↓	1 0K	1	1/8 W.
R6	1006750-73	↓	51 K	2	1/4 W
R7	1006750-30	↓	820	2	1/4 W
R8	1010364-252	↓	1 K	1	1/8 W
R9	↓ ↓	↓	1 K	↓	↓
R10	↓ ↓	↓	1 K	↓	↓
R11	↓ ↓	↓	1 K	↓	↓
R12	1010312 -029	↓	500	1	2 W
R13	1006750 - 65	↓	24K	2	1/4 W
R14	↓ -56	↓	10K	↓	↓
R15	↓ -8	↓	100	↓	↓
R16	↓ -63	↓	20K	↓	↓
R17	↓ -54	↓	8.2K	↓	↓
R18	1006760 -44	↓	3.3K	↓	1/2 W
R19	1006750 - 52	↓	6.8K	↓	1/4 W
R20	↓ -52	↓	6.8K	↓	↓
R21	↓ -52	↓	6.8K	↓	↓
R22	↓ -40	↓	2.2K	↓	↓
R23	1010369 -140	↓	33	5	1/8W
R24	1006750 -23	↓	430	2	1/4 W
R25	↓ -49	↓	5.1K	↓	↓
R26	1010364 - 60	↓	100	1	1/8 W
R27	1006750 - 33	↓	1.1 K	2	1/4 W
R28	1010364 -444	↓	1 0 K	1	1/8 W
R29	1006750 -73	↓	51 K	2	1/4 W
R30	1006750 - 30	↓	820	2	1/4 W
R31	1010364 - 252	↓	1 K	1	1/8W
R32	↓ ↓	↓	1 K	↓	↓
R33	↓ ↓	↓	1 K	↓	↓
R34	↓ ↓	↓	1 K	↓	↓
R35	1010312 -029	↓	500	1	2 W
R36	1006750-65	↓	24K	2	1/4 W
R37	↓ -56	↓	10K	↓	↓
R38	↓ -8	↓	100	↓	↓
R39	↓ -63	↓	20K	↓	↓
R40	↓ -54	↓	8.2K	↓	↓
R41	1006760 —44	↓	3.3K	↓	1/2 W
R42	1006750 -56	↓	10K	↓	1/4 W
R43	↓ -44	↓	3.3K	↓	↓
R44	↓ 52	↓	6.8K	↓	↓
R45	↓ ↓	↓	6.8K	↓	↓
R46	↓ ↓	↓	6.8K	↓	↓
R47	↓ -40	↓	2.2K	↓	↓
R48	1010369 —140	↓	33	5	1/8 W
~~R49~~		↓			
~~R50~~		↓			
~~R51~~		↓			
~~R52~~		↓			
R53	1C 06750—49	↓	5.1K	2	1/4 W
R54	↓ ↓	↓	5.1K	↓	↓
R55	↓ —72	↓	47K	↓	↓
R56	↓ —72	↓	47K	↓	↓
T1	1010366	TRANSFORMER			
T2	1010366	↓			
T3	1010344—2	↓			
T4	1010366	↓			
T5	1010366	↓			
T6	1010344-2	↓			

REF. DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	1006755-65	↓	0.47	↓	35V
C3	1010393 - 37	↓	4.7	↓	50V
C4	1006755-69	↓	1.0	↓	35V
C5	1C 0359 -29	↓	.01	20	200V
C6	1006755-69	↓	1.0	10	35V
C7	1010393 —37	↓	4.7	↓	50V
C8	1010279-216	↓	.05	↓	35V
C9	1010359 - 17	↓	.001	20	200V
C10	1010359 - 17	↓	.001	20	200V
C11	1010375 - 21	↓	.047	10	50V
C12	1006755 - 69	↓	1.0	↓	35V
C13	1006755 —65	↓	0.47	↓	35V
C14	1010393 -37	↓	4.7	↓	50V
C15	1006755 - 69	↓	1.0	↓	35V
C16	1010359 -29	↓	.01	20	200V
C17	1006755 - 69	↓	1.0	10	35V
C18	1010393 - 37	↓	4.7	↓	50V
C19	1010279-216	↓	.05	↓	35V
C20	1010359 - 17	↓	.001	20	200V
C21	↓ -11	↓	330 PF	↓	↓
C22	1010359 - 17	↓	.001	↓	↓
C23	↓ ↓	↓	↓	↓	↓
C24	1010375 - 21	↓	.047	10	50V
CR1	1010362-2	DIODE			400V
CR2	↓ ↓	↓			↓
CR3	↓ ↓	↓			↓
CR4	↓ ↓	↓			↓
CR5	1010265-12	DIODE,(ZENER)		5	20V
CR6	1010362-2	DIODE			400V
CR7	1010370	↓			50 V
CR8	↓	↓			↓
CR9	↓	↓			↓
CR10	↓	↓			↓
CR11	1010286-001	DIODE (ZENER)		5	6.8V
CR12	1010362-2	DIODE			400V
CR13	↓ ↓	↓			↓
CR14	↓ ↓	↓			↓
CR15	↓ ↓	↓			↓
CR16	1010265-12	DIODE,(ZENER)		5	20V
CR17	1010362 - 2	DIODE			400 V
CR18	1010370	↓			50V
CR19	↓	↓			↓
CR20	↓	↓			↓
CR21	↓	↓			↓
CR22	↓	↓			↓
CR23	↓	↓			↓
CR24	1010288-001	DIODE (ZENER)		5	6.8V
L1	1010309-005	COIL	20 MH		
L2	1010309-005	COIL	20MH		
Q1	1010397	TRANSISTOR			
Q2	1010397	↓			
Q3	1010357	↓			
Q4	↓	↓			
Q5	↓	↓			
Q6	↓	↓			
Q7	1010285	↓			
Q8	1010397	↓			
Q9	1010397	↓			
Q10	1010357	↓			
Q11	↓	↓			
Q12	↓	↓			
Q13	↓	↓			
Q14	1010285	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
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MATERIAL
HEAT TREATMENT
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN R.SHARP DATE 1-15-63
CHECKED [illegible] 1-23-63
APPROVAL John E. Miller 1-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
. ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034 B
SCALE
WT
SHEET 2 OF 2

1010034 B

INCHES
PHOTOGRAPHIC SCALE ONLY

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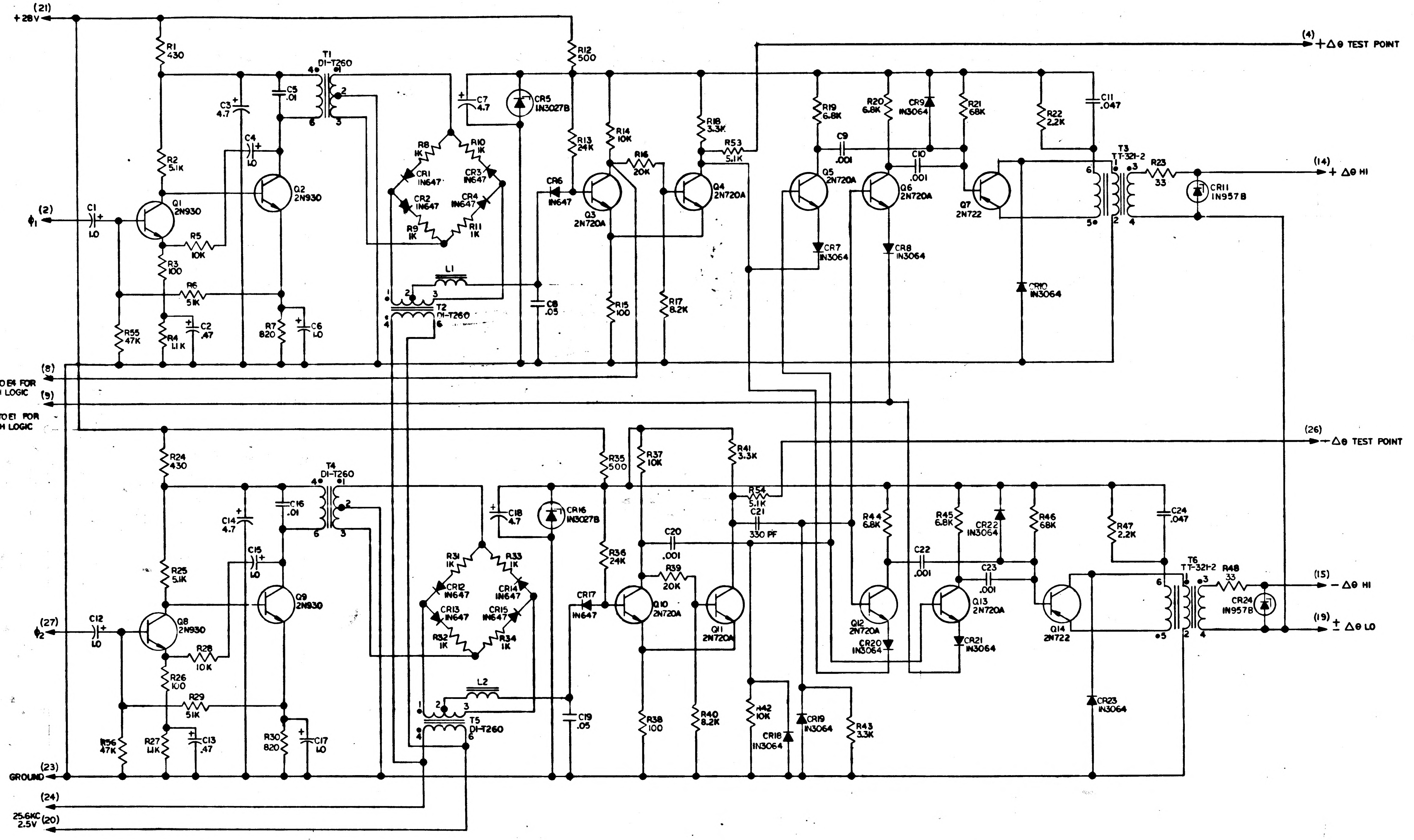
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	WR
B	REVISED PER TDRR 01116	5-1-63	WR
C	REVISED PER TDRR 01966	9-20-63	WR


(21) +28V
R1 430
T1 DI-T260
C3 4.7
C5 .01
C7 4.7
CR5 1N3027B
R12 500
(4) +Δθ TEST POINT
C4 1.0
R2 5.1K
Q1 2N930
Q2 2N930
(2) φ1
C1 1.0
R5 10K
R3 100
R6 51K
R55 47K
R4 1.1K
C2 .47
R7 820
C6 1.0
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
L1
T2 DI-T260
C8 .05
CR6 1N647
R13 24K
R14 10K
R16 20K
R18 3.3K
R53 5.1K
Q3 2N720A
Q4 2N720A
R15 100
R17 8.2K
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
R22 2.2K
C11 .047
C9 .001
C10 .001
Q5 2N720A
Q6 2N720A
Q7 2N722
T3 TT-321-2
R23 33
CR11 1N957B
(14) +Δθ HI
CR7 1N3064
CR8 1N3064
CR10 1N3064
(8)
CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
(9)
CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
(26) −Δθ TEST POINT
R24 430
T4 DI-T260
C14 4.7
C16 .01
C18 4.7
CR16 1N3027B
R35 500
R37 10K
R41 3.3K
R54 5.1K
C21 330 PF
C15 1.0
R25 5.1K
Q8 2N930
Q9 2N930
(27) φ2
C12 1.0
R28 10K
R26 100
R29 51K
R56 47K
R27 1.1K
C13 .47
R30 820
C17 1.0
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
L2
T5 DI-T260
C19 .05
CR17 1N647
R36 24K
C20 .001
R39 20K
Q10 2N720A
Q11 2N720A
R38 100
R40 8.2K
R42 10K
CR18 1N3064
CR19 1N3064
R43 3.3K
R44 6.8K
R45 6.8K
CR22 1N3064
R46 68K
R47 2.2K
C24 .047
C22 .001
C23 .001
Q12 2N720A
Q13 2N720A
CR20 1N3064
CR21 1N3064
Q14 2N722
CR23 1N3064
T6 TT-321-2
R48 33
CR24 1N957B
(15) −Δθ HI
(19) ±Δθ LO
(23) GROUND
(24)
25.6KC 2.5V (20)

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

MIT
INSTRUMENTATION LAB
Cambridge, Mass
DWG NO. CONTRACT
DRAWN THENO DATE 1-15-63
CHECKED G Cushman 1-23-63
APPROVAL J E Miller 1-28-63
APPROVAL
NASA APPROVAL 1-28-63
MIT APPROVAL 1-23-63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
ENCODER
ELECTRONICS

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010034
SCALE — WT SHEET F OF 7

1010034 C

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	
B	REVISED PER TDRR 08116	5-1-63	
C	REVISED PER TDRR 31966	7-20-63	J.S.A. WK

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49		5.1 K	2	1/4 W
R3	1010364-60		100	1	1/8 W
R4	1006750-33		1.1 K	2	1/4 W
R5	1010364-444		10 K	1	1/8 W
R6	1006750-73		51 K	2	1/4 W
R7	1006750-30		820	2	1/4 W
R8	1010364-252		1 K	1	1/8 W
R9			1 K		
R10			1K		
R11			1 K		
R12	1010312 -029		500	1	2 W
R13	1006750 - 65		24 K	2	1/4 W
R14	-56		10 K		
R15	-8		100		
R16	-63		20 K		
R17	-54		8.2 K		
R18	1006760 -44		3.3K		1/2 W
R19	1006750 - 52		6.8K		1/4 W
R20	-52		6.8K		
R21	-52		6.8K		
R22	-40		2.2K		
R23	1010369 -140		33	5	1/8W
R24	1006750 -23		430	2	1/4 W
R25	-49		5.1K		
R26	1010364 - 60		100	1	1/8 W
R27	1006750 - 33		1.1K	2	1/4 W
R28	1010364 -444		10 K	1	1/8 W
R29	1006750-73		51 K	2	1/4 W
R30	1006750 - 30		820	2	1/4 W
R31	1010364 - 252		1 K	1	1/8W
R32			1K		
R33			1K		
R34			1K		
R35	1010312 -029		500	1	2 W
R36	1006750-65		24K	2	1/4 W
R37	-56		10 K		
R38	-8		100		
R39	-63		20K		
R40	-54		8.2K		
R41	1006760 -44		3.3K		1/2 W
R42	1006750 -56		10K		1/4W
R43	-44		3.3K		
R44	52		6.8K		
R45			6.8K		
R46			6.8K		
R47	-40		2.2K		
R48	1010369 -140		33	5	1/8 W
~~R49~~					
~~R50~~					
~~R51~~					
~~R52~~					
R53	1006750-49		5.1K	2	1/4 W
R54			5.1K		
R55	-72		47K		
R56	-72		47K		
T1	1010366	TRANSFORMER			
T2	1010366				
T3	1010344-2				
T4	1010366				
T5	1010366				
T6	1010344-2				

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	1006755-65		0.47		35V
C3	1010393 -37		4.7		50V
C4	1006755-69		1.0		35V
C5	1010359 -29		.01	20	200V
C6	1006755-69		1.0	10	35V
C7	1010393 -37		4.7		50V
C8	1010279-216		.05		35V
C9	1010359 - 17		.001	20	200V
C10	1010359 - 17		.001	20	200V
C11	1010375 - 21		.047	10	50V
C12	1006755-69		1.0		35V
C13	1006755 -65		0.47		35V
C14	1010393 -37		4.7		50V
C15	1006755-69		1.0		35V
C16	1010359 -29		.01	20	200V
C17	1006755-69		1.0	10	35V
C18	1010393 - 37		4.7		50V
C19	1010279-216		.05		35V
C20	1010359 - 17		.001	20	200V
C21	-11		330 PF		
C22	1010359 - 17		.001		
C23					
C24	1010375 - 21		.047	10	50V
CR1	1010362-2	DIODE			400V
CR2					
CR3					
CR4					
CR5	1010265-12	DIODE,(ZENER)		5	20V
CR6	1010362-2	DIODE			400V
CR7	1010370				50 V
CR8					
CR9					
CR10					
CR11	1010286-001	DIODE (ZENER)		5	6.8V
CR12	1010362-2	DIODE			400V
CR13					
CR14					
CR15					
CR16	1010265-12	DIODE,(ZENER)		5	20V
CR17	1010362-2	DIODE			400V
CR18	1010370				50V
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	1010286-001	DIODE (ZENER)		5	6.8V
L1	1010309-005	COIL	20 MH		
L2	1010309-005	COIL	20MH		
Q1	1010397	TRANSISTOR			
Q2	1010397				
Q3	1010357				
Q4					
Q5					
Q6					
Q7	1010285				
Q8	1010397				
Q9	1010397				
Q10	1010357				
Q11					
Q12					
Q13					
Q14	1010285				

1010034 C

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DWG NO. CONTRACT
DRAWN R. SHARP DATE 1-15-63
CHECKED J. Cushman 1-23-63
APPROVAL John E. Miller 1-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL W.A. Koppe 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
. ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034
SCALE
WT
SHEET 2 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

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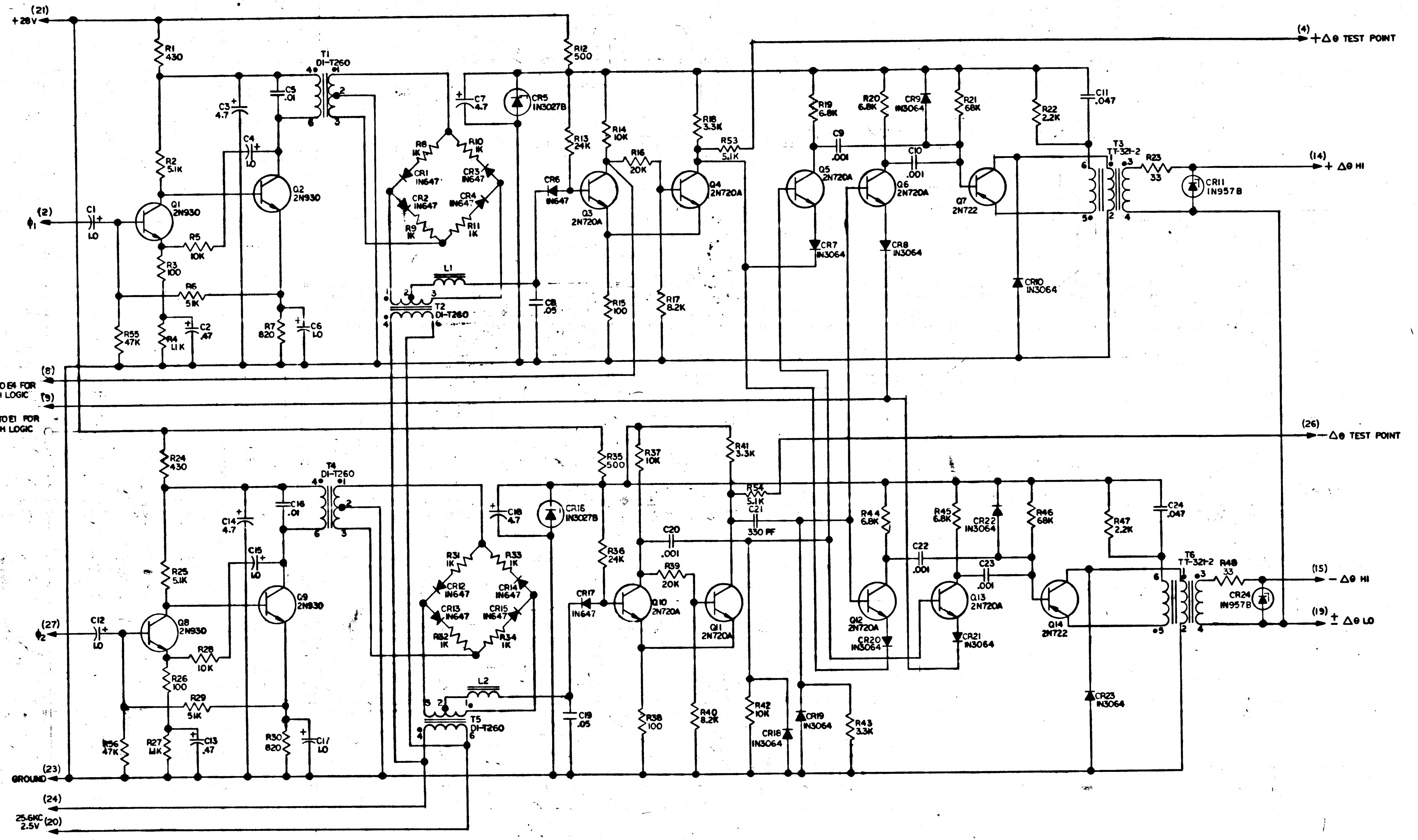
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	[illegible]
B	REVISED PER TDRR 01116	5-1-63	[illegible] WR
C	REVISED PER TDRR 01966	[illegible]	[illegible] WR
D	REVISED PER TDRR 04470	NOV 63	[illegible] WR



(21) +28V
R1 430
T1 DI-T260
C3 4.7
C5 .01
C4 1.0
R2 5.1K
Q1 2N930
Q2 2N930
(2) φ1
C1 1.0
R5 10K
R3 100
R6 51K
R55 47K
R4 1.1K
C2 .47
R7 820
C6 1.0
R12 500
C7 4.7
CR5 1N3027B
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
L1
T2 DI-T260
R13 24K
CR6 1N647
C8 .05
R14 10K
R16 20K
Q3 2N720A
R15 100
R17 8.2K
R18 3.3K
R53 5.1K
Q4 2N720A
(4) +Δθ TEST POINT
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
C9 .001
C10 .001
Q5 2N720A
Q6 2N720A
Q7 2N722
CR7 1N3064
CR8 1N3064
CR10 1N3064
R22 2.2K
C11 .047
T3 TT-321-2
R23 33
CR11 1N957B
(14) +Δθ HI
(8) CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
(9) CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
(26) -Δθ TEST POINT
R24 430
T4 DI-T260
C14 4.7
C16 .01
C15 1.0
R25 5.1K
Q8 2N930
Q9 2N930
(27) φ2
C12 1.0
R28 10K
R26 100
R29 51K
R56 47K
R27 1.1K
C13 .47
R30 820
C17 1.0
C18 4.7
CR16 1N3027B
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
L2
T5 DI-T260
R35 500
R36 24K
CR17 1N647
C19 .05
R37 10K
C20 .001
R39 20K
Q10 2N720A
Q11 2N720A
R38 100
R40 8.2K
R41 3.3K
R54 5.1K
C21 330 PF
R42 10K
CR18 1N3064
CR19 1N3064
R43 3.3K
R44 6.8K
Q12 2N720A
CR20 1N3064
R45 6.8K
CR22 1N3064
C22 .001
C23 .001
Q13 2N720A
CR21 1N3064
R46 68K
R47 2.2K
C24 .047
Q14 2N722
CR23 1N3064
T6 TT-321-2
R48 33
CR24 1N957B
(15) -Δθ HI
(19) ±Δθ LO
(23) GROUND
(24)
(20) 25.6KC 2.5V

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

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QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

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DRAWN THENO DATE 1-15-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-28-63
APPROVAL
NASA APPROVAL 1-28-63
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
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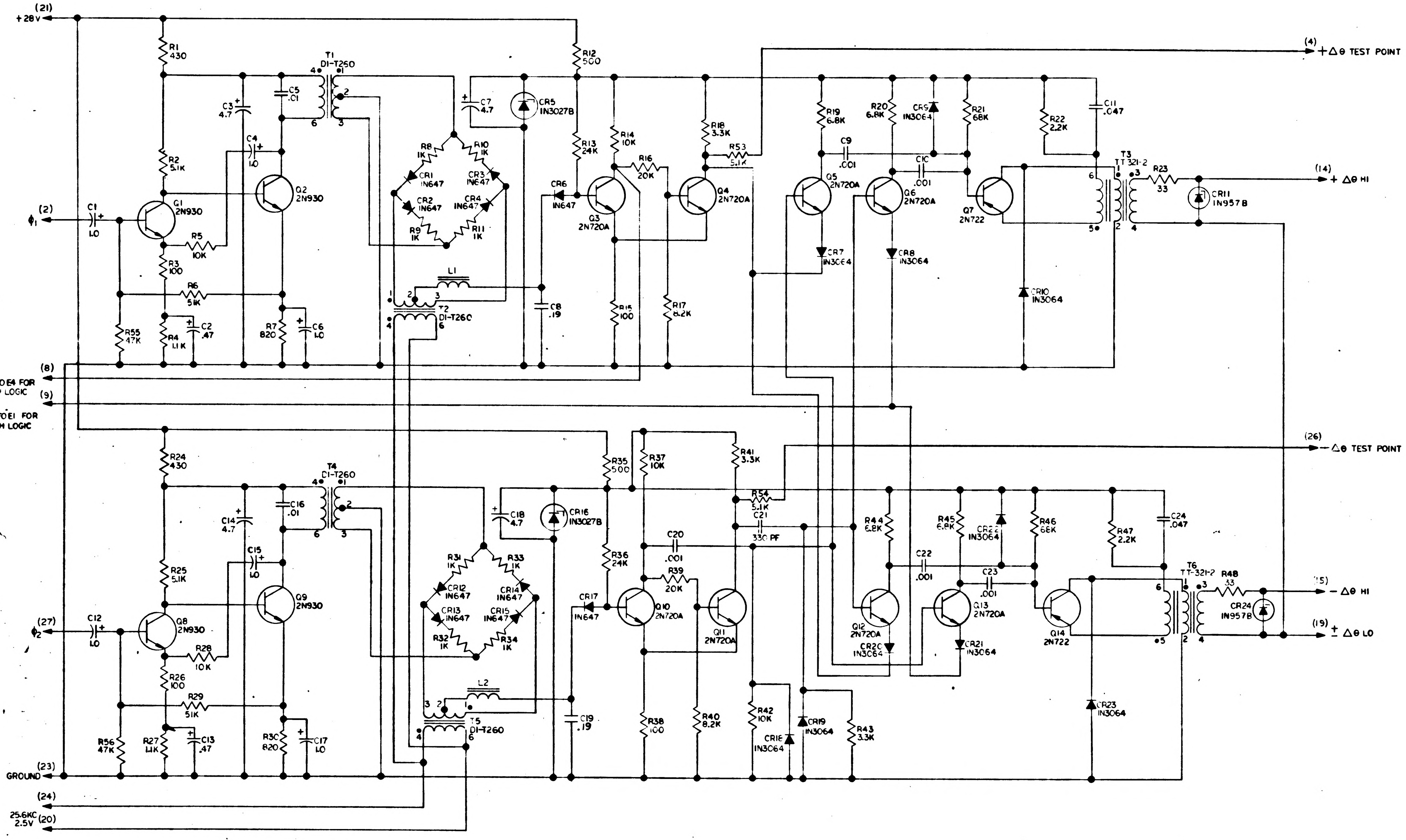
SCHEMATIC,
ENCODER
ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034
SCALE —— WT SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	WR
B	REVISED PER TDRR 01116	5-1-63	WK
C	REVISED PER TDRR 01966	7-30-63	W.A. WK
D	REVISED PER TDRR 04470	5 NOV 63	WK
E	REVISED PER TDRR 07556	20 APR 64	JWR


(21)
+28V
R1 430
T1 DI-T260
C3 4.7
C5 .01
C4 1.0
R2 5.1K
Q1 2N930
Q2 2N930
(2)
ϕ_1
C1 1.0
R5 10K
R3 100
R6 51K
R55 47K
R4 1.1K
C2 .47
R7 820
C6 1.0
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
L1
T2 DI-T260
C7 4.7
CR5 1N3027B
R12 500
R13 24K
CR6 1N647
C8 .19
R14 10K
R16 20K
Q3 2N720A
R15 100
R17 8.2K
R18 3.3K
R53 5.1K
Q4 2N720A
(4) +Δθ TEST POINT
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
R22 2.2K
C11 .047
C9 .001
C10 .001
Q5 2N720A
Q6 2N720A
Q7 2N722
CR7 1N3064
CR8 1N3064
CR10 1N3064
T3 TT 321-2
R23 33
CR11 1N957B
(14) +Δθ HI
(8)
(9)
CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
(26) −Δθ TEST POINT
R24 430
T4 DI-T260
C14 4.7
C16 .01
C15 1.0
R25 5.1K
Q8 2N930
Q9 2N930
(27)
ϕ_2
C12 1.0
R28 10K
R26 100
R29 51K
R56 47K
R27 1.1K
C13 .47
R30 820
C17 1.0
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
L2
T5 DI-T260
C18 4.7
CR16 1N3027B
R35 500
R36 24K
CR17 1N647
C19 .19
R37 10K
C20 .001
R39 20K
Q10 2N720A
Q11 2N720A
R38 100
R40 8.2K
R41 3.3K
R54 5.1K
C21 330 PF
R42 10K
CR18 1N3064
CR19 1N3064
R43 3.3K
R44 6.8K
R45 6.8K
CR22 1N3064
R46 68K
R47 2.2K
C24 .047
C22 .001
C23 .001
Q12 2N720A
Q13 2N720A
Q14 2N722
CR20 1N3064
CR21 1N3064
CR23 1N3064
T6 TT-321-2
R48 33
CR24 1N957B
(15) −Δθ HI
(19) ± Δθ LO
(23) GROUND
(24)
25.6KC (20) 2.5V

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

E	E
D	C
C	C
B	B
A	A
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
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APPROVAL
NASA APPROVAL 1-23-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010034
SCALE
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SHEET 1 OF 2

1010034 E

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	WR
B	REVISED PER TDRR 08116	5-1-63	WR
C	REVISED PER TDRR 09966	7-8-63	WR
E	REVISED PER TDRR 07556	20 APR 65	JHR

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49	↓	5.1K	2	1/4 W
R3	1010364-60	↓	100	1	1/8 W
R4	1006750-33	↓	1.1K	2	1/4 W
R5	1010364-444	↓	10K	1	1/8 W
R6	1006750-73	↓	51K	2	1/4 W
R7	1006750-30	↓	820	2	1/4 W
R8	1010364-252	↓	1K	1	1/8 W
R9	↓ ↓	↓	1K	↓	↓
R10	↓ ↓	↓	1K	↓	↓
R11	↓ ↓	↓	1K	↓	↓
R12	1010312 -029	↓	500	1	2 W
R13	1006750 -65	↓	24K	2	1/4 W
R14	↓ -56	↓	10K	↓	↓
R15	↓ -8	↓	100	↓	↓
R16	↓ -63	↓	20K	↓	↓
R17	↓ -54	↓	8.2K	↓	↓
R18	1006760-44	↓	3.3K	↓	1/2 W
R19	1006750-52	↓	6.8K	↓	1/4 W
R20	↓ -52	↓	6.8K	↓	↓
R21	↓ -52	↓	6.8K	↓	↓
R22	↓ -40	↓	2.2K	↓	↓
R23	1010369 -140	↓	33	5	1/8W
R24	1006750 -23	↓	430	2	1/4 W
R25	↓ -49	↓	5.1K	↓	↓
R26	1010364 - 60	↓	100	1	1/8 W
R27	1006750 - 33	↓	1.1K	2	1/4 W
R28	1010364 -444	↓	10K	1	1/8 W
R29	1006750-73	↓	51K	2	1/4 W
R30	1006750 - 30	↓	820	2	1/4 W
R31	1010364 - 252	↓	1K	1	1/8W
R32	↓ ↓	↓	1K	↓	↓
R33	↓ ↓	↓	1K	↓	↓
R34	↓ ↓	↓	1K	↓	↓
R35	1010312 -029	↓	500	1	2 W
R36	1006750-65	↓	24K	2	1/4 W
R37	↓ -56	↓	10K	↓	↓
R38	↓ -8	↓	100	↓	↓
R39	↓ -63	↓	20K	↓	↓
R40	↓ -54	↓	8.2K	↓	↓
R41	1006760 -44	↓	3.3K	↓	1/2 W
R42	1006750 -56	↓	10K	↓	1/4 W
R43	↓ -44	↓	3.3K	↓	↓
R44	↓ 52	↓	6.8K	↓	↓
R45	↓ ↓	↓	6.8K	↓	↓
R46	↓ ↓	↓	6.8K	↓	↓
R47	↓ -40	↓	2.2K	↓	↓
R48	1010369 -140	↓	33	5	1/8 W
R49		↓			
R50		↓			
R51		↓			
R52		↓			
R53	1006750-49	↓	5.1K	2	1/4 W
R54	↓ ↓	↓	5.1K	↓	↓
R55	↓ -72	↓	47K	↓	↓
R56	↓ -72	↓	47K	↓	↓
T1	1010366	TRANSFORMER			
T2	1010366	↓			
T3	1010344-2	↓			
T4	1010366	↓			
T5	1010366	↓			
T6	1010344-2	↓			

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	1006755-65	↓	0.47	↓	35V
C3	1010393 -37	↓	4.7	↓	50V
C4	1006755-69	↓	1.0	↓	35V
C5	1010359 -29	↓	.01	20	200V
C6	1006755-69	↓	1.0	10	35V
C7	1010393 -37	↓	4.7	↓	50V
C8	1010279-223	↓	.19	↓	35V
C9	1010359 - 17	↓	.001	20	200V
C10	1010359 - 17	↓	.001	20	200V
C11	1010375 -21	↓	.047	10	50V
C12	1006755-69	↓	1.0	↓	35V
C13	1006755 -65	↓	0.47	↓	35V
C14	1010393 -37	↓	4.7	↓	50V
C15	1006755 - 69	↓	1.0	↓	35V
C16	1010359 -29	↓	.01	20	200V
C17	1006755 - 69	↓	1.0	10	35V
C18	1010393 - 37	↓	4.7	↓	50V
C19	1010279-223	↓	.19	↓	35V
C20	1010359 - 17	↓	.001	20	200V
C21	↓ -11	↓	330 PF	↓	↓
C22	1010359 17	↓	.001	↓	↓
C23	↓ ↓	↓	↓	↓	↓
C24	1010375 - 21	↓	.047	10	50V
CR1	1010362-2	DIODE			400V
CR2	↓ ↓	↓			↓
CR3	↓ ↓	↓			↓
CR4	↓ ↓	↓			↓
CR5	1010265-12	DIODE,(ZENER)		5	20V
CR6	1010362-2	DIODE			400V
CR7	1010370	↓			50 V
CR8	↓	↓			↓
CR9	↓	↓			↓
CR10	↓	↓			↓
CR11	1010286-001	DIODE (ZENER)		5	6.8V
CR12	1010362 - 2	DIODE			400V
CR13	↓ ↓	↓			↓
CR14	↓ ↓	↓			↓
CR15	↓ ↓	↓			↓
CR16	1010265-12	DIODE,(ZENER)		5	20V
CR17	1010362 - 2	DIODE			400 V
CR18	1010370	↓			50V
CR19	↓	↓			↓
CR20	↓	↓			↓
CR21	↓	↓			↓
CR22	↓	↓			↓
CR23	↓	↓			↓
CR24	1010286-001	DIODE (ZENER)		5	6.8V
L1	1010309-005	COIL	20 MH		
L2	1010309-005	COIL	20MH		
Q1	1010397	TRANSISTOR			
Q2	1010397	↓			
Q3	1010357	↓			
Q4	↓	↓			
Q5	↓	↓			
Q6	↓	↓			
Q7	1010285	↓			
Q8	1010397	↓			
Q9	1010397	↓			
Q10	1010357	↓			
Q11	↓	↓			
Q12	↓	↓			
Q13	↓	↓			
Q14	1010285	↓			

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CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R SHARP DATE 1-15-63
CHECKED 1-23-63
APPROVAL John Miller 1-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
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ENCODER ELECTRONICS

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010034
SCALE
WT
SHEET 2 OF 2

1010034 E

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REVISIONS			
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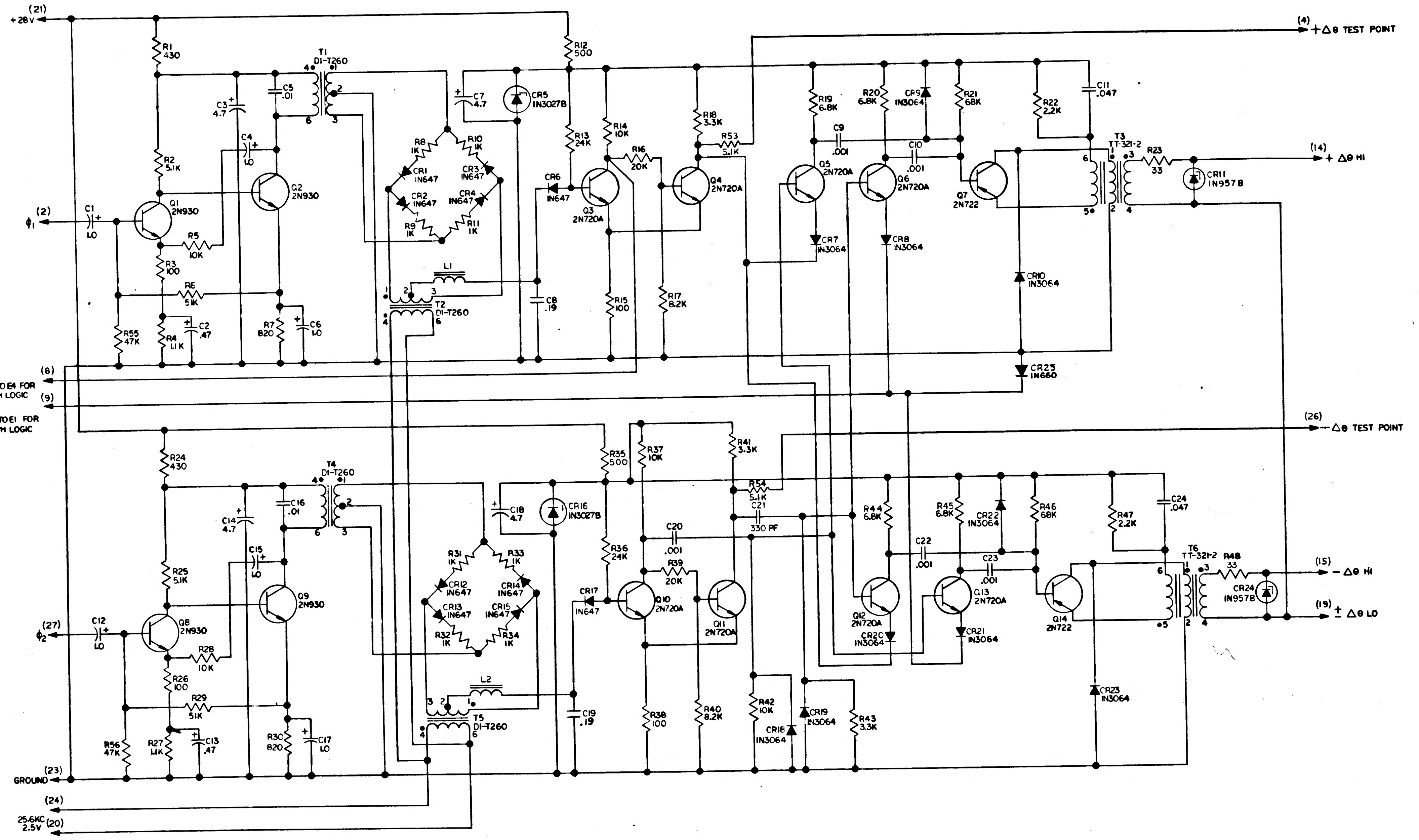
B	REVISED PER TDRR 01116	5-1-63	WR
C	REVISED PER TDRR 01966	7-20-63	WR
D	REVISED PER TDRR 04470	5 NOV 63	
E	REVISED PER TDRR 07556	20 APR 64	JWR
F	REVISED PER TDRR 11870	3 SEP 64	JWP DAS



(21)
+28V
R1 430
C3 4.7
C5 .01
T1 DI-T260
C7 4.7
CR5 1N3027B
R12 500
(4) +Δθ TEST POINT
R2 5.1K
C4 1.0
Q1 2N930
Q2 2N930
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
CR6 1N647
R13 24K
R14 10K
R16 20K
Q3 2N720A
Q4 2N720A
R18 3.3K
R53 5.1K
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
R22 2.2K
C11 .047
C9 .001
C10 .001
Q5 2N720A
Q6 2N720A
Q7 2N722
T3 TT-321-2
R23 33
CR11 1N957B
(14) +Δθ HI
(2) φ1
C1 1.0
R5 10K
R3 100
R6 51K
L1
T2 DI-T260
C8 .19
R15 100
R17 8.2K
CR7 1N3064
CR8 1N3064
CR10 1N3064
R55 47K
R4 1.1K
C2 .47
R7 820
C6 1.0
CR25 1N660
(8)
CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
(9)
CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
(26) −Δθ TEST POINT
R24 430
T4 DI-T260
C14 4.7
C16 .01
C18 4.7
CR16 1N3027B
R35 500
R37 10K
R41 3.3K
R54 5.1K
C21 330 PF
R44 6.8K
R45 6.8K
CR22 1N3064
R46 68K
R47 2.2K
C24 .047
R25 5.1K
C15 1.0
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
CR17 1N647
R36 24K
C20 .001
R39 20K
Q10 2N720A
Q11 2N720A
C22 .001
C23 .001
Q12 2N720A
Q13 2N720A
Q14 2N722
T6 TT-321-2
R48 33
CR24 1N957B
(15) −Δθ HI
(19) ±Δθ LO
(27) φ2
C12 1.0
Q8 2N930
Q9 2N930
R28 10K
R26 100
R29 51K
L2
T5 DI-T260
C19 .19
R38 100
R40 8.2K
R42 10K
CR18 1N3064
CR19 1N3064
R43 3.3K
CR20 1N3064
CR21 1N3064
CR23 1N3064
R56 47K
R27 1.1K
C13 .47
R30 820
C17 1.0
(23) GROUND
(24)
25.6KC 2.5V (20)

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN THENO DATE 1-15-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL 1-28-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
ENCODER
ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034
SCALE ——— WT SHEET 1 OF 2

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	[illegible]
B	REVISED PER TDRR 08116	5-1-63	[illegible] WK
C	REVISED PER TDRR 01966	[illegible]	JSA WK
E	REVISED PER TDRR 07556	20 APR 64	JHR [illegible]
F	REVISED PER TDRR 11870	SEP 64	JWP / DAS

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49		5.1K	2	1/4 W
R3	1010364-60		100	1	1/8 W
R4	1006750-33		1.1K	2	1/4 W
R5	1010364-444		10K	1	1/8 W
R6	1006750-73		51K	2	1/4 W
R7	1006750-30		820	2	1/4 W
R8	1010364-252		1K	1	1/8 W
R9			1K		
R10			1K		
R11	↓ ↓		1K	↓	↓
R12	1010312 -029		500	1	2 W
R13	1006750 -65		24K	2	1/4 W
R14	-56		10K		
R15	-8		100		
R16	-63		20K		
R17	↓ -54		8.2K		↓
R18	1006760 -44		3.3K		1/2 W
R19	1006750 -52		6.8K		1/4 W
R20	-52		6.8K		
R21	-52		6.8K		
R22	↓ -40		2.2K	↓	↓
R23	1010369 -140		33	5	1/8 W
R24	1006750 -23		430	2	1/4 W
R25	↓ -49		5.1K	↓	↓
R26	1010364 - 60		100	1	1/8 W
R27	1006750 -33		1.1K	2	1/4 W
R28	1010364 -444		10K	1	1/8 W
R29	1006750-73		51K	2	1/4 W
R30	1006750 - 30		820	2	1/4 W
R31	1010364 - 252		1K	1	1/8W
R32			1K		
R33			1K		
R34	↓ ↓		1K	↓	↓
R35	1010312 -029		500	1	2 W
R36	1006750-65		24K	2	1/4 W
R37	-56		10K		
R38	-8		100		
R39	-63		20K		
R40	↓ -54		8.2K		↓
R41	1006760 -44		3.3K		1/2 W
R42	1006750 -56		10K		1/4 W
R43	-44		3.3K		
R44	52		6.8K		
R45			6.8K		
R46	↓		6.8K		
R47	↓ -40		2.2K	↓	↓
R48	1010369 -140		33	5	1/8 W
~~R49~~					
R50					
~~R51~~					
~~R52~~					
R53	1006750-49		5.1K	2	1/4 W
R54	↓		5.1K		
R55	-72		47K		
R56	↓ -72	↓	47K	↓	↓
T1	1010366	TRANSFORMER			
T2	1010366				
T3	1010344-2				
T4	1010366				
T5	1010366				
T6	1010344-2	↓			

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	1006755-65		0.47		35V
C3	1010393 -37		4.7		50V
C4	1006755-69		1.0	↓	35V
C5	1010359 -29		.01	20	200V
C6	1006755-69		1.0	10	35V
C7	1010393 -37		4.7		50V
C8	1010279-223		.19	↓	35V
C9	1010359 - 17		.001	20	200V
C10	1010359 - 17		.001	20	200V
C11	1010375 -21		.047	10	50V
C12	1006755-69		1.0		35V
C13	1006755 -65		0.47		35V
C14	1010393 -37		4.7		50V
C15	1006755-69		1.0	↓	35V
C16	1010359 -29		.01	20	200V
C17	1006755-69		1.0	10	35V
C18	1010393 - 37		4.7		50V
C19	1010279-223		.19	↓	35V
C20	1010359 - 17		.001	20	200V
C21	↓ -11		330 PF		
C22	1010359 - 17		.001		
C23	↓ ↓		↓	↓	↓
C24	1010375 -21	↓	.047	10	50V
CR1	1010362-2	DIODE			400V
CR2					
CR3					
CR4	↓ ↓	↓			↓
CR5	1010265-12	DIODE,(ZENER)		5	20V
CR6	1010362-2	DIODE			400V
CR7	1010370				50 V
CR8					
CR9					
CR10	↓	↓			↓
CR11	1010286-001	DIODE (ZENER)		5	6.8V
CR12	1010362-2	DIODE			400V
CR13					
CR14					
CR15	↓ ↓	↓			↓
CR16	1010265-12	DIODE,(ZENER)		5	20V
CR17	1010362 - 2	DIODE			400 V
CR18	1010370				50V
CR19					
CR20					
CR21					
CR22					
CR23	↓	↓			↓
CR24	1010286-001	DIODE (ZENER)		5	6.8V
CR25	1010385	DIODE			100 V
L1	1010309-005	COIL	20 MH		
L2	1010309-005	COIL	20MH		
Q1	1010397	TRANSISTOR			
Q2	1010397				
Q3	1010357				
Q4					
Q5					
Q6	↓				
Q7	1010285				
Q8	1010397				
Q9	1010397				
Q10	1010357				
Q11					
Q12					
Q13	↓				
Q14	1010285	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN R. SHARP DATE 1-15-63
CHECKED [illegible] 1-23-63
APPROVAL John E Miller 1-23-63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 23 Jan 63

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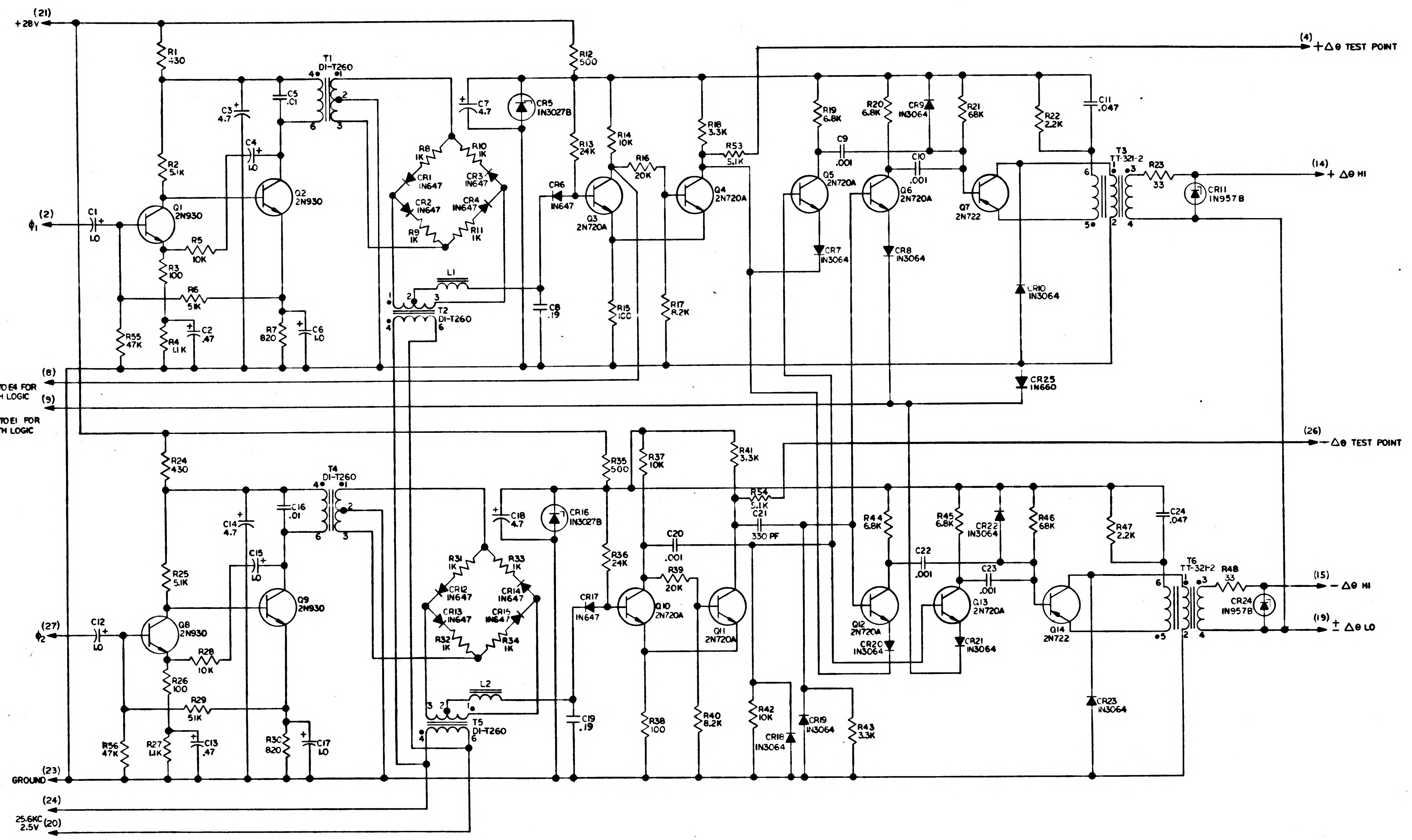
ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034
SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	WR
B	REVISED PER TDRR 01116	5-1-63	WR
C	REVISED PER TDRR 01966	9-30-63	WR
D	REVISED PER TDRR 04470	5 NOV 63	WR
E	REVISED PER TDRR 07556	20 APR 64	JWR
F	REVISED PER TDRR 11870	3 SEP 64	JWP DAS
G	REVISED PER TDRR 17610	26 MAR 65	HTO


(21) +28V
R1 430
T1 DI-T260
C3 4.7
C5 .01
R12 500
C7 4.7
CR5 1N3027B
R13 24K
R14 10K
R16 20K
R18 3.3K
R53 5.1K
(4) +Δθ TEST POINT
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
R22 2.2K
C11 .047
C9 .001
C10 .001
T3 TT-321-2
R23 33
(14) +Δθ HI
CR11 1N957B
R2 5.1K
C4 1.0
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
CR6 1N647
Q1 2N930
Q2 2N930
Q3 2N720A
Q4 2N720A
Q5 2N720A
Q6 2N720A
Q7 2N722
(2) φ1
C1 1.0
R5 10K
R3 100
R6 51K
L1
T2 DI-T260
C8 .19
R15 100
R17 8.2K
CR7 1N3064
CR8 1N3064
CR10 1N3064
R55 47K
R4 1.1K
C2 .47
R7 820
C6 1.0
CR25 1N660
(8)
CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
(9)
CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
(26) −Δθ TEST POINT
R24 430
T4 DI-T260
R35 500
R37 10K
R41 3.3K
R54 5.1K
C21 330 PF
C14 4.7
C16 .01
C18 4.7
CR16 1N3027B
R36 24K
C20 .001
R44 6.8K
R45 6.8K
CR22 1N3064
R46 68K
R47 2.2K
C24 .047
C22 .001
C23 .001
R39 20K
T6 TT-321-2
R48 33
(15) −Δθ HI
CR24 1N957B
(19) ± Δθ LO
R25 5.1K
C15 1.0
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
CR17 1N647
Q8 2N930
Q9 2N930
Q10 2N720A
Q11 2N720A
Q12 2N720A
Q13 2N720A
Q14 2N722
CR20 1N3064
CR21 1N3064
(27) φ2
C12 1.0
R28 10K
R26 100
R29 51K
L2
T5 DI-T260
C19 .19
CR23 1N3064
R42 10K
CR19 1N3064
R43 3.3K
CR18 1N3064
R56 47K
R27 1.1K
C13 .47
R30 820
C17 1.0
R38 100
R40 8.2K
(23) GROUND
(24)
25.6KC 2.5V (20)

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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APPROVAL
NASA APPROVAL W J Rhine 1-28-63
MIT APPROVAL 23 Jan 63

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SCHEMATIC, ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034
SCALE
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SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00481	2-28-63	WK
B	REVISED PER TDRR 08116	5-1-63	WK
C	REVISED PER TDRR 09966	7-30-63	WK
E	REVISED PER TDRR 07556	20 APR 64	JHR
F	REVISED PER TDRR 11870	3 SEP 64	DAS
G	REVISED PER TDRR 17610	24 MAR 65	CJP

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49		5.1 K	2	1/4 W
R3	1010364-60		100	1	1/8 W
R4	1006750-33		1.1 K	2	1/4 W
R5	1010364-444		10K	1	1/8 W
R6	1006750-73		51 K	2	1/4 W
R7	1006750-30		820	2	1/4 W
R8	1010364 -252		1K	1	1/8W
R9			1K		
R10			1K		
R11	↓ ↓		1K	↓	↓
R12	1010312 -029		500	1	2 W
R13	1006750 - 65		24K	2	1/4 W
R14	-56		10K		
R15	-8		100		
R16	-63		20K		
R17	↓ -54		8.2K		↓
R18	1006760 —44		3.3K		1/2 W
R19	1006750 - 52		6.8K		1/4 W
R20	-52		6.8K		
R21	-52		6.8K		
R22	↓ -40		2.2K	↓	↓
R23	1010369 -140		33	5	1/8W
R24	1006750 -23		430	2	1/4 W
R25	↓ -49		5.1K	↓	↓
R26	1010364 - 60		100	1	1/8 W
R27	1006750 - 33		1.1K	2	1/4 W
R28	1010364 —444		10K	1	1/8 W
R29	1006750-73		51K	2	1/4 W
R30	1006750 - 30		820	2	1/4 W
R31	1010364 - 252		1K	1	1/8W
R32			1K		
R33			1K		
R34	↓ ↓		1K	↓	↓
R35	1010312 -029		500	1	2 W
R36	1006750-65		24K	2	1/4 W
R37	-56		10K		
R38	-8		100		
R39	-63		20K		
R40	↓ -54		8.2K		↓
R41	1006760 —44		3.3K		1/2 W
R42	1006750 -56		10K		1/4 W
R43	-44		3.3K		
R44	52		6.8K		
R45			6.8K		
R46	↓		6.8K		
R47	↓ -40		2.2K	↓	↓
R48	1010369 —140		33	5	1/8 W
R49					
R50					
R51					
R52					
R53	1006750—49		5.1K	2	1/4 W
R54	↓		5.1K		
R55	—72		47K		
R56	↓ —72	↓	47K	↓	↓
T1	1010366	TRANSFORMER			
T2	1010366				
T3	1010344-2				
T4	1010366				
T5	1010366				
T6	1010344-2	↓			

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	1006755-65		0.47		35V
C3	1010393 -37		4.7		50V
C4	1006755-69		1.0	↓	35V
C5	1010359 -29		.01	20	200V
C6	1006755-69		1.0	10	35V
C7	1010393 —37		4.7		50V
C8	1010279-223		.19	↓	35V
C9	1010359 - 17		.001	20	200V
C10	1010359 - 17		.001	20	200V
C11	1010375 -21		.047	10	50V
C12	1006755-69		1.0		35V
C13	1006755 —65		0.47		35V
C14	1010393 -37		4.7		50V
C15	1006755 - 69		1.0	↓	35V
C16	1010359 -29		.01	20	200V
C17	1006755-69		1.0	10	35V
C18	1010393 - 37		4.7		50V
C19	1010279-223		.19	↓	35V
C20	1010359 -17		.001	20	200V
C21	↓ -11		330 PF		
C22	1010359 - 17		.001		
C23	↓ ↓		↓	↓	↓
C24	1010375 -21	↓	.047	10	50V
CR1	1010362-2	DIODE			400V
CR2					
CR3					
CR4	↓ ↓	↓			↓
CR5	1010829-12	DIODE,(ZENER)		5	20V
CR6	1010362-2	DIODE			400V
CR7	1010370				50 V
CR8					
CR9					
CR10	↓	↓			↓
CR11	1010830-1	DIODE (ZENER)		5	6.8V
CR12	1010362-2	DIODE			400V
CR13					
CR14					
CR15	↓ ↓	↓			↓
CR16	1010829-12	DIODE,(ZENER)		5	20V
CR17	1010362-2	DIODE			400V
CR18	1010370				50V
CR19					
CR20					
CR21					
CR22					
CR23	↓	↓			↓
CR24	1010830-1	DIODE (ZENER)		5	6.8V
CR25	1010385	DIODE			100 V
L1	1010309-005	COIL	20MH		
L2	1010309-005	COIL	20MH		
Q1	1010397	TRANSISTOR			
Q2	1010397				
Q3	1010357				
Q4					
Q5					
Q6	↓				
Q7	1010285				
Q8	1010397				
Q9	1010397				
Q10	1010357				
Q11					
Q12					
Q13	↓				
Q14	1010285	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DRAWN R.SHARP DATE 1-15-63
CHECKED 1-23-63
APPROVAL John E Miller 1-23-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 23 Jan 63

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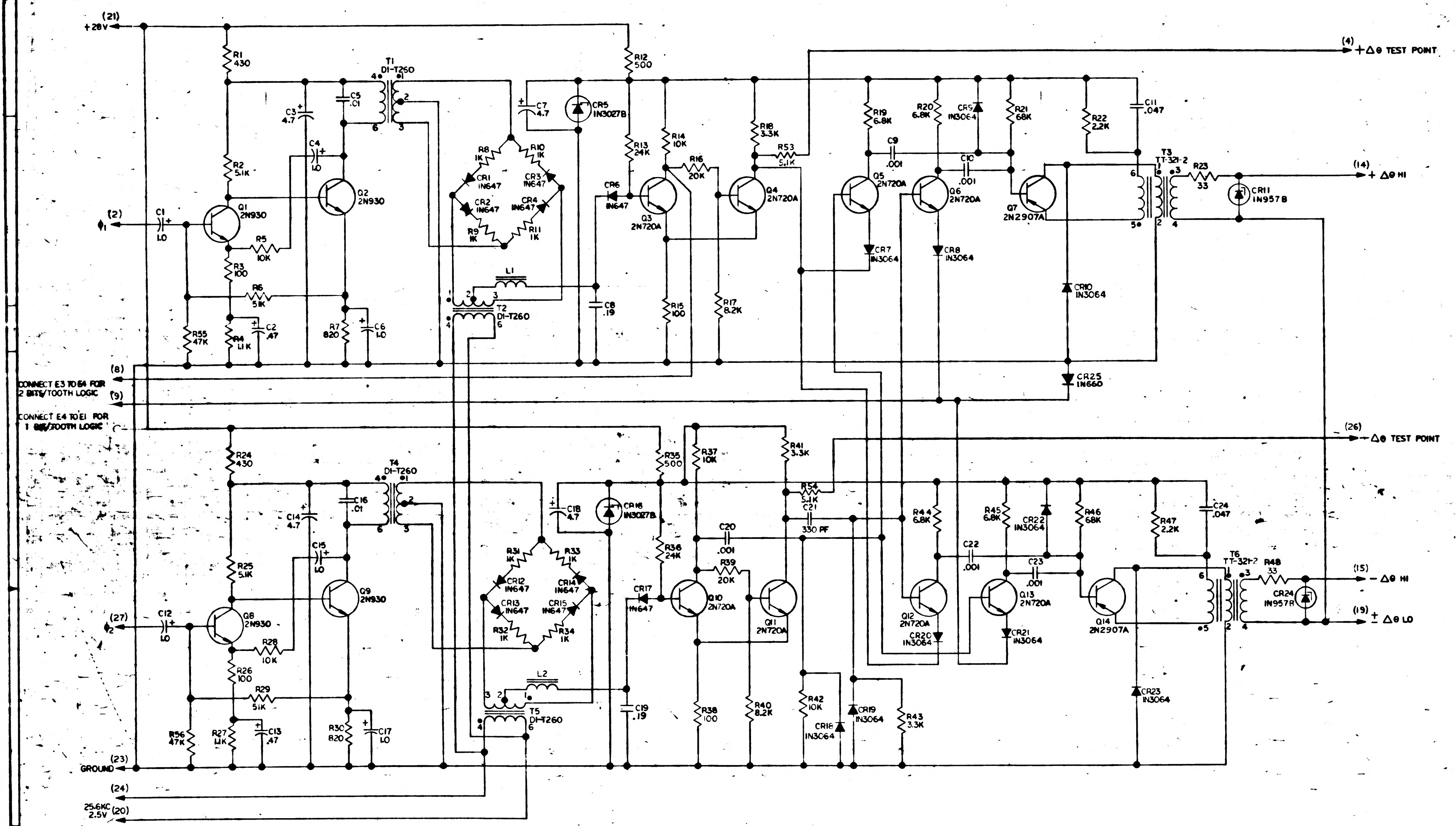
HOUSTON, TEXAS

SCHEMATIC
ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010034
SCALE
WT
SHEET 2 OF 2

SYM	DESCRIPTION	DATE	APPROVED
A	REVISED TDRR 00481	[illegible]	[illegible]
B	REVISED PER TDRR [illegible]	[illegible]	[illegible]
C	REVISED PER TDRR 02966	[illegible]	[illegible]
D	REVISED PER TDRR 04470	[illegible]	[illegible]
E	REVISED PER TDRR 07656	30 APR 64	[illegible]
F	REVISED PER TDRR 11870	[illegible]	[illegible]
G	REVISED PER TDRR 17612	[illegible]	[illegible]
H	REVISED PER TDRR 29756	29 JUN 65	[illegible]


(21) +28V
(2) φ1
(27) φ2
(8)
(9)
CONNECT E3 TO E4 FOR 2 BITS/TOOTH LOGIC
CONNECT E4 TO E1 FOR 1 BIT/TOOTH LOGIC
(23) GROUND
(24)
25.6KC 2.5V (20)
(4) +Δθ TEST POINT
(14) +Δθ HI
(26) Δθ TEST POINT
(15) −Δθ HI
(19) ±Δθ LO
R1 430
R2 5.1K
R3 100
R4 1.1K
R5 10K
R6 51K
R7 820
R8 1K
R9 1K
R10 1K
R11 1K
R12 500
R13 24K
R14 10K
R15 100
R16 20K
R17 8.2K
R18 3.3K
R19 6.8K
R20 6.8K
R21 68K
R22 2.2K
R23 33
R24 430
R25 5.1K
R26 100
R27 1.1K
R28 10K
R29 51K
R30 820
R31 1K
R32 1K
R33 1K
R34 1K
R35 500
R36 24K
R37 10K
R38 100
R39 20K
R40 8.2K
R41 3.3K
R42 10K
R43 3.3K
R44 6.8K
R45 6.8K
R46 68K
R47 2.2K
R48 33
R53 5.1K
R54 5.1K
R55 47K
R56 47K
C1 1.0
C2 .47
C3 4.7
C4 1.0
C5 .01
C6 1.0
C7 4.7
C8 .19
C9 .001
C10 .001
C11 .047
C12 1.0
C13 .47
C14 4.7
C15 1.0
C16 .01
C17 1.0
C18 4.7
C19 .19
C20 .001
C21 330 PF
C22 .001
C23 .001
C24 .047
CR1 1N647
CR2 1N647
CR3 1N647
CR4 1N647
CR5 1N3027B
CR6 1N647
CR7 1N3064
CR8 1N3064
CR9 1N3064
CR10 1N3064
CR11 1N957B
CR12 1N647
CR13 1N647
CR14 1N647
CR15 1N647
CR16 1N3027B
CR17 1N647
CR18 1N3064
CR19 1N3064
CR20 1N3064
CR21 1N3064
CR22 1N3064
CR23 1N3064
CR24 1N957B
CR25 1N660
Q1 2N930
Q2 2N930
Q3 2N720A
Q4 2N720A
Q5 2N720A
Q6 2N720A
Q7 2N2907A
Q8 2N930
Q9 2N930
Q10 2N720A
Q11 2N720A
Q12 2N720A
Q13 2N720A
Q14 2N2907A
T1 DI-T250
T2 DI-T260
T3 TT-321-2
T4 DI-T260
T5 DI-T260
T6 TT-321-2
L1
L2

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN THENO DATE 1-15-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-28-63
APPROVAL
NASA APPROVAL 1-29-63
MIT APPROVAL 1-23-63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
ENCODER
ELECTRONICS

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1010034
SCALE
WT
SHEET

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR [illegible]	[illegible]	[illegible]
B	REVISED PER TDRR [illegible]	[illegible]	[illegible]
C	REVISED PER TDRR [illegible]	[illegible]	[illegible]
E	REVISED PER TDRR [illegible]	[illegible]	[illegible]
F	REVISED PER TDRR 11820	[illegible] 64	[illegible]
G	REVISED PER TDRR 17610	24 MAR 64	[illegible]
H	REVISED PER TDRR [illegible]	25 JUN 65	[illegible]

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49		5.1 K	2	1/4 W
R3	1010364-60		100	1	1/8 W
R4	1006750-33		1.1 K	2	1/4 W
R5	1010364-444		10K	1	1/8 W
R6	1006750-73		51 K	2	1/4 W
R7	1006750-30		820	2	1/4 W
R8	1010364-252		1K	1	1/8 W
R9			1K		
R10			1K		
R11			1K		
R12	1010312 -029		500	1	2 W
R13	1006750-65		24K	2	1/4 W
R14	-56		10K		
R15	-8		100		
R16	-63		20K		
R17	-54		8.2K		
R18	1006760-44		3.3K		1/2 W
R19	1006750-52		6.8K		1/4 W
R20	-52		6.8K		
R21	-52		6.8K		
R22	-40		2.2K		
R23	1010369 -140		33	5	1/8 W
R24	1006750 -23		430	2	1/4 W
R25	-49		5.1K		
R26	1010364-60		100	1	1/8 W
R27	1006750-33		1.1K	2	1/4 W
R28	1010364-444		10K	1	1/8 W
R29	1006750-73		51K	2	1/4 W
R30	1006750-30		820	2	1/4 W
R31	1010364-252		1K	1	1/8W
R32			1K		
R33			1K		
R34			1K		
R35	1010312 -029		500	1	2 W
R36	1006750-65		24K	2	1/4 W
R37	-56		10K		
R38	-8		100		
R39	-63		20K		
R40	-54		8.2K		
R41	1006760-44		3.3K		1/2 W
R42	1006750-56		10K		1/4 W
R43	-44		3.3K		
R44	52		6.8K		
R45			6.8K		
R46			6.8K		
R47	-40		2.2K		
R48	1010369 -140		33	5	1/8 W
~~R49~~					
~~R50~~					
~~R51~~					
~~R52~~					
R53	1006750-49		5.1K	2	1/4 W
R54			5.1K		
R55	-72		47K		
R56	-72		47K		
T1	1010366	TRANSFORMER			
T2	1010366				
T3	1010344-2				
T4	1010366				
T5	1010366				
T6	1010344-2				

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35 V
C2	1006755-65		0.47		35 V
C3	1010393-37		4.7		50 V
C4	1006755-69		1.0		35 V
C5	1010359-29		.01	20	200 V
C6	1006755-69		1.0	10	35V
C7	1010393-37		4.7		50V
C8	1010279-223		.19		35V
C9	1010359-17		.001	20	200V
C10	1010359-17		.001	20	200V
C11	1010375-21		.047	10	50V
C12	1006755-69		1.0		35V
C13	1006755-65		0.47		35V
C14	1010393-37		4.7		50V
C15	1006755-69		1.0		35V
C16	1010359-29		.01	20	200V
C17	1006755-69		1.0	10	35V
C18	1010393-37		4.7		50V
C19	1010279-223		.19		35V
C20	1010359-17		.001	20	200V
C21	-11		330 PF		
C22	1010359-17		.001		
C23					
C24	1010375-21		.047	10	50V
CR1	1010362-2	DIODE			400 V
CR2					
CR3					
CR4					
CR5	1010829-12	DIODE (ZENER)		5	20V
CR6	1010362-2	DIODE			400V
CR7	1010370				50 V
CR8					
CR9					
CR10					
CR11	1010830-1	DIODE (ZENER)		5	6.8V
CR12	1010362-2	DIODE			400V
CR13					
CR14					
CR15					
CR16	1010829-12	DIODE (ZENER)		5	20V
CR17	1010362-2	DIODE			400 V
CR18	1010370				50V
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	1010830-1	DIODE (ZENER)		5	6.8V
CR25	1010385	DIODE			100 V
L1	1010309-005	COIL	20 MH		
L2	1010309-005	COIL	20MH		
Q1	1010397	TRANSISTOR			
Q2	1010397				
Q3	1010357				
Q4					
Q5					
Q6					
Q7	1008814-1		2N2907A		
Q8	1010397				
Q9	1010397				
Q10	1010357				
Q11					
Q12					
Q13					
Q14	1008814-1		2N2907A		

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN R SHARP DATE 1-[illegible]-63
CHECKED [illegible] 1-23-63
APPROVAL John E Miller 1-23-63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 23 [illegible] 63

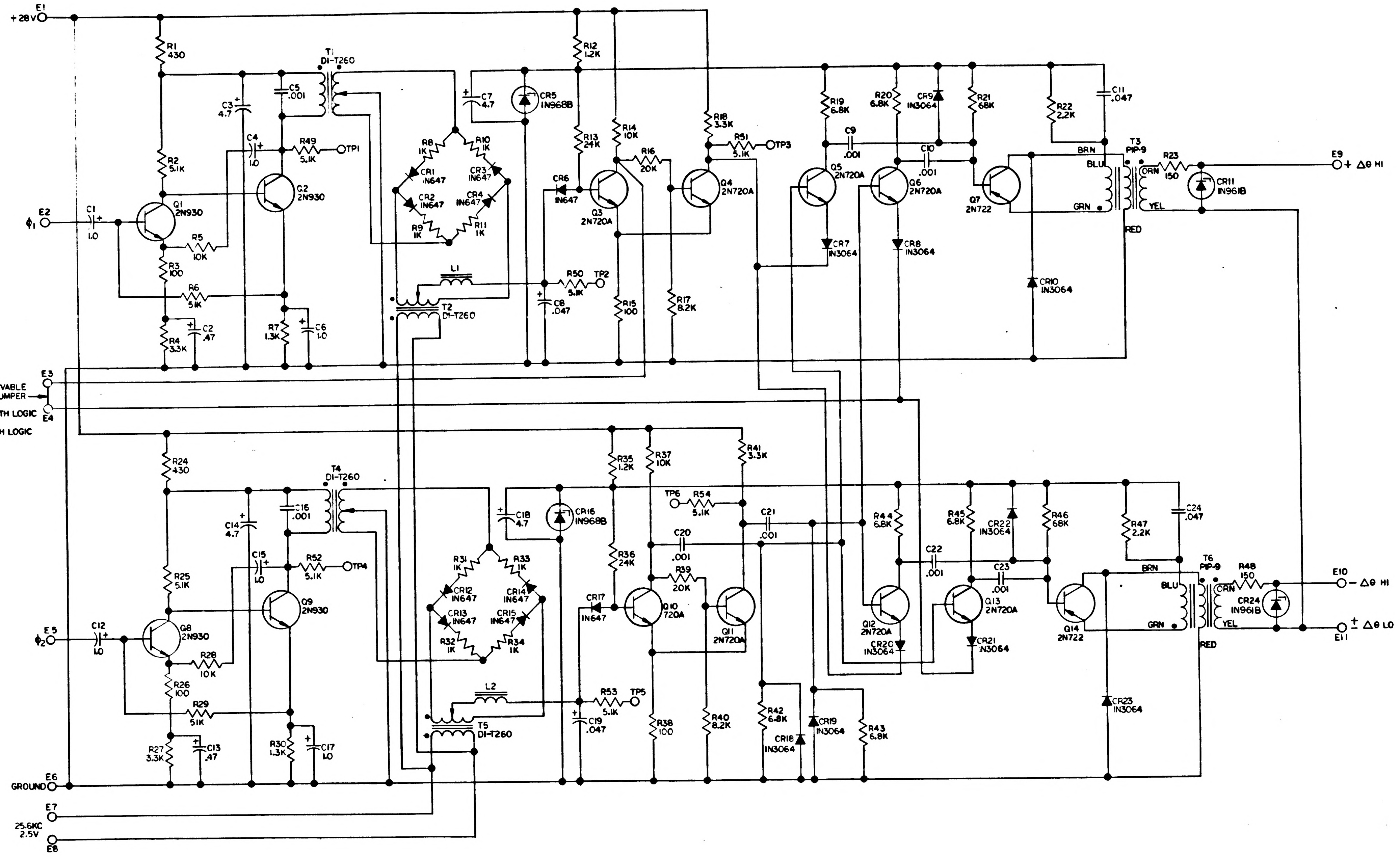
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
ENCODER ELECTRONICS

CODE IDENT NO. 80230
SIZE E
NASA DRAWING NO. 1010[illegible]34
SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL



E1
+28V
R1 430
T1 DI-T260
C3 4.7
C5 .001
C4 1.0
R49 5.1K
TP1
R2 5.1K
Q1 2N930
Q2 2N930
E2
φ1
C1 1.0
R5 10K
R3 100
R6 51K
C2 .47
R4 3.3K
R7 1.3K
C6 1.0
C7 4.7
CR5 1N968B
R8 1K
R10 1K
CR1 1N647
CR3 1N647
CR2 1N647
CR4 1N647
R9 1K
R11 1K
L1
T2 DI-T260
R50 5.1K
TP2
C8 .047
R12 1.2K
R13 24K
R14 10K
R16 20K
CR6 1N647
Q3 2N720A
Q4 2N720A
R15 100
R17 8.2K
R18 3.3K
R51 5.1K
TP3
R19 6.8K
R20 6.8K
CR9 1N3064
R21 68K
C9 .001
C10 .001
Q5 2N720A
Q6 2N720A
Q7 2N722
CR7 1N3064
CR8 1N3064
CR10 1N3064
R22 2.2K
C11 .047
T3 PIP-9
BRN
BLU
GRN
YEL
RED
R23 150
CR11 1N961B
E9
+ Δθ HI
E3
REMOVABLE JUMPER
WHEN IN: 2 BITS/TOOTH LOGIC
WHEN OUT: 1 BIT/TOOTH LOGIC
E4
R24 430
T4 DI-T260
C14 4.7
C16 .001
C15 1.0
R52 5.1K
TP4
R25 5.1K
Q8 2N930
Q9 2N930
E5
φ2
C12 1.0
R28 10K
R26 100
R29 51K
R27 3.3K
C13 .47
R30 1.3K
C17 1.0
C18 4.7
CR16 1N968B
R31 1K
R33 1K
CR12 1N647
CR14 1N647
CR13 1N647
CR15 1N647
R32 1K
R34 1K
L2
T5 DI-T260
R53 5.1K
TP5
C19 .047
R35 1.2K
R36 24K
R37 10K
R39 20K
C20 .001
CR17 1N647
Q10 720A
Q11 2N720A
R38 100
R40 8.2K
R41 3.3K
TP6
R54 5.1K
C21 .001
R42 6.8K
CR18 1N3064
CR19 1N3064
R43 6.8K
R44 6.8K
R45 6.8K
CR22 1N3064
R46 68K
C22 .001
C23 .001
Q12 2N720A
Q13 2N720A
Q14 2N722
CR20 1N3064
CR21 1N3064
CR23 1N3064
R47 2.2K
C24 .047
T6 PIP-9
R48 150
CR24 1N961B
E10
− Δθ HI
E11
± Δθ LO
E6
GROUND
E7
25.6KC 2.5V
E8

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS, RESISTOR VALUES IN OHMS.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00278 DATE 23 JAN 63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
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CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN THENO DATE 1-15-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL WJ Rhine 1-23-63
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, UNIVERSAL ENCODER ELECTRONICS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010034
SCALE —
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
R1	1006750-23	RESISTOR	430	2	1/4 W
R2	1006750-49		5.1 K	2	1/4 W
R3	1010364-60		100	1	1/8 W
R4	1006750-44		3.3 K	2	1/4 W
R5	1010364-444		10 K	1	1/8 W.
R6	1006750-73		51 K	2	1/4 W
R7	1006750-35		1.3K	2	1/4 W
R8	1010364 - 252		1 K	1	1/8W
R9			1 K		
R10			1K		
R11			1 K		
R12	1006750 - 34		1.2K	2	1/4W
R13	-65		24 K		
R14	- 56		10K		
R15	-8		100		
R16	-63		20K		
R17	-54		8.2 K		
R18	1010278		3.3K		1 W
R19	1006750 - 52		6.8K		1/4 W
R20	- 52		6.8K		
R21	-52		6.8K		
R22	-40		2.2K		
R23	-12		150		
R24	-23		430		
R25	-49		5.1K		
R26	1010364 - 60		100	1	1/8 W
R27	1006750 - 44		3.3K	2	1/4 W
R28	1010364 - 444		10 K	1	1/8 W
R29	1006750 - 73		51 K	2	1/4 W
R30	1006750 - 35		1.3	2	1/4 W
R31	1010364 - 252		1 K	1	1/8W
R32			1K		
R33			1K		
R34			1K		
R35	1006750 - 34		1.2K	2	1/4 W
R36	-65		24K		
R37	-56		10K		
R38	-8		100		
R39	-63		20K		
R40	-54		8.2K		
R41	1010278		3,3K		1 W
R42	1006750 - 52		6,8K		1/4 W
R43			6.8K		
R44			6.8K		
R45			6.8K		
R46			6.8K		
R47	-40		2.2K		
R48	-12		150		
R49	-49		5.1K		
R50			5.1K		
R51			5.1K		
R52			5.1K		
R53			5.1K		
R54			5.1K		
T1	1010366	TRANSFORMER			
T2	1010366				
T3	1010310				
T4	1010366				
T5	1010366				
T6	1010310				

REF. DES	PART NO	DESCRIPTION	VALUE	TOL%	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	1006755-65		0.47		35 V
C3	1010393		4.7		50 V
C4	1006755-69		1.0		35 V
C5	1010359 - 17		.001	20	200 V
C6	1006755-69		1.0	10	35V
C7	1010393		4.7		50V
C8	1006755-53		.047		35V
C9	1010359 - 17		.001	20	200V
C10	1010359 - 17		.001	20	200V
C11	1010375 - 21		.047	10	50V
C12	1006755 - 69		1.0		35V
C13	1006755 - 65		0.47		35V
C14	1010393		4.7		50V
C15	1006755 - 69		1,0		35V
C16	1010359 - 17		.001	20	200V
C17	1006755 - 69		1,0	10	35V
C18	1010393		4.7		50V
C19	1006755 - 53		.047		35V
C20	1010359 - 17		.001	20	200V
C21					
C22					
C23					
C24	1010375 - 21		.047	10	50V
CR1	1010362-2	DIODE			400 V
CR2					
CR3					
CR4					
CR5	1010286	DIODE,(ZENER)		5	400MW
CR6	1010362 - 2	DIODE			400 V
CR7	1010370				50 V
CR8					
CR9					
CR10					
CR11	1010286	DIODE,(ZENER)		5	400MW
CR12	1010362 - 2	DIODE			400V
CR13					
CR14					
CR15					
CR16	1010286	DIODE,(ZENER)		5	400MW
CR17	1010362 - 2	DIODE			400 V
CR18	1010370				50V
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	1010286	DIODE (ZENER)		5	400MW
L1	1010309	COIL	20 MH		
L2	1010309	COIL	20MH		
Q1	1010397	TRANSISTOR			
Q2	1010397				
Q3	1010357				
Q4					
Q5					
Q6					
Q7	1010285				
Q8	1010397				
Q9	1010397				
Q10	1010357				
Q11					
Q12					
Q13					
Q14	1010285				

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00278 DATE 23 JAN '63

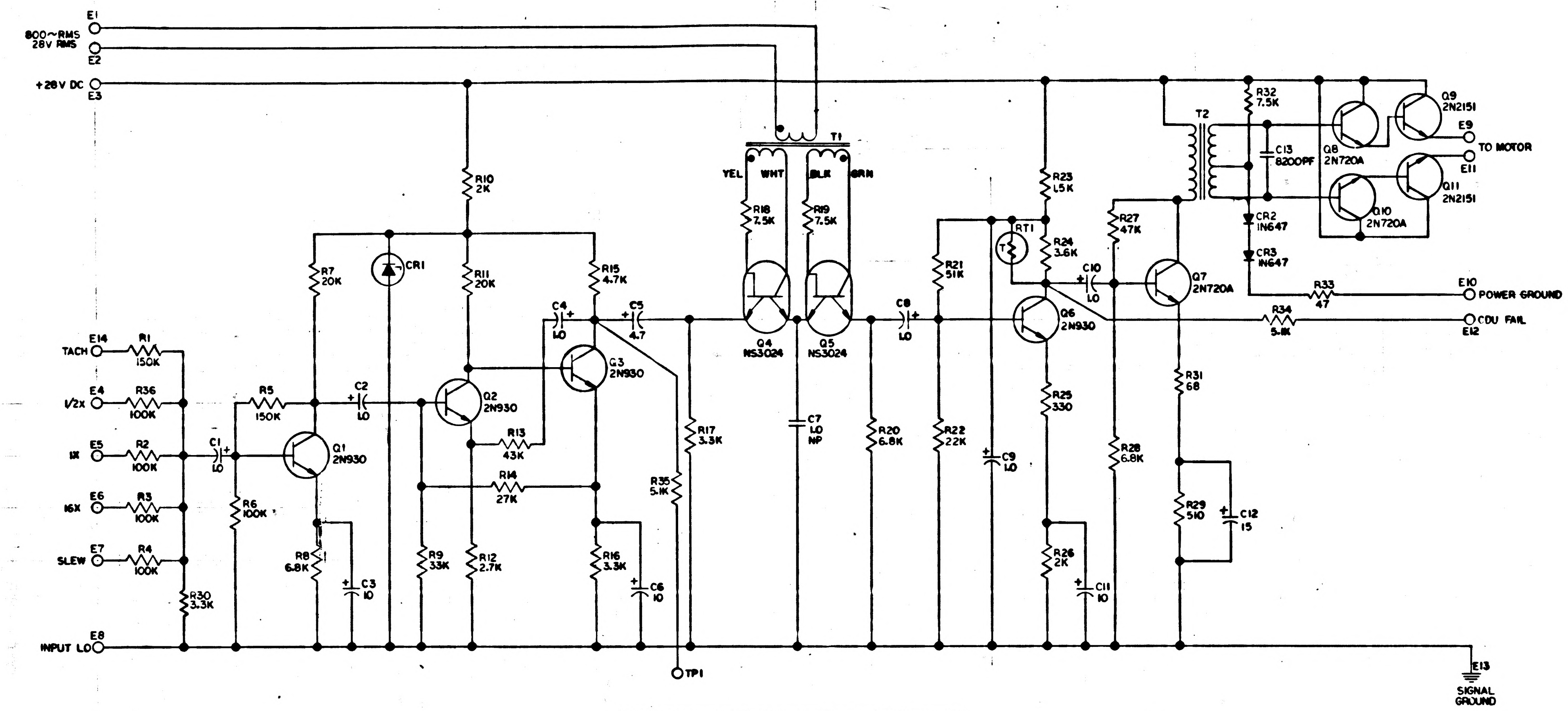
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DWG NO CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL	DRAWN R SHARP DATE 1-15-63 CHECKED 1-23-63 APPROVAL John E Miller 1-23-63 APPROVAL	SCHEMATIC UNIVERSAL ENCODER ELECTRONICS
		HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO / SIZE E / NASA DRAWING NO 1010034
		FINAL FINISH	MIT APPROVAL 23 Jan 63	SCALE / WT / SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TPRR 00735	4-1-63	


E1
800~RMS
28V RMS
E2
+28V DC
E3
E14
TACH
R1
150K
E4
1/2X
R36
100K
E5
1X
R2
100K
E6
16X
R3
100K
E7
SLEW
R4
100K
R30
3.3K
E8
INPUT LO
C1
1.0
R5
150K
R6
100K
Q1
2N930
R8
6.8K
C3
10
R7
20K
CR1
C2
1.0
R10
2K
R11
20K
Q2
2N930
R13
43K
R14
27K
R9
33K
R12
2.7K
R15
4.7K
C4
1.0
C5
4.7
Q3
2N930
R16
3.3K
C6
10
R35
5.1K
R17
3.3K
TP1
T1
YEL
WHT
BLK
GRN
R18
7.5K
R19
7.5K
Q4
NS3024
Q5
NS3024
C7
1.0
NP
R20
6.8K
C8
1.0
R21
51K
R22
22K
C9
1.0
RT1
R23
1.5K
R24
3.6K
Q6
2N930
R25
330
R26
2K
C11
10
C10
1.0
R27
47K
R28
6.8K
Q7
2N720A
R31
68
R29
510
C12
15
T2
R32
7.5K
C13
8200PF
CR2
1N647
CR3
1N647
Q8
2N720A
Q9
2N2151
Q10
2N720A
Q11
2N2151
E9
TO MOTOR
E11
R33
47
E10
POWER GROUND
R34
5.1K
CDU FAIL
E12
E13
SIGNAL GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-81		10		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359-26		5600PF	20	200V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
Q1	1010397	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397		2N930		
Q7	1010357		2N720A		
Q8	1010357		2N720A		
Q9	1010269		2N2151		
Q10	1010357		2N720A		
Q11	1010269		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-84		150K		1/4
R6	80		100K	2	
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	71		43K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	20		330		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	25		510		
R30	1006760-44		3.3K		
R31	1006750-4		68		
R32	1006760-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K		1/8
RT1	1010434	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DI-T288		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE EXPRESSED IN OHMS.
   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR AND TANSFORMER TYPES ARE LISTED UNDER "VALUE" IN THE TABLE.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00274 DATE 1-23-63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN THENO DATE 1-12-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
CDU MOTOR DRIVE
AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

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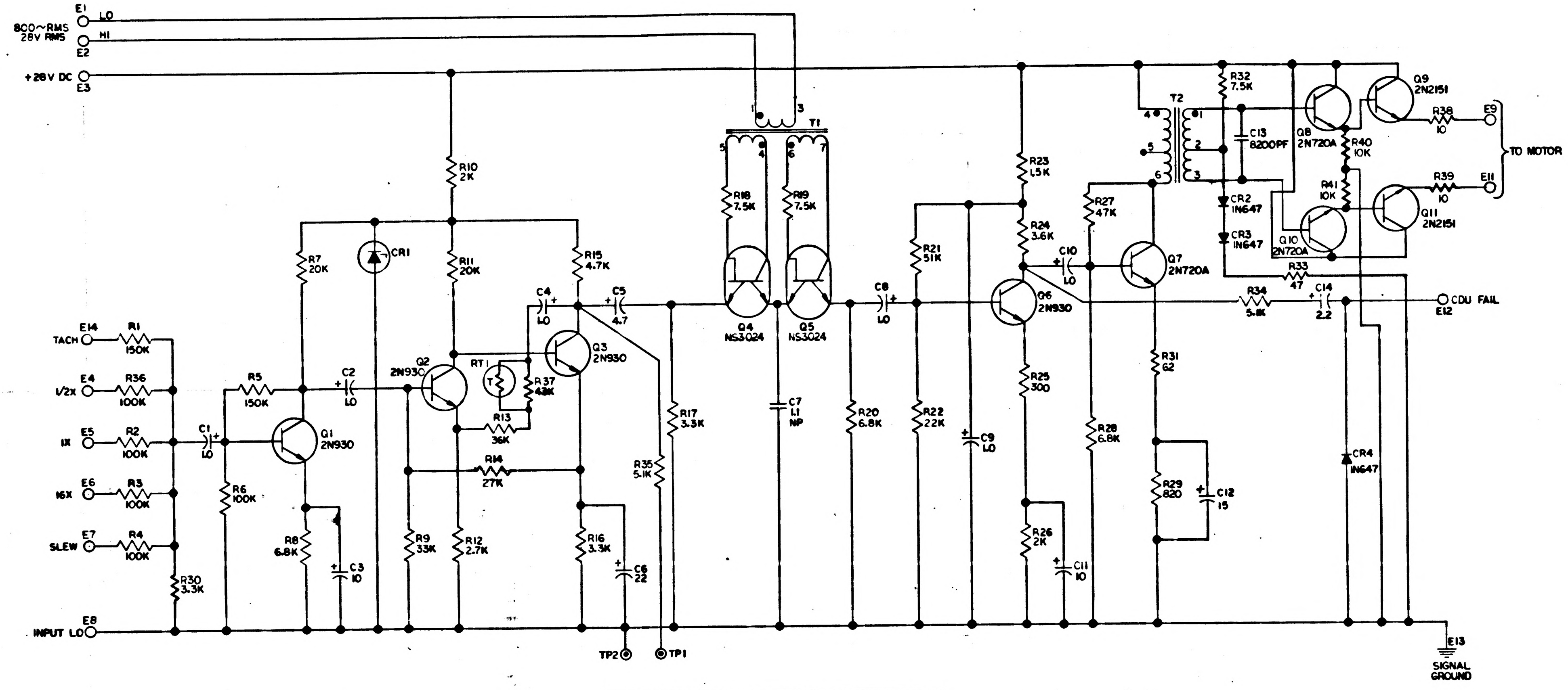
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TPRR 00735	4-1-63	
B	REVISED, UPGRADED TO CLASS "A" TORR 00960	4-17-63	


E1
LO
800~RMS
28V RMS
HI
E2
+28V DC
E3
E14
TACH
R1
150K
E4
1/2X
R36
100K
E5
1X
R2
100K
E6
16X
R3
100K
E7
SLEW
R4
100K
R30
3.3K
E8
INPUT LO
C1
1.0
R6
100K
R5
150K
Q1
2N930
R7
20K
R8
6.8K
C3
10
CR1
C2
1.0
Q2
2N930
R10
2K
R11
20K
R9
33K
R12
2.7K
RT1
T
R37
43K
R13
36K
R14
27K
R15
4.7K
C4
1.0
C5
4.7
Q3
2N930
R16
3.3K
C6
22
R35
5.1K
R17
3.3K
TP2
TP1
T1
1
3
5
4
6
7
R18
7.5K
R19
7.5K
Q4
NS3024
Q5
NS3024
C7
1.1
NP
R20
6.8K
C8
1.0
R21
51K
R22
22K
C9
1.0
R23
1.5K
R24
3.6K
Q6
2N930
R25
300
R26
2K
C11
10
C10
1.0
R27
47K
R28
6.8K
Q7
2N720A
R31
62
R29
820
C12
15
T2
4
5
6
1
2
3
R32
7.5K
C13
8200PF
CR2
1N647
CR3
1N647
Q8
2N720A
Q9
2N2151
R40
10K
R41
10K
Q10
2N720A
Q11
2N2151
R38
10
R39
10
E9
E11
TO MOTOR
R33
47
R34
5.1K
C14
2.2
CDU FAIL
E12
CR4
1N647
E13
SIGNAL
GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-85		22		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359-28		8200PF	20	200V
C14	10106755-73		2.2	10	35V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
CR4	1010362-2				
Q1	1010397	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397		2N930		
Q7	1010357		2N720A		
Q8	1010357		2N720A		
Q9	1010269-1		2N2151		
Q10	1010357		2N720A		
Q11	1010269-1		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-84		150K	2	1/4
R6	80		100K		
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	69		36K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	19		300		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	30		820		
R30	1006750-44		3.3K		
R31	1006750-3		62		
R32	1006750-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K		1/8
RT1	1010434	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DI-T288		
R37	1006750-71	RESISTOR	43K	2	1/4 W
R38	1006802		10		1/2
R39	1006802		10		1/2
R40	1006750-56		10K	2	1/4
R41	1006750-56		10K	2	1/4

NOTES:

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   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR & TRANSFORMER TYPES ARE LISTED UNDER "VALUE" IN THE TABLE.

00278   1-23-63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN THENO DATE 1-12-63
CHECKED 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL 1-23-63
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, CDU MOTOR DRIVE AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET OF

1010035

INCHES
PHOTOGRAPHIC SCALE ONLY

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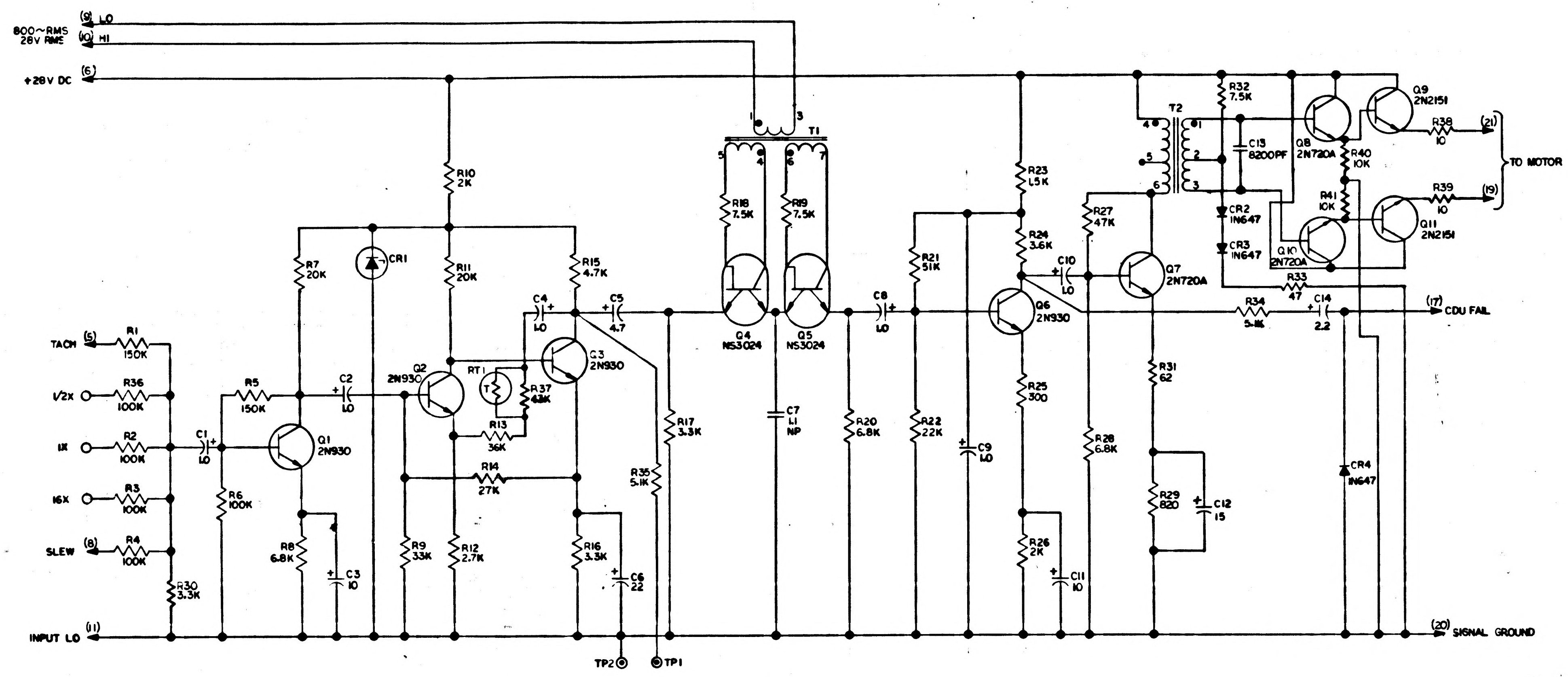
REVISIONS Class B TDRR 00276

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00735	4-1-63	
B	REVISED, UPGRADED TO CLASS "A" TDRR 00960	4-17-63	
C	REVISED PER TDRR 01408	5-20-63	


800~RMS
28V RMS
(9) LO
(10) HI
(6) +28V DC
(5) TACH
1/2X
1X
16X
(8) SLEW
(11) INPUT LO
R1 150K
R36 100K
R2 100K
R3 100K
R4 100K
R30 3.3K
C1 1.0
R6 100K
R5 150K
Q1 2N930
R7 20K
R8 6.8K
C3 10
CR1
C2 1.0
R10 2K
R11 20K
Q2 2N930
RT1
R37 43K
R13 36K
R14 27K
R9 33K
R12 2.7K
R15 4.7K
C4 1.0
C5 4.7
Q3 2N930
R16 3.3K
C6 22
R35 5.1K
R17 3.3K
TP2
TP1
T1
R18 7.5K
R19 7.5K
Q4 NS3024
Q5 NS3024
C7 1.1 NP
R20 6.8K
C8 1.0
R21 51K
R22 22K
C9 1.0
R23 1.5K
R24 3.6K
Q6 2N930
R25 300
R26 2K
C11 10
C10 1.0
R27 47K
Q7 2N720A
R28 6.8K
R31 62
R29 820
C12 15
T2
R32 7.5K
C13 8200PF
CR2 1N647
CR3 1N647
Q8 2N720A
Q9 2N2151
Q10 2N720A
Q11 2N2151
R40 10K
R41 10K
R38 10
R39 10
(21)
(19)
TO MOTOR
R33 47
R34 5.1K
C14 2.2
(17) CDU FAIL
CR4 1N647
(20) SIGNAL GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TC %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-85		22		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359-28		8200PF	20	200V
C14	1006755-73		2.2	10	35V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
CR4	1010362-2				
Q1	1010397-001	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397-001		2N930		
Q7	1010357		2N720A		
Q8	1010357		2N720A		
Q9	1010269-1		2N2151		
Q10	1010357		2N720A		
Q11	1010269-1		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-84		150K	2	1/4
R6	80		100K		
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	69		36K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	19		300		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	30		820		
R30	1006750-44		3.3K		
R31	1006750-3		62		
R32	1006760-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K		1/8
RT1	1010434	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DI-T288		
R37	1006750-71	RESISTOR	43K	2	1/4 W
R38	1006802		10		1/2
R39	1006802		10		1/2
R40	1006750-56		10K	2	1/4
R41	1006750-56		10K	2	1/4

NOTES:

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MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN THENO DATE 1-12-63
CHECKED 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL 1-23-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

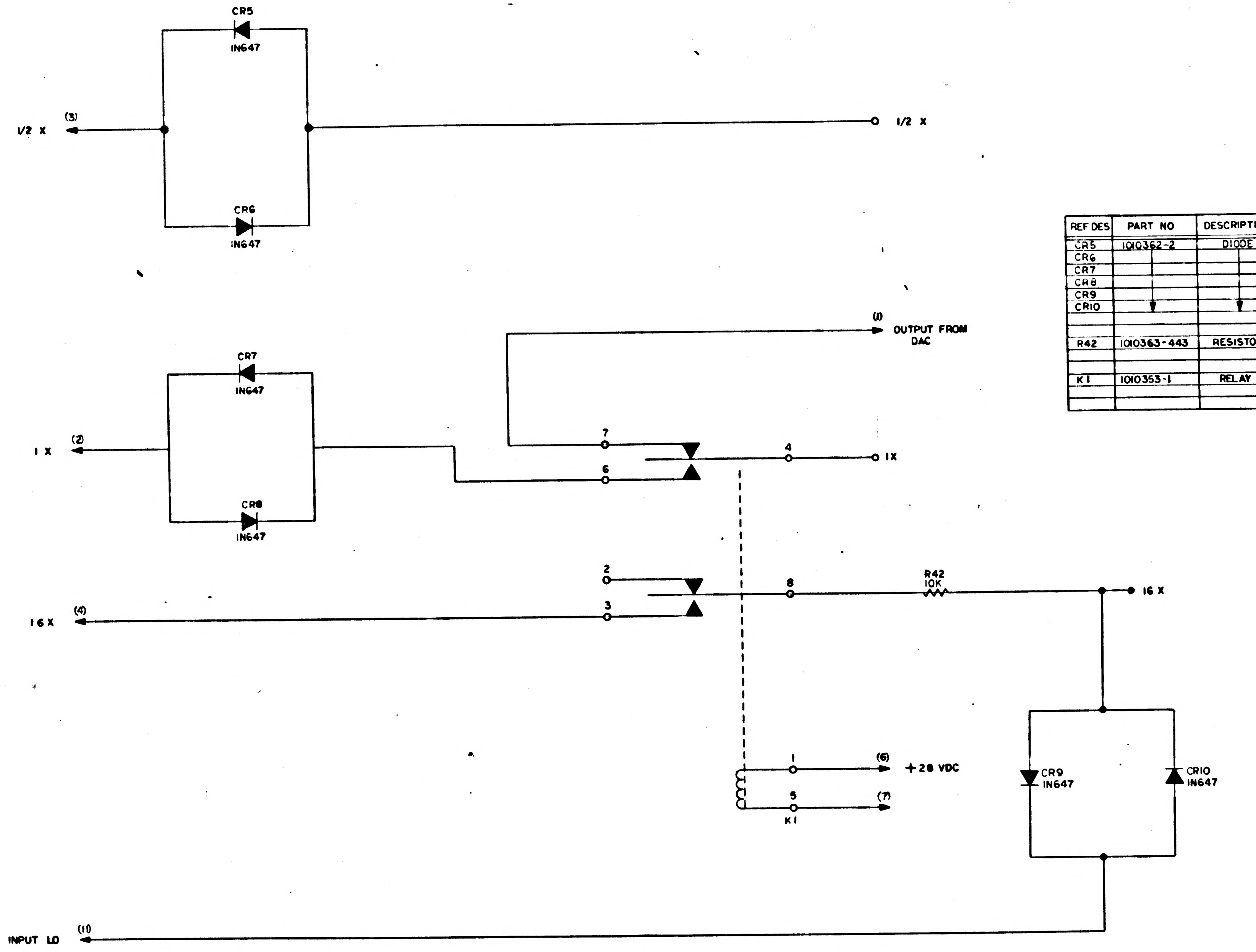
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 1 OF 2

1010035 C

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED PER TDRR 01408		



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR5	1010362-2	DIODE			
CR6					
CR7					
CR8					
CR9					
CR10					
R42	1010363-443	RESISTOR	10 K	1 %	1/4 W
K1	1010353-1	RELAY			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 5-2-63
CHECKED 5-24-63
APPROVAL J. E. Miller 5-24-63
APPROVAL
NASA APPROVAL
MIT APPROVAL W.R. 29 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 2 OF 2

1010035 C

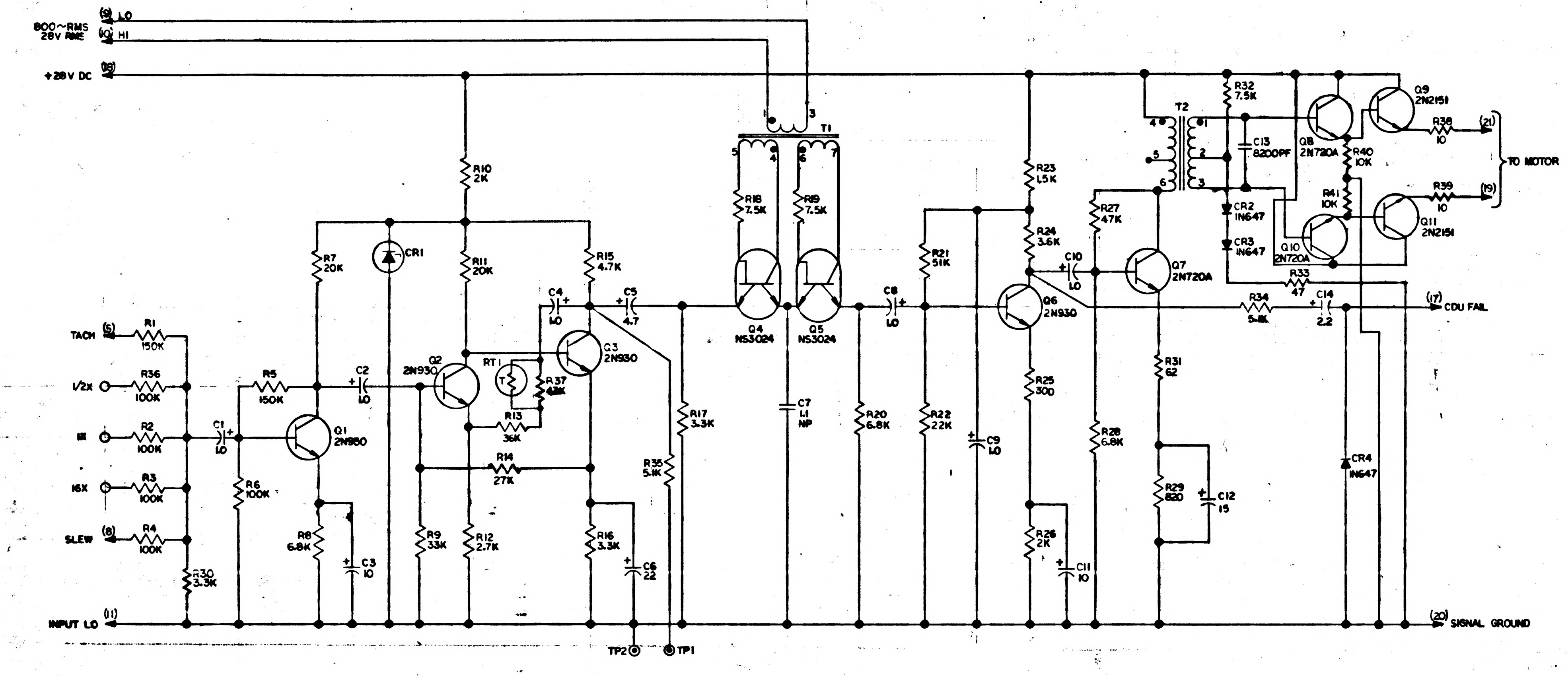
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS Class B TDRR 00272

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00735	4-1-63	
B	REVISED, UPGRADED TO CLASS "A" TDRR 00980	4-17-63	
C	REVISED PER TDRR 01408	5-23-63	
D	REVISED PER TDRR 02735		


800~RMS
28V RMS
(9) LO
(10) HI
+28V DC
(18)
T1
1
3
5
4
6
7
R10
2K
R7
20K
CR1
R11
20K
R15
4.7K
C4
1.0
C5
4.7
R18
7.5K
R19
7.5K
Q4
NS3024
Q5
NS3024
TACH
(5)
R1
150K
1/2X
R36
100K
1X
R2
100K
16X
R3
100K
SLEW
(8)
R4
100K
R30
3.3K
C1
1.0
R5
150K
Q1
2N930
R6
100K
R8
6.8K
C3
10
C2
1.0
Q2
2N930
RT1
R37
43K
R13
36K
Q3
2N930
R14
27K
R9
33K
R12
2.7K
R16
3.3K
C6
22
R17
3.3K
R35
5.1K
C7
1.1
NP
INPUT LO
(11)
TP2
TP1
C8
1.0
R20
6.8K
R21
51K
R22
22K
C9
1.0
R23
1.5K
R24
3.6K
C10
1.0
Q6
2N930
R25
300
R26
2K
C11
10
R27
47K
R28
6.8K
Q7
2N720A
R31
62
R29
820
C12
15
T2
4
5
6
1
2
3
R32
7.5K
C13
8200PF
CR2
1N647
CR3
1N647
Q8
2N720A
R40
10K
R41
10K
Q10
2N720A
Q9
2N2151
Q11
2N2151
R38
10
R39
10
(21)
(19)
TO MOTOR
R33
47
R34
5.1K
C14
2.2
(17)
CDU FAIL
CR4
1N647
(20)
SIGNAL GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-85		22		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359-28		8200PF	20	200V
C14	1006755-73		2.2	10	35V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
CR4	1010362-2				
Q1	1010397-001	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397-001		2N930		
Q7	1010357		2N720A		
Q8	1010357		2N720A		
Q9	1010269-1		2N2151		
Q10	1010357		2N720A		
Q11	1010269-1		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-84		150K	2	1/4
R6	80		100K		
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	69		36K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	19		300		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	30		820		
R30	1006750-44		3.3K		
R31	1006750-3		62		
R32	1006760-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K		1/8
RT1	1010434	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DFT288		
R37	1006750-71	RESISTOR	43K	2	1/4 W
R38	1005802		10	1	1/2
R39	1005802		10	1	1/2
R40	1006750-56		10K	2	1/4
R41	1006750-56		10K	2	1/4

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE EXPRESSED IN OHMS.
   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR & TRANSFORMER TYPES ARE LISTED UNDER "VALUE" IN THE TABLE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT
DRAWN THENO DATE 1-12-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W M 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
CDU MOTOR DRIVE AMPL,
SELECTOR CIRCUIT &
FINE ALIGN RELAY

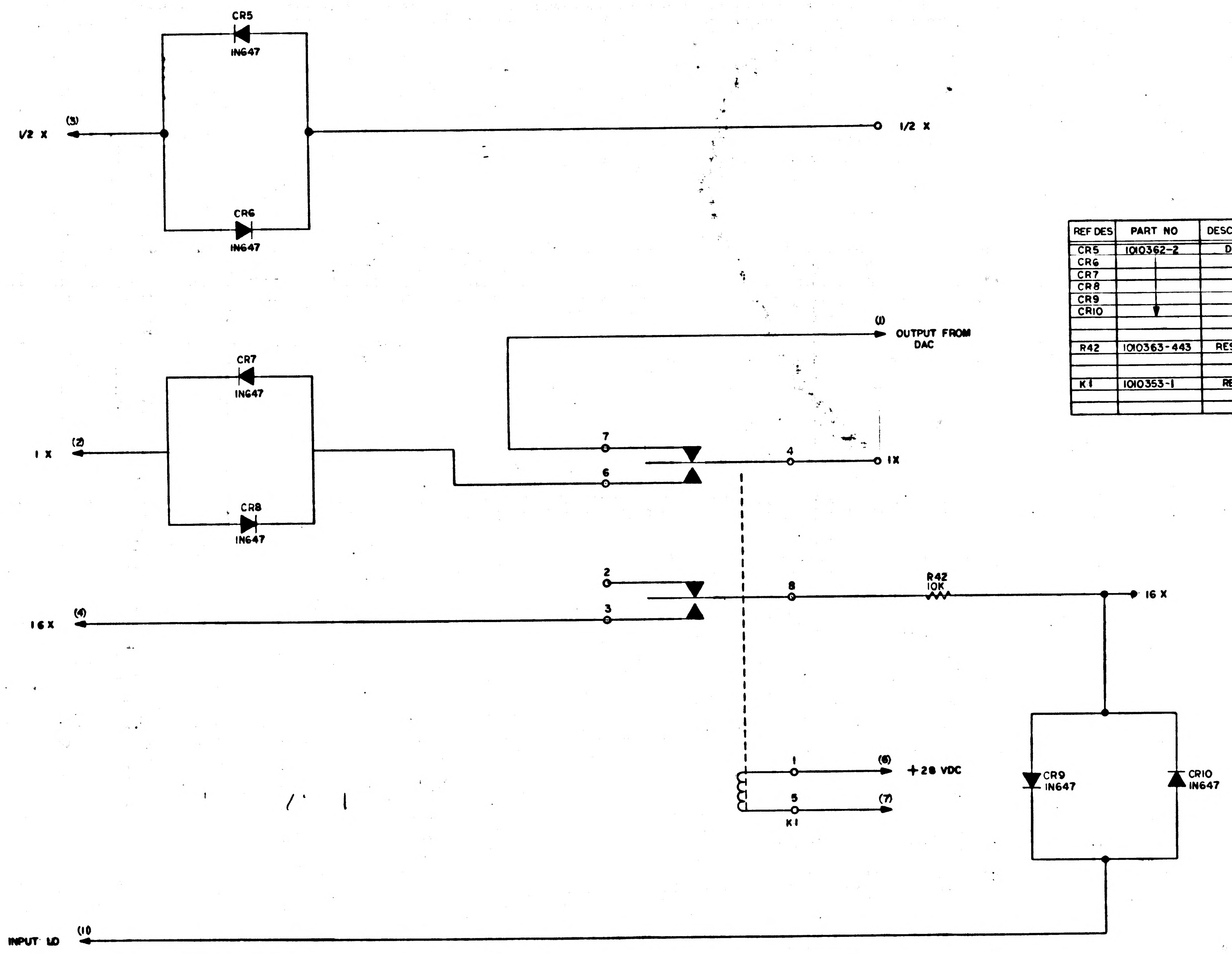
CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 1 OF 2

1010035 D

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED PER TDRR 01408	[illegible]	EVV
D	REVISED PER TDRR 02735	25 63	[illegible]



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR5	1010362-2	DIODE			
CR6					
CR7					
CR8					
CR9					
CR10					
R42	1010363-443	RESISTOR	10 K	1 %	1/4 W
K1	1010353-1	RELAY			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —
DECIMALS ± —
ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO.
CONTRACT
DRAWN [illegible] DATE 5-2-63
CHECKED [illegible] 5-24-63
APPROVAL J E Miller 5-24-63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CDU MOTOR DRIVE AMPL SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 2 OF 2

1010035 D

INCHES
PHOTOGRAPHIC SCALE ONLY

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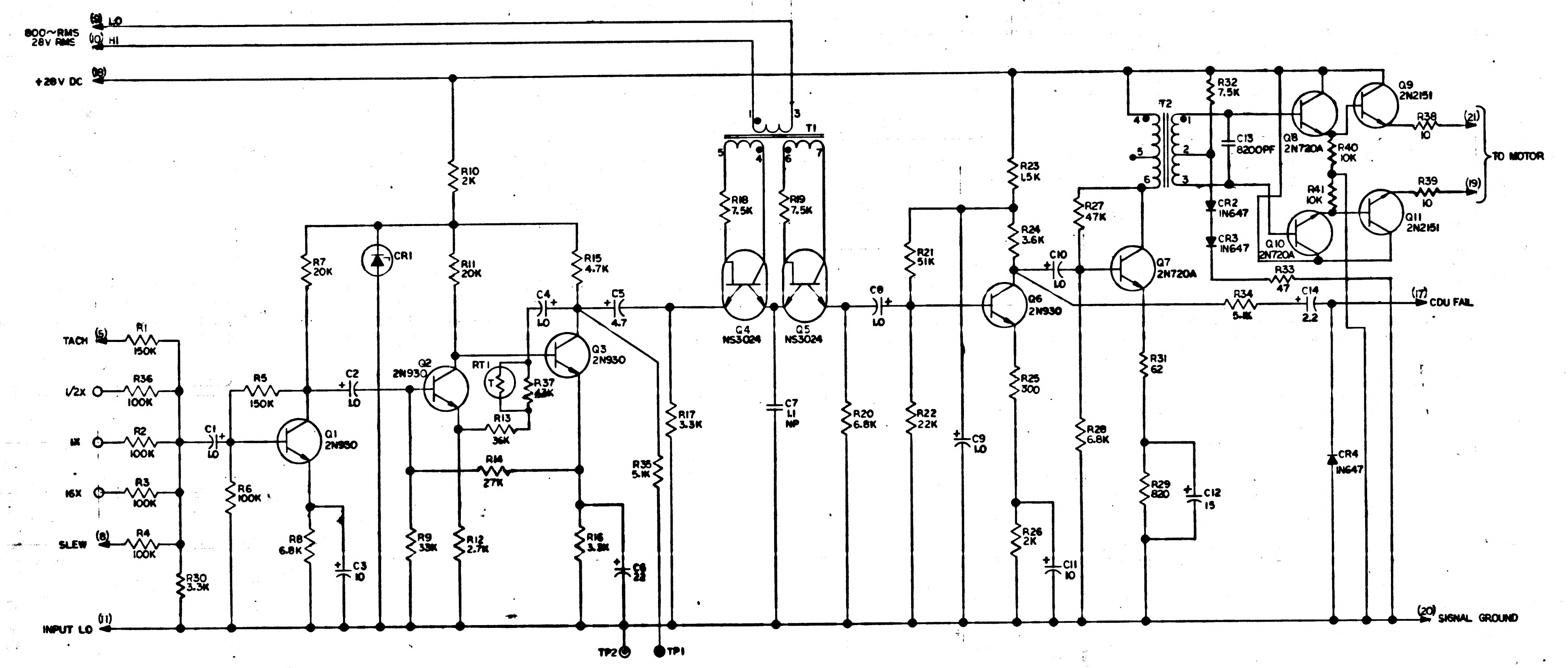
REVISIONS Class B TDRR 00271

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00735	4-1-63	JJC
B	REVISED, UPGRADED TO CLASS "A" TDRR 00960	4-17-63	JJC
C	REVISED PER TDRR 01408	5-23-63	RW
D	REVISED PER TDRR 02735	8/62	JJm
E	REVISED PER TDRR C2092	9-12-63	



800~RMS
28V RMS
(9) LO
(10) HI
(18) +28V DC
TACH (5)
1/2X
1X
16X
SLEW (8)
INPUT LO (11)
R1 150K
R36 100K
R2 100K
R3 100K
R4 100K
R30 3.3K
C1 1.0
R5 150K
R6 100K
Q1 2N930
R7 20K
R8 6.8K
C3 10
CR1
R10 2K
R11 20K
C2 1.0
Q2 2N930
RT1
T
R37 43K
R13 36K
R14 27K
R9 33K
R12 2.7K
R15 4.7K
C4 1.0
Q3 2N930
C5 4.7
R16 3.3K
C6 22
R35 5.1K
R17 3.3K
TP2
TP1
T1
1
3
5
4
6
7
R18 7.5K
R19 7.5K
Q4 NS3024
Q5 NS3024
C7 1.1 NP
R20 6.8K
C8 1.0
R21 51K
R22 22K
C9 1.0
R23 1.5K
R24 3.6K
Q6 2N930
R25 300
R26 2K
C11 10
C10 1.0
R27 47K
R28 6.8K
Q7 2N720A
R31 62
R29 820
C12 15
T2
4
5
6
1
2
3
R32 7.5K
C13 8200PF
CR2 1N647
CR3 1N647
Q8 2N720A
Q9 2N2151
Q10 2N720A
Q11 2N2151
R40 10K
R41 10K
R38 10
R39 10
(21)
(19)
TO MOTOR
R33 47
R34 5.1K
C14 2.2
(17) CDU FAIL
CR4 1N647
(20) SIGNAL GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-85		22		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359-28		8200PF	20	200V
C14	1006753-73		2.2	10	35V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
CR4	1010362-2				
Q1	1010397-001	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397-001		2N930		
Q7	1010357		2N720A		
Q8	1010357		2N720A		
Q9	1010269-1		2N2151		
Q10	1010357		2N720A		
Q11	1010269-1		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-84		150K	2	1/4
R6	80		100K		
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	69		36K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	19		300		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	30		820		
R30	1006750-44		3.3K		
R31	1006750-3		62		
R32	1006750-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K		1/8
RT1	1010434	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DI-T288		
R37	1006750-71	RESISTOR	43K	2	1/4 W
R38	[illegible]		10		1/2
R39	1006802		10		1/2
R40	1006750-56		10K	2	1/4
R41	1006750-56		10K	2	1/4

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE EXPRESSED IN OHMS.
   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR & TRANSFORMER TYPES ARE LISTED UNDER "VALUE" IN THE TABLE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT

DRAWN THENO DATE 1-12-63
CHECKED G. Cushman 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL

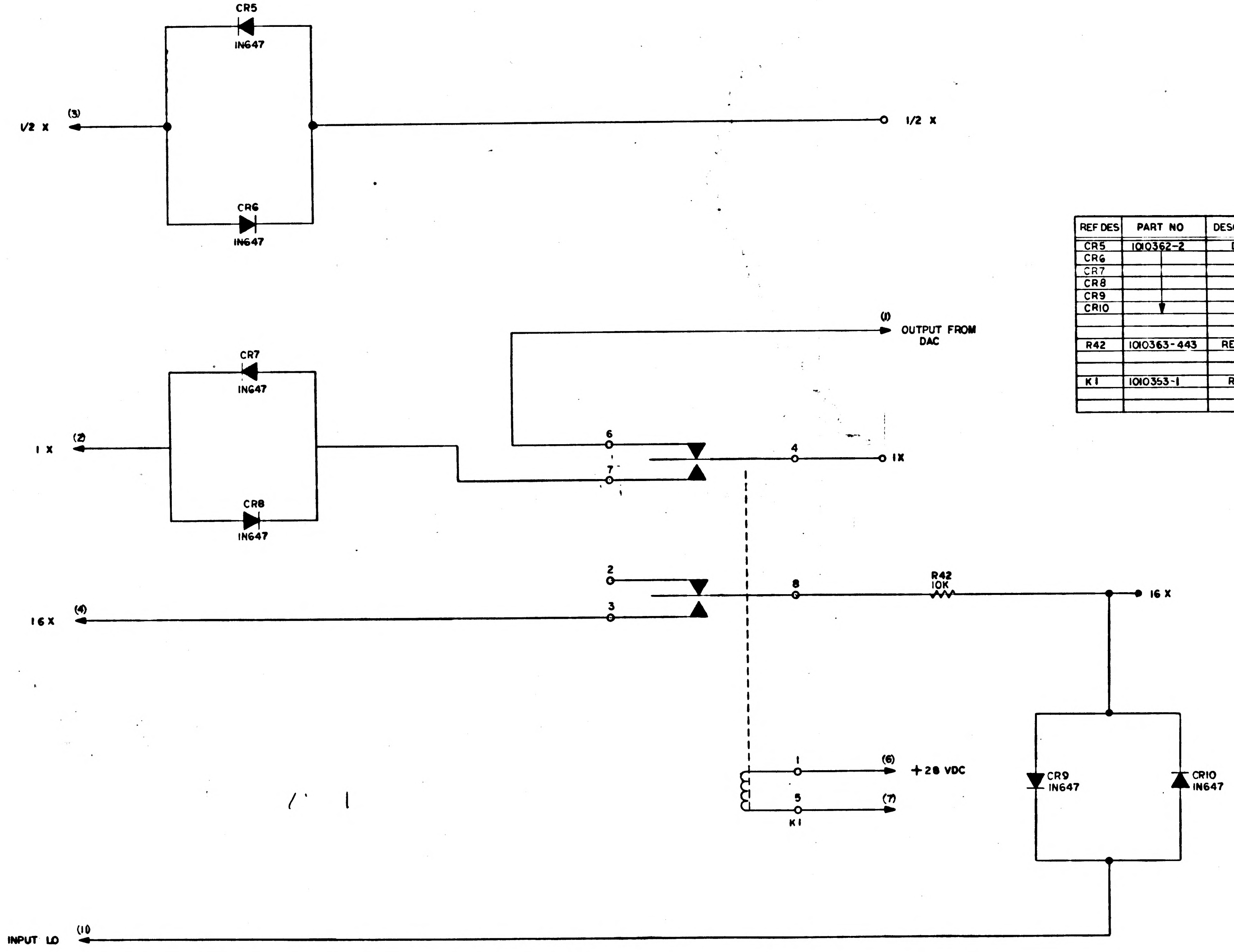
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE —
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED PER TDRR 01408	5-20-63	[illegible]
D	REVISED PER TDRR 02735	25 63	[illegible]
E	REVISED PER TDRR 03092	[illegible]	[illegible]



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR5	1010362-2	DIODE			
CR6					
CR7					
CR8					
CR9					
CR10					
R42	1010363-443	RESISTOR	10 K	1 %	1/4 W
K1	1010353-1	RELAY			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO. CONTRACT
DRAWN J. Crosby DATE 5-24-63
CHECKED [illegible] 5-24-63
APPROVAL J E Miller 5-24-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010035
SCALE | WT | SHEET 2 OF 2

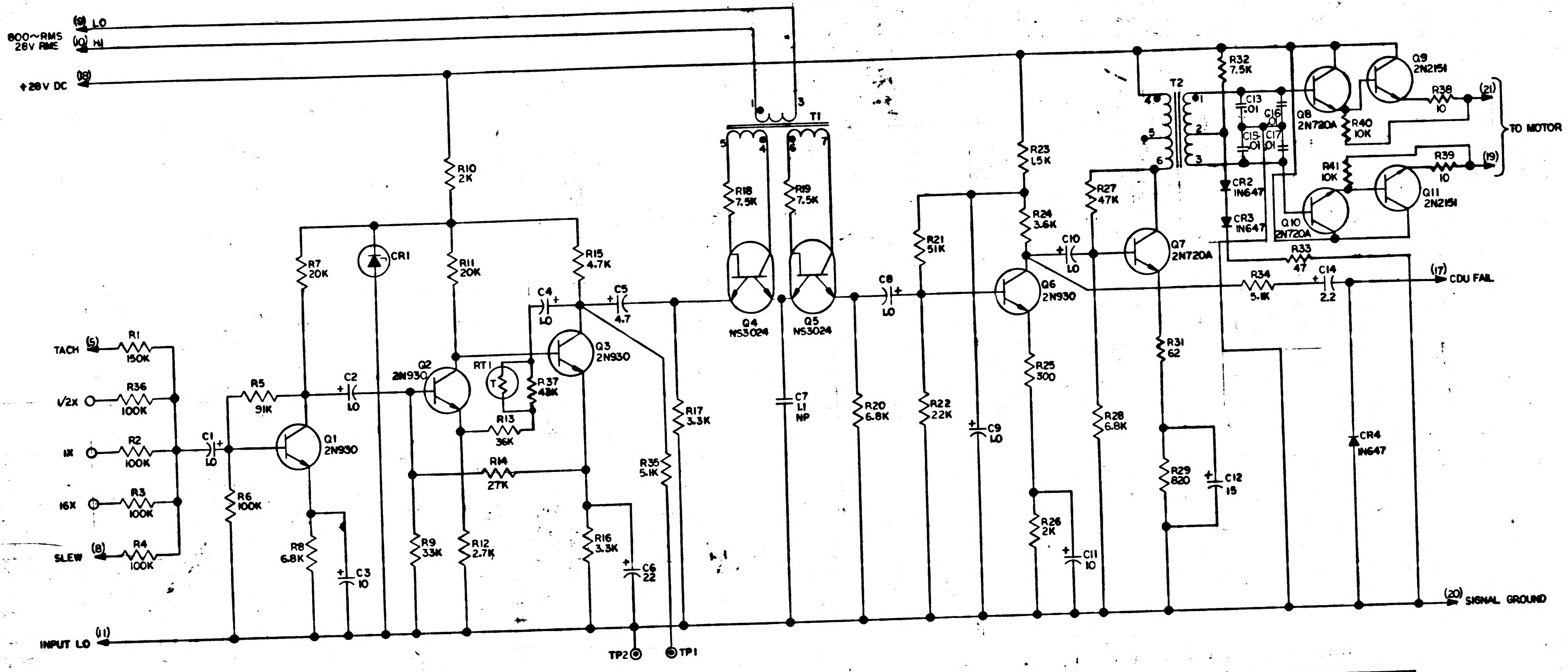
1010035 F

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS Class B TDRR 00778

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00735	4-1-63	
B	REVISED, UPGRADED TO CLASS "A" TDRR 00960	4-17-63	
C	REVISED PER TDRR 01408	5-23-63	
D	REVISED PER TDRR 02735		
E	REVISED PER TDRR 03092	9-12-63	
F	REVISED PER TDRR 04665	11-21-63	



800~RMS
28V RMS
(9) LO
(10) HI
(18) +28V DC
TACH (5)
R1 150K
R36 100K
V2X
1X
R2 100K
16X
R3 100K
SLEW (8)
R4 100K
C1 1.0
R5 91K
R6 100K
Q1 2N930
R7 20K
R8 6.8K
C3 10
CR1
C2 1.0
R10 2K
R11 20K
Q2 2N930
RT1
R37 43K
R13 36K
R14 27K
R9 33K
R12 2.7K
R15 4.7K
C4 1.0
Q3 2N930
C5 4.7
R16 3.3K
C6 22
R35 5.1K
R17 3.3K
TP2
TP1
INPUT LO (11)
T1
1
3
5
4
6
7
R18 7.5K
R19 7.5K
Q4 NS3024
Q5 NS3024
C7 1.1 NP
C8 1.0
R20 6.8K
R21 51K
R22 22K
C9 1.0
R23 1.5K
R24 3.6K
Q6 2N930
R25 300
R26 2K
C11 10
C10 1.0
R27 47K
R28 6.8K
Q7 2N720A
R31 62
R29 820
C12 15
T2
4
5
6
1
2
3
R32 7.5K
C13 .01
C16 .01
C15 .01
C17 .01
CR2 1N647
CR3 1N647
Q8 2N720A
Q9 2N2151
R40 10K
R38 10
(21)
TO MOTOR
R41 10K
R39 10
(19)
Q10 2N720A
Q11 2N2151
R33 47
R34 5.1K
C14 2.2
(17) CDU FAIL
CR4 1N647
(20) SIGNAL GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-85		22		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359-29		.01	10	200V
C14	1006755-73		2.2	10	35V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
CR4	1010362-2				
Q1	1010397-001	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397-001		2N930		
Q7	1010357		2N720A		
Q8	1010357		2N720A		
Q9	1010269-1		2N2151		
Q10	1010357		2N720A		
Q11	1010269-1		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-79		91K	2	1/4
R6	80		100K		
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	69		36K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	19		300		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	30		820		
R31	1006750-3		62		1/4
R32	1006760-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K		1/8
RT1	1010434	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DI-T288		
R37	1006750-71	RESISTOR	43K	2	1/4 W
R38	1006802		10		1/2
R39	1006802		10		1/2
R40	1006750-56		10K	2	1/4
R41	1006750-56		10K	2	1/4

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C15	1010359-29	CAPACITOR	.01	10	200 V
C16					
C17					

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE EXPRESSED IN OHMS.
   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR & TRANSFORMER TYPES ARE LISTED UNDER "VALUE" IN THE TABLE.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT
DRAWN THENO DATE 1-12-63
CHECKED 1-23-63
APPROVAL J E Miller 1-28-63
APPROVAL
NASA APPROVAL W J 1-23-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

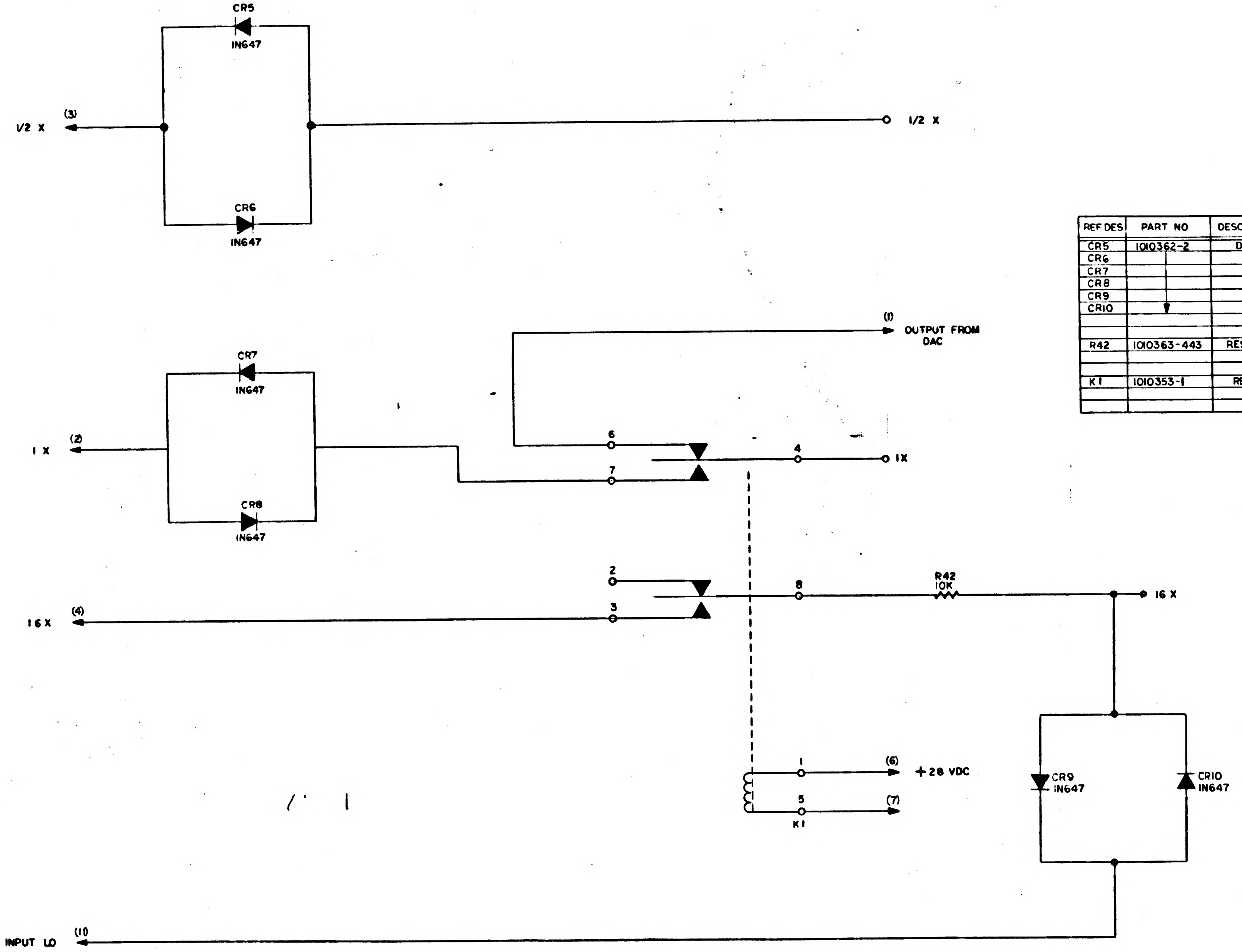
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 1 OF 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED PER TDRR 01408	5-28-63	EVU W
D	REVISED PER TDRR 02735	8-26-63	
E	REVISED PER TDRR 03092	9 DEC 63	WK
F	REVISED PER TDRR 04665	11-4-63	



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR5	1010362-2	DIODE			
CR6					
CR7					
CR8					
CR9					
CR10					
R42	1010363-443	RESISTOR	10K	1%	1/4 W
K1	1010353-1	RELAY			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DATE 5-2-63
CHECKED 5-24-63
APPROVAL 5-24-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

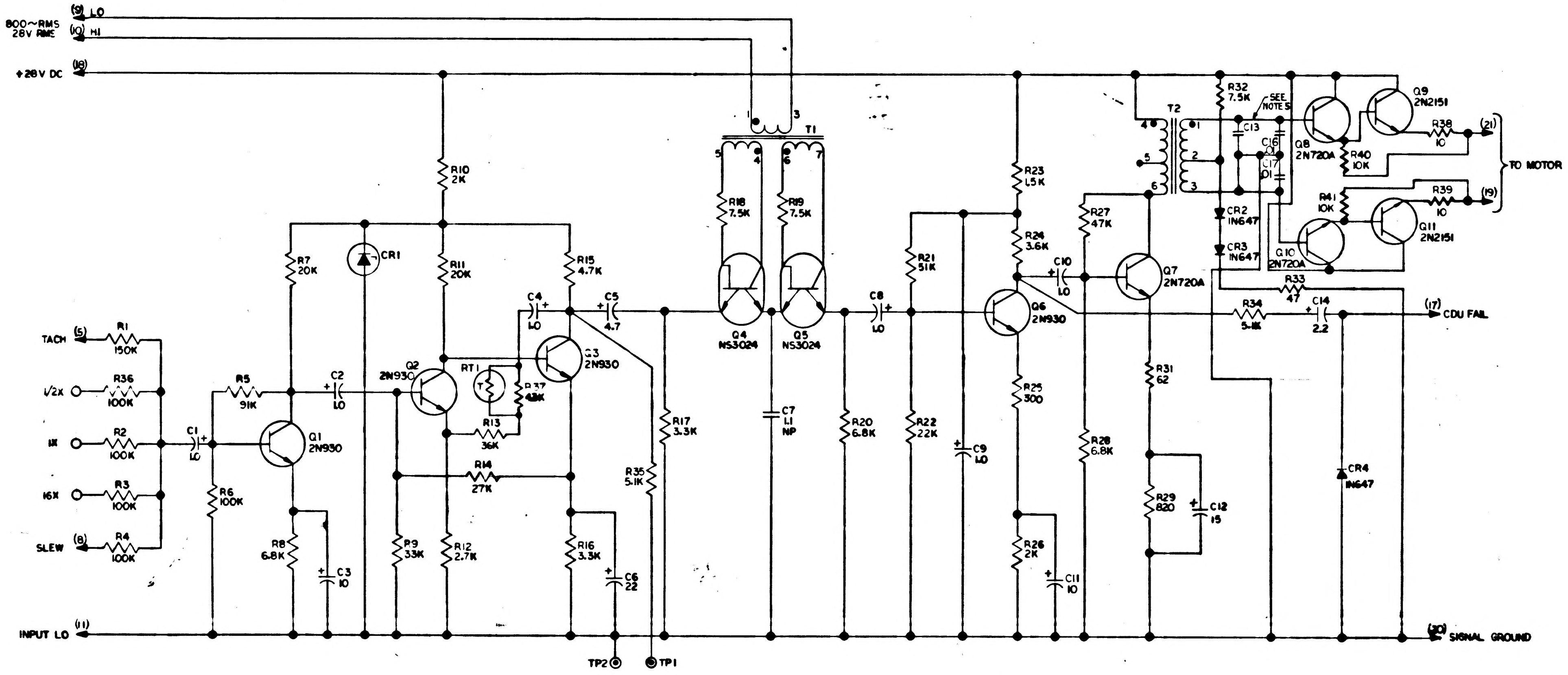
CDU MOTOR DRIVE AMPL., SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS CLASS B TDRR 01271

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00735	4-1-63	
B	REVISED, UPGRADED TO CLASS "A" TDRR 00960	4-17-63	
C	REVISED PER TDRR 01408	5-23-63	
D	REVISED PER TDRR 02735		
E	REVISED PER TDRR 03092	9-12-63	
F	REVISED PER TDRR 04665		
G	REVISED PER TDRR 07137	64	


(9) LO
800~RMS 28V RMS
(10) HI
(18) +28V DC
TACH (5)
R1 150K
1/2X
R36 100K
1X
R2 100K
16X
R3 100K
SLEW (8)
R4 100K
C1 1.0
R5 91K
R6 100K
Q1 2N930
R7 20K
R8 6.8K
C3 10
C2 1.0
CR1
R10 2K
R11 20K
Q2 2N930
R9 33K
R12 2.7K
RT1
R37 43K
R13 36K
R14 27K
C4 1.0
Q3 2N930
R15 4.7K
R16 3.3K
C6 22
C5 4.7
R35 5.1K
R17 3.3K
TP2
TP1
INPUT LO (11)
T1
1 3 5 4 6 7
R18 7.5K
R19 7.5K
Q4 NS3024
Q5 NS3024
C7 1.1 NP
R20 6.8K
C8 1.0
R21 51K
R22 22K
C9 1.0
R23 1.5K
R24 3.6K
Q6 2N930
R25 300
R26 2K
C11 10
C10 1.0
R27 47K
R28 6.8K
Q7 2N720A
R31 62
R29 820
C12 15
T2
4 5 6 1 2 3
R32 7.5K
SEE NOTE 5
C13
C16 .01
C17 .01
CR2 1N647
CR3 1N647
Q8 2N720A
Q9 2N2151
R38 10
R40 10K
R41 10K
R39 10
Q10 2N720A
Q11 2N2151
(21)
(19)
TO MOTOR
R33 47
R34 5.1K
C14 2.2
(17) CDU FAIL
CR4 1N647
(20) SIGNAL GROUND

SEE NOTE 5

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-85		22		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359			10	200V
C14	1006755-73		2.2	10	35V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
CR4	1010362-2				
Q1	1010397-001	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397-001		2N930		
Q7	1010357-1		2N720A		
Q8	1010357-1		2N720A		
Q9	1010269-1		2N2151		
Q10	1010357-1		2N720A		
Q11	1010269-1		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-79		91K	2	1/4
R6	80		100K		
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	69		36K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	19		300		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	30		820		
R31	1006750-3		62		1/4
R32	1006760-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K		1/8
RT1	1010434-1	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DI-T288		
R37	1006750-71	RESISTOR	43K	2	1/4 W
R38	1006802		10		1/2
R39	1006802		10		1/2
R40	1006750-56		10K	2	1/4
R41	1006750-56		10K	2	1/4

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C16	1010359-29	CAPACITOR	.01	10	200 V
C17					

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
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3. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE EXPRESSED IN OHMS.
   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR & TRANSFORMER TYPES ARE LISTED UNDER VALUE IN THE TABLE.
5. VALUE OF C-13 TO BE SELECTED FROM CHART BY ELECTRICAL TEST.

CHART

PART NUMBER 1010359 DASH NO.	CAPACITANCE μμf
-1	47
-13	470
-16	820
-18	1200
-19	1500
-20	1800
-21	2200
-22	2700
-23	3300
-24	3900
-25	4700
-26	5600
-27	6800
-28	8200
-29	10,000

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO Contract NAS 9-497
DRAWN THENO DATE 1-12-63
CHECKED 1-23-63
APPROVAL J E Miller 1-23-63
APPROVAL
NASA APPROVAL 1-23-63
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

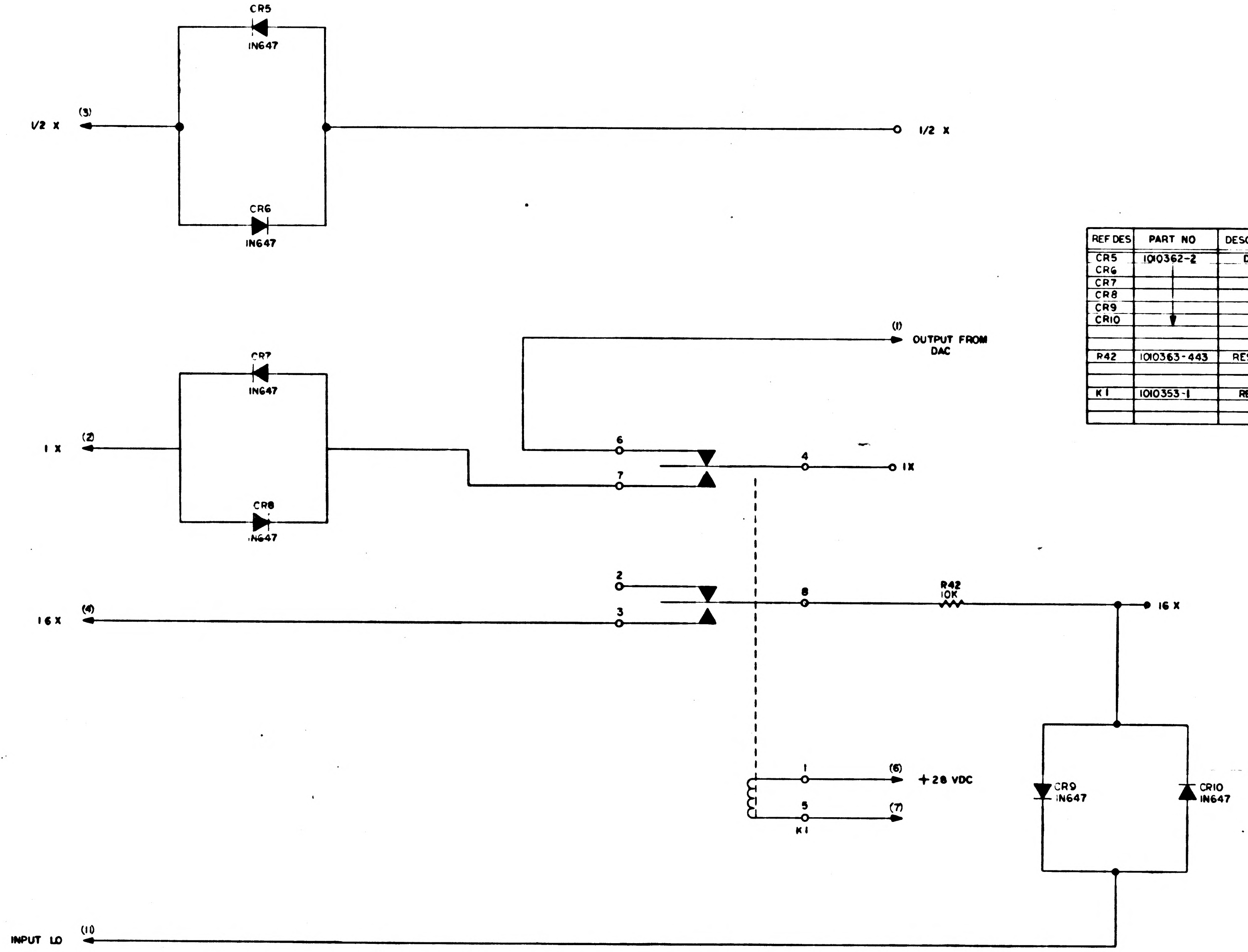
SCHEMATIC,
CDU MOTOR DRIVE AMPL,
SELECTOR CIRCUIT &
FINE ALIGN RELAY

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED PER TDRR 01408	5-28-63	EVU W
D	REVISED PER TDRR 02735	8-26-63	[illegible]
E	REVISED PER TDRR 03092	9 NOV 63	[illegible]
F	REVISED PER TDRR 04665	11-4-63	[illegible]
G	REVISED PER TDRR 07137	APR 64	J.W.F.



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR5	1010362-2	DIODE			
CR6	↓	↓			
CR7					
CR8					
CR9					
CR10					
R42	1010363-443	RESISTOR	10K	1 %	1/4 W
K1	1010353-1	RELAY			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
Contract NAS 9-497
DRAWN [illegible] DATE 5-2-63
CHECKED [illegible] 5-24-63
APPROVAL J E Miller 5-24-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

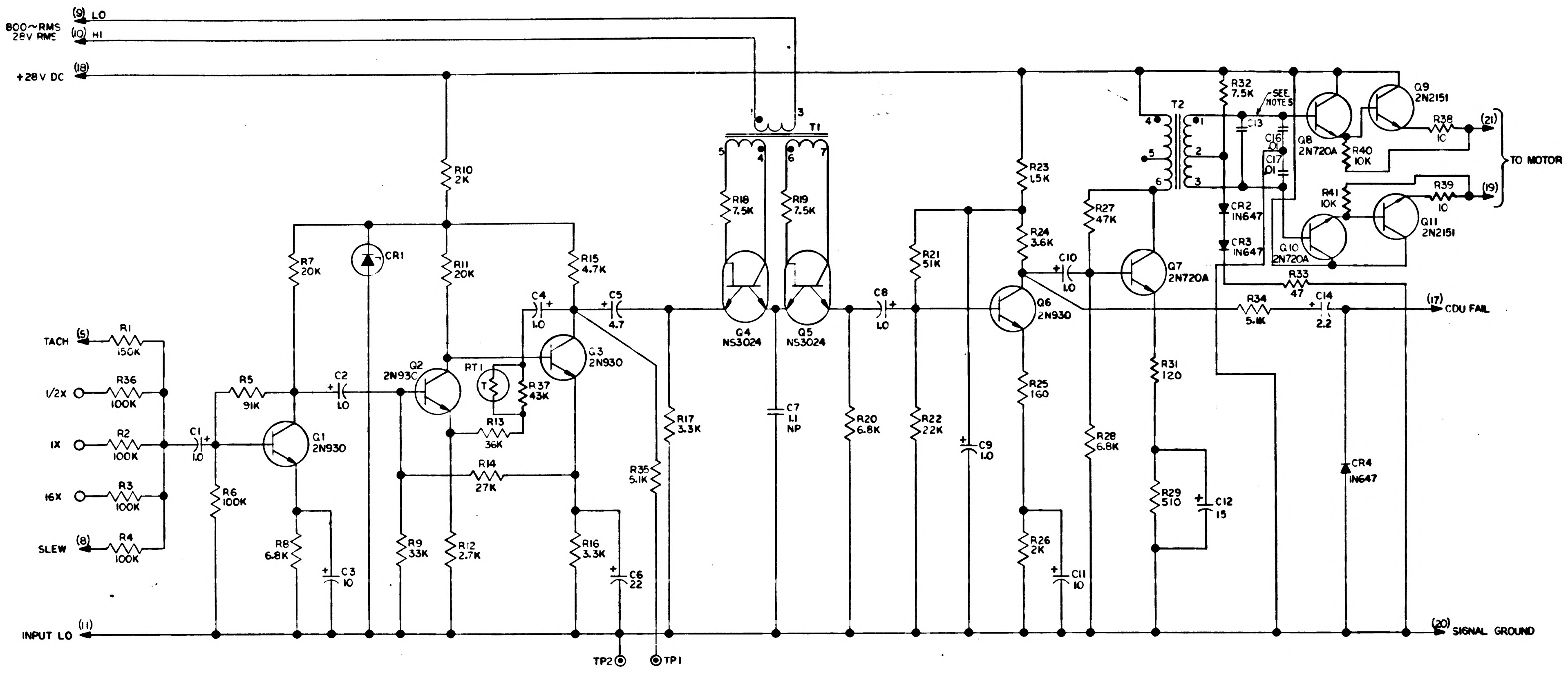
CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS Class B TDRR 00278

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 00735	4-1-63	[illegible]
B	REVISED, UPGRADED TO CLASS "A" TDRR 00980	4-17-63	[illegible]
C	REVISED PER TDRR 01408	5-23-63	[illegible]
D	REVISED PER TDRR 02735	[illegible] 63	[illegible]
E	REVISED PER TDRR 03092	9-12-63	[illegible]
F	REVISED PER TDRR 04665	11-21-63	[illegible] 12/3
G	REVISED PER TDRR 07137	[illegible] 64	[illegible]
H	REVISED PER TDRR 11336	24 AUG 64	JWP [illegible]


800~RMS
28V RMS
(9) LO
(10) HI
+28V DC (18)
TACH (5)
1/2X
1X
16X
SLEW (8)
INPUT LO (11)
R1 150K
R36 100K
R2 100K
R3 100K
R4 100K
C1 1.0
R5 91K
R6 100K
Q1 2N930
R7 20K
R8 6.8K
C3 10
C2 1.0
CR1
R10 2K
R11 20K
Q2 2N930
RT1
R37 43K
R13 36K
R14 27K
R9 33K
R12 2.7K
R15 4.7K
C4 1.0
Q3 2N930
R16 3.3K
C6 22
C5 4.7
R35 5.1K
R17 3.3K
TP2
TP1
T1
1 3 5 4 6 7
R18 7.5K
R19 7.5K
Q4 NS3024
Q5 NS3024
C7 1.1 NP
R20 6.8K
C8 1.0
R21 51K
R22 22K
C9 1.0
R23 1.5K
R24 3.6K
Q6 2N930
R25 160
R26 2K
C11 10
C10 1.0
R27 47K
R28 6.8K
Q7 2N720A
R31 120
R29 510
C12 15
T2
4 5 6 1 2 3
R32 7.5K
SEE NOTE 5
C13
C16 .01
C17 .01
CR2 1N647
CR3 1N647
Q8 2N720A
Q9 2N2151
R40 10K
R38 10
(21)
TO MOTOR
R41 10K
R39 10
(19)
Q10 2N720A
Q11 2N2151
R33 47
R34 5.1K
C14 2.2
(17) CDU FAIL
CR4 1N647
(20) SIGNAL GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-85		22		
C7	1010279-232		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393-029		1.0		50V
C10	1006755-69		1.0		35V
C11	1006755-81		10		35V
C12	1006755-83		15		35V
C13	1010359			10	200V
C14	1006755-73		2.2	10	35V
CR1	1010372-24	DIODE			18V
CR2	1010362-2				
CR3	1010362-2				
CR4	1010362-2				
Q1	1010397-001	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397-001		2N930		
Q7	1010357-1		2N720A		
Q8	1010357-1		2N720A		
Q9	1010269-1		2N2151		
Q10	1010357-1		2N720A		
Q11	1010269-1		2N2151		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	-636		100K		
R3					
R4					
R5	1006750-79		91K	2	1/4
R6	80		100K		
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	69		36K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	36		1.5K		
R24	45		3.6K		
R25	13		160		
R26	39		2K		
R27	72		47K		
R28	52		6.8K		
R29	25		510		
R31	1006750-10		120		1/4
R32	1006760-53		7.5K		1/2
R33	1010368-17		47		1/4
R34	1006750-49		5.1K		
R35	1006750-49		5.1K		
R36	1010364-636		100K	1	1/8
RT1	1010434-1	THERMISTOR			
T1	1010365	TRANSFORMER	DI-T278		
T2	1010275	TRANSFORMER	DI-T288		
R37	1006750-71	RESISTOR	43K	2	1/4 W
R38	1006802		10	1	1/2
R39	1006802		10	1	1/2
R40	1006750-56		10K	2	1/4
R41	1006750-56		10K	2	1/4

SEE NOTE 5

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C16	1010359-29	CAPACITOR	.01	10	200 V
C17					

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. UNLESS OTHERWISE SPECIFIED:
   RESISTOR VALUES ARE EXPRESSED IN OHMS.
   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR & TRANSFORMER TYPES ARE LISTED UNDER "VALUE" IN THE TABLE.
5. VALUE OF C-13 TO BE SELECTED FROM CHART BY ELECTRICAL TEST.

CHART

PART NUMBER 1010359 DASH NO.	CAPACITANCE μμf
-1	47
-13	470
-16	820
-18	1200
-19	1500
-20	1800
-21	2200
-22	2700
-23	3300
-24	3900
-25	4700
-26	5600
-27	6800
-28	8200
-29	10,000

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO Contract NAS 9-497
DRAWN THENO DATE 1-12-63
CHECKED G. Cushman 1-23-63
APPROVAL J.E. Miller 1-23-63
APPROVAL
NASA APPROVAL W.J. Rhine 1-23-63
MIT APPROVAL W.H. [illegible] 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

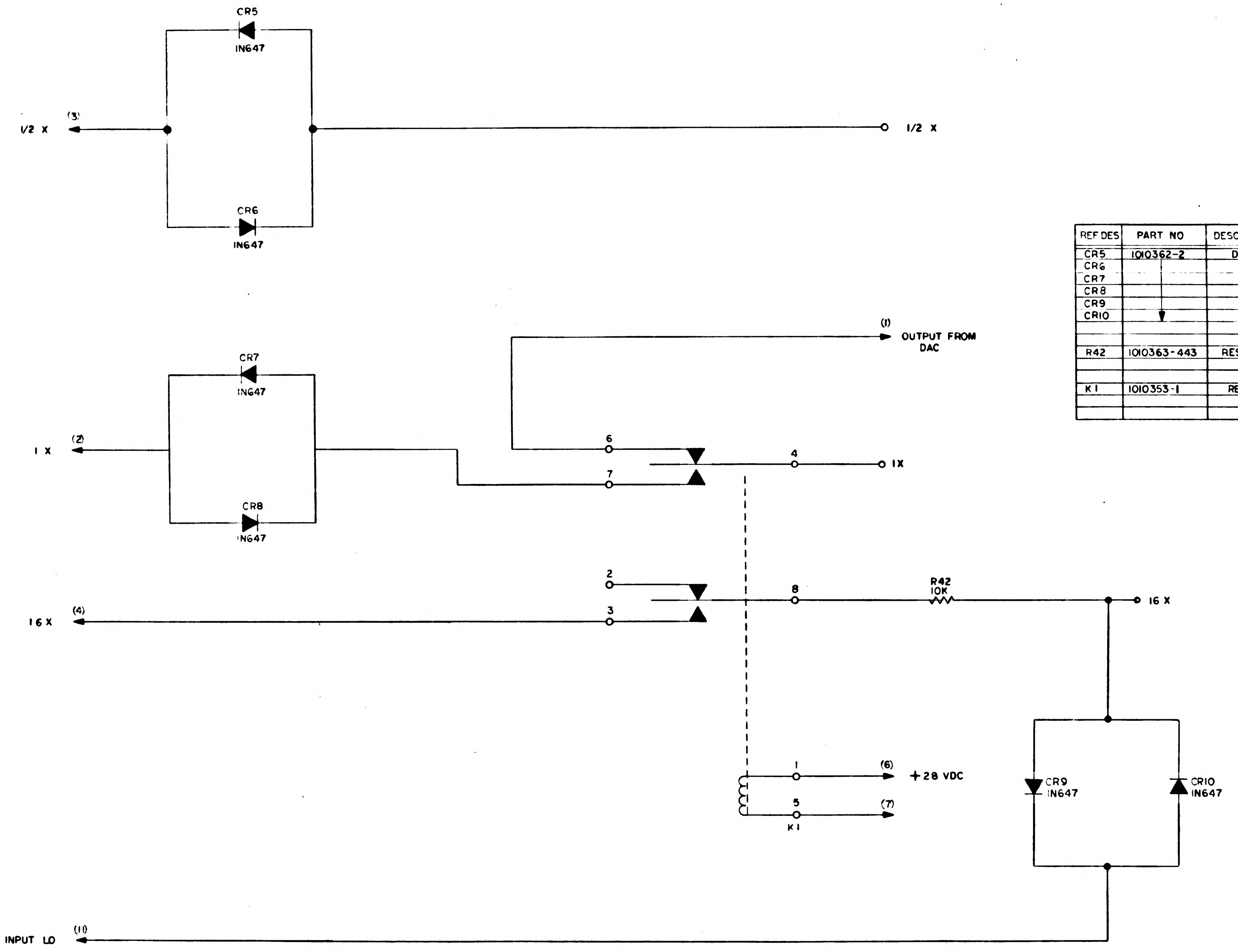
SCHEMATIC, CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010035
SCALE —
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
C	REVISED PER TDRR 01408	5-28-63	EVV
D	REVISED PER TDRR 02735	25 63	
E	REVISED PER TDRR 03092	9 Dec 63	
F	REVISED PER TDRR 04665	11-4-63	
G	REVISED PER TDRR C7137	APR 64	J.W.P.
H	REVISED PER TDRR 11336	12 AUG 64	J.V.D.



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR5	1010362-2	DIODE			
CR6					
CR7					
CR8					
CR9					
CR10					
R42	1010363-443	RESISTOR	10 K	1 %	1/4 W
K1	1010353-1	RELAY			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO Contract NAS 9-497
DRAWN DATE 5-2-63
CHECKED 5-24-63
APPROVAL J E Miller 5-24-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

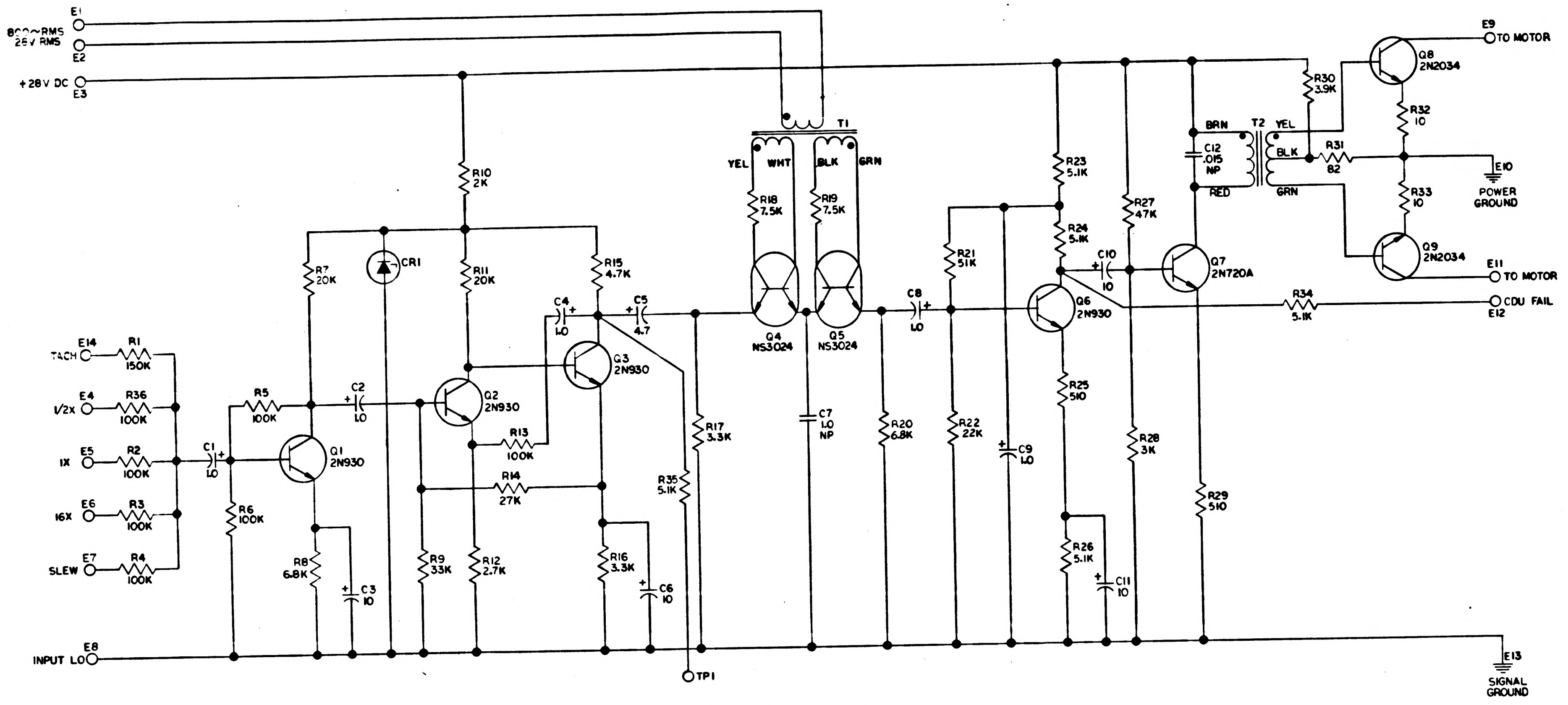
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


E1
800~RMS
26V RMS
E2
+28V DC
E3
E14
TACH
R1
150K
E4
1/2X
R36
100K
E5
1X
R2
100K
E6
16X
R3
100K
E7
SLEW
R4
100K
E8
INPUT LO
C1
1.0
R6
100K
R5
100K
Q1
2N930
R7
20K
R8
6.8K
C3
10
CR1
C2
1.0
R10
2K
R11
20K
Q2
2N930
R13
100K
R14
27K
R9
33K
R12
2.7K
R15
4.7K
C4
1.0
C5
4.7
Q3
2N930
R16
3.3K
C6
10
R35
5.1K
R17
3.3K
TP1
T1
YEL
WHT
BLK
GRN
R18
7.5K
R19
7.5K
Q4
NS3024
Q5
NS3024
C7
1.0
NP
R20
6.8K
C8
1.0
R21
51K
R22
22K
C9
1.0
R23
5.1K
R24
5.1K
C10
10
Q6
2N930
R25
510
R26
5.1K
C11
10
R27
47K
R28
3K
Q7
2N720A
R29
510
C12
.015
NP
BRN
RED
T2
YEL
BLK
GRN
R30
3.9K
R31
82
Q8
2N2034
R32
10
R33
10
Q9
2N2034
E9
TO MOTOR
E10
POWER GROUND
E11
TO MOTOR
R34
5.1K
CDU FAIL
E12
E13
SIGNAL GROUND

REF DESIG	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-69	CAPACITOR	1.0	10	35V
C2	-69		1.0		
C3	-81		10		
C4	-69		1.0		
C5	-77		4.7		
C6	-81		10		
C7	1010279 -		1.1		20V
C8	1006755-69		1.0		35V
C9	1010393 -		1.0		50V
C10	1006755-81		10		35V
C11	1006755-81		10		35V
C12			.015		100V
CR1	1010372-24	DIODE			18V
Q1	1010397	TRANSISTOR	2N930		
Q2					
Q3					
Q4	1010367		NS3024		
Q5	1010367		NS3024		
Q6	1010397		2N930		
Q7	1010357		2N720A		
Q8	1010371		2N2034		
Q9	1010371		2N2034		
R1	1010364-670	RESISTOR	150K	1	1/8 W
R2	636		100K		
R3					
R4					
R5	1006750 80				1/4
R6	80			2	
R7	63		20K		
R8	52		6.8K		
R9	68		33K		
R10	39		2K		
R11	63		20K		
R12	42		2.7K		
R13	80		100K		
R14	66		27K		
R15	48		4.7K		
R16	44		3.3K		
R17	44		3.3K		
R18	53		7.5K		
R19	53		7.5K		
R20	52		6.8K		
R21	73		51K		
R22	64		22K		
R23	49		5.1K		
R24	49		5.1K		
R25	25		510		
R26	49		5.1K		
R27	72		47K		
R28	43		3K		
R29	25		510		
R30	1006760 46		3.9K		1/2
R31	1006750		82		1/4
R32			10		1/2
R33			10		1/2
R34	1006750 49		5.1K		1/4
R35	1006750 49		5.1K		1/4
R36	1010364 636		100K	1	1/8
T1	1010365	TRANSFORMER	DI-T278		
T2	1010276	TRANSFORMER	DI-T276		

NOTES:

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   CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS.
4. TRANSISTOR AND TANSFORMER TYPES ARE LISTED UNDER "VALUE" IN THE TABLE.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00278 DATE 1-23-63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN THENO DATE 1-12-63
CHECKED J. Cushman 1-23-63
APPROVAL J.E. Miller -23-63
APPROVAL
NASA APPROVAL W.J. Rhine 1-23-63
MIT APPROVAL W.A. Hoag Jan 23 Jan 63

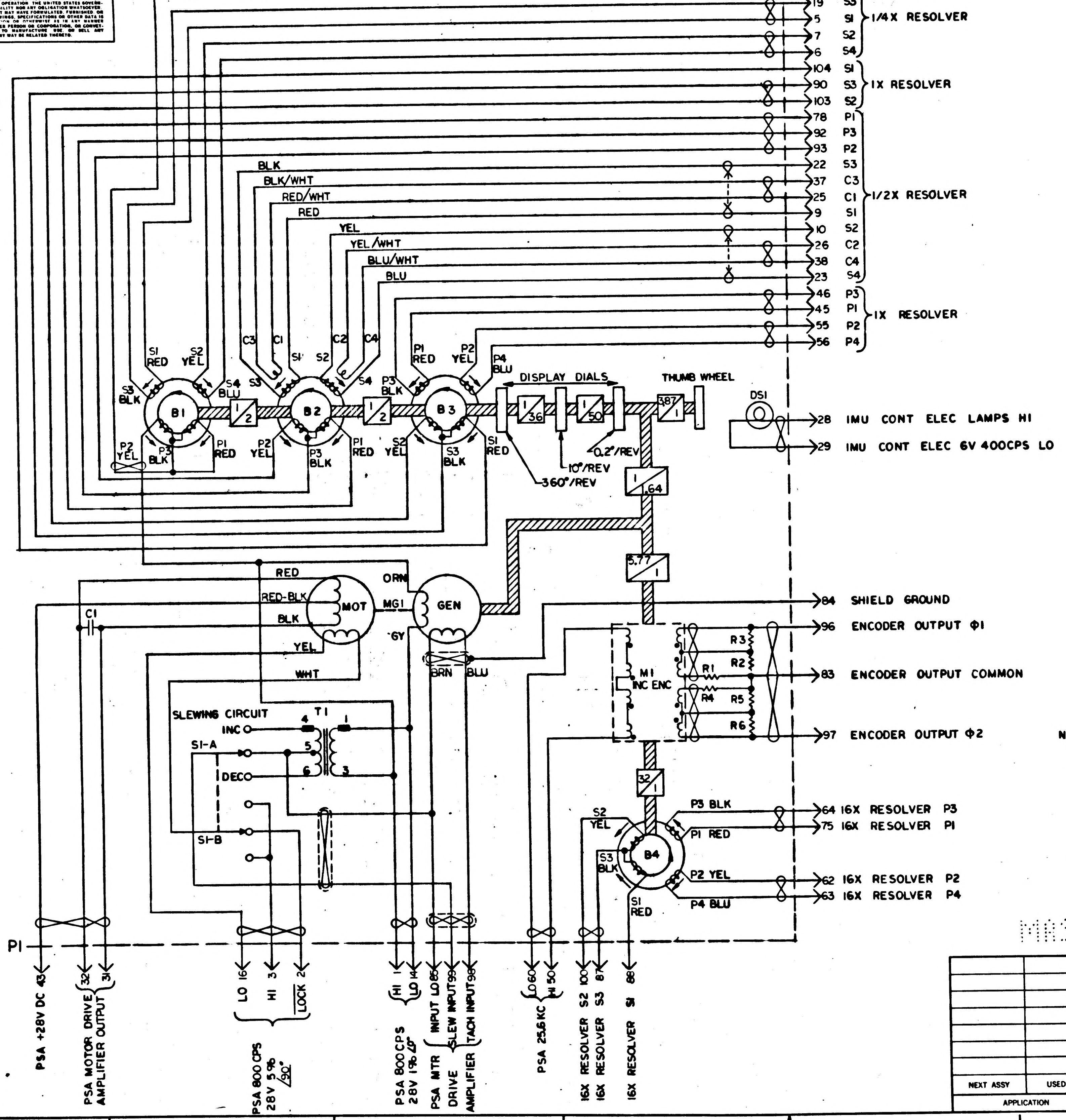
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
CDU MOTOR DRIVE
AMPLIFIER

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010035
SCALE
WT
SHEET OF

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	ADDED THUMB WHEEL REVISED M1, B2, B1, S1-A ADDED NOTE 3 & "DS1" ADDED TWISTING REVISED CONN. PINS TDRR 00504	2/15/63	R. J. T. WAK



4 P3
19 S3
5 S1
7 S2
6 S4
1/4X RESOLVER
104 S1
90 S3
103 S2
1X RESOLVER
78 P1
92 P3
93 P2
22 S3
37 C3
25 C1
9 S1
10 S2
26 C2
38 C4
23 S4
1/2X RESOLVER
46 P3
45 P1
55 P2
56 P4
1X RESOLVER
BLK
BLK/WHT
RED/WHT
RED
YEL
YEL/WHT
BLU/WHT
BLU
S1 RED
S2 YEL
S3 BLK
S4 BLU
P2 YEL
P3 BLK
P1 RED
C3
C1
C2
C4
S1
S2
S3
S4
P3 BLK
P1 RED
P2 YEL
P4 BLU
S2 YEL
S3 BLK
S1 RED
B1
B2
B3
1/2
1/2
DISPLAY DIALS
1/36
1/50
360°/REV
10°/REV
0.2°/REV
THUMB WHEEL
387/1
DS1
28 IMU CONT ELEC LAMPS HI
29 IMU CONT ELEC 6V 400CPS LO
1/.64
5.77/1
RED
RED-BLK
BLK
YEL
WHT
MOT
ORN
MG1
GEN
GY
BRN
BLU
C1
84 SHIELD GROUND
96 ENCODER OUTPUT Φ1
83 ENCODER OUTPUT COMMON
97 ENCODER OUTPUT Φ2
M1 INC ENC
R1
R2
R3
R4
R5
R6
SLEWING CIRCUIT
INC
DEC
S1-A
S1-B
T1
1
2
3
4
5
6
32/1
B4
S2 YEL
S3 BLK
S1 RED
P3 BLK
P1 RED
P2 YEL
P4 BLU
64 16X RESOLVER P3
75 16X RESOLVER P1
62 16X RESOLVER P2
63 16X RESOLVER P4
P1
PSA +28V DC 43
PSA MOTOR DRIVE AMPLIFIER OUTPUT 32 31
LO 16
HI 3
LOCK 2
PSA 800 CPS 28V 5% /90°
HI 1
LO 14
PSA 800CPS 28V 1% /0°
INPUT LO 85
SLEW INPUT 99
TACH INPUT 98
PSA MTR DRIVE AMPLIFIER
LO 60
HI 50
PSA 25.6KC
16X RESOLVER S2 100
16X RESOLVER S3 87
16X RESOLVER S1 88

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00 319 DATE 6 Feb '63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. FOR A CCW ROTATION OF THE MOTOR-GENERATOR AS VIEWED FROM THE SHAFT END, ALL RESOLVERS SHALL ROTATE CW AS VIEWED FROM THE SHAFT END AND THE DISPLAY DIALS SHALL REGISTER AN INCREASING COUNT.
4. ARROWS ON INNER MEMBERS OF RESOLVERS SHOW DIRECTION OF CCW ROTATION AS VIEWED FROM SHAFT END.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS B

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN [illegible] DATE JAN 17 63
CHECKED J. [illegible]
APPROVAL R. J. Thurston 2-5-63
APPROVAL
NASA APPROVAL [illegible] 6 Feb 63
MIT APPROVAL W. A. Kupfer 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

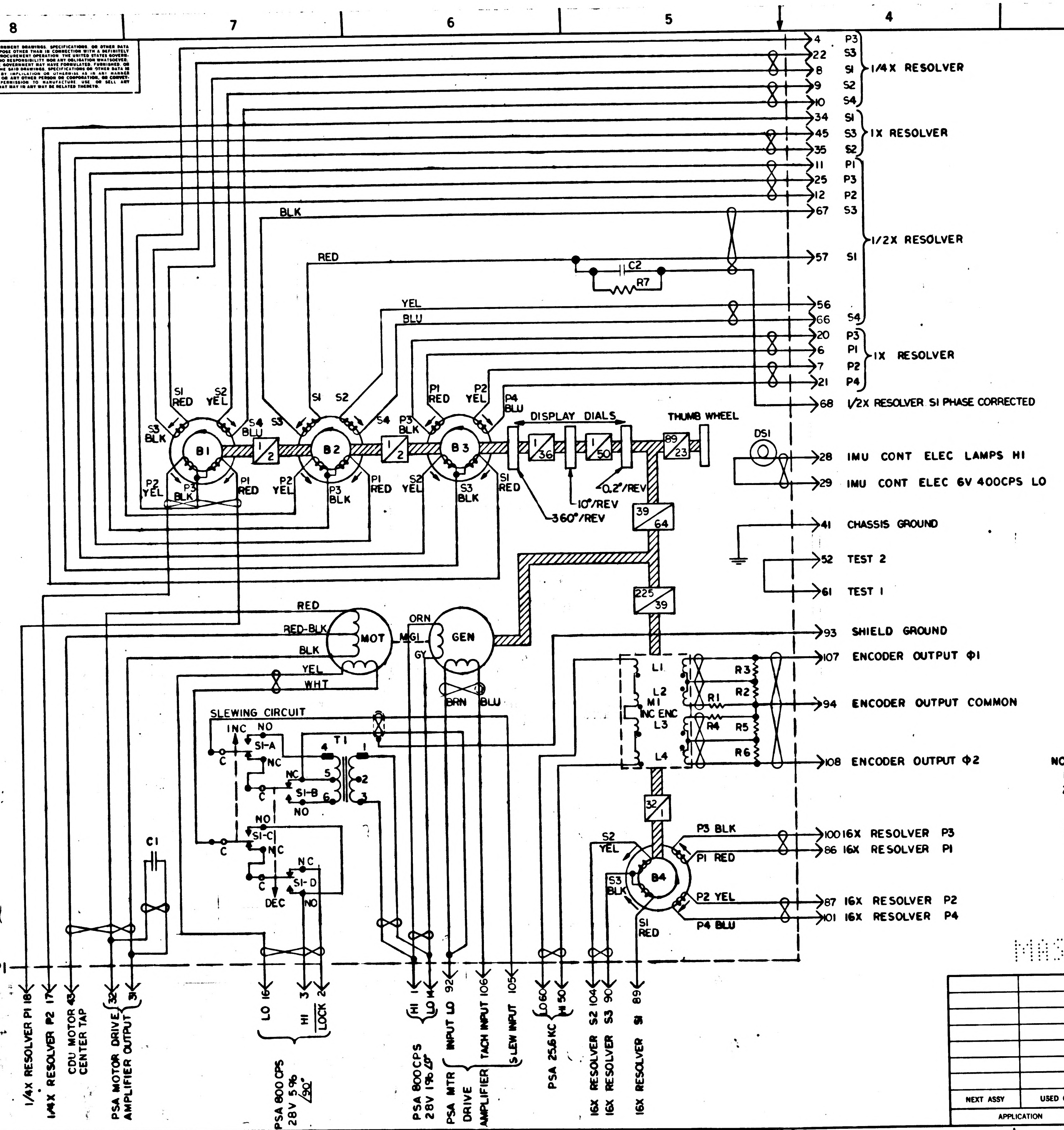
WIRING DIAGRAM
CDU

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010036
SCALE —
WT
SHEET — OF —

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
ⓜ A	ADDED THUMB WHEEL REVISED M1, B2, B1, S1-A ADDED NOTE 3 & "DS1" ADDED TWISTING REVISED CONN. PINS TDRR 00504	2/15/63	R. J. T. WAK.
ⓜ B	REVISED S1 ADDED TWIST TO C1 LEADS " LEADS TO PINS 17, 18, 41, 52, 61 CHANGED DESIG. OF PIN 43 REVISED SHIELD GROUNDS REM'D COMPENSATING WINDINGS FROM B2, REVISED DWG TITLE, REVISED CONN PINS, ADDED R7, C2, PIN 68; UPGRADED TO CLASS A TDRR 01019	4/4/63	R. J. T. WK 1 May 63



4 P3
22 S3
8 S1
9 S2
10 S4
1/4X RESOLVER
34 S1
45 S3
35 S2
1X RESOLVER
11 P1
25 P3
12 P2
67 S3
BLK
1/2X RESOLVER
RED
C2
R7
57 S1
YEL
BLU
56
66 S4
20 P3
6 P1
7 P2
21 P4
1X RESOLVER
68 1/2X RESOLVER S1 PHASE CORRECTED
S1 RED
S2 YEL
S3 BLK
S4 BLU
B1
P2 YEL
P3 BLK
P1 RED
1/2
S1
S2
S3
S4
B2
P2 YEL
P3 BLK
P1 RED
1/2
P3 BLK
P1 RED
P2 YEL
P4 BLU
B3
S2 YEL
S3 BLK
S1 RED
DISPLAY DIALS
1/36
1/50
10°/REV
0.2°/REV
360°/REV
THUMB WHEEL
89/23
DS1
28 IMU CONT ELEC LAMPS HI
29 IMU CONT ELEC 6V 400CPS LO
39/64
41 CHASSIS GROUND
52 TEST 2
61 TEST 1
225/39
93 SHIELD GROUND
RED
RED-BLK
BLK
YEL
WHT
MOT
MG1
ORN
GY
GEN
BRN
BLU
107 ENCODER OUTPUT Φ1
L1
L2
M1
INC ENC
L3
L4
R3
R2
R1
R4
R5
R6
94 ENCODER OUTPUT COMMON
108 ENCODER OUTPUT Φ2
SLEWING CIRCUIT
INC
NO
S1-A
C
NC
T1
4
5
6
1
2
3
NC
S1-B
C
NO
NO
S1-C
C
NC
NC
S1-D
C
DEC
NO
C1
32
S2 YEL
S3 BLK
B4
S1 RED
P3 BLK
P1 RED
P2 YEL
P4 BLU
100 16X RESOLVER P3
86 16X RESOLVER P1
87 16X RESOLVER P2
101 16X RESOLVER P4
P1
1/4X RESOLVER P1 18
1/4X RESOLVER P2 17
CDU MOTOR CENTER TAP 43
PSA MOTOR DRIVE AMPLIFIER OUTPUT 32 31
LO 16
HI 3
LOCK 2
PSA 800 CPS 28V 5% /90°
HI 1
LO 14
PSA 800 CPS 28V 1% /0°
INPUT LO 92
TACH INPUT 106
SLEW INPUT 105
PSA MTR DRIVE AMPLIFIER
LO 60
HI 50
PSA 25.6KC
16X RESOLVER S2 104
16X RESOLVER S3 90
16X RESOLVER S1 89

00 319 6 Feb '63

NOTES:
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4. ARROWS ON INNER MEMBERS OF RESOLVERS SHOW DIRECTION OF CCW ROTATION AS VIEWED FROM SHAFT END.
5. DRAWINGS FOR REF:
   1015500 CDU GEAR BOX ASSY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE
CHECKED
APPROVAL R. J. Thurston 3-5-63
APPROVAL
NASA APPROVAL 6 Feb 63
MIT APPROVAL 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM
CDU

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010036
SCALE — WT SHEET — OF —

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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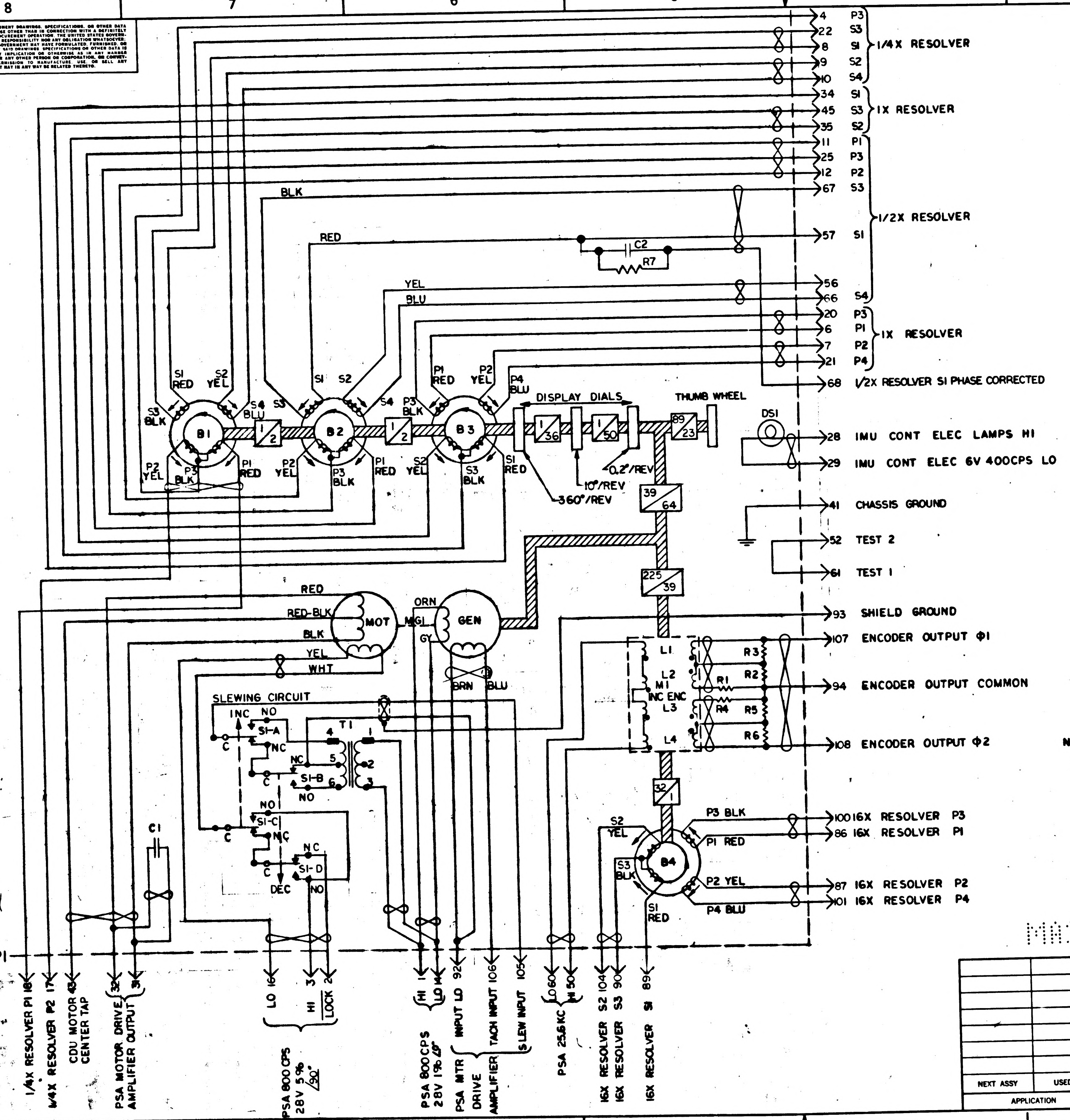

4 P3
22 S3
8 S1 1/4X RESOLVER
9 S2
10 S4
34 S1
45 S3 1X RESOLVER
35 S2
11 P1
25 P3
12 P2
67 S3
BLK
1/2X RESOLVER
RED
C2
R7
57 S1
YEL
BLU
56
66 S4
20 P3
6 P1 1X RESOLVER
7 P2
21 P4
68 1/2X RESOLVER S1 PHASE CORRECTED
S1 RED
S2 YEL
S3 BLK
S4 BLU
S3
B1
P2 YEL
P3 BLK
P1 RED
1/2
S1
S2
S4
B2
P2 YEL
P3 BLK
P1 RED
P3 BLK
1/2
P1 RED
P2 YEL
P4 BLU
B3
S2 YEL
S3 BLK
S1 RED
DISPLAY DIALS
1/36
1/50
360°/REV
10°/REV
0.2°/REV
THUMB WHEEL
89/23
DS1
28 IMU CONT ELEC LAMPS HI
29 IMU CONT ELEC 6V 400CPS LO
39/64
41 CHASSIS GROUND
52 TEST 2
61 TEST 1
225/39
93 SHIELD GROUND
RED
RED-BLK
BLK
YEL
WHT
MOT
ORN
MG1
GY
GEN
BRN
BLU
L1
L2
M1 INC ENC
L3
L4
R3
R1
R2
R4
R5
R6
107 ENCODER OUTPUT Φ1
94 ENCODER OUTPUT COMMON
108 ENCODER OUTPUT Φ2
SLEWING CIRCUIT
INC
NO
S1-A
C
NC
T1
4
5
1
2
3
NC
S1-B
NO
NO
S1-C
NC
C
NC
S1-D
DEC
NO
C1
32/1
S2 YEL
P3 BLK
P1 RED
S3 BLK
B4
P2 YEL
S1 RED
P4 BLU
100 16X RESOLVER P3
86 16X RESOLVER P1
87 16X RESOLVER P2
101 16X RESOLVER P4
P1
1/4X RESOLVER P1 18
1/4X RESOLVER P2 17
CDU MOTOR CENTER TAP 43
PSA MOTOR DRIVE AMPLIFIER OUTPUT 32 31
LO 16
HI 3
LOCK 2
PSA 800 CPS 28V 5% /90°
HI 1
LO 14
PSA 800CPS 28V 1% /0°
INPUT LO 92
TACH INPUT 106
SLEW INPUT 105
PSA MTR DRIVE AMPLIFIER
LO 60
HI 50
PSA 25.6KC
16X RESOLVER S2 104
16X RESOLVER S3 90
16X RESOLVER S1 89

00 319 6 FEB '63

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	ADDED THUMB WHEEL REVISED M1, B2, B1, S1-A ADDED NOTE 3 & "DS1" ADDED TWISTING REVISED CONN. PINS TDRR 00504	2/15/63	R. J. T. W.!!
B	REVISED S1 ADDED TWIST TO C1 LEADS " LEADS TO PINS 17, 18, 41, 52, 61 CHANGED DESIG. OF PIN 43 REVISED SHIELD GROUNDS REM'D COMPENSATING WINDINGS FROM B2, REVISED DWG TITLE, REVISED CONN PINS, ADDED R7, C2, PIN 68; UPGRADED TO CLASS A TDRR 01019	4/4/63	R. J. T.
C	REPLACED BY REV D WITH CHANGES TDRR 02893	8-14 63	

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
3. FOR A CCW ROTATION OF THE MOTOR-GENERATOR AS VIEWED FROM THE SHAFT END, ALL RESOLVERS SHALL ROTATE CW AS VIEWED FROM THE SHAFT END AND THE DISPLAY DIALS SHALL REGISTER AN INCREASING COUNT.
4. ARROWS ON INNER MEMBERS OF RESOLVERS SHOW DIRECTION OF CCW ROTATION AS VIEWED FROM SHAFT END.
5. DRAWINGS FOR REF:
   1015500 CDU GEAR BOX ASSY

Ⓒ REPLACED WITH CHANGE BY REV D

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE
CHECKED
APPROVAL R. J. Theriault 3-5-63
APPROVAL
NASA APPROVAL 6 Feb 63
MIT APPROVAL W. A. Kupfer 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM
CDU

CODE IDENT NO. | SIZE D | NASA DRAWING NO. 1010036
SCALE — | WT | SHEET — OF —

1010036 B

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

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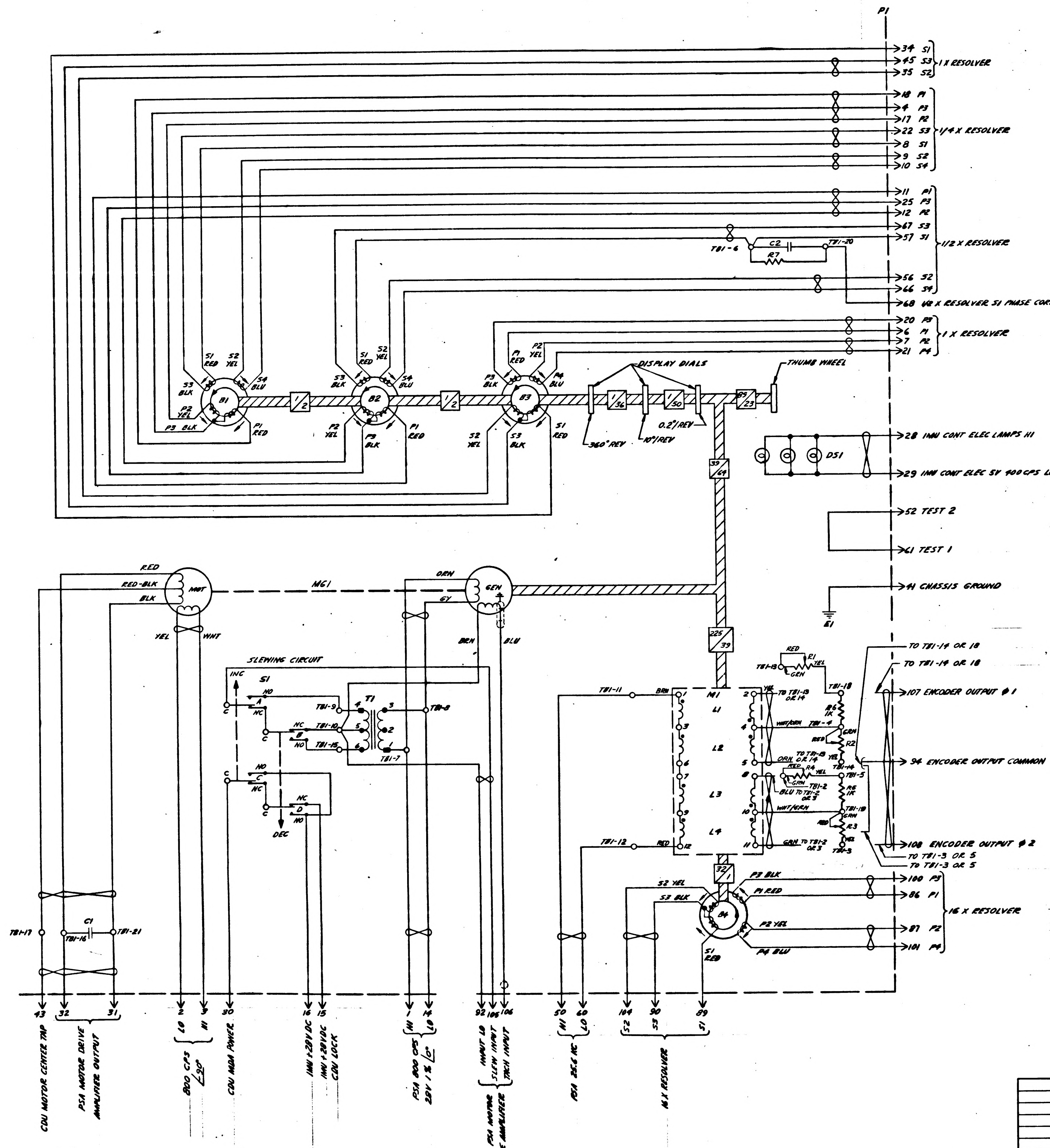
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGES TDRR 02893	9/5/63	wK



P1
34 S1
45 S3
35 S2
1 X RESOLVER
18 P1
4 P3
17 P2
22 S3
8 S1
9 S2
10 S4
1/4 X RESOLVER
11 P1
25 P3
12 P2
67 S3
57 S1
1/2 X RESOLVER
56 S2
66 S4
68 1/2 X RESOLVER S1 PHASE CORRECTED
20 P3
6 P1
7 P2
21 P4
1 X RESOLVER
TB1-6
C2
R7
TB1-20
S1 RED
S2 YEL
S3 BLK
S4 BLU
P2 YEL
P3 BLK
P1 RED
B1
B2
B3
1/2
DISPLAY DIALS
THUMB WHEEL
1/36
1/50
89/23
360° REV
10°/REV
0.2°/REV
39/64
225/39
32/1
28 IMU CONT ELEC LAMPS HI
DS1
29 IMU CONT ELEC 5V 400 CPS LO
52 TEST 2
61 TEST 1
41 CHASSIS GROUND
E1
RED
RED-BLK
BLK
MOT
YEL
WHT
MG1
ORN
GY
GEN
BRN
BLU
SLEWING CIRCUIT
INC
S1
NO
NC
A
B
C
D
DEC
T1
TB1-9
TB1-10
TB1-15
TB1-8
TB1-7
TB1-11
TB1-12
M1
L1
L2
L3
L4
TB1-13
R1
GRN
TB1-18
TO TB1-13 OR 14
WHT/ORN TB1-4
R6 1K
R2
TO TB1-13 OR 14
TB1-14
R4
TB1-5
TB1-2
BLU TO TB1-2 OR 3
R5 1K
WHT/GRN
TB1-19
R3
GRN TO TB1-2 OR 3
TB1-3
TO TB1-14 OR 18
TO TB1-14 OR 18
107 ENCODER OUTPUT ϕ 1
94 ENCODER OUTPUT COMMON
108 ENCODER OUTPUT ϕ 2
TO TB1-3 OR 5
TO TB1-3 OR 5
S2 YEL
S3 BLK
P3 BLK
P1 RED
P2 YEL
P4 BLU
B4
S1 RED
100 P3
86 P1
87 P2
101 P4
16 X RESOLVER
TB1-17
C1
TB1-16
TB1-21
43
32
31
CDU MOTOR CENTER TAP
PSA MOTOR DRIVE AMPLIFIER OUTPUT
2 LO
3 HI
800 CPS ∠90°
30
CDU MDA POWER
16
15
IMU +28V DC
IMU +28VDC CDU LOCK
1 HI
14 LO
PSA 800 CPS 28V 1% ∠0°
92
105
106
INPUT LO
SLEW INPUT
TACH INPUT
PSA MOTOR DRIVE AMPLIFIER
50 HI
60 LO
PSA 25.6 KC
104 S2
90 S3
89 S1
16 X RESOLVER

REF DESIG	PART NO.	DESCRIPTION	VALUE	TOL	~~RATING~~
B1	1015672	RESOLVER 1/4 X			
B2	1016890	RESOLVER 1/2 X			
B3	1015681	RESOLVER 1X			
B4	1015673	RESOLVER 16X			
C1	1010264-33	CAPACITOR	.47μf	5%	200V
C2	1010410-13	CAPACITOR	680 PF	2%	300V
DS1	1010493	LAMP-MINIATURE			
E1	1015902-043	LUG-TERMINAL			
M1	1015559	DIGITAL CORE ASSY			
MG1	1015674	MOTOR-TACH			
P1	1010347-2	CONNECTOR-PLUG			
R1	1010360-12	RESISTOR VAR	100 Ω	5%	1.5 W
R2	-16		2K		
R3	-16		2K		
R4	-12		100 Ω		
R5	1010311-126		1K	1%	1/10 W
R6	1010311-126		1K		
R7	1010364-577		49.9K		1/8 W
S1	1010435-002	MICROSWITCH			
T1	1010276	TRANSFORMER			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327.
2. WIRE CONNECTIONS FOR ENCODER TO BE DETERMINED DURING CALIBRATION AT FINAL ASSY PER ATP 1015500.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH.
4. FOR A CCW ROTATION OF THE MOTOR-GENERATOR AS VIEWED FROM THE SHAFT END, ALL RESOLVERS SHALL ROTATE CW AS VIEWED FROM THE SHAFT END AND THE DISPLAY DIALS SHALL REGISTER AN INCREASING COUNT.
5. ARROWS ON INNER MEMBERS OF RESOLVERS SHOW DIRECTION OF CCW ROTATION AS VIEWED FROM SHAFT END.

DRAWINGS FOR REFERENCE:
1015500 CDU ASSEMBLY
1015670 WIRING DIAGRAM

Ⓓ REPLACES REV C WITH CHANGE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
1015500-0N	1015500-0N

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN THENO DATE 7-31-63
CHECKED
APPROVAL R. J. Theissen 9-4-63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 5 Sep 63

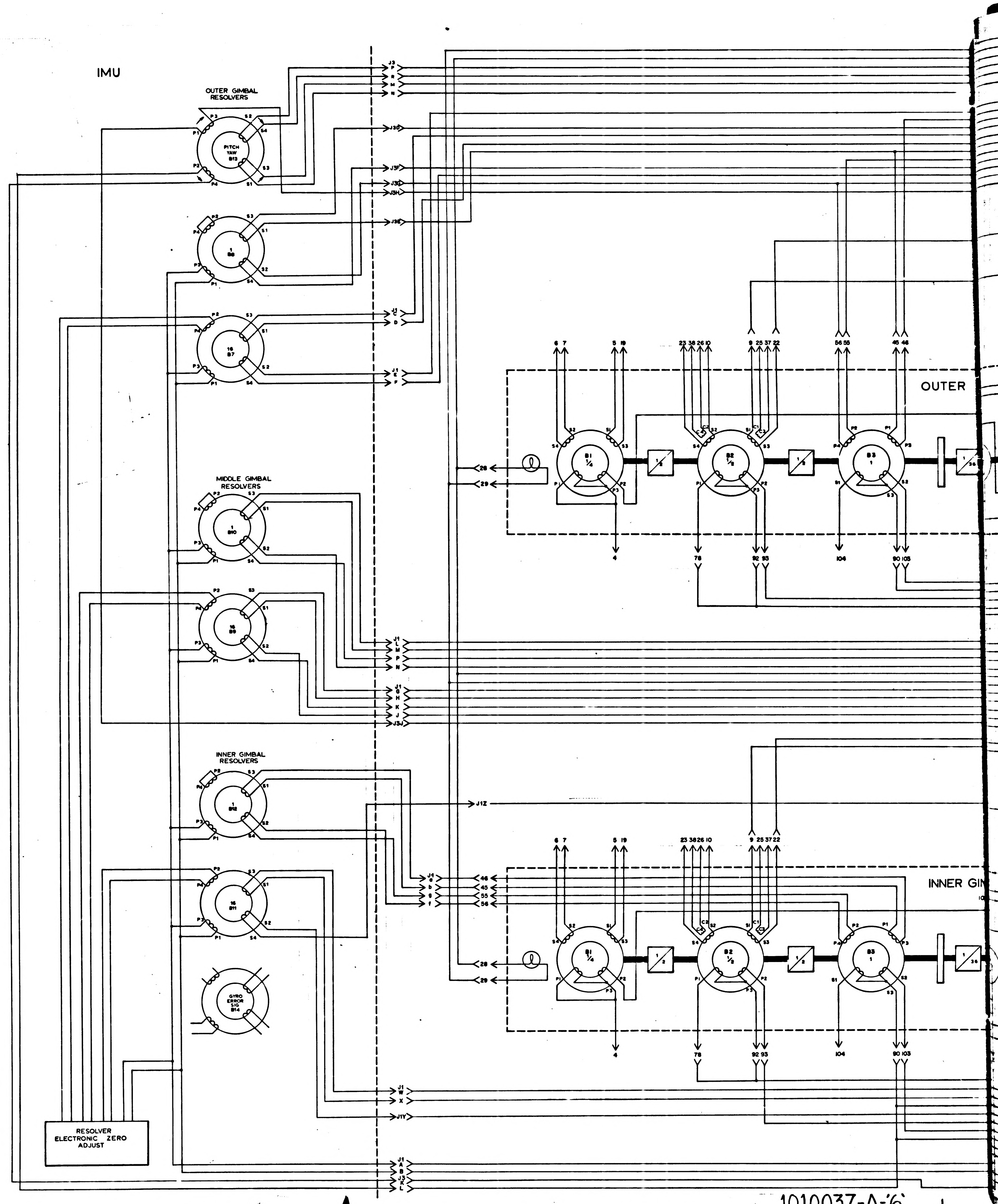
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM
CDU

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010036
SCALE
WT
SHEET 1 OF 1

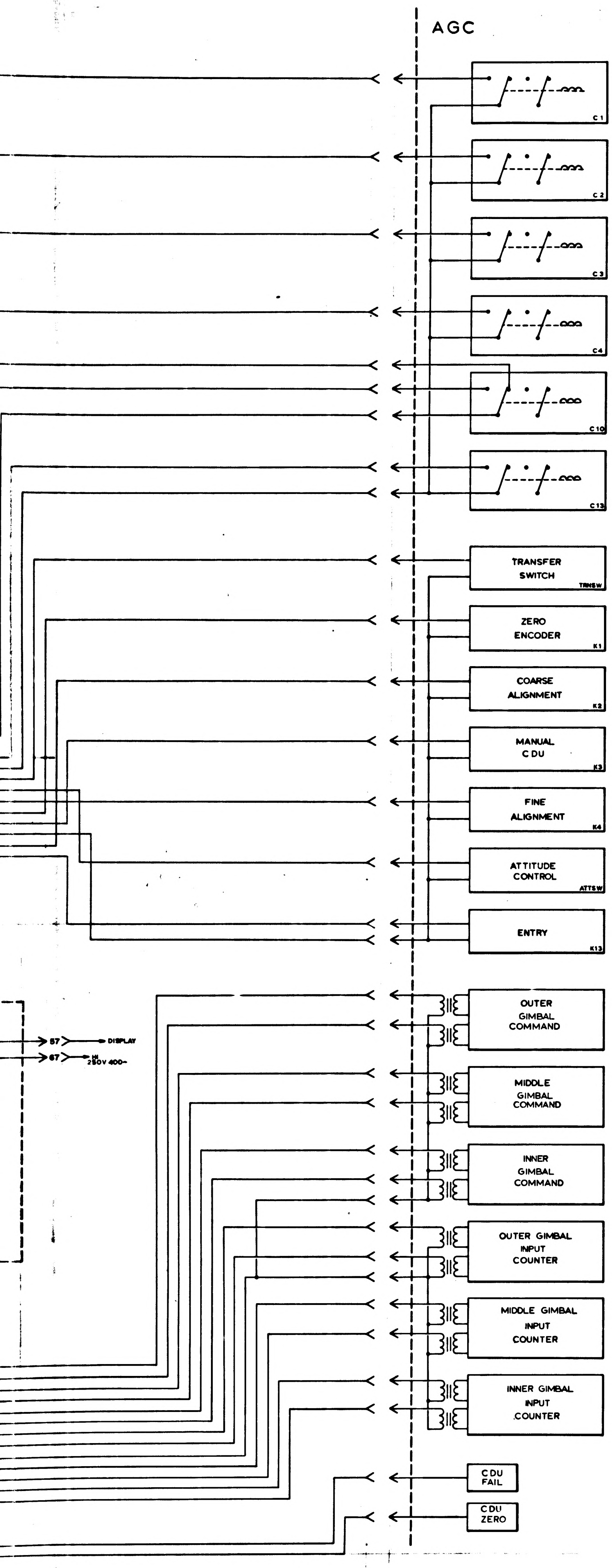
MASTER

INCHES
PHOTOGRAPHING SCALE ONLY


IMU
OUTER GIMBAL RESOLVERS
PITCH YAW B13
1 B8
16 B7
MIDDLE GIMBAL RESOLVERS
1 B10
16 B9
INNER GIMBAL RESOLVERS
1 B12
16 B11
GYRO ERROR SIG B14
RESOLVER ELECTRONIC ZERO ADJUST
OUTER
INNER GIM
B1 1/4
B2 1/2
B3 1
J12
J1Y

(16)

1010037-A-6


AGC
C1
C2
C3
C4
C10
C13
TRANSFER SWITCH
TRNSW
ZERO ENCODER
K1
COARSE ALIGNMENT
K2
MANUAL CDU
K3
FINE ALIGNMENT
K4
ATTITUDE CONTROL
ATTSW
ENTRY
K13
OUTER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
INNER GIMBAL COMMAND
OUTER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
INNER GIMBAL INPUT COUNTER
CDU FAIL
CDU ZERO
87
DISPLAY
87
250V 400~

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00506	3/6/63	R.J.T.

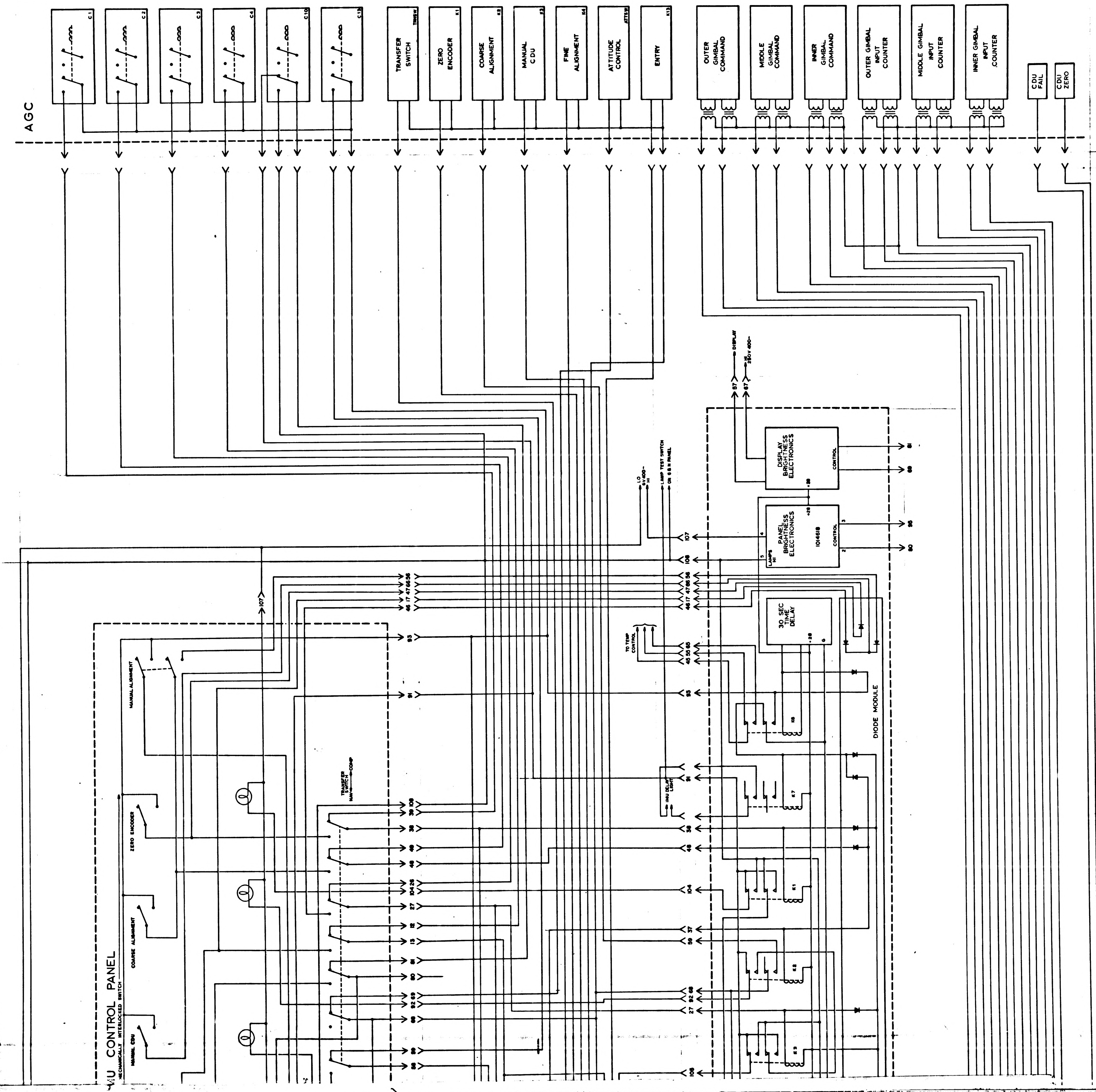
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00320 DATE 6 FEB 1963

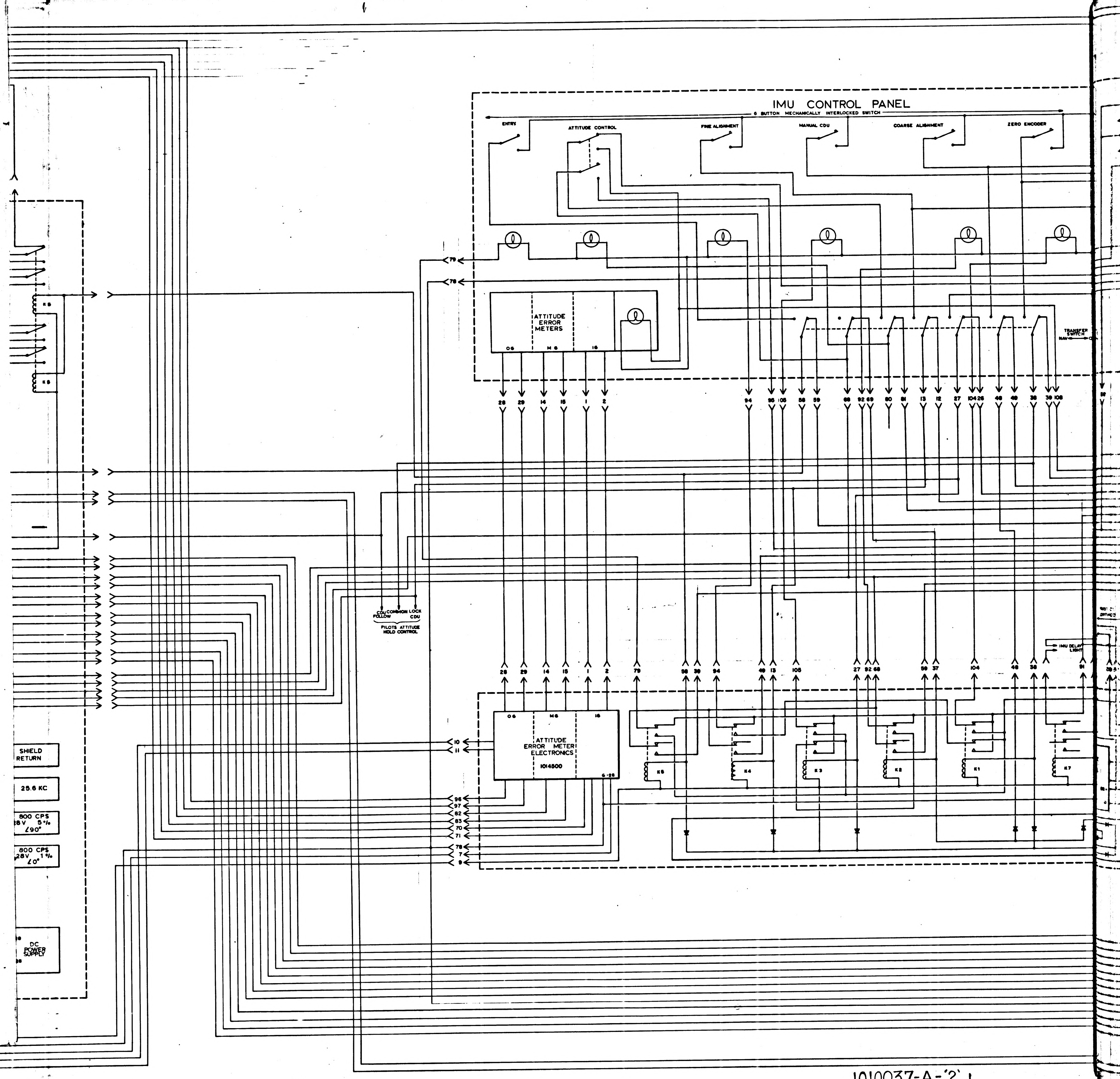
QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			A

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	M I T INSTRUMENTATION LAB CAMBRIDGE, MASS REQ. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
		MATERIAL	DRAWN wayne Thompson DATE 2·1·63 CHECKED J. Green APPROVAL R. J. Thomas 2-8-63 APPROVAL	MODING MECHANIZATION DIAGRAM CDU / IMU
NEXT ASSY	USED ON	HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO. · SIZE · NASA DRAWING NO. 1010037 -J
APPLICATION		FINAL FINISH	MIT APPROVAL 6 Feb 63	SCALE · WT · SHEET OF

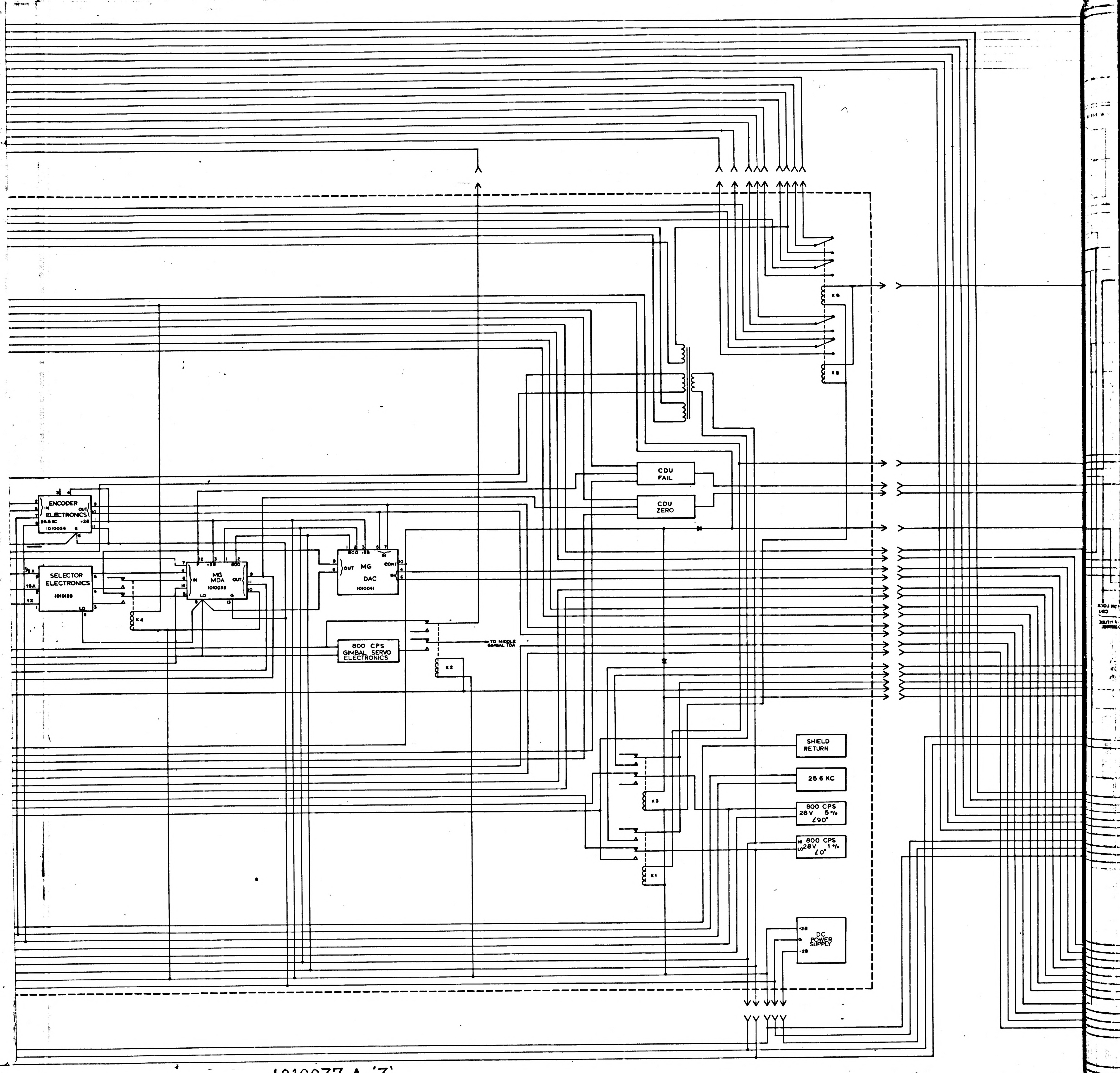

AGC
C1
C2
C3
C4
C10
C12
TRANSFER SWITCH
ZERO ENCODER
COARSE ALIGNMENT
MANUAL CDU
FINE ALIGNMENT
ATTITUDE CONTROL
ENTRY
OUTER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
INNER GIMBAL COMMAND
OUTER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
INNER GIMBAL INPUT COUNTER
CDU FAIL
CDU ZERO
DISPLAY
28V 400~
DISPLAY BRIGHTNESS ELECTRONICS
CONTROL
PANEL BRIGHTNESS ELECTRONICS
1014618
LAMPS HI
LAMP TEST SWITCH ON G&N PANEL
30 SEC TIME DELAY
TO TEMP CONTROL
DIODE MODULE
IMU DELAY LIGHT
TRANSFER SWITCH NAV COMP
/U CONTROL PANEL
MECHANICALLY INTERLOCKED SWITCH
MANUAL ALIGNMENT
ZERO ENCODER
COARSE ALIGNMENT
MANUAL CDU
K1
K2
K3
K7
K8
107
108

1010037-A-'2' 1


IMU CONTROL PANEL
6 BUTTON MECHANICALLY INTERLOCKED SWITCH
ENTRY
ATTITUDE CONTROL
FINE ALIGNMENT
MANUAL CDU
COARSE ALIGNMENT
ZERO ENCODER
TRANSFER SWITCH
NAV
ATTITUDE ERROR METERS
OG
MG
IG
79
78
28
29
14
15
1
2
94
95
105
56
59
68
92
69
60
61
13
12
27
104
26
46
38
39
108
CDU FOLLOW
COMMON
LOCK CDU
PILOTS ATTITUDE HOLD CONTROL
ATTITUDE ERROR METER ELECTRONICS
1014500
G-28
10
11
96
97
82
83
70
71
78
7
9
37
91
IMU DELAY LIGHT
K1
K2
K3
K4
K5
K6
K7
K8
SHIELD RETURN
25.6 KC
800 CPS 28V 5% ∠90°
800 CPS 28V 1% ∠0°
DC POWER SUPPLY

2

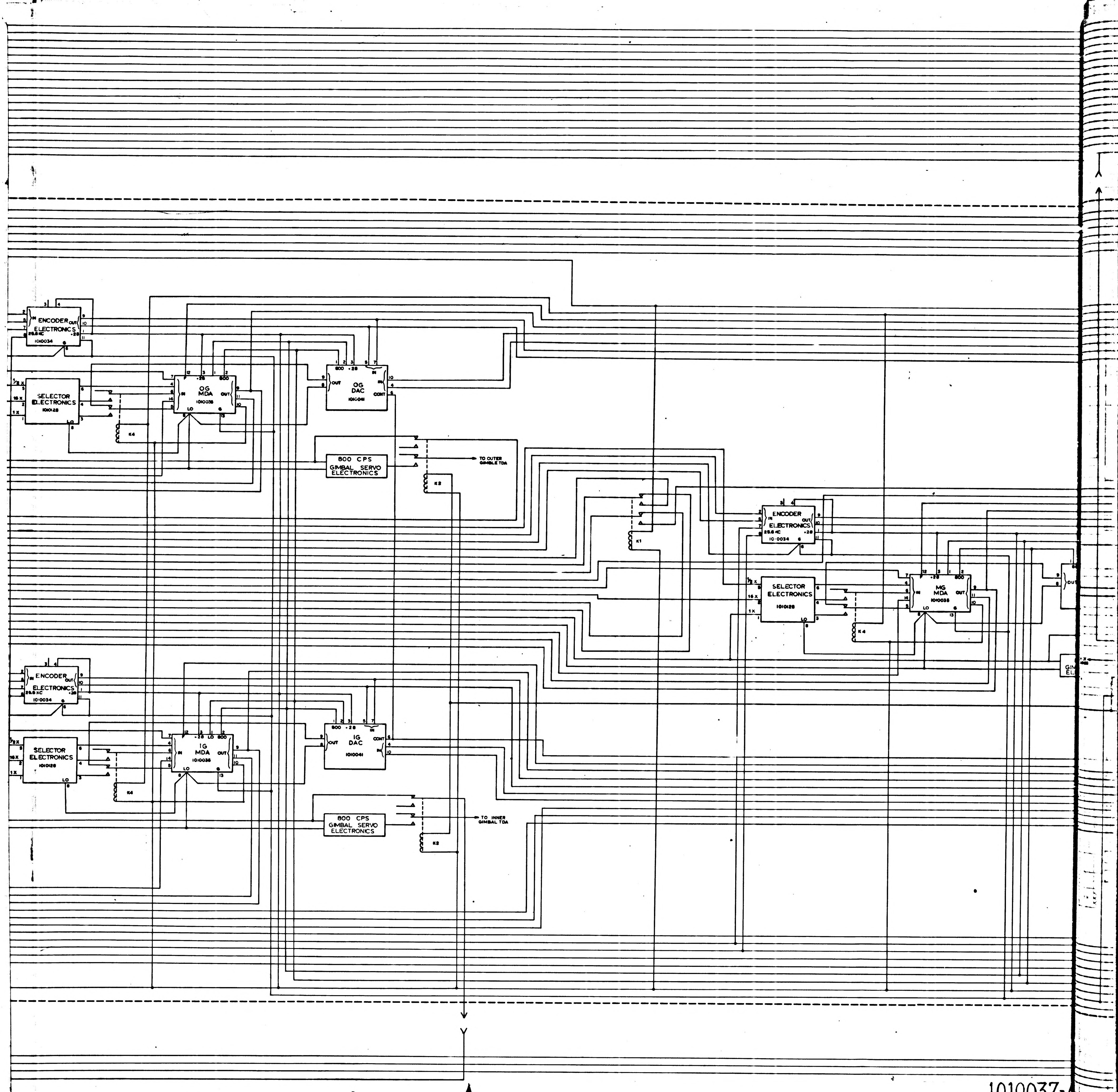
1010037-A-'2' 1



ENCODER ELECTRONICS
IN
OUT
25.6 KC
+28
1010034
SELECTOR ELECTRONICS
1010128
½X
16X
1X
LO
K4
MG MDA
1010038
IN
OUT
F
+28
800
LO
G
MG DAC
1010041
OUT
800
-28
IN
CONT
800 CPS GIMBAL SERVO ELECTRONICS
TO MIDDLE GIMBAL TDA
K2
CDU FAIL
CDU ZERO
K5
K5
K3
K1
SHIELD RETURN
25.6 KC
800 CPS 28V 5% ∠90°
HI
LO
800 CPS 28V 1% ∠0°
DC POWER SUPPLY
+28
G
-28

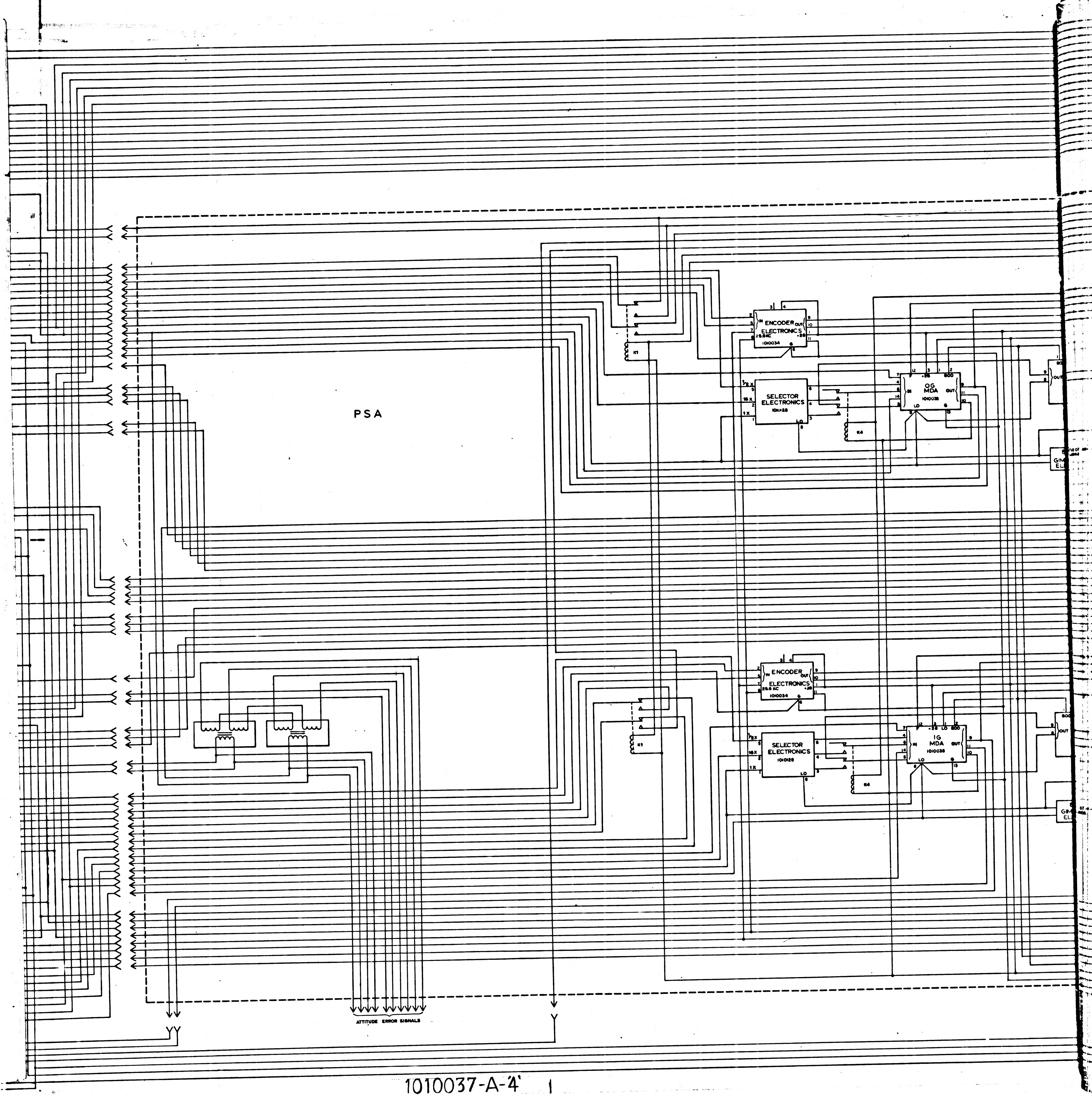
1010037-A-'3'

2

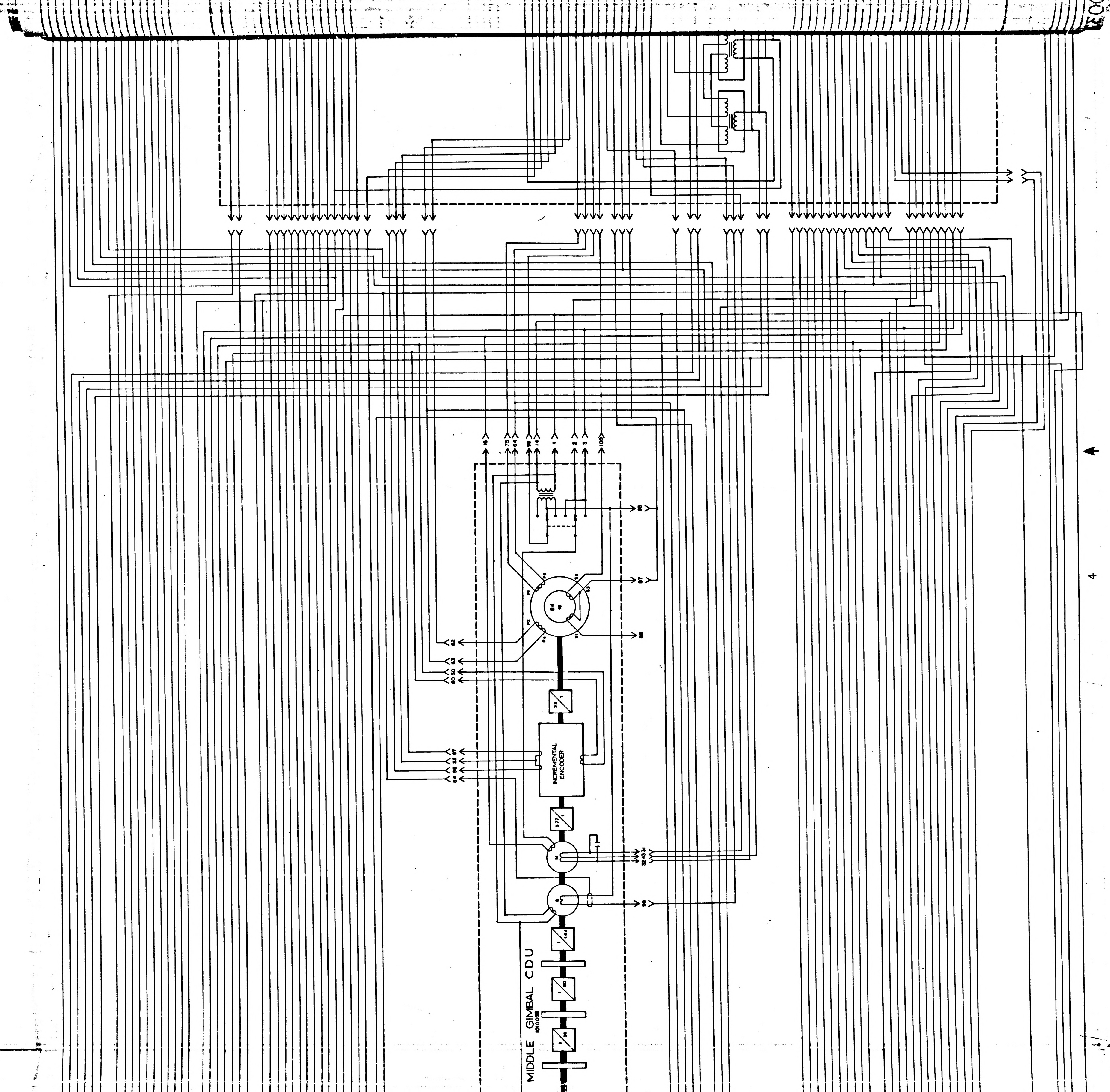

ENCODER ELECTRONICS 28.8 KC 1010034
SELECTOR ELECTRONICS 1010128
OG MDA 1010038
OG DAC 1010041
800 CPS GIMBAL SERVO ELECTRONICS
TO OUTER GIMBLE TDA
K4
K2
K1
ENCODER ELECTRONICS 28.8 KC 10-0034
SELECTOR ELECTRONICS 1010128
MG MDA 1010038
ENCODER ELECTRONICS 28.8 KC 10-0034
SELECTOR ELECTRONICS 1010128
IG MDA 1010038
IG DAC 1010041
800 CPS GIMBAL SERVO ELECTRONICS
TO INNER GIMBAL TDA
IN
OUT
CONT
LO
800
+28
1X
16X
1/2X

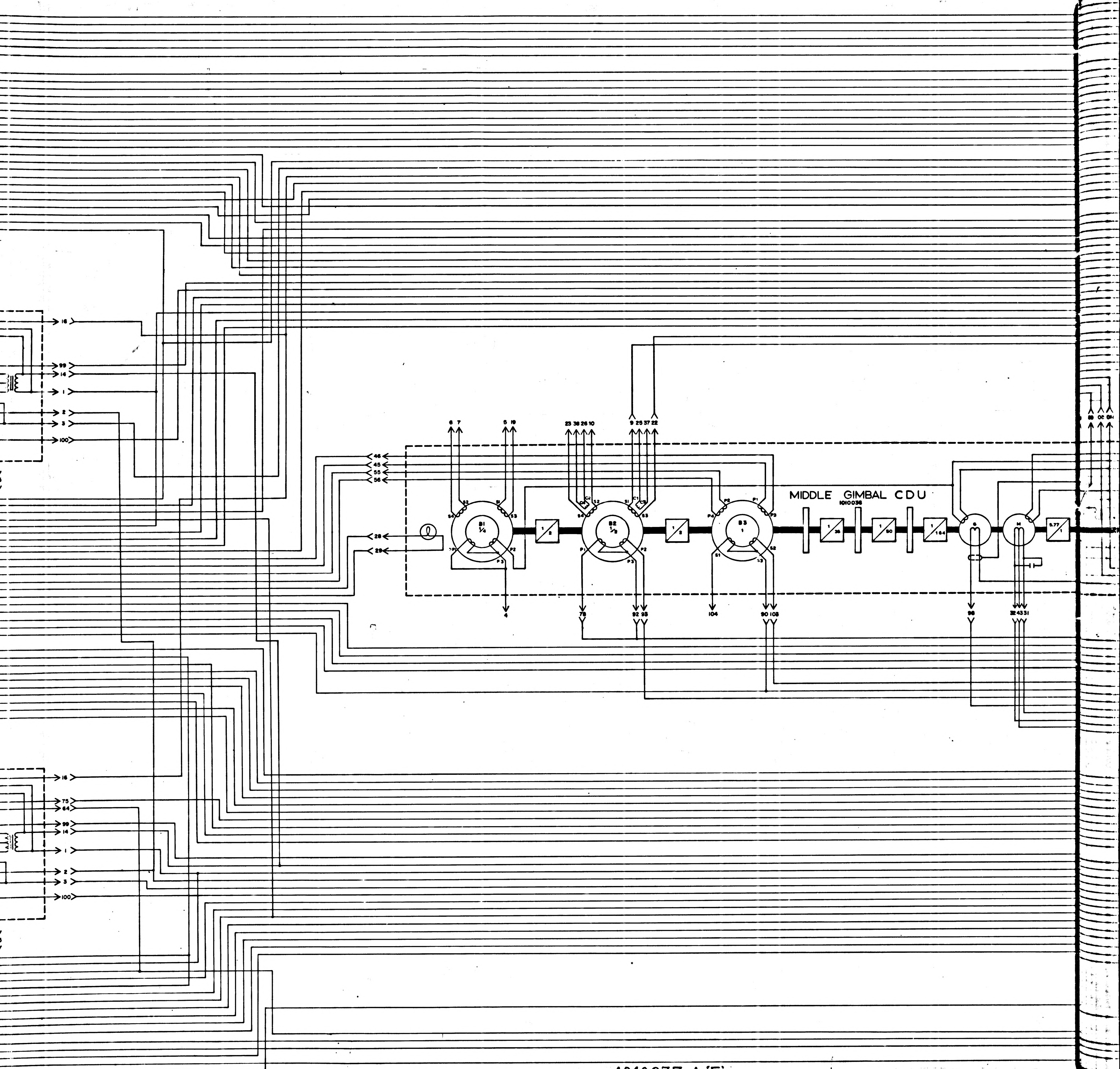
3

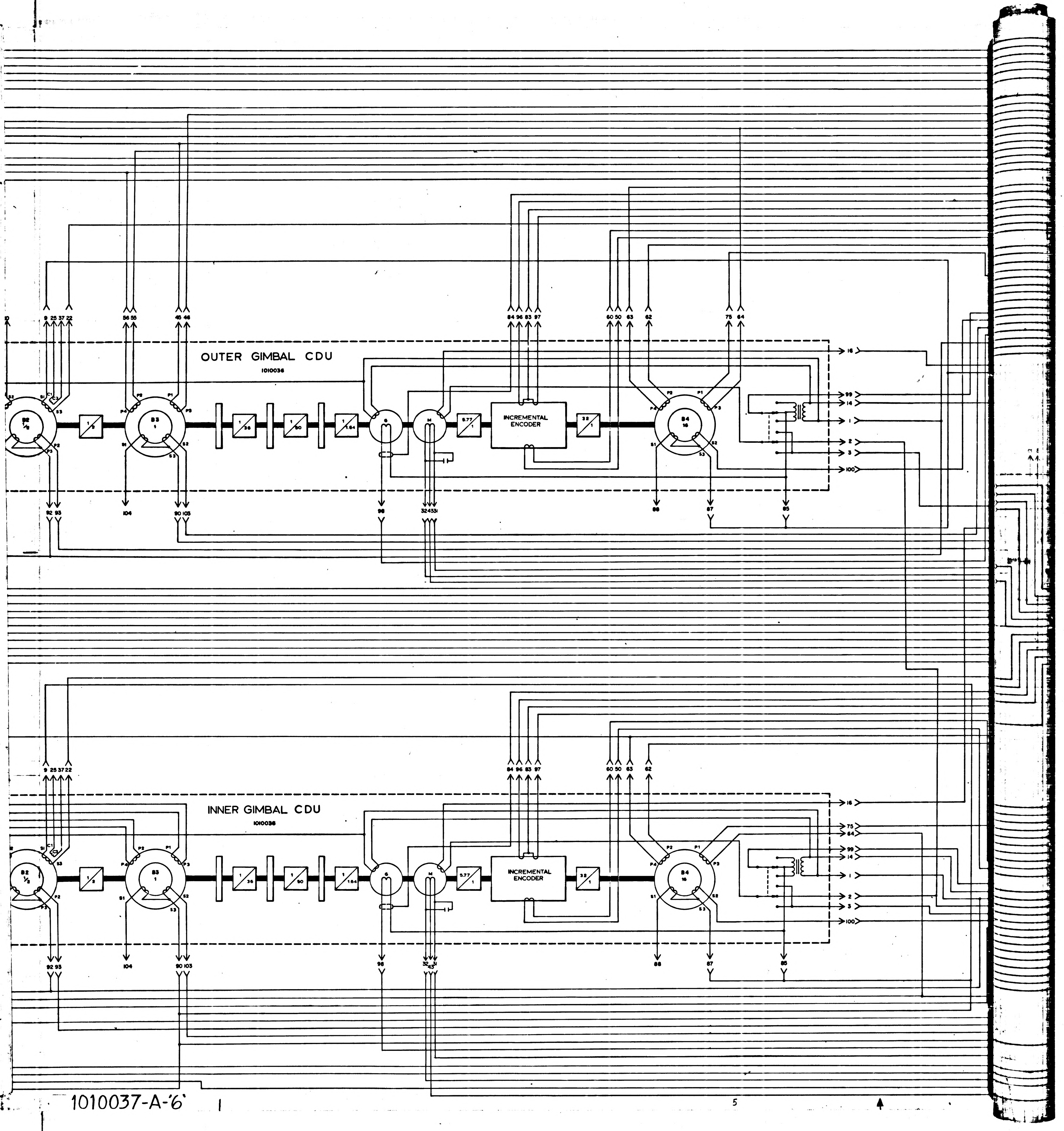
1010037-A


PSA
ENCODER ELECTRONICS
IN
OUT
25.6 KC
+28
1010034
SELECTOR ELECTRONICS
½ X
16 X
1 X
LO
1010128
OG MDA
IN
OUT
F
+28
800
LO
1010038
K1
K4
ENCODER ELECTRONICS
IN
OUT
25.6 KC
+28
1010034
SELECTOR ELECTRONICS
½ X
16 X
1 X
LO
1010128
IG MDA
IN
OUT
F
+28
LO
800
1010038
OUT
GIM
EL
ATTITUDE ERROR SIGNALS

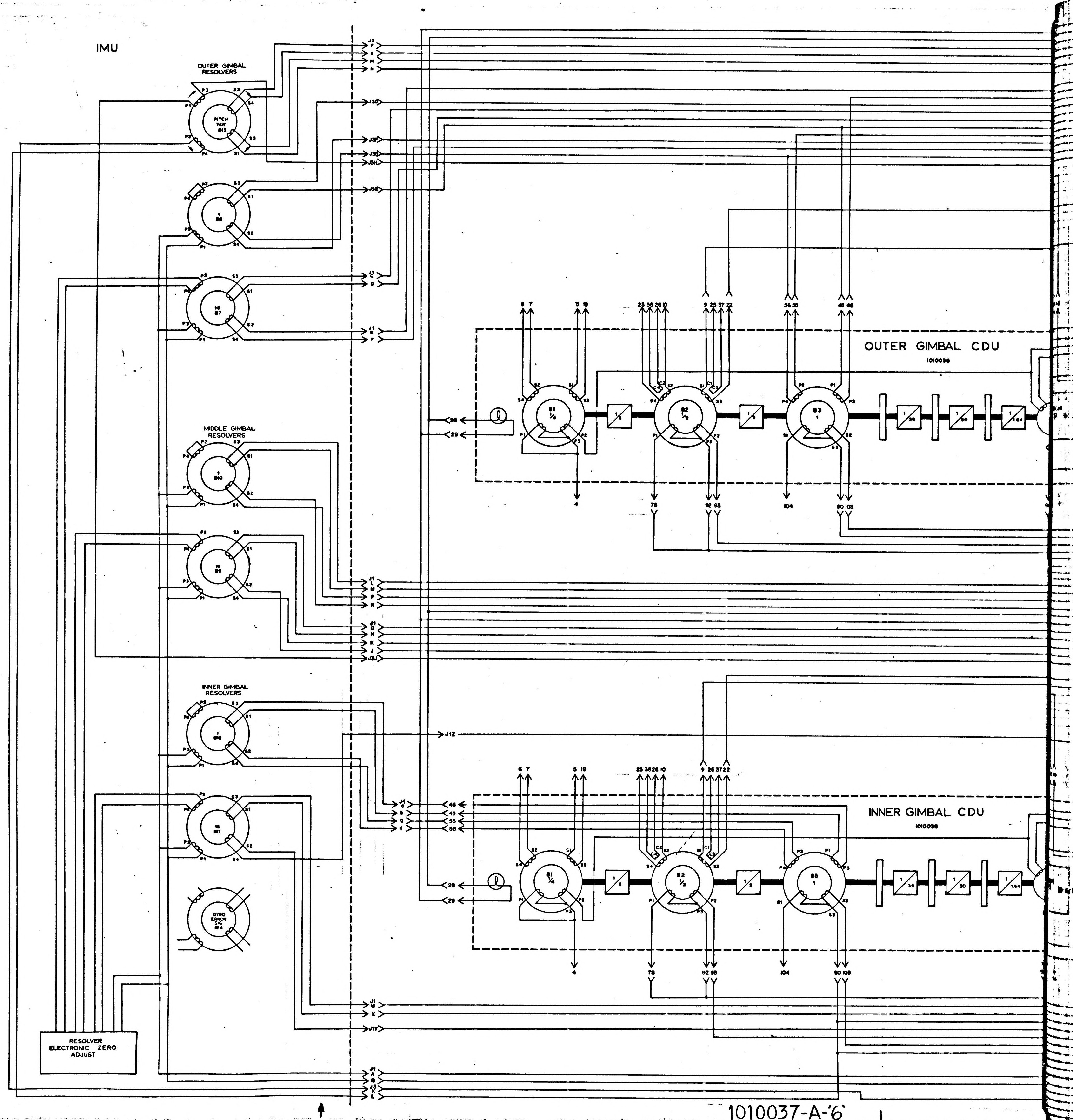
1010037-A-4 1


MIDDLE GIMBAL CDU
1010038
INCREMENTAL ENCODER
16
75
64
99
14
1
2
3
100
85
87
88
62
63
60 50
84 96 83 97
32 43 31
98
P1
P2
P3
P4
S1
S2
S3
32
1
5.77
1.64
80
36
M
G
4


MIDDLE GIMBAL CDU
1010036
B1 1/4
B2 1/2
B3 1
1/2
1/2
1/2
1/36
1/50
1/164
5.77/1
6 7
5 19
23 38 26 10
9 25 37 22
46
45
55
56
28
29
4
78
92 93
104
90 108
98
32 43 31
16
99
14
1
2
3
100
16
75
64
99
14
1
2
3
100
1010037-A-5

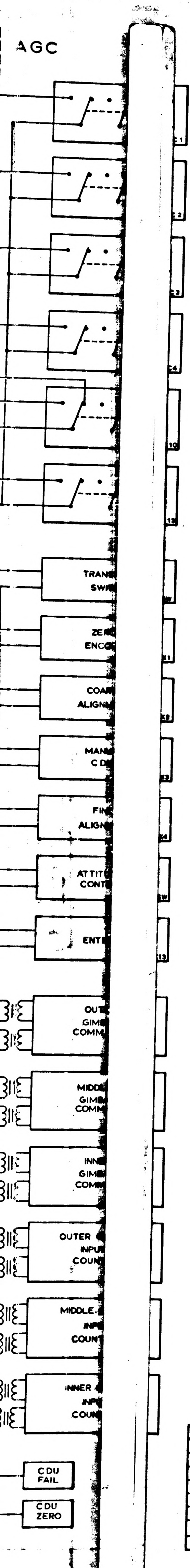

OUTER GIMBAL CDU
1010036
INNER GIMBAL CDU
1010036
INCREMENTAL ENCODER
INCREMENTAL ENCODER
B2
B3
B4
G
M
P1
P2
P3
P4
S1
S2
S3
C1
1/2
1/36
1/90
1/64
5.77/1
32/1
9 25 37 22
56 55
45 46
84 96 83 97
60 50 63
62
75 64
16
99
14
1
2
3
100
92 93
104
90 103
98
32 43 31
88
87
85
5

1010037-A-'6'


IMU
OUTER GIMBAL RESOLVERS
PITCH YAW B13
1 B6
16 B7
MIDDLE GIMBAL RESOLVERS
1 B10
16 B9
INNER GIMBAL RESOLVERS
1 B12
16 B11
GYRO ERROR SIG B14
RESOLVER ELECTRONIC ZERO ADJUST
OUTER GIMBAL CDU
1010036
INNER GIMBAL CDU
1010036
B1 1/4
B2 1/2
B3 1
J12
28
29
4
78
92 93
104
90 103
6 7
5 19
23 38 26 10
9 25 37 22
54 55
45 46
1/64
1/90
1/36

1010037-A-'6'

(94)


AGC
C1
C2
C3
C4
10
13
TRANS SW
ZER ENCO
COAR ALIGN
MANU CD
FIN ALIGN
ATTIT CONT
ENT
OUT GIM COMM
MIDD GIMB COMM
INN GIM COM
OUTER INPU COUN
MIDDLE INP COUNT
INNER INP COUN
CDU FAIL
CDU ZERO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00506	3/6/63	R.J.T.W.
B	REDRAWN AND REPLACED BY REVISION C PER TDRR 01433	5 June 63 5 June	W.K.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00320 DATE 6 FEB 1963

REV B REPLACED BY REV C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS B

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH
NEXT ASSY USED ON
APPLICATION

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN Wayne Thompson DATE 2·1·63
CHECKED
APPROVAL R J Thiessen 2-8-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 6 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MODING MECHANIZATION DIAGRAM
CDU / IMU

CODE IDENT NO. SIZE NASA DRAWING NO. 1010037 -J
SCALE WT SHEET OF

(94)

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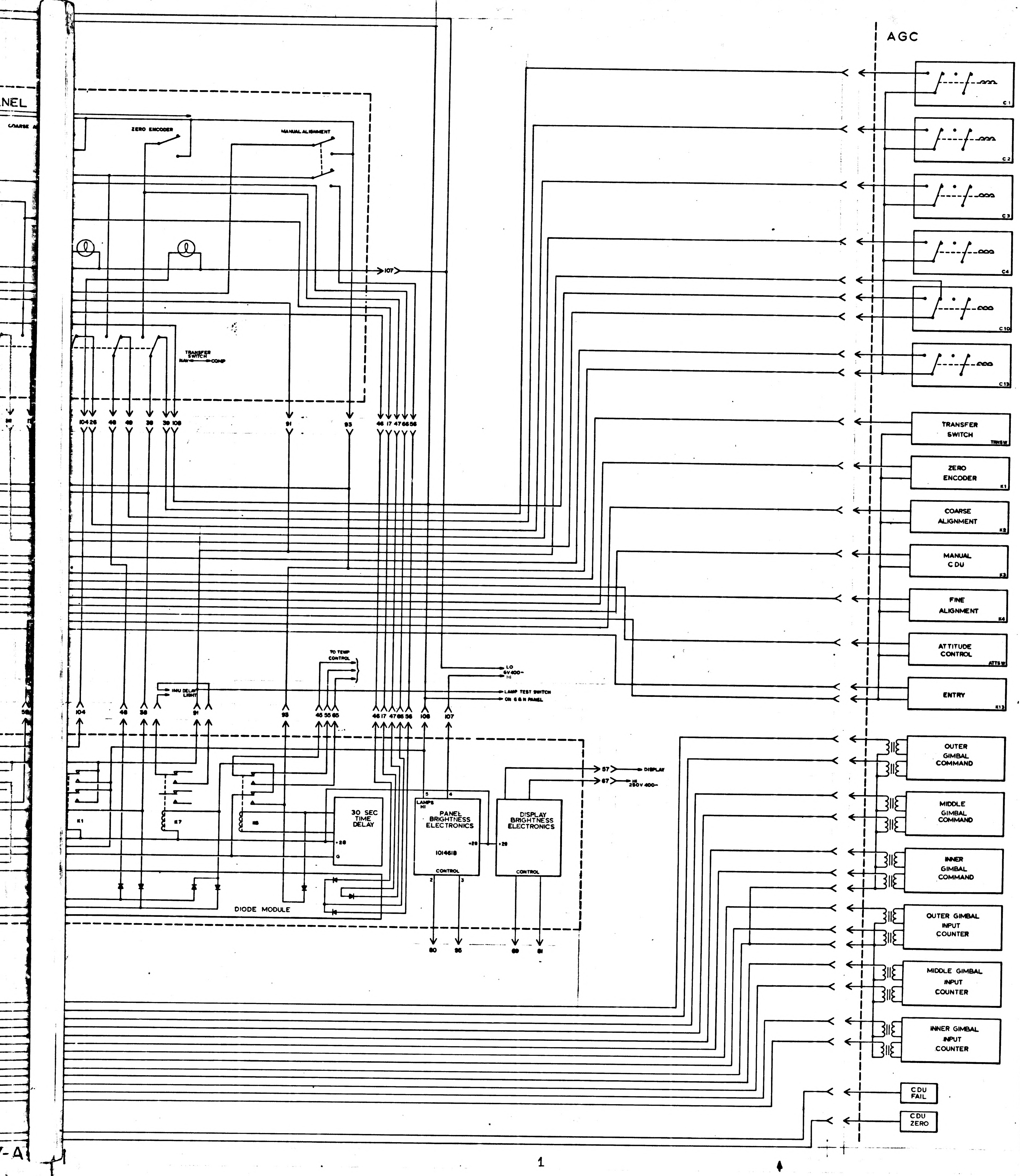
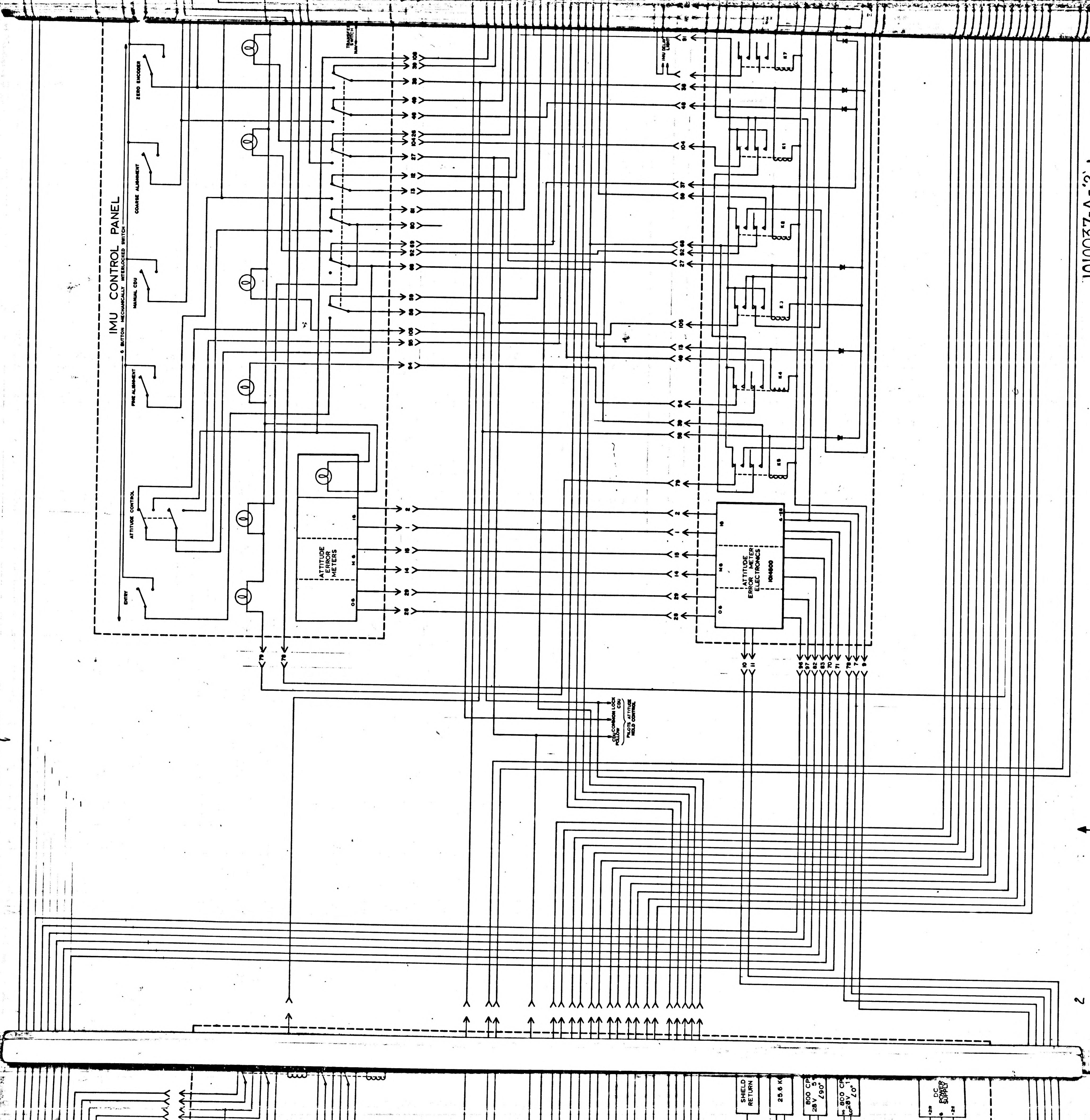
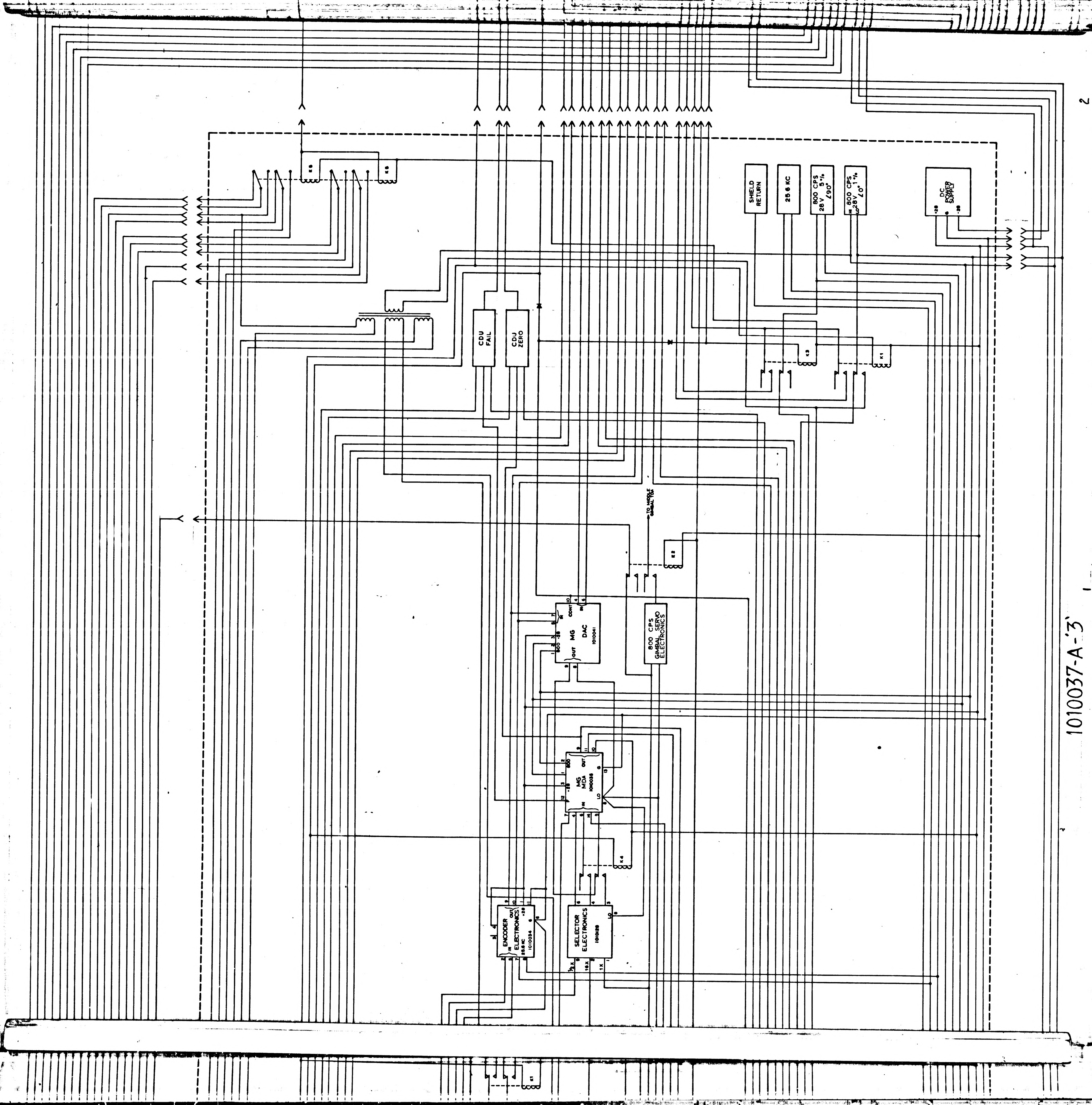

NEL
COARSE A
ZERO ENCODER
MANUAL ALIGNMENT
107
TRANSFER SWITCH
NAV
COMP
104 26 48 49 38 39 108
91
93
46 17 47 66 56
TO TEMP CONTROL
IMU DELAY LIGHT
104 48 38 91 93 45 55 65 46 17 47 66 56 108 107
LO 6V 400~ HI
LAMP TEST SWITCH
ON G & N PANEL
57 DISPLAY
67 HI 250V 400~
K1
K7
K6
30 SEC TIME DELAY
+28
G
5 4
LAMPS HI
PANEL BRIGHTNESS ELECTRONICS
+28
1014618
CONTROL
2 3
DISPLAY BRIGHTNESS ELECTRONICS
+28
CONTROL
DIODE MODULE
80 95 69 81
AGC
C1
C2
C3
C4
C10
C13
TRANSFER SWITCH
TRNSW
ZERO ENCODER
K1
COARSE ALIGNMENT
K2
MANUAL CDU
K3
FINE ALIGNMENT
K4
ATTITUDE CONTROL
ATTSW
ENTRY
K13
OUTER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
INNER GIMBAL COMMAND
OUTER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
INNER GIMBAL INPUT COUNTER
CDU FAIL
CDU ZERO
Y-A

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ± ± DO NOT SCALE THIS DRAWING
		MATERIAL
		HEAT TREATMENT
NEXT ASSY	USED ON	FINAL FINISH
APPLICATION		

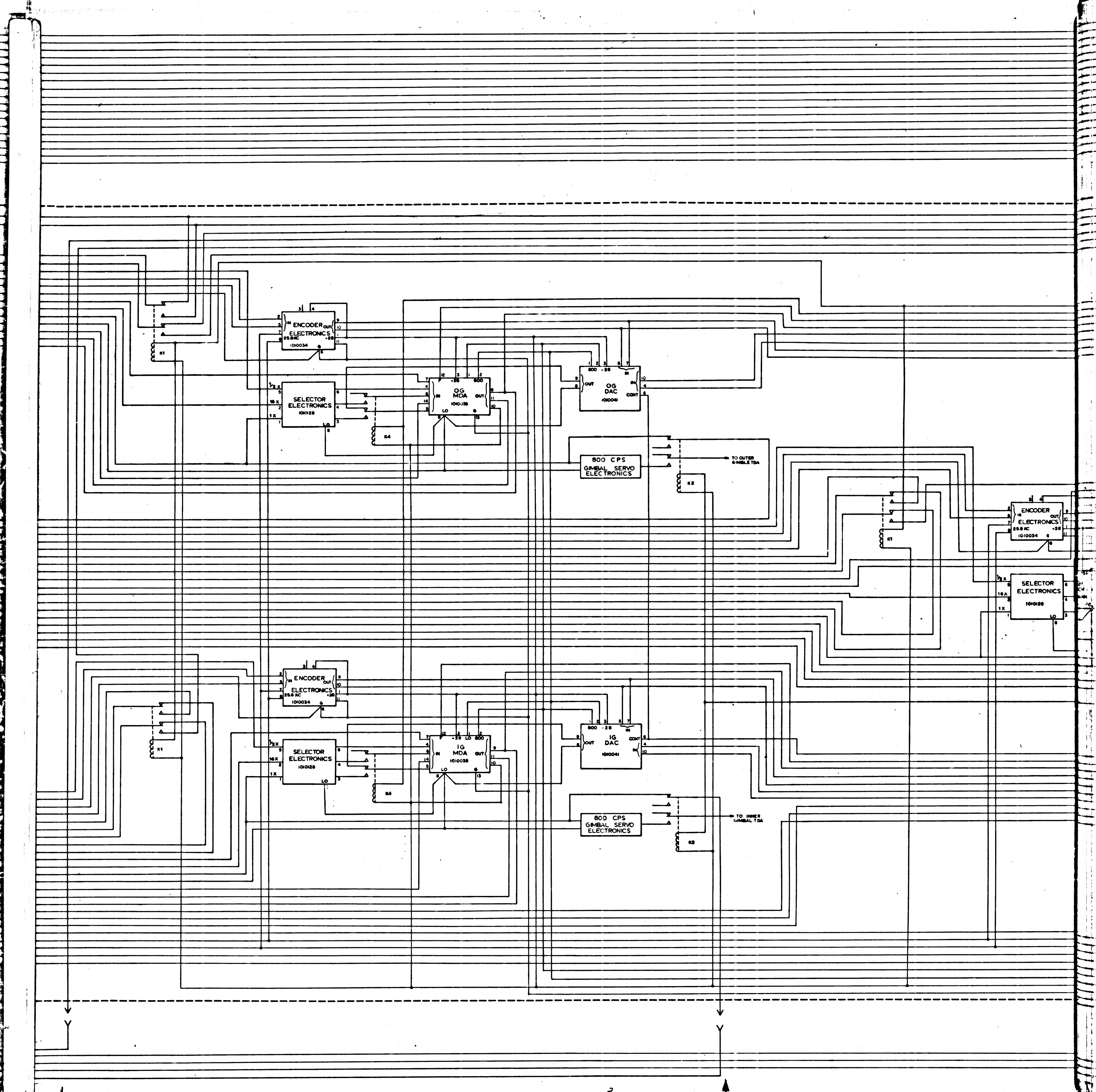

IMU CONTROL PANEL
6 BUTTON MECHANICALLY INTERLOCKED SWITCH
ZERO ENCODER
COARSE ALIGNMENT
MANUAL CDU
FINE ALIGNMENT
ATTITUDE CONTROL
ENTRY
TRANSFER SWITCH
NAV
ATTITUDE ERROR METERS
16
M 6
O 6
ATTITUDE ERROR METER ELECTRONICS
1014800
6-28
K7
K1
K2
K3
K4
K5
CDU COMMON LOCK CDU FOLLOW
PILOTS ATTITUDE HOLD CONTROL
79
78
10
11
96
97
82
83
70
71
78
7
9
SHIELD RETURN
25.6 K
800 CPS 28V 5 ∠90°
800 CPS 28V ∠0°
DC POWER SUPPLY

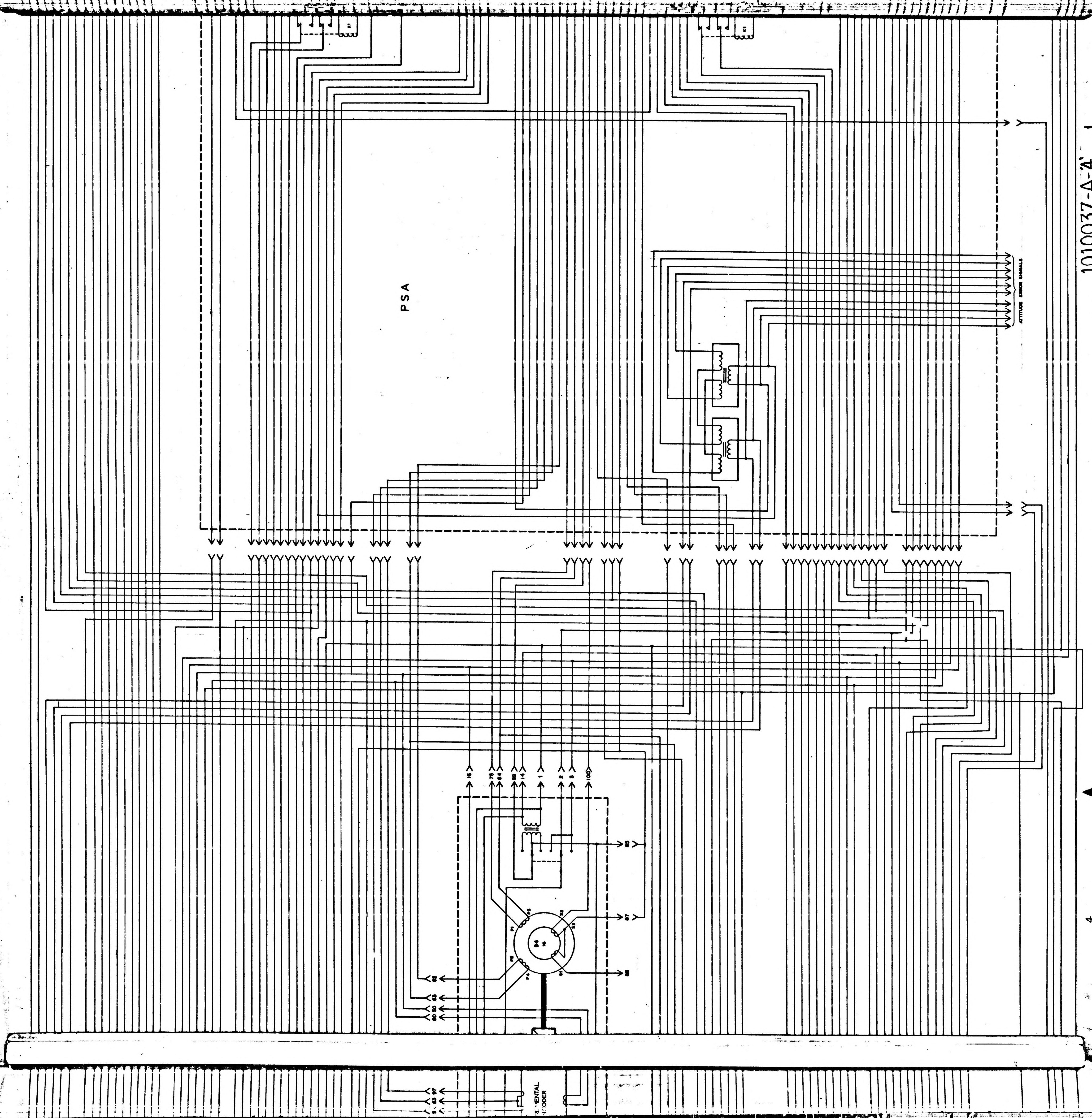
1010037-A-'2' 1


SHIELD RETURN
25.6 KC
800 CPS 28V 5% ∠90°
800 CPS 28V 1% ∠0° HI LO
DC POWER SUPPLY +28 -28
K1
K2
K3
K4
K5
K6
CDU FAIL
CDU ZERO
TO MIDDLE GIMBAL TGA
MG DAC 1010041 CONT IN OUT 800 +28
800 CPS GIMBAL SERVO ELECTRONICS
MG MDA 1010036 800 +28 OUT IN LO
ENCODER ELECTRONICS 25.6 KC 1010034 IN OUT +28
SELECTOR ELECTRONICS 1010128 ½X 16X 1X LO

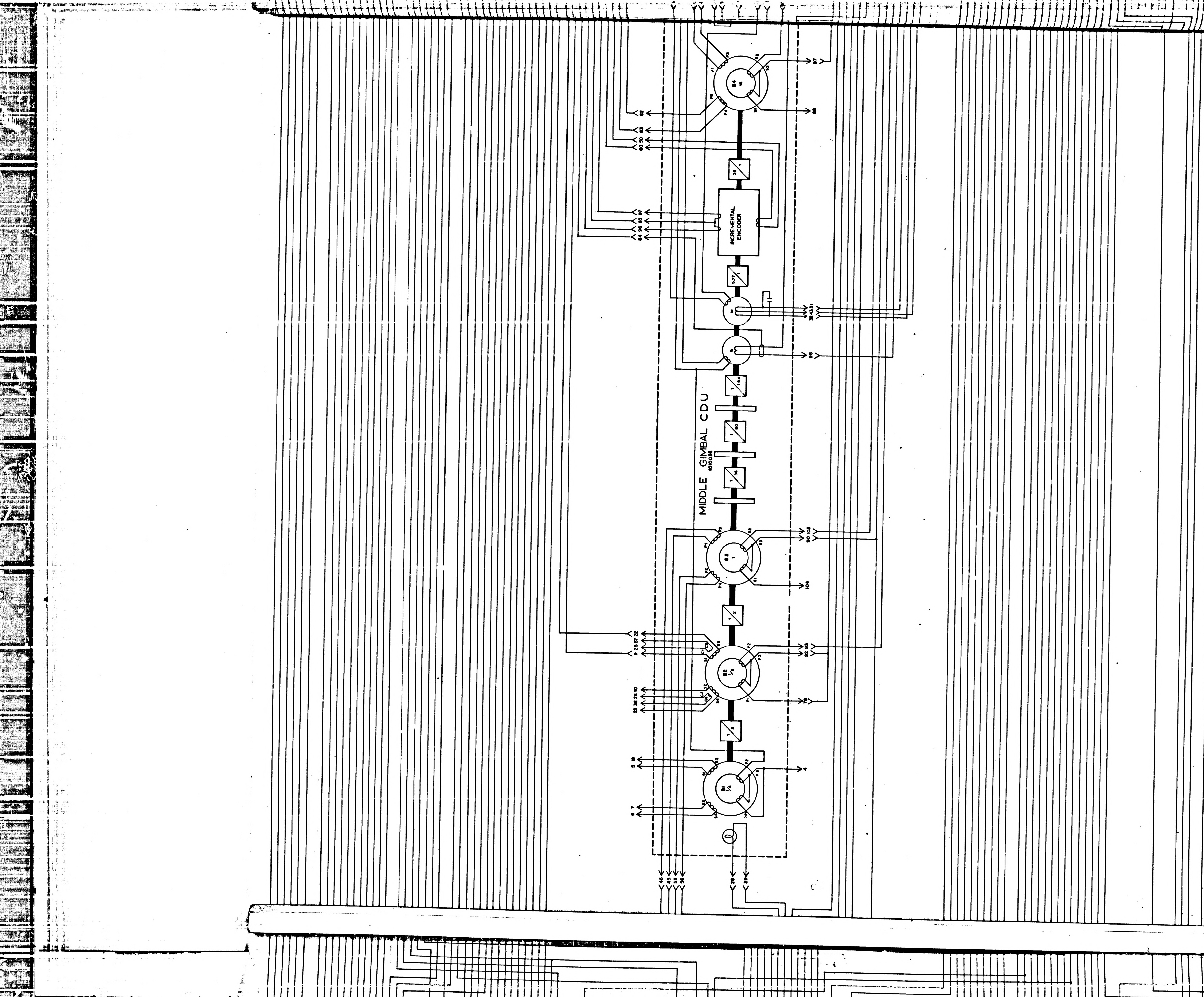
1010037-A-'3'

2


ENCODER ELECTRONICS 25.6 KC 1010034
IN
OUT
+28
SELECTOR ELECTRONICS 1010128
½ X
16 X
1 X
LO
OG MDA 1010036
IN
OUT
LO
F
-28
800
OG DAC 1010041
OUT
IN
CONT
800
-28
800 CPS GIMBAL SERVO ELECTRONICS
TO OUTER GIMBLE TDA
K1
K2
K4
ENCODER ELECTRONICS 25.6 KC 1010034
SELECTOR ELECTRONICS 1010128
IG MDA 1010036
IG DAC 1010041
800 CPS GIMBAL SERVO ELECTRONICS
TO INNER GIMBAL TDA
K1
K2
K4
ENCODER ELECTRONICS 25.6 KC 1010034
SELECTOR ELECTRONICS 1010128
1
3

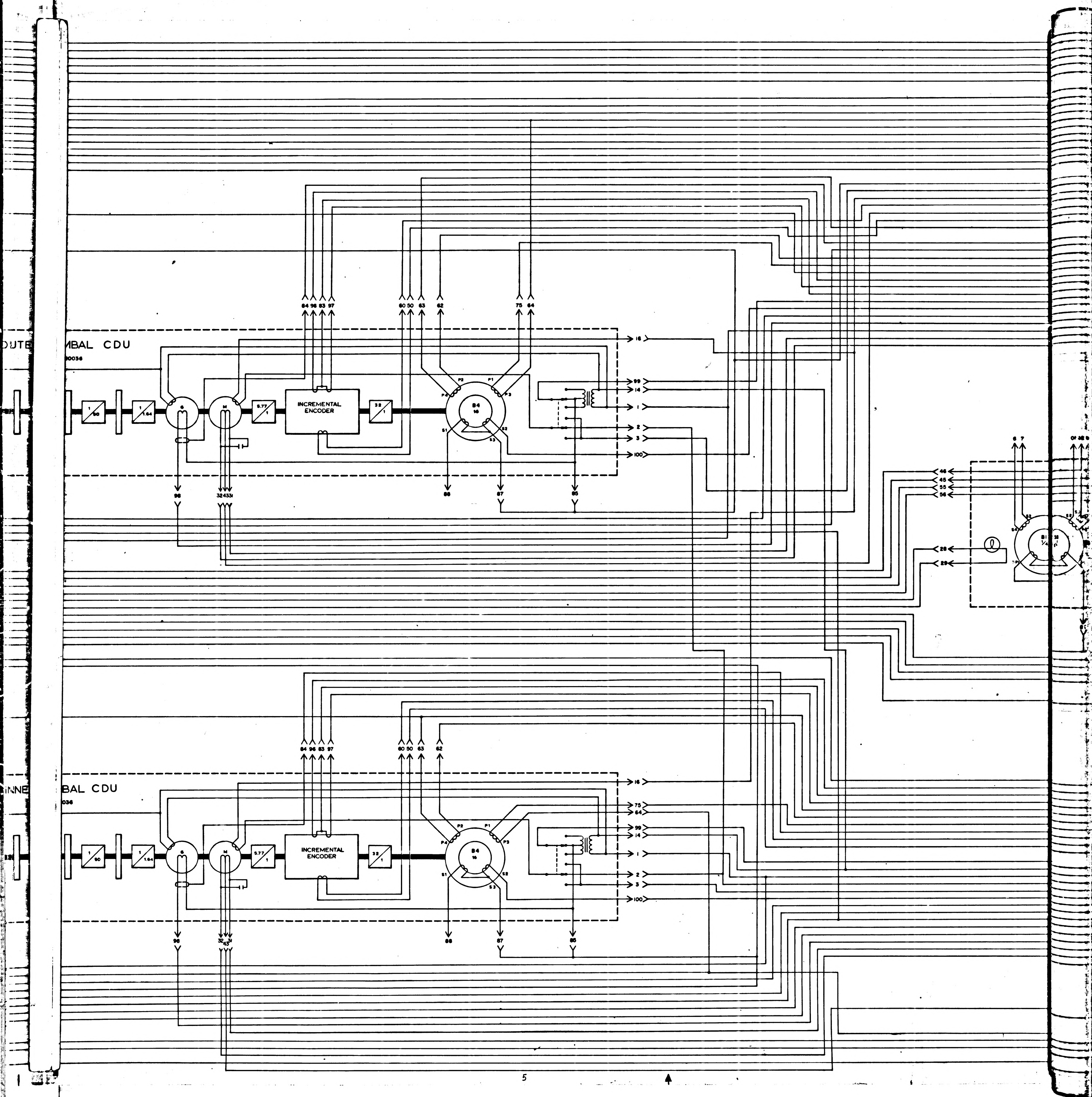

PSA
ATTITUDE ERROR SIGNALS
16
75
64
99
14
1
2
3
100
95
97
98
62
63
50
60
P1
P2
P3
P4
S1
S2
S3
B4
K1
K1
97
83
RE MENTAL
NCODER
1
4

1010037-A-4


MIDDLE GIMBAL CDU
1010036
INCREMENTAL ENCODER
B1
B2
B3
B4
S1
S2
S3
S4
P1
P2
P3
P4
4
5 19
6 7
78
92 93
104
90 103
98
32 43 31
87
88
62
63
60 50
84 96 83 97
9 25 37 22
23 38 26 10
46 45 55 56
28 29

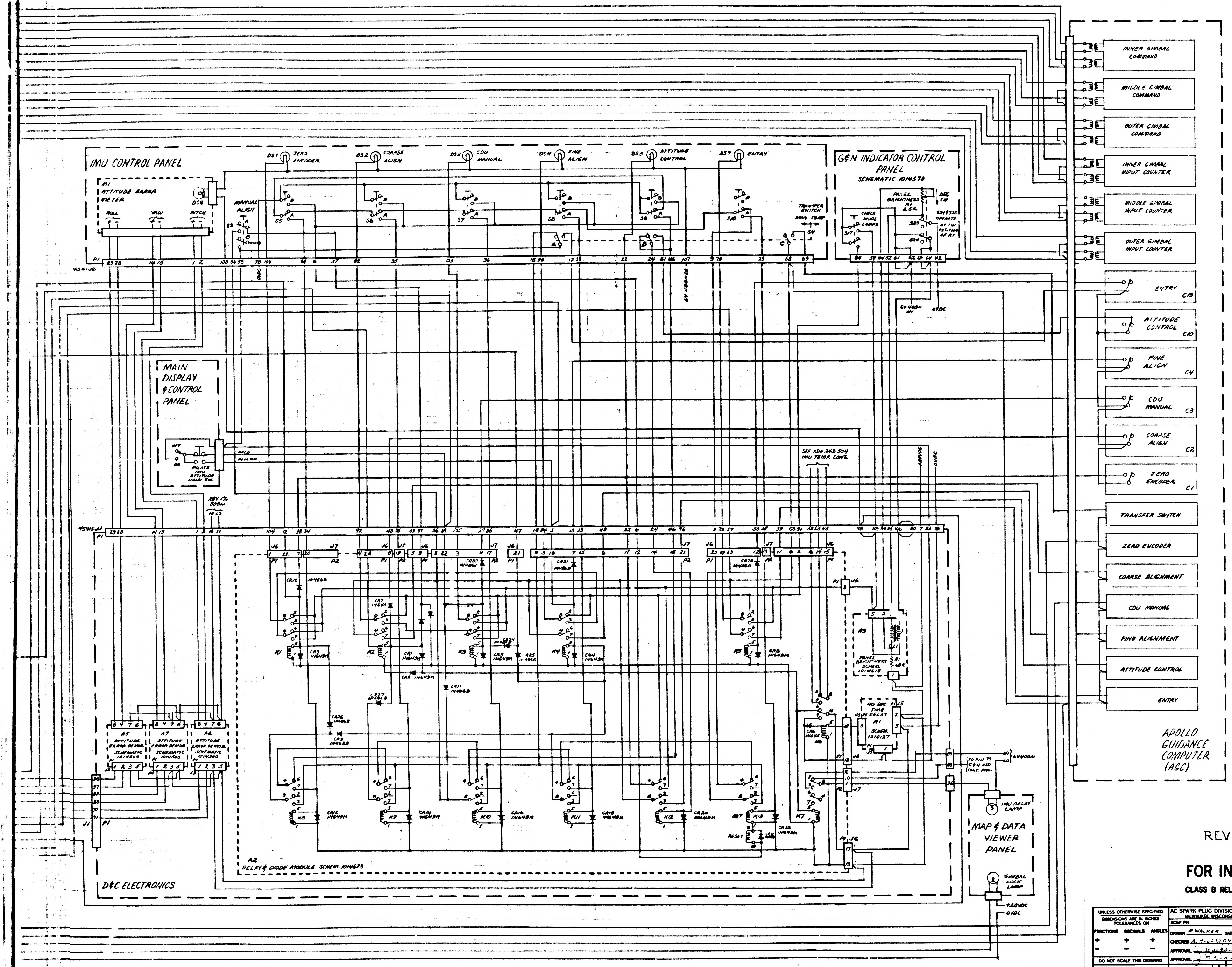
4

1010037-A-5



OUTE[ ]MBAL CDU
0036
INNE[ ]BAL CDU
036
1 / 50
1 / 1.64
G
M
5.77 / 1
INCREMENTAL ENCODER
32 / 1
B4 16
P1
P2
P3
P4
S1
S2
S3
84 96 83 97
60 50 63 62
75 64
16
99
14
1
2
3
100
86
87
85
96
32 43 31
46
45
55
56
28
29
6 7
5

SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH SYSTEM CHANGES -TDR	3 June 63	


IMU CONTROL PANEL
M1 ATTITUDE ERROR METER
ROLL
YAW
PITCH
DS6
DS1 ZERO ENCODER
DS2 COARSE ALIGN
DS3 CDU MANUAL
DS4 FINE ALIGN
DS5 ATTITUDE CONTROL
DS7 ENTRY
MANUAL ALIGN
S3
S5
S6
S7
S8
S9
S10
TRANSFER SWITCH
MAN COMP
S4
G&N INDICATOR CONTROL PANEL
SCHEMATIC 1014579
CHECK MODE LAMPS
S17
PANEL BRIGHTNESS R1 2.5K
DEC CW
S24 & S25 OPERATE AT CW POSITION OF R1
S25
S24
6V 400~ HI
0VDC
MAIN DISPLAY & CONTROL PANEL
OFF
ON
PILOTS IMU ATTITUDE HOLD SW.
HOLD
FOLLOW
28V 1% 800~
SEE XDE 34D 504 IMU TEMP. CONT.
+28VDC
0VDC
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
K1
K2
K3
K4
K5
K6
K7
K8
K9
K10
K11
K12
K13
SET
RESET
A3
PANEL BRIGHTNESS SCHEM. 1014618
R1 40K
L1
40 SEC. TIME DELAY A1 SCHEM. 1010127
TO P11 73 G&N IND. CONT. PNL.
6V400~
HI
LO
A2
RELAY & DIODE MODULE SCHEM. 1014623
D&C ELECTRONICS
MAP & DATA VIEWER PANEL
IMU DELAY LAMP
GIMBAL LOCK LAMP
INNER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
OUTER GIMBAL COMMAND
INNER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
OUTER GIMBAL INPUT COUNTER
ENTRY C13
ATTITUDE CONTROL C10
FINE ALIGN C4
CDU MANUAL C3
COARSE ALIGN C2
ZERO ENCODER C1
TRANSFER SWITCH
ZERO ENCODER
COARSE ALIGNMENT
CDU MANUAL
FINE ALIGNMENT
ATTITUDE CONTROL
ENTRY
APOLLO GUIDANCE COMPUTER (AGC)

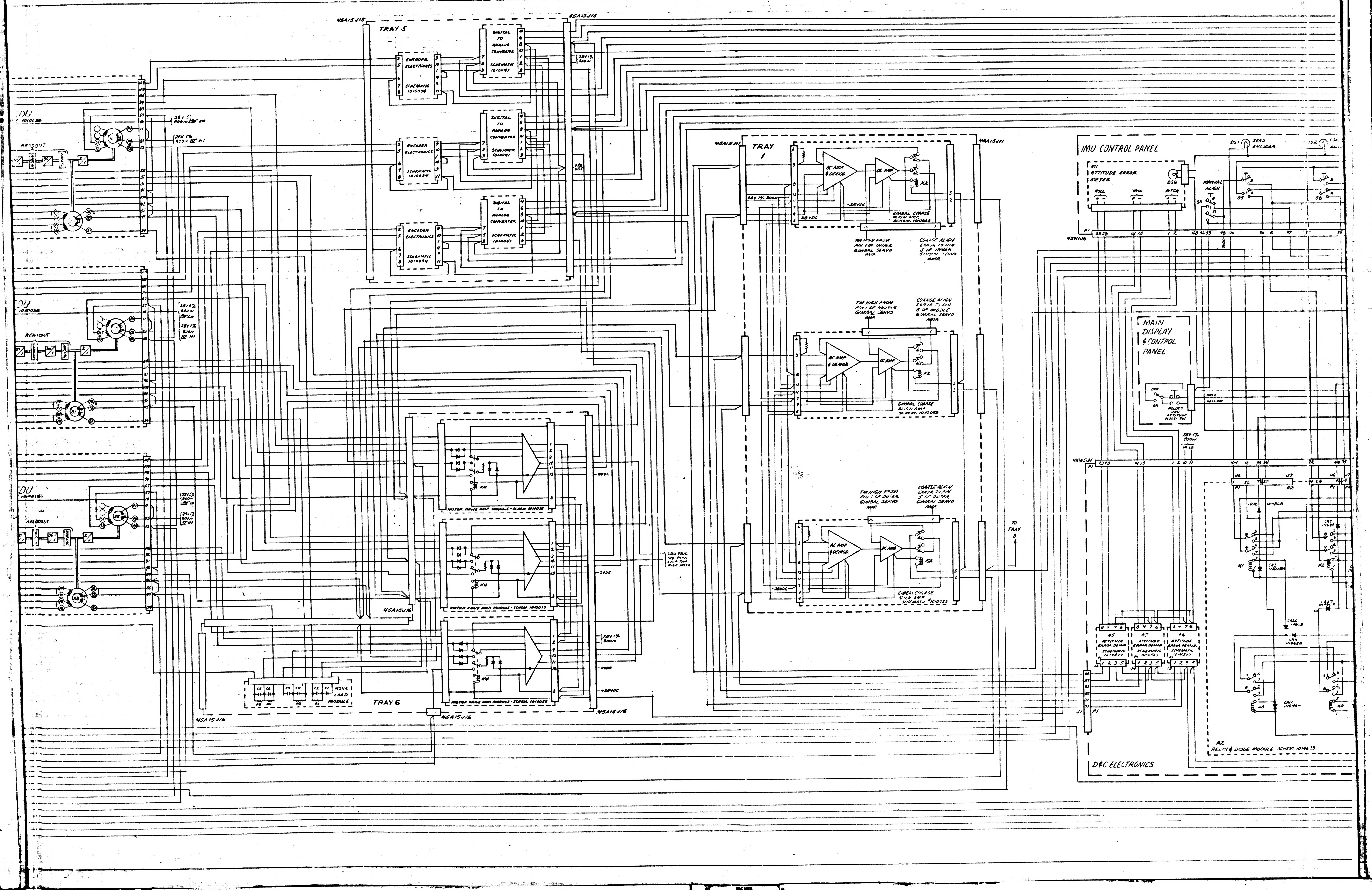
REV C REPLACES REV B.

FOR INFORMATION ONLY

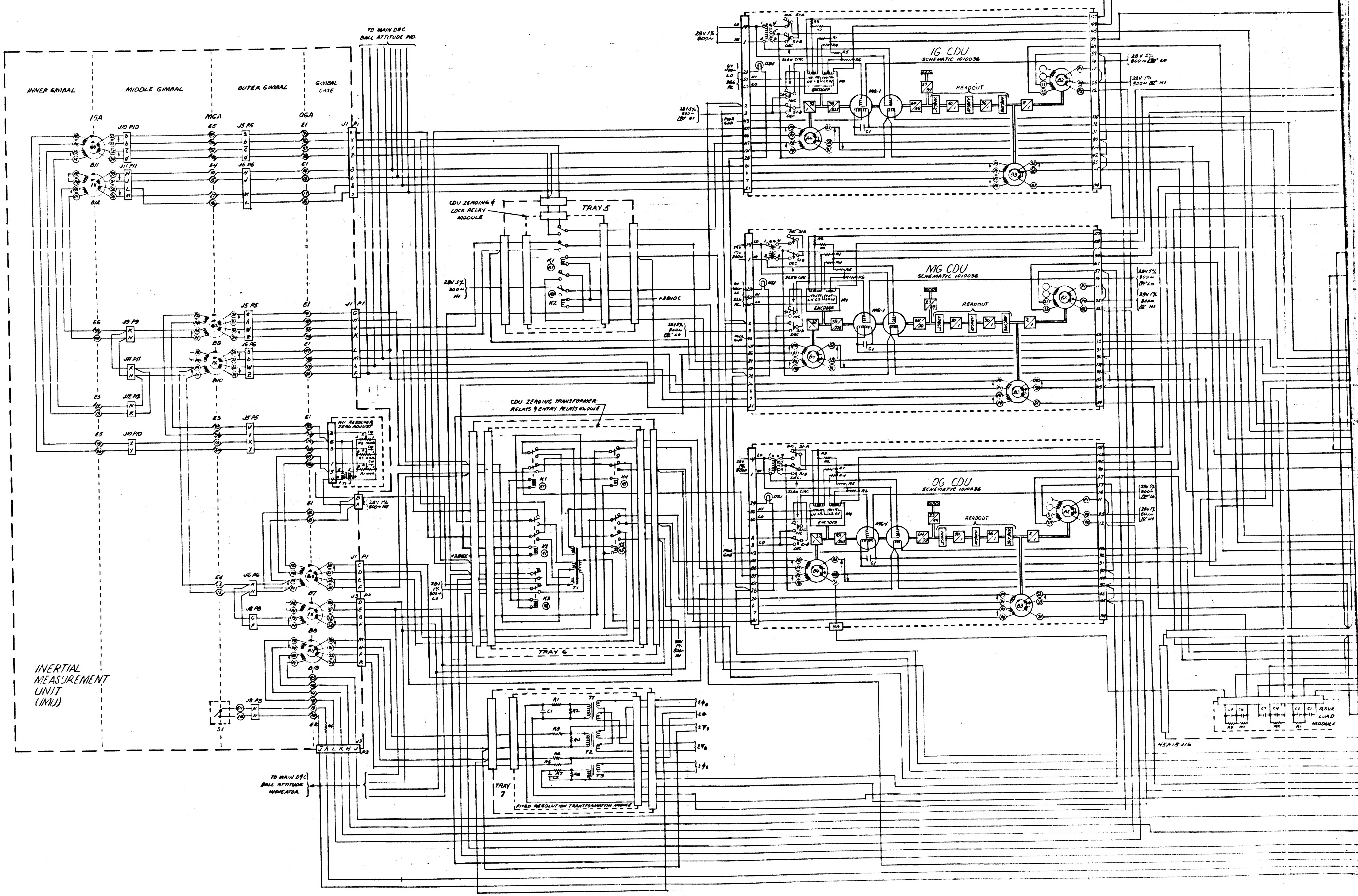
CLASS B RELEASE TDR No. 01433 DATE 6/5/63

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES + + + − − −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	ACSP PN	
	DRAWN R. WALKER DATE 6-4-63 CHECKED A. ALDERSON APPROVAL APPROVAL	APOLLO IMU/CDU MODING MECHANIZATION DRAWING
DO NOT SCALE THIS DRAWING		
MATERIAL	NASA APPROVAL	CODE IDENT NO. SIZE 1,010,037
CONTRACT	MIT APPROVAL 5 June 63	SCALE SHEET

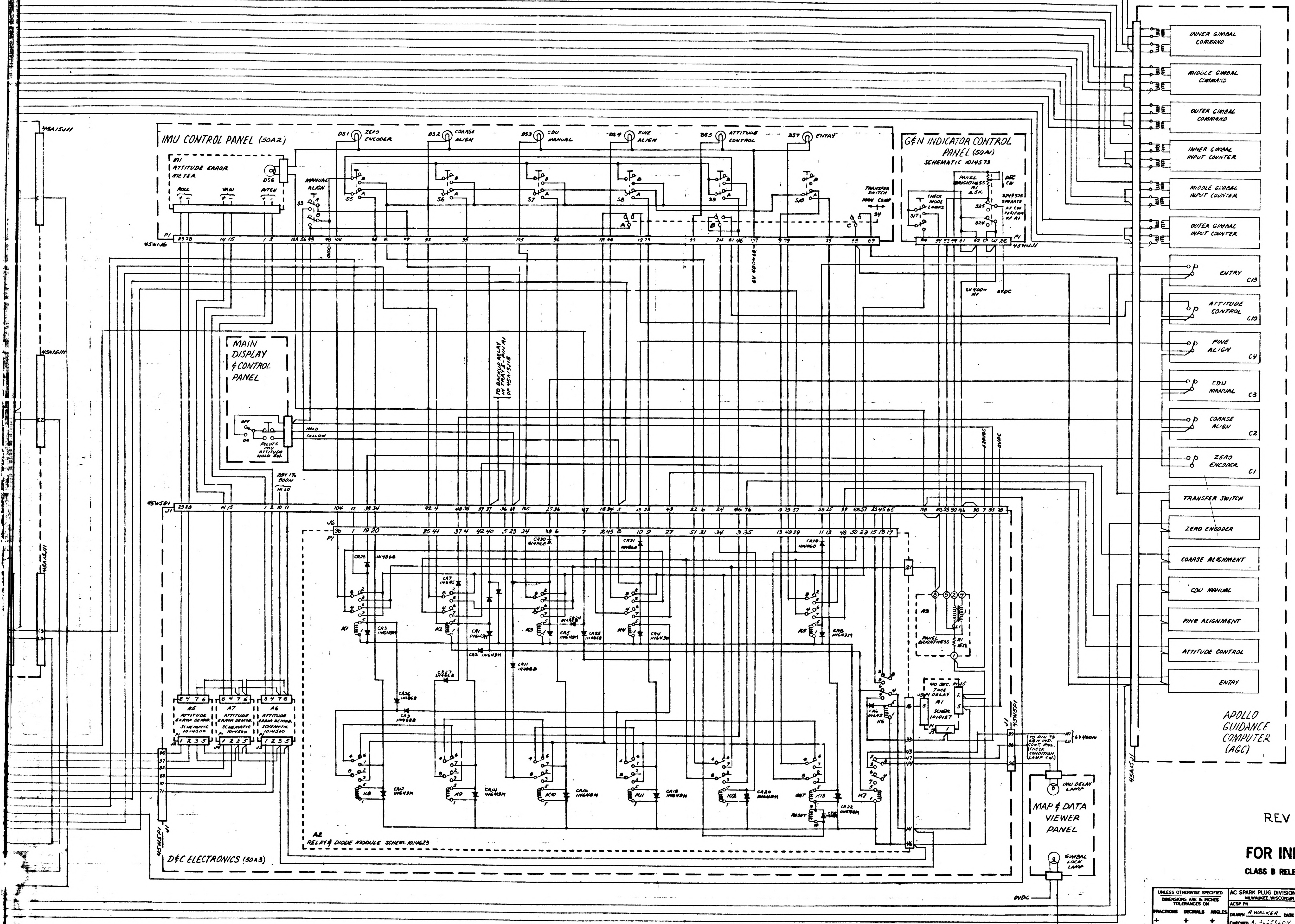
MASTER


45A15J15
TRAY 5
ENCODER ELECTRONICS
SCHEMATIC 1010034
DIGITAL TO ANALOG CONVERTER
SCHEMATIC 1010041
28V 1% 800~
+28 VDC
CDU
READOUT
28V 1% 800~ HI
28V 5% 800~ LO
45A15J11
TRAY 1
AC AMP & DEMOD.
DC AMP
K2
28V 1% 800~
-28VDC
28VDC
GIMBAL COARSE ALIGN AMP. SCHEM. 1010023
TM HIGH FROM PIN 1 OF INNER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF INNER GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF MIDDLE GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF MIDDLE GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF OUTER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF OUTER GIMBAL SERVO AMP.
GIMBAL COARSE ALIGN AMP SCHEMATIC #1010023
TO TRAY 5
MOTOR DRIVE AMP. MODULE - SCHEM. 1010035
K4
0VDC
+28VDC
CDU FAIL SEE PIPA LOOP TWO WIRE MECH
RSVR LOAD MODULE
C5 C6 C3 C4 C2 C1
R3 R4 R2 R1
TRAY 6
45A15J16
45A16J16
IMU CONTROL PANEL
M1 ATTITUDE ERROR METER
ROLL
YAW
PITCH
DS6
DS1 ZERO ENCODER
DS2
MANUAL ALIGN
S3
S5
S6
P1
45W1J6
0VDC
MAIN DISPLAY & CONTROL PANEL
OFF
ON
PILOTS IMU ATTITUDE HOLD SW.
HOLD
FOLLOW
28V 1% 800~
HI LO
45W5J1
J6
J7
P2
CR28 1N486B
CR7 1N645
K1
K2
CR3 1N645M
CR27 1N486B
CR26 1N486B
CR9 1N468B
CR12 1N645M
K3
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
J2
J3
J1
A2 RELAY & DIODE MODULE SCHEM 1014633
D&C ELECTRONICS

INCHES
PHOTOGRAPHIC SCALE ONLY


TO MAIN D&C BALL ATTITUDE IND.
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
GIMBAL CASE
IGA
MGA
OGA
B11
B12
J10 P10
J11 P11
J5 P5
J6 P6
E5
E4
E1
J1 P1
E6
J9 P9
J12 P12
B9
B10
B7
B8
B13
A11 RESOLVER ZERO ADJUST
28V 1% 800~ HI
J8 P8
J3 P3
S1
INERTIAL MEASUREMENT UNIT (IMU)
TO MAIN D&C BALL ATTITUDE INDICATOR
CDU ZEROING & LOCK RELAY MODULE
TRAY 5
K1
K2
28V 5% 800~ HI
+28VDC
28V 5% 800~ 180° LO
CDU ZEROING TRANSFORMER RELAYS & ENTRY RELAYS MODULE
K3
K4
T1
TRAY 6
28V 1% 800~ HI
TRAY 7
FIXED RESOLUTION TRANSFORMATION MODULE
R1
R2
R3
R4
R5
R6
R7
R8
C1
C2
T2
T3
EΦB
EΘ
EΨS
EΨB
EΦS
IG CDU
SCHEMATIC 1010036
MG CDU
SCHEMATIC 1010036
OG CDU
SCHEMATIC 1010036
28V 1% 800~
6V 400~ LO
25.6 KC
28V 5% 800~ 180° HI
PWR GND
INC S1-A
S1-B DEC
SLEW CIRC
ENCODER
MG-1
DS1
READOUT
B2
B3
B4
28V 5% 800~ 180° LO
28V 1% 800~ 180° HI
RSVR LOAD MODULE
45A15J16
45A

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH SYSTEM CHANGES -TDRR 01433	5 JUN 63	WK
D	REVISED PER TDRR 01988	9/17/63	WK



IMU CONTROL PANEL (50A2)
M1 ATTITUDE ERROR METER
ROLL
YAW
PITCH
DS6
DS1 ZERO ENCODER
DS2 COARSE ALIGN
DS3 CDU MANUAL
DS4 FINE ALIGN
DS5 ATTITUDE CONTROL
DS7 ENTRY
MANUAL ALIGN
S3
S5
S6
S7
S8
S9
S10
TRANSFER SWITCH
MAN COMP
S4
G&N INDICATOR CONTROL PANEL (50A1)
SCHEMATIC 1014579
CHECK MODE LAMPS
S11
PANEL BRIGHTNESS
R1
S24
S25
6V 400~ H1
6VDC
45W1J6
45W1J1
45A15J11
MAIN DISPLAY & CONTROL PANEL
OFF
ON
PILOTS IMU ATTITUDE HOLD SW.
HOLD
FOLLOW
TO BACKUP RELAY
28V 1ϕ 800~
28VDC
0VDC
45W5P1
J1
J6
P1
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
K1
K2
K3
K4
K5
K6
K7
K8
K9
K10
K11
K12
K13
SET
RESET
1N4868
1N458M
A3 PANEL BRIGHTNESS
R1 15Ω
40 SEC. TIME DELAY A1 SCHEM. 1010127
A2 RELAY & DIODE MODULE SCHEM. 1014623
D&C ELECTRONICS (50A3)
45W5P1
TO PIN 73 G&N IND. CONT. PNL. (CHECK CONDITION LAMP SW.)
6V 400~
IMU DELAY LAMP
MAP & DATA VIEWER PANEL
GIMBAL LOCK LAMP
0VDC
INNER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
OUTER GIMBAL COMMAND
INNER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
OUTER GIMBAL INPUT COUNTER
ENTRY C13
ATTITUDE CONTROL C10
FINE ALIGN C4
CDU MANUAL C3
COARSE ALIGN C2
ZERO ENCODER C1
TRANSFER SWITCH
ZERO ENCODER
COARSE ALIGNMENT
CDU MANUAL
FINE ALIGNMENT
ATTITUDE CONTROL
ENTRY
APOLLO GUIDANCE COMPUTER (AGC)
45A15J11

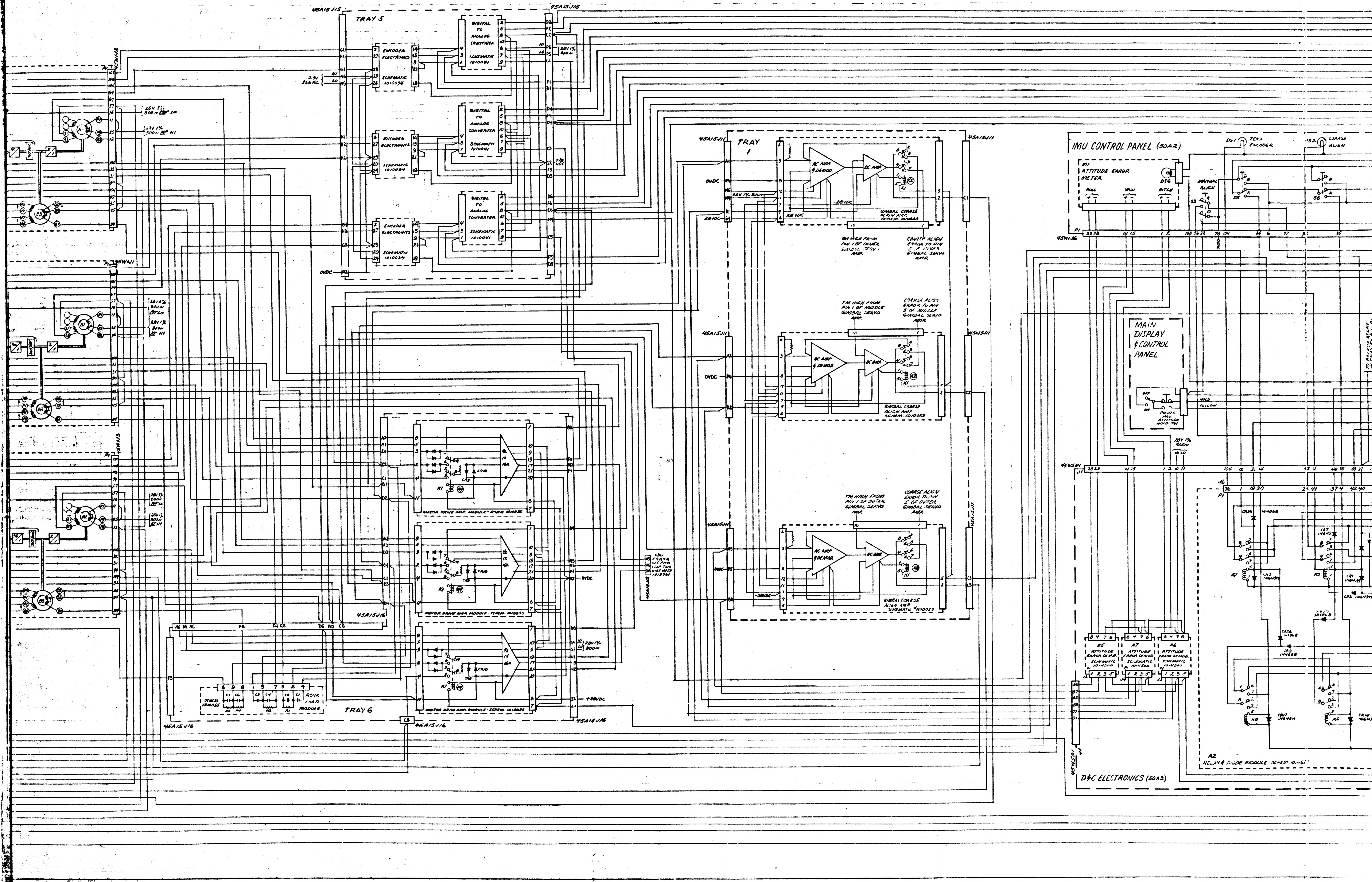
REV C REPLACES REV B.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01433 **DATE** 6/5/63

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES + + + − − −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	DRAWN R. WALKER DATE 6/4/63 CHECKED A. ALDERSON APPROVAL APPROVAL	APOLLO IMU/CDU MODING MECHANIZATION DRAWING
MATERIAL	NASA APPROVAL	CODE IDENT NO. SIZE 1,010,037
CONTRACT	MIT APPROVAL 5 Jun 63	SCALE SHEET

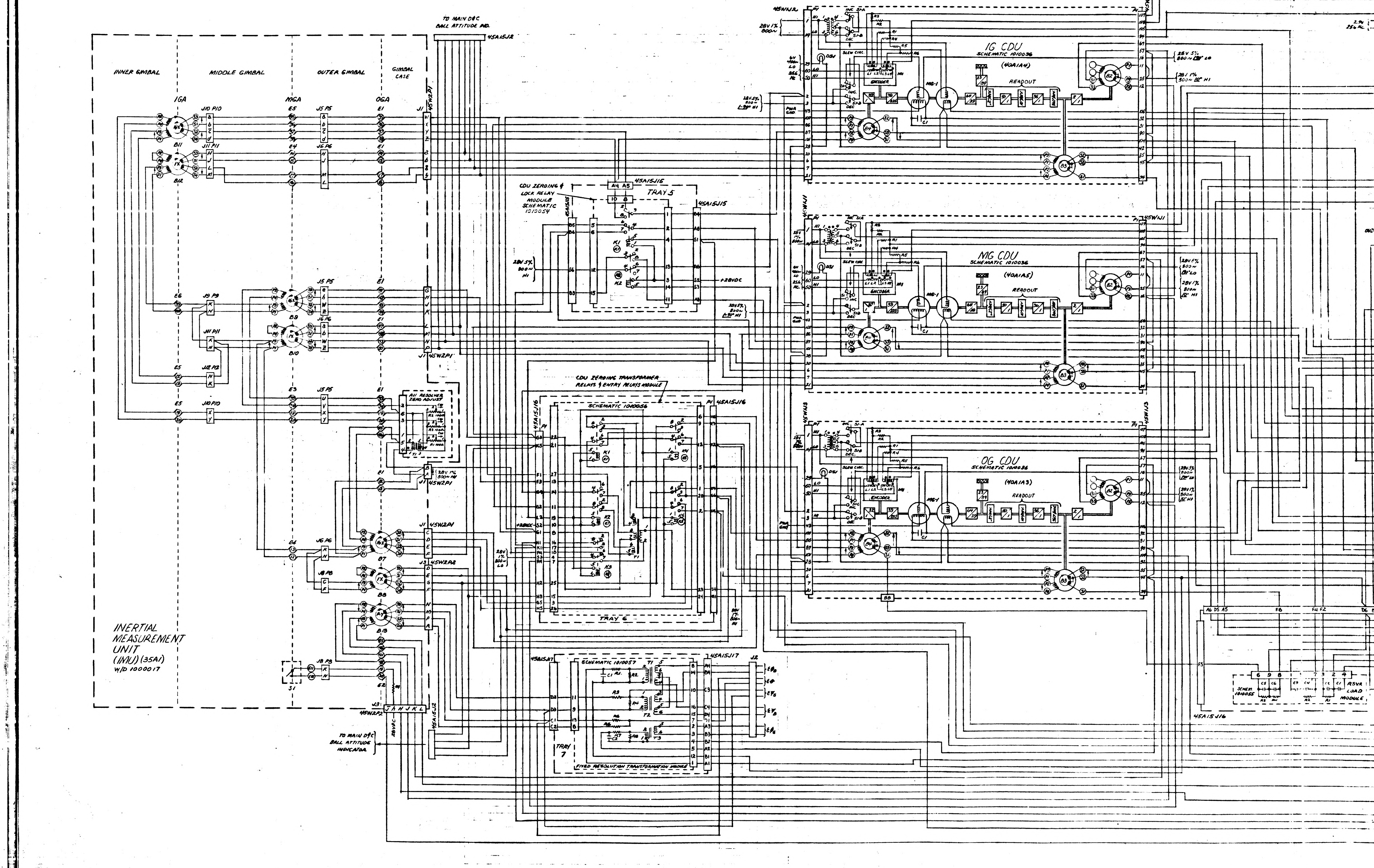
MASTER


45A15J15
TRAY 5
ENCODER ELECTRONICS
SCHEMATIC 1010034
DIGITAL TO ANALOG CONVERTER
SCHEMATIC 1010041
2.5V 25.6 Kc.
HI
LO
28V 1% 800~
+28 VDC
0VDC
45W1J2
45W1J1
28V 5% 800~ 0° LO
28V 1% 800~ 0° HI
TRAY 1
45A15J11
AC AMP. & DEMOD.
DC AMP.
28V 1% 800~
-28VDC
28VDC
0VDC
GIMBAL COARSE ALIGN AMP. SCHEM. 1010023
TM HIGH FROM PIN 1 OF INNER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF INNER GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF MIDDLE GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF MIDDLE GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF OUTER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF OUTER GIMBAL SERVO AMP.
K1
K2
CDU ERROR SEE PIPA LOOP TWO WIRE MECH 1015561
45A15J12
MOTOR DRIVE AMP. MODULE - SCHEM. 1010035
1/2 1X 16X
CR9
CR10
45A15J16
45A16J16
28V 1% 800~
+28VDC
0VDC
SCHEM. 1010055
RSVR LOAD MODULE
TRAY 6
IMU CONTROL PANEL (50A2)
M1 ATTITUDE ERROR METER
ROLL
YAW
PITCH
DS6
DS1 ZERO ENCODER
DS2 COARSE ALIGN
MANUAL ALIGN
S3
S5
S6
P1
45W1J6
MAIN DISPLAY & CONTROL PANEL
OFF
ON
HOLD
FOLLOW
PILOTS IMU ATTITUDE HOLD SW.
28V 1% 800~
HI LO
45W5P1
J1
J6
P1
CR26 1N486B
CR27 1N486B
CR9 1N468B
CR3 1N649M
CR1 1N649M
CR2 1N649M
CR12 1N649M
CR14 1N649M
K8
K9
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
J2
J3
J4
A2
RELAY & DIODE MODULE SCHEM 10146
D&C ELECTRONICS (50A3)
45W5P1 J1
TO BACKUP RELAY

INCHES
PHOTOGRAPHIC SCALE ONLY

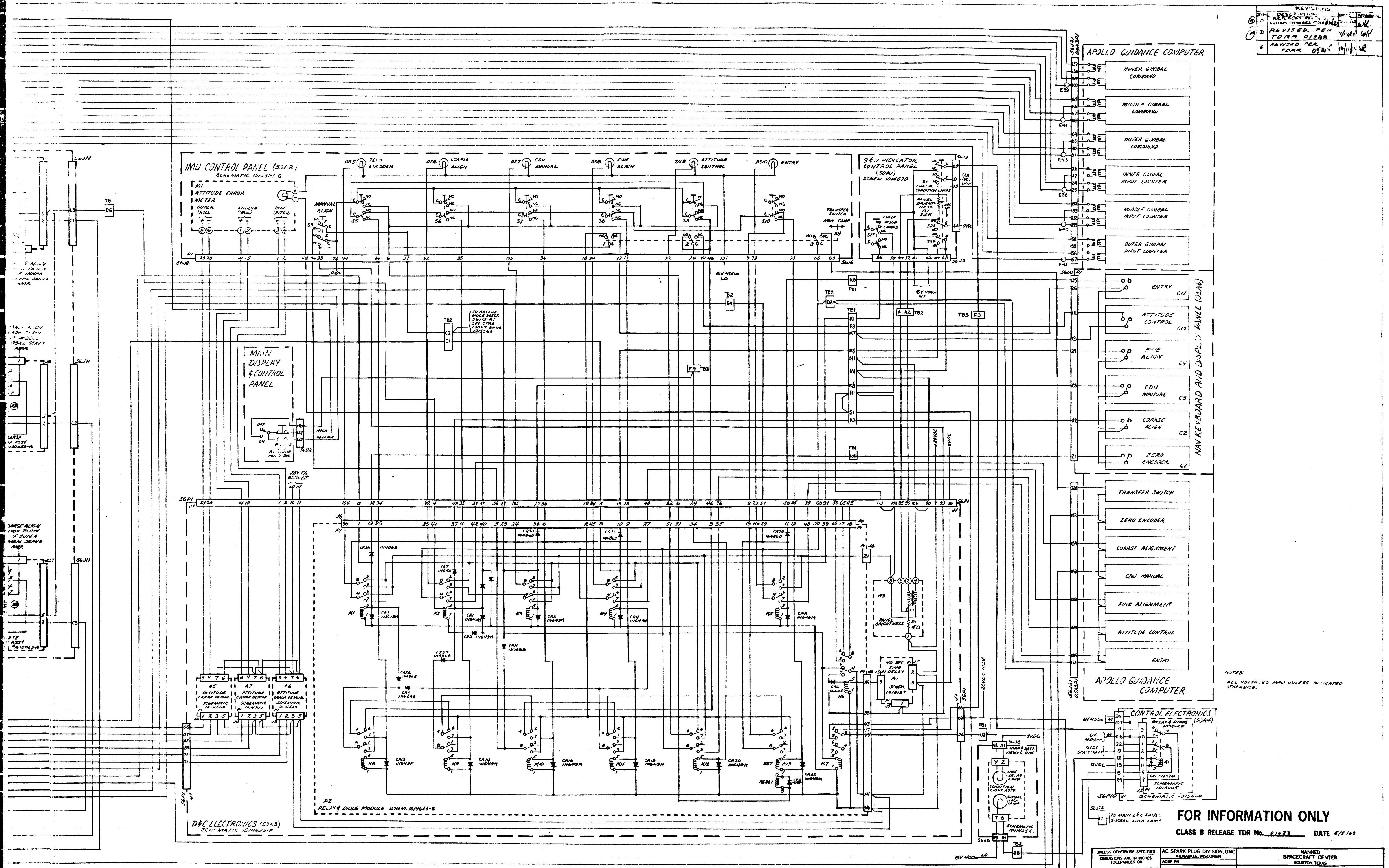
F-2

1010037


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
GIMBAL CASE
IGA
MGA
OGA
B11
B12
B7
B8
B9
B10
B13
J10 P10
J11 P11
J5 P5
J6 P6
J9 P9
J12 P12
J8 P8
J1 45W2P1
J3 45W2P2
S1
INERTIAL MEASUREMENT UNIT (IMU) (35A1)
W/D 1000017
A11 RESOLVER ZERO ADJUST
28V 1% 800~
TO MAIN D&C BALL ATTITUDE IND.
45A15J2
TO MAIN D&C BALL ATTITUDE INDICATOR
28VDC
CDU ZEROING & LOCK RELAY MODULE SCHEMATIC 1010054
45A15J15
TRAY 5
K1
K2
28V 5% 800~ HI
+28VDC
CDU ZEROING TRANSFORMER RELAYS & ENTRY RELAYS MODULE
SCHEMATIC 1010056
45A15J16
K3
K4
K5
T1
TRAY 6
28V 1% 800~ LO
28V 1% 800~ HI
45A15J17
SCHEMATIC 1010057
T2
T3
TRAY 7
FIXED RESOLUTION TRANSFORMATION MODULE
J2
$E\phi_D$
$E\theta$
$E\psi_S$
$E\psi_D$
$E\phi_S$
45W1J2
IG CDU
SCHEMATIC 1010036
(40A1A4)
45W1J1
MG CDU
SCHEMATIC 1010036
(40A1A5)
45W1J3
OG CDU
SCHEMATIC 1010036
(40A1A3)
INC S1A
S1B
DEC
SLEW CIRC.
DS1
ENCODER
MG-1
READOUT
B2
B3
B4
C1
28V 1% 800~
6V 400~ LO
256 KC
28V 5% 800~ -90° HI
PWR GND
28V 5% 800~ LO
28V 1% 800~ HI
A6 D5 A5
F6
F4 F2
D6
F5
SCHEM. 1010055
RSVR LOAD MODULE
45A15J16

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH SYSTEM CHANGES TDRR 01433	5 [illegible] 63	WK
D	REVISED PER TDRR 01988	7/17/63	WK
E	REVISED PER TDRR 05165	12/11/63	WK


APOLLO GUIDANCE COMPUTER
INNER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
OUTER GIMBAL COMMAND
INNER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
OUTER GIMBAL INPUT COUNTER
IMU CONTROL PANEL (5DA2)
SCHEMATIC 1014534-6
ATTITUDE ERROR METER
DS5 ZERO ENCODER
DS6 COARSE ALIGN
DS7 CDU MANUAL
DS8 FINE ALIGN
DS9 ATTITUDE CONTROL
DS10 ENTRY
MANUAL ALIGN
TRANSFER SWITCH
G&N INDICATOR CONTROL PANEL (5DA1)
SCHEM. 1014679
CHECK MODE LAMPS
PANEL BRIGHTNESS
NAV KEYBOARD AND DISPLAY PANEL (5DA6)
ENTRY
ATTITUDE CONTROL
FINE ALIGN
CDU MANUAL
COARSE ALIGN
ZERO ENCODER
TRANSFER SWITCH
ZERO ENCODER
COARSE ALIGNMENT
CDU MANUAL
FINE ALIGNMENT
ATTITUDE CONTROL
ENTRY
APOLLO GUIDANCE COMPUTER
MAIN DISPLAY & CONTROL PANEL
TO BACKUP MODE ELECT.
ATTITUDE ERROR DEMOD.
SCHEMATIC 1014500
D&C ELECTRONICS (5DA3)
SCHEMATIC 1014622-F
A2 RELAY & DIODE MODULE SCHEM. 1014623-6
A3 PANEL BRIGHTNESS
40 SEC. TIME DELAY
CONTROL ELECTRONICS (5DA4)
RELAY & DIODE MODULE
SCHEMATIC 1015005
56P10 J1 SCHEMATIC 1015004
56J22 TO MAIN D&C PANEL GIMBAL LOCK LAMP
IMU DELAY LAMP
CONDITION LIGHT ASSY.
GIMBAL LOCK LAMP
6V 400~ LO
28V DC
0VDC

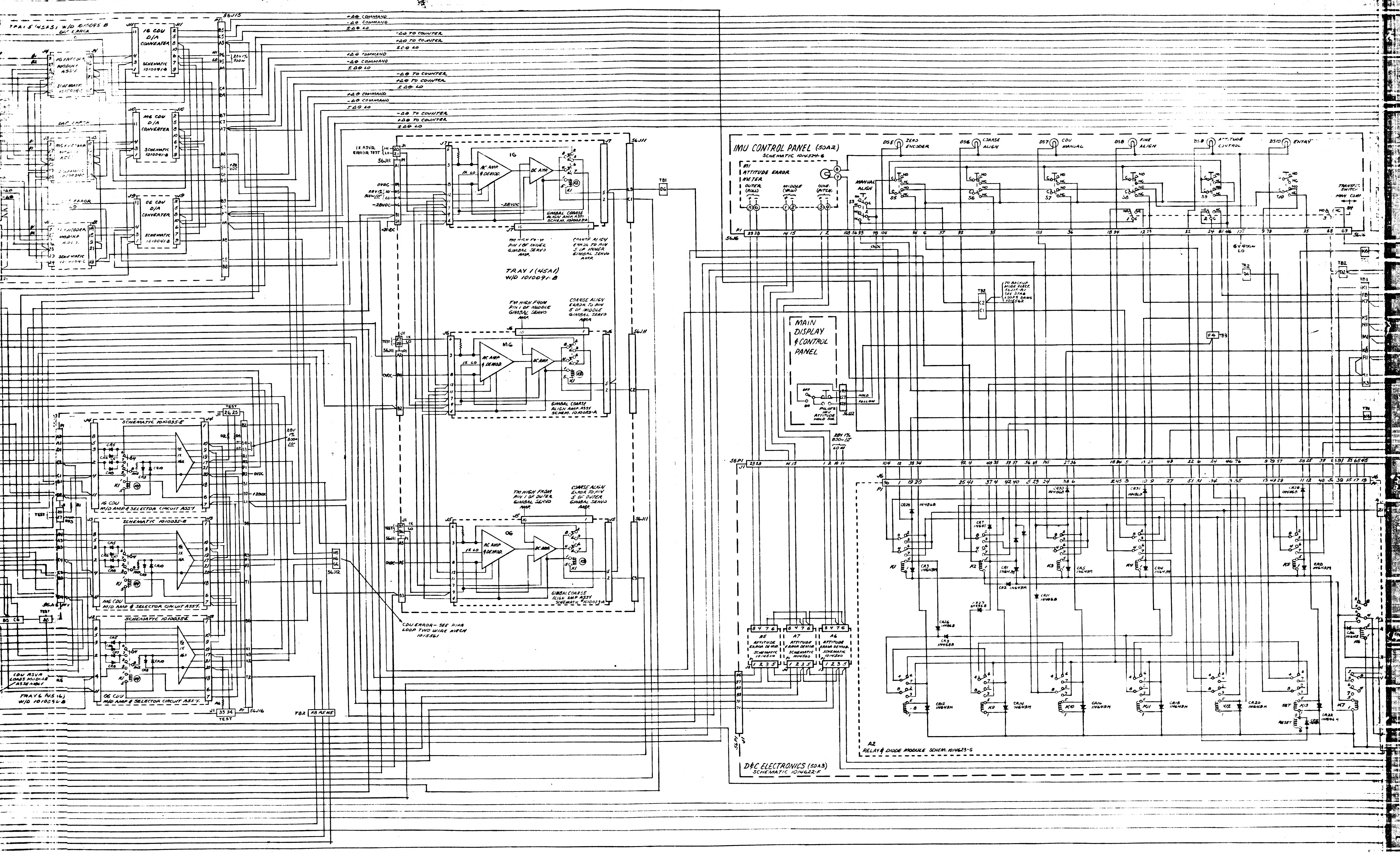
NOTES:
ALL VOLTAGES IMU UNLESS INDICATED OTHERWISE.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01433 DATE 6/5/63

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	ACSP PN	
	DRAWN R WALKER DATE [illegible] CHECKED [illegible] APPROVAL [illegible] APPROVAL [illegible]	APOLLO IMU/CDU MODING MECHANIZATION DRAWING
DO NOT SCALE THIS DRAWING		
MATERIAL	NASA APPROVAL [illegible] 6/63	CODE IDENT NO. / SIZE / [illegible]101[illegible]
CONTRACT	MIT APPROVAL [illegible] 63	SCALE / SHEET

PHOTOGRAPHIC SCALE ONLY
INCHES


TRAY 5 (45A5) W/D 1010095 B
DAC ERROR
1G ENCODER MODULE ASS'Y. SCHEMATIC 1010034-C
MG ENCODER MODULE ASS'Y SCHEMATIC 1010034-C
OG ENCODER MODULE ASS'Y. SCHEMATIC 1010034-C
1G CDU D/A CONVERTER SCHEMATIC 1010041-B
MG CDU D/A CONVERTER SCHEMATIC 1010041-B
OG CDU D/A CONVERTER SCHEMATIC 1010041-B
56J15
28V 1% 800~
+28 VDC
+Δθ COMMAND
-Δθ COMMAND
±Δθ LO
-Δθ TO COUNTER
+Δθ TO COUNTER
±Δθ LO
1X RSVR ERROR TEST HI LO
56J11
0VDC
28V 1% 800~ /0° HI LO
-28VDC
+28VDC
1G
AC AMP. & DEMOD.
DC AMP.
1X LO
GIMBAL COARSE ALIGN AMP. ASSY SCHEM. 1010023-A
TM HIGH FROM PIN 1 OF INNER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF INNER GIMBAL SERVO AMP.
TRAY 1 (45A1) W/D 1010091-B
TM HIGH FROM PIN 1 OF MIDDLE GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF MIDDLE GIMBAL SERVO AMP.
MG
TM HIGH FROM PIN 1 OF OUTER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF OUTER GIMBAL SERVO AMP.
OG
GIMBAL COARSE ALIGN AMP ASSY SCHEMATIC 1010023-A
TB1
SCHEMATIC 1010035-E
1G CDU M/D AMP & SELECTOR CIRCUIT ASS'Y
MG CDU M/D AMP & SELECTOR CIRCUIT ASS'Y.
OG CDU M/D AMP & SELECTOR CIRCUIT ASS'Y.
½ 1X 16X
TEST
56J16
56J12
CDU RSVR LOADS MODULE ASSEMBLY
TRAY 6 (45A6) W/D 1010096-B
TB2
CDU ERROR - SEE PIPA LOOP TWO WIRE MECH 1015561
IMU CONTROL PANEL (50A2)
SCHEMATIC 1014524-6
M1 ATTITUDE ERROR METER
OUTER (ROLL)
MIDDLE (YAW)
INNER (PITCH)
MANUAL ALIGN
DS5 ZERO ENCODER
DS6 COARSE ALIGN
DS7 CDU MANUAL
DS8 FINE ALIGN
DS9 ATTITUDE CONTROL
DS10 ENTRY
S3 S5 S6 S7 S8 S9 S10
TRANSFER SWITCH MAN COMP
S4
6V 400~ LO
TO BACKUP MODE ELECT. 56J15-R1 SEE STAB LOOPS DRWG 1015562
MAIN DISPLAY & CONTROL PANEL
OFF ON
HOLD
FOLLOW
PILOTS IMU ATTITUDE HOLD SW.
56J22
28V 1% 800~ /0° LO HI
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014500
D&C ELECTRONICS (50A3)
SCHEMATIC 1014622-F
A2
RELAY & DIODE MODULE SCHEM. 1014623-G
K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K13
CR12 1N649M
CR26 1N4868
CR27 1N4868
CR9 1N4688
SET
RESET

2

INCHES
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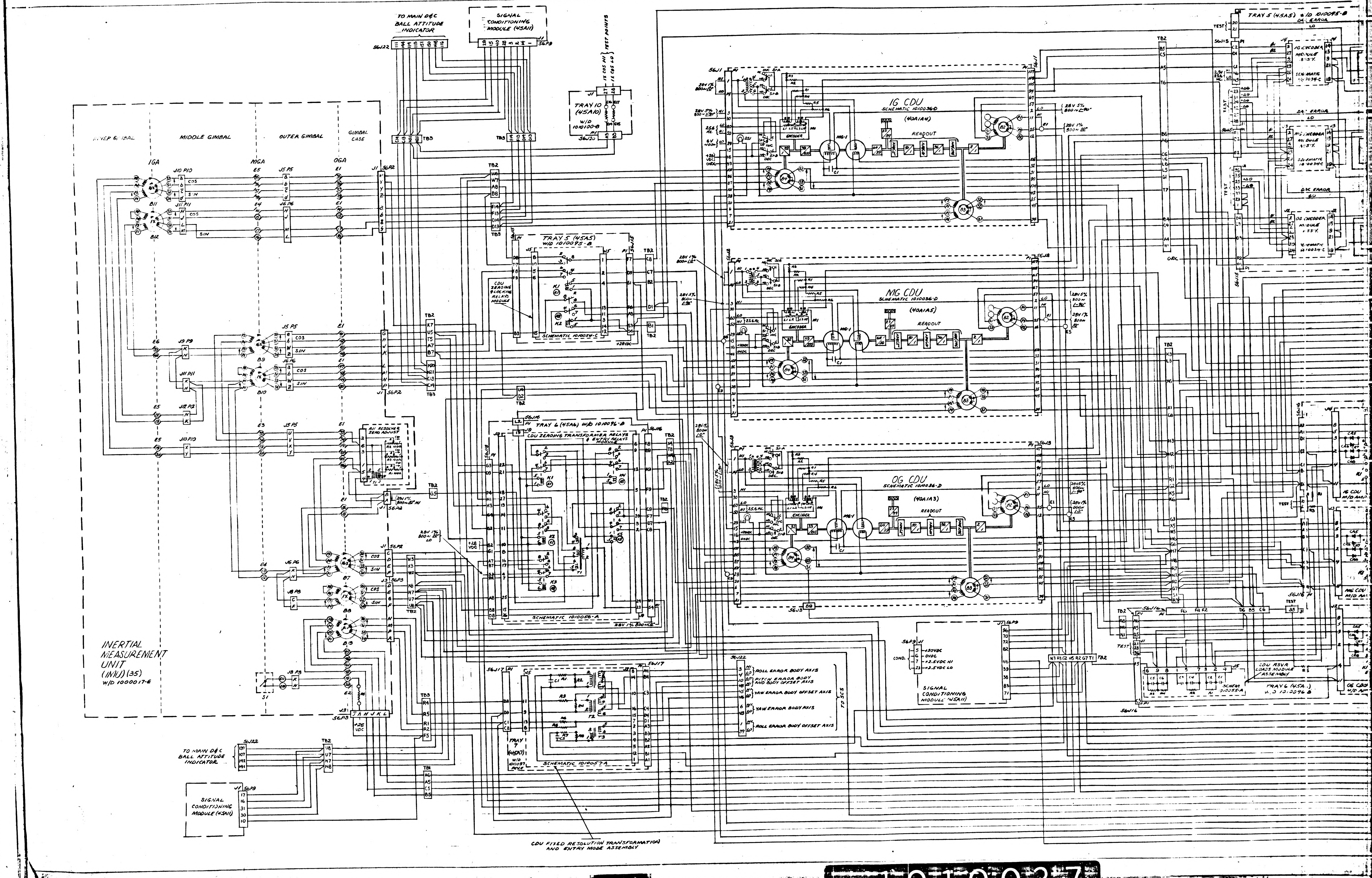
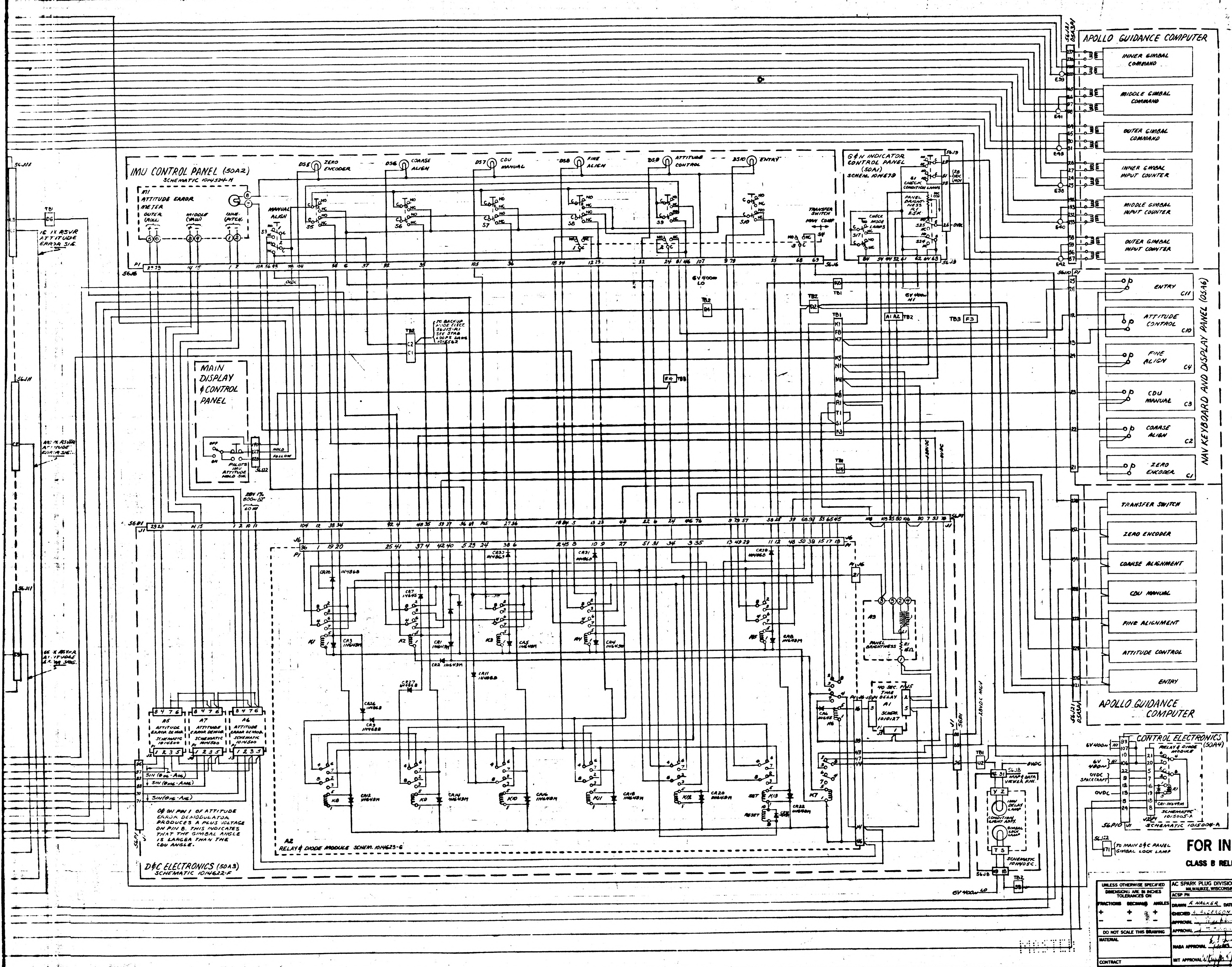

TO MAIN D&C BALL ATTITUDE INDICATOR
SIGNAL CONDITIONING MODULE (45A11)
TEST POINTS
TRAY 10 (45A10) W/D 1010100-B
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
GIMBAL CASE
IGA
MGA
OGA
TRAY 5 (45A5) W/D 1010095-B
CDU ZEROING & LOCKING RELAYS MODULE
SCHEMATIC 1010054-C
IG CDU
SCHEMATIC 1010036-D
(40A1A4)
MG CDU
SCHEMATIC 1010036-D
(40A1A5)
OG CDU
SCHEMATIC 1010036-D
(40A1A3)
READOUT
ENCODER
TRAY 6 (45A6) W/D 1010096-B
CDU ZEROING TRANSFORMER RELAYS & ENTRY RELAYS MODULE
SCHEMATIC 1010056-A
A11 RESOLVER ZERO ADJUST
INERTIAL MEASUREMENT UNIT (IMU) (35) W/D 1000017-E
TRAY 7 (45A7) W/D 1010097
SCHEMATIC 1010057A
CDU FIXED RESOLUTION TRANSFORMATION AND ENTRY MODE ASSEMBLY
ROLL ERROR BODY AXIS
PITCH ERROR BODY AND BODY OFFSET AXIS
YAW ERROR BODY OFFSET AXIS
YAW ERROR BODY AXIS
ROLL ERROR BODY OFFSET AXIS
TO SCS
SIGNAL CONDITIONING MODULE (45A11)
+20VDC
0VDC
+2.5VDC HI
+2.5VDC LO
COND.
IG ENCODER MODULE 16:3:5 Y
SCHEMATIC 1010034-C
MG ENCODER MODULE 16:3:5 Y
OG ENCODER MODULE 16:3:5 Y
DA ERROR
IG CDU M/D AMP
MG CDU M/D AMP
OG CDU M/D AMP
CDU RSVR LOADS MODULE ASSEMBLY
SCHEM 1010055A
TRAY 6 (45A6) W/D 1010096 B
TRAY 5 (45A5) W/D 1010095-B
TEST
28V 1% 800~ 0°
28V 5% 800~ -90°
+28 VDC
TB1
TB2
TB3
56J1
56J13
56J15
56J16
56J17
56J22
S1

1010037

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPR
C	REPLACES REV B WITH SYSTEM CHANGES TDRR 0142	5 ... 63	WK
D	REVISED PER TDRR 01988	7/17/63	WK
E	REVISED PER TDRR 05165	11/11/63	WK
F	REVISED PER TDRR 06210	2/4/64	LK



IMU CONTROL PANEL (50A2)
SCHEMATIC 1014524-H
ATTITUDE ERROR METER
OUTER (ROLL)
MIDDLE (YAW)
INNER (PITCH)
MANUAL ALIGN
ZERO ENCODER
COARSE ALIGN
CDU MANUAL
FINE ALIGN
ATTITUDE CONTROL
ENTRY
TRANSFER SWITCH
G&N INDICATOR CONTROL PANEL (50A1)
SCHEM. 1014679
CHECK CONDITION LAMPS
PANEL BRIGHTNESS
APOLLO GUIDANCE COMPUTER
INNER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
OUTER GIMBAL COMMAND
INNER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
OUTER GIMBAL INPUT COUNTER
NAV KEYBOARD AND DISPLAY PANEL (65A6)
ZERO ENCODER
COARSE ALIGNMENT
CDU MANUAL
FINE ALIGNMENT
ATTITUDE CONTROL
MAIN DISPLAY & CONTROL PANEL
PILOTS IMU ATTITUDE HOLD SW.
HOLD
FOLLOW
1X RSVR ATTITUDE ERROR SIG.
16X RSVR ATTITUDE ERROR SIG.
64X RSVR ATTITUDE ERROR SIG.
D&C ELECTRONICS (50A3)
SCHEMATIC 1014622-F
ATTITUDE ERROR DEMOD.
SCHEMATIC 1014500
A2
RELAY & DIODE MODULE SCHEM. 1014623-G
40 SEC TIME DELAY
SCHEM. 1010127
CONTROL ELECTRONICS (50A4)
RELAY & DIODE MODULE
SCHEMATIC 1015005-A
SCHEMATIC 1015004-A
IMU DELAY LAMP
CONDITION LIGHT ASSY.
GIMBAL LOCK LAMP
SCHEMATIC 1014908
MAP & DATA VIEWER PNL.
TO MAIN D&C PANEL GIMBAL LOCK LAMP
TO BACKUP MODE ELECT.
6V 400~
28V DC
0VDC
SET
RESET
θΦ ON PIN 1 OF ATTITUDE ERROR DEMODULATOR PRODUCES A PLUS VOLTAGE ON PIN 8. THIS INDICATES THAT THE GIMBAL ANGLE IS LARGER THAN THE CDU ANGLE.

NOTES:

ALL VOLTAGES 400~ UNLESS INDICATED OTHERWISE.

SYMBOLS USED IN PHASING NOTATIONS INDICATE THE FOLLOWING:
- θ - CDU RSVR SHAFT ANGLE
- A - IMU RSVR SHAFT ANGLE
- ↑ - DIRECTION OF ZERO PHASE IN FIRST AND SECOND QUADRANTS FOR SINE FUNCTIONS AND IN FIRST AND FOURTH QUADRANTS FOR COSINE FUNCTIONS

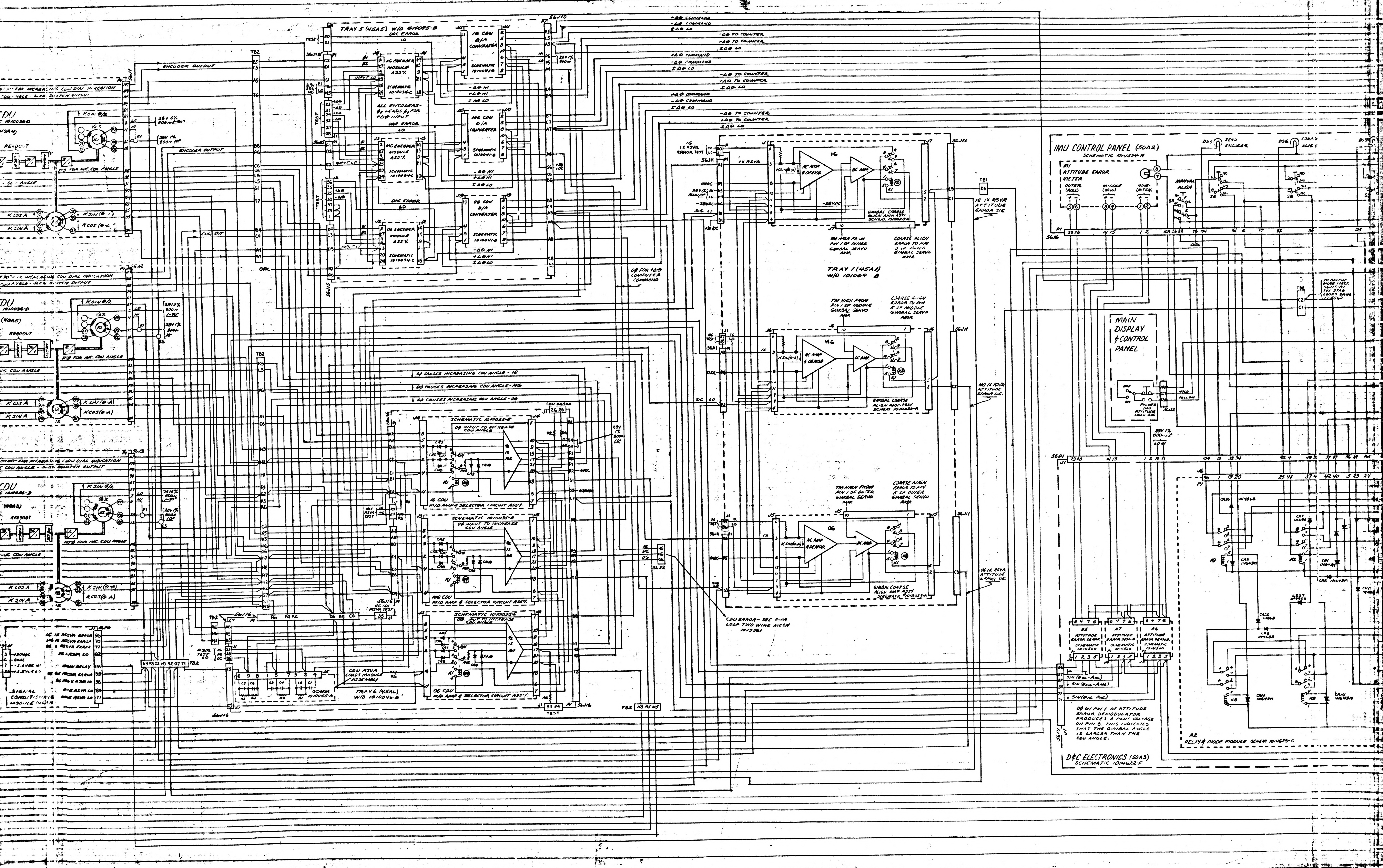
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01433 DATE 6/5/63

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES + + + − − −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN ACSP PN DRAWN R WALKER DATE 6/14/63 CHECKED A. ALDERSON APPROVAL APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS APOLLO IMU/CDU MODING MECHANIZATION DRAWING
DO NOT SCALE THIS DRAWING MATERIAL CONTRACT	NASA APPROVAL MIT APPROVAL 5 June 63	CODE IDENT NO. SIZE 1010037 SCALE SHEET

INCHES
PHOTOGRAPHIC SCALE ONLY

E3 1010037


TRAY 5 (45A5) W/O 1010095-B
DAC ERROR
1G ENCODER MODULE ASS'Y.
SCHEMATIC 1010034-C
ALL ENCODERS-ϕ_2 LEADS ϕ_1 FOR +$\Delta\theta$ INPUT
MG ENCODER MODULE ASS'Y.
OG ENCODER MODULE ASS'Y.
1G CDU D/A CONVERTER
MG CDU D/A CONVERTER
OG CDU D/A CONVERTER
SCHEMATIC 1010041-B
ENCODER OUTPUT
+Δθ COMMAND
-Δθ COMMAND
ΣΔθ LO
+Δθ TO COUNTER
-Δθ TO COUNTER
ΣΔθ LO
+Δθ HI
-Δθ HI
ΣΔθ LO
ϕ_θ FOR ±Δθ COMPUTER COMMAND
1X RSVR ERROR TEST
TRAY 1 (45A1) W/O 101009-B
AC AMP & DEMOD.
DC AMP
GIMBAL COARSE ALIGN AMP. ASS'Y SCHEM. 1010023-A
TM HIGH FROM PIN 1 OF INNER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 3 OF INNER GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF MIDDLE GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF MIDDLE GIMBAL SERVO AMP.
TM HIGH FROM PIN 1 OF OUTER GIMBAL SERVO AMP.
COARSE ALIGN ERROR TO PIN 5 OF OUTER GIMBAL SERVO AMP.
1G 1X RSVR ATTITUDE ERROR SIG.
MG 1X RSVR ATTITUDE ERROR SIG.
OG 1X RSVR ATTITUDE ERROR SIG.
ϕ_θ CAUSES INCREASING CDU ANGLE - 1G
ϕ_θ CAUSES INCREASING CDU ANGLE - MG
ϕ_θ CAUSES INCREASING CDU ANGLE - OG
SCHEMATIC 1010035-E
ϕ_θ INPUT TO INCREASE CDU ANGLE
1G CDU MID AMP & SELECTOR CIRCUIT ASS'Y.
MG CDU MID AMP & SELECTOR CIRCUIT ASS'Y.
OG CDU MID AMP & SELECTOR CIRCUIT ASS'Y.
CDU ERROR - SEE PIPA LOOP TWO WIRE MECH 1015561
CDU RSVR LOADS MODULE ASSEMBLY
SCHEM. 1010055-A
TRAY 6 (45A6) W/O 1010096-B
SIGNAL CONDITIONING MODULE
CDU
READOUT
K SIN θ/2
K COS A
K SIN A
K SIN (θ-A)
K COS (θ-A)
28V 5% 800 ~
28V 1% 800 ~
IMU CONTROL PANEL (50A2)
SCHEMATIC 1014524-H
M1 ATTITUDE ERROR METER
OUTER (ROLL)
MIDDLE (YAW)
INNER (PITCH)
MANUAL ALIGN
ZERO ENCODER
COARSE ALIGN
MAIN DISPLAY & CONTROL PANEL
PILOTS IMU ATTITUDE HOLD SW.
HOLD
FOLLOW
TO BACKUP DIODE ELECT.
A5 ATTITUDE ERROR DEMOD. SCHEMATIC 1014560
A7 ATTITUDE ERROR DEMOD. SCHEMATIC 1014560
A6 ATTITUDE ERROR DEMOD. SCHEMATIC 1014560
SIN (OG - AIG)
SIN (MG - AMG)
SIN (IG - AIG)
ϕ_θ ON PIN 1 OF ATTITUDE ERROR DEMODULATOR PRODUCES A PLUS VOLTAGE ON PIN 8. THIS INDICATES THAT THE GIMBAL ANGLE IS LARGER THAN THE CDU ANGLE.
A2 RELAY & DIODE MODULE SCHEM. 1014623-S
D&C ELECTRONICS (50A3)
SCHEMATIC 1014622-F

INCHES
PHOTOGRAPHIC SCALE ONLY

1-2

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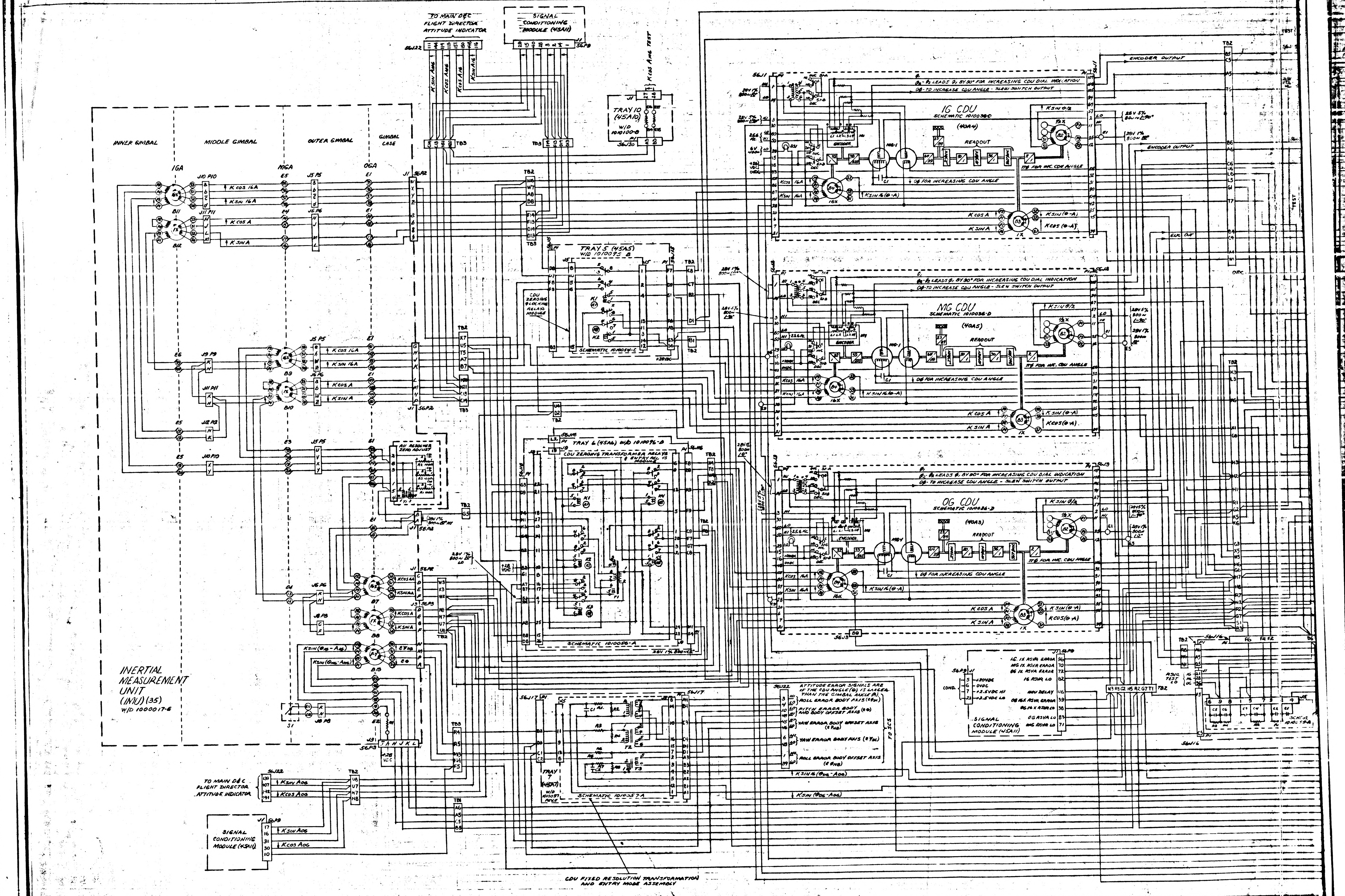
TO MAIN D&C
FLIGHT DIRECTOR
ATTITUDE INDICATOR
SIGNAL
CONDITIONING
MODULE (45A11)
56J22
56P9
K SIN Amg
K COS Amg
K COS A16
K SIN A16
TB3
K COS Amg TEST
TRAY 10
(45A10)
W/D
1010100-B
56J20
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
GIMBAL
CASE
IGA
MGA
OGA
J10 P10
J11 P11
J5 P5
J6 P6
J1 56P2
K COS 16A
K SIN 16A
K COS A
K SIN A
B11
B12
16X
1X
TB2
TRAY 5 (45A5)
W/D 1010095 B
CDU
ZEROING
& LOCKING
RELAYS
MODULE
SCHEMATIC 1010054-C
K1
K2
B9
B10
J12 P12
J9 P9
A11 RESOLVER
ZERO ADJUST
28V 1%
800~ 0° HI
J1 56P2
TRAY 6 (45A6) W/D 1010096-B
CDU ZEROING TRANSFORMER RELAYS
& ENTRY RELAYS
MODULE
SCHEMATIC 1010056-A
K3
K4
K5
T1
28V 1% 800~ 0°
28V 1%
800~ 0°
LO
+28
VDC
J1 56P2
J3 56P3
K COS 16A
K SIN 16A
K COS A
K SIN A
B7
B8
B13
.2X
K SIN (θIG - AIG)
K SIN (θMG - AMG)
EΨNB
Eθ
J8 P8
S1
E2
+28
VCC
56P3
INERTIAL
MEASUREMENT
UNIT
(IMU) (35)
W/D 1000017-E
TRAY
7
(45A7)
W/D
1010097
REV E
56J17
SCHEMATIC 1010057-A
T2
T3
CDU FIXED RESOLUTION TRANSFORMATION
AND ENTRY MODE ASSEMBLY
TO MAIN D&C
FLIGHT DIRECTOR
ATTITUDE INDICATOR
K SIN AOG
K COS AOG
SIGNAL
CONDITIONING
MODULE (45A11)
TB1
56J1
IG CDU
SCHEMATIC 1010036-D
(40A4)
ENCODER
READOUT
MG-1
DS1
φ1
φ2 - φ2 LEADS φ1 BY 90° FOR INCREASING CDU DIAL INDICATION
0φ - TO INCREASE CDU ANGLE - SLEW SWITCH OUTPUT
28V 1%
800~ 0°
28V 5%
800~ -90°
25.6
KC
6V
400~
+28
VDC
0VDC
K COS 16A
K SIN 16A
K SIN 16 (θ-A)
16X
1X
1/2X
K SIN θ/2
K COS A
K SIN A
K SIN (θ-A)
K COS (θ-A)
0φ FOR INCREASING CDU ANGLE
Π φ FOR INC. CDU ANGLE
ENCODER OUTPUT
ENC. OUT
28V 5%
800~ -90°
28V 1%
800~ 0°
TB2
TEST
0VDC
MG CDU
SCHEMATIC 1010036-D
(40A5)
OG CDU
SCHEMATIC 1010036-D
(40A3)
56J3
ATTITUDE ERROR SIGNALS ARE
+ IF THE CDU ANGLE (θ) IS LARGER
THAN THE GIMBAL ANGLE (A).
ROLL ERROR BODY AXIS (EΦSC)
PITCH ERROR BODY
AND BODY OFFSET AXIS (Eθ)
YAW ERROR BODY OFFSET AXIS
(EΨNB)
YAW ERROR BODY AXIS (EΨSC)
ROLL ERROR BODY OFFSET AXIS
(EΦNB)
TO SCS
K SIN 16 (θOG - AOG)
K SIN (θOG - AOG)
COND.
+20VDC
0VDC
+2.5VDC HI
+2.5VDC LO
IG 1X RSVR ERROR
MG 1X RSVR ERROR
OG 1X RSVR ERROR
IG RSVR LO
IMU DELAY
OG 16X RSVR ERROR
OG 16 X RSVR LO
OG RSVR LO
MG RSVR LO
SIGNAL
CONDITIONING
MODULE (45A11)
RSVR
TEST
LO
56J16
SCHEM
1010055-A

INCHES
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F1

1010037

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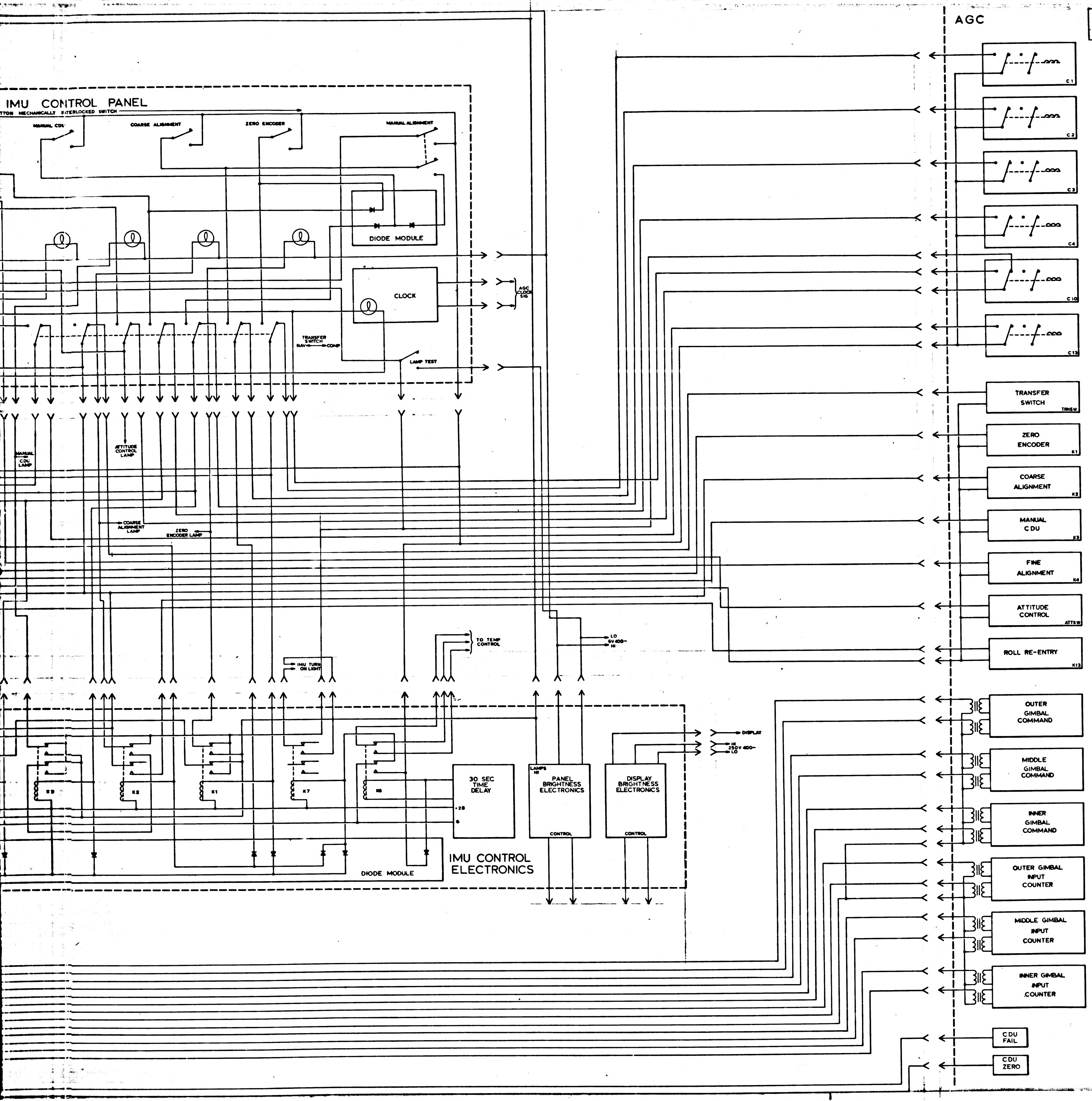
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL


IMU CONTROL PANEL
TTON MECHANICALLY INTERLOCKED SWITCH
MANUAL CDU
COARSE ALIGNMENT
ZERO ENCODER
MANUAL ALIGNMENT
DIODE MODULE
CLOCK
AGC CLOCK SIG
TRANSFER SWITCH
NAV COMP
LAMP TEST
MANUAL CDU LAMP
ATTITUDE CONTROL LAMP
COARSE ALIGNMENT LAMP
ZERO ENCODER LAMP
IMU TURN ON LIGHT
TO TEMP CONTROL
LO
6V 400~
HI
K9
K2
K1
K7
K6
30 SEC TIME DELAY
+28
LAMPS HI
PANEL BRIGHTNESS ELECTRONICS
CONTROL
DISPLAY BRIGHTNESS ELECTRONICS
CONTROL
DISPLAY
HI
250V 400~
LO
DIODE MODULE
IMU CONTROL ELECTRONICS
AGC
C1
C2
C3
C4
C10
C13
TRANSFER SWITCH
TRNSW
ZERO ENCODER
K1
COARSE ALIGNMENT
K2
MANUAL CDU
K3
FINE ALIGNMENT
K4
ATTITUDE CONTROL
ATTSW
ROLL RE-ENTRY
K13
OUTER GIMBAL COMMAND
MIDDLE GIMBAL COMMAND
INNER GIMBAL COMMAND
OUTER GIMBAL INPUT COUNTER
MIDDLE GIMBAL INPUT COUNTER
INNER GIMBAL INPUT COUNTER
CDU FAIL
CDU ZERO

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 00320 DATE 6 FEB 1963

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS A

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

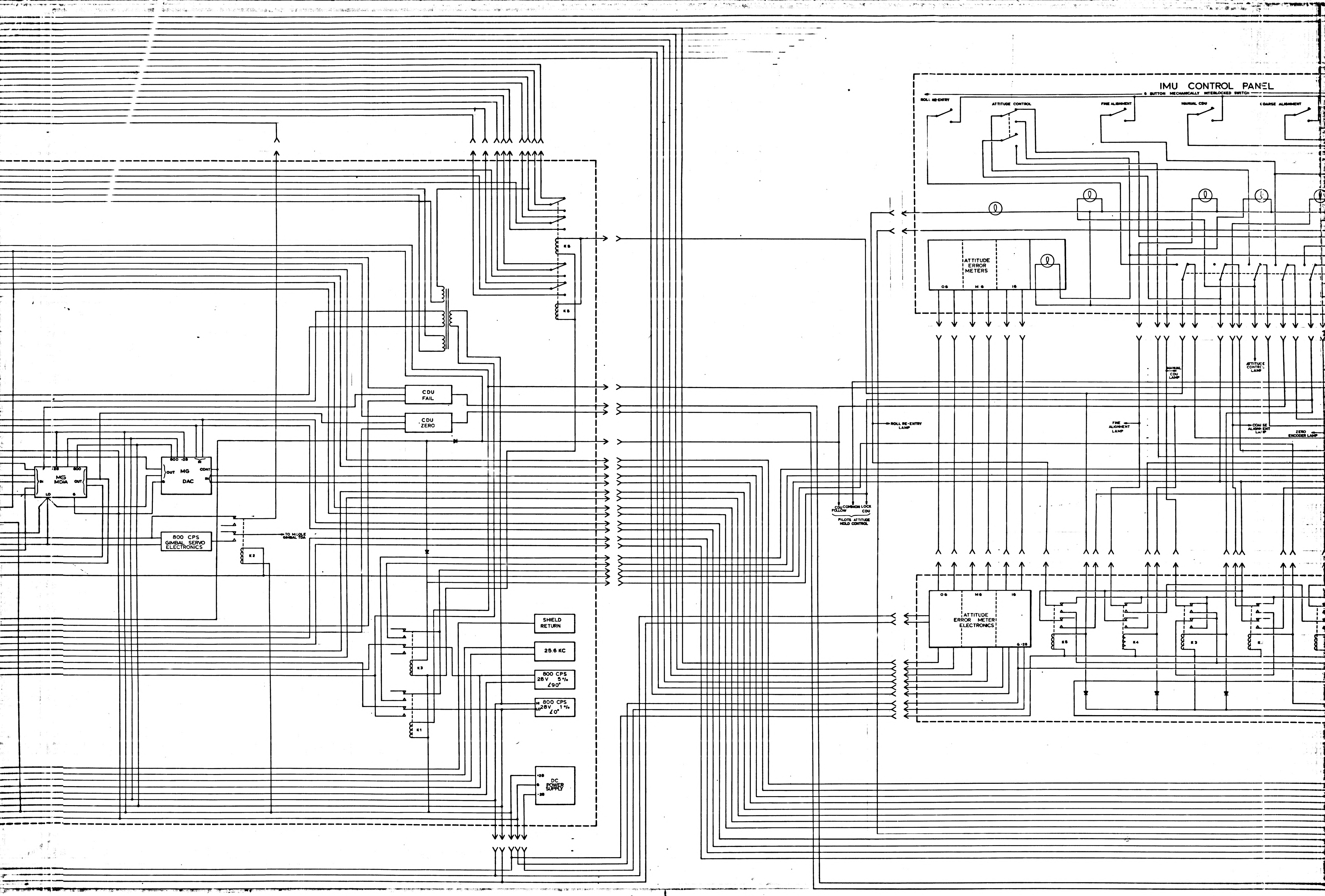
M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
REQ. NO. CONTRACT

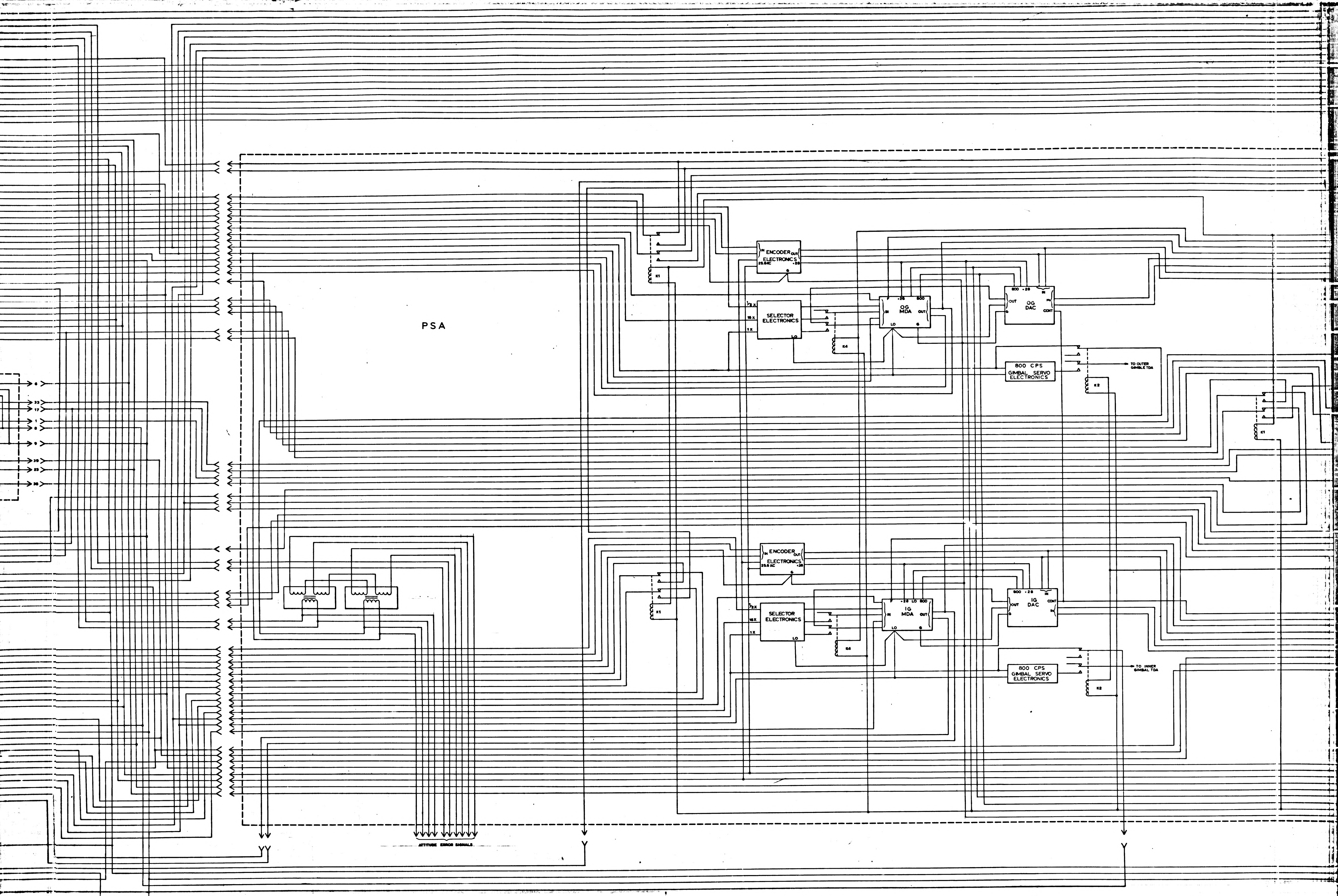
DRAWN Wayne Thompson DATE 2-1-63
CHECKED
APPROVAL R. J. Therrien 2-5-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 6 Feb 63

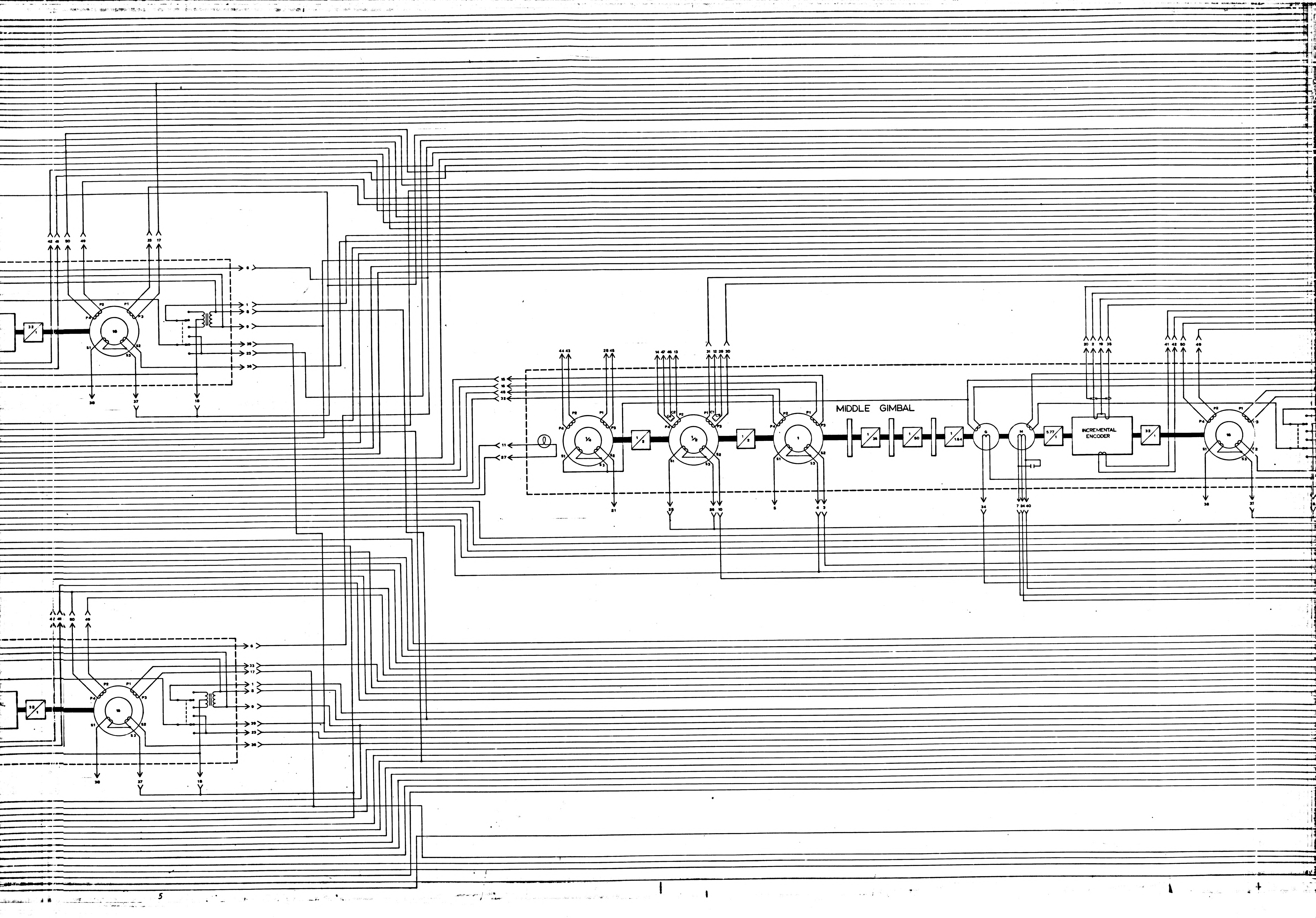
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

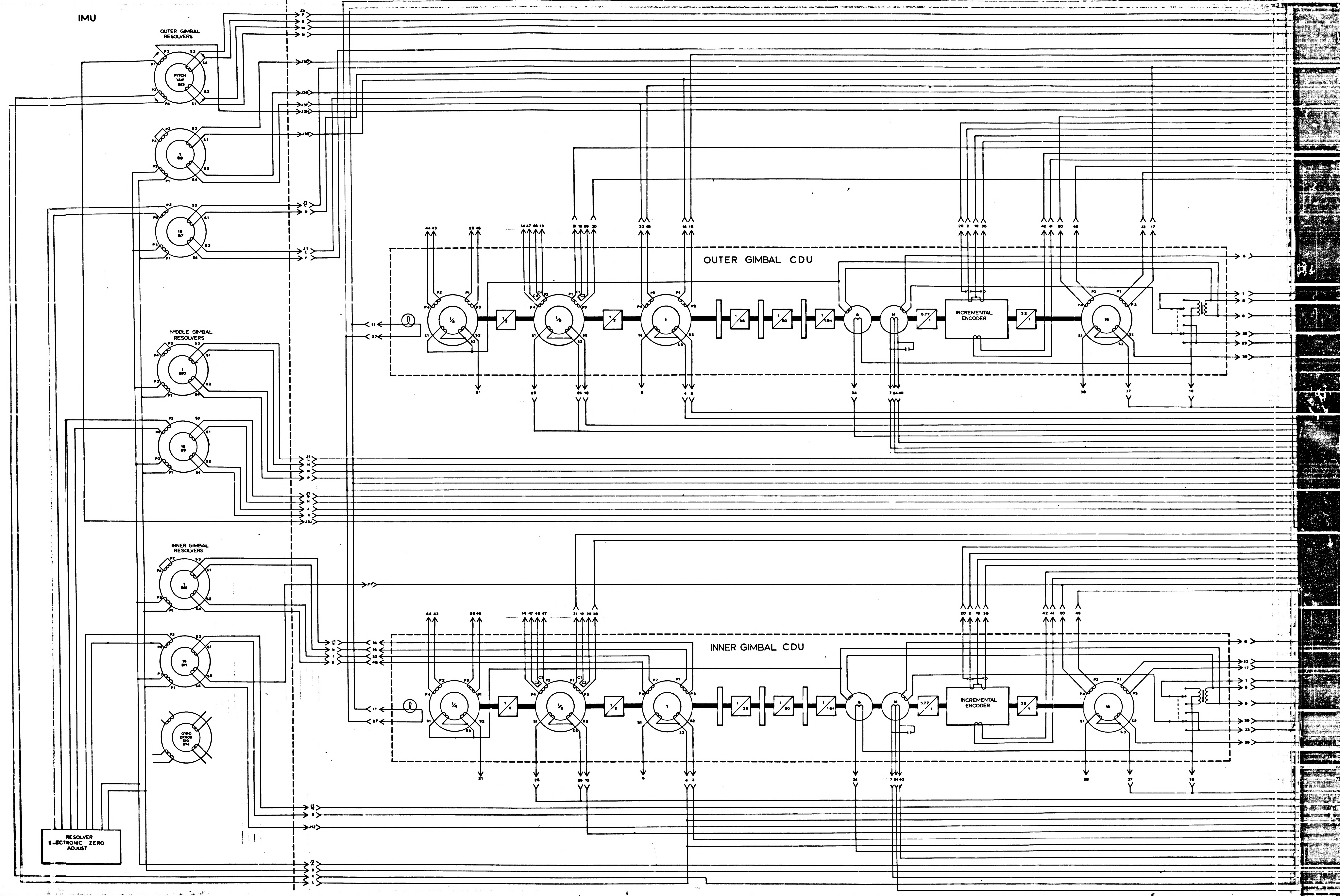
MODING MECHANIZATION DIAGRAM
CDU / IMU

CODE IDENT NO. SIZE NASA DRAWING NO
1010037-J
SCALE WT SHEET OF

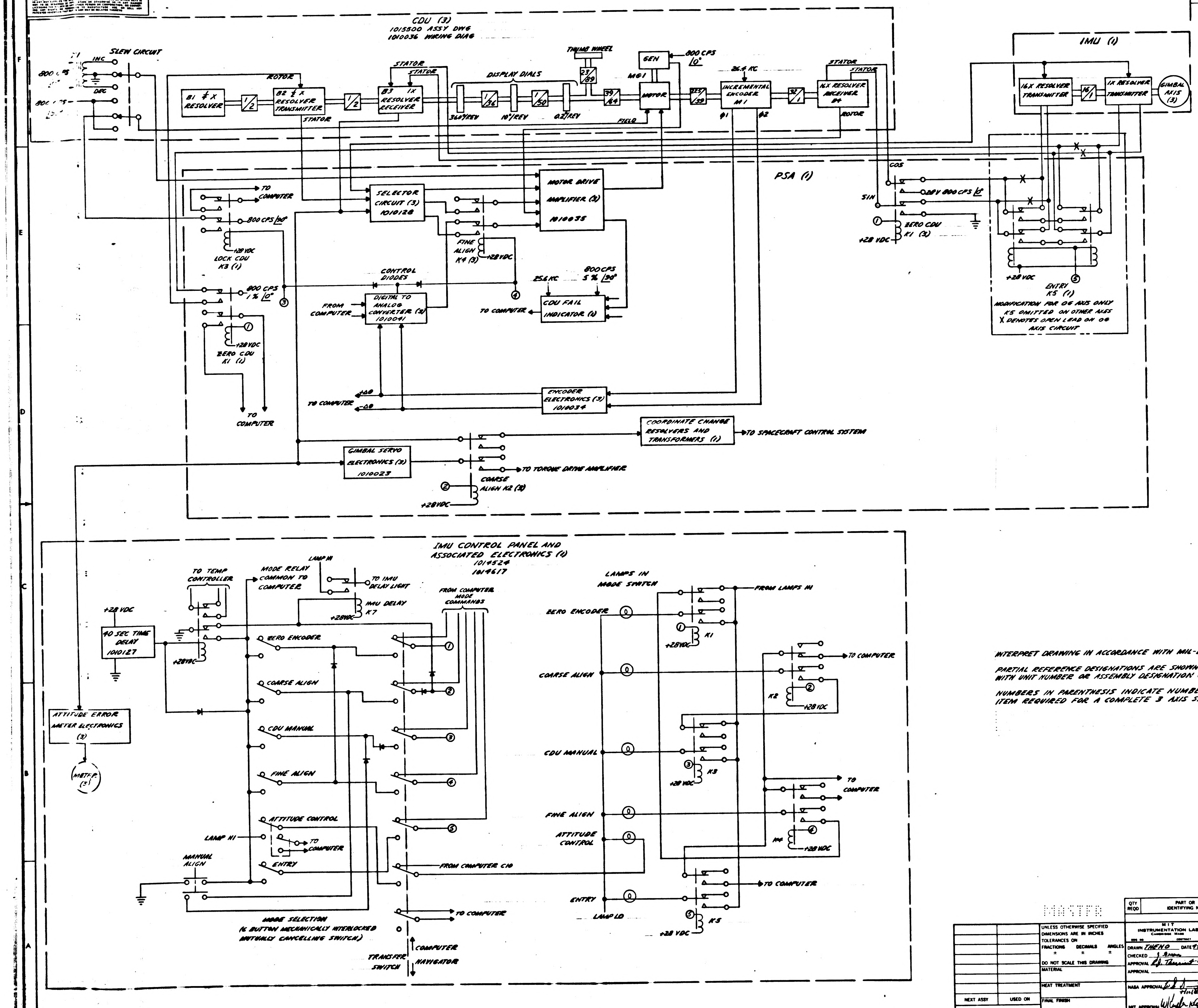

IMU CONTROL PANEL
6 BUTTON MECHANICALLY INTERLOCKED SWITCH
ROLL RE-ENTRY
ATTITUDE CONTROL
FINE ALIGNMENT
MANUAL CDU
COARSE ALIGNMENT
ATTITUDE ERROR METERS
OG
MG
IG
K6
K5
CDU FAIL
CDU ZERO
MG MDIA
F
+28
800
IN
OUT
LO
G
MG DAC
800
+28
IN
OUT
CONT
G
800 CPS GIMBAL SERVO ELECTRONICS
TO MIDDLE GIMBAL TDA
K2
K3
K1
SHIELD RETURN
25.6 KC
800 CPS 28V 5% ∠90°
HI
LO
800 CPS 28V 1% ∠0°
DC POWER SUPPLY
+28
G
-28
ROLL RE-ENTRY LAMP
CDU FOLLOW
COMMON
LOCK CDU
PILOTS ATTITUDE HOLD CONTROL
MANUAL CDU LAMP
ATTITUDE CONTROL LAMP
FINE ALIGNMENT LAMP
COARSE ALIGNMENT LAMP
ZERO ENCODER LAMP
OG
MG
IG
ATTITUDE ERROR METER ELECTRONICS
G-28
K5
K4
K3


PSA
6
33
17
1
8
9
39
23
36
K1
ENCODER ELECTRONICS
IN
OUT
25.6KC
+28
G
SELECTOR ELECTRONICS
1/2X
16X
1X
LO
K4
OG MDA
F
+28
800
IN
OUT
LO
G
OG DAC
800
+28
IN
OUT
G
CONT
800 CPS GIMBAL SERVO ELECTRONICS
TO OUTER GIMBLE TDA
K2
K1
ENCODER ELECTRONICS
IN
OUT
25.6 KC
+28
G
SELECTOR ELECTRONICS
1/2X
16X
1X
LO
K4
IG MDA
F
+28
LO
800
IN
OUT
LO
G
IG DAC
800
+28
IN
OUT
G
CONT
800 CPS GIMBAL SERVO ELECTRONICS
TO INNER GIMBAL TDA
K2
ATTITUDE ERROR SIGNALS


42 41 50 49
33 17
32/1
16
P1 P2 P3 P4 S1 S2 S3
6
1
8
9
39
23
36
38
37
18
15
16
48
32
11
27
44 43
28 45
14 47 46 13
31 12 29 30
C1 C2 C3 C4
1/4
1/2
1
1/2
21
25
26 10
5
4 3
MIDDLE GIMBAL
1/36
1/50
1/1.64
G
M
5.77/1
INCREMENTAL ENCODER
32/1
20 2 19 35
41 42 50 49
16
34
7 24 40
38
37
42 41 50 49
6
33
17
1
8
9
39
23
36
32/1
16
38
37
18
5


IMU
OUTER GIMBAL RESOLVERS
PITCH YAW B13
1 B8
16 B7
MIDDLE GIMBAL RESOLVERS
1 B10
16 B9
INNER GIMBAL RESOLVERS
1 B12
16 B11
GYRO ERROR SIG B14
RESOLVER ELECTRONIC ZERO ADJUST
OUTER GIMBAL CDU
INNER GIMBAL CDU
INCREMENTAL ENCODER
INCREMENTAL ENCODER
1/4
1/2
1
16
1/36
1/90
1/64
5.77/1
32/1
G
M

SYM	DESCRIPTION	DATE	APPROVAL
B	REVISED, REDRAWN, & UPGRADED FOR CLASS A RELEASE PER TDRR 00786	4-10-63	WK


CDU (3)
1015500 ASSY DWG
1010036 WIRING DIAG
SLEW CIRCUIT
INC
DEC
800 CPS
B1 ½ X RESOLVER
B2 ½ X RESOLVER TRANSMITTER
B3 1X RESOLVER RECEIVER
ROTOR
STATOR
DISPLAY DIALS
360°/REV
10°/REV
0.2°/REV
THUMB WHEEL
23/39
39/64
GEN
MG1
MOTOR
FIELD
800 CPS /0°
26.4 KC
INCREMENTAL ENCODER M1
Φ1
Φ2
32/1
16X RESOLVER RECEIVER B4
IMU (1)
16X RESOLVER TRANSMITTER
16/1
1X RESOLVER TRANSMITTER
GIMBAL AXIS (3)
PSA (1)
TO COMPUTER
SELECTOR CIRCUIT (3) 1010128
MOTOR DRIVE AMPLIFIER (3) 1010035
800 CPS /90°
+28 VDC
LOCK CDU K3 (1)
FINE ALIGN K4 (3)
CONTROL DIODES
800 CPS 1% /0°
FROM COMPUTER
DIGITAL TO ANALOG CONVERTER (3) 1010041
25.6 KC
800 CPS 5% /90°
CDU FAIL INDICATOR (1)
ZERO CDU K1 (1)
COS
SIN
28 V 800 CPS /0°
ZERO CDU K1 (3)
ENTRY K5 (1)
MODIFICATION FOR OG AXIS ONLY
K5 OMITTED ON OTHER AXES
X DENOTES OPEN LEAD ON OG AXIS CIRCUIT
+Δθ
-Δθ
ENCODER ELECTRONICS (3) 1010034
COORDINATE CHANGE RESOLVERS AND TRANSFORMERS (1)
TO SPACECRAFT CONTROL SYSTEM
GIMBAL SERVO ELECTRONICS (3) 1010023
TO TORQUE DRIVE AMPLIFIER
COARSE ALIGN K2 (3)
IMU CONTROL PANEL AND ASSOCIATED ELECTRONICS (1)
1014524
1014617
LAMP H1
TO IMU DELAY LIGHT
IMU DELAY K7
TO TEMP CONTROLLER
MODE RELAY COMMON TO COMPUTER
FROM COMPUTER MODE COMMANDS
40 SEC TIME DELAY 1010127
ZERO ENCODER
COARSE ALIGN
CDU MANUAL
FINE ALIGN
ATTITUDE CONTROL
ENTRY
MANUAL ALIGN
ATTITUDE ERROR METER ELECTRONICS (3)
METER (3)
FROM COMPUTER C10
MODE SELECTION (6 BUTTON MECHANICALLY INTERLOCKED MUTUALLY CANCELLING SWITCH)
COMPUTER
NAVIGATOR
TRANSFER SWITCH
LAMPS IN MODE SWITCH
FROM LAMPS H1
K1
K2
K3
K4
K5
LAMP LD

INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH UNIT NUMBER OR ASSEMBLY DESIGNATION OR BOTH

NUMBERS IN PARENTHESIS INDICATE NUMBER OF EACH ITEM REQUIRED FOR A COMPLETE 3 AXIS SYSTEM

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN THENO DATE 4-1-63
CHECKED
APPROVAL R.J. Thomas 4-5-63
APPROVAL
NASA APPROVAL 4-10-63
MIT APPROVAL W. Kupfer 4-4-63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

IMU-CDU FUNCTIONAL DIAGRAM

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010038
SCALE
WT
SHEET OF

1010038 B

INCHES
PHOTOGRAPHIC SCALE ONLY

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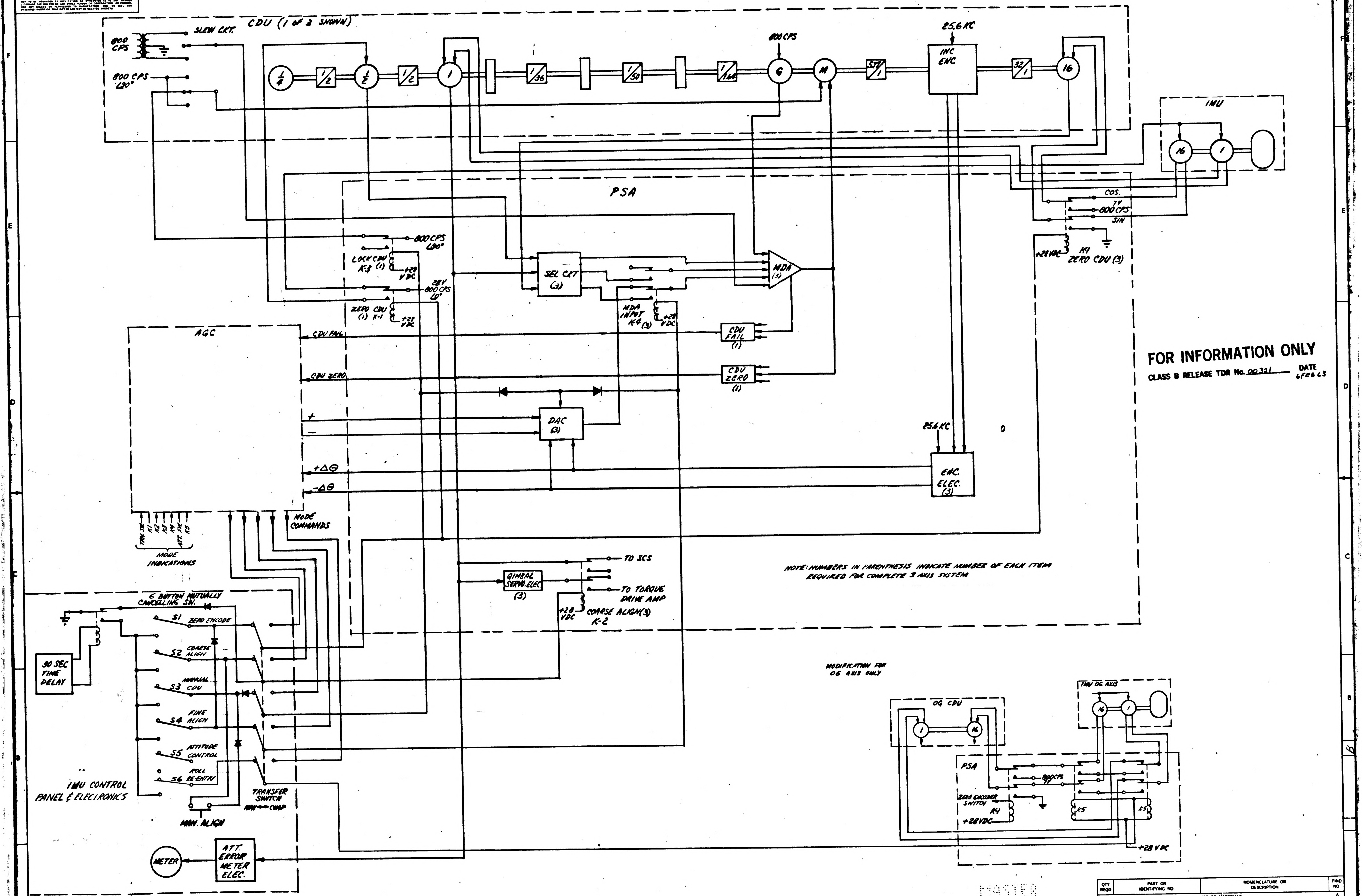
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


CDU (1 of 3 SHOWN)
800 CPS
SLEW CKT.
800 CPS ∠90°
1/4
1/2
1/2
1/2
1
1/36
1/50
1/1.66
800 CPS
G
M
57/1
25.6 KC
INC ENC
32/1
16
IMU
16
1
PSA
COS.
7V 800 CPS
SIN
+28 VDC
K1 ZERO CDU (3)
800 CPS ∠90°
LOCK CDU K-3 (1)
+28 VDC
28V 800 CPS ∠0°
ZERO CDU (1) K-1
+28 VDC
SEL CKT (3)
MDA (3)
MDA INPUT K4 (3)
+28 VDC
AGC
CDU FAIL
CDU FAIL (1)
CDU ZERO
CDU ZERO (1)
+
−
DAC (3)
25.6 KC
ENC. ELEC. (3)
+ΔΘ
−ΔΘ
TRN. SW
K1
K2
K3
K4
ATT. SW
K5
MODE INDICATIONS
MODE COMMANDS
TO SCS
GIMBAL SERVO. ELEC (3)
TO TORQUE DRIVE AMP
+28 VDC
COARSE ALIGN (3) K-2
NOTE: NUMBERS IN PARENTHESIS INDICATE NUMBER OF EACH ITEM REQUIRED FOR COMPLETE 3 AXIS SYSTEM
6 BUTTON MUTUALLY CANCELLING SW.
S1 ZERO ENCODE
S2 COARSE ALIGN
S3 MANUAL CDU
S4 FINE ALIGN
S5 ATTITUDE CONTROL
S6 ROLL RE-ENTRY
30 SEC TIME DELAY
IMU CONTROL PANEL & ELECTRONICS
TRANSFER SWITCH MAN ↔ COMP
MAN. ALIGN
METER
ATT. ERROR METER ELEC.
MODIFICATION FOR OG AXIS ONLY
OG CDU
1
16
IMU OG AXIS
16
1
PSA
800 CPS 7V
ZERO ENCODER SWITCH
K4
+28 VDC
K5
K5
+28 VDC

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00321 DATE 6FEB63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			A

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL
HEAT TREATMENT
FINAL FINISH

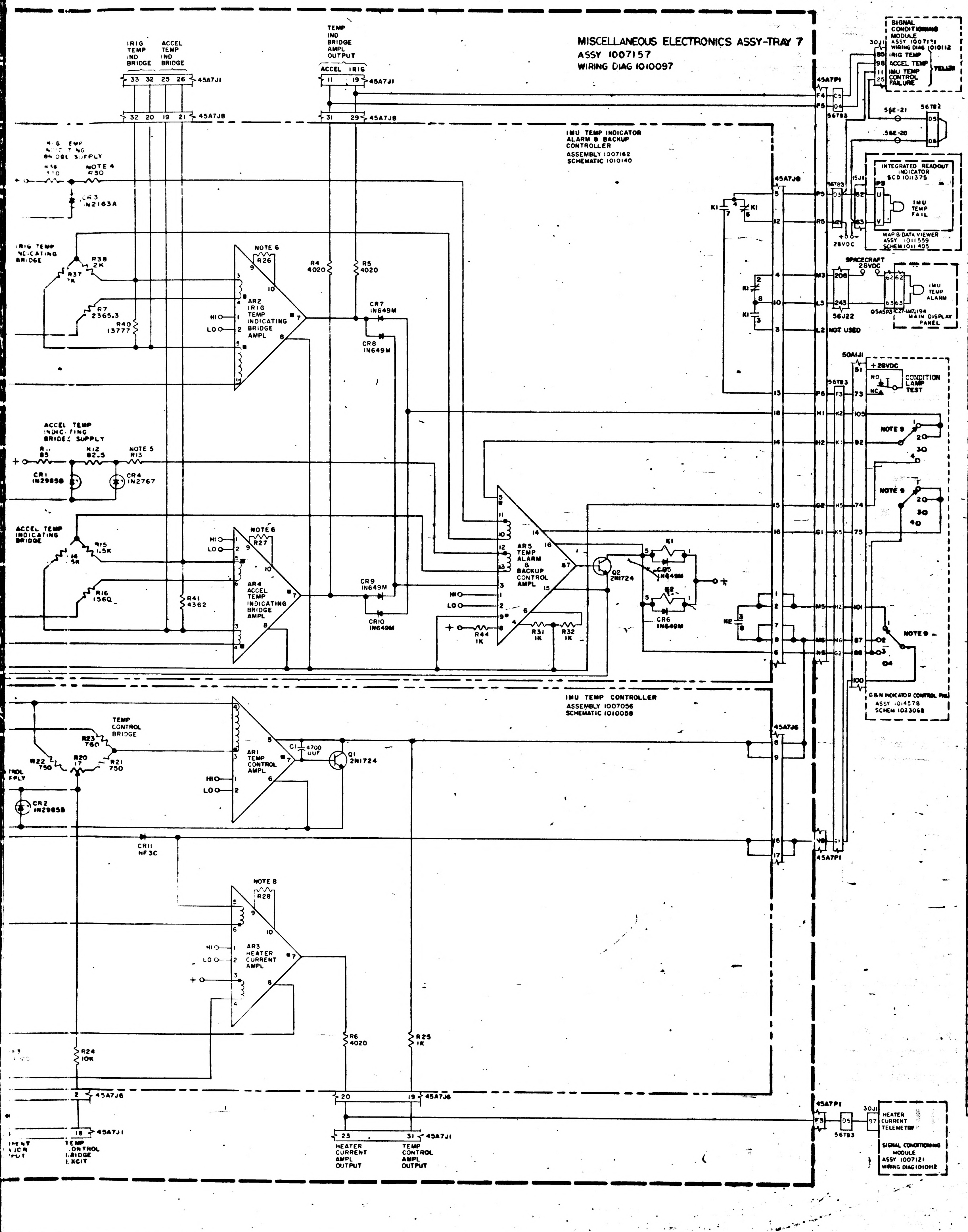
MIT
INSTRUMENTATION LAB
Cambridge Mass
DWG NO
CONTRACT
DRAWN DATE 2-25-63
CHECKED
APPROVAL R. J. Thurow 2-5-63
APPROVAL
NASA APPROVAL 4/4/63
MIT APPROVAL 6Feb63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CDU FUNCTIONAL DIAGRAM

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010038
SCALE
WT
SHEET OF

BLOCK I ONLY


MISCELLANEOUS ELECTRONICS ASSY-TRAY 7
ASSY 1007157
WIRING DIAG 1010097
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
TEMP IND BRIDGE AMPL OUTPUT
ACCEL
IRIG
45A7J1
45A7J8
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007162
SCHEMATIC 1010140
IRIG TEMP INDICATING BRIDGE SUPPLY
NOTE 4
R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 1K
R7 2365.3
R40 13777
R4 4020
R5 4020
NOTE 6
R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
HI
LO
CR7 1N649M
CR8 1N649M
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5
R13
CR1 1N2985B
CR4 1N2767
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R41 4362
R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 1N649M
CR10 1N649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
R44 1K
R31 1K
R32 1K
Q2 2N1724
K1
CR5 1N649M
K2
CR6 1N649M
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
IRIG TEMP
ACCEL TEMP
IMU TEMP CONTROL FAILURE
TELEM
45A7P1
56TB3
56E-21
56E-20
56TB2
INTEGRATED READOUT INDICATOR
SCD 1011375
IMU TEMP FAIL
MAP & DATA VIEWER
ASSY 1011559
SCHEM 1011405
28VDC
SPACECRAFT 28VDC
IMU TEMP ALARM
MAIN DISPLAY PANEL
56J22
NOT USED
50A1J1
+28VDC
CONDITION LAMP TEST
NOTE 9
G&N INDICATOR CONTROL PNL
ASSY 1014578
SCHEM 1023068
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
AR1 TEMP CONTROL AMPL
C1 4700 UUF
Q1 2N1724
CR2 1N2985B
CR11 HF3C
45A7J6
NOTE 8
R28
AR3 HEATER CURRENT AMPL
R6 4020
R25 1K
R24 10K
TEMP CONTROL BRIDGE EXCIT
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
HEATER CURRENT TELEMETRY
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
4
3

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR 1	1000285	MAG AMPL			
AR 2	1000284	↓			
AR3	1000286	↓			
AR4	1000284	↓			
AR5	1018900	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-020	DIODE	1N2985B	2%	10W
CR2	↓ -009	↓	↓	5%	↓
CR3	1010440	↓	1N2163A	2%	3/4 W
CR4	1010441-2	↓	1N2767	2%	2W
CR5	1010362-3	↓	1N649M		600MW
CR6	↓	↓	↓		↓
CR7	↓	↓	↓		↓
CR8	↓	↓	↓		↓
CR9	↓	↓	↓		↓
CR10	↓	↓	↓		↓
CR11	1010322-001	↓	HF3C		6 AMP
C1	1010359-25	CAPACITOR	4700 UUF	20 %	200 VDC
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1	1000247	MERCURY THERMOSTAT			
S2	1000266	THERMOSTAT			
S3	↓	↓			
HR1	1000126	HEATER			
HR2	1000134	↓			
HR3	1000247	↓			
HR4	1000134	↓			
HR5	1000126	↓			
HR 6	1000134	↓			
A1	1000126	SENSOR			
A2	1000287	CURRENT SENSOR			
M1	1007012	EMERGENCY HEATERS CONTROL MODULE			
M2	1007013	28VDC REGULATOR ASSY			
R3	1010364-368	RESISTOR	4020	1%	1/8 W
R4	↓	↓	↓	↓	↓
R5	↓	↓	↓	↓	↓
R6	↓	↓	↓	↓	↓
R7	1010450-12	↓	2365.3	0.01%	↓
R8	↓	↓	↓	↓	↓
R9	1010450-13	↓	2567.8	↓	↓
R11	1010361-112	↓	85	3%	5W
R12	1010364-44	↓	82.5	1%	1/8 W
R13	1010377	↓ NOTE 5	SAT	0.1%	1/10 W
R14	1010450-2	↓	1500	0.01%	1/8 W
R15	↓ -2	↓	↓	↓	↓
R16	↓ -3	↓	1560	↓	↓
R17	↓ -3	↓	↓	↓	↓
R18	↓ -14	↓	1582	↓	↓
R19	1010399-16	↓	50	5%	5W
R20	1010453-1	POTENTIOMETER	17	10%	1/4 W
R21	1010449-1	RESISTOR	750	0.01%	3/4 W
R22	↓ -1	↓	↓	↓	↓
R23	↓ -2	↓	760	↓	↓
R24	1006750-56	↓	10K	2%	1/4 W
R25	1010312-36	↓	1K	5%	2W
R26	1010311	↓ NOTE 6	SAT	1%	1/10W
R27	↓	↓ NOTE 6	↓	↓	↓
R28	↓	↓ NOTE 8	↓	↓	↓
R30	1010377	↓ NOTE 4	SAT	0.1%	↓
R31	↓ -237	↓	1K	↓	↓
R32	↓ -237	↓	1K	↓	↓
R33	1010498	↓ NOTE 7	SAT	1%	10W
R34	↓	↓ ↓	↓	↓	↓
R35	↓	↓ ↓	↓	↓	↓
R36	1010452-167	↓	1330	↓	1W
R37	1010450-9	↓	2000	0.01%	1/8 W
R38	↓	↓	↓	↓	↓
R40	1010450-10	↓	13777	↓	↓
R41	↓ -11	↓	4362	↓	↓
R42	1010325-251	↓	402	1 %	5W
R43	↓ -500	↓	280	0.1 %	↓
R44	1010604-22	↓	1K	1%	1W

	V	REVISED PER TDRR 06373		
	W	REVISED PER TDRR 08486	4 May 64	
	Y	REVISED PER TDRR 12626		
	Z	REVISED PER TDRR 20708		
	AA	REVISED PER TDRR 28389		

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL

M I T
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

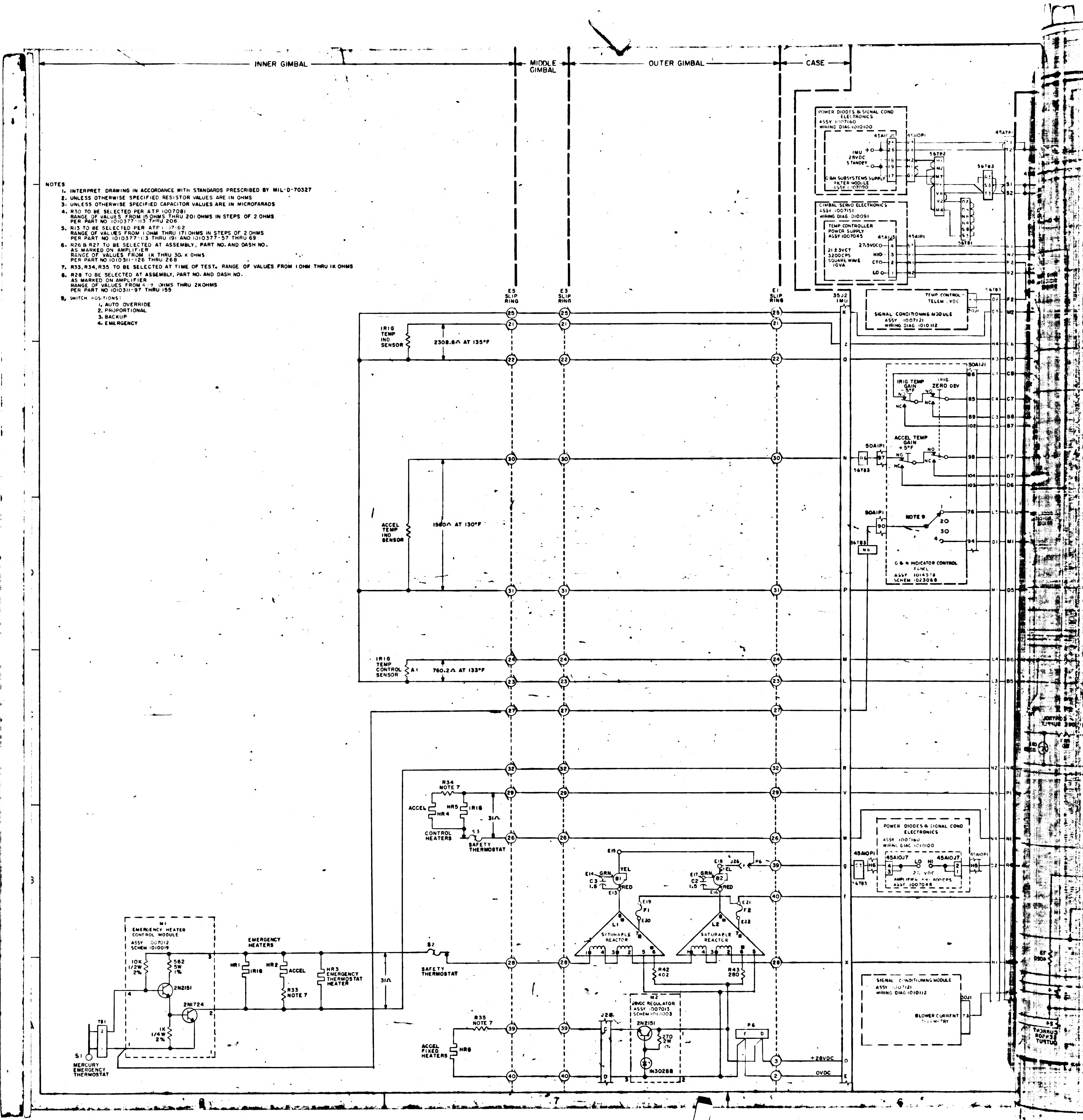
		DATE
APPROVED		2-4-64
CHECKED	GK	2-5-64
DRAWN	LWR	8-9-63

APPROVED FOR MSC
W J Rhine 2-5-64
NASA APPROVAL DATE

APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I, SERIES 0

SCALE
UNIT WT
CODE IDENT 80230

M I T
INSTRUMENTATION LABORATORY
CAMBRIDGE MASS
DWG NO
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO
1010039
SHEET 1 OF


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
POWER DIODES & SIGNAL COND ELECTRONICS
ASSY 1007160
WIRING DIAG 1010100
IMU 28VDC STANDBY
G&N SUBSYSTEMS SUPPLY FILTER MODULE
GIMBAL SERVO ELECTRONICS
ASSY 1007151
WIRING DIAG 1010091
TEMP CONTROLLER POWER SUPPLY
ASSY 1007045
2123VCT 3200CPS SQUARE WAVE 10VA
27.5VDC
TEMP CONTROL - TELEM VDC
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
E5 SLIP RING
E3 SLIP RING
E1 SLIP RING
35J2 IMU
IRIG TEMP IND SENSOR
2308.8Ω AT 135°F
IRIG TEMP GAIN +5°F
IRIG ZERO DEV
ACCEL TEMP GAIN +5°F
NOTE 9
G & N INDICATOR CONTROL PANEL
ASSY 1014578
SCHEM 1023068
ACCEL TEMP IND SENSOR
1560Ω AT 130°F
IRIG TEMP CONTROL SENSOR
760.2Ω AT 133°F
R34 NOTE 7
ACCEL
HR4
HR5
IRIG
CONTROL HEATERS
SAFETY THERMOSTAT
31Ω
SATURABLE REACTOR
L1
L2
R42 402
R43 280
28VDC REGULATOR
ASSY 1007013
SCHEM 1010003
2N2151
270 2W 1%
1N3028B
+28VDC
0VDC
M1
EMERGENCY HEATER CONTROL MODULE
ASSY 1007012
SCHEM 1010019
10K 1/2W 2%
562 5W 1%
2N1724
1K 1/4W 2%
EMERGENCY HEATERS
HR1
HR2
HR3 EMERGENCY THERMOSTAT HEATER
R33 NOTE 7
S1 MERCURY EMERGENCY THERMOSTAT
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
SIGNAL CONDITIONING MODULE
BLOWER CURRENT TELEMETRY
AMPLIFIER 800CPS
ASSY 1007048

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081
RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS
PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007162
RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS
PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
AS MARKED ON AMPLIFIER
RANGE OF VALUES FROM 1K THRU 30.1K OHMS
PER PART NO 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
AS MARKED ON AMPLIFIER
RANGE OF VALUES FROM 49.9 OHMS THRU 2K OHMS
PER PART NO 1010311-97 THRU 155
9. SWITCH POSITIONS:
    1. AUTO OVERRIDE
    2. PROPORTIONAL
    3. BACKUP
    4. EMERGENCY

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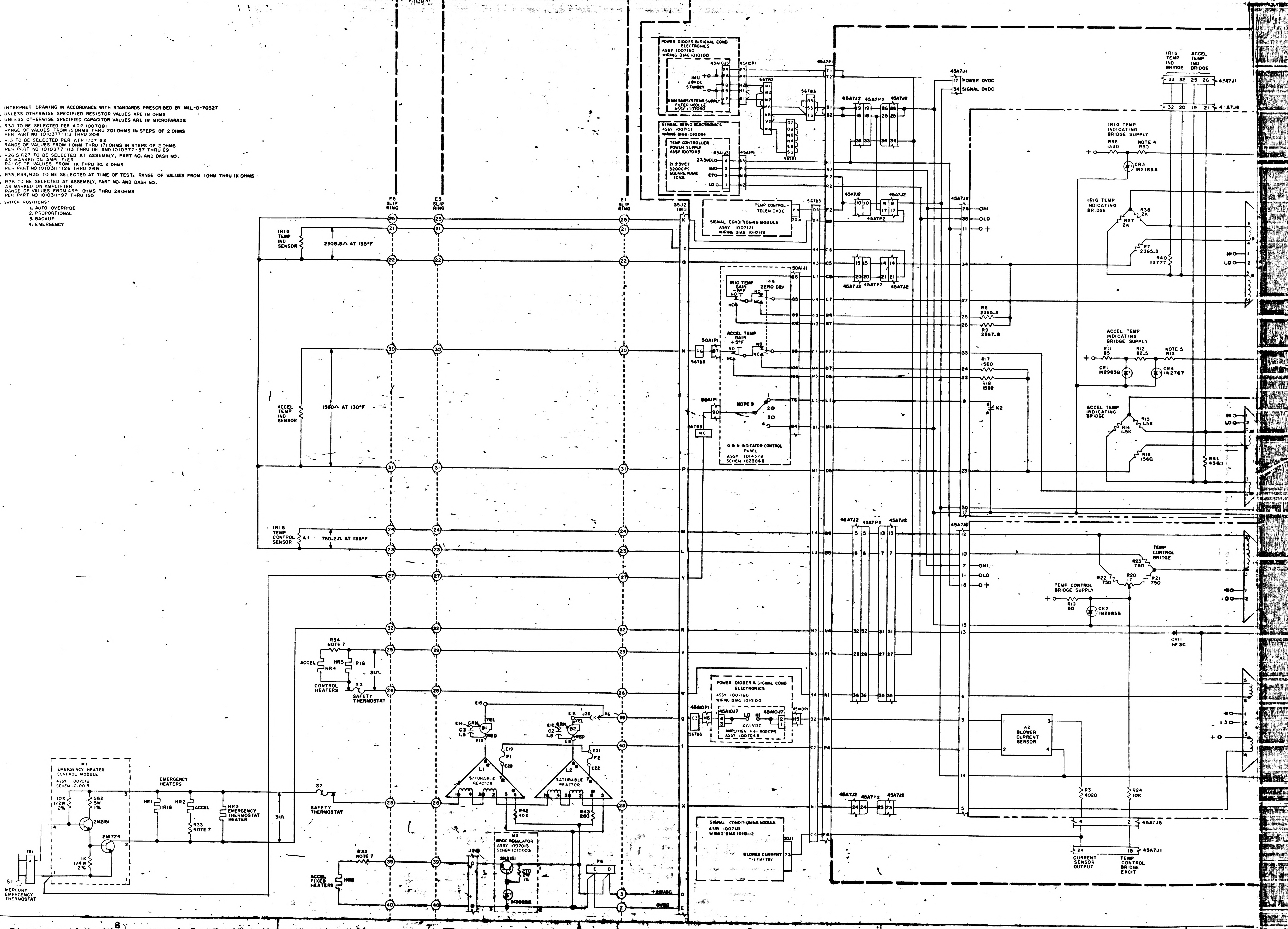
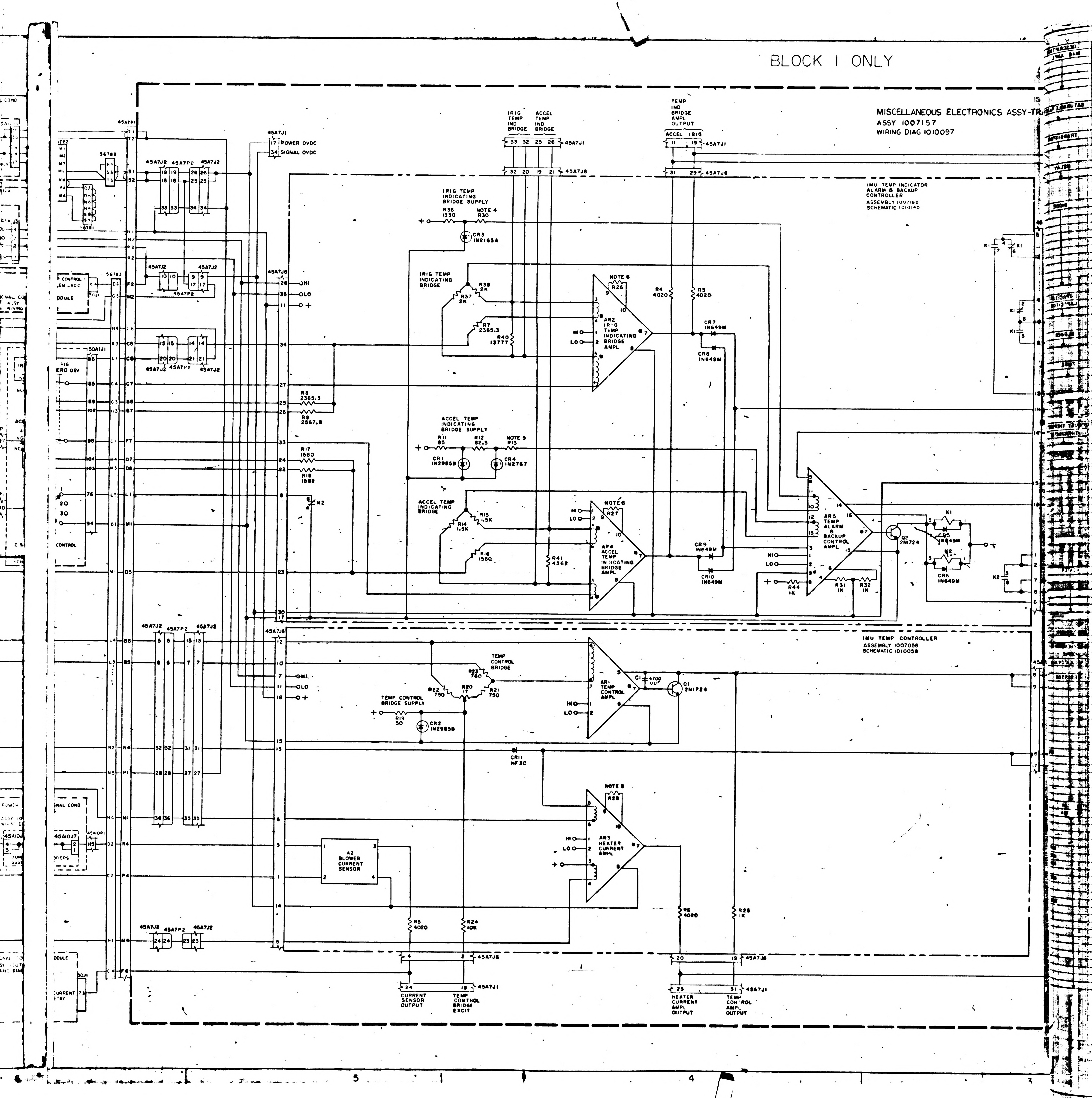
NOTES

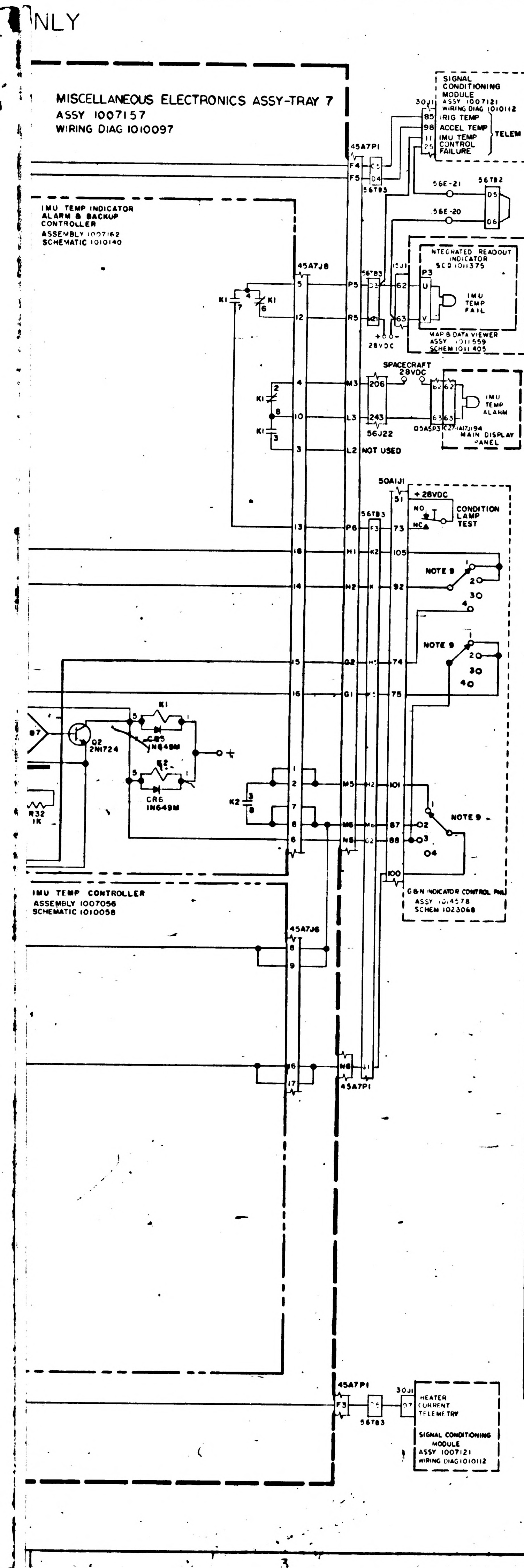
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081
   RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007162
   RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 1K THRU 30.1K OHMS
   PER PART NO 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 499 OHMS THRU 2K OHMS
   PER PART NO 1010311-97 THRU 155
9. SWITCH POSITIONS:
   1. AUTO OVERRIDE
   2. PROPORTIONAL
   3. BACKUP
   4. EMERGENCY


POWER DIODES & SIGNAL COND ELECTRONICS
ASSY 1007160
WIRING DIAG 1010100
45A10J5
45A10P1
IMU 28VDC STANDBY
G & N SUBSYSTEMS SUPPLY FILTER MODULE
ASSY 1007090
56TB2
56TB3
56TB1
45A7P1
GIMBAL SERVO ELECTRONICS
ASSY 1007151
WIRING DIAG 1010091
TEMP CONTROLLER POWER SUPPLY
ASSY 1007045
45A1J3
45A1P1
27.5VDC
21 ± 3VCT
3200CPS
SQUARE WAVE
10VA
HI
CT
LO
TEMP CONTROL-TELEM OVDC
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
30J1
35J2 IMU
E5 SLIP RING
E3 SLIP RING
E1 SLIP RING
IRIG TEMP IND SENSOR
2308.8Ω AT 135°F
ACCEL TEMP IND SENSOR
1560Ω AT 130°F
IRIG TEMP CONTROL SENSOR
A1
760.2Ω AT 133°F
50A1J1
IRIG TEMP GAIN -5°F
IRIG ZERO DEV
ACCEL TEMP GAIN +5°F
NO
NC
50A1P1
NOTE 9
G & N INDICATOR CONTROL PANEL
ASSY 1014578
SCHEM 1023068
45A7J1
POWER OVDC
SIGNAL OVDC
45A7J2
45A7P2
45A7J8
OHI
OLO
R8 2365.3
R9 2567.8
R17 1560
R18 1582
K2
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
4'A7J8
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 IN2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 IN2985B
CR4 IN2767
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R41 4361
45A7J6
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 IN2985B
CR11 HF3C
A2 BLOWER CURRENT SENSOR
R3 4020
R24 10K
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
R34 NOTE 7
ACCEL
HR4
HR5
IRIG
CONTROL HEATERS
S3
SAFETY THERMOSTAT
3Ω
E15
E14
C3 1.5
B1
YEL
GRN
RED
E13
E18
J26
P6
E17
C2 1.5
B2
E16
E19
F1
E20
E21
F2
E22
L1 SATURABLE REACTOR
L2 SATURABLE REACTOR
R42 402
R43 280
45A10P1
45A10J7
27.5VDC
AMPLIFIER 59A 800CPS
ASSY 1007048
BLOWER CURRENT TELEMETRY
M1 EMERGENCY HEATER CONTROL MODULE
ASSY 1007012
SCHEM 1010019
10K 1/2W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
TB1
S1 MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 NOTE 7
HR3 EMERGENCY THERMOSTAT HEATER
S2 SAFETY THERMOSTAT
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
M2 28VDC REGULATOR
ASSY 1007013
SCHEM 1010003
J28
2N2151
270 2W 1%
IN3028B
+28VDC
0VDC
8
5


BLOCK I ONLY
MISCELLANEOUS ELECTRONICS ASSY-TR
ASSY 1007157
WIRING DIAG 1010097
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007162
SCHEMATIC 1013140
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
TEMP IND BRIDGE AMPL OUTPUT
ACCEL
IRIG
45A7J1
45A7J8
45A7J2
45A7P2
45A7P1
POWER OVDC
SIGNAL OVDC
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
NOTE 6 R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
R4 4020
R5 4020
CR7 1N649M
CR8 1N649M
R8 2365.3
R9 2567.8
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B
CR4 1N2767
R17 1560
R18 1882
K2
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 156Ω
NOTE 6 R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
R41 4362
CR9 1N649M
CR10 1N649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
Q2 2N1724
K1
CR5 1N649M
CR6 1N649M
R44 1K
R31 1K
R32 1K
HI
LO
TEMP CONTROL BRIDGE
R23 750
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
AR1 TEMP CONTROL AMPL
C1 4700 UUF
Q1 2N1724
CR11 HF3C
NOTE 8 R28
AR3 HEATER CURRENT AMPL
A2 BLOWER CURRENT SENSOR
R3 4020
R24 10K
R6 4020
R25 1K
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
56TB3
56TB1
50A1J1
45A10J7
45A10P1
IRIG ZERO DEV
CONTROL
5
4
3

2/1010039

NLY


MISCELLANEOUS ELECTRONICS ASSY-TRAY 7
ASSY 1007157
WIRING DIAG 1010097
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
30J1
85 IRIG TEMP
98 ACCEL TEMP
11 IMU TEMP CONTROL
25 FAILURE
TELEM
45A7P1
F4
F5
C5
D4
56TB3
56E-21
56E-20
56TB2
D5
D6
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007162
SCHEMATIC 1010140
45A7J8
INTEGRATED READOUT INDICATOR
SCD 1011375
P3
U
V
IMU TEMP FAIL
MAP & DATA VIEWER
ASSY 1011559
SCHEM 1011405
15J1
62
63
P5
R5
D3
M21
+28VDC
SPACECRAFT 28VDC
206
243
56J22
M3
L3
L2 NOT USED
IMU TEMP ALARM
05A5P3
K27-1A17J194
MAIN DISPLAY PANEL
K1
K2
50A1J1
51
+28VDC
NO
NC
CONDITION LAMP TEST
P6
F3
73
H1
K2
105
H2
92
NOTE 9
G2
74
G1
75
M5
101
M6
87
N5
88
100
Q2 2N1724
CR5 1N649M
CR6 1N649M
R32 1K
G&N INDICATOR CONTROL PNL
ASSY 1014578
SCHEM 1023068
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
45A7J6
N6
45A7P1
HEATER CURRENT TELEMETRY
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
30J1
F3
56TB3

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	1000284				
AR5	1018900	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-020	DIODE	1N2985B	2%	10W
CR2	↓ -009		↓	5%	↓
CR3	1010440		1N2163A	2%	3/4 W
CR4	1010441-2		1N2767	2%	2W
CR5	1010362-3		1N649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	↓		↓		↓
CR11	1010322-001	↓	HF3C		6AMP
C1	1010359-25	CAPACITOR	4700UUF	20%	200VDC
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1	1000247	MERCURY THERMOSTAT			
S2	1000266	THERMOSTAT			
S3	↓	↓			
HR1	1000126	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126				
HR6	1000134	↓			
A1	1000126	SENSOR			
A2	1000287	CURRENT SENSOR			
M1	1007012	EMERGENCY HEATERS CONTROL MODULE			
M2	1007013	28VDC REGULATOR ASSY			
R3	1010364-368	RESISTOR	4020	1%	1/8 W
R4					
R5					
R6	↓		↓	↓	
R7	1010450-12		2365.3	0.01%	
R8	↓		↓		
R9	1010450-13		2567.8	↓	↓
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8 W
R13	1010377	NOTE 5	SAT	0.1%	1/10 W
R14	1010450-2		1500	0.01%	1/8 W
R15	-2		↓		
R16	-3		1560		
R17	-3		↓		
R18	↓ -14		1582	↓	↓
R19	1010399-16	↓	50	5%	5W
R20	1010453-1	POTENTIOMETER	17	10%	1/4 W
R21	1010449-1	RESISTOR	750	0.01%	3/4 W
R22	-1		↓		
R23	↓ -2		760	↓	↓
R24	1006750-56		10K	2%	1/4 W
R25	1010312-36		1K	5%	2W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27		NOTE 6			
R28	↓	NOTE 8	↓	↓	
R30	1010377	NOTE 4	SAT	0.1%	
R31	-237		1K		
R32	↓ -237		1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10W
R34					
R35	↓	↓	↓		↓
R36	1010452-167		1330	↓	1W
R37	1010450-9		2000	0.01%	1/8 W
R38	↓		↓		
R40	1010450-10		13777		
R41	↓ -11		4362	↓	↓
R42	1010325-251		402	1%	5W
R43	↓ -500		280	0.1%	↓
R44	1010604-22	↓	1K	1%	1W

1010039 AA

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	V	REVISED PER TDRR 06373	18 Feb 64	GK
	W	REVISED PER TDRR 08486	1 May 64	WR
	Y	REVISED PER TDRR 12626		
	Z	REVISED PER TDRR 20708	7/8/65	WR
	AA	REVISED PER TDRR 28389		

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL

M I T
INSTRUMENTATION LAB
CONTRACT NAS 9-153

		DATE
APPROVED		2-4-64
CHECKED	GK	2-5-64
DRAWN	LWE	8-9-63

APPROVED FOR MSC
W J Whitney 4 Feb 64
INITIAL APPROVAL DATE
18 Feb 64

APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I, SERIES O

SCALE
UNIT WT
CODE IDENT 80230

M I T
INSTRUMENTATION LABORATORY
CAMBRIDGE MASS
DWG NO
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO
1010039
SHEET 1 OF 3

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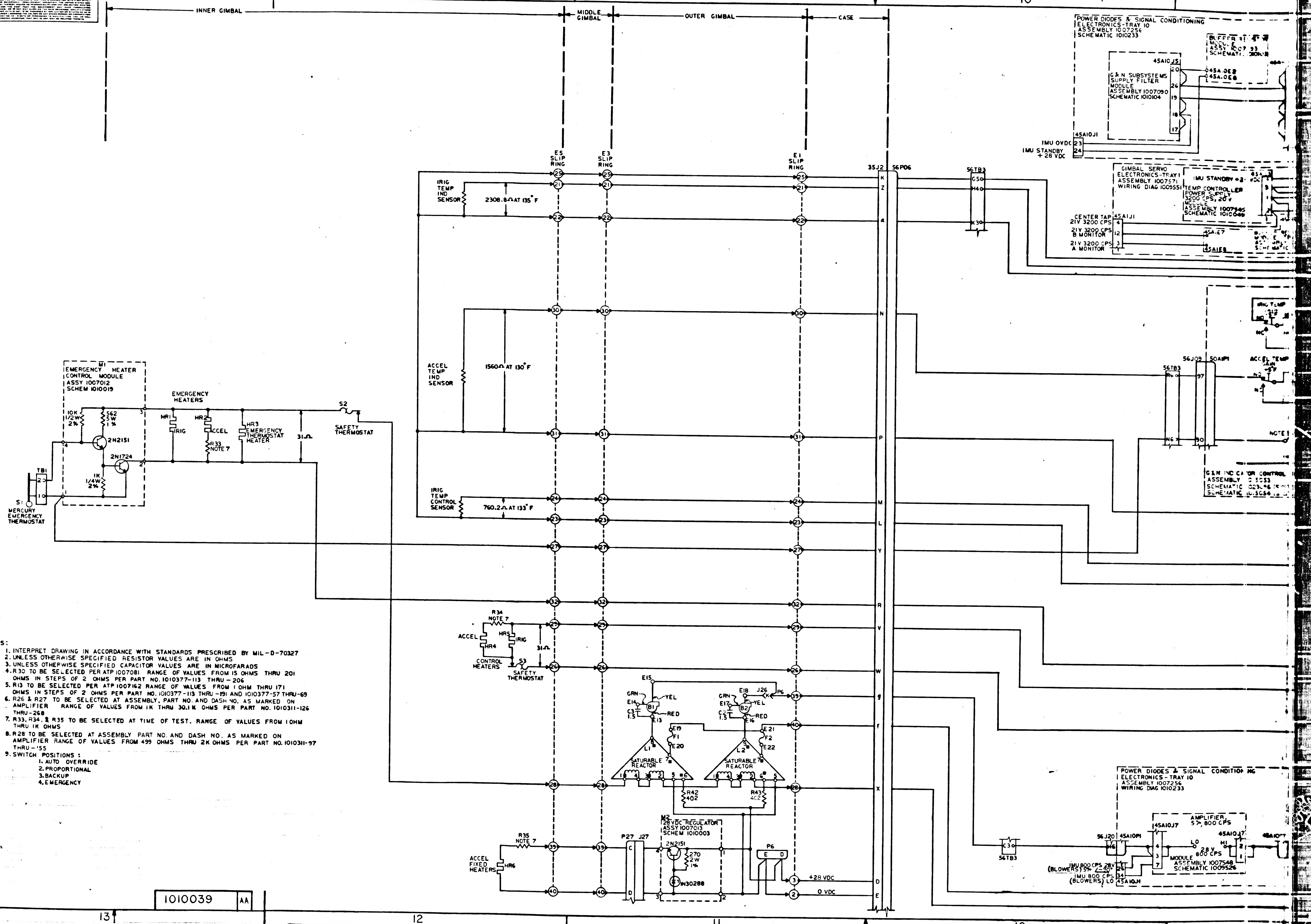
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
E5 SLIP RING
E3 SLIP RING
E1 SLIP RING
35J2
56P06
56TB3
IRIG TEMP IND SENSOR
2308.8Ω AT 135° F
ACCEL TEMP IND SENSOR
1560Ω AT 130° F
IRIG TEMP CONTROL SENSOR
760.2Ω AT 133° F
M1
EMERGENCY HEATER CONTROL MODULE
ASSY 1007012
SCHEM 1010019
10K 1/2W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
TB1
S1
MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 NOTE 7
HR3 EMERGENCY THERMOSTAT HEATER
31Ω
S2
SAFETY THERMOSTAT
R34 NOTE 7
ACCEL
HR4
HR5 IRIG
CONTROL HEATERS
S3
SAFETY THERMOSTAT
E15
GRN
YEL
RED
E14
B1
C3 1.5
E13
E18
J26
P6
E17
B2
C2 1.5
E16
E19
F1
E20
E21
F2
E22
L1
L2
SATURABLE REACTOR
R42 402
R43 402
M2
28 VDC REGULATOR
ASSY 1007013
SCHEM 1010003
2N2151
270 2W 1%
1N30288
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
P27
J27
+28 VDC
0 VDC
POWER DIODES & SIGNAL CONDITIONING ELECTRONICS-TRAY 10
ASSEMBLY 1007256
SCHEMATIC 1010233
G & N SUBSYSTEMS SUPPLY FILTER MODULE
ASSEMBLY 1007090
SCHEMATIC 1010104
45A10J5
45A10J1
IMU OVDC
IMU STANDBY +28 VDC
GIMBAL SERVO ELECTRONICS-TRAY 1
ASSEMBLY 1007571
WIRING DIAG 1009551
IMU STANDBY +28 VDC
TEMP CONTROLLER POWER SUPPLY 3200 CPS, 20 V MODULE
ASSEMBLY 1007545
SCHEMATIC 1010049
45A1J1
CENTER TAP 21V 3200 CPS
21V 3200 CPS B MONITOR
21V 3200 CPS A MONITOR
45A1E7
45A1E8
56J09
50A1P1
ACCEL TEMP
IRIG TEMP
NO
NC
NOTE 1
G & N INDICATOR CONTROL
ASSEMBLY
SCHEMATIC
SCHEMATIC
POWER DIODES & SIGNAL CONDITIONING ELECTRONICS - TRAY 10
ASSEMBLY 1007256
WIRING DIAG 1010233
56TB3
56J20
45A10P1
45A10J7
AMPLIFIER, 5%, 800 CPS
LO
HI
28 V 800 CPS
MODULE ASSEMBLY 1007548
SCHEMATIC 1009526
IMU 800 CPS 28V (BLOWERS) 5% ∠-90°
IMU 800 CPS (BLOWERS) LO
45A10J1
D
C
B
A
13
12
11
10

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081 RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS PER PART NO. 1010377-113 THRU -206
5. R13 TO BE SELECTED PER ATP 1007162 RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS PER PART NO. 1010377-113 THRU -191 AND 1010377-57 THRU -69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO. AS MARKED ON AMPLIFIER RANGE OF VALUES FROM 1K THRU 30.1K OHMS PER PART NO. 1010311-126 THRU -268
7. R33, R34, & R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY PART NO. AND DASH NO. AS MARKED ON AMPLIFIER RANGE OF VALUES FROM 499 OHMS THRU 2K OHMS PER PART NO. 1010311-97 THRU -155
9. SWITCH POSITIONS:
    1. AUTO OVERRIDE
    2. PROPORTIONAL
    3. BACKUP
    4. EMERGENCY

1010039	AA

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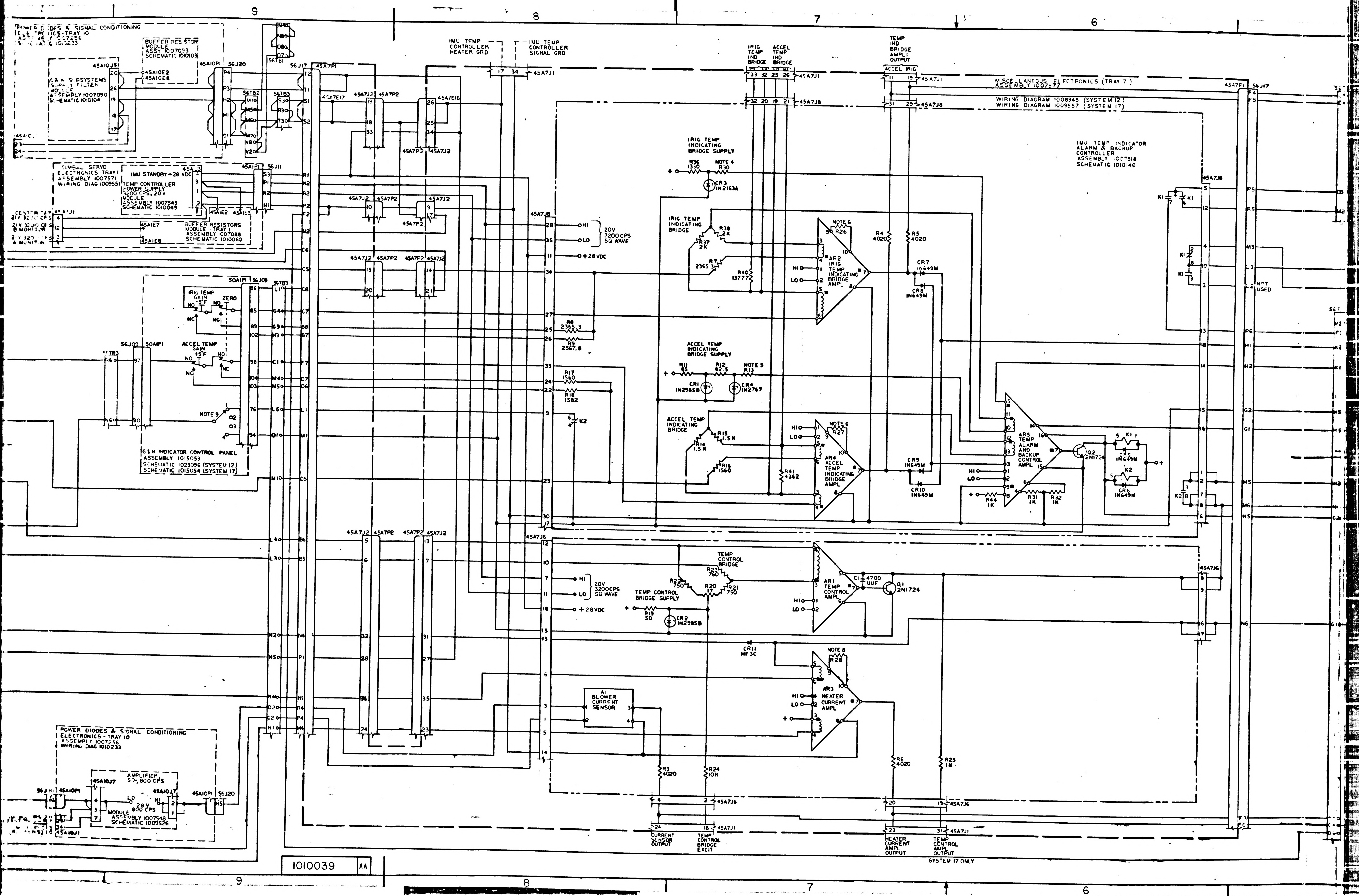
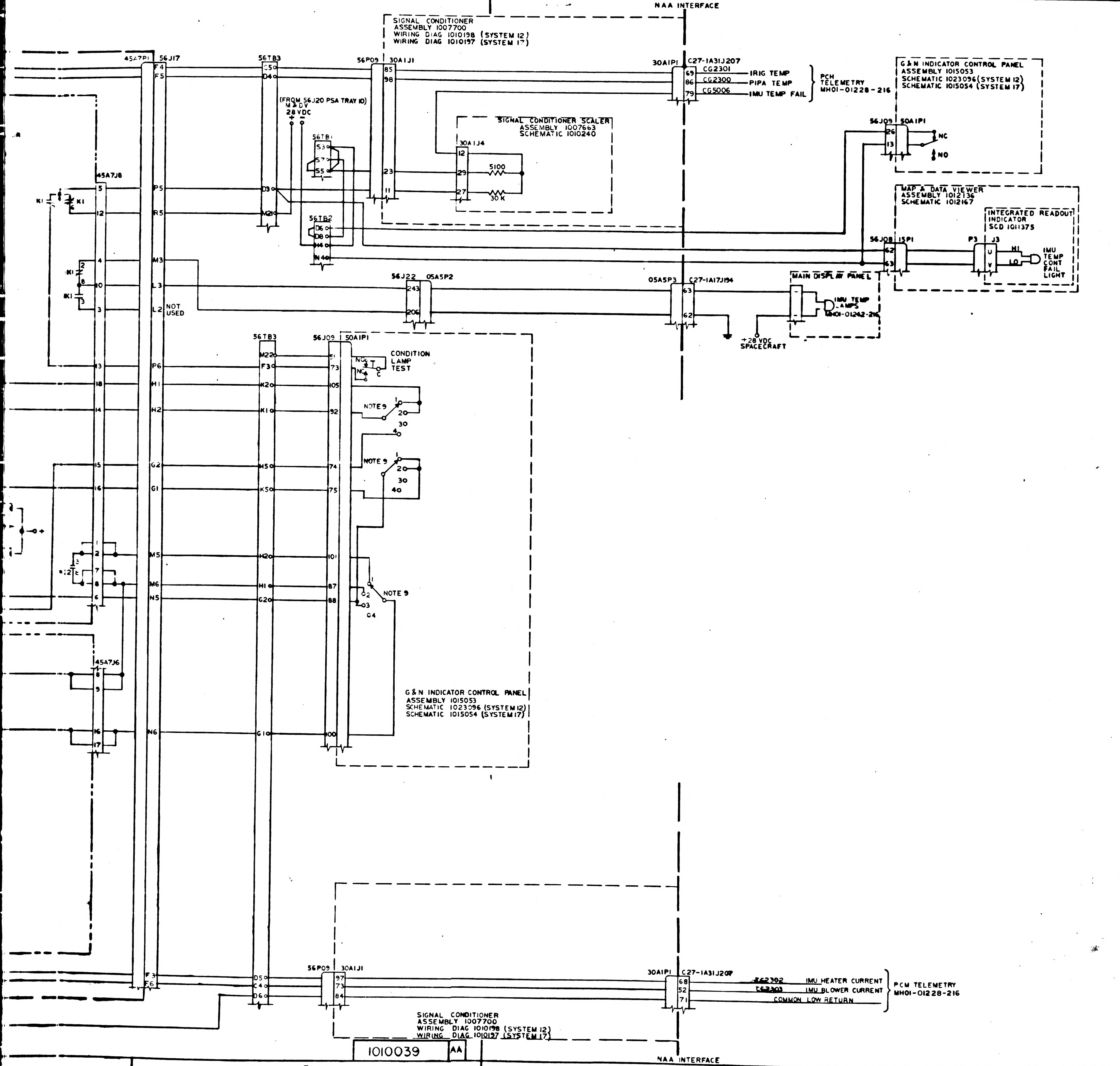

9
8
7
6
POWER DIODES & SIGNAL CONDITIONING ELECTRONICS-TRAY 10 ASSEMBLY 1007256 SCHEMATIC 1010233
BUFFER RESISTOR MODULE ASSY 1007093 SCHEMATIC 1010103
G & N SUBSYSTEMS SUPPLY FILTER MODULE ASSEMBLY 1007090 SCHEMATIC 1010104
45A10J5
45A10E2
45A10E8
45A10P1
56J20
56TB1
56TB2
56TB3
56J17
45A7P1
45A7E17
45A7J2
45A7P2
45A7E16
GIMBAL SERVO ELECTRONICS-TRAY 1 ASSEMBLY 1007571 WIRING DIAG 1009551
IMU STANDBY +28 VDC
TEMP CONTROLLER POWER SUPPLY 3200 CPS, 20V MODULE ASSEMBLY 1007545 SCHEMATIC 1010049
45A1J3
45A1P1
56J11
45A1E2
45A1E3
CENTER TAP 21V 3200 CPS
21V 3200 CPS B MONITOR
21V 3200 CPS A MONITOR
45A1J1
45A1E7
45A1E8
BUFFER RESISTORS MODULE - TRAY 1 ASSEMBLY 1007088 SCHEMATIC 1010060
IMU TEMP CONTROLLER HEATER GRD
IMU TEMP CONTROLLER SIGNAL GRD
45A7J1
45A7J8
45A7J6
20V 3200 CPS SQ WAVE
HI
LO
+28 VDC
50A1P1
56J09
IRIG TEMP GAIN -5°F
ZERO
ACCEL TEMP GAIN +5°F
NO
NC
NOTE 9
G & N INDICATOR CONTROL PANEL ASSEMBLY 1015053 SCHEMATIC 1023096 (SYSTEM 12) SCHEMATIC 1015054 (SYSTEM 17)
R8 2365.3
R9 2567.8
R17 1560
R18 1582
K2
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
TEMP IND BRIDGE AMPLI OUTPUT
ACCEL IRIG
MISCELLANEOUS ELECTRONICS (TRAY 7) ASSEMBLY 1007577
WIRING DIAGRAM 1008345 (SYSTEM 12)
WIRING DIAGRAM 1009557 (SYSTEM 17)
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER ASSEMBLY 1007518 SCHEMATIC 1010140
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R37 2K
R38 2K
R7 2365.3
R40 13777
NOTE 6 R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
R4 4020
R5 4020
CR7 1N649M
CR8 1N649M
K1
NOT USED
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B
CR4 1N2767
ACCEL TEMP INDICATING BRIDGE
R14 1.5K
R15 1.5K
R16 1560
R41 4362
NOTE 6 R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 1N649M
CR10 1N649M
AR5 TEMP ALARM AND BACKUP CONTROL AMPL
R44 1K
R31 1K
R32 1K
Q2 2N1724
CR5 1N649M
CR6 1N649M
TEMP CONTROL BRIDGE
R22 750
R23 760
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
AR1 TEMP CONTROL AMPL
C1 4700 UUF
Q1 2N1724
CR11 HF3C
NOTE 8 R28
AR3 HEATER CURRENT AMPL
A1 BLOWER CURRENT SENSOR
R3 4020
R24 10K
R6 4020
R25 1K
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
SYSTEM 17 ONLY
AMPLIFIER, 5%, 800 CPS
45A10J7
28 V 800 CPS
MODULE ASSEMBLY 1007548 SCHEMATIC 1009526
45A10J1
POWER DIODES & SIGNAL CONDITIONING ELECTRONICS - TRAY 10 ASSEMBLY 1007256 WIRING DIAG 1010233
1010039
AA

271010039


5
4
3
2
NAA INTERFACE
SIGNAL CONDITIONER
ASSEMBLY 1007700
WIRING DIAG 1010198 (SYSTEM 12)
WIRING DIAG 1010197 (SYSTEM 17)
45A7P1
56J17
56TB3
56P09
30A1J1
30A1P1
C27-1A31J207
CG2301
CG2300
CG5006
IRIG TEMP
PIPA TEMP
IMU TEMP FAIL
PCM TELEMETRY MH01-01228-216
(FROM 56J20 PSA TRAY 10)
M ADV
28 VDC
56TB1
56TB2
SIGNAL CONDITIONER SCALER
ASSEMBLY 1007663
SCHEMATIC 1010240
30A1J4
5100
30 K
G&N INDICATOR CONTROL PANEL
ASSEMBLY 1015053
SCHEMATIC 1023096 (SYSTEM 12)
SCHEMATIC 1015054 (SYSTEM 17)
56J09
50A1P1
NC
NO
MAP & DATA VIEWER
ASSEMBLY 1012136
SCHEMATIC 1012167
INTEGRATED READOUT INDICATOR
SCD 1011375
56J08
15P1
P3
J3
HI
LO
IMU TEMP CONT FAIL LIGHT
45A7J8
K1
56J22
05A5P2
05A5P3
C27-1A17J194
MAIN DISPLAY PANEL
IMU TEMP LAMPS
MH01-01242-216
+28 VDC SPACECRAFT
NOT USED
CONDITION LAMP TEST
NOTE 9
45A7J6
56P09
30A1J1
30A1P1
C27-1A31J207
CG2302
CG2303
IMU HEATER CURRENT
IMU BLOWER CURRENT
COMMON LOW RETURN
PCM TELEMETRY MH01-01228-216
SIGNAL CONDITIONER
ASSEMBLY 1007700
WIRING DIAG 1010198 (SYSTEM 12)
WIRING DIAG 1010197 (SYSTEM 17)
NAA INTERFACE
5
4
3
2

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	1000284				
AR5	1018900	MAG AMPL			
L1	1000288	SATURABLE REACTOR			
L2	1000288	SATURABLE REACTOR			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	1010273-1	TRANSISTOR	2N1724		
K1	1010353-1	RELAY	33 WK-2		
K2	1010353-1	RELAY	33 WK-2		
CR1	1010331-020	DIODE	IN2985B	2%	10 W
CR2	1010331-009		IN2985 B	5%	10 W
CR3	1010440		IN2163A	2%	3/4 W
CR4	1010441-2		IN2767	2%	2 W
CR5	1010362-3		IN649 M		600 MW
CR6					
CR7					
CR8					
CR9					
CR10	1010362-3		IN649 M		600 MW
CR11	1010322-001	DIODE	HF3C		6 AMP
C1	1010359-25	CAPACITOR	4700 UUF	20%	200 V
C2	1010264-38	CAPACITOR	1.5	5%	200 VDC
C3	1010264-38	CAPACITOR	1.5	5%	200 VDC
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170	FUSE			
F2	1000170	FUSE			
S1	1000247	MERCURY THERMOSTAT			
S2	1000266	THERMOSTAT			
S3	1000266	THERMOSTAT			
HR1	1000126	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126				
HR6	1000134	HEATER			
A1	1000287	CURRENT SENSOR			
M1	1007012	EMERGENCY HEATER CONTROL MODULE			
M2	1007013	28 VDC REGULATOR MODULE			
R3	1010364-368	RESISTOR	4020	1%	1/8 W
R4	1010364-368		4020	1%	
R5	1010364-368		4020	1%	
R6	1010364-368		4020	1%	
R7	1010450-12		2365.3	0.01%	
R8	1010450-12		2365.3	0.01%	
R9	1010450-13		2567.8	0.01%	1/8 W
R11	1010361-112		85	3%	5 W
R12	1010364-44		82.5	1%	1/8 W
R13	1010377	NOTE 5	SAT	0.1%	1/10 W
R14	1010450-2		1500	0.01%	1/8 W
R15	-2		1500		
R16	-3		1560		
R17	-3		1560		
R18	1010450-14		1582	0.01%	1/8 W
R19	1010399-16	RESISTOR	50	5%	5 W
R20	1010453-1	POTENTIOMETER	17	10%	1/4 W
R21	1010449-1	RESISTOR	750	0.01%	3/4 W
R22	1010449-1		750	0.01%	3/4 W
R23	1010449-2		760	0.01%	3/4 W
R24	1006750-56		10K	2%	1/4 W
R25	1010312-36		1K	5%	2 W
R26	1010311	NOTE 6	SAT	1%	1/10 W
R27	1010311	NOTE 6	SAT	1%	
R28	1010311	NOTE 8	SAT	1%	
R30	1010377	NOTE 4	SAT	0.1%	
R31	1010377-237		1K	0.1%	
R32	1010377-237		1K	0.1%	1/10 W
R33	1010498	NOTE 7	SAT	1%	10 W
R34	1010498	NOTE 7	SAT	1%	10 W
R35	1010498	NOTE 7	SAT	1%	10 W
R36	1010452-167		1330	1%	1 W
R37	1010450-9		2000	0.01%	1/8 W
R38	1010450-9		2000		
R40	1010450-10		13777		
R41	1010450-11		4362	0.01%	1/8 W
R42	1010325-251		402	1%	5 W
R43	1010325-[illegible]		[illegible]	1%	5 W
R44	1010604-22	RESISTOR	1K	1%	1 W

NEXT ASSY	USED ON
APPLICATION	

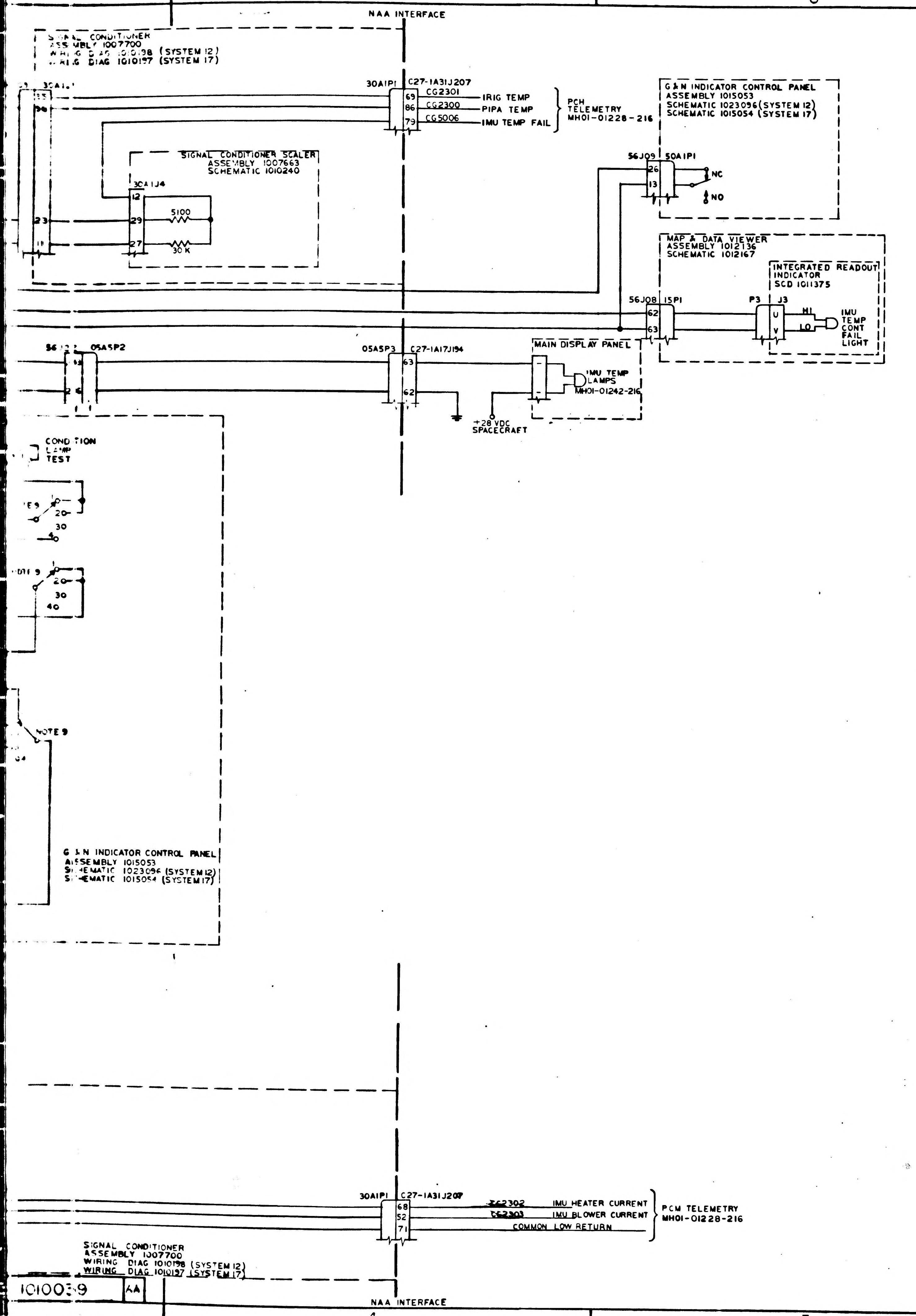
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± —— ± —— ± ——
DO NOT SCALE THIS DRAWING
MATERIAL

M I T
INSTRUMENTATION

1010039 AA

3/1010039

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
AA		THIS SHEET ADDED PER TDRR28889	DKD	KEL	3MAY66	


4
3
NAA INTERFACE
SIGNAL CONDITIONER ASSEMBLY 1007700
WIRING DIAG 1010198 (SYSTEM 12)
WIRING DIAG 1010197 (SYSTEM 17)
3CA1J1
30A1P1
C27-1A31J207
65
66
79
CG2301
CG2300
CG5006
IRIG TEMP
PIPA TEMP
IMU TEMP FAIL
PCM TELEMETRY MH01-01228-216
G&N INDICATOR CONTROL PANEL
ASSEMBLY 1015053
SCHEMATIC 1023096 (SYSTEM 12)
SCHEMATIC 1015054 (SYSTEM 17)
SIGNAL CONDITIONER SCALER
ASSEMBLY 1007663
SCHEMATIC 1010240
3CA1J4
12
29
27
5100
30K
23
56J09
50A1P1
26
13
NC
NO
MAP & DATA VIEWER
ASSEMBLY 1012136
SCHEMATIC 1012167
INTEGRATED READOUT INDICATOR
SCD 1011375
56J08
15P1
62
63
P3
J3
U
V
HI
LO
IMU TEMP CONT FAIL LIGHT
05A5P2
05A5P3
C27-1A17J194
63
62
MAIN DISPLAY PANEL
IMU TEMP LAMPS
MH01-01242-216
+28 VDC SPACECRAFT
CONDITION LAMP TEST
20
30
40
NOTE 9
G&N INDICATOR CONTROL PANEL
ASSEMBLY 1015053
SCHEMATIC 1023096 (SYSTEM 12)
SCHEMATIC 1015054 (SYSTEM 17)
30A1P1
C27-1A31J207
68
52
71
CG2302
CG2303
IMU HEATER CURRENT
IMU BLOWER CURRENT
COMMON LOW RETURN
PCM TELEMETRY MH01-01228-216
SIGNAL CONDITIONER ASSEMBLY 1007700
WIRING DIAG 1010198 (SYSTEM 12)
WIRING DIAG 1010197 (SYSTEM 17)
NAA INTERFACE
4
3

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	1000284				
AR5	1018900	MAG AMPL			
L1	1000288	SATURABLE REACTOR			
L2	1000288	SATURABLE REACTOR			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	1010273-1	TRANSISTOR	2N1724		
K1	1010353-1	RELAY	33 WK-2		
K2	1010353-1	RELAY	33 WK-2		
CR1	1010331-020	DIODE	1N2985B	2%	10 W
CR2	1010331-009		1N2985 B	5%	10W
CR3	1010440		1N2163A	2%	3/4 W
CR4	1010441-2		1N2767	2%	2 W
CR5	1010362-3		1N649 M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	1010362-3		1N649 M		600 MW
CR11	1010322-001	DIODE	HF3C		6 AMP
C1	1010359-25	CAPACITOR	4700 UUF	20%	200 V
C2	1010264-38	CAPACITOR	1.5	5%	200 VDC
C3	1010264-38	CAPACITOR	1.5	5%	200 VDC
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170	FUSE			
F2	1000170	FUSE			
S1	1000247	MERCURY THERMOSTAT			
S2	1000266	THERMOSTAT			
S3	1000266	THERMOSTAT			
HR1	1000126	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126				
HR6	1000134	HEATER			
A1	1000287	CURRENT SENSOR			
M1	1007012	EMERGENCY HEATER CONTROL MODULE			
M2	1007013	28 VDC REGULATOR MODULE			
R3	1010364-368	RESISTOR	4020	1%	1/8 W
R4	1010364-368		4020	1%	
R5	1010364-368		4020	1%	
R6	1010364-368		4020	1%	
R7	1010450-12		2365.3	0.01%	
R8	1010450-12		2365.3	0.01%	
R9	1010450-13		2567.8	0.01%	1/8 W
R11	1010361-112		85	3%	5 W
R12	1010364-44		82.5	1%	1/8 W
R13	1010377	NOTE 5	SAT	0.1%	1/10 W
R14	1010450-2		1500	0.01%	1/8 W
R15	-2		1500		
R16	-3		1560		
R17	-3		1560		
R18	1010450-14		1582	0.01%	1/8 W
R19	1010399-16	RESISTOR	50	5%	5 W
R20	1010453-1	POTENTIOMETER	17	10%	1/4 W
R21	1010449-1	RESISTOR	750	0.01%	3/4 W
R22	1010449-1		750	0.01%	3/4 W
R23	1010449-2		760	0.01%	3/4 W
R24	1006750-56		10K	2%	1/4 W
R25	1010312-36		1 K	5%	2 W
R26	1010311	NOTE 6	SAT	1%	1/10 W
R27	1010311	NOTE 6	SAT	1%	
R28	1010311	NOTE 8	SAT	1%	
R30	1010377	NOTE 4	SAT	0.1%	
R31	1010377-237		1 K	0.1%	
R32	1010377-237		1K	0.1%	1/10 W
R33	1010498	NOTE 7	SAT	1%	10 W
R34	1010498	NOTE 7	SAT	1%	10 W
R35	1010498	NOTE 7	SAT	1%	10 W
R36	1010452-167		1330	1%	1 W
R37	1010450-9		2000	0.01%	1/8 W
R38	1010450-9		2000		
R40	1010450-10		13777		
R41	1010450-11		4362	0.01%	1/8 W
R42	1010325-251		402	1%	5 W
R43	1010325-25		[illegible]	1%	5 W
R44	1010604-22	RESISTOR	1K	1%	1W

D

C

B

A

1010039

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± —— ± —— ± ——
DO NOT SCALE THIS DRAWING

MATERIAL ——

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN Sam J. DeLuca 16 June 66
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

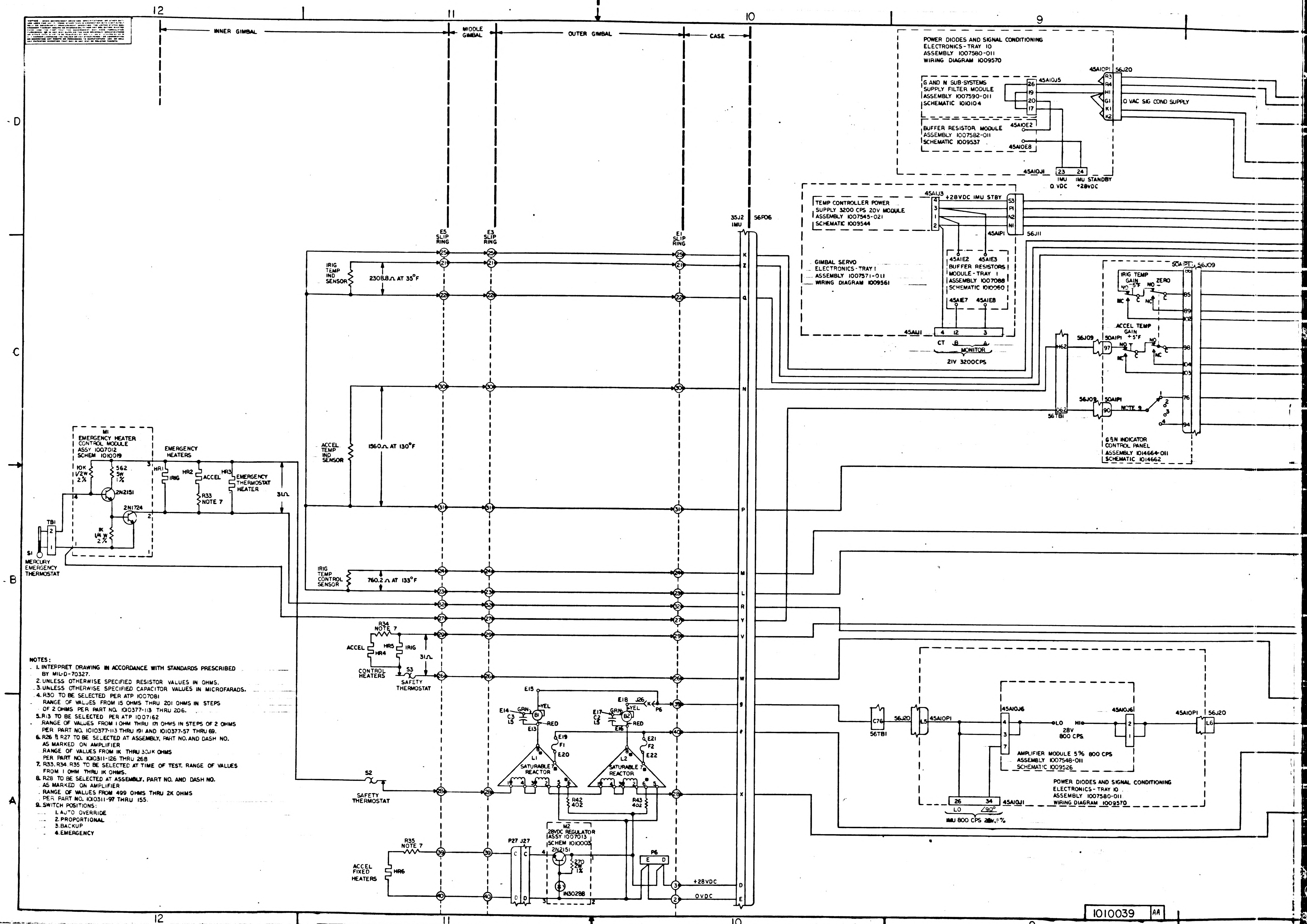
APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I, SERIES 50

CODE IDENT NO	SIZE	DRAWING NO
80230	J	1010039

SCALE —— SHEET 2 OF 3

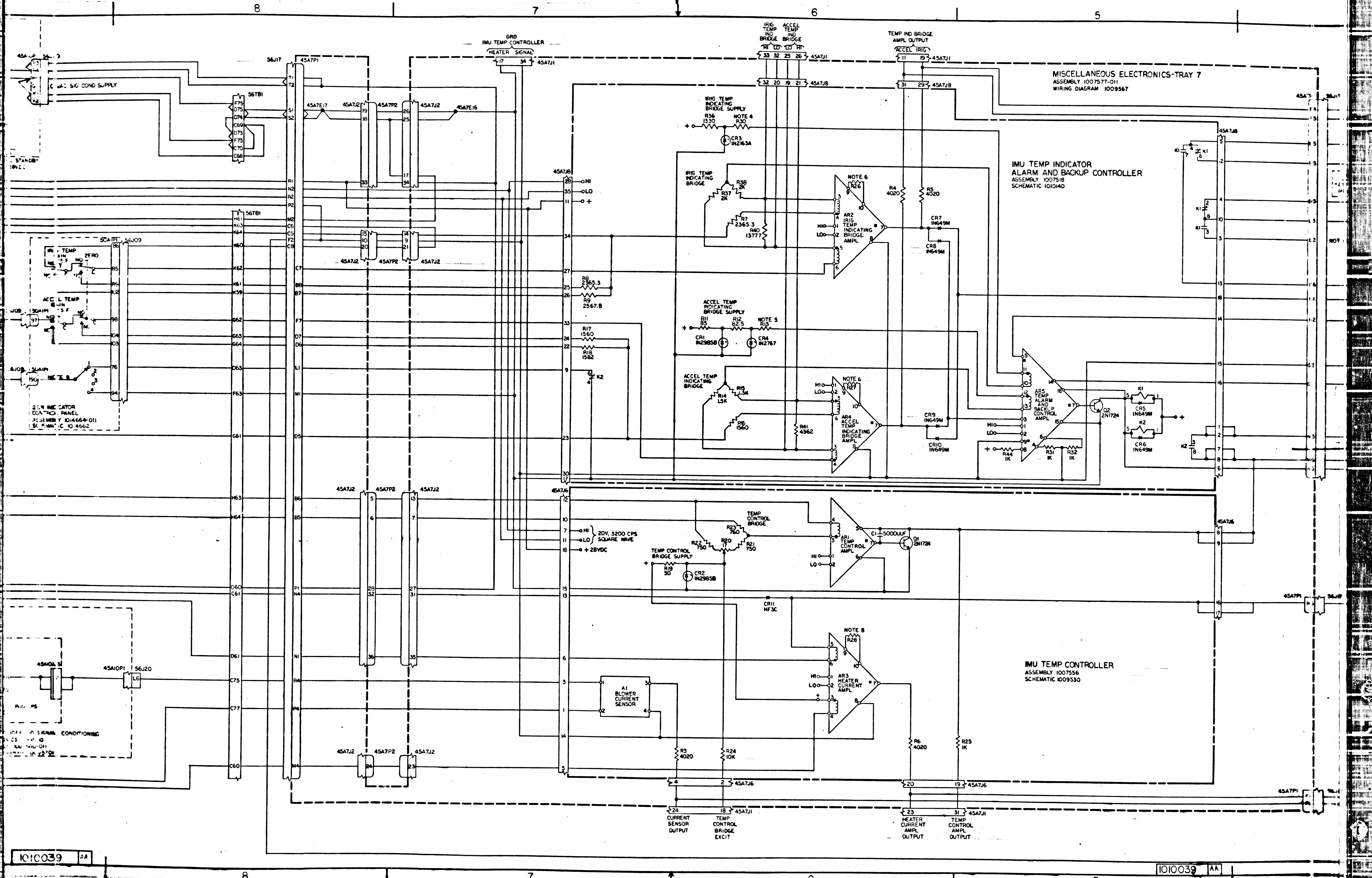
1010039 AA

4/1010039

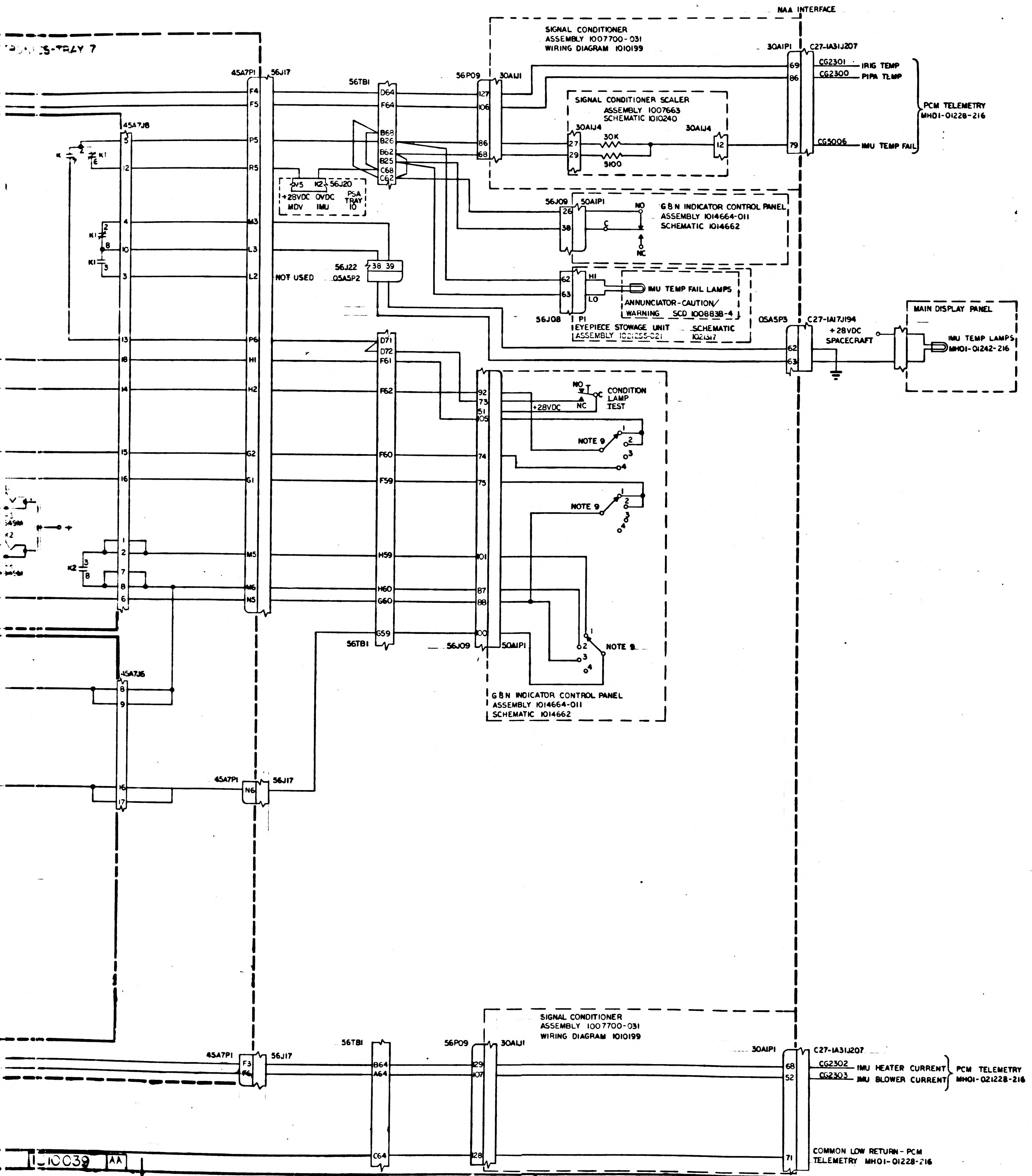

12
11
10
9
D
C
B
A
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
POWER DIODES AND SIGNAL CONDITIONING
ELECTRONICS-TRAY 10
ASSEMBLY 1007580-011
WIRING DIAGRAM 1009570
G AND N SUB-SYSTEMS
SUPPLY FILTER MODULE
ASSEMBLY 1007590-011
SCHEMATIC 1010104
45A10J5
26
19
20
17
45A10P1
56J20
R3
R4
H1
G1
K1
K2
0 VAC SIG COND SUPPLY
BUFFER RESISTOR MODULE
ASSEMBLY 1007582-011
SCHEMATIC 1009537
45A10E2
45A10E8
45A10J1
23
24
IMU
0 VDC
IMU STANDBY
+28VDC
TEMP CONTROLLER POWER
SUPPLY 3200 CPS 20V MODULE
ASSEMBLY 1007545-021
SCHEMATIC 1009544
45A1J3
+28VDC IMU STBY
4
3
1
2
S3
P1
N2
N1
45A1P1
56J11
GIMBAL SERVO
ELECTRONICS-TRAY 1
ASSEMBLY 1007571-011
WIRING DIAGRAM 1009561
45A1E2
45A1E3
BUFFER RESISTORS
MODULE-TRAY 1
ASSEMBLY 1007088
SCHEMATIC 1010060
45A1E7
45A1E8
45A1J1
4
12
3
CT
B
A
MONITOR
21V 3200CPS
35J2
IMU
56P06
E5
SLIP
RING
E3
SLIP
RING
E1
SLIP
RING
IRIG
TEMP
IND
SENSOR
2308.8 Ω AT 35°F
ACCEL
TEMP
IND
SENSOR
1560 Ω AT 130°F
IRIG
TEMP
CONTROL
SENSOR
760.2 Ω AT 133°F
25
21
22
30
31
24
23
32
27
29
26
39
40
28
3
2
K
Z
G
N
P
M
L
R
Y
V
W
S
F
X
D
E
M1
EMERGENCY HEATER
CONTROL MODULE
ASSY 1007012
SCHEM 1010019
10K
1/2W
2%
562
5W
1%
2N2151
2N1724
1K
1/4 W
2%
TB1
S1
MERCURY
EMERGENCY
THERMOSTAT
EMERGENCY
HEATERS
HR1
IRIG
HR2
ACCEL
R33
NOTE 7
HR3
EMERGENCY
THERMOSTAT
HEATER
31Ω
R34
NOTE 7
ACCEL
HR4
HR5
IRIG
CONTROL
HEATERS
S3
SAFETY
THERMOSTAT
S2
SAFETY
THERMOSTAT
R35
NOTE 7
ACCEL
FIXED
HEATERS
HR6
E15
E14
GRN
B1
YEL
RED
C3
1.5
E13
E18
J26
K
P6
E17
C2
1.5
B2
E16
E19
F1
E20
E21
F2
E22
L1
SATURABLE
REACTOR
L2
SATURABLE
REACTOR
R42
402
R43
402
M2
28VDC REGULATOR
ASSY 1007013
SCHEM 1010003
2N2151
270
2W
1%
1N3028B
P27
J27
C
D
P6
E
D
+28VDC
0VDC
56JO9
50A1P1
IRIG TEMP
GAIN
-5°F
ZERO
NO
NC
C
ACCEL TEMP
GAIN
+5°F
88
85
89
102
98
104
103
76
94
97
90
H62
D62
56TB1
NOTE 9
G&N INDICATOR
CONTROL PANEL
ASSEMBLY 1014664-011
SCHEMATIC 1014662
C76
56TB1
56J20
L5
45A10P1
45A10J6
4
3
7
LO
HI
28V
800 CPS
2
1
L6
AMPLIFIER MODULE 5% 800 CPS
ASSEMBLY 1007548-011
SCHEMATIC 1009526
POWER DIODES AND SIGNAL CONDITIONING
ELECTRONICS-TRAY 10
ASSEMBLY 1007580-011
WIRING DIAGRAM 1009570
26
34
45A10J1
LO
∠90°
IMU 800 CPS 28V,5%
1010039
AA

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES IN OHMS.
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES IN MICROFARADS.
4. R30 TO BE SELECTED PER ATP 1007081
   RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS PER PART NO. 1010377-113 THRU 206.
5. R13 TO BE SELECTED PER ATP 1007162
   RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS PER PART NO. 1010377-113 THRU 191 AND 1010377-57 THRU 69.
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO. AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 1K THRU 30.1K OHMS PER PART NO. 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS.
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO. AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 499 OHMS THRU 2K OHMS PER PART NO. 1010311-97 THRU 155.
9. SWITCH POSITIONS:
   1. AUTO OVERRIDE
   2. PROPORTIONAL
   3. BACKUP
   4. EMERGENCY


8
7
6
5
MISCELLANEOUS ELECTRONICS-TRAY 7
ASSEMBLY 1007577-011
WIRING DIAGRAM 1009567
IMU TEMP INDICATOR
ALARM AND BACKUP CONTROLLER
ASSEMBLY 1007518
SCHEMATIC 1010140
IMU TEMP CONTROLLER
ASSEMBLY 1007556
SCHEMATIC 1009530
GRD
IMU TEMP CONTROLLER
HEATER SIGNAL
17 34 45A7J1
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
HI LO LO HI
33 32 25 26 45A7J1
32 20 19 21 45A7J8
TEMP IND BRIDGE AMPL OUTPUT
ACCEL IRIG
11 19 45A7J1
31 29 45A7J8
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
NOTE 6
R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
R4 4020
R5 4020
CR7 1N649M
CR8 1N649M
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B
CR4 1N2767
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R27
R41 4362
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 1N649M
CR10 1N649M
AR5 TEMP ALARM AND BACKUP CONTROL AMPL
R44 1K
R31 1K
R32 1K
Q2 2N1724
K1
K2
CR5 1N649M
CR6 1N649M
45A7J8
HI
LO
+
R8 2365.3
R9 2567.8
R17 1560
R18 1582
K2
45A7J6
20V, 3200 CPS SQUARE WAVE
+28VDC
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
AR1 TEMP CONTROL AMPL
C1 5000UUF
Q1 2N1724
CR11 HF3C
NOTE 8
R28
AR3 HEATER CURRENT AMPL
A1 BLOWER CURRENT SENSOR
R3 4020
R24 10K
R6 4020
R25 1K
4 2 45A7J6
20 19 45A7J6
24 18 45A7J1
23 31 45A7J1
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
45A7P1
56J17
56TB1
45A7E17
45A7E16
45A7J2
45A7P2
50A1P1
56J09
IRIG TEMP
ZERO
ACCEL TEMP
NOTE 9
GSN INDICATOR CONTROL PANEL
ASSEMBLY 1014664-011
SCHEMATIC 1014662
45A10P1
56J20
L6
SIGNAL CONDITIONING
STANDBY
SIG COND SUPPLY
1010039 AA
1010039 AA

27/1010039



-TRAY 7
45A7P1
56J17
45A7J8
K1
K2
F4
F5
P5
R5
M3
L3
L2
NOT USED
P6
H1
H2
G2
G1
M5
M6
N5
45A7J6
N6
56TB1
D64
F64
B68
B26
B62
B25
C68
C62
V5
K2
56J20
+28VDC MDV
0VDC IMU
PSA TRAY 10
56J22
05A5P2
38 39
D71
D72
F61
F62
F60
F59
H59
H60
G60
G59
56P09
30A1J1
127
106
86
68
SIGNAL CONDITIONER
ASSEMBLY 1007700-031
WIRING DIAGRAM 1010199
SIGNAL CONDITIONER SCALER
ASSEMBLY 1007663
SCHEMATIC 1010240
30A1J4
30K
5100
NAA INTERFACE
30A1P1
C27-1A31J207
CG2301
IRIG TEMP
CG2300
PIPA TEMP
CG5006
IMU TEMP FAIL
PCM TELEMETRY
MH01-01228-216
56J09
50A1P1
NO
C
NC
G&N INDICATOR CONTROL PANEL
ASSEMBLY 1014664-011
SCHEMATIC 1014662
56J08
P1
H1
LO
IMU TEMP FAIL LAMPS
ANNUNCIATOR-CAUTION/WARNING
SCD 1008838-4
EYEPIECE STOWAGE UNIT
ASSEMBLY 1021255-021
SCHEMATIC 1021317
05A5P3
C27-1A17J194
+28VDC SPACECRAFT
MAIN DISPLAY PANEL
IMU TEMP LAMPS
MH01-01242-216
CONDITION LAMP TEST
+28VDC
NOTE 9
G&N INDICATOR CONTROL PANEL
ASSEMBLY 1014664-011
SCHEMATIC 1014662
F3
F6
B64
A64
C64
129
107
128
68
52
71
CG2302
IMU HEATER CURRENT
CG2303
IMU BLOWER CURRENT
PCM TELEMETRY
MH01-021228-216
COMMON LOW RETURN-PCM TELEMETRY MH01-01228-216

1010039 AA

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	10[illegible]284				
AR5	1018900	MAG AMPL			
L1	1000288	SATURABLE REACTOR			
L2	1000288	SATURABLE REACTOR			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	1010273-1	TRANSISTOR	2N1724		
K1	1010353-1	RELAY	33WK-2		
K2	1010353-1	RELAY	33WK-2		
CR1	1010331-020	DIODE	1N2985B	2 %	10W
CR2	1010331-009		1N2985B	5 %	
CR3	1010440		1N2163A	2 %	3/4 W
CR4	1010441-2		1N2767	2 %	2W
CR5	1010362-3		1N649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	1010362-3		1N649M		600MW
CR11	1010777-1	DIODE			6 AMP
C1	1006777-29	CAPACITOR	5000UUF	10 %	100V
C2	1010264-38	CAPACITOR	1.5	5 %	200VDC
C3	1010264-38	CAPACITOR	1.5	5 %	200VDC
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170	FUSE			
F2	1000170	FUSE			
S1	1000247	MERCURY THERMOSTAT			
S2	1000266	THERMOSTAT			
S3	1000266	THERMOSTAT			
HR1	1000126	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126				
HR6	1000134	HEATER			
A1	1000287	CURRENT SENSOR			
M1	1007012	EMERGENCY HEATER CONTROL MODULE			
M2	1007013	28VDC REGULATOR MODULE			
R3	1010364-368	RESISTOR	4050	1%	1/8W
R4			4020	1%	
R5			4020	1%	
R6	1010364-368		4050	1%	
R7	1010450-12		2365.3	0.01%	
R8	1010450-12		2365.3	0.01%	
R9	1010450-13		2567.8	0.01%	1/8W
R11	1010361-112		85	3 %	5W
R12	1010364-44		82.5	1 %	1/8 W
R13	1010377	NOTE 5	SAT	0.1 %	1/10W
R14	1010450-2		1500	0.01%	1/8W
R15	-2		1500		
R16	-3		1560		
R17	-3		1560		
R18	1010450-14		1582	0.01%	1/8W
R19	1010399-16	RESISTOR	50	5 %	5W
R20	1010453-1	POTENTIOMETER	17	10 %	1/4W
R21	1010835-1	RESISTOR	750	0.01%	3/4W
R22	1010835-1		750	0.01%	3/4W
R23	1010835-2		760	0.01%	3/4W
R24	1006750-56		10K	2 %	1/4W
R25	1010312-36		1K	5 %	2W
R26	1010311	NOTE 6	SAT	1 %	1/10W
R27	1010311	NOTE 6	SAT	1 %	1/10W
R28	1010311	NOTE 8	SAT	1 %	1/10W
R30	1010377	NOTE 4	SAT	0.1 %	1/10W
R31	1010377-237		1K	0.1 %	1/10W
R32	1010377-237		1K	0.1 %	1/10W
R33	1010498	NOTE 7	SAT	1 %	10 W
R34	1010498	NOTE 7	SAT	1 %	10W
R35	1010498	NOTE 7	SAT	1 %	10W
R36	1010452-167		1330	1 %	1W
R37	1010450-9		2000	0.01%	1/8W
R38	1010450-9		2000	0.01%	1/8W
R40	1010450-10		13777	0.01%	1/8W
R41	1010450-11		4362	0.01%	1/8W
R42	1010325-251		402	1 %	5W
R43	1010325-25		402	1 %	5W
R44	1010604-22	RESISTOR	1K	1 %	1W

REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
AA		THIS SHEET ADDED PER TDRR 28329	JLD	VSL	3/1/66	

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

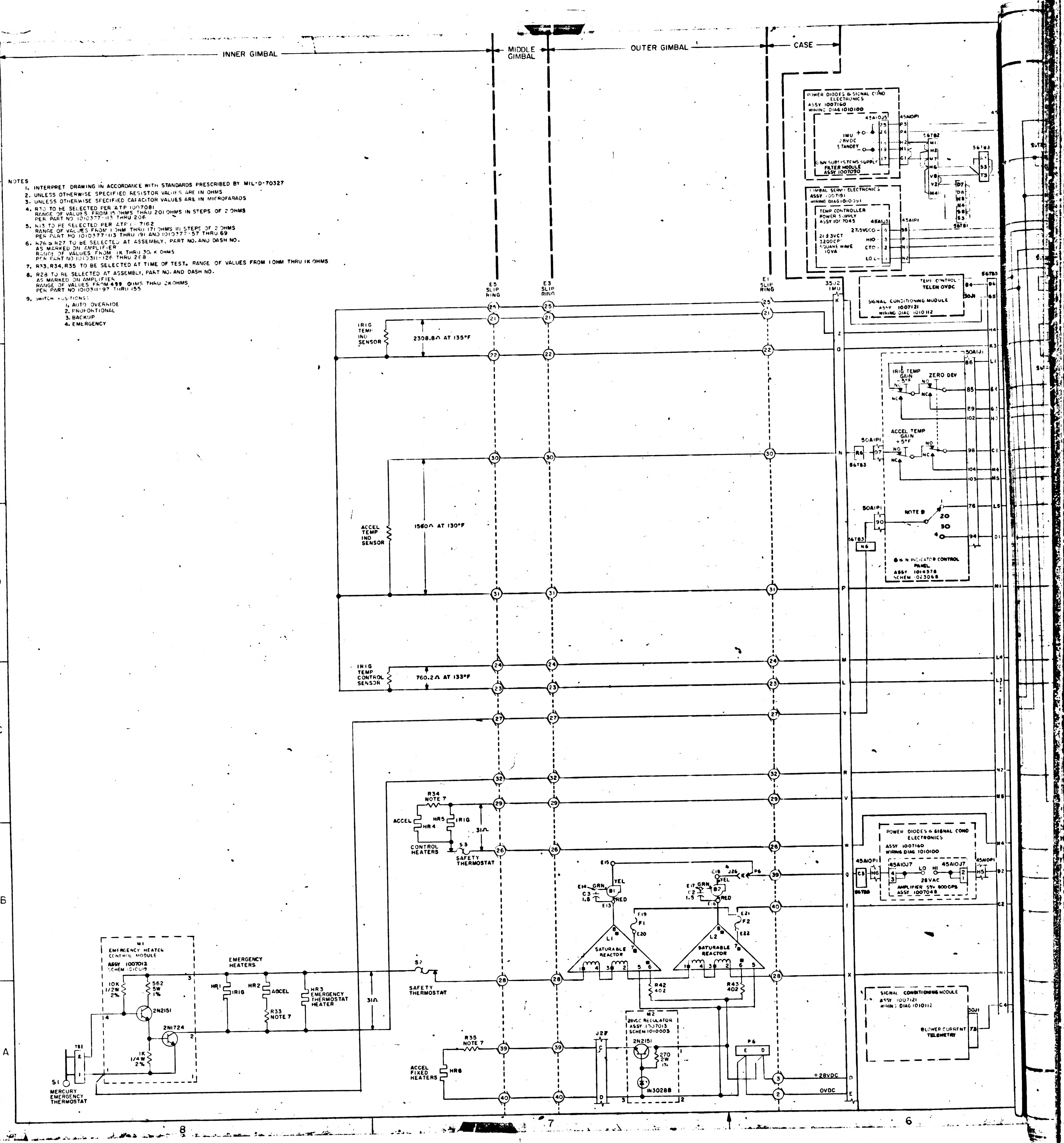
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN E. Miller
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I-SERIES 100

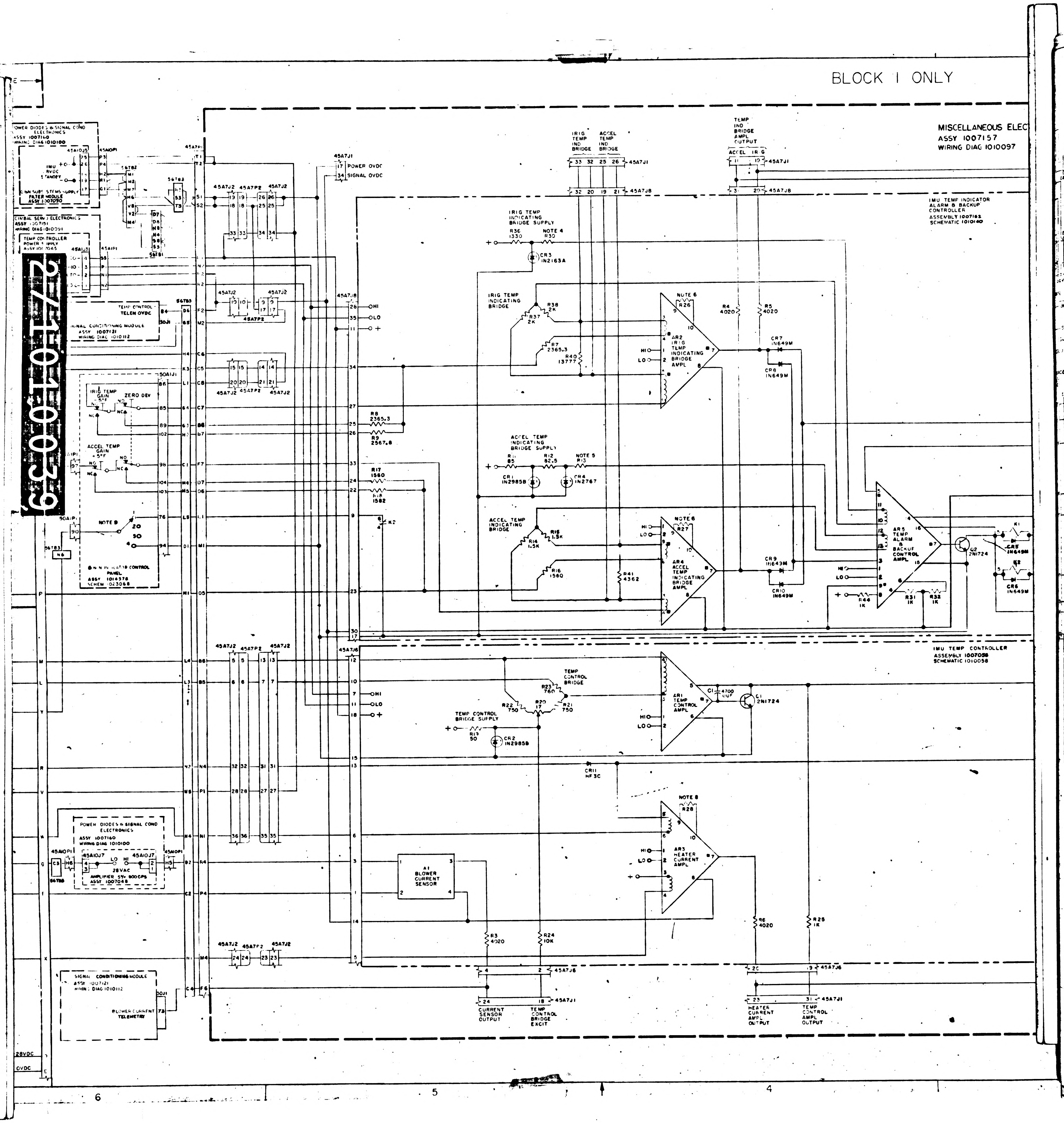
CODE IDENT NO 80230
SIZE J
DRAWING NO. 1010039
SCALE —
SHEET 3 OF 3

3/1010039

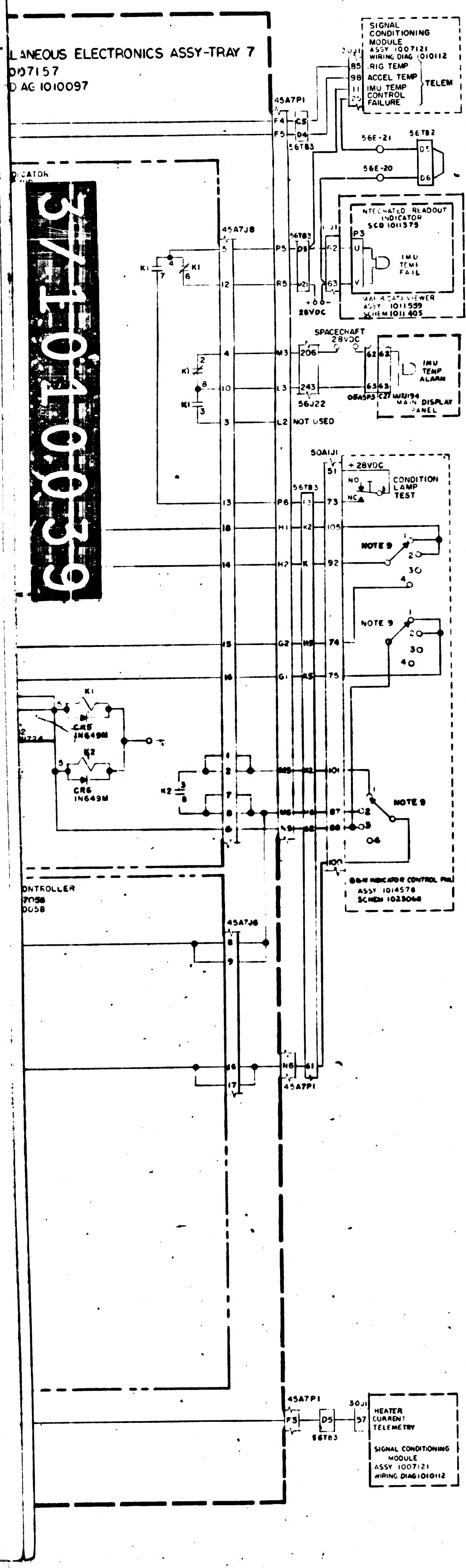

INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
G
F
E
D
C
B
A
8
7
6
POWER DIODES & SIGNAL COND ELECTRONICS
ASSY 1007160
WIRING DIAG 1010100
45A10J5
45A10P1
IMU 28VDC STANDBY
G&N SUBSYSTEMS SUPPLY
FILTER MODULE
ASSY 1007090
56TB2
56TB8
56TB1
GIMBAL SERVO ELECTRONICS
ASSY 1007151
WIRING DIAG 1010091
TEMP CONTROLLER POWER SUPPLY
ASSY 1007045
45A1J3
45A1P1
27.5VDC
HI
CT
LO
21 ± 3VCT
3200CPS
SQUARE WAVE
10VA
E1 SLIP RING
E3 SLIP RING
E5 SLIP RING
35J2 IMU
TEMP CONTROL TELEM 0VDC
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
30J1
56TB3
50A1J1
IRIG TEMP GAIN -5°F
ZERO DEV
NO
NC
ACCEL TEMP GAIN +5°F
50A1P1
R6
NOTE 9
G & N INDICATOR CONTROL PANEL
ASSY 1014578
SCHEM 1023068
N6
IRIG TEMP IND SENSOR
2308.8Ω AT 135°F
ACCEL TEMP IND SENSOR
1560Ω AT 130°F
IRIG TEMP CONTROL SENSOR
760.2Ω AT 133°F
R34 NOTE 7
ACCEL
HR4
HR5
IRIG
31Ω
CONTROL HEATERS
S3
SAFETY THERMOSTAT
E15
E14
GRN
YEL
RED
B1
C3 1.5
E13
E17
E18
C2 1.5
B2
E16
J26
P6
E19
F1
E20
E21
F2
E22
L1
L2
SATURABLE REACTOR
R42 402
R43 402
POWER DIODES & SIGNAL COND ELECTRONICS
ASSY 1007160
WIRING DIAG 1010100
45A10P1
45A10J7
LO
HI
28VAC
AMPLIFIER 5% 800CPS
ASSY 1007048
C3
H6
H5
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
BLOWER CURRENT TELEMETRY
73
M1
EMERGENCY HEATER CONTROL MODULE
ASSY 1007012
SCHEM 1010019
10K 1/2W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
TB1
S1
MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1
IRIG
HR2
ACCEL
R33 NOTE 7
HR3 EMERGENCY THERMOSTAT HEATER
31Ω
S7
SAFETY THERMOSTAT
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
J27
M2
28VDC REGULATOR
ASSY 1007013
SCHEM 1010003
2N2151
270 2W 1%
1N3028B
+28VDC
0VDC

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081
   RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007162
   RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 1K THRU 30.K OHMS
   PER PART NO 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 499 OHMS THRU 2K OHMS
   PER PART NO 1010311-97 THRU 155
9. SWITCH POSITIONS:
   1. AUTO OVERRIDE
   2. PROPORTIONAL
   3. BACKUP
   4. EMERGENCY


BLOCK I ONLY
MISCELLANEOUS ELEC
ASSY 1007157
WIRING DIAG 1010097
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007163
SCHEMATIC 1010140
IMU TEMP CONTROLLER
ASSEMBLY 1007058
SCHEMATIC 1010058
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
TEMP IND BRIDGE AMPL OUTPUT
ACCEL IR G
45A7J1
45A7J8
45A7J6
45A7J2
45A7P2
POWER OVDC
SIGNAL OVDC
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
NOTE 6 R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
R4 4020
R5 4020
CR7 1N649M
CR8 1N649M
R8 2365.3
R9 2567.8
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B
CR4 1N2767
R17 1560
R18 1582
K2
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R41 4362
NOTE 6 R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 1N643M
CR10 1N649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
R44 1K
R31 1K
R32 1K
Q2 2N1724
K1
CR5 1N649M
CR6 1N649M
TEMP CONTROL BRIDGE
R23 760
R20 17
R22 750
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
AR1 TEMP CONTROL AMPL
C1 4700 UF
Q1 2N1724
CR11 HF3C
NOTE 8 R28
AR3 HEATER CURRENT AMPL
A1 BLOWER CURRENT SENSOR
R3 4020
R24 10K
R6 4020
R25 1K
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
HI
LO
POWER DIODES & SIGNAL COND ELECTRONICS
ASSY 1007160
WIRING DIAG 1010100
45A10J5
45A10P1
IMU RVDC STANDBY
GIMBAL SUBSYSTEMS SUPPLY FILTER MODULE
ASSY 1007090
56T82
56T83
56T81
GIMBAL SERVO ELECTRONICS
ASSY 1007151
WIRING DIAG 1010091
TEMP CONTROLLER POWER SUPPLY
ASSY 1010145
45A1J1
45A1P1
TEMP CONTROL TELEM OVDC
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
56T85
50A1J1
IRIG TEMP GAIN +5°F
ZERO DEV
ACCEL TEMP GAIN +5°F
NO
NC
50A1P1
NOTE 9
20
30
B & N INDICATOR CONTROL PANEL
ASSY 1014578
SCHEM 1023068
POWER DIODES & SIGNAL COND ELECTRONICS
ASSY 1007160
WIRING DIAG 1010100
45A10J7
45A10P1
AMPLIFIER 5V, 800CPS
ASSY 1007048
28VAC
56T88
SIGNAL CONDITIONING MODULE
ASSY 1007121
WIRING DIAG 1010112
BLOWER CURRENT TELEMETRY
28VDC
OVDC
4
5
6

27/1010039


LANEOUS ELECTRONICS ASSY-TRAY 7
007157
D AG 1010097
DICATOR
45A7P1
F4
F5
C5
D4
56TB3
SIGNAL CONDITIONING MODULE ASSY 1007121 WIRING DIAG 1010112
30J1
85 RIG TEMP
98 ACCEL TEMP
11 IMU TEMP CONTROL
25 FAILURE
TELEM
56E-21
56E-20
56TB2
D5
D6
45A7J8
K1
INTEGRATED READOUT INDICATOR SCD 1011375
P3
IMU TEMP FAIL
MAIN DATA VIEWER ASSY 1011559 SCHEM 1011405
+28VDC
SPACECRAFT 28VDC
206
243
56J22
IMU TEMP ALARM
05A5P5 C27 1A12J194 MAIN DISPLAY PANEL
NOT USED
50A1J1
+28VDC
NO
NC
CONDITION LAMP TEST
NOTE 9
K2
CR5 1N649M
CR6 1N649M
B&M INDICATOR CONTROL PNL ASSY 1014578 SCHEM 1023068
ONTROLLER
7056
0058
45A7J6
45A7P1
HEATER CURRENT TELEMETRY
SIGNAL CONDITIONING MODULE ASSY 1007121 WIRING DIAG 1010112
F3
D5
57
30J1
56TB3

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REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	1000284				
AR5	1018900	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK 2		
K2	↓	↓	↓		
CR1	1010331-020	DIODE	1N2985B	2%	10W
CR2	↓ -009		↓	5%	↓
CR3	1010440		1N2163A	2%	3/4 W
CR4	1010441-2		1N2767	2%	2 W
CR5	1010362-3		1N649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	↓		↓		↓
CR11	1010322-001	↓	HF3C		6AMP
C1	1010359-25	CAPACITOR	4700UUF	20 %	200 VDC
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1	1000247	MERCURY THERMOSTAT			
S2	1000266	THERMOSTAT			
S3	↓	↓			
HR1	1000126	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126				
HR6	1000134	↓			
A1	1000287	CURRENT SENSOR			
M1	1007012	EMERGENCY HEATERS CONTROL MODULE			
M2	1007013	28VDC REGULATOR ASSY			
R3	1010364-368	RESISTOR	4020	1%	1/8 W
R4					
R5					
R6	↓		↓	↓	
R7	1010450-12		2365.3	0.01%	
R8	↓		↓		
R9	1010450-13		2567.8	↓	↓
R11	1010361-112		85	3%	5 W
R12	1010364-44		82.5	1%	1/8 W
R13	1010377	NOTE 5	SAT	0.1%	1/10 W
R14	1010450-2		1500	0.01%	1/8 W
R15	-2		↓		
R16	-3		1560		
R17	-3		↓		
R18	↓ -14		1582	↓	↓
R19	1010399-16	↓	50	5%	5 W
R20	1010453-1	POTENTIOMETER	17	10%	1/4 W
R21	1010449-1	RESISTOR	750	0.01%	3/4 W
R22	-1		↓		
R23	↓ -2		760	↓	↓
R24	1006750-56		10K	2%	1/4 W
R25	1010312-36		1K	5%	2 W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27		NOTE 6			
R28	↓	NOTE 8	↓	↓	
R30	1010377	NOTE 4	SAT	0.1%	
R31	-237		1K		
R32	↓ 237		1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10 W
R34					
R35	↓	↓	↓		↓
R36	1010452-167		1330	↓	1 W
R37	1010450-9		2000	0.01%	1/8 W
R38	↓		↓		
R40	1010450-10		13777		
R41	↓ -11		4362	↓	↓
R42	1010325-251		402	1%	5 W
R43	↓ -251		402	1%	↓
R44	1010604-22	↓	1K	1%	1W

1010039 A3

ZONE	SYM	REVISION DESCRIPTION	DATE	APPROVAL
	V	REVISED PER TDRR 06373	18 Feb 64	GK
	W	REVISED PER TDRR 08486	1 May 64	WK
	Y	REVISED PER TDRR 12626	[illegible]	[illegible]
	Z	REVISED PER TDRR 20708	7/8/65	WK
	AA	REVISED PER TDRR 28384	[illegible]	[illegible]
	AB	REVISED PER TDRR 30669	21 SEP 66	JJB NS

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL

M.I.T. INSTRUMENTATION LAB
CONTRACT NAS 9-153

		DATE
APPROVED		2-4-64
CHECKED	GK	2-5-64
DRAWN	LWC	8-9-63

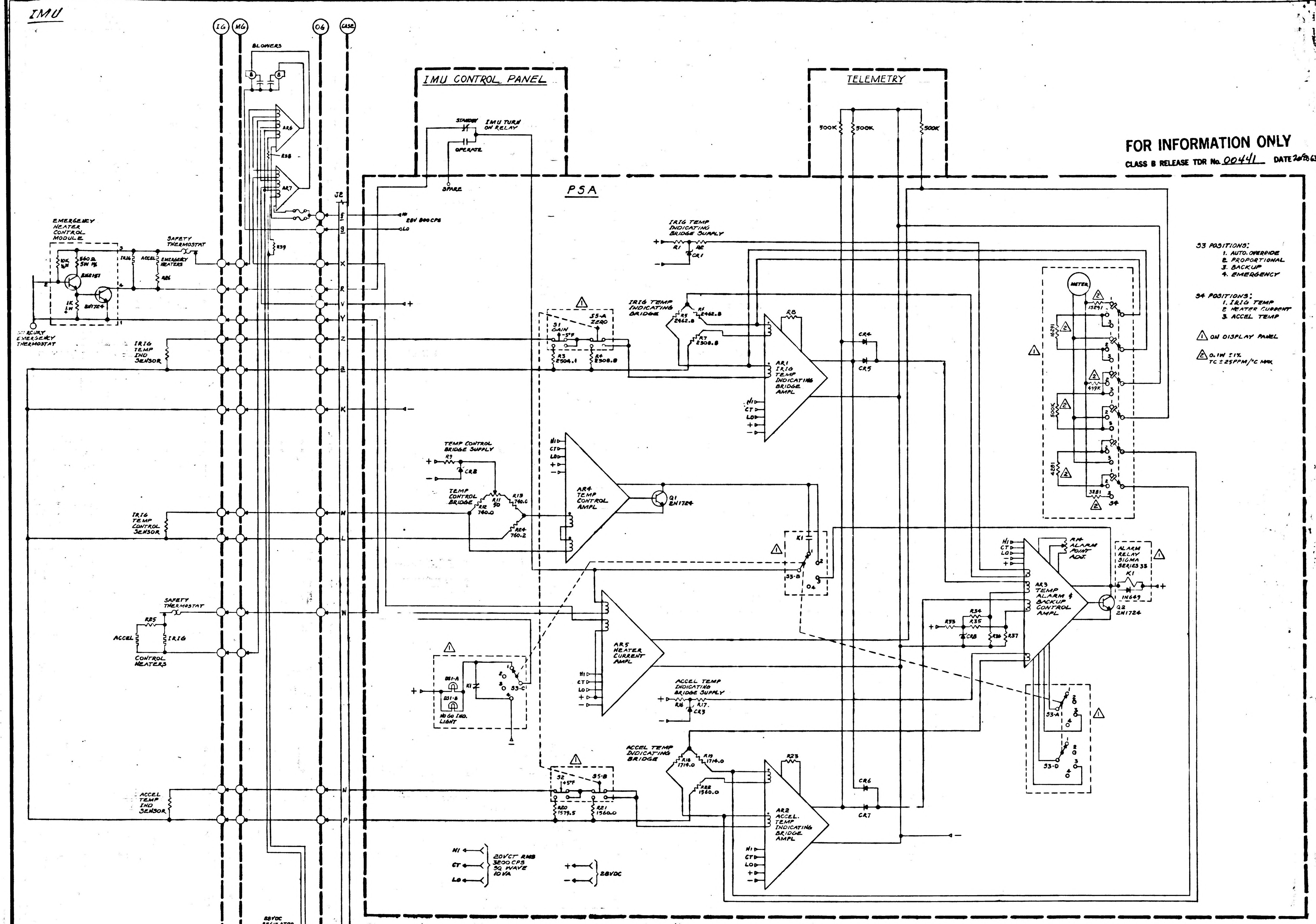
APPROVED FOR MSC
W. Johnson 4-1-64

APPROVAL	DATE
WK for	18 Feb 64

APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I, SERIES 0

SCALE
UNIT WT
CODE IDENT 80230

M.I.T.
INSTRUMENTATION LABORATORY
CAMBRIDGE MASS
DWG NO
MANNED SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO
1010039
SHEET 1 OF 1


IMU
IG
MG
OG
CASE
BLOWERS
B
AR6
R38
AR7
R39
J2
IMU CONTROL PANEL
STANDBY
IMU TURN ON RELAY
OPERATE
SPARE
TELEMETRY
500K
500K
500K
PSA
28V 800CPS
HI
LO
EMERGENCY HEATER CONTROL MODULE
10K 1W
560Ω 5W 1%
2N2151
2N1724
1K 1W
SAFETY THERMOSTAT
IRIG
ACCEL
EMERGENCY HEATERS
R26
MERCURY EMERGENCY THERMOSTAT
IRIG TEMP IND SENSOR
IRIG TEMP INDICATING BRIDGE SUPPLY
R1
R2
CR1
IRIG TEMP INDICATING BRIDGE
R5 2462.8
R6 2462.8
R7 2308.8
R8
S1 GAIN ±5°F
S5-A ZERO
R3 2504.1
R4 2308.8
AR1 IRIG TEMP INDICATING BRIDGE AMPL
CR4
CR5
TEMP CONTROL BRIDGE SUPPLY
R9
CR8
TEMP CONTROL BRIDGE
R11 50
R12 740.0
R13 740.0
R14 760.2
AR4 TEMP CONTROL AMPL
Q1 2N1724
IRIG TEMP CONTROL SENSOR
K1
S5-B
SAFETY THERMOSTAT
R85
ACCEL
IRIG
CONTROL HEATERS
DS1-A
DS1-B
NO GO IND. LIGHT
S5-C
AR5 HEATER CURRENT AMPL
ACCEL TEMP INDICATING BRIDGE SUPPLY
R16
R17
CR3
ACCEL TEMP INDICATING BRIDGE
R18 1714.0
R19 1714.0
R22 1560.0
R23
S2 ±5°F
S5-B
R20 1579.5
R21 1560.0
AR2 ACCEL. TEMP INDICATING BRIDGE AMPL
CR6
CR7
ACCEL TEMP IND SENSOR
METER
15291
16291
499K
500K
4281
3281
S4
R4 ALARM POINT ADJ.
AR3 TEMP ALARM & BACKUP CONTROL AMPL
ALARM RELAY SIGMA SERIES 33 K1
1N649
Q2 2N1724
R33
R34
R35
CR8
R36
R37
S3-A
S3-D
HI
CT
LO
20VCT RMS 3200 CPS SQ WAVE 10 VA
28VDC
28VDC REGULATOR
2N2151
1N3026
J27
0-200
ACCEL FIXED HEATERS
+28VDC
0VDC
f
g
X
R
V
Y
Z
a
K
M
L
W
N
P
D
E

S3 POSITIONS:
1. AUTO. OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY

S4 POSITIONS:
1. IRIG TEMP
2. HEATER CURRENT
3. ACCEL TEMP

△1 ON DISPLAY PANEL

△2 0.1W ±1%
TC ±25PPM/°C MAX

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00441 DATE 20 Feb 63

MASTER

M REDRAWN & REPLACED BY REV N
TDRR 00819 WK.
10 APRIL 1963

L		REVISED	LR	
K		REVISED	LR	
J		REVISED	LR	
I		REVISED	LR	
H		REVISED	LR	
G		REVISED	LR	
F		REVISED	LR	

NOT APPROVED FOR PRODUCTION

REF:
BLOCK DIAGRAM
DWG. D-94305

UNLESS OTHERWISE NOTED:-
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
ELECTRICAL TOLERANCES ±10%
K = ×1000 M = ×1,000,000

INSTRUMENTATION LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE MASS

APOLLO IMU TEMPERATURE CONTROL SYSTEM SCHEMATIC DIAGRAM

L.W.R.

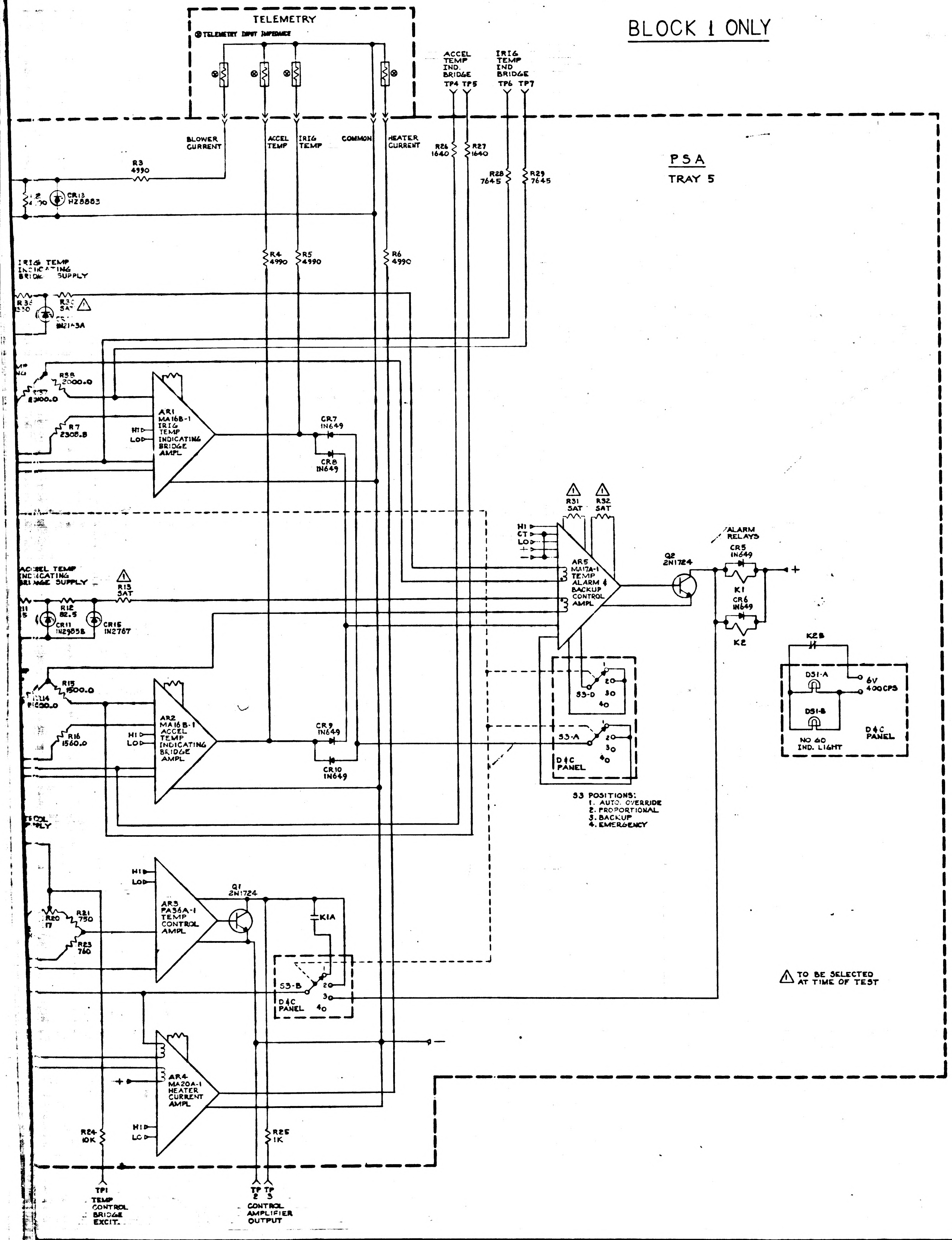
NASA DRAWING NO. 1010039
NASA APPROVAL
Jack Barnard 2/20/63
MIT APPROVAL
W Kupfer 20 Feb 63

(M)

INCHES
PHOTOGRAPHIC SCALE ONLY

N	1010039

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
N	REVISED PER TDRR 00819	4-8-63	WK.


BLOCK I ONLY
TELEMETRY
⊗ TELEMETRY INPUT IMPEDANCE
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
ACCEL TEMP IND. BRIDGE
TP4 TP5
IRIG TEMP IND BRIDGE
TP6 TP7
R26 1640
R27 1640
R28 7645
R29 7645
PSA
TRAY 5
R3 4990
R2 4990
CR13 HZ8883
R4 4990
R5 4990
R6 4990
IRIG TEMP INDICATING BRIDGE SUPPLY
R35 330
R30 SAT
CR14 IN2163A
R38 2000.0
R37 2300.0
R7 2308.8
HI
LO
AR1 MA16B-1 IRIG TEMP INDICATING BRIDGE AMPL
CR7 IN649
CR8 IN649
ACCEL TEMP INDICATING BRIDGE SUPPLY
R13 SAT
R11 85
R12 82.5
CR11 IN2985B
CR15 IN2767
R15 1500.0
R14 1500.0
R16 1560.0
AR2 MA16B-1 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 IN649
CR10 IN649
R31 SAT
R32 SAT
HI
CT
LO
+
−
AR5 MA17A-1 TEMP ALARM & BACKUP CONTROL AMPL
Q2 2N1724
ALARM RELAYS
CR5 IN649
K1
CR6 IN649
K2
+
S3-D
S3-A
1
2
3
4
D&C PANEL
S3 POSITIONS:
1. AUTO. OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY
K2B
DS1-A
DS1-B
6V 400CPS
NO 60 IND. LIGHT
D&C PANEL
T/C COL SUPPLY
R20 17
R21 750
R23 760
AR3 PA36A-1 TEMP CONTROL AMPL
Q1 2N1724
K1A
S3-B
D&C PANEL
AR4 MA20A-1 HEATER CURRENT AMPL
R24 10K
R25 1K
TP1 TEMP CONTROL BRIDGE EXCIT.
TP 2 TP 3 CONTROL AMPLIFIER OUTPUT

△ TO BE SELECTED AT TIME OF TEST

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1010446	MAG. AMPL	MA16B-1		
AR2	1010448	MAG. AMPL	MA16B-1		
AR3	1010444	MAG. AMPL	PA36A-1		
AR4	1010443	MAG. AMPL	MA20A-1		
AR5	1010445	MAG. AMPL	MA17A-1		
AR6	1010447	MAG. AMPL	RU27A-1		
AR7	1010447	MAG. AMPL	RU27A-1		
Q1	1010273	TRANSISTOR	2N1724		
Q2	1010273	TRANSISTOR	2N1724		
K1	1010362	RELAY	33WK-2		
K2	1010353				
K3					
CR1	1010362	DIODE	IN649		
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11	1010331-009		IN2985B	5%	10W
CR12	1010331-009		IN2985B	5%	10W
CR13	1010439		HZ8883		
CR14	1010440		IN2163A	2%	
CR15	1010441		IN2767	5%	
R1	1010364-386	RESISTOR	4990	1%	1/8W
R2					
R3					
R4					
R5					
R6					
R7	1010450-6		2308.8	0.01%	1/8W
R8	1010450-6		2308.8	0.01%	1/8W
R9	1010450-5		2504.1	0.01%	1/8W
R10	1010450-1		60.7K	0.01%	1/8W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377		SAT		
R14	1010450-2		1500.0	0.01%	1/8W
R15	1010450-2		1500.0	0.01%	1/8W
R16	1010450-3		1560.0	0.01%	1/8W
R17	1010450-3		1560.0	0.01%	1/8W
R18	1010450-4		1579.5	0.01%	1/8W
R19	1010399-16		50	5%	5W
R20	1010453		17		
R21	1010449-1		750	0.01%	
R22	1010449-1		750	0.01%	
R23	1010449-2		760	0.01%	
R24	1006750-56		10K	5%	1/4W
R25	1010312-34		1K	5%	2W
R26	1010450-7		1640	0.01%	1/8W
R27	1010450-7		1640	0.01%	1/8W
R28	1010450-8		7645	0.01%	1/8W
R29	1010450-8		7645	0.01%	1/8W
R30	1010377		SAT	0.1%	1/10W
R31			SAT		
R32			SAT		
R33	RE656		SAT 2.67-35.7	1%	10W
R34			SAT 2.67-35.7		
R35			SAT 169-1K		
R36	1010452		1330	1%	1W
R37	1010450-9		2000.0		1/8W
R38	1010450-9		2000.0		1/8W
C1	1010438-1	CAPACITOR	12.5	10%	15VDC
C2					
C3					
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170-	FUSE			
F2	1000170-	FUSE			
S1		SWITCH			
S2					
S3					
S4					
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	1000266	THERMOSTAT			
HR1	(1000126)(D105318)	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	(1000126)(D105318)				
HR6	1000134				
A1	D1505	SENSOR			
A2	96149				
A3	(1000126)(D105318)				
M1	1010014	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1-DS2		DUAL LAMP			
T1	1010442	TRANSFORMER			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN L W R DATE 4-4-63
CHECKED [illegible] 4-5-63
APPROVAL [illegible] 4-5-63
APPROVAL [illegible] 4-8-63
NASA APPROVAL [illegible] 4/10/63
MIT APPROVAL [illegible] 10 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

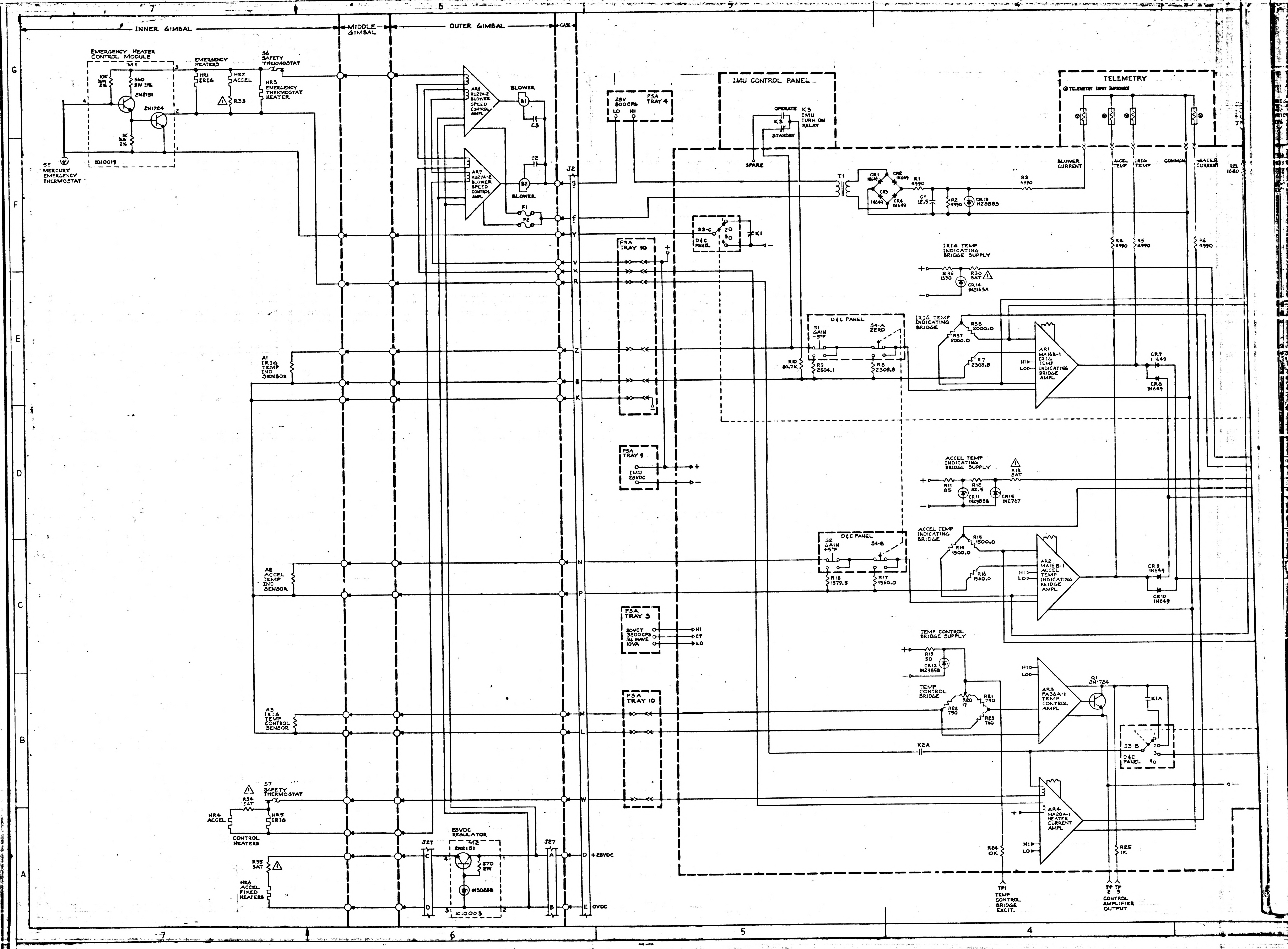
APOLLO IMU TEMPERATURE CONTROL SYSTEM SCHEMATIC

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1010039
SCALE | WT | SHEET 1 OF 1

INCHES

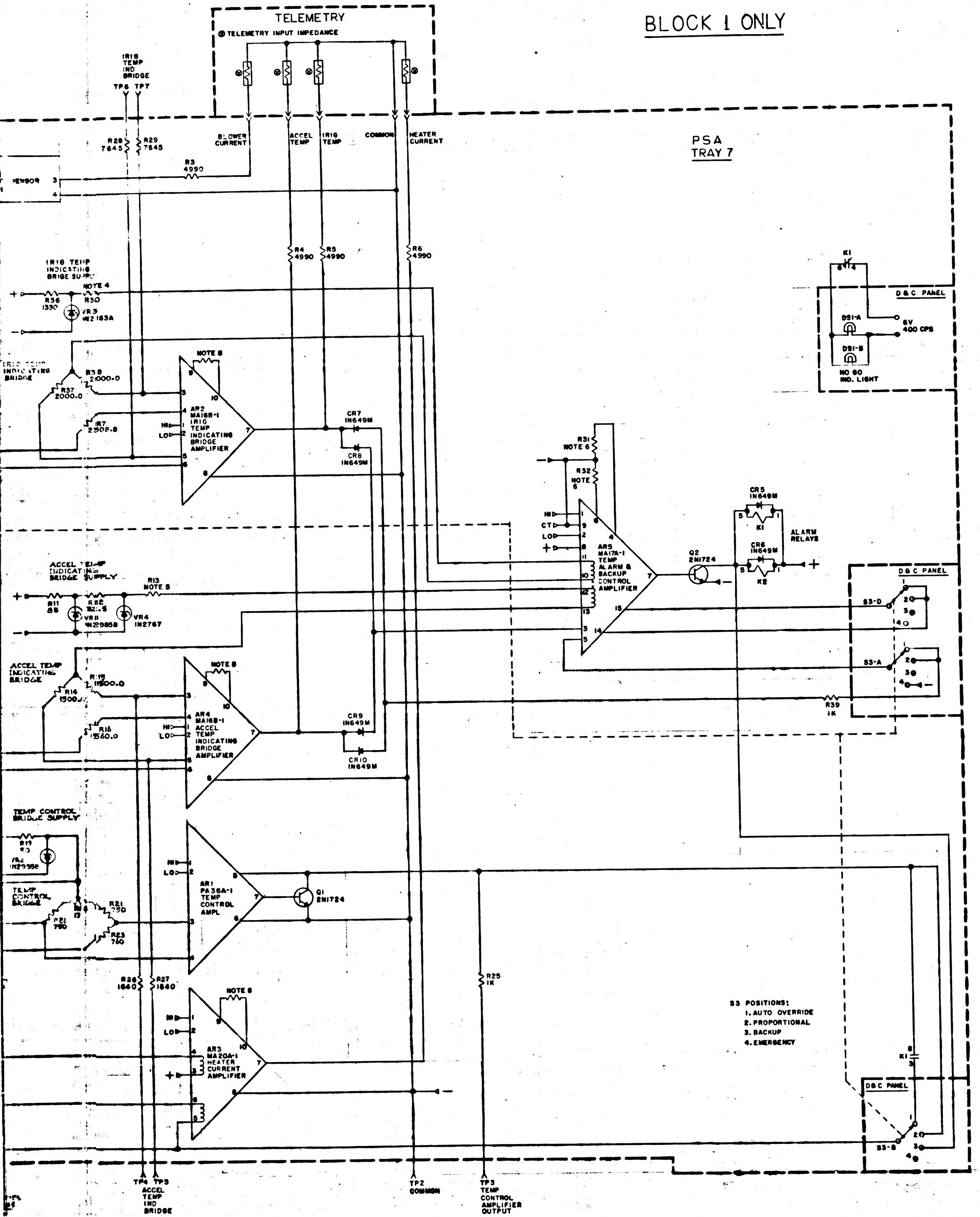
N 1010039

MASTER


7
6
5
4
G
F
E
D
C
B
A
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
EMERGENCY HEATER CONTROL MODULE
M1
10K ½W 2%
560 5W ±1%
2N2151
2N1724
1K ½W 2%
1010019
S5 MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33
S6 SAFETY THERMOSTAT
HR3 EMERGENCY THERMOSTAT HEATER
AR6 RU27A-2 BLOWER SPEED CONTROL AMPL
AR7 RU27A-2 BLOWER SPEED CONTROL AMPL
BLOWER
B1
B2
C2
C3
F1
F2
J2
g
f
Y
V
X
R
Z
a
K
N
P
M
L
W
D +28VDC
E 0VDC
28V 800CPS
LO HI
PSA TRAY 4
IMU CONTROL PANEL
OPERATE
K3 IMU TURN ON RELAY
STANDBY
SPARE
TELEMETRY
⊗ TELEMETRY INPUT IMPEDANCE
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
R26 1640
T1
CR1 1N649
CR2 1N649
CR3 1N649
CR4 1N649
R1 4990
R3 4990
C1 12.5
R2 4990
CR13 HZ8883
S3-C
D&C PANEL
K1
PSA TRAY 10
R4 4990
R5 4990
R6 4990
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
R30 SAT
CR14 1N2163A
D&C PANEL
S1 GAIN -5°F
S4-A ZERO
R10 60.7K
R9 2504.1
R8 2308.8
IRIG TEMP INDICATING BRIDGE
R37 2000.0
R38 2000.0
R7 2308.8
AR1 MA16B-1 IRIG TEMP INDICATING BRIDGE AMPL
HI
LO
CR7 1N649
CR8 1N649
A1 IRIG TEMP IND SENSOR
PSA TRAY 9
IMU 28VDC
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
R13 SAT
CR11 1N2985B
CR15 1N2767
S2 GAIN +5°F
S4-B
R18 1579.5
R17 1560.0
ACCEL TEMP INDICATING BRIDGE
R14 1500.0
R15 1500.0
R16 1560.0
AR2 MA16B-1 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 1N649
CR10 1N649
A2 ACCEL TEMP IND SENSOR
PSA TRAY 3
20VCT 3200CPS SQ. WAVE 10VA
HI
CT
LO
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR12 1N2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR3 PA36A-1 TEMP CONTROL AMPL
Q1 2N1724
K1A
S3-B
K2A
A3 IRIG TEMP CONTROL SENSOR
AR4 MA20A-1 HEATER CURRENT AMPL
R24 10K
R25 1K
TP1 TEMP CONTROL BRIDGE EXCIT.
TP 2 TP 3 CONTROL AMPLIFIER OUTPUT
S7 SAFETY THERMOSTAT
R34 SAT
HR4 ACCEL
HR5 IRIG
CONTROL HEATERS
R35 SAT
HR6 ACCEL FIXED HEATERS
28VDC REGULATOR
M2
2N2151
270 2W
1N3028B
1010003
J27

N	REVISED PER TDRR 00819	4-8-63	wR
P	REVISED PER TDRR 01244	5-7-63	W

BLOCK I ONLY


TELEMETRY
⊗ TELEMETRY INPUT IMPEDANCE
IRIG TEMP IND BRIDGE
TP6 TP7
R28 7645
R29 7645
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
PSA TRAY 7
SENSOR 3 4
R3 4990
R4 4990
R5 4990
R6 4990
IRIG TEMP INDICATING BRIGE SUPPLY
NOTE 4
R36 1330
R30
VR3 IN2163A
IRIG TEMP INDICATING BRIDGE
R38 2000.0
R37 2000.0
R7 2308.8
NOTE 8
AR2 MA16B-1 IRIG TEMP INDICATING BRIDGE AMPLIFIER
HI
LO
CR7 IN649M
CR8 IN649M
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
VR11 IN2985B
VR4 IN2767
R13 NOTE 5
ACCEL TEMP INDICATING BRIDGE
R15 1500.0
R14 1500.0
R16 1560.0
AR4 MA16B-1 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 IN649M
CR10 IN649M
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 IN2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 PA36A-1 TEMP CONTROL AMPL
Q1 2N1724
R26 1640
R27 1640
R25 1K
AR3 MA20A-1 HEATER CURRENT AMPLIFIER
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPLIFIER OUTPUT
K1
D & C PANEL
DS1-A
DS1-B
6V 400 CPS
NO 80 IND. LIGHT
R31 NOTE 6
R32 NOTE 6
HI
CT
LO
AR5 MA17A-1 TEMP ALARM & BACKUP CONTROL AMPLIFIER
Q2 2N1724
CR5 IN649M
CR6 IN649M
K1
K2
ALARM RELAYS
S3-D
S3-A
S3-B
R39 1K
S3 POSITIONS:
1. AUTO OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG. AMPL	PA36A-1		
AR2	1000284	MAG. AMPL	MA16B-1		
AR3	1000286	MAG. AMPL	MA20A-1		
AR4	1000284	MAG. AMPL	MA16B-1		
AR5	1000283	MAG. AMPL	MA17A-1		
L1	1000288	SATURABLE REACTOR	RU27A-1		
L2	1000288	SATURABLE REACTOR	RU27A-1		
Q1	1010273	TRANSISTOR	2N1724		
Q2	1010273	TRANSISTOR	2N1724		
K1	1010353	RELAY	33WK-2		
K2	1010353				
K3					
CR5	1010362	DIODE	IN649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10					
VR1	1010331-009		IN2985B	5%	10W
VR2	1010331-009		IN2985B	5%	10W
VR3	1010440		IN2163A	2%	3/4 W
VR4	1010441		IN2767	5%	3/4 W
R3	1010364-386	RESISTOR	4990	1%	1/8W
R4					
R5					
R6					
R7	1010450-6		2308.8	0.01%	1/8W
R8	1010450-6		2308.8	0.01%	1/8W
R9	1010450-5		2504.1	0.01%	1/8W
R10	1010450-1		60.7K	0.01%	1/8W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	SEE NOTE 5	SAT	1%	1/10 W
R14	1010450-2		1500.0	0.01%	1/8W
R15	1010450-2		1500.0	0.01%	1/8W
R16	1010450-3		1560.0	0.01%	1/8W
R17	1010450-3		1560.0	0.01%	1/8W
R18	1010450-4		1579.5	0.01%	1/8W
R19	1010399-16		50	5%	5W
R20	1010453	VAR	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4 W
R22	1010449-1		750	0.01%	
R23	1010449-2		760	0.01%	
R24	1006750-56		10K	5%	1/4W
R25	1010312-34		1K	5%	2W
R26	1010450-7		1640	0.01%	1/8W
R27	1010450-7		1640	0.01%	1/8W
R28	1010450-8		7645	0.01%	1/8W
R29	1010450-8		7645	0.01%	1/8W
R30	1010377	SEE NOTE 4	SAT	0.1%	1/10W
R31		6			
R32		6			
R33	RE656		SAT 2.87-38.7	1%	10W
R34			SAT 2.67-35.7		
R35			SAT 1.69-1K		
R36	1010452		1330	1%	1W
R37	1010450-9		2000.0	0.01%	1/8W
R38	1010450-9		2000.0	0.01%	1/8W
R39	1010364-252		1000	1%	1/8W
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	1010264-38				
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170-	FUSE			
F2	1000170-	FUSE			
S1		SWITCH			
S2					
S3					
S4					
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	1000266	THERMOSTAT			
HR1	(1000126)(D105318)	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	(1000126)(D105318)				
HR6	1000134				
A1	D1505	SENSOR			
A2	96149				
A3	(1000126)(D105318)				
A4	1000287	CURRENT SENSOR	MA25A-1		
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1-DS2		DUAL LAMP			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP RANGE OF VALUES, FROM FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-113 THRU-206
5. R13 TO BE SELECTED PER ATP RANGE OF VALUES, FROM 71 OHMS THRU 171 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-141 THRU-191
6. R 31-32 TO BE SELECTED PER ATP RANGE OF VALUES, FROM FROM 750 OHMS THRU 1250 OHMS IN STEPS OF 10 OHMS, PER PART NO 1010377-212 THRU -262.
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST
8. EXTERNAL RESISTORS SUPPLIED WITH AMPLIFIER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

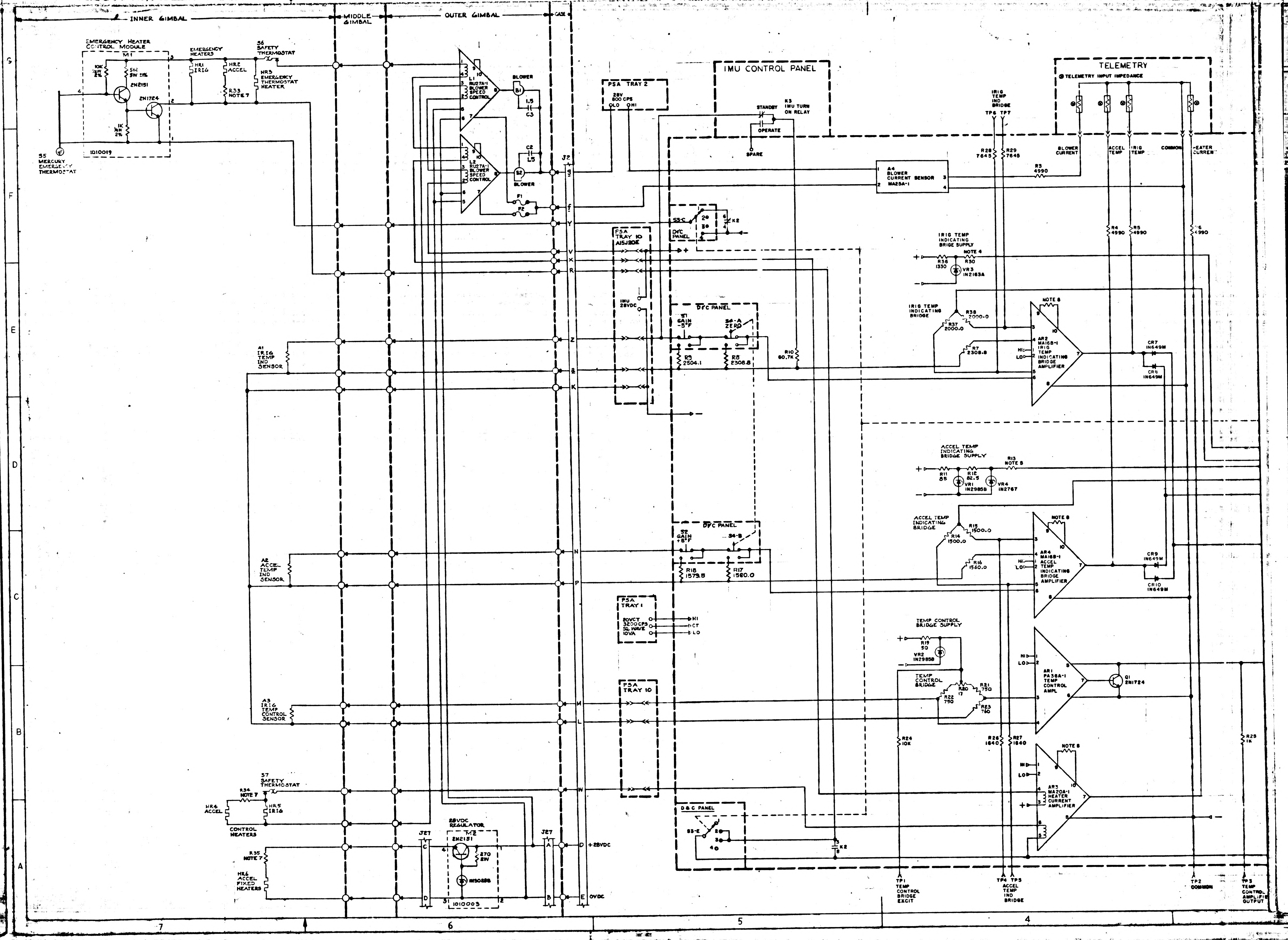
MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L W R DATE 4-4-63
CHECKED 4-5-63
APPROVAL 4-5-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO IMU TEMPERATURE
CONTROL SYSTEM
SCHEMATIC

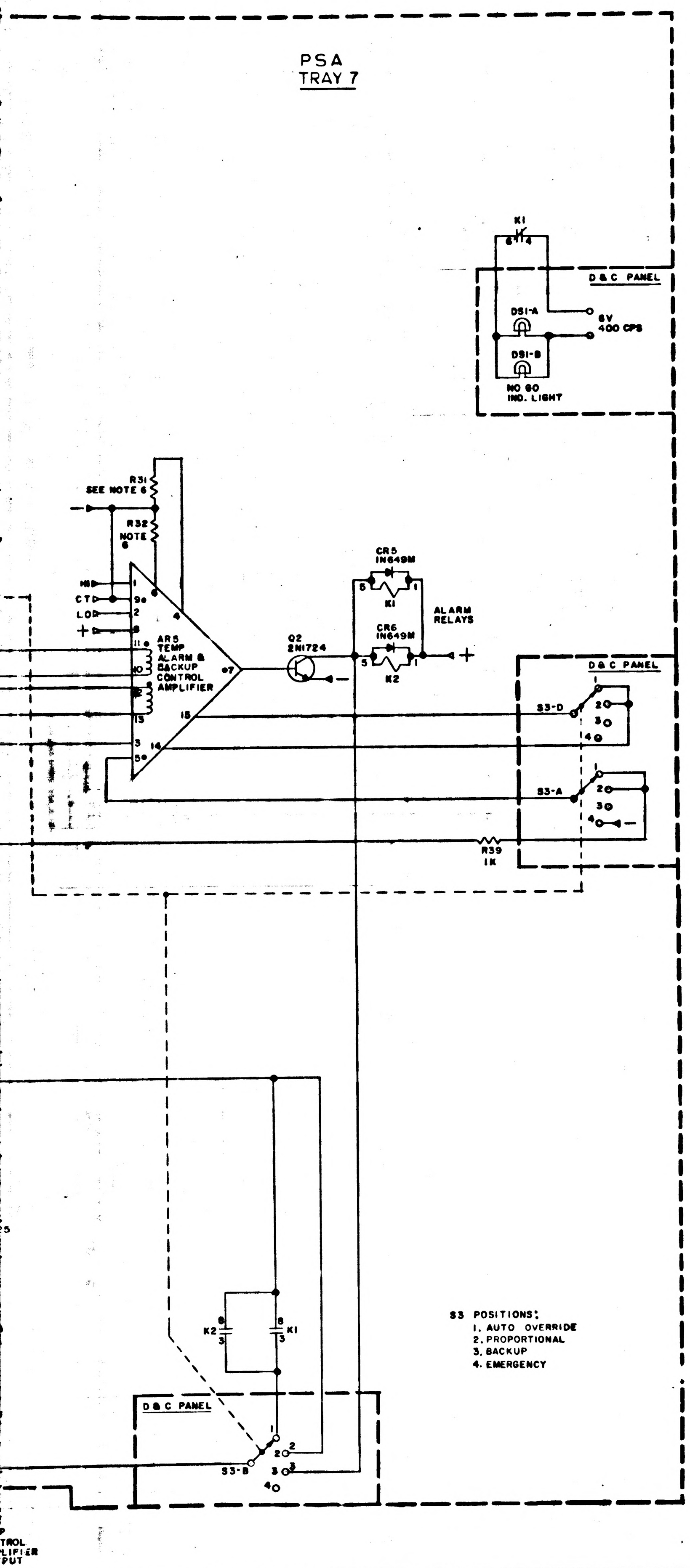
CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010039
SCALE
WT
SHEET 1 OF 1

1010039


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
EMERGENCY HEATER CONTROL MODULE
M1
10K ½W 2%
562 5W ±1%
2N2151
2N1724
1K ½W 2%
1010019
S5 MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 NOTE 7
S6 SAFETY THERMOSTAT
HR3 EMERGENCY THERMOSTAT HEATER
L1 RU27A-1 BLOWER SPEED CONTROL
L2 RU27A-1 BLOWER SPEED CONTROL
BLOWER
B1
B2
1.5
C3
C2
L5
F1
F2
J2
g
f
Y
V
X
R
Z
a
K
N
P
M
L
W
D +28VDC
E OVDC
A1 IRIG TEMP IND SENSOR
A2 ACCEL TEMP IND SENSOR
A3 IRIG TEMP CONTROL SENSOR
S7 SAFETY THERMOSTAT
R34 NOTE 7
HR4 ACCEL
HR5 IRIG
CONTROL HEATERS
R35 NOTE 7
HR6 ACCEL FIXED HEATERS
J27
C
D
A
B
28VDC REGULATOR
M2
2N2151
270 2W
1N3028B
1010003
PSA TRAY 2
28V 800 CPS
LO
HI
IMU CONTROL PANEL
STANDBY
K3 IMU TURN ON RELAY
OPERATE
SPARE
PSA TRAY 10 A15J20E
IMU 28VDC
S3-C
D/C PANEL
2
3
4
6
K2
D/C PANEL
S1 GAIN -5°F
S4-A ZERO
R9 2504.1
R8 2308.8
R10 60.7K
D/C PANEL
S2 GAIN +5°F
S4-B
R18 1579.5
R17 1560.0
PSA TRAY 1
20VCT 3200CPS SQ. WAVE 10VA
HI
CT
LO
PSA TRAY 10
D & C PANEL
S3-E
K2
A4 BLOWER CURRENT SENSOR MA25A-1
R3 4990
TELEMETRY
⊗ TELEMETRY INPUT IMPEDANCE
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
IRIG TEMP IND BRIDGE
TP6
TP7
R28 7645
R29 7645
R4 4990
R5 4990
R6 4990
IRIG TEMP INDICATING BRIGE SUPPLY
R36 1330
NOTE 4
R30
VR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2000.0
R37 2000.0
R7 2308.8
NOTE 8
AR2 MA168-1 IRIG TEMP INDICATING BRIDGE AMPLIFIER
HI
LO
CR7 1N649M
CR8 1N649M
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
VR1 1N2985B
VR4 1N2767
R13 NOTE 8
ACCEL TEMP INDICATING BRIDGE
R15 1500.0
R14 1500.0
R16 1560.0
AR4 MA168-1 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 1N649M
CR10 1N649M
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 1N2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 PA36A-1 TEMP CONTROL AMPL
Q1 2N1724
R24 10K
R26 1640
R27 1640
R25 1K
AR3 MA20A-1 HEATER CURRENT AMPLIFIER
TP1 TEMP CONTROL BRIDGE EXCIT
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPLIFIER OUTPUT
G
F
E
D
C
B
A
7
6
5
4

3 2 1

BLOCK 1 ONLY



REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG. AMPL			
AR2	1000284	MAG. AMPL			
AR3	1000286	MAG. AMPL			
AR4	1000284	MAG. AMPL			
AR5	1000283	MAG. AMPL			
L1	1000288	SATURABLE REACTOR			
L2	1000288	SATURABLE REACTOR			
Q1	1010273	TRANSISTOR	2N1724		
Q2	1010273	TRANSISTOR	2N1724		
K1	1010353	RELAY	33WK-2		
K2	1010353				
K3					
CR4	1010322	DIODE	HF3C		6 AMP
CR5	1010362	DIODE	1N649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10					
VR1	1010331-009		1N2985B	5%	10W
VR2	1010331-009		1N2985B	5%	10W
VR3	1010440		1N2163A	2%	3/4 W
VR4	1010441		1N2767	5%	3/4 W
R3	1010364-386	RESISTOR	4990	1%	1/8W
R4					
R5					
R6					
R7	1010450-6		2308.8	0.01%	1/8W
R8	1010450-6		2308.8	0.01%	1/8W
R9	1010450-5		2504.1	0.01%	1/8W
R10	1010450-1		60.7K	0.01%	1/8W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	SEE NOTE 5	SAT	1%	1/10 W
R14	1010450-2		1500.0	0.01%	1/8W
R15	1010450-2		1500.0	0.01%	1/8W
R16	1010450-3		1560.0	0.01%	1/8W
R17	1010450-3		1560.0	0.01%	1/8W
R18	1010450-4		1579.5	0.01%	1/8W
R19	1010399-16		50	5%	5W
R20	1010453	VAR	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4 W
R22	1010449-1		750	0.01%	
R23	1010449-2		760	0.01%	
R24	1006750-56		10K	5%	1/4W
R25	1010312-34		1K	5%	2W
R26	1010450-7		1640	0.01%	1/8W
R27	1010450-7		1640	0.01%	1/8W
R28	1010450-8		7645	0.01%	1/8W
R29	1010450-8		7645	0.01%	1/8W
R30	1010377	SEE NOTE 4	SAT	0.1%	1/10W
R31		6			
R32		6			
R33	RE656		SAT 2.67-36.7	1%	10W
R34			SAT 2.67-35.7		
R35			SAT 1.69-1K		
R36	1010452		1330	1%	1W
R37	1010450-9		2000.0	0.01%	1/8W
R38	1010450-9		2000.0	0.01%	1/8W
R39	1010364-252		1000	1%	1/8W
C2	1010264-38	CAPACITOR	.15	5%	200VDC
C3	1010264-38				
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170-	FUSE			
F2	1000170-	FUSE			
S1		SWITCH			
S2					
S3					
S4					
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	1000266	THERMOSTAT			
HR1	(1000126)(D105318)	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	(1000126)(D105318)				
HR6	1000134				
A1	D1505	SENSOR			
A2	96149				
A3	(1000126)(D105318)				
A4	1000287	CURRENT SENSOR	MA25A-1		
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1-DS2		DUAL LAMP			

R 1010039

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
N	REVISED PER TDRR 00819	4-8-63	WK.
P	REVISED PER TDRR 01264	5-7-63	WK 5/15
R	REVISED PER TDRR 01400	5-29-63	WK

(M)
(N)

G F E D C B A

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP RANGE OF VALUES, FROM FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-113 THRU-206
5. R 13 TO BE SELECTED PER ATP RANGE OF VALUES, FROM 71 OHMS THRU 171 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-141 THRU-191
6. R 31-32 TO BE SELECTED PER ATP RANGE OF VALUES, FROM 750 OHMS THRU 1250 OHMS IN STEPS OF 10 OHMS, PER PART NO 1010377-212 THRU-262.
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST
8. EXTERNAL RESISTORS SUPPLIED WITH AMPLIFIER

R 1010039

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

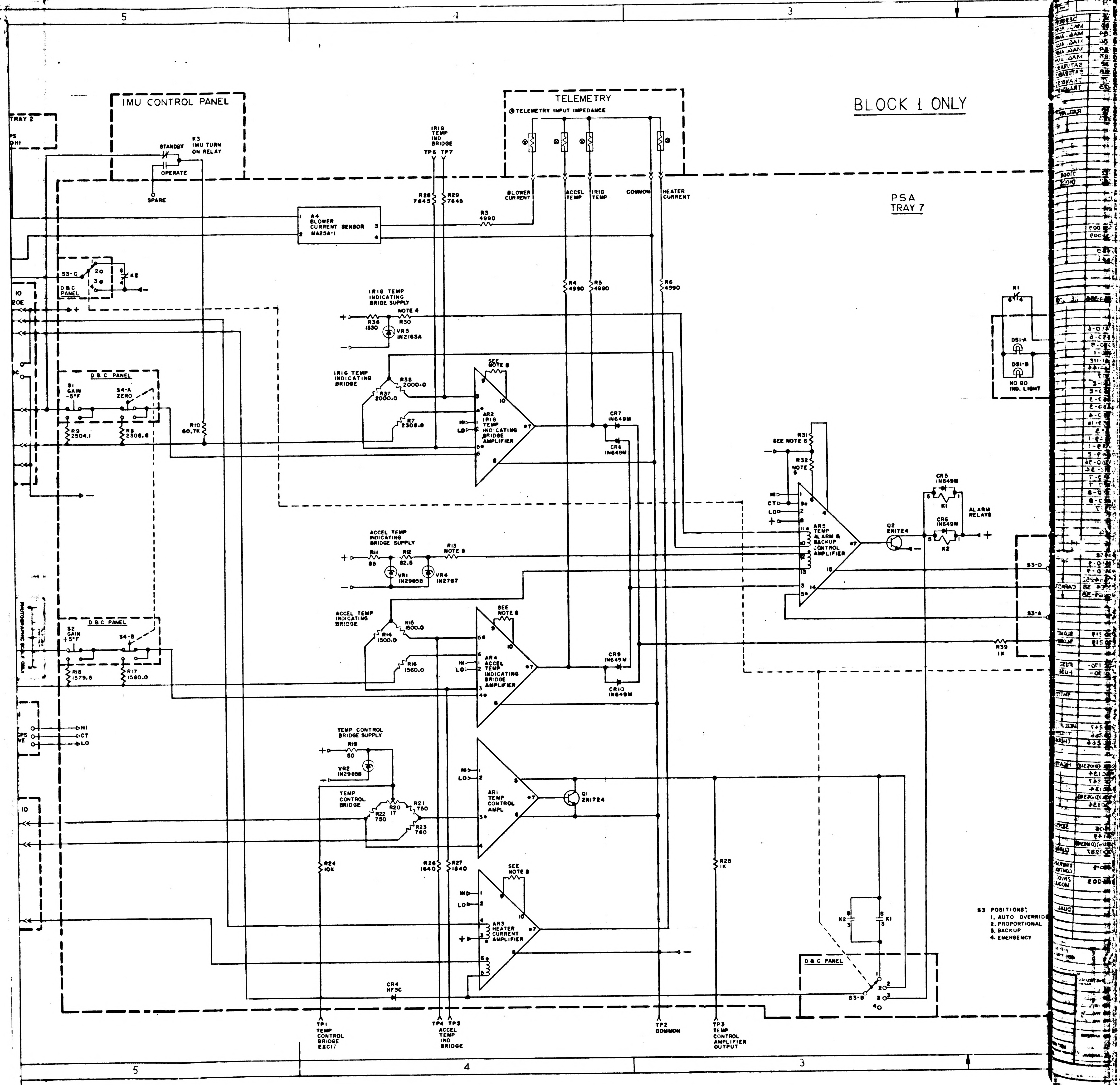
M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN L W R DATE 4-4-63
CHECKED [illegible] 4-5-63
APPROVAL [illegible] 4-5-63
APPROVAL [illegible]
NASA APPROVAL [illegible] 4/10/63
MIT APPROVAL [illegible] 4/13

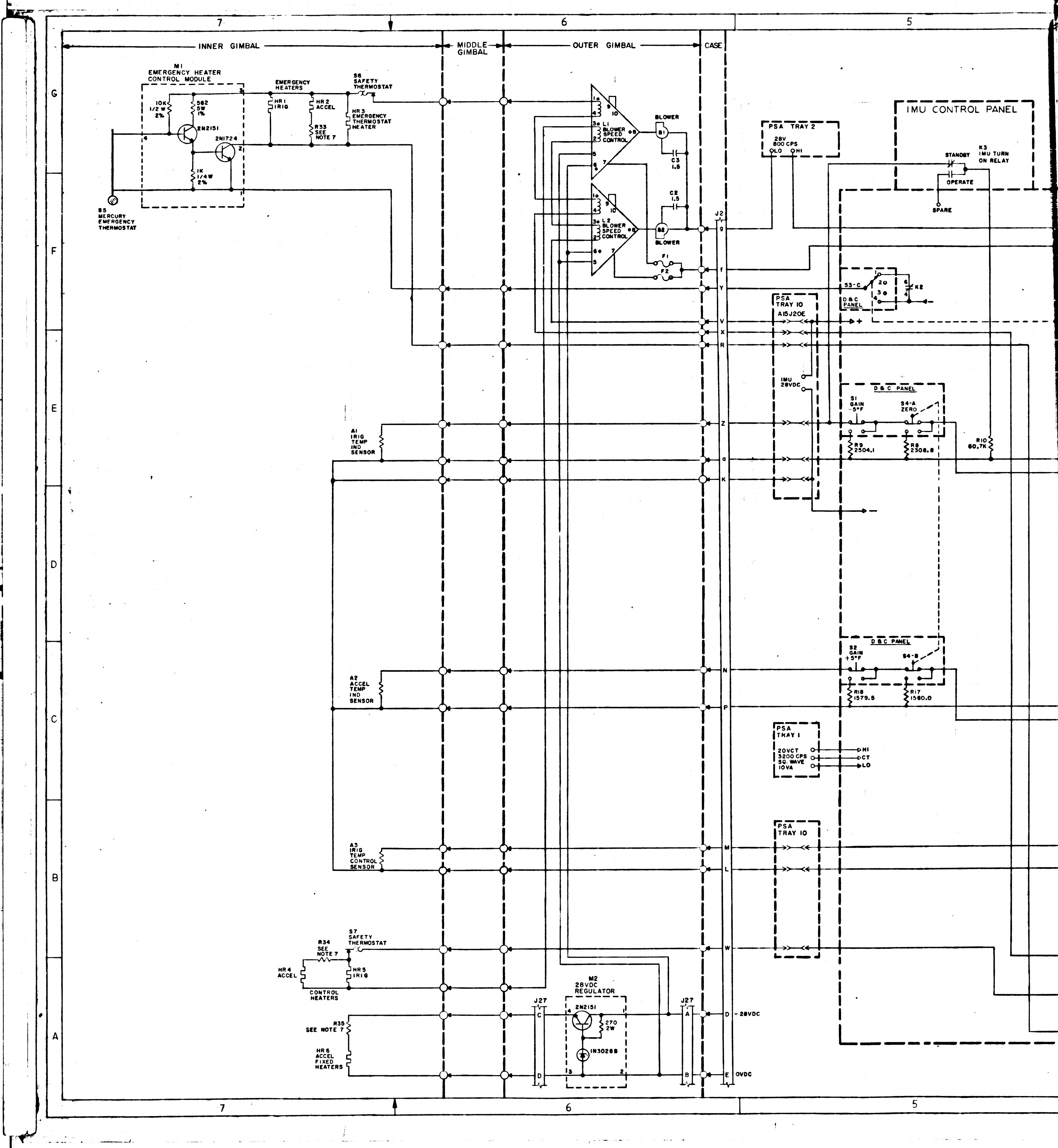
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO IMU TEMPERATURE
CONTROL SYSTEM
SCHEMATIC

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010039
SCALE
WT
SHEET 1 OF 1

(2N)


BLOCK I ONLY
PSA
TRAY 7
IMU CONTROL PANEL
STANDBY
K3
IMU TURN
ON RELAY
OPERATE
SPARE
TRAY 2
TELEMETRY
TELEMETRY INPUT IMPEDANCE
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
IRIG TEMP IND BRIDGE
TP6 TP7
R28 7645
R29 7645
A4 BLOWER CURRENT SENSOR MA25A-1
R3 4990
R4 4990
R5 4990
R6 4990
S3-C
K2
D & C PANEL
IRIG TEMP INDICATING BRIGE SUPPLY
NOTE 4
R36 1330
R30
VR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R37 2000.0
R38 2000.0
R7 2308.8
SEE NOTE 8
AR2 IRIG TEMP INDICATING BRIDGE AMPLIFIER
CR7 1N649M
CR6 1N649M
S1 GAIN -5°F
S4-A ZERO
R9 2504.1
R8 2308.8
R10 60.7K
R31 SEE NOTE 6
R32 NOTE 6
AR5 TEMP ALARM & BACKUP CONTROL AMPLIFIER
Q2 2N1724
CR5 1N649M
K1
CR6 1N649M
K2
ALARM RELAYS
DS1-A
DS1-B
NO GO IND. LIGHT
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
R13 NOTE 8
VR1 1N2985B
VR4 1N2767
ACCEL TEMP INDICATING BRIDGE
R14 1500.0
R15 1500.0
R16 1560.0
AR4 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 1N649M
CR10 1N649M
S3-D
S3-A
R39 1K
S2 GAIN +5°F
S4-B
R18 1579.5
R17 1560.0
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 1N2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 750
AR1 TEMP CONTROL AMPL
Q1 2N1724
R24 10K
R26 1640
R27 1640
R25 1K
AR3 HEATER CURRENT AMPLIFIER
CR4 HF3C
K2
K1
S3-B
S3 POSITIONS:
1. AUTO OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY
HI
CT
LO
TP1 TEMP CONTROL BRIDGE EXCIT
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPLIFIER OUTPUT
5
4
3


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
M1 EMERGENCY HEATER CONTROL MODULE
10K 1/2 W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
S5 MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 SEE NOTE 7
S6 SAFETY THERMOSTAT
HR3 EMERGENCY THERMOSTAT HEATER
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
BLOWER
B1
B2
C3 1.5
C2 1.5
F1
F2
J2
PSA TRAY 2
28V 800 CPS
LO
HI
IMU CONTROL PANEL
K3 IMU TURN ON RELAY
STANDBY
OPERATE
SPARE
S3-C
D&C PANEL
K2
PSA TRAY 10
A15J20E
IMU 28VDC
D&C PANEL
S1 GAIN -5°F
S4-A ZERO
R9 2304.1
R8 2308.8
R10 60.7K
S2 GAIN +5°F
S4-B
R18 1579.5
R17 1560.0
PSA TRAY 1
20VCT 3200 CPS SQ. WAVE 10VA
HI
CT
LO
A1 IRIG TEMP IND SENSOR
A2 ACCEL TEMP IND SENSOR
A3 IRIG TEMP CONTROL SENSOR
S7 SAFETY THERMOSTAT
R34 SEE NOTE 7
HR4 ACCEL
HR5 IRIG
CONTROL HEATERS
R35 SEE NOTE 7
HR6 ACCEL FIXED HEATERS
M2 28VDC REGULATOR
2N2151
270 2W
IN3028B
J27
+28VDC
0VDC
g
f
Y
V
X
R
Z
a
K
N
P
M
L
W
D
E
A
B
C
7
6
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G
F
E
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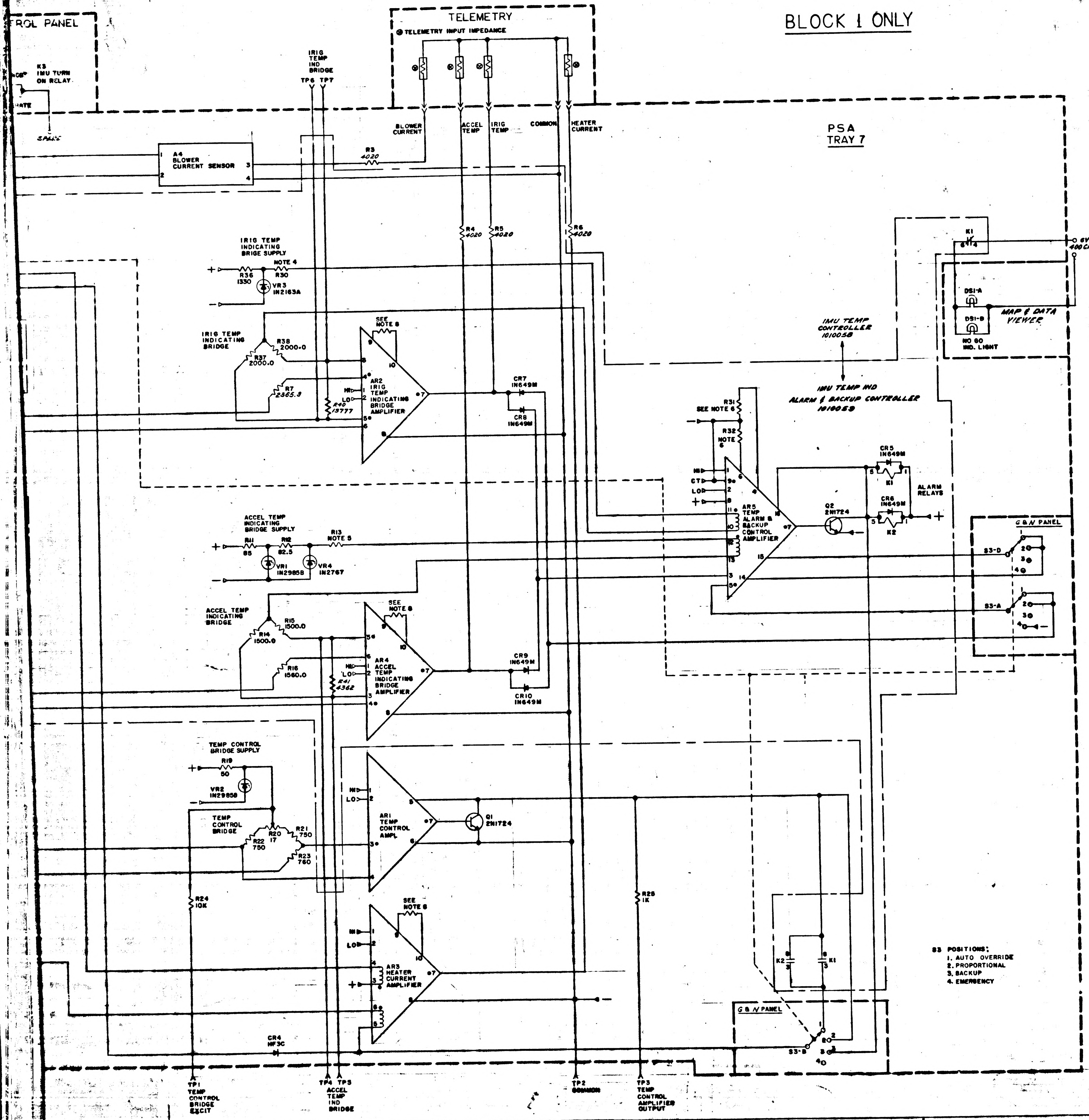
C
B
A
PHOTOGRAPHIC SCALE ONLY

S | 1010039

N	REVISED PER TDRR 00819	4-8-63	WK.
P	REVISED PER TDRR 01264	5-7-63	
R	REVISED PER TDRR 01400	5-29-63	WK
S	REVISED PER TDRR 01937	7-4-63	

BLOCK I ONLY


TROL PANEL
K3 IMU TURN ON RELAY
SPACE
TELEMETRY
TELEMETRY INPUT IMPEDANCE
IRIG TEMP IND BRIDGE
TP6 TP7
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
PSA TRAY 7
A4 BLOWER CURRENT SENSOR
R3 4020
R4 4020
R5 4020
R6 4020
IRIG TEMP INDICATING BRIGE SUPPLY
NOTE 4
R36 1330
R30
VR3 IN2163A
IRIG TEMP INDICATING BRIDGE
R38 2000.0
R37 2000.0
R7 2365.3
R40 13777
SEE NOTE 8
AR2 IRIG TEMP INDICATING BRIDGE AMPLIFIER
CR7 IN649M
CR8 IN649M
K1
6V 400 CPS
DS1-A
DS1-B
MAP & DATA VIEWER
NO GO IND. LIGHT
IMU TEMP CONTROLLER 1010058
IMU TEMP IND ALARM & BACKUP CONTROLLER 1010059
R31 SEE NOTE 6
R32 NOTE 6
AR5 TEMP ALARM & BACKUP CONTROL AMPLIFIER
Q2 2N1724
CR5 IN649M
CR6 IN649M
K1
K2
ALARM RELAYS
G & N PANEL
S3-D
S3-A
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
R13 NOTE 5
VR1 IN2985B
VR4 IN2767
ACCEL TEMP INDICATING BRIDGE
R15 1500.0
R14 1500.0
R16 1560.0
R41 4362
SEE NOTE 8
AR4 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 IN649M
CR10 IN649M
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 IN2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 TEMP CONTROL AMPL
Q1 2N1724
R24 10K
R25 1K
SEE NOTE 8
AR3 HEATER CURRENT AMPLIFIER
CR4 HF3C
K2
K1
G & N PANEL
S3-B
TP1 TEMP CONTROL BRIDGE EXCIT
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPLIFIER OUTPUT

S3 POSITIONS:
1. AUTO OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG. AMPL			
AR2	1000284	MAG. AMPL			
AR3	1000286	MAG. AMPL			
AR4	1000284	MAG. AMPL			
AR5	1000283	MAG. AMPL			
L1	1000288	SATURABLE REACTOR			
L2	1000288	SATURABLE REACTOR			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	1010273-1	TRANSISTOR	2N1724		
K1	1010353-1	RELAY	33WK-2		
K2	1010353-1				
K3					
CR4	1010322	DIODE	HF3C		6 AMP
CR5	1010362-3	DIODE	IN649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10					
VR1	1010331-009		IN2965B	5%	10W
VR2	1010331-009		IN2985B	5%	10W
VR3	1010440		IN2163A	2%	3/4W
VR4	1010441		IN2767	5%	2W
R43	1010325-500	RESISTOR	280	.1%	5W
R42					
R41	1010450-11		4362	.01%	1/8W
R40	1010450-10		13777		
R3	1010364-368	RESISTOR	4020	1%	1/8W
R4					
R5					
R6					
R7	1010450-12		2365.3	0.01%	1/8W
R8	1010450-12		2365.3	0.01%	1/8W
R9	1010450-13		2567.8	0.01%	1/8W
R11	1010364-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	SEE NOTE 5	SAT	1%	1/10W
R14	1010450-2		1500.0	0.01%	1/8W
R15	1010450-2		1500.0	0.01%	1/8W
R16	1010450-3		1560.0	0.01%	1/8W
R17	1010450-3		1560.0	0.01%	1/8W
R18	1010450-14		1582.0	0.01%	1/8W
R19	1010399-16		50	5%	5W
R20	1010453-1	VAR	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4W
R22	1010449-1		750	0.01%	
R23	1010449-2		760	0.01%	
R24	1006750-56		10K	2%	1/4W
R25	1010312-36		1K	5%	2W
R30	1010377	SEE NOTE 4	SAT	0.1%	1/10W
R31		6			
R32		6			
R33	1010498		SAT 2.67-35.7	1%	10W
R34			SAT 2.67-35.7		
R35			SAT 1.69-1K		
R36	1010452		1330	1%	1W
R37	1010450-9		2000.0	0.01%	1/8W
R38	1010450-9		2000.0	0.01%	1/8W
C2	1010264-38	CAPACITOR	.15	5%	200VDC
C3	1010264-38				
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170-	FUSE			
F2	1000170-	FUSE			
S1		SWITCH			
S2					
S3					
S4					
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	1000266	THERMOSTAT			
HR1	(1000126)(D105318)	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	(1000126)(D105318)				
HR6	1000134				
A1	D1505	SENSOR			
A2	96149				
A3	(1000126)(D105318)				
A4	1000287	CURRENT SENSOR			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1-DS2		DUAL LAMP			

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP RANGE OF VALUES, FROM FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-113 THRU-206
5. R13 TO BE SELECTED PER ATP RANGE OF VALUES, FROM 71 OHMS THRU 171 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-141 THRU-191
6. R 31-32 TO BE SELECTED PER ATP RANGE OF VALUES, FROM 750 OHMS THRU 1250 OHMS IN STEPS OF 10 OHMS, PER PART NO 1010377-212 THRU-262.
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST
8. EXTERNAL RESISTORS SUPPLIED WITH AMPLIFIER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN L.W.R. DATE 4-4-63
CHECKED 4-5-63
APPROVAL Bert Katz 4-5-63
APPROVAL
NASA APPROVAL 4/10/63
MIT APPROVAL

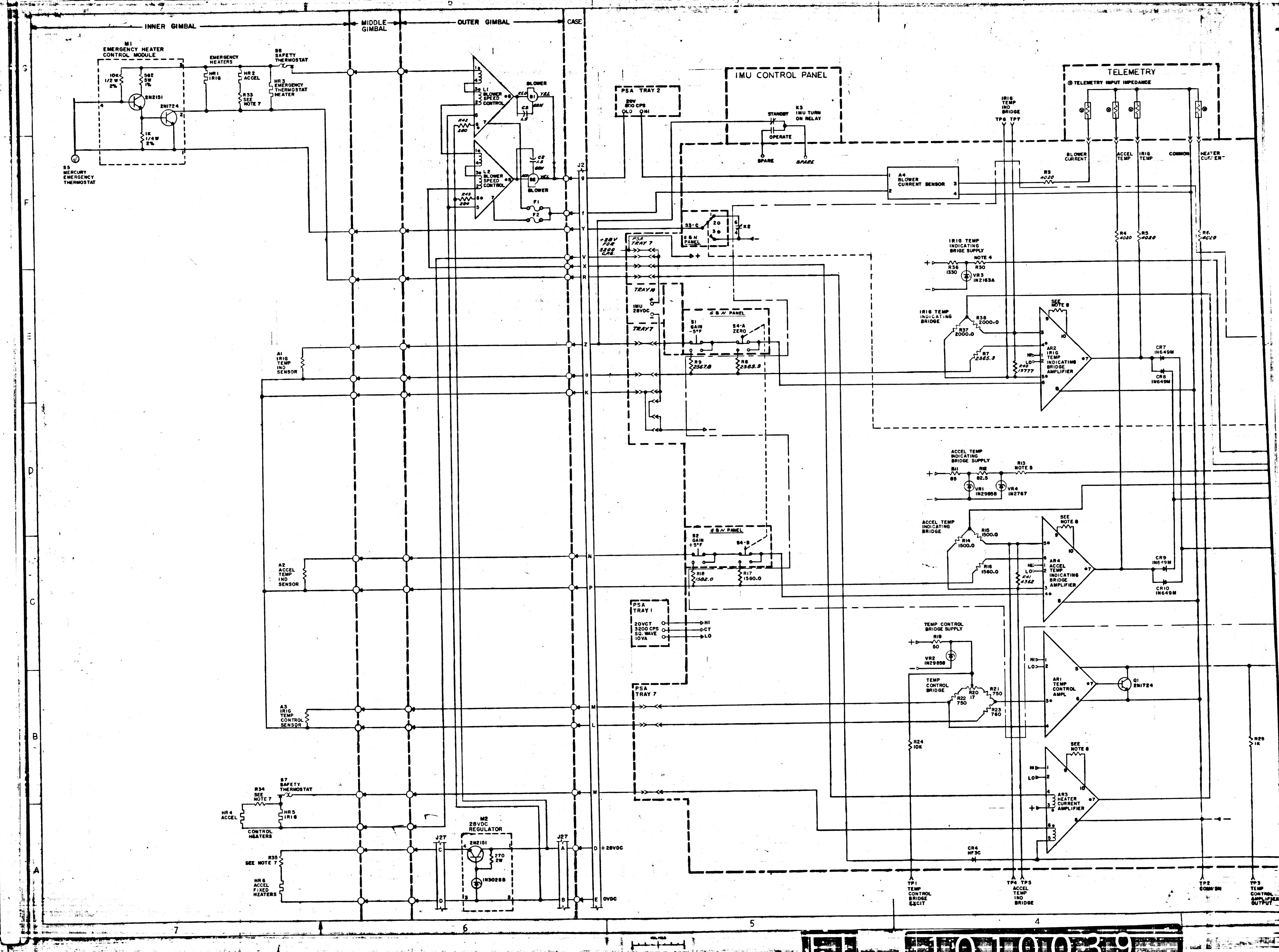
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO IMU TEMPERATURE
CONTROL SYSTEM
SCHEMATIC

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1010039
SCALE | WT | SHEET

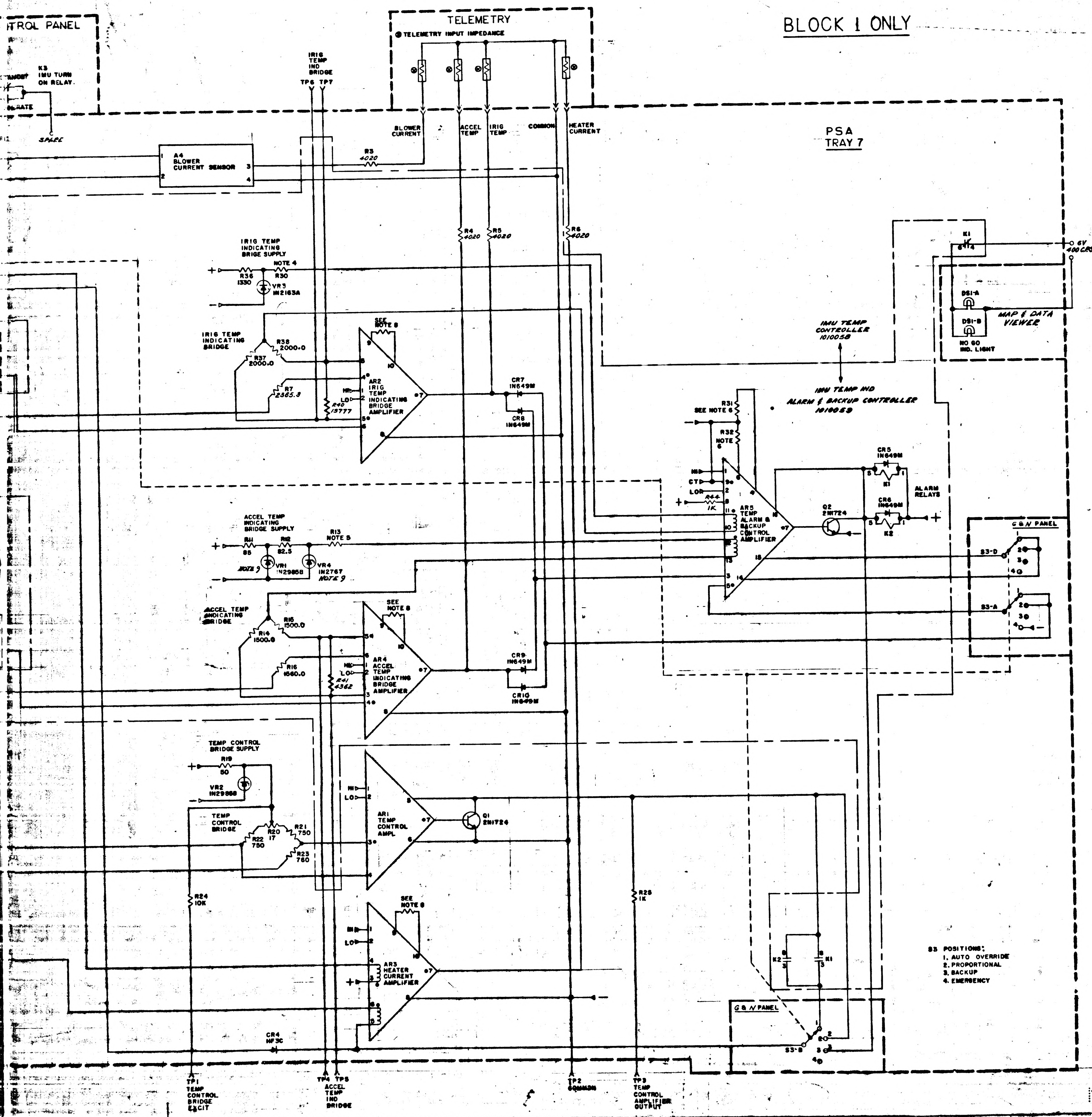
MASTER

E2 1010039


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
M1 EMERGENCY HEATER CONTROL MODULE
10K 1/2 W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
S5 MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 SEE NOTE 7
S6 SAFETY THERMOSTAT
HR3 EMERGENCY THERMOSTAT HEATER
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
B1 BLOWER
B2 BLOWER
C3 1.5
C2 1.5
R42 280
R43 280
F1
F2
RED
YEL
GRN
J2
PSA TRAY 2
28V 800 CPS
LO HI
IMU CONTROL PANEL
STANDBY
K3 IMU TURN ON RELAY
OPERATE
SPARE
TELEMETRY
TELEMETRY INPUT IMPEDANCE
IRIG TEMP IND BRIDGE
TP6 TP7
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
A4 BLOWER CURRENT SENSOR
R3 4020
R4 4020
R5 4020
R6 4020
S3-C
G&N PANEL
K2
+28V 400 3200 CPS
PSA TRAY 7
TRAY 10
IMU 28VDC
TRAY 7
IRIG TEMP INDICATING BRIGE SUPPLY
R36 1330
R30 NOTE 4
VR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R37 2000.0
R38 2000.0
R7 2365.3
R40 13777
SEE NOTE 8
AR2 IRIG TEMP INDICATING BRIDGE AMPLIFIER
CR7 1N649M
CR8 1N649M
G&N PANEL
S1 GAIN -5°F
S4-A ZERO
R9 2567.8
R8 2363.9
A1 IRIG TEMP IND SENSOR
ACCEL TEMP INDICATING BRIDGE SUPPLY
B11 85
R12 82.5
R13 NOTE 5
VR1 1N2985B
VR4 1N2767
ACCEL TEMP INDICATING BRIDGE
R14 1500.0
R15 1500.0
R16 1560.0
R41 4362
AR4 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 1N649M
CR10 1N649M
G&N PANEL
S2 GAIN +5°F
S4-B
R18 1582.0
R17 1560.0
A2 ACCEL TEMP IND SENSOR
PSA TRAY 1
20VCT 3200 CPS SQ. WAVE 10VA
HI
CT
LO
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 1N2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 TEMP CONTROL AMPL
Q1 2N1724
PSA TRAY 7
A3 IRIG TEMP CONTROL SENSOR
R24 10K
R25 1K
AR3 HEATER CURRENT AMPLIFIER
S7 SAFETY THERMOSTAT
R34 SEE NOTE 7
HR4 ACCEL
HR5 IRIG
CONTROL HEATERS
M2 28VDC REGULATOR
2N2151
270 2W
1N3028B
J27
R35 SEE NOTE 7
HR6 ACCEL FIXED HEATERS
+28VDC
0VDC
CR4 HF3C
TP1 TEMP CONTROL BRIDGE EXCIT
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPLIFIER OUTPUT
g f Y V X R Z a K N P M L W D E
A B C D
7 6 5 4
G F E D C B A
FI
10100039

1010039 T

SYM	DESCRIPTION	DATE	APPROVAL
N	REVISED PER TDRR [illegible]	4-8-63	WK.
P	REVISED PER TDRR [illegible]	5-7-63	WK
R	REVISED PER TDRR [illegible]	5-29-63	WK
S	REVISED PER TDRR 01937	[illegible]	X.E.L.
T	REVISED PER TDRR 02785	8-28-63	X.E.L.


BLOCK 1 ONLY
TROL PANEL
K3 IMU TURN ON RELAY.
SPARE
TELEMETRY
TELEMETRY INPUT IMPEDANCE
IRIG TEMP IND BRIDGE
TP6 TP7
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
PSA TRAY 7
A4 BLOWER CURRENT SENSOR
R3 4020
R4 4020
R5 4020
R6 4020
IRIG TEMP INDICATING BRIGE SUPPLY
NOTE 4
R36 1330
R30
VR3 IN2163A
IRIG TEMP INDICATING BRIDGE
R38 2000.0
R37 2000.0
R7 2365.3
R40 13777
SEE NOTE 8
AR2 IRIG TEMP INDICATING BRIDGE AMPLIFIER
HI
LO
CR7 IN649M
CR8 IN649M
6V 400 CPS
K1
DS1-A
DS1-B
NO GO IND. LIGHT
MAP & DATA VIEWER
IMU TEMP CONTROLLER 1010058
IMU TEMP IND ALARM & BACKUP CONTROLLER 1010059
R31 SEE NOTE 6
R32 NOTE 6
HI
CT
LO
R44 1K
AR5 TEMP ALARM & BACKUP CONTROL AMPLIFIER
Q2 2N1724
CR5 IN649M
K1
CR6 IN649M
K2
ALARM RELAYS
G & N PANEL
S3-D
S3-A
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
R13 NOTE 5
VR1 IN2985B NOTE 9
VR4 IN2767 NOTE 9
ACCEL TEMP INDICATING BRIDGE
R14 1500.0
R15 1500.0
R16 1560.0
R41 4362
AR4 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 IN649M
CR10 IN649M
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 IN2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 TEMP CONTROL AMPL
Q1 2N1724
R24 10K
R25 1K
AR3 HEATER CURRENT AMPLIFIER
CR4 HF3C
K2
K1
G & N PANEL
S3-B
S3 POSITIONS:
1. AUTO OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY
TP1 TEMP CONTROL BRIDGE EXCIT
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPLIFIER OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG. AMPL			
AR2	1000284	MAG. AMPL			
AR3	1000236	MAG. AMPL			
AR4	1000284	MAG. AMPL			
AR5	1000283	MAG. AMPL			
L1	1000288	SATURABLE REACTOR			
L2	1000288	SATURABLE REACTOR			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	1010273-1	TRANSISTOR	2N1724		
K1	1010353-1	RELAY	33WK-2		
K2	1010353-1				
K3					
CR4	1010322	DIODE	HF3C		6 AMP
CR5	1010362-3	DIODE	IN649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10					
VR1	1010331-009		IN2985B	5%	10W
VR2	1010331-009		IN2985B	5%	10W
VR3	1010440		IN2163A	2%	3/4W
VR4	1010441		IN2767	5%	2W
R43	1010325-500	RESISTOR	280	.1%	5W
R42					
R41	1010450-11		4362	.01%	1/8W
R40	1010450-10		13777		
R3	1010364-368	RESISTOR	4020	1%	1/8W
R4					
R5					
R6					
R7	1010450-12		2365.3	0.01%	1/8W
R8	1010450-12		2365.3	0.01%	1/8W
R9	1010450-13		2567.8	0.01%	1/8W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	SEE NOTE 5	SAT	1%	1/10W
R14	1010450-2		1500.0	0.01%	1/8W
R15	1010450-2		1500.0	0.01%	1/8W
R16	1010450-3		1560.0	0.01%	1/8W
R17	1010450-3		1560.0	0.01%	1/8W
R18	1010450-14		1582.0	0.01%	1/8W
R19	1010399-16		50	5%	5W
R20	1010453-1	VAR	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4W
R22	1010449-1		750	0.01%	
R23	1010449-2		760	0.01%	
R24	1006750-56		10K	2%	1/4W
R25	1010312-36		1K	5%	2W
R30	1010377	SEE NOTE 4	SAT	0.1%	1/10W
R31		6			
R32		6			
R33	1010498		SAT 2.67-36.7	1%	10W
R34			SAT 2.67-36.7		
R35			SAT 1.69-1K		
R36	1010452		1330	1%	1W
R37	1010450-9		2000.0	0.01%	1/8W
R38	1010450-9		2000.0	0.01%	1/8W
R44	1010604-22		1K	1%	1W
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	1010264-38				
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170-	FUSE			
F2	1000170-	FUSE			
S1		SWITCH			
S2					
S3					
S4					
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	1000266	THERMOSTAT			
HR1	(1000126)(D105318)	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	(1000126)(D105318)				
HR6	1000134				
A1	D1505	SENSOR			
A2	96149				
A3	(1000126)(D105318)				
A4	1000287	CURRENT SENSOR			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1-DS2		DUAL LAMP			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081 RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007056 RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R31 & R32 TO BE SELECTED PER ATP 1007056 RANGE OF VALUES FROM 750 OHMS THRU 1250 OHMS IN STEPS OF 10 OHMS, PER PART NO 1010377-212 THRU 262
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST
8. EXTERNAL RESISTORS SUPPLIED WITH AMPLIFIER
9. VR1 & VR4 SHALL BE SELECTED SO THAT VR1 ZENER VOLTAGE EXCEEDS VR4 ZENER VOLTAGE BY AT LEAST 1.0 VOLTS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L W R DATE 4-4-63
CHECKED 4-5-63
APPROVAL 4-5-63
APPROVAL
NASA APPROVAL 4/10/63
MIT APPROVAL

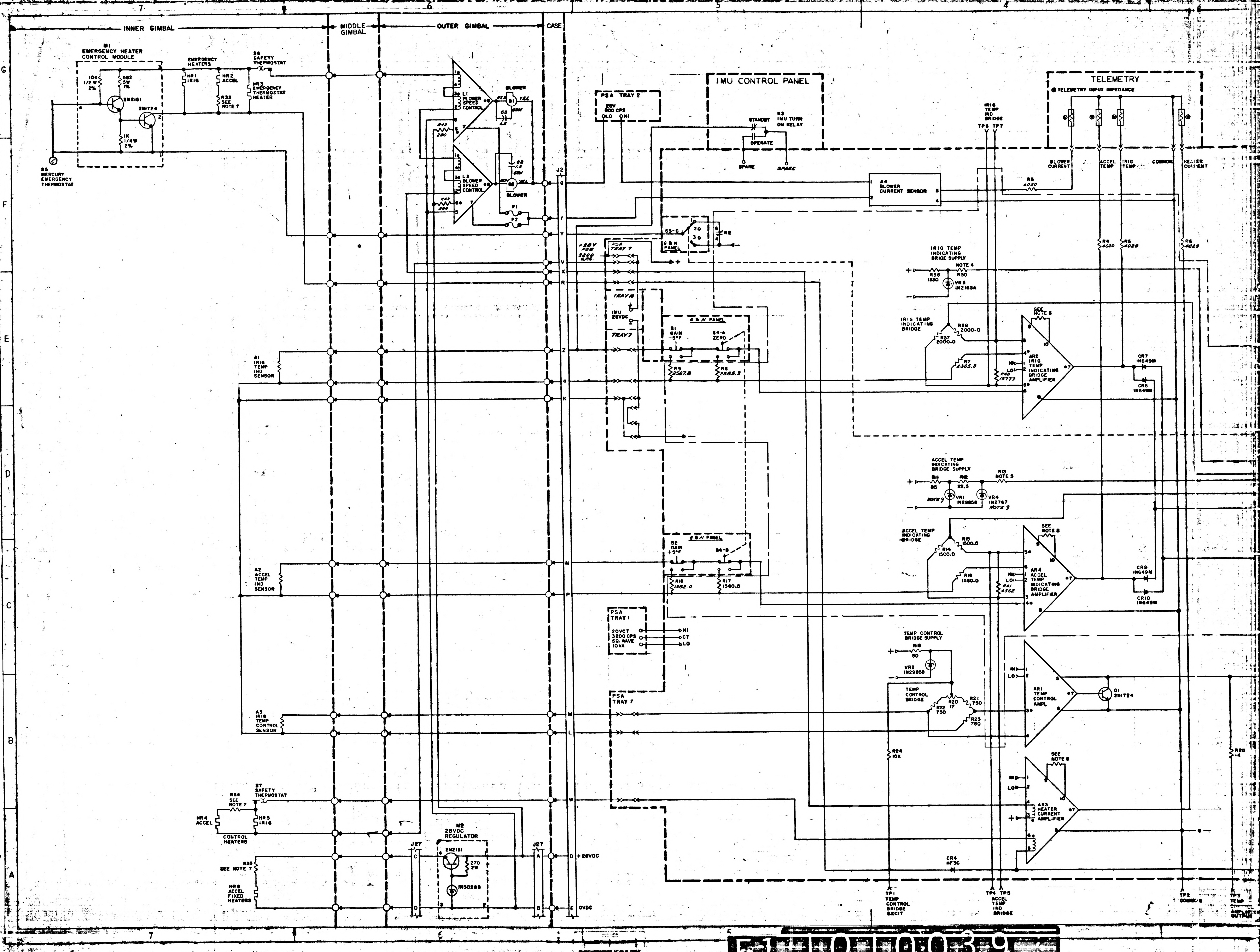
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO IMU TEMPERATURE
CONTROL SYSTEM
SCHEMATIC

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010039
SCALE
WT
SHEET 1 OF 1

MASTER

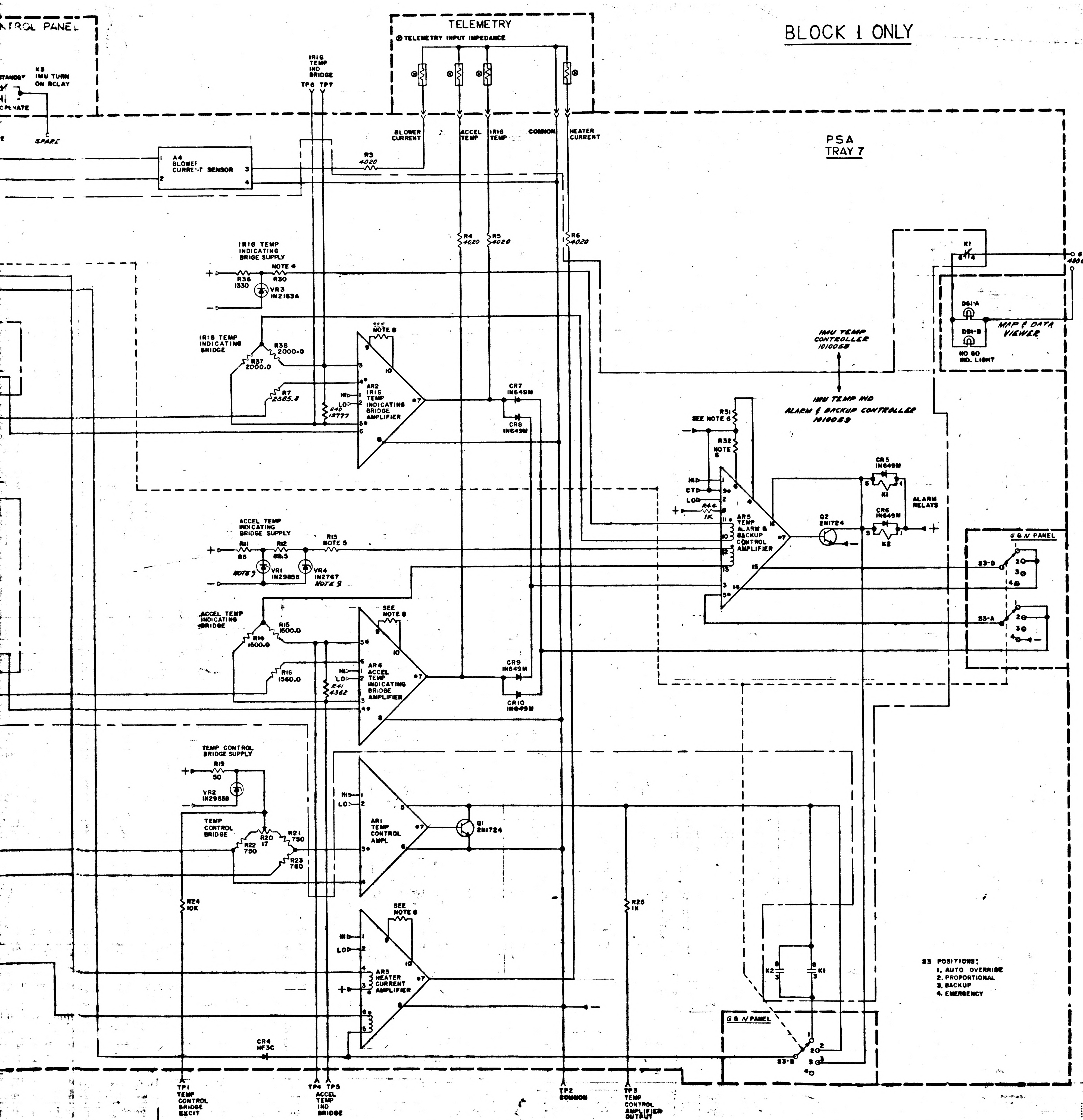
E2


7
6
5
4
G
F
E
D
C
B
A
INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
M1
EMERGENCY HEATER CONTROL MODULE
10K 1/2 W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
S5
MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 SEE NOTE 7
S6
SAFETY THERMOSTAT
HR3 EMERGENCY THERMOSTAT HEATER
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
R42 280
R43 280
BLOWER
B1
B2
RED
YEL
GRN
C3 1.5
C2 1.5
F1
F2
J2
PSA TRAY 2
28V 800 CPS
LO
HI
IMU CONTROL PANEL
STANDBY
OPERATE
K3 IMU TURN ON RELAY
SPARE
SPARE
A4 BLOWER CURRENT SENSOR
IRIG TEMP IND BRIDGE
TP6
TP7
TELEMETRY
TELEMETRY INPUT IMPEDANCE
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
R3 4020
R4 4020
R5 4020
R6 4020
S3-C
G & N PANEL
K2
+28V FOR 3200 CPS.
PSA TRAY 7
TRAY 10
IMU 28VDC
TRAY 7
G & N PANEL
S1 GAIN -5°F
S4-A ZERO
R9 2567.8
R8 2365.3
IRIG TEMP INDICATING BRIGE SUPPLY
R36 1330
NOTE 4
R30
VR3 IN2163A
IRIG TEMP INDICATING BRIDGE
R37 2000.0
R38 2000.0
R7 2365.3
R40 13777
SEE NOTE 8
AR2 IRIG TEMP INDICATING BRIDGE AMPLIFIER
HI
LO
CR7 IN649M
CR8 IN649M
A1 IRIG TEMP IND SENSOR
A2 ACCEL TEMP IND SENSOR
A3 IRIG TEMP CONTROL SENSOR
G & N PANEL
S2 GAIN +5°F
S4-B
R18 1582.0
R17 1560.0
PSA TRAY 1
20VCT 3200 CPS SQ. WAVE 10VA
HI
CT
LO
PSA TRAY 7
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
R13 NOTE 5
VR1 IN2985B
NOTE 9
VR4 IN2767
NOTE 9
ACCEL TEMP INDICATING BRIDGE
R14 1500.0
R15 1500.0
R16 1560.0
R41 4362
SEE NOTE 8
AR4 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 IN649M
CR10 IN649M
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 IN2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 TEMP CONTROL AMPL
Q1 2N1724
R24 10K
R25 1K
SEE NOTE 8
AR3 HEATER CURRENT AMPLIFIER
CR4 HF3C
TP1 TEMP CONTROL BRIDGE EXCIT
TP4
TP5
ACCEL TEMP IND BRIDGE
TP2
TP3
S7
SAFETY THERMOSTAT
R34 SEE NOTE 7
HR4 ACCEL
HR5 IRIG
CONTROL HEATERS
R35 SEE NOTE 7
HR6 ACCEL FIXED HEATERS
J27
M2 28VDC REGULATOR
2N2151
270 2W
IN3028B
+28VDC
OVDC
g
f
Y
V
X
R
Z
a
K
N
P
M
L
W
D
E
A
B
C
1010039

∩ 6E00101

SYM	DESCRIPTION	DATE	APPROVAL
N	REVISED PER TDRR [illegible]	4-8-63	W.K.
P	REVISED PER TDRR 01264	5-7-63	W.K.
R	REVISED PER TDRR [illegible]	5-29-63	W.K.
S	REVISED PER TDRR 01937	7-4-63	K.E.
T	REVISED PER TDRR 02705	8-26-63	K.E.L
U	REVISED PER TDRR 06-73	2-10-64	W.K.

BLOCK I ONLY



CONTROL PANEL
STANDBY
K3 IMU TURN ON RELAY
HI
OPERATE
SPARE
TELEMETRY
⊗ TELEMETRY INPUT IMPEDANCE
IRIG TEMP IND BRIDGE
TP6 TP7
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
PSA TRAY 7
A4 BLOWER CURRENT SENSOR
R3 4020
R4 4020
R5 4020
R6 4020
IRIG TEMP INDICATING BRIGE SUPPLY
NOTE 4
R36 1330
R30
VR3 IN2163A
IRIG TEMP INDICATING BRIDGE
R38 2000.0
R37 2000.0
R7 2365.8
R40 13777
SEE NOTE 8
AR2 IRIG TEMP INDICATING BRIDGE AMPLIFIER
HI
LO
CR7 IN649M
CR8 IN649M
IMU TEMP CONTROLLER 1010058
IMU TEMP IND ALARM & BACKUP CONTROLLER 1010059
K1
6V 400 CPS
DS1-A
DS1-B
MAP & DATA VIEWER
NO GO IND. LIGHT
R31 SEE NOTE 6
R32 NOTE 6
HI
CT
LO
R44 1K
AR5 TEMP ALARM & BACKUP CONTROL AMPLIFIER
Q2 2N1724
CR5 IN649M
K1
CR6 IN649M
K2
ALARM RELAYS
G & N PANEL
S3-D
S3-A
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
R13 NOTE 5
VR1 IN2985B
NOTE 9
VR4 IN2767
NOTE 9
ACCEL TEMP INDICATING BRIDGE
R15 1500.0
R14 1500.0
R16 1560.0
R41 4362
AR4 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 IN649M
CR10 IN649M
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 IN2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 TEMP CONTROL AMPL
Q1 2N1724
R24 10K
R25 1K
AR3 HEATER CURRENT AMPLIFIER
CR4 HF3C
K2
K1
G & N PANEL
S3-B
S3 POSITIONS:
1. AUTO OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY
TP1 TEMP CONTROL BRIDGE EXCIT
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPLIFIER OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG. AMPL			
AR2	1000284	MAG. AMPL			
AR3	1000286	MAG. AMPL			
AR4	1000284	MAG. AMPL			
AR5	1000283	MAG. AMPL			
L1	1000288	SATURABLE REACTOR			
L2	1000288	SATURABLE REACTOR			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	1010273-1	TRANSISTOR	2N1724		
K1	1010353-1	RELAY	33WK-2		
K2	1010353-1				
K3					
CR4	1010322	DIODE	HF3C		6 AMP
CR5	1010362-3	DIODE	IN649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10					
VR1	1010331-009		IN2985B	5%	10W
VR2	1010331-009		IN2985B	5%	10W
VR3	1010440		IN2163A	2%	3/4 W
VR4	1010441		IN2767	5%	2 W
R43	1010325-300	RESISTOR	280	.1%	5W
R42					
R41	1010450-11		4362	.01%	1/8W
R40	1010450-10		13777		
R3	1010364-368	RESISTOR	4020	1%	1/8W
R4					
R5					
R6					
R7	1010450-12		2365.8	0.01%	1/8W
R8	1010450-12		2365.8	0.01%	1/8W
R9	1010450-13		2567.8	0.01%	1/8W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	SEE NOTE 5	SAT	1%	1/10 W
R14	1010450-2		1500.0	0.01%	1/8W
R15	1010450-2		1500.0	0.01%	1/8W
R16	1010450-3		1560.0	0.01%	1/8W
R17	1010450-3		1560.0	0.01%	1/8W
R18	1010450-14		1582.0	0.01%	1/8W
R19	1010399-16		50	5%	5W
R20	1010453-1	VAR	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4 W
R22	1010449-1		750	0.01%	
R23	1010449-2		760	0.01%	
R24	1006750-56		10K	2%	1/4W
R25	1010312-36		1K	5%	2W
R30	1010377	SEE NOTE 4	SAT	0.1%	1/10W
R31		6			
R32		6			
R33	1010498		SAT 2.67-36-7	1%	10W
R34			SAT 2.67-35-7		
R35			SAT 1.69-1K		
R36	1010452		1330	1%	1W
R37	1010450-9		2000.0	0.01%	1/8W
R38	1010450-9		2000.0	0.01%	1/8W
R44	1010604-22		1K	1%	1W
C2	1010264-38	CAPACITOR	.15	5%	200VDC
C3	1010264-38				
B1	1000219	BLOWER			
B2	1000219	BLOWER			
F1	1000170-	FUSE			
F2	1000170-	FUSE			
S1		SWITCH			
S2					
S3					
S4					
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	1000266	THERMOSTAT			
HR1	(1000126)(D105318)	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	(1000126)(D105318)				
HR6	1000134				
A1	D1505	SENSOR			
A2	96149				
A3	(1000126)(D105318)				
A4	1000287	CURRENT SENSOR			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1-DS2		DUAL LAMP			

REPLACED BY REV. V

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBE BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081 RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007056 RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS, PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R31 & R32 TO BE SELECTED PER ATP 1007056 RANGE OF VALUES FROM 750 OHMS THRU 1250 OHMS IN STEPS OF 10 OHMS, PER PART NO 1010377-212 THRU 262
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST
8. EXTERNAL RESISTORS SUPPLIED WITH AMPLIFIER
9. VR1 & VR4 SHALL BE SELECTED SO THAT VR1 ZENER VOLTAGE EXCEEDS VR4 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN L.W.R. DATE 4-4-63
CHECKED 4-5-63
APPROVAL 4-5-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

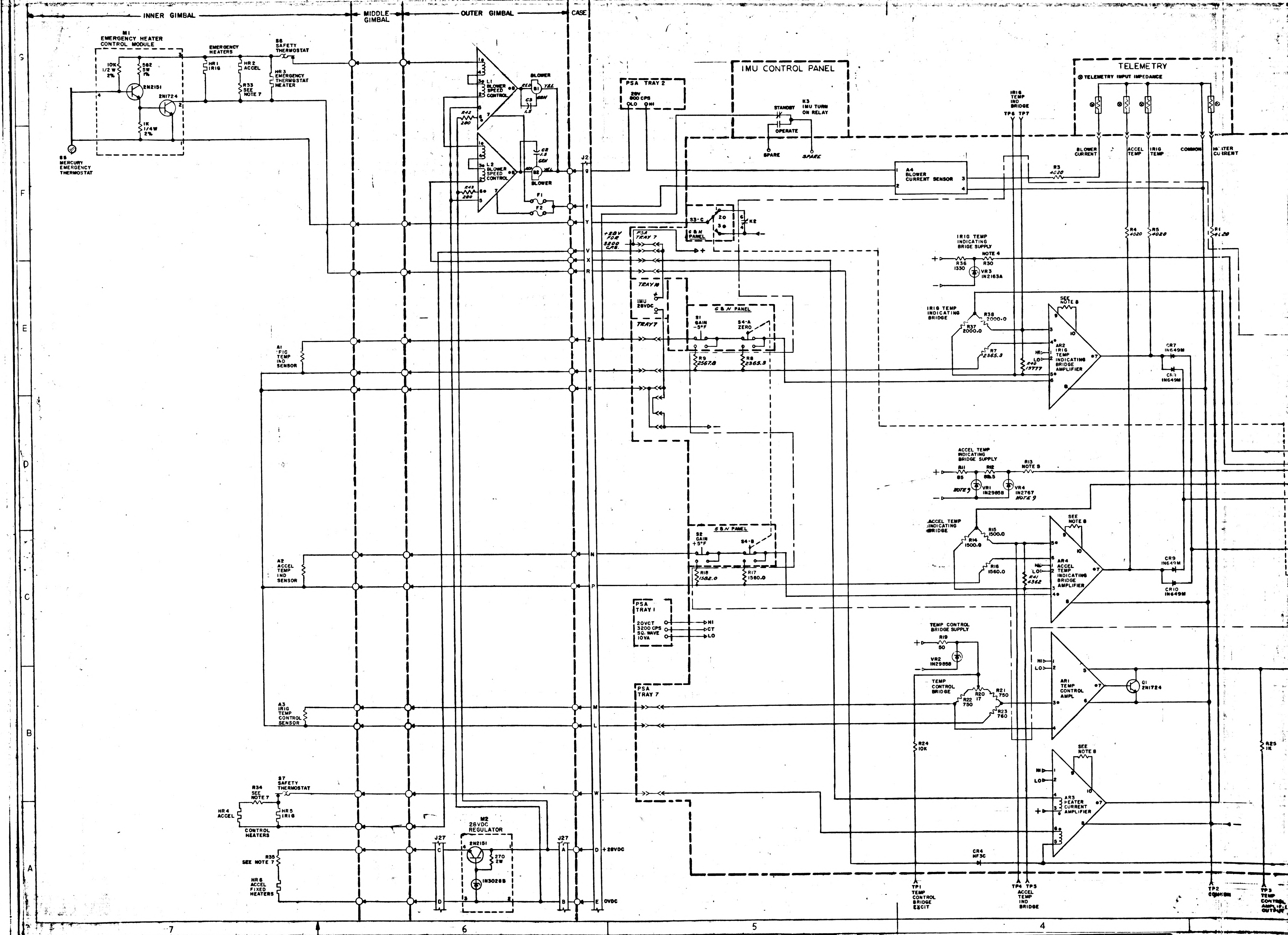
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO IMU TEMPERATURE
CONTROL SYSTEM
SCHEMATIC

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010039
SCALE
WT
SHEET 1 OF 1

MASTER

E2 1010039



INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
M1 EMERGENCY HEATER CONTROL MODULE
10K 1/2 W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
S5 MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 SEE NOTE 7
S6 SAFETY THERMOSTAT
HR3 EMERGENCY THERMOSTAT HEATER
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
BLOWER
B1
B2
C3 1.5
C2 1.5
RED
YEL
GRN
R42 280
R43 280
F1
F2
J2
PSA TRAY 2
28V 800 CPS
IMU CONTROL PANEL
STANDBY
OPERATE
K3 IMU TURN ON RELAY
SPARE
TELEMETRY
TELEMETRY INPUT IMPEDANCE
BLOWER CURRENT
ACCEL TEMP
IRIG TEMP
COMMON
HEATER CURRENT
IRIG TEMP IND BRIDGE
TP6 TP7
A4 BLOWER CURRENT SENSOR
R3 4020
R4 4020
R5 4020
R1 4020
S3-C
G & N PANEL
K2
+28V FOR 3200 CPS
PSA TRAY 7
TRAY 18
IMU 28VDC
TRAY 7
G & N PANEL
S1 GAIN -5°F
S4-A ZERO
R9 2567.8
R8 2365.3
IRIG TEMP INDICATING BRIGE SUPPLY
R36 1330
R30 NOTE 4
VR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R37 2000.0
R38 2000.0
R7 2365.3
R40 13777
SEE NOTE 8
AR2 IRIG TEMP INDICATING BRIDGE AMPLIFIER
CR7 1N649M
CR8 1N649M
A1 IRIG TEMP IND SENSOR
A2 ACCEL TEMP IND SENSOR
G & N PANEL
S2 GAIN +5°F
S4-B
R18 1582.0
R17 1560.0
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 98.5
R13 NOTE 9
VR1 1N2985B
VR4 1N2767 NOTE 9
ACCEL TEMP INDICATING BRIDGE
R14 1500.0
R15 1500.0
R16 1560.0
R41 4362
AR4 ACCEL TEMP INDICATING BRIDGE AMPLIFIER
CR9 1N649M
CR10 1N649M
PSA TRAY 1
20VCT 3200 CPS SQ. WAVE 10VA
HI
CT
LO
TEMP CONTROL BRIDGE SUPPLY
R19 50
VR2 1N2985B
TEMP CONTROL BRIDGE
R20 17
R21 750
R22 750
R23 760
AR1 TEMP CONTROL AMPL
Q1 2N1724
PSA TRAY 7
A3 IRIG TEMP CONTROL SENSOR
R24 10K
R25 1K
AR3 HEATER CURRENT AMPLIFIER
CR4 HF3C
S7 SAFETY THERMOSTAT
R34 SEE NOTE 7
HR4 ACCEL
HR5 IRIG
CONTROL HEATERS
M2 28VDC REGULATOR
2N2151
270 2W
1N3028B
J27
R35 SEE NOTE 7
HR6 ACCEL FIXED HEATERS
+28VDC
0VDC
TP1 TEMP CONTROL BRIDGE EXCIT
TP4 TP5 ACCEL TEMP IND BRIDGE
TP2 COMMON
TP3 TEMP CONTROL AMPL OUTPUT
G
F
E
D
C
B
A
7
6
5
4

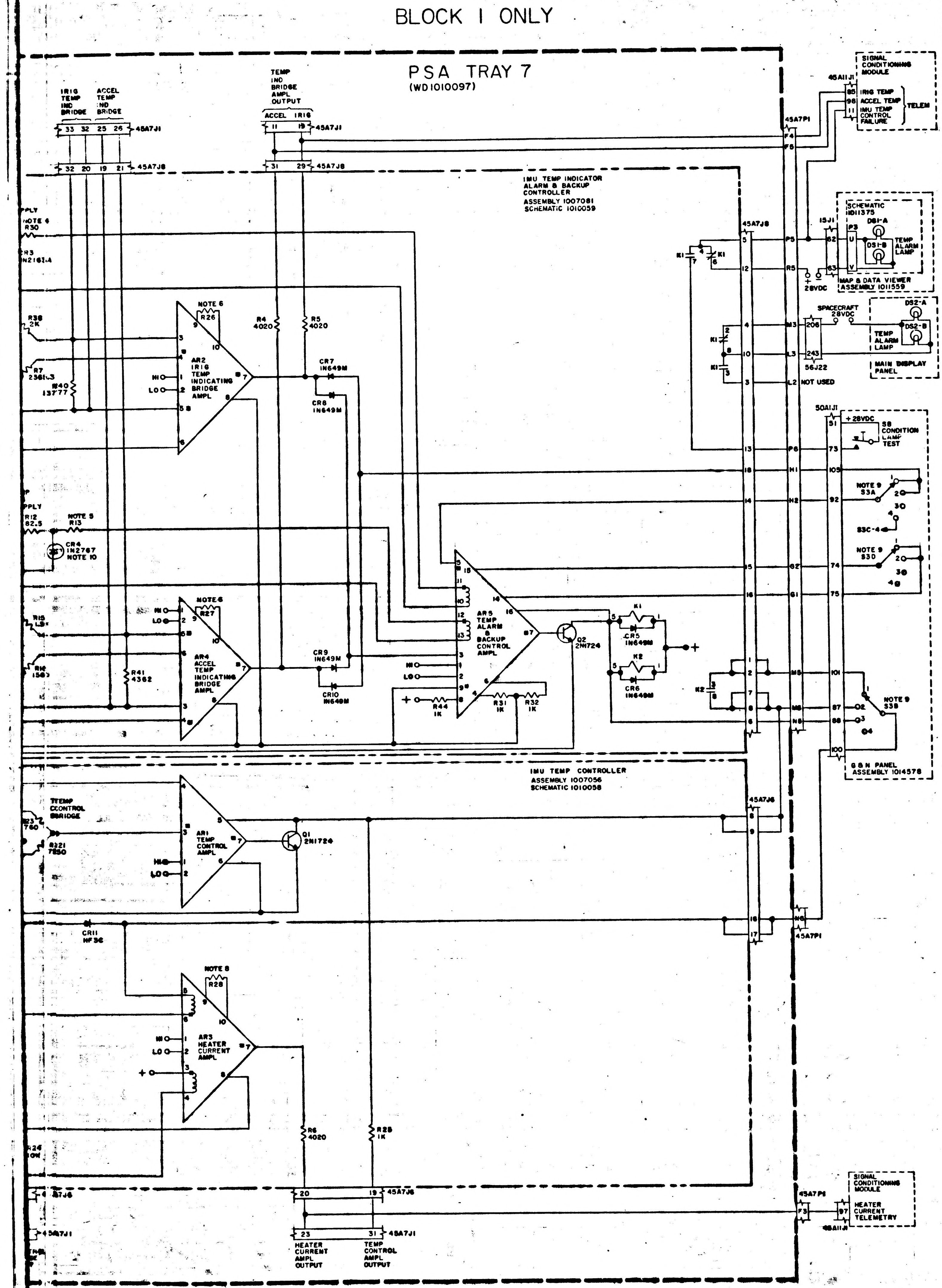
F1

1010039

1010039 V

	REV	DESCRIPTION	DATE	APPROVED
	V	REVISED PER TORR 06373		

BLOCK I ONLY



PSA TRAY 7
(WD1010097)
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
45A7J1
45A7J8
TEMP IND BRIDGE AMPL OUTPUT
ACCEL
IRIG
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER ASSEMBLY 1007081 SCHEMATIC 1010059
SIGNAL CONDITIONING MODULE
45A11J1
IRIG TEMP
ACCEL TEMP
IMU TEMP CONTROL FAILURE
TELEM
45A7P1
SCHEMATIC 1011375
15J1
DS1-A
DS1-B
TEMP ALARM LAMP
28VDC
MAP & DATA VIEWER ASSEMBLY 1011559
SPACECRAFT 28VDC
DS2-A
DS2-B
TEMP ALARM LAMP
56J22
MAIN DISPLAY PANEL
NOT USED
50A1J1
+28VDC
S8 CONDITION LAMP TEST
NOTE 9 S3A
S3C-4
NOTE 9 S3D
NOTE 9 S3B
G & N PANEL ASSEMBLY 1014578
K1
K2
R30
CR3 IN2163A
NOTE 6 R26
R38 2K
AR2 IRIG TEMP INDICATING BRIDGE AMPL
R7 2361.3
R40 13777
R4 4020
R5 4020
CR7 IN649M
CR8 IN649M
R12 82.5
NOTE 5 R13
CR4 IN2767 NOTE 10
NOTE 6 R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
R41 4362
CR9 IN649M
CR10 IN649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
Q2 2N1724
CR5 IN649M
CR6 IN649M
R44 1K
R31 1K
R32 1K
IMU TEMP CONTROLLER ASSEMBLY 1007056 SCHEMATIC 1010058
TEMP CONTROL BRIDGE
R21 750
AR1 TEMP CONTROL AMPL
Q1 2N1724
45A7J6
CR11 HF3C
NOTE 8 R28
AR3 HEATER CURRENT AMPL
R6 4020
R25 1K
R24 10K
SIGNAL CONDITIONING MODULE
HEATER CURRENT TELEMETRY
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
HI
LO

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	1000284				
AR5	1001614	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-009	DIODE	1N2985B	5%	10W
CR2	↓		↓	↓	↓
CR3	1010440		1N2163A	2%	3/4W
CR4	1010441		1N2767	5%	2W
CR5	1010362-3		1N649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	↓		↓		↓
CR11	1010322	↓	HF3C		6 AMP
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1		SWITCH			
S2					
S3					
S4		↓			
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	↓	↓			
S8		SWITCH			
HR1	1000126 D105318	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126 D105318				
HR6	1000134	↓			
A1	D1505	SENSOR			
A2	D96149				
A3	1000126 D105318	↓			
A4	1000287	CURRENT SENSOR			
A5	1000272	PRESSURE TRANSDUCER			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1		DUAL LAMP			
DS2		↓			
R3	1010364-368	RESISTOR	4020	1%	1/8W
R4					
R5					
R6	↓		↓	↓	
R7	1010450-12		2365.3	0.01%	
R8	↓		↓		
R9	1010450-13		2567.8	↓	↓
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	NOTE 5	SAT	1%	1/10W
R14	1010450-2		1500	0.01%	1/8W
R15	-2		↓		
R16	-3		1560		
R17	-3		↓		
R18	↓ -14		1582	↓	↓
R19	1010399-16		50	5%	5W
R20	1010453-1	POT	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4W
R22	-1		↓		
R23	↓ -2		760	↓	↓
R24	1006750-56		10K	2%	1/4W
R25	1010312-36		1K	5%	2W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27		NOTE 6			
R28	↓	NOTE 8	↓	↓	
R30	1010377	NOTE 4	SAT	0.1%	
R31	-237		1K		
R32	↓ -237		1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10W
R34					
R35	↓	↓	↓		↓
R36	1010452		1330	↓	1W
R37	1010450-9		2000	0.01%	1/8W
R38	↓		↓		
R40	1010450-10		13777		
R41	↓ -11		4362	↓	↓
R42	1010325-500		280	0.1%	5W
R43	↓		↓	↓	↓
R44	1010604-22	↓	1K	1%	1W

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL

M I T
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		2-11-66
CHECKED	B K	2-5-66
DRAWN	LWB	2-9-66
APPROVED FOR MSC		
MIT/IL APPROVAL		DATE

APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I

SCALE
UNIT WT
CODE IDENT

M I T
INSTRUMENTATION
LABORATORY
CAMBRIDGE MASS

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO
1010039

SHEET 1 OF 1

MASTER

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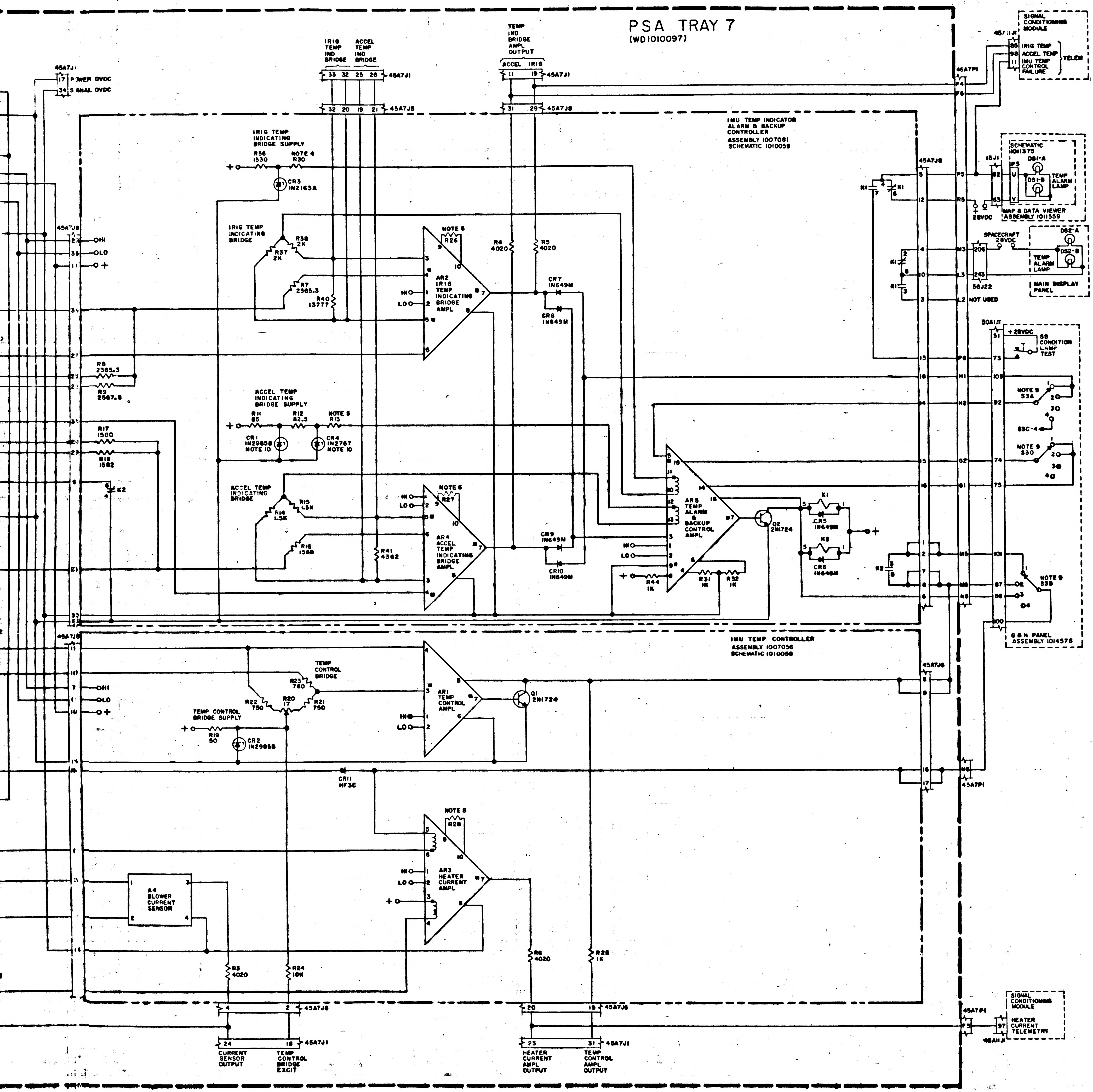


PSA TRAY 7
(WD1010097)
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007081
SCHEMATIC 1010059
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
45A7J1
45A7J8
45A7P1
POWER OVDC
SIGNAL OVDC
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
TEMP IND BRIDGE AMPL OUTPUT
ACCEL
IRIG
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R37 2K
R38 2K
R7 2365.3
R40 13777
AR2 IRIG TEMP INDICATING BRIDGE AMPL
NOTE 6
R26
R4 4020
R5 4020
CR7 1N649M
CR8 1N649M
R8 2365.3
R9 2567.8
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B NOTE 10
CR4 1N2767 NOTE 10
R17 1500
R18 1582
K2
ACCEL TEMP INDICATING BRIDGE
R14 1.5K
R15 1.5K
R16 1560
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
R27
R41 4362
CR9 1N649M
CR10 1N649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
R44 1K
R31 1K
R32 1K
Q2 2N1724
K1
CR5 1N649M
K2
CR6 1N649M
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
AR1 TEMP CONTROL AMPL
Q1 2N1724
CR11 HF3C
NOTE 8
R28
AR3 HEATER CURRENT AMPL
A4 BLOWER CURRENT SENSOR
R3 4020
R24 10K
R6 4020
R25 1K
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
SIGNAL CONDITIONING MODULE
IRIG TEMP
ACCEL TEMP
IMU TEMP CONTROL FAILURE
TELEM
SCHEMATIC 1011375
DS1-A
DS1-B
TEMP ALARM LAMP
MAP & DATA VIEWER ASSEMBLY 1011559
28VDC
SPACECRAFT 28VDC
DS2-A
DS2-B
TEMP ALARM LAMP
MAIN DISPLAY PANEL
56J22
NOT USED
50A1J1
+28VDC
S8 CONDITION LAMP TEST
NOTE 9 S3A
S3C-4
NOTE 9 S3D
NOTE 9 S3B
G & N PANEL ASSEMBLY 1014578
HEATER CURRENT TELEMETRY

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	1000284				
AR5	1001614	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-009	DIODE	1N2985B	5%	10W
CR2	↓		↓	↓	↓
CR3	1010440		1N2163A	2%	3/4W
CR4	1010441		1N2767	5%	2W
CR5	1010362-3		1N649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	↓		↓		↓
CR11	1010322	↓	HF3C		6AMP
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1		SWITCH			
S2					
S3					
S4		↓			
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	↓	↓			
S8		SWITCH			
HR1	1000126 D105318	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126 D105318				
HR6	1000134	↓			
A1	D1505	SENSOR			
A2	D96149				
A3	1000126 D105318	↓			
A4	1000287	CURRENT SENSOR			
A5	1000272	PRESSURE TRANSDUCER			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1		DUAL LAMP			
DS2		↓			
R3	1010364-368	RESISTOR	4020	1%	1/8W
R4					
R5					
R6	↓		↓	↓	
R7	1010450-12		2365.3	0.01%	
R8	↓		↓		
R9	1010450-13		2567.8	↓	↓
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	NOTE 5	SAT	1%	1/10W
R14	1010450-2		1500	0.01%	1/8W
R15	-2		↓		
R16	-3		1560		
R17	-3		↓		
R18	↓ -14		1582	↓	↓
R19	1010399-16		50	5%	5W
R20	1010453-1	POT	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4W
R22	-1		↓		
R23	↓ -2		760	↓	↓
R24	1006750-56		10K	2%	1/4W
R25	1010312-36		1K	5%	2W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27		NOTE 6			
R28	↓	NOTE 8	↓	↓	
R30	1010377	NOTE 4	SAT	0.1%	
R31	-237		1K		
R32	↓ -237		1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10W
R34					
R35	↓	↓	↓		↓
R36	1010452		1330	↓	1W
R37	1010450-9		2000	0.01%	1/8W
R38	↓		↓		
R40	1010450-10		13777		
R41	↓ -11		4362	↓	↓
R42	1010325-500		280	0.1%	5W
R43	↓		↓	↓	↓
R44	1010604-22	↓	1K	1%	1W

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION

LIST OF PARTS

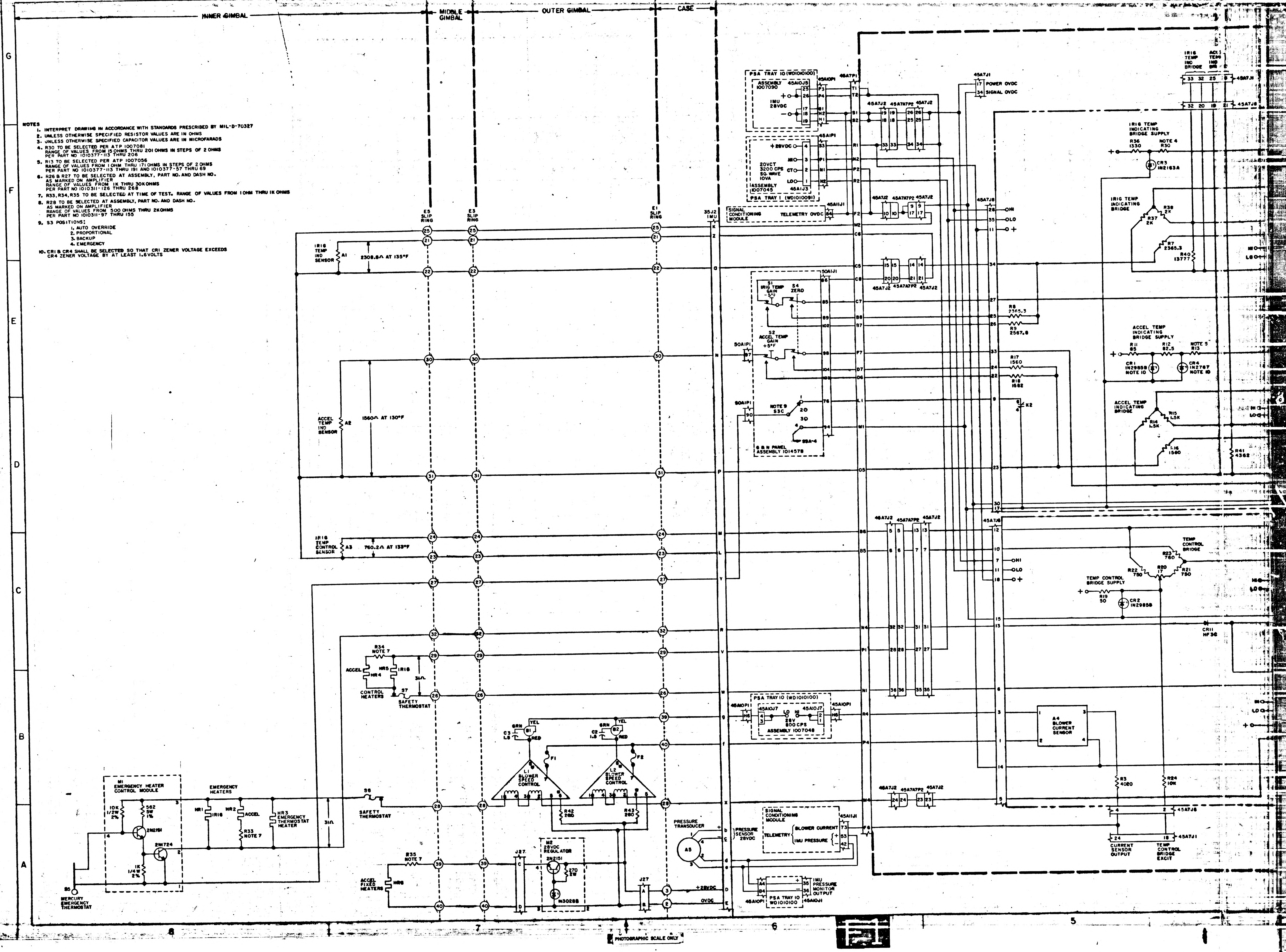
		UNLESS OTHERWISE SPECIFIED	M I T INSTRUMENTATION LAB CONTRACT NAS 9-153	DATE
		DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES	APPROVED	2-4-6
			CHECKED	2-5-6
			DRAWN LWB	1-29-
		DO NOT SCALE THIS DRAWING	APPROVED FOR MSC	
		MATERIAL		
NEXT ASSY	USED ON		MIT/IL APPROVAL	DATE

APOLLO I
TEMPERATURE C
SYSTEM S
BLOCK I

SCALE

MASTER

PHOTOGRAPHIC SCALE ONLY



INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
G
F
E
D
C
B
A
8
7
6
5
E5 SLIP RING
E3 SLIP RING
E1 SLIP RING
35J2 IMU
IRIG TEMP IND SENSOR
A1
2308.8Ω AT 135°F
ACCEL TEMP IND SENSOR
A2
1560Ω AT 130°F
IRIG TEMP CONTROL SENSOR
A3
760.2Ω AT 133°F
R34 NOTE 7
ACCEL
HR4
HR5
IRIG
CONTROL HEATERS
S7
SAFETY THERMOSTAT
31Ω
C3 1.5
B1
GRN
YEL
RED
C2 1.5
B2
F1
F2
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
R42 280
R43 280
M1 EMERGENCY HEATER CONTROL MODULE
10K 1/2W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
S5
MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1
IRIG
HR2
ACCEL
R33 NOTE 7
HR3 EMERGENCY THERMOSTAT HEATER
S6
SAFETY THERMOSTAT
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
J27
M2 28VDC REGULATOR
2N2151
270 2W
1N3028B
PRESSURE TRANSDUCER
A5
PRESSURE SENSOR 28VDC
+28VDC
OVDC
PSA TRAY 10 (WD1010100)
ASSEMBLY 1007090
45A10J8
45A10P1
IMU 28VDC
45A7P1
45A1P1
+28VDC
20VCT 3200 CPS SQ. WAVE 10VA
ASSEMBLY 1007045
45A1J3
PSA TRAY 1 (WD1010091)
SIGNAL CONDITIONING MODULE
TELEMETRY OVDC
45A11J1
45A7J2
45A7A7P2
45A7J1
POWER OVDC
SIGNAL OVDC
45A7J8
50A1J1
S1 IRIG TEMP GAIN 5°F
S4 ZERO
S2 ACCEL TEMP GAIN ±5°F
50A1P1
NOTE 9 S3C
S3A-4
G & N PANEL ASSEMBLY 1014578
R8 2365.3
R9 2567.8
R17 1560
R18 1582
K2
45A7J6
HI
LO
+
PSA TRAY 10 (WD1010100)
45A10J7
28V 800 CPS
ASSEMBLY 1007048
45A10P1
SIGNAL CONDITIONING MODULE
BLOWER CURRENT
TELEMETRY
IMU PRESSURE
45A11J1
PSA TRAY 10 WD1010100
45A10J1
IMU PRESSURE MONITOR OUTPUT
A4 BLOWER CURRENT SENSOR
R3 4020
R24 10K
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B NOTE 10
CR4 1N2787 NOTE 10
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R41 4362
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
CR11 HF56
PHOTOGRAPHIC SCALE ONLY

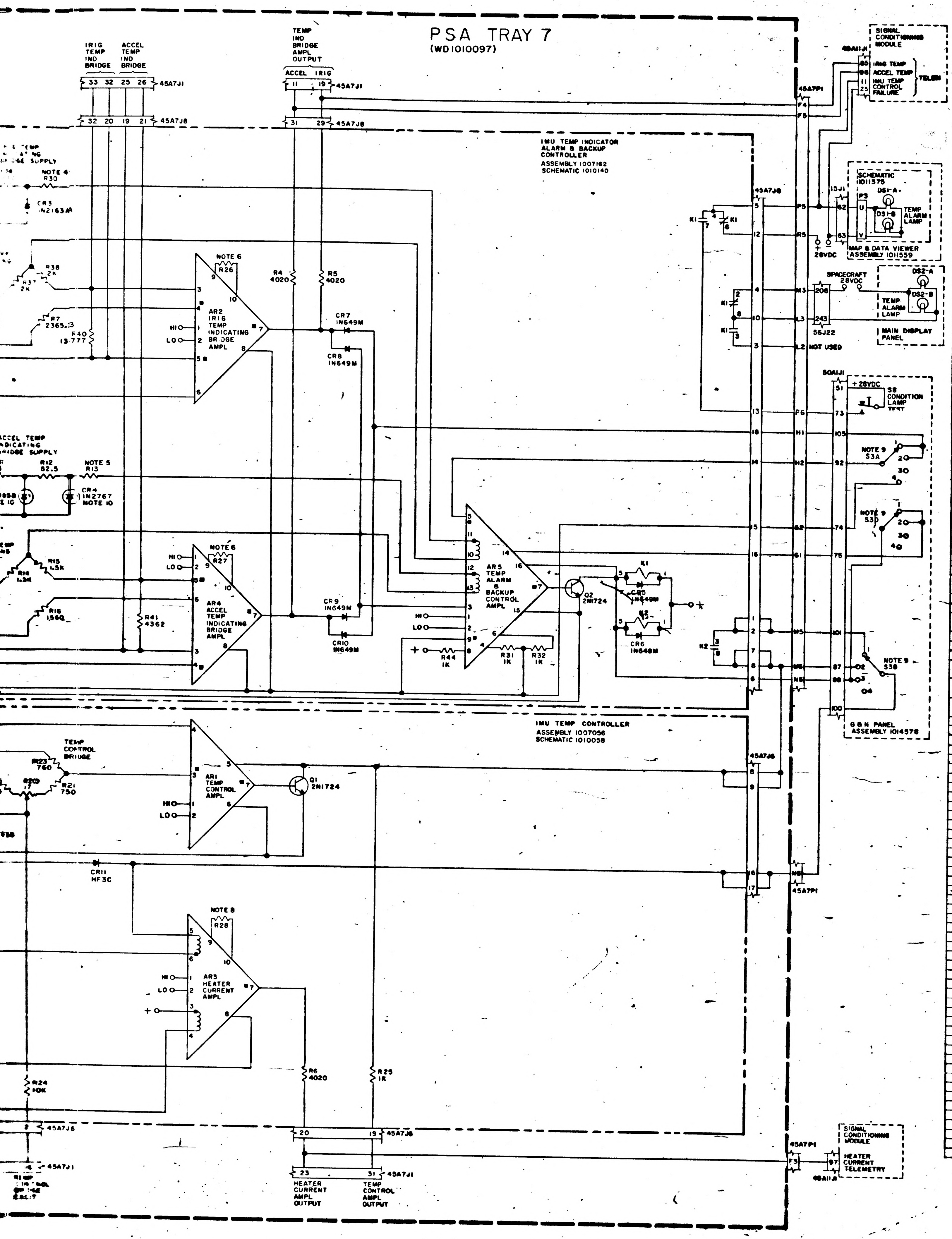
NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081
   RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007056
   RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 1K THRU 30K OHMS
   PER PART NO 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 500 OHMS THRU 2K OHMS
   PER PART NO 1010311-97 THRU 155
9. S3 POSITIONS:
   1. AUTO OVERRIDE
   2. PROPORTIONAL
   3. BACKUP
   4. EMERGENCY
10. CR1 & CR4 SHALL BE SELECTED SO THAT CR1 ZENER VOLTAGE EXCEEDS
    CR4 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS

BLOCK I ONLY

W 1010039

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	V	REVISED PER TORR 06373		GK
	W	REVISED PER TORR 08486	14 Aug '64	WR



PSA TRAY 7
(WD1010097)
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
TEMP IND BRIDGE AMPL OUTPUT
ACCEL IRIG
45A7J1
45A7J8
45A7P1
45A7J6
SIGNAL CONDITIONING MODULE
45A11J1
IRIG TEMP
ACCEL TEMP
IMU TEMP CONTROL FAILURE
TELEM
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007162
SCHEMATIC 1010140
SCHEMATIC 1011375
DS1-A
DS1-B
TEMP ALARM LAMP
MAP & DATA VIEWER ASSEMBLY 1011559
15J1
28VDC
SPACECRAFT 28VDC
DS2-A
DS2-B
TEMP ALARM LAMP
MAIN DISPLAY PANEL
56J22
NOT USED
50A1J1
+28VDC
S8 CONDITION LAMP TEST
NOTE 9 S3A
NOTE 9 S3D
NOTE 9 S3B
G & N PANEL ASSEMBLY 1014578
NOTE 4 R30
CR3 1N2163A
NOTE 6 R26
R36 2K
R7 2365.13
R40 13.777
R4 4020
R5 4020
AR2 IRIG TEMP INDICATING BRIDGE AMPL
CR7 1N649M
CR8 1N649M
ACCEL TEMP INDICATING BRIDGE SUPPLY
R12 82.5
NOTE 5 R13
CR4 1N2767 NOTE 10
R15 1.5K
R14 1.5K
R16 1.560
NOTE 6 R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
R41 4362
CR9 1N649M
CR10 1N649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
Q2 2N1724
K1
K2
CR5 1N649M
CR6 1N649M
R44 1K
R31 1K
R32 1K
HI
LO
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
TEMP CONTROL BRIDGE
R23 760
R20 17
R21 750
AR1 TEMP CONTROL AMPL
Q1 2N1724
CR11 HF3C
NOTE 8 R28
AR3 HEATER CURRENT AMPL
R24 10K
R6 4020
R25 1K
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
HEATER CURRENT TELEMETRY

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284	↓			
AR3	1000286	↓			
AR4	1000284	↓			
AR5	1018900	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-020	DIODE	1N2985B	5%	10W
CR2	↓	↓	↓	↓	↓
CR3	1010440	↓	1N2163A	2%	3/4W
CR4	1010441-2	↓	1N2767	5%	2W
CR5	1010362-3	↓	1N649M		600MW
CR6	↓	↓	↓		↓
CR7	↓	↓	↓		↓
CR8	↓	↓	↓		↓
CR9	↓	↓	↓		↓
CR10	↓	↓	↓		↓
CR11	1010322	↓	HF3C		6 AMP
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1		SWITCH			
S2		↓			
S3		↓			
S4		↓			
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	↓	↓			
S8		SWITCH			
HR1	1000126 D105318	HEATER			
HR2	1000134	↓			
HR3	1000247	↓			
HR4	1000134	↓			
HR5	1000126 D105318	↓			
HR6	1000134	↓			
A1	D1505	SENSOR			
A2	D96149	↓			
A3	1000126 D105318	↓			
A4	1000287	CURRENT SENSOR			
A5	1000272	PRESSURE TRANSDUCER			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1		DUAL LAMP			
DS2		↓			
R3	1010364-368	RESISTOR	4020	1%	1/8W
R4	↓	↓	↓	↓	↓
R5	↓	↓	↓	↓	↓
R6	↓	↓	↓	↓	↓
R7	1010450-12	↓	2365.3	0.01%	↓
R8	↓	↓	↓	↓	↓
R9	1010450-13	↓	2567.8	↓	↓
		↓			
R11	1010361-112	↓	85	3%	5W
R12	1010364-44	↓	82.5	1%	1/8W
R13	1010377	NOTE 5	SAT	1%	1/10W
R14	1010450-2	↓	1500	0.01%	1/8W
R15	-2	↓	↓	↓	↓
R16	-3	↓	1560	↓	↓
R17	-3	↓	↓	↓	↓
R18	-14	↓	1582	↓	↓
R19	1010399-16	↓	50	5%	5W
R20	1010453-1	POT	17	10%	1/4W
R21	1010449-1	↓	750	0.01%	3/4W
R22	-1	↓	↓	↓	↓
R23	-2	↓	760	↓	↓
R24	1006750-56	↓	10K	2%	1/4W
R25	1010312-36	↓	1K	5%	2W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27	↓	NOTE 6	↓	↓	↓
R28	↓	NOTE 8	↓	↓	↓
		↓			↓
R30	1010377	NOTE 4	SAT	0.1%	↓
R31	-237	↓	1K	↓	↓
R32	-237	↓	1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10W
R34	↓	↓	↓	↓	↓
R35	↓	↓	↓	↓	↓
R36	1010452	↓	1330	↓	1W
R37	1010450-9	↓	2000	0.01%	1/8W
R38	↓	↓	↓	↓	↓
		↓		↓	↓
R40	1010450-10	↓	13777	↓	↓
R41	-11	↓	4362	↓	↓
R42	1010325-500	↓	280	0.1%	5W
R43	↓	↓	↓	↓	↓
R44	1010604-22	↓	1K	1%	1W

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED		2-11-64
CHECKED	BK	2-5-64
DRAWN	LWR	8-9-63

APPROVED FOR MSC

MIT/IL APPROVAL | DATE

APOLLO IMU TEMPERATURE CONTROL SYSTEM SCHEMATIC BLOCK I

SCALE | UNIT WT | CODE IDENT

MIT
INSTRUMENTATION LABORATORY
CAMBRIDGE MASS

DWG NO

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO
1010039

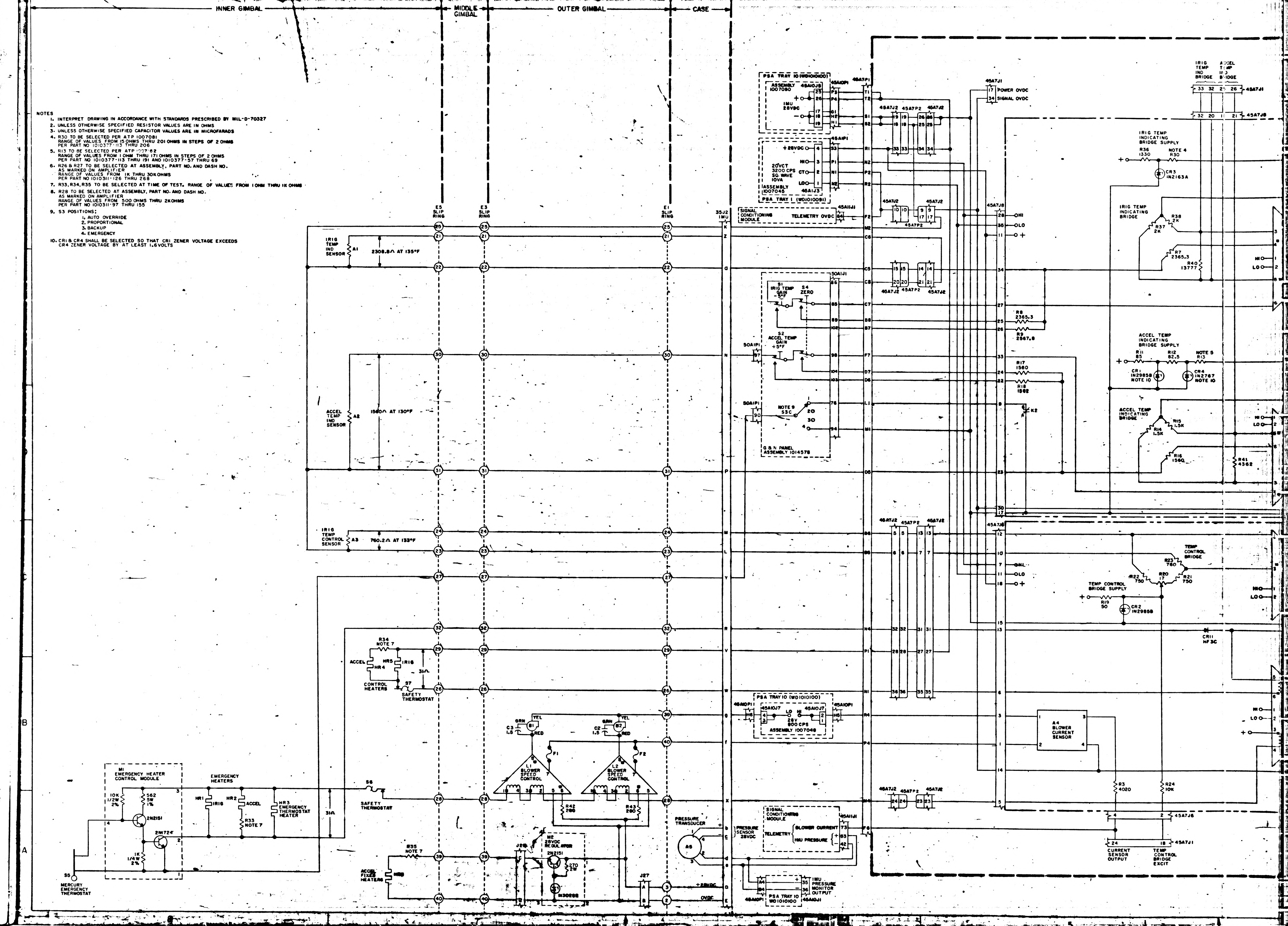
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

E2

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081
   RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007162
   RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 1K THRU 30K OHMS
   PER PART NO 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 500 OHMS THRU 2K OHMS
   PER PART NO 1010311-97 THRU 155
9. S3 POSITIONS:
   1. AUTO OVERRIDE
   2. PROPORTIONAL
   3. BACKUP
   4. EMERGENCY
10. CR1 & CR4 SHALL BE SELECTED SO THAT CR1 ZENER VOLTAGE EXCEEDS
    CR4 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
E5 SLIP RING
E3 SLIP RING
E1 SLIP RING
35J2 IMU
IRIG TEMP IND SENSOR
A1
2308.8Ω AT 135°F
ACCEL TEMP IND SENSOR
A2
1560Ω AT 130°F
IRIG TEMP CONTROL SENSOR
A3
760.2Ω AT 133°F
R34 NOTE 7
ACCEL
HR4
HR5
IRIG
31Ω
CONTROL HEATERS
S7
SAFETY THERMOSTAT
M1 EMERGENCY HEATER CONTROL MODULE
10K 1/2W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
S5
MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1
HR2
R33 NOTE 7
HR3 EMERGENCY THERMOSTAT HEATER
S6
SAFETY THERMOSTAT
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
C3 1.5
C2 1.5
B1
B2
GRN
YEL
RED
F1
F2
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
R42 200
R43 200
J26
M2 28VDC REGULATOR
2N2151
270 2W
1N3026B
J27
+28VDC
0VDC
PRESSURE TRANSDUCER
A6
PRESSURE SENSOR 28VDC
PSA TRAY 10 (WD1010100)
ASSEMBLY 1007090
45A10J8
45A10P1
IMU 28VDC
45A7P1
PSA TRAY 1 (WD1010091)
ASSEMBLY 1007045
45A1J3
45A1P1
+28VDC
HI
CT
LO
20VCT 3200 CPS SQ. WAVE 10VA
SIGNAL CONDITIONING MODULE
TELEMETRY 0VDC
45A11J1
45A7J1
POWER 0VDC
SIGNAL 0VDC
45A7J2
45A7P2
45A7J8
50A1J1
50A1P1
S1 IRIG TEMP GAIN -5°F
S4 ZERO
S2 ACCEL TEMP GAIN +5°F
NOTE 9 S3C
G & N PANEL ASSEMBLY 1014578
R8 2365.3
R9 2567.8
R17 1560
R18 1562
K2
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B NOTE 10
CR4 1N2767 NOTE 10
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R41 4362
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
CR11 HF3C
PSA TRAY 10 (WD1010100)
45A10J7
28V 800 CPS
ASSEMBLY 1007048
A4 BLOWER CURRENT SENSOR
R3 4020
R24 10K
45A7J6
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
SIGNAL CONDITIONING MODULE
TELEMETRY
BLOWER CURRENT
IMU PRESSURE
IMU PRESSURE MONITOR OUTPUT
PSA TRAY 10 WD1010100
45A10J1
HI
LO
PHOTOGRAPHIC SCALE ONLY

1010039 Y

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	V	REVISED PER TDRR 06373	18 Feb 66	WK
	W	REVISED PER TDRR 08486	14 May 64	WK
	Y	REVISED PER TDRR 12626	[illegible]	[illegible]

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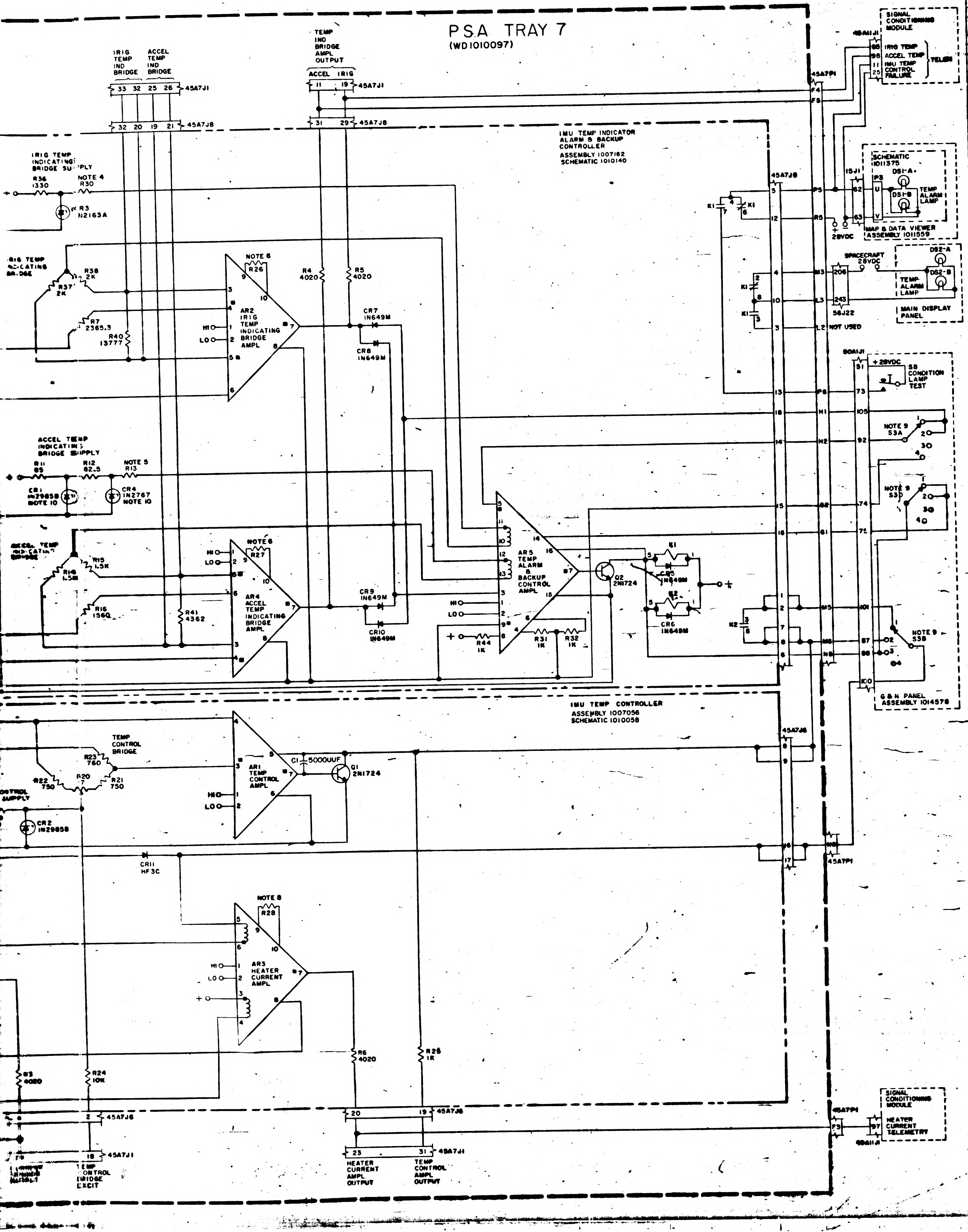

PSA TRAY 7
(WD1010097)
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
33 32 25 26 45A7J1
32 20 19 21 45A7J8
TEMP IND BRIDGE AMPL OUTPUT
ACCEL IRIG
11 19 45A7J1
31 29 45A7J8
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
NOTE 6 R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
HI
LO
R4 4020
R5 4020
CR7 1N649M
CR8 1N649M
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007162
SCHEMATIC 1010140
45A7J8
45A7P1
K1
SIGNAL CONDITIONING MODULE
45A11J1
IRIG TEMP
ACCEL TEMP
IMU TEMP CONTROL FAILURE
TELEM
SCHEMATIC 1011375
15J1
P3
DS1-A
DS1-B
TEMP ALARM LAMP
28VDC
MAP & DATA VIEWER ASSEMBLY 1011559
SPACECRAFT 28VDC
DS2-A
DS2-B
TEMP ALARM LAMP
56J22
MAIN DISPLAY PANEL
NOT USED
50A1J1
+28VDC
S8 CONDITION LAMP TEST
NOTE 9 S3A
NOTE 9 S3B
NOTE 9 S3C
G & N PANEL ASSEMBLY 1014578
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B NOTE 10
CR4 1N2767 NOTE 10
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R41 4362
NOTE 6 R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 1N649M
CR10 1N649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
R44 1K
R31 1K
R32 1K
Q2 2N1724
K1
K2
CR5 1N649M
CR6 1N649M
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
45A7J6
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 7
R21 750
CONTROL SUPPLY
CR2 1N2985B
AR1 TEMP CONTROL AMPL
C1 5000UUF
Q1 2N1724
CR11 HF3C
NOTE 8 R28
AR3 HEATER CURRENT AMPL
R3 4020
R24 10K
R6 4020
R25 1K
2 45A7J6
20 19 45A7J6
18 45A7J1
TEMP CONTROL BRIDGE EXCIT
23 31 45A7J1
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
45A7P1
F3
97
SIGNAL CONDITIONING MODULE
HEATER CURRENT TELEMETRY
45A11J1

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR 1	1000285	MAG AMPL			
AR 2	1000284				
AR 3	1000286				
AR 4	1000284				
AR5	1018900	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-020	DIODE	1N2985B	5%	10W
CR2	↓		↓	↓	↓
CR3	1010440		1N2163A	2%	3/4 W
CR4	1010441-2		1N2767	5%	2W
CR5	1010362-3		1N649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	↓		↓		↓
CR11	1010322	↓	HF3C		6 AMP
C1	1006777-29	CAPACITOR	5000UUF	10%	100V
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1		SWITCH			
S2					
S3	1010494-2				
S4		↓			
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	↓	↓			
S8		SWITCH			
HR1	1000126 D105318	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126 D105318				
HR6	1000134	↓			
A1	D1505	SENSOR			
A2	D96149				
A3	1000126 D105318	↓			
A4	1000287	CURRENT SENSOR			
A5	1000272	PRESSURE TRANSDUCER			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1		DUAL LAMP			
DS2		↓			
R3	1010364-368	RESISTOR	4020	1%	1/8 W
R4					
R5					
R6	↓		↓	↓	
R7	1010450-12		2365.3	0.01%	
R8	↓		↓		
R9	1010450-13		2567.8	↓	↓
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8 W
R13	1010377	NOTE 5	SAT	1%	1/10 W
R14	1010450-2		1500	0.01%	1/8 W
R15	-2		↓		
R16	-3		1560		
R17	-3		↓		
R18	↓ -14		1582	↓	↓
R19	1010399-16		50	5%	5W
R20	1010453-1	POT	17	10%	1/4 W
R21	1010449-1		750	0.01%	3/4 W
R22	-1		↓		
R23	↓ -2		760	↓	↓
R24	1006750-56		10K	2%	1/4 W
R25	1010312-36		1K	5%	2W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27		NOTE 6			
R28	↓	NOTE 8	↓	↓	
R30	1010377	NOTE 4	SAT	0.1%	
R31	-237		1K		
R32	↓ -237		1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10W
R34					
R35	↓	↓	↓		↓
R36	1010452		1330	↓	1W
R37	1010450-9		2000	0.01%	1/8 W
R38	↓		↓		
R40	1010450-10		13777		
R41	↓ -11		4362	↓	↓
R42	1010325-500		280	0.1%	5W
R43	↓		↓	↓	↓
R44	1010604-22	↓	1K	1%	1W

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153

		DATE
APPROVED	[illegible]	2-4-66
CHECKED	B.K.	2-5-66
DRAWN	L.W.R.	[illegible]

APPROVED FOR MSC
[illegible] 2 Feb 66

APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

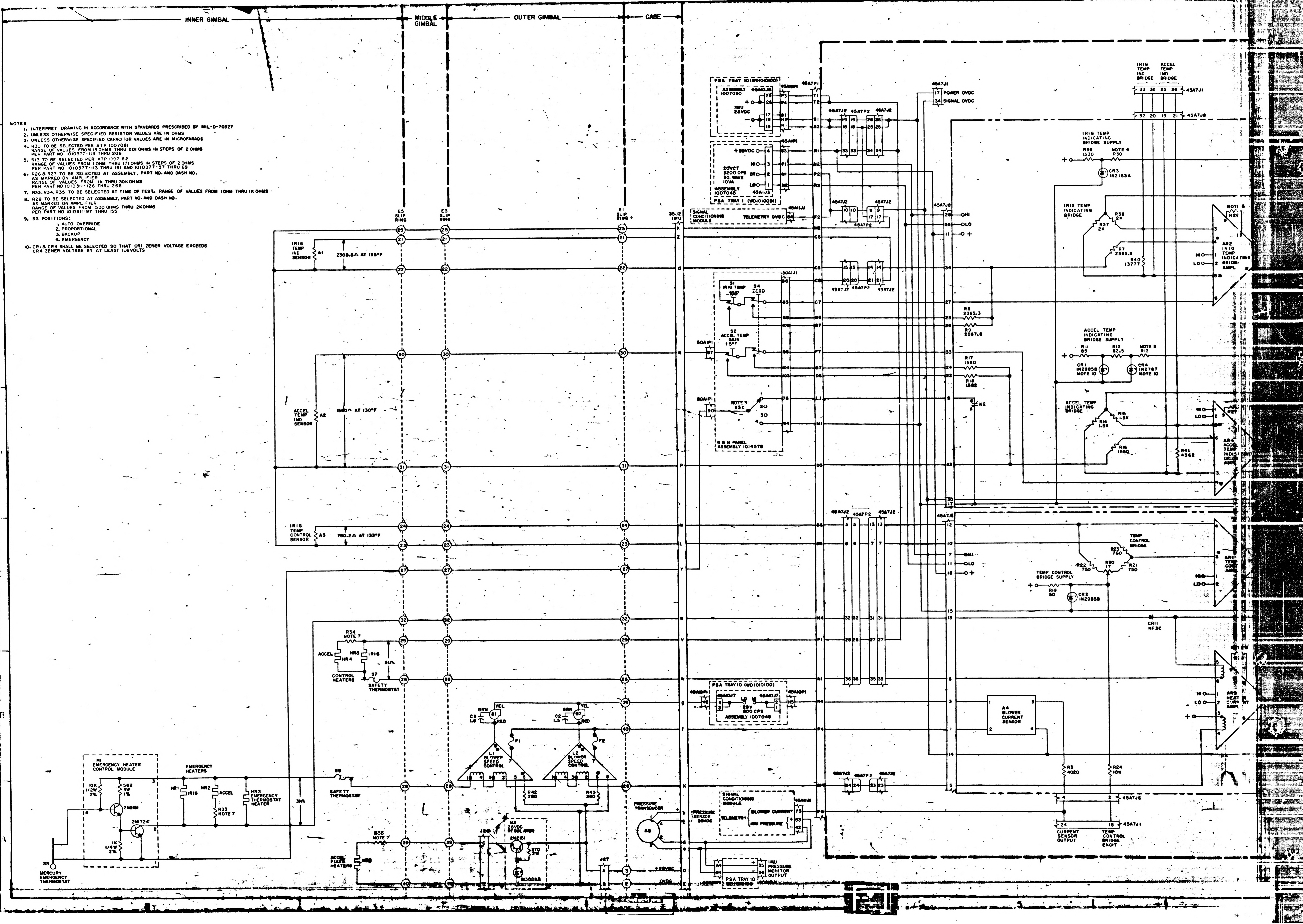
SCALE | UNIT WT | CODE IDENT

NASA DRAWING NO
1010039
SHEET 1 OF 2

A

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081
   RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP 1007 62
   RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS
   PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 1K THRU 30K OHMS
   PER PART NO 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
   AS MARKED ON AMPLIFIER
   RANGE OF VALUES FROM 500 OHMS THRU 2K OHMS
   PER PART NO 1010311-97 THRU 155
9. S3 POSITIONS:
   1. AUTO OVERRIDE
   2. PROPORTIONAL
   3. BACKUP
   4. EMERGENCY
10. CR1 & CR4 SHALL BE SELECTED SO THAT CR1 ZENER VOLTAGE EXCEEDS
    CR4 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
E5 SLIP RING
E3 SLIP RING
E1 SLIP RING
35J2 IMU
IRIG TEMP IND SENSOR
A1
2308.8Ω AT 135°F
ACCEL TEMP IND SENSOR
A2
1560Ω AT 130°F
IRIG TEMP CONTROL SENSOR
A3
760.2Ω AT 133°F
R34 NOTE 7
ACCEL
HR4
HR5
IRIG
31Ω
CONTROL HEATERS
S7 SAFETY THERMOSTAT
M1 EMERGENCY HEATER CONTROL MODULE
10K 1/2W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
EMERGENCY HEATERS
HR1 IRIG
HR2 ACCEL
R33 NOTE 7
HR3 EMERGENCY THERMOSTAT HEATER
S6 SAFETY THERMOSTAT
S5 MERCURY EMERGENCY THERMOSTAT
GRN
YEL
RED
B1
B2
C3 1.5
C2 1.5
F1
F2
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
R42 260
R43 260
M2 28VDC REGULATOR
2N2151
270 2W
1N3028B
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
J28
J27
+28VDC
0VDC
PRESSURE TRANSDUCER
A6
PRESSURE SENSOR 28VDC
PSA TRAY 10 (WD1010100)
ASSEMBLY 1007090
45A10J6
45A10P1
IMU 28VDC
PSA TRAY 1 (WD1010091)
20VCT 3200 CPS SQ. WAVE 10VA
ASSEMBLY 1007046
45A1J3
45A1P1
45A7P1
SIGNAL CONDITIONING MODULE
TELEMETRY 0VDC
45A11J1
45A7J2
45A7P2
45A7J1
POWER 0VDC
SIGNAL 0VDC
45A7J8
50A1J1
S1 IRIG TEMP
S4 ZERO
S2 ACCEL TEMP GAIN +5°F
50A1P1
NOTE 9 S3C
G & N PANEL ASSEMBLY 1014579
PSA TRAY 10 (WD1010100)
45A10J7
26V 800 CPS
ASSEMBLY 1007048
SIGNAL CONDITIONING MODULE
TELEMETRY
BLOWER CURRENT
IRU PRESSURE
PSA TRAY 10
IMU PRESSURE MONITOR OUTPUT
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
R8 2365.3
R9 2567.8
NOTE 6 R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
HI
LO
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B NOTE 10
CR4 1N2767 NOTE 10
R17 1560
R18 1582
K2
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 1560
R41 4362
R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
AR1 TEMP CONT AMPL
CR11 HF3C
A4 BLOWER CURRENT SENSOR
R3 4020
R24 10K
AR3 HEATER CURRENT AMPL
45A7J6
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT

	[illegible]	[illegible]	[illegible]
W	REVISED PER TDRR 08486	May '64	WR
Y	REVISED PER TDRR 12626		
Z	REVISED PER TDRR 20708		

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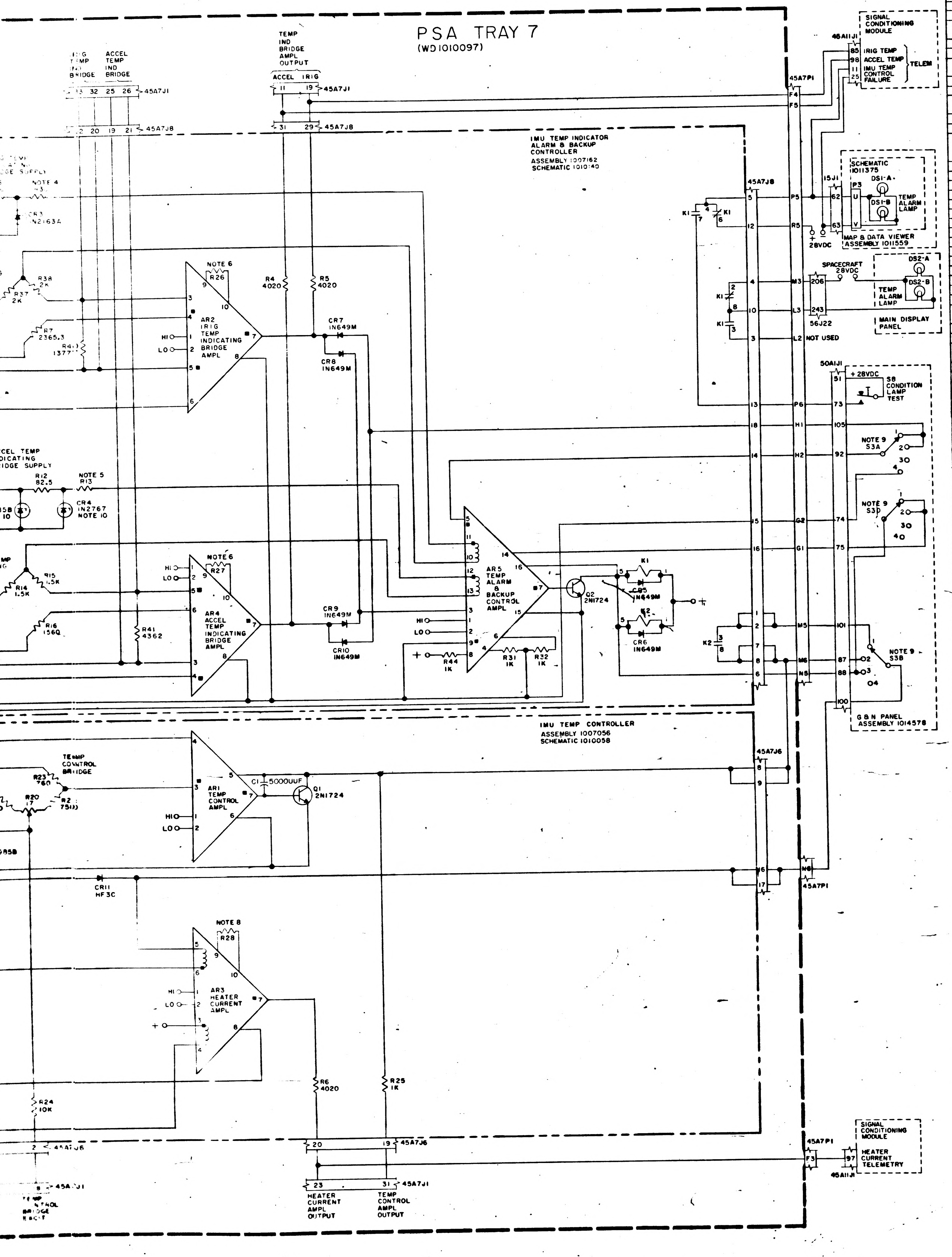
PSA TRAY 7
(WD1010097)
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
TEMP IND BRIDGE AMPL OUTPUT
ACCEL
IRIG
45A7J1
45A7J8
45A7J6
45A7P1
45A11J1
SIGNAL CONDITIONING MODULE
IRIG TEMP
ACCEL TEMP
IMU TEMP CONTROL FAILURE
TELEM
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007162
SCHEMATIC 1010140
SCHEMATIC 1011375
DS1-A
DS1-B
TEMP ALARM LAMP
MAP & DATA VIEWER ASSEMBLY 1011559
28VDC
15J1
SPACECRAFT 28VDC
DS2-A
DS2-B
TEMP ALARM LAMP
MAIN DISPLAY PANEL
56J22
NOT USED
50A1J1
+28VDC
S8 CONDITION LAMP TEST
NOTE 9 S3A
NOTE 9 S3D
NOTE 9 S3B
G & N PANEL ASSEMBLY 1014578
NOTE 4
CR3 IN2163A
R38 2K
R37 2K
R7 2365.3
R4 1377
NOTE 6
R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
HI
LO
R4 4020
R5 4020
CR7 IN649M
CR8 IN649M
ACCEL TEMP INDICATING BRIDGE SUPPLY
R12 82.5
NOTE 5
R13
CR4 IN2767
NOTE 10
R15 1.5K
R14 1.5K
R16 1560
R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
R41 4362
CR9 IN649M
CR10 IN649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
Q2 2N1724
K1
CR5 IN649M
CR6 IN649M
K2
R44 1K
R31 1K
R32 1K
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
TEMP CONTROL BRIDGE
R23 760
R20 17
R2 750
AR1 TEMP CONTROL AMPL
C1 5000UUF
Q1 2N1724
CR11 HF3C
NOTE 8
R28
AR3 HEATER CURRENT AMPL
R6 4020
R25 1K
R24 10K
HEATER CURRENT TELEMETRY
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR 1	1000285	MAG AMPL			
AR 2	1000284				
AR 3	1000286				
AR 4	1000284				
AR 5	1018900	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-020	DIODE	IN2985B	5%	10W
CR2	↓		↓	↓	↓
CR3	1010440		IN2163A	2%	3/4 W
CR4	1010441-2		IN2767	5%	2 W
CR5	1010362-3		IN649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	↓		↓		↓
CR11	1010322	↓	HF3C		6 AMP
C1	1006777-29	CAPACITOR	5000UUF	10%	100V
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1		SWITCH			
S2					
S3	1010494-2				
S4		↓			
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	↓	↓			
S8		SWITCH			
HR1	1000126 D105318	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126 D105318				
HR6	1000134	↓			
A1	D1505	SENSOR			
A2	D96149				
A3	1000126 D105318	↓			
A4	1000287	CURRENT SENSOR			
A5	1000272	PRESSURE TRANSDUCER			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1		DUAL LAMP			
DS2		↓			
R3	1010364-368	RESISTOR	4020	1%	1/8 W
R4					
R5					
R6	↓		↓	↓	
R7	1010450-12		2365.3	0.01%	
R8	↓		↓		
R9	1010450-13		2567.8	↓	↓
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8 W
R13	1010377	NOTE 5	SAT	1%	1/10 W
R14	1010450-2		1500	0.01%	1/8 W
R15	-2		↓		
R16	-3		1560		
R17	-3		↓		
R18	↓ -14		1582	↓	↓
R19	1010399-16		50	5%	5W
R20	1010453-1	POT	17	10%	1/4 W
R21	1010449-1		750	0.01%	3/4 W
R22	-1		↓		
R23	↓ -2		760	↓	↓
R24	1006750-56		10K	2%	1/4 W
R25	1010312-36		1K	5%	2W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27		NOTE 6			
R28	↓	NOTE 8	↓	↓	
R30	1010377	NOTE 4	SAT	0.1%	
R31	-237		1K		
R32	↓ -237		1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10W
R34					
R35	↓	↓	↓		↓
R36	1010452		1330	↓	1W
R37	1010450-9		2000	0.01%	1/8 W
R38	↓		↓		
R40	1010450-10		13777		
R41	↓ -11		4362	↓	↓
R42	1010325-500		280	0.1%	5W
R43	↓		↓	↓	↓
R44	1010604-22	↓	1K	1%	1W

REPLACES REV U WITH CHANGES

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	SPECIFICATION	MATERIAL OR NOTES

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL

M I T
INSTRUMENTATION LAB
CONTRACT
NAS 9 153

		DATE
APPROVED		2-11-64
CHECKED	OK	2-5-64
DRAWN	LWR	8-9-63

APPROVED FOR MSC

NASA/IL APPROVAL | DATE
18 Feb 64

APOLLO IMU
TEMPERATURE CONTROL
SYSTEM SCHEMATIC
BLOCK I

SCALE	UNIT WT	CODE IDENT

M I T
INSTRUMENTATION
LABORATORY
CAMBRIDGE MASS

DWG NO

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS

NASA DRAWING NO
1010039

SHEET 1 OF 1

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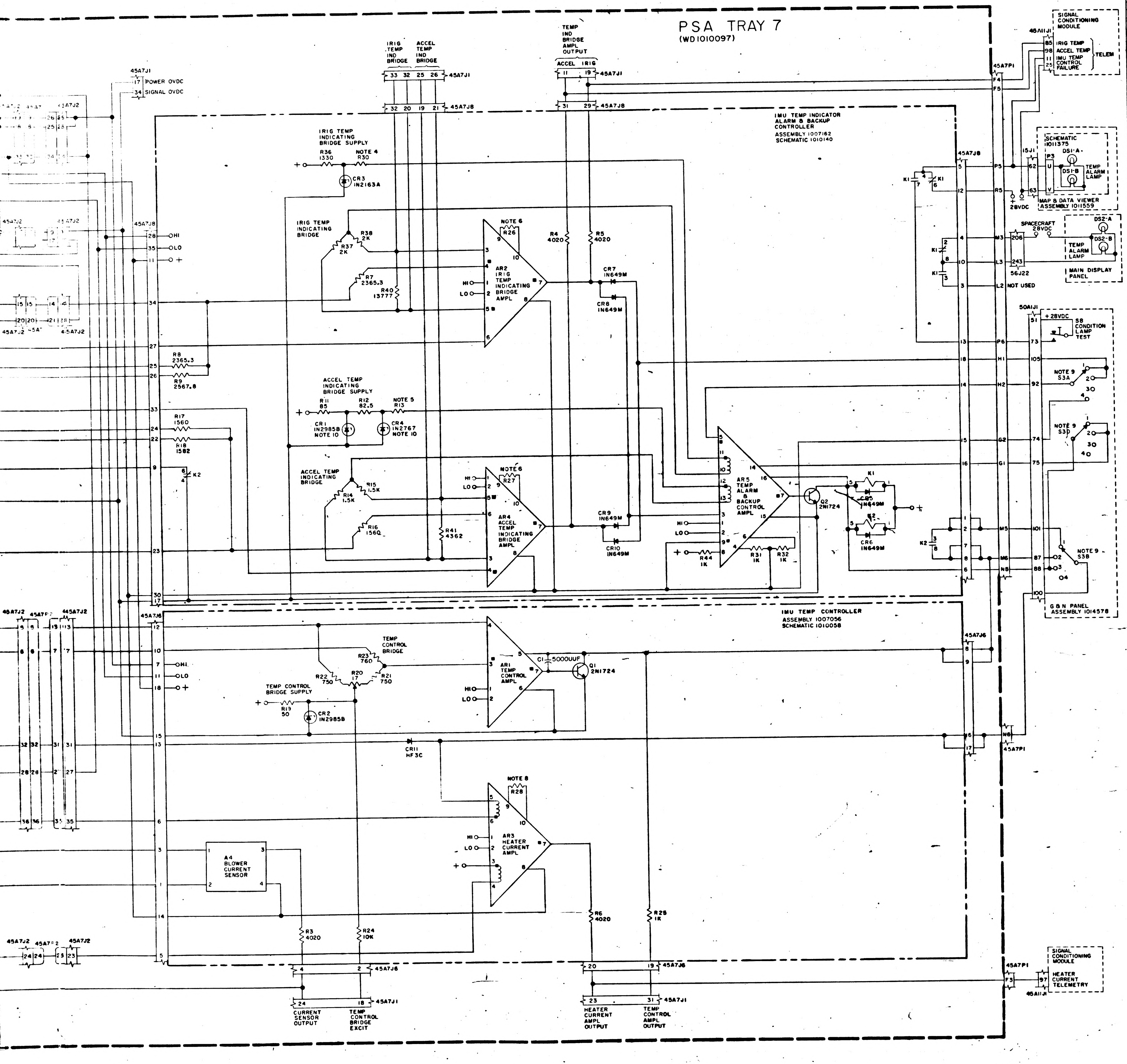

PSA TRAY 7
(WD1010097)
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
33 32 25 26 45A7J1
32 20 19 21 45A7J8
TEMP IND BRIDGE AMPL OUTPUT
ACCEL IRIG
11 19 45A7J1
31 29 45A7J8
45A7J1
17 POWER OVDC
34 SIGNAL OVDC
IMU TEMP INDICATOR ALARM & BACKUP CONTROLLER
ASSEMBLY 1007162
SCHEMATIC 1010140
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 IN2163A
IRIG TEMP INDICATING BRIDGE
R38 2K
R37 2K
R7 2365.3
R40 13777
NOTE 6 R26
AR2 IRIG TEMP INDICATING BRIDGE AMPL
HI
LO
R4 4020
R5 4020
CR7 IN649M
CR8 IN649M
45A7J8
R8 2365.3
R9 2567.8
R17 1560
R18 1582
K2
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 IN2985B NOTE 10
CR4 IN2767 NOTE 10
ACCEL TEMP INDICATING BRIDGE
R15 1.5K
R14 1.5K
R16 156Ω
R41 4362
NOTE 6 R27
AR4 ACCEL TEMP INDICATING BRIDGE AMPL
CR9 IN649M
CR10 IN649M
AR5 TEMP ALARM & BACKUP CONTROL AMPL
R44 1K
R31 1K
R32 1K
Q2 2N1724
K1
CR5 IN649M
K2
CR6 IN649M
45A7P1
F4
F5
P5
R5
M3
L3
L2 NOT USED
P6
H1
H2
G2
G1
M5
M6
N5
SIGNAL CONDITIONING MODULE
45A11J1
85 IRIG TEMP
98 ACCEL TEMP
11 IMU TEMP CONTROL FAILURE
25
TELEM
SCHEMATIC 1011375
15J1
P3
DS1-A
DS1-B
TEMP ALARM LAMP
28VDC
MAP & DATA VIEWER ASSEMBLY 1011559
SPACECRAFT 28VDC
206
243
56J22
DS2-A
DS2-B
TEMP ALARM LAMP
MAIN DISPLAY PANEL
50A1J1
+28VDC
S8 CONDITION LAMP TEST
NOTE 9 S3A
NOTE 9 S3D
NOTE 9 S3B
G & N PANEL ASSEMBLY 1014578
IMU TEMP CONTROLLER
ASSEMBLY 1007056
SCHEMATIC 1010058
45A7J6
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
AR1 TEMP CONTROL AMPL
C1 5000UUF
Q1 2N1724
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 IN2985B
CR11 HF3C
NOTE 8 R28
AR3 HEATER CURRENT AMPL
A4 BLOWER CURRENT SENSOR
R3 4020
R24 10K
R6 4020
R25 1K
4 2 45A7J6
20 19 45A7J6
24 18 45A7J1
23 31 45A7J1
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
HEATER CURRENT AMPL OUTPUT
TEMP CONTROL AMPL OUTPUT
SIGNAL CONDITIONING MODULE
F3
97 HEATER CURRENT TELEMETRY
45A11J1
45A7J2
45A7P2

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
AR1	1000285	MAG AMPL			
AR2	1000284				
AR3	1000286				
AR4	1000284				
AR5	1018900	↓			
L1	1000288	SATURABLE REACTOR			
L2	↓	↓			
Q1	1010273-1	TRANSISTOR	2N1724		
Q2	↓	↓	↓		
K1	1010353-1	RELAY	33WK-2		
K2	↓	↓	↓		
CR1	1010331-020	DIODE	IN2985B	5%	10W
CR2	↓		↓	↓	↓
CR3	1010440		IN2163A	2%	3/4W
CR4	1010441-2		IN2767	5%	2W
CR5	1010362-3		IN649M		600MW
CR6					
CR7					
CR8					
CR9					
CR10	↓		↓		↓
CR11	1010322	↓	HF3C		6AMP
C1	1006777-29	CAPACITOR	5000UUF	10%	00V
C2	1010264-38	CAPACITOR	1.5	5%	200VDC
C3	↓	↓	↓	↓	↓
B1	1000219	BLOWER			
B2	↓	↓			
F1	1000170	FUSE			
F2	↓	↓			
S1		SWITCH			
S2					
S3	1010494-2				
S4		↓			
S5	1000247	MERCURY THERMOSTAT			
S6	1000266	THERMOSTAT			
S7	↓	↓			
S8		SWITCH			
HR1	1000126 D105318	HEATER			
HR2	1000134				
HR3	1000247				
HR4	1000134				
HR5	1000126 D105318				
HR6	1000134	↓			
A1	D1505	SENSOR			
A2	D96149				
A3	1000126 D105318	↓			
A4	1000287	CURRENT SENSOR			
A5	1000272	PRESSURE TRANSDUCER			
M1	1010019	EMERGENCY HEATER CONTROL MODULE			
M2	1010003	28VDC REGULATOR MODULE			
DS1		DUAL LAMP			
DS2		↓			
R3	1010364-368	RESISTOR	4020	1%	1/8W
R4					
R5					
R6	↓		↓	↓	
R7	1010450-12		2365.3	0.01%	
R8	↓		↓		
R9	1010450-13		2567.8	↓	↓
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	1%	1/8W
R13	1010377	NOTE 5	SAT	1%	1/10W
R14	1010450-2		1500	0.01%	1/8W
R15	-2		↓		
R16	-3		1560		
R17	-3		↓		
R18	↓ -14		1562	↓	↓
R19	1010399-16		50	5%	5W
R20	1010453-1	POT	17	10%	1/4W
R21	1010449-1		750	0.01%	3/4W
R22	-1		↓		
R23	↓ -2		760	↓	↓
R24	1006750-56		10K	2%	1/4W
R25	1010312-36		1K	5%	2W
R26	1010311	NOTE 6	SAT	1%	1/10W
R27		NOTE 6			
R28	↓	NOTE 8	↓	↓	
R30	1010377	NOTE 4	SAT	0.1%	
R31	-237		1K		
R32	↓ -237		1K	↓	↓
R33	1010498	NOTE 7	SAT	1%	10W
R34					
R35	↓	↓	↓		↓
R36	1010452		1330	↓	1W
R37	1010450-9		2000	0.01%	1/8W
R38	↓		↓		
R40	1010450-10		13777		
R41	↓ -11		4362	↓	↓
R42	1010325-500		280	0.1%	5W
R43	↓		↓	↓	↓
R44	1010604-22	↓	1K	1%	1W

REPLACES REV U WITH CHA

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

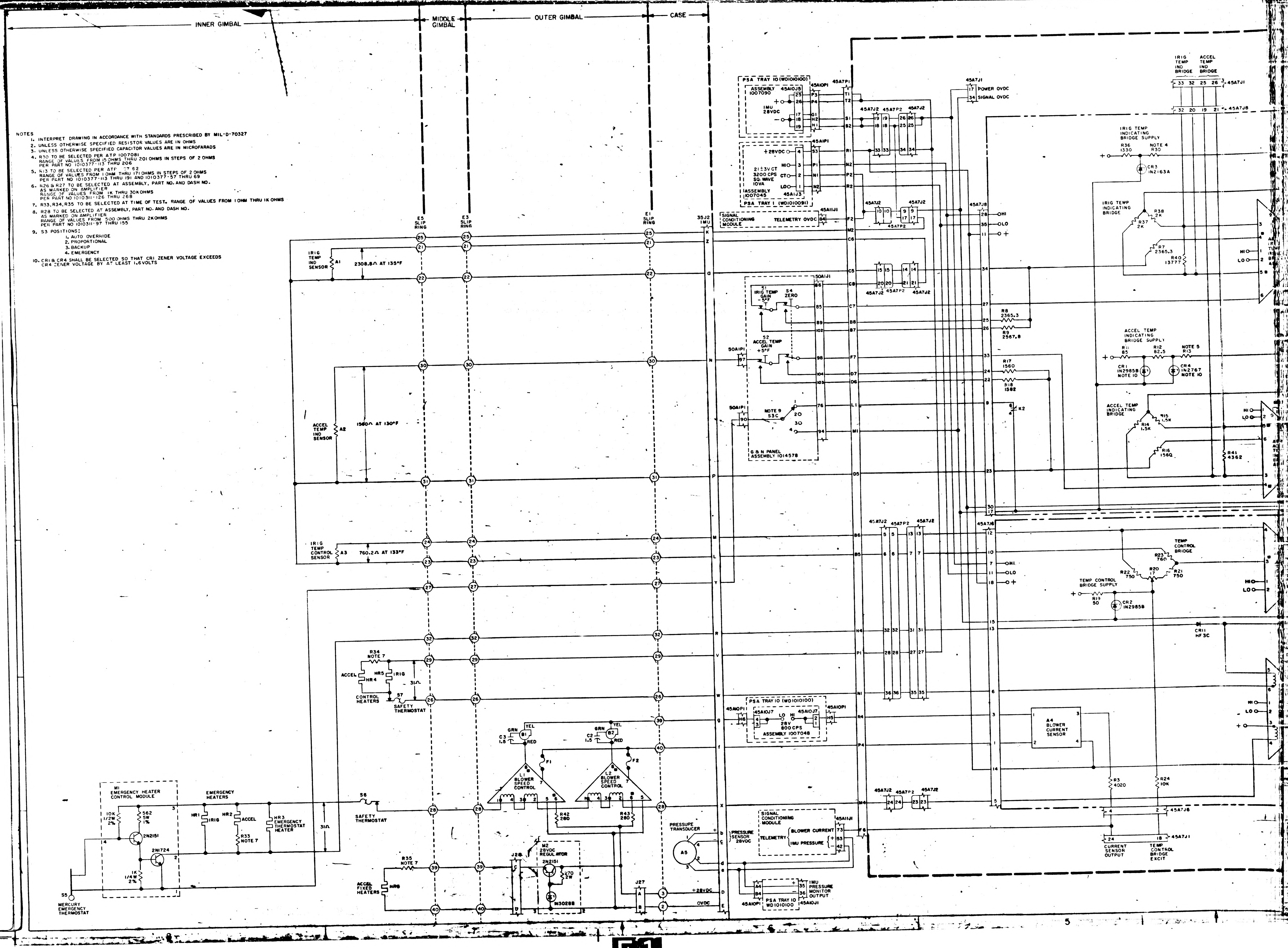
MATERIAL

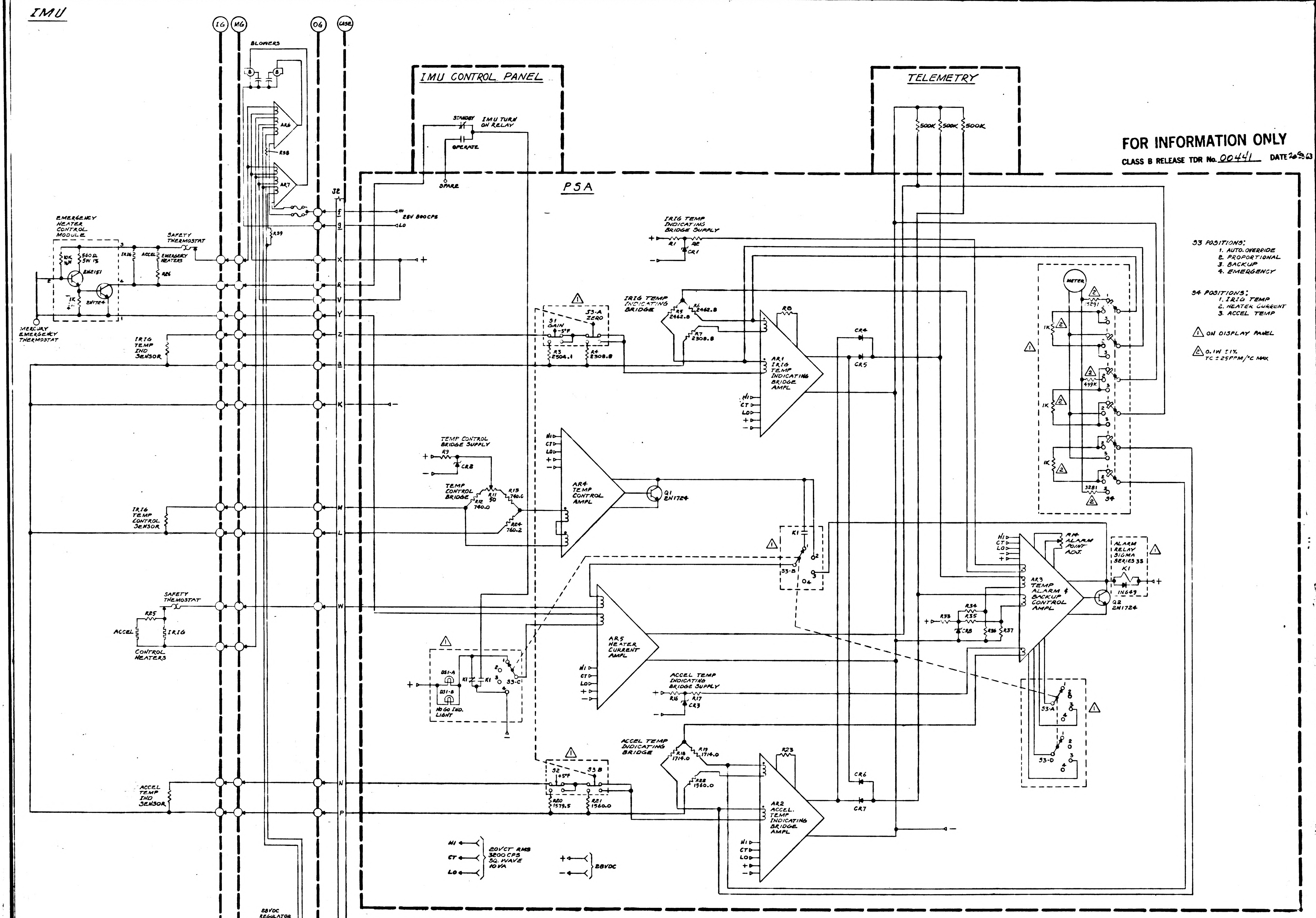
NEXT ASSY | USED ON
APPLICATION

QTY REQD

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC
APPROVAL

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. R30 TO BE SELECTED PER ATP 1007081
RANGE OF VALUES FROM 15 OHMS THRU 201 OHMS IN STEPS OF 2 OHMS
PER PART NO 1010377-113 THRU 206
5. R13 TO BE SELECTED PER ATP [illegible]7 62
RANGE OF VALUES FROM 1 OHM THRU 171 OHMS IN STEPS OF 2 OHMS
PER PART NO 1010377-113 THRU 191 AND 1010377-57 THRU 69
6. R26 & R27 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
AS MARKED ON AMPLIFIER
RANGE OF VALUES FROM 1K THRU 30K OHMS
PER PART NO 1010311-126 THRU 268
7. R33, R34, R35 TO BE SELECTED AT TIME OF TEST. RANGE OF VALUES FROM 1 OHM THRU 1K OHMS
8. R28 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO.
AS MARKED ON AMPLIFIER
RANGE OF VALUES FROM 500 OHMS THRU 2K OHMS
PER PART NO 1010311-97 THRU 155
9. S3 POSITIONS:
   1. AUTO OVERRIDE
   2. PROPORTIONAL
   3. BACKUP
   4. EMERGENCY
10. CR1 & CR4 SHALL BE SELECTED SO THAT CR1 ZENER VOLTAGE EXCEEDS
CR4 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS


INNER GIMBAL
MIDDLE GIMBAL
OUTER GIMBAL
CASE
E5 SLIP RING
E3 SLIP RING
E1 SLIP RING
35J2 IMU
IRIG TEMP IND SENSOR
A1
2308.8Ω AT 135°F
ACCEL TEMP IND SENSOR
A2
1560Ω AT 130°F
IRIG TEMP CONTROL SENSOR
A3
760.2Ω AT 133°F
R34 NOTE 7
ACCEL
HR4
HR5
IRIG
31Ω
CONTROL HEATERS
S7
SAFETY THERMOSTAT
M1 EMERGENCY HEATER CONTROL MODULE
10K 1/2W 2%
562 5W 1%
2N2151
2N1724
1K 1/4W 2%
S5
MERCURY EMERGENCY THERMOSTAT
EMERGENCY HEATERS
HR1
IRIG
HR2
ACCEL
R33 NOTE 7
HR3 EMERGENCY THERMOSTAT HEATER
S6
SAFETY THERMOSTAT
31Ω
R35 NOTE 7
ACCEL FIXED HEATERS
HR6
J28
M2 28VDC REGULATOR
2N2151
470 2W
1N3028B
J27
+28VDC
0VDC
GRN
YEL
RED
C3 1.5
B1
C2 1.5
B2
F1
F2
L1 BLOWER SPEED CONTROL
L2 BLOWER SPEED CONTROL
R42 280
R43 280
PRESSURE TRANSDUCER
A5
PRESSURE SENSOR 28VDC
PSA TRAY 10 (WD1010100)
ASSEMBLY 1007090
45A10J5
45A10P1
45A7P1
IMU 28VDC
45A1P1
+28VDC
2133VCT 3200 CPS SQ. WAVE 10VA
ASSEMBLY 1007045
45A1J3
PSA TRAY 1 (WD1010091)
SIGNAL CONDITIONING MODULE
TELEMETRY 0VDC
45A11J1
45A7J1
POWER 0VDC
SIGNAL 0VDC
45A7J2
45A7P2
45A7J8
50A1J1
S1 IRIG TEMP GAIN -5°F
S4 ZERO
S2 ACCEL TEMP GAIN +5°F
50A1P1
NOTE 9 S3C
G & N PANEL ASSEMBLY 1014578
45A10P1
45A10J7
28V 800 CPS ASSEMBLY 1007048
PSA TRAY 10 (WD1010100)
SIGNAL CONDITIONING MODULE
TELEMETRY
BLOWER CURRENT
IMU PRESSURE
IMU PRESSURE MONITOR OUTPUT
PSA TRAY 10 WD1010100
45A10J1
IRIG TEMP IND BRIDGE
ACCEL TEMP IND BRIDGE
IRIG TEMP INDICATING BRIDGE SUPPLY
R36 1330
NOTE 4 R30
CR3 1N2163A
IRIG TEMP INDICATING BRIDGE
R37 2K
R38 2K
R7 2365.3
R40 13777
R8 2365.3
R9 2367.8
ACCEL TEMP INDICATING BRIDGE SUPPLY
R11 85
R12 82.5
NOTE 5 R13
CR1 1N2985B NOTE 10
CR4 1N2767 NOTE 10
R17 1560
R18 1582
K2
ACCEL TEMP INDICATING BRIDGE
R14 1.5K
R15 1.5K
R16 1560
R41 4362
45A7J6
TEMP CONTROL BRIDGE
R23 760
R22 750
R20 17
R21 750
TEMP CONTROL BRIDGE SUPPLY
R19 50
CR2 1N2985B
CR11 HF3C
A4 BLOWER CURRENT SENSOR
R3 4020
R24 10K
CURRENT SENSOR OUTPUT
TEMP CONTROL BRIDGE EXCIT
HI
LO
+
5


IMU
IG
MG
OG
CASE
BLOWERS
AR6
AR7
R38
R39
J2
28V 800CPS
HI
LO
EMERGENCY HEATER CONTROL MODULE
10K
560Ω 5W 1%
2N2151
2N1724
1K
MERCURY EMERGENCY THERMOSTAT
SAFETY THERMOSTAT
ACCEL
EMERGENCY HEATERS
R26
IRIG TEMP IND SENSOR
IRIG TEMP CONTROL SENSOR
SAFETY THERMOSTAT
R25
ACCEL
IRIG
CONTROL HEATERS
ACCEL TEMP IND SENSOR
0-200
ACCEL FIXED HEATERS
28VDC REGULATOR
2N2151
+28VDC
0VDC
IMU CONTROL PANEL
STANDBY
IMU TURN ON RELAY
OPERATE
SPARE
PSA
TELEMETRY
500K
500K
500K
IRIG TEMP INDICATING BRIDGE SUPPLY
R1
R2
CR1
IRIG TEMP INDICATING BRIDGE
R5 2462.8
R6 2462.8
R7 2308.8
R8
S1 GAIN ±5°F
S3-A ZERO
R3 2504.1
R4 2308.8
AR1 IRIG TEMP INDICATING BRIDGE AMPL
CR4
CR5
TEMP CONTROL BRIDGE SUPPLY
R9
CR2
TEMP CONTROL BRIDGE
R11 70
R12 740.0
R13 740.0
R24 760.2
AR4 TEMP CONTROL AMPL
Q1 2N1724
K1
S3-B
AR5 HEATER CURRENT AMPL
DS1-A
DS1-B
NO GO IND. LIGHT
S3-C
ACCEL TEMP INDICATING BRIDGE SUPPLY
R16
R17
CR3
ACCEL TEMP INDICATING BRIDGE
R18 1714.0
R19 1714.0
R22 1560.0
R23
S2 ±5°F
S3 B
R20 1579.5
R21 1560.0
AR2 ACCEL. TEMP INDICATING BRIDGE AMPL
CR6
CR7
METER
15291
499K
1K
3281
S4
R14 ALARM POINT ADJ.
AR3 TEMP ALARM & BACKUP CONTROL AMPL
ALARM RELAY SIGMA SERIES 33 K1
1N669
Q2 2N1724
R33
R34
R35
R36
R37
CR8
S3-A
S3-D
HI
CT
LO
20VCT RMS 3200 CPS SQ. WAVE 10VA
28VDC

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00441 DATE 20 Feb 63

S3 POSITIONS:
1. AUTO. OVERRIDE
2. PROPORTIONAL
3. BACKUP
4. EMERGENCY

S4 POSITIONS:
1. IRIG TEMP
2. HEATER CURRENT
3. ACCEL TEMP

① ON DISPLAY PANEL

② 0.1W ±1%.
TC ±25PPM/°C MAX

REF:
BLOCK DIAGRAM
DWG. D-94305

NOT APPROVED FOR PRODUCTION

NASA DRAWING No. 1010039

NASA APPROVAL
Jack Barnard 2/20/63

MIT APPROVAL
W Kupfer 20 Feb 63

L	1-29-64	REVISED	LR
K	12-12-63	REVISED	LR
J	11-21-63	REVISED	LR
I	10-29-63	REVISED	LR
H	10-8-63	REVISED	LR
G	8-27-63	REVISED	LR
F	3-4-63	REVISED	LR

UNLESS OTHERWISE NOTED -
CAPACITOR VALUES ARE IN μF
RESISTOR VALUES ARE IN OHMS
ELECTRICAL TOLERANCES 10%
K = X1000 M = X1 000 000

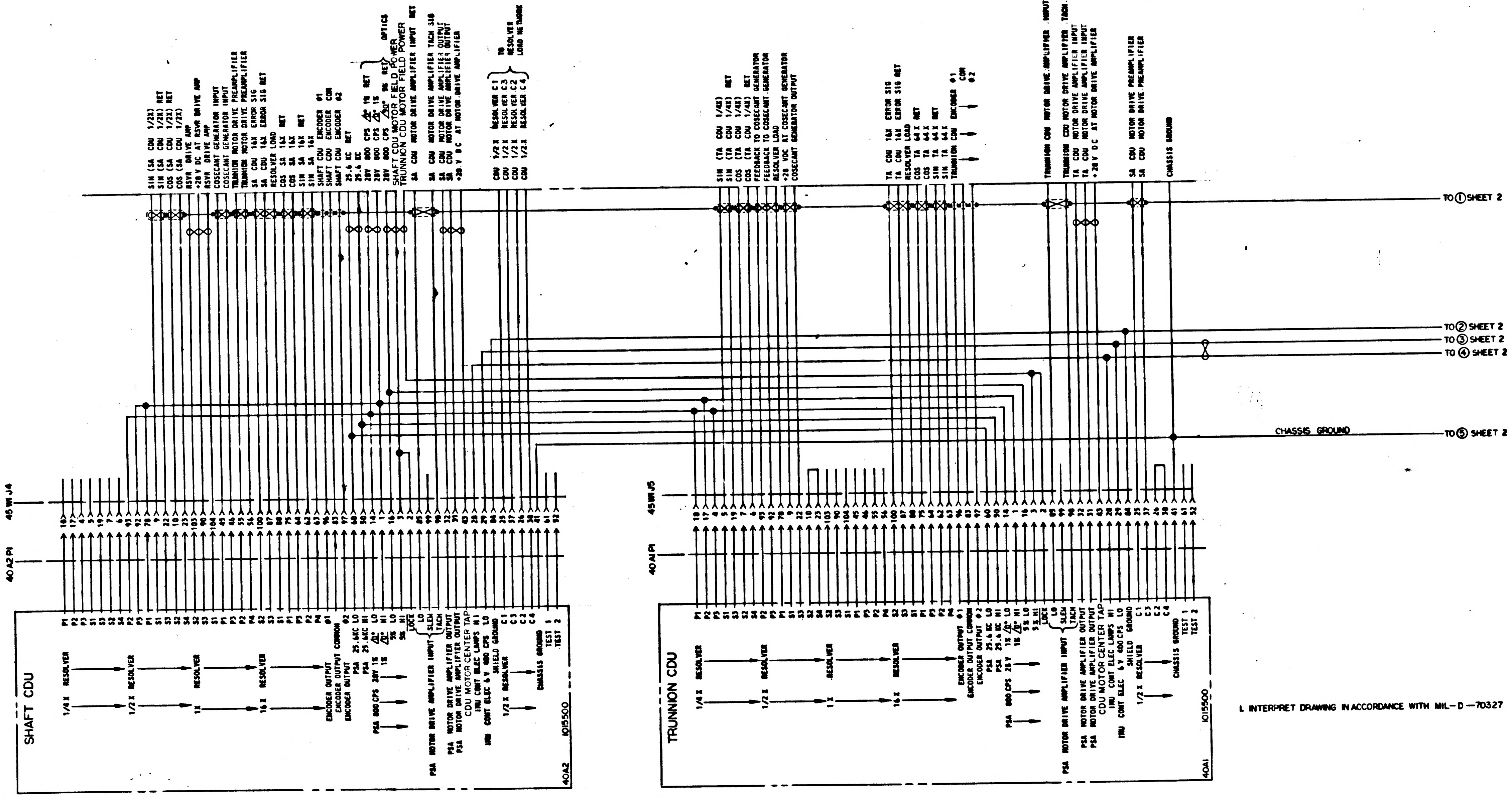
INSTRUMENTATION LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE MASS.

APOLLO IMU TEMPERATURE CONTROL SYSTEM SCHEMATIC DIAGRAM

L W.R 12-29-62

55-191-37-83

SYM	DESCRIPTION	DATE	APPROVAL
B	REVISED, REDRAWN, & UPGRADED FOR CLASS A RELEASE PER TDRR 00785	4-10-63	WK



TO ① SHEET 2
TO ② SHEET 2
TO ③ SHEET 2
TO ④ SHEET 2
CHASSIS GROUND
TO ⑤ SHEET 2
45W1J4
40A2P1
45W1J5
40A1P1
SHAFT CDU
1015500
40A2
TRUNNION CDU
1015500
40A1
RESOLVER
1/4 X
1/2 X
1X
16 X
ENCODER OUTPUT COMMON
ENCODER OUTPUT
PSA 800 CPS
PSA MOTOR DRIVE AMPLIFIER INPUT
CDU MOTOR CENTER TAP
IRU CONT ELEC LAMPS
CHASSIS GROUND
TEST 1
TEST 2
TO RESOLVER LOAD NETWORK

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN THENO DATE 3-26-63
CHECKED J. Green
APPROVAL R. J. Theissen 4-5-63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 10 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

CDU RACK
WIRING DIAGRAM

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010040
SCALE
WT
SHEET 1 OF 2

1010040 B

INCHES
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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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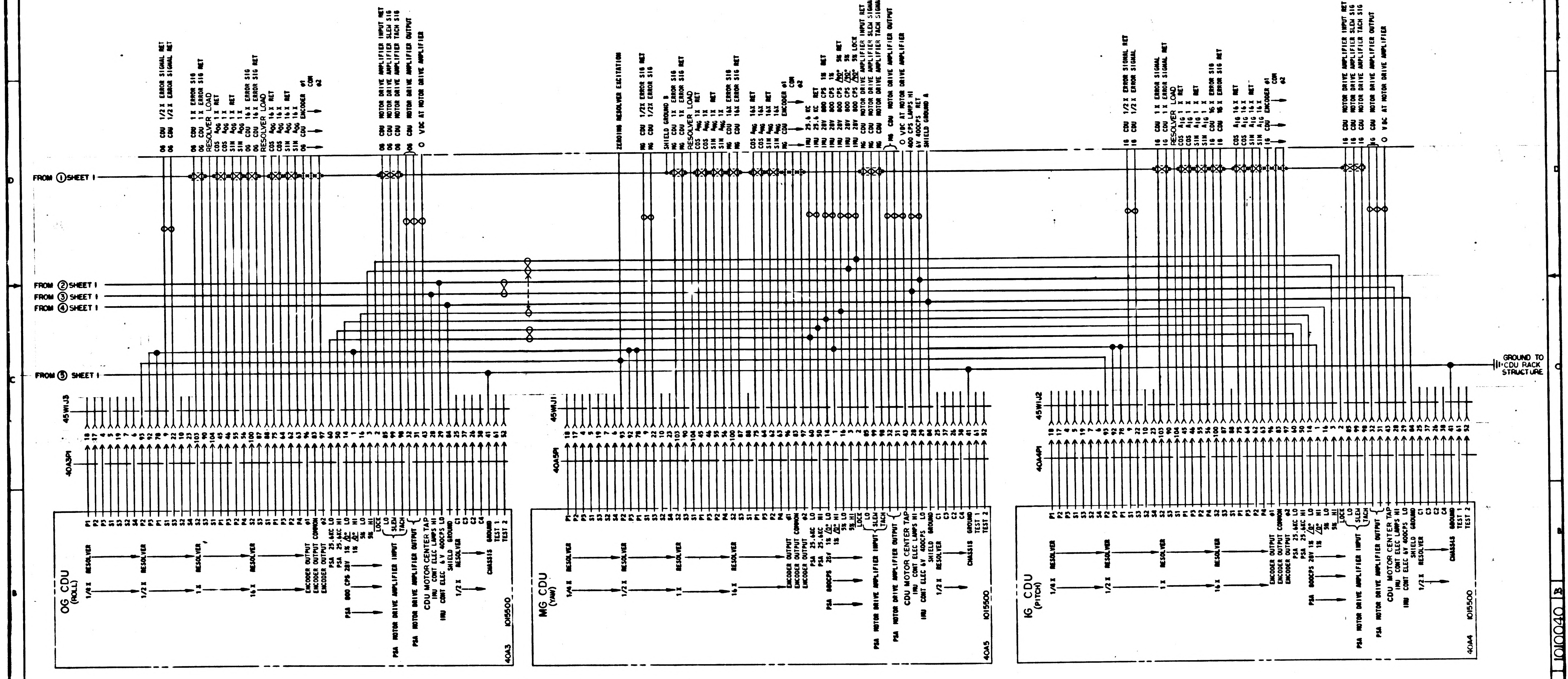
FROM ① SHEET 1
FROM ② SHEET 1
FROM ③ SHEET 1
FROM ④ SHEET 1
FROM ⑤ SHEET 1
GROUND TO CDU RACK STRUCTURE
45W1J3
40A3P1
OG CDU (ROLL)
1015500
40A3
45W1J1
40A5P1
MG CDU (YAW)
1015500
40A5
45W1J2
40A4P1
IG CDU (PITCH)
1015500
40A4

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN THENO DATE 4-2-63
CHECKED J Green
APPROVAL R. J. Theriault 4-5-63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Hughes 10 Apr 63

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CDU RACK WIRING DIAGRAM

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010040
SCALE
WT
SHEET 2 OF 2

1010040 B

INCHES
PHOTOGRAPHIC SCALE ONLY

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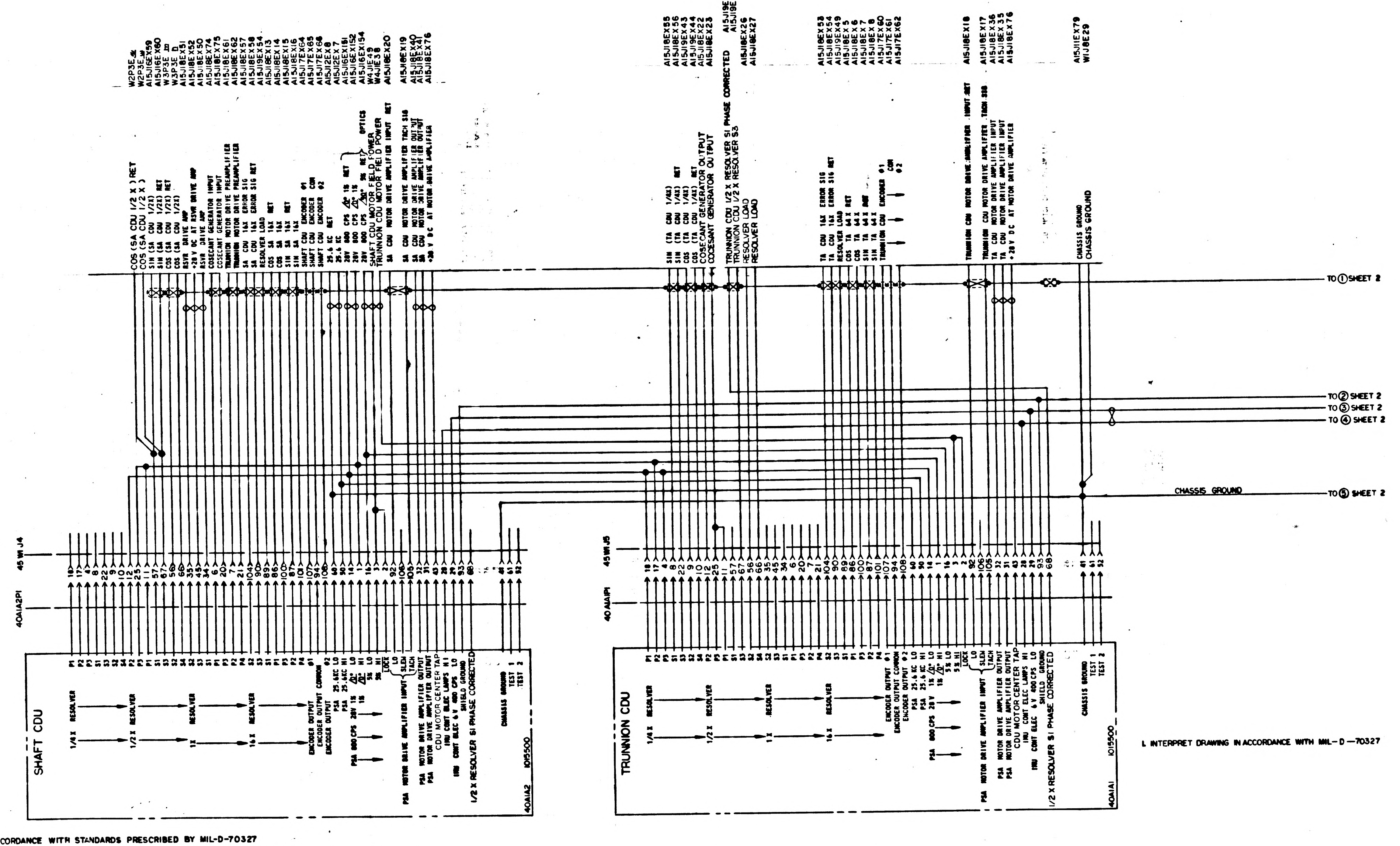
	REVISIONS		
SYM	DESCRIPTION	DATE	APPROVAL
B	REVISED, REDRAWN, & UPGRADED FOR CLASS A RELEASE PER TDRR 00785	4-10-63	WK
C	REVISED PER TDRR 01420	5/23/63	WK


SHAFT CDU
TRUNNION CDU
RESOLVER
1/4 X
1/2 X
1 X
16 X
ENCODER OUTPUT
ENCODER OUTPUT COMMON
PSA 800 CPS
PSA MOTOR DRIVE AMPLIFIER INPUT
CDU MOTOR CENTER TAP
IRU CONT ELEC LAMPS
1/2 X RESOLVER S1 PHASE CORRECTED
CHASSIS GROUND
TEST 1
TEST 2
40A1A2
105500
40A1A1
40A1A2P1
40A1A1P1
45W1J4
45W1J5
TO ① SHEET 2
TO ② SHEET 2
TO ③ SHEET 2
TO ④ SHEET 2
TO ⑤ SHEET 2
CHASSIS GROUND

1. INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150-PSA FAMILY TREE
3. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
4. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS
5. REFER TO DRAWINGS IN NOTE 2 FOR DEFINITION OF REFERENCE NUMBERS AND LISTING OF DRAWINGS WHICH SHOW DESTINATIONS OF THE CONDUCTORS SHOWN IN THIS DRAWING
6. PARTIAL REFERENCE DESIGNATIONS FOR CONDUCTORS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
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DWG NO CONTRACT
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CHECKED J. Beam
APPROVAL R.J. Therrien 4-5-63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 10 Apr 63

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CDU RACK
WIRING DIAGRAM

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010040
SCALE | WT | SHEET 1 OF 2

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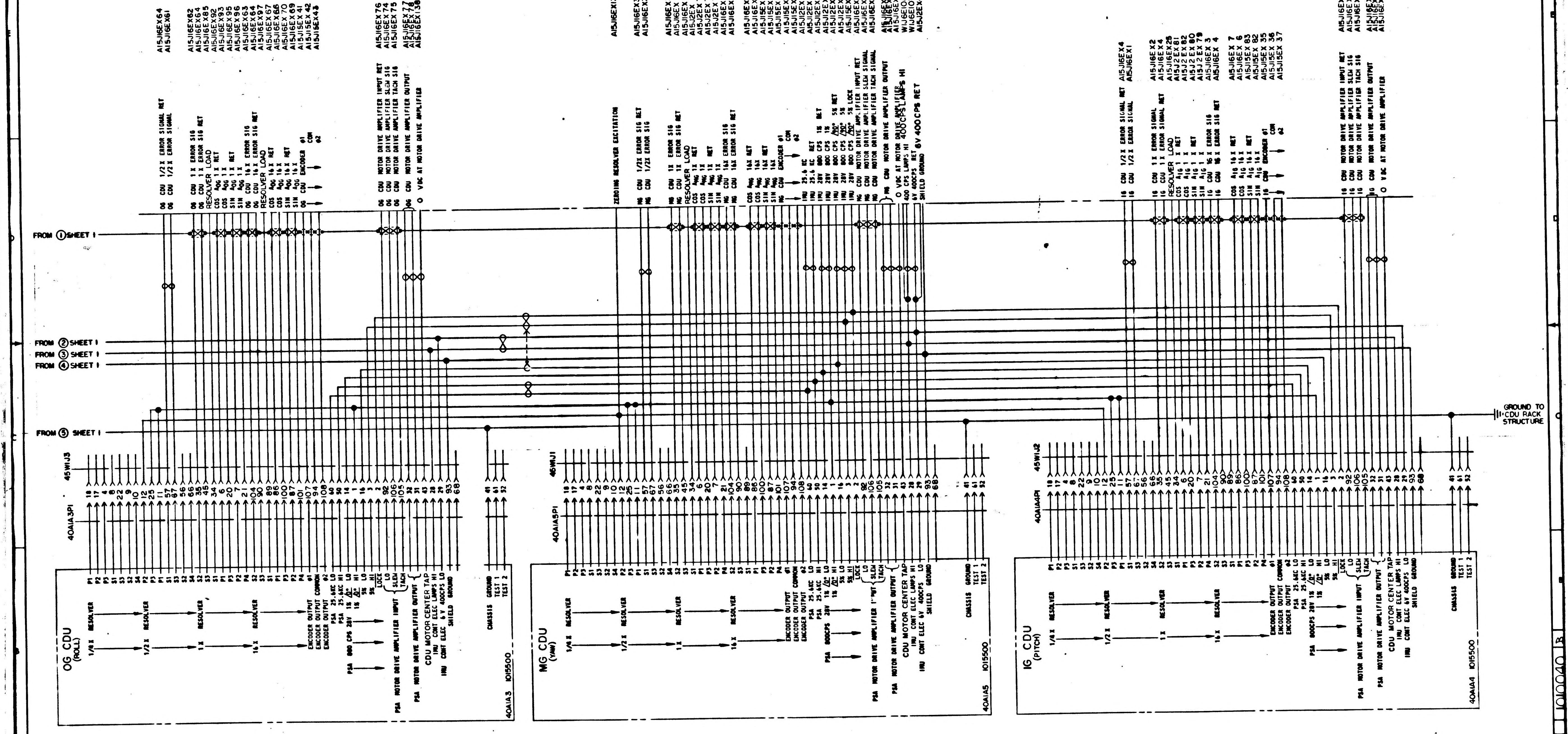
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
B	REVISED, REDRAWN, & UPGRADED FOR CLASS A RELEASE PER TDRR 00785	4-10-63	WL
C	REVISED PER TDRR 01020	5/29/63	W.K.

Ⓜ



FROM ① SHEET 1
FROM ② SHEET 1
FROM ③ SHEET 1
FROM ④ SHEET 1
FROM ⑤ SHEET 1
GROUND TO CDU RACK STRUCTURE
45W1J3
40A1A3P1
OG CDU (ROLL)
1/4 X RESOLVER
1/2 X RESOLVER
1 X RESOLVER
16 X RESOLVER
CDU MOTOR CENTER TAP
CHASSIS
40A1A3 1015500
45W1J1
40A1A5P1
MG CDU (YAW)
40A1A5 1015500
45W1J2
40A1A4P1
IG CDU (PITCH)
40A1A4 1015500
ZEROING RESOLVER EXCITATION
6V 400CPS RET

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN THENO DATE 4-2-63
CHECKED J. Gran
APPROVAL R.J. Thomas 4-5-63
APPROVAL
NASA APPROVAL
MIT APPROVAL W 10 Apr 63

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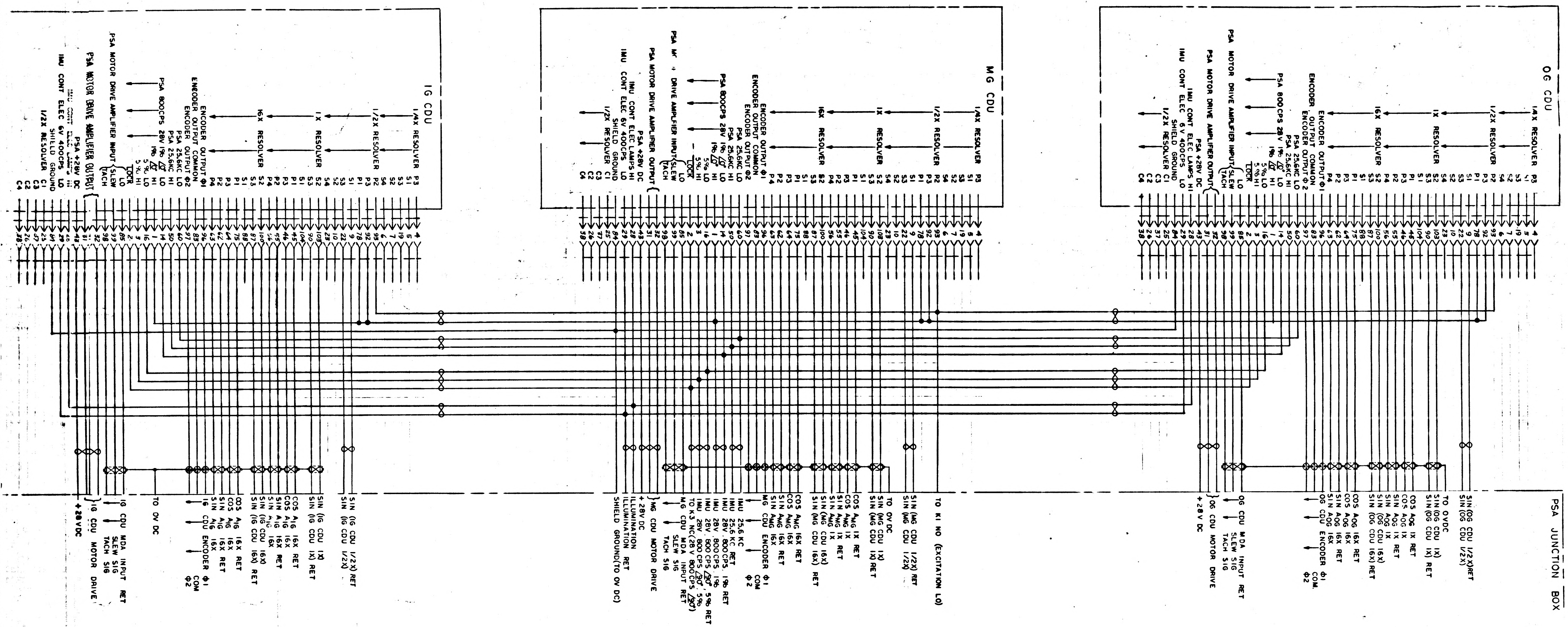
CDU RACK WIRING DIAGRAM

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010040
SCALE
WT
SHEET 2 OF 2

1010040 B

INCHES
PHOTOGRAPHIC SCALE ONLY


IG CDU
MG CDU
OG CDU
PSA JUNCTION BOX
1/4X RESOLVER
1/2X RESOLVER
1X RESOLVER
16X RESOLVER
ENCODER OUTPUT Φ1
ENCODER OUTPUT COMMON
ENCODER OUTPUT Φ2
PSA 25.6KC LO
PSA 25.6KC HI
PSA 800CPS 28V 1% LO
1% HI
5% LO
5% HI
LOCK
PSA MOTOR DRIVE AMPLIFIER INPUT
SLEW
TACH
PSA MOTOR DRIVE AMPLIFIER OUTPUT
PSA +28V DC
IMU CONT ELEC 6V 400CPS LO
IMU CONT ELEC 6V 400CPS HI
SHIELD GROUND
1/2X RESOLVER C1
C2
C3
C4
SIN (IG CDU 1/2X) RET
SIN (IG CDU 1/2X)
SIN (IG CDU 1X) RET
SIN (IG CDU 1X)
SIN (IG CDU 16X) RET
SIN (IG CDU 16X)
COS AIG 1X RET
COS AIG 16X RET
IG CDU ENCODER Φ1
COM
Φ2
TO 0V DC
IG CDU MDA INPUT RET
SLEW SIG
TACH SIG
IG CDU MOTOR DRIVE
+28V DC
TO K1 NO (EXCITATION LO)
SIN (MG CDU 1/2X) RET
SIN (MG CDU 1/2X)
SIN (MG CDU 1X) RET
SIN (MG CDU 1X)
SIN (MG CDU 16X) RET
SIN (MG CDU 16X)
MG CDU ENCODER Φ1
IMU 25.6 KC
IMU 25.6 KC RET
IMU 28V 800CPS 1%
IMU 28V 800CPS 1% RET
IMU 28V 800CPS 5%
IMU 28V 800CPS 5% RET
TO K3 NC (28V 800CPS 20°)
MG CDU MDA INPUT RET
MG CDU MOTOR DRIVE
+28V DC
ILLUMINATION
ILLUMINATION RET
SHIELD GROUND (TO 0V DC)
SIN (OG CDU 1/2X) RET
SIN (OG CDU 1/2X)
SIN (OG CDU 1X) RET
SIN (OG CDU 1X)
SIN (OG CDU 16X) RET
SIN (OG CDU 16X)
TO 0VDC
OG CDU ENCODER Φ1
COM.
Φ2
OG CDU MDA INPUT RET
SLEW SIG
TACH SIG
OG CDU MOTOR DRIVE
+28V DC

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CLASS B RELEASE TDR No. 00505 DATE 8 Mar 63

MASTER

1010040

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING
NEXT ASSY	USED ON	MATERIAL
APPLICATION		HEAT TREATMENT
		FINAL FINISH

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CHECKED L Green
APPROVAL R. J. Duisin 3-6-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

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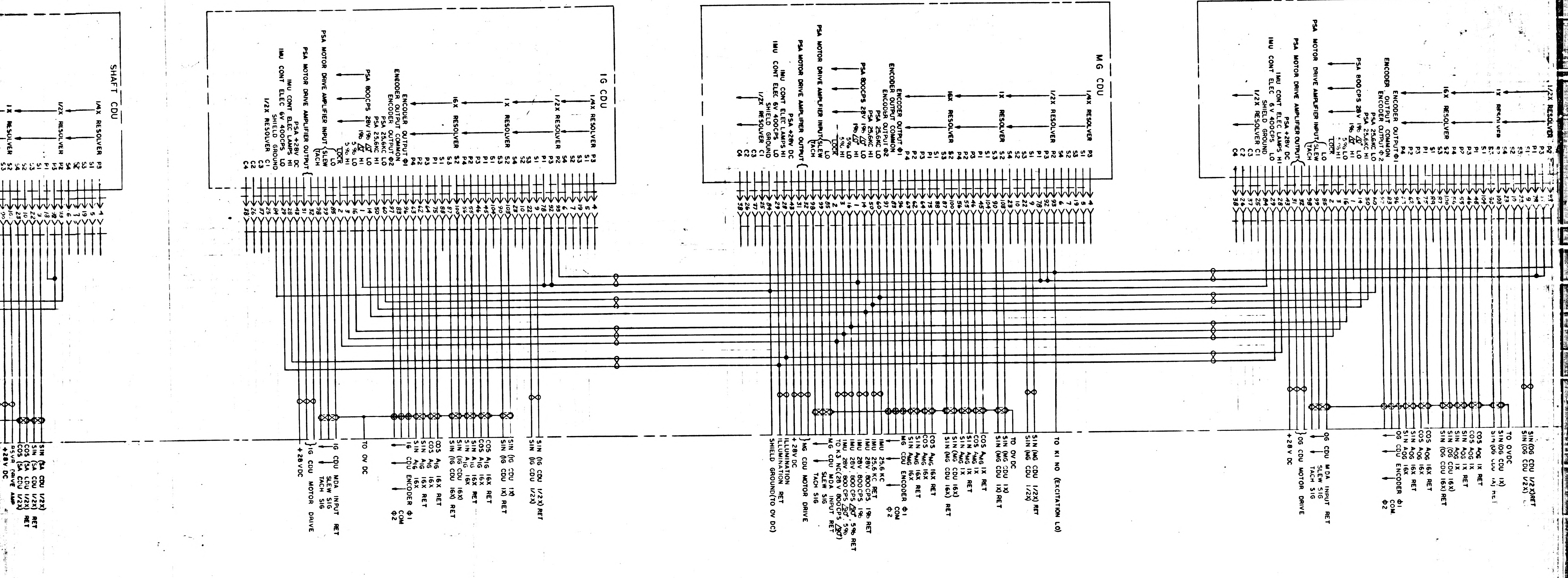
CDU RACK
WIRING DIAGRAM

CODE IDENT NO. SIZE NASA DRAWING NO. 1010040
SCALE WT SHEET OF


SHAFT CDU
IG CDU
MG CDU
1/4X RESOLVER
1/2X RESOLVER
1X RESOLVER
16X RESOLVER
ENCODER OUTPUT Φ1
ENCODER OUTPUT COMMON
ENCODER OUTPUT Φ2
PSA 25.6KC LO
PSA 25.6KC HI
PSA 800CPS 28V 1% LO
5% HI
5% LO
TORK
PSA MOTOR DRIVE AMPLIFIER INPUT
SLEW
TACH
PSA MOTOR DRIVE AMPLIFIER OUTPUT
PSA +28V DC
IMU CONT ELEC LAMPS HI
IMU CONT ELEC 6V 400CPS LO
SHIELD GROUND
TO 0V DC
+28 VDC
IG CDU MOTOR DRIVE
IG CDU MDA INPUT RET
SLEW SIG
TACH SIG
IG CDU ENCODER Φ1
COM
Φ2
SIN (IG CDU 1/2X) RET
SIN (IG CDU 1X) RET
MG CDU MOTOR DRIVE
MG CDU ENCODER
ILLUMINATION
ILLUMINATION RET
SHIELD GROUND(TO 0V DC)
IMU 25.6 KC
IMU 28V 800CPS 1% RET
TO K3 NC(28 V 800CPS 5%)
SIN (MG CDU 1/2X) RET
TO K1 NO (EXCITATION LO)
OG CDU MOTOR DRIVE
OG CDU MDA INPUT RET
OG CDU ENCODER Φ1
SIN (OG CDU 1/2X) RET
TO 0VDC

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CLASS B RELEASE TDR No. 00505 DATE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY USED ON
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INSTRUMENTATION LAB

DRAWN SHARP DATE 2-26-63
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WIRING DIAG

CODE IDENT NO. SIZE

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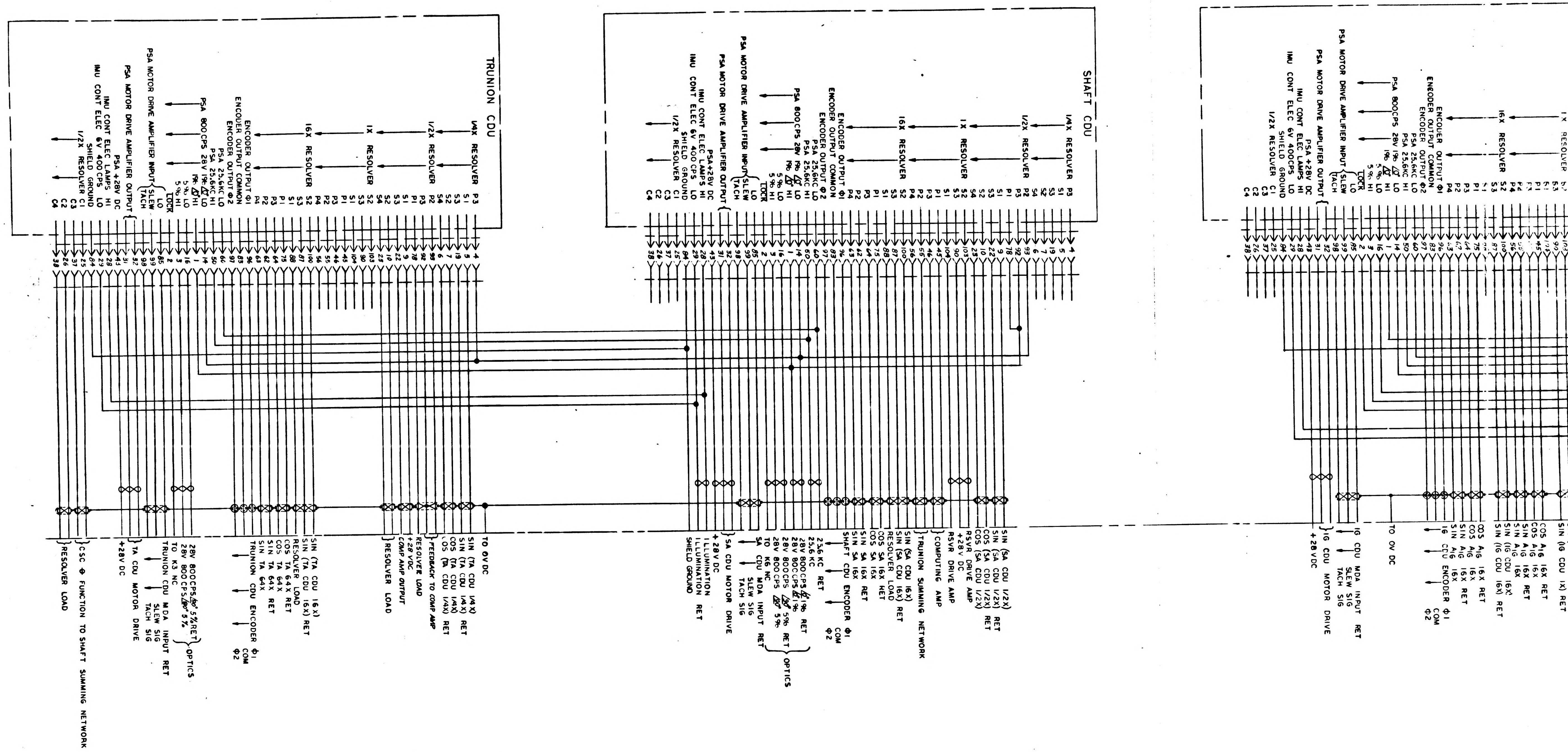
1010040


TRUNION CDU
SHAFT CDU
1/4X RESOLVER
1/2X RESOLVER
1X RESOLVER
16X RESOLVER
ENCODER OUTPUT Φ1
ENCODER OUTPUT COMMON
ENCODER OUTPUT Φ2
PSA 25.6KC LO
PSA 25.6KC HI
PSA 800CPS 28V
PSA MOTOR DRIVE AMPLIFIER INPUT
PSA MOTOR DRIVE AMPLIFIER OUTPUT
PSA +28V DC
IMU CONT ELEC LAMPS HI
IMU CONT ELEC 6V 400CPS LO
SHIELD GROUND
SLEW
TACH
TO 0V DC
SIN (TA CDU 1/4X)
COS (TA CDU 1/4X)
FEEDBACK TO COMP AMP
RESOLVER LOAD
COMP AMP OUTPUT
+28 VDC
TRUNION CDU ENCODER Φ1 COM Φ2
TA CDU MOTOR DRIVE
TRUNION CDU MDA INPUT RET
SLEW SIG
TACH SIG
OPTICS
CSC Φ FUNCTION TO SHAFT SUMMING NETWORK
SA CDU MOTOR DRIVE
ILLUMINATION
ILLUMINATION RET
SHIELD GROUND
SA CDU MDA INPUT RET
SHAFT CDU ENCODER Φ1 COM Φ2
TRUNION SUMMING NETWORK
COMPUTING AMP
RSVR DRIVE AMP
IG CDU MDA INPUT RET
IG CDU MOTOR DRIVE
IG CDU ENCODER Φ1 COM Φ2

1010040

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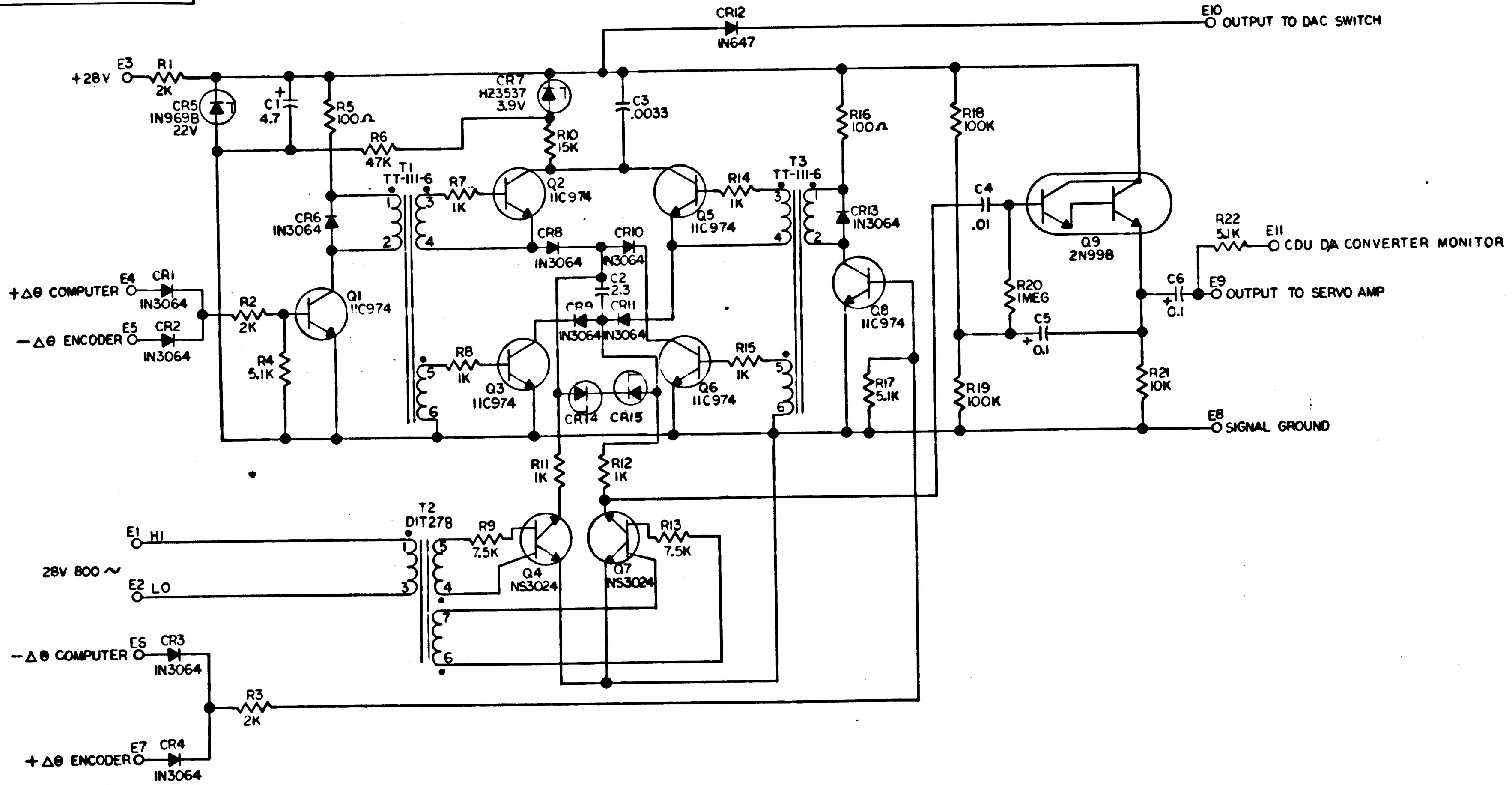
⑰

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00979	4-20-63	R.J.T. WK



E3
R1
2K
+28V
CR5
IN969B
22V
C1
4.7
R5
100Ω
R6
47K
CR7
HZ3537
3.9V
R10
15K
C3
.0033
CR12
IN647
E10
OUTPUT TO DAC SWITCH
R16
100Ω
R18
100K
T1
TT-111-6
R7
1K
Q2
11C974
CR6
IN3064
CR8
IN3064
CR10
IN3064
C2
2.3
CR9
CR11
IN3064
Q5
11C974
R14
1K
T3
TT-111-6
CR13
IN3064
C4
.01
Q9
2N998
R22
5.1K
E11
CDU DA CONVERTER MONITOR
+Δθ COMPUTER
E4
CR1
IN3064
−Δθ ENCODER
E5
CR2
IN3064
R2
2K
Q1
11C974
R4
5.1K
R8
1K
Q3
11C974
CR14
CR15
Q6
11C974
R15
1K
Q8
11C974
R17
5.1K
R20
1MEG
C5
0.1
R19
100K
R21
10K
C6
0.1
E9
OUTPUT TO SERVO AMP
E8
SIGNAL GROUND
R11
1K
R12
1K
T2
DIT278
E1
HI
28V 800 ~
E2
LO
R9
7.5K
Q4
NS3024
Q7
NS3024
R13
7.5K
−Δθ COMPUTER
E6
CR3
IN3064
R3
2K
+Δθ ENCODER
E7
CR4
IN3064

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
C1	1010393-37	CAPACITOR	4.7 MF	10 %	50V
C2	1010279-236		2.3	10 %	35V
C3	1010359-23		.0033	20%	200V
C4	1010359-29		.01	20%	200V
C5	1006755-57		0.1	10%	35V
C6	1006755-57		0.1	10%	35V
CR1	1010370	DIODE			
CR2					
CR3					
CR4					
CR5	1010286-013	ZENER	22V	5 %	400MW
CR6	1010370				
CR7	1010372-8	ZENER	3.9V	5 %	250MW
CR8	1010370				
CR9					
CR10					
CR11					
CR12	1010362-2				
CR13	1010370				
CR14	1010372-18	ZENER	10V	5%	250MW
CR15	1010372-18	ZENER	10V	5%	250MW
Q1	1010343	TRANSISTOR			
Q2					
Q3					
Q4	1010367				
Q5	1010343				
Q6	1010343				
Q7	1010367				
Q8	1010343				
Q9	1010342				

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
R1	1010389-63	RESISTOR	2 K	1 %	3 W
R2	1006750-39		2	2 %	250 W
R3	-39		2		
R4	-49		5.1		
R5	- 8		100Ω		
R6	-72		47 K		
R7	-32		1		
R8	-32		1		
R9	-53		7.5		
R10	-60		15		
R11	-32		1		
R12	-32		1		
R13	-53		7.5		
R14	-32		1		
R15	-32		1		
R16	-8		100Ω		
R17	-49		5.1 K		
R18	-80		100		
R19	-80		100		
R20	1010369-105		1 MEG	5 %	125MW
R21	1006750-56		10 K	2 %	250MW
R22	1006750-49		5.1 K	2 %	250MW
T1	1010344	TRANSFORMER			
T2	1010365				
T3	1010344				

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00447 DATE 27Feb63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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APPROVAL Robert J. [illegible] 2-27-63
APPROVAL
NASA APPROVAL W.J. Rhine 2-27-63
MIT APPROVAL W. Hopper 27Feb63

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CONVERTER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010041
SCALE
WT
SHEET OF

INCHES
0 1 2
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1010041

8 7 6 5 4 3 2 1

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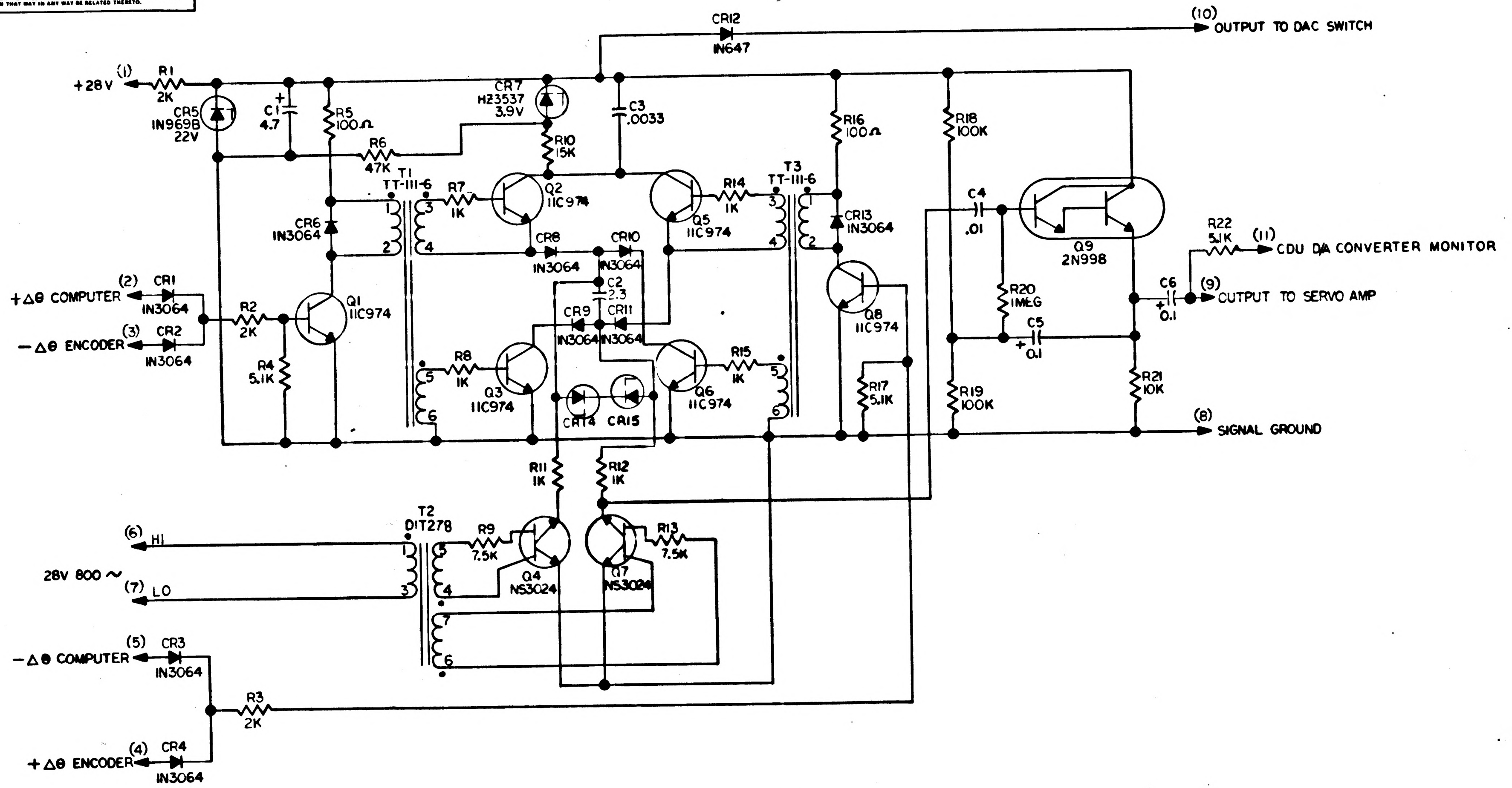
REVISIONS TDR 00447

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00979	4-20-63	R.J.T. WK
B	REVISED PER TDRR 01312	5-20-63	RV JK


+28V
(1)
R1
2K
CR5
IN969B
22V
C1
4.7
R5
100Ω
R6
47K
T1
TT-111-6
CR6
IN3064
CR7
HZ3537
3.9V
R10
15K
R7
1K
Q2
11C974
C3
.0033
CR12
IN647
(10) OUTPUT TO DAC SWITCH
Q5
11C974
R14
1K
T3
TT-111-6
R16
100Ω
CR13
IN3064
R18
100K
C4
.01
Q9
2N998
R22
5.1K
(11) CDU D/A CONVERTER MONITOR
C6
0.1
(9) OUTPUT TO SERVO AMP
R20
1MEG
C5
0.1
R21
10K
R19
100K
(8) SIGNAL GROUND
CR8
IN3064
CR10
IN3064
C2
2.3
CR9
IN3064
CR11
IN3064
(2) CR1
+Δθ COMPUTER
IN3064
(3) CR2
−Δθ ENCODER
IN3064
R2
2K
Q1
11C974
R4
5.1K
R8
1K
Q3
11C974
CR14
CR15
Q6
11C974
R15
1K
Q8
11C974
R17
5.1K
R11
1K
R12
1K
T2
DIT278
(6) HI
28V 800 ~
(7) LO
R9
7.5K
Q4
NS3024
Q7
NS3024
R13
7.5K
(5) CR3
−Δθ COMPUTER
IN3064
R3
2K
(4) CR4
+Δθ ENCODER
IN3064
1 2 3 4 5 6 7

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
C1	1010333-37	CAPACITOR	4.7 MF	10 %	50V
C2	1010279-236		2.3	10 %	35V
C3	1010359-23		.0033	20%	200V
C4	1010359-29		.01	20%	200V
C5	1006755-57		0.1	10%	35V
C6	1006755-57		0.1	10%	35V
CR1	1010370	DIODE			
CR2					
CR3					
CR4					
CR5	1010286-013	ZENER	22V	5 %	400MW
CR6	1010370				
CR7	1010372-8	ZENER	3.9V	5 %	250MW
CR8	1010370				
CR9					
CR10					
CR11					
CR12	1010362-2				
CR13	1010370				
CR14	1010372-18	ZENER	10V	5%	250MW
CR15	1010372-18	ZENER	10V	5%	250MW
Q1	1010343	TRANSISTOR			
Q2					
Q3					
Q4	1010367				
Q5	1010343				
Q6	1010343				
Q7	1010367				
Q8	1010343				
Q9	1010342				

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
R1	1010389-63	RESISTOR	2 K	1 %	3 W
R2	1006750-39		2	2 %	250MW
R3	-39		2		
R4	-49		5.1		
R5	-8		100Ω		
R6	-72		47 K		
R7	-32		1		
R8	-32		1		
R9	-53		7.5		
R10	-60		15		
R11	-32		1		
R12	-32		1		
R13	-53		7.5		
R14	-32		1		
R15	-32		1		
R16	-8		100Ω		
R17	-49		5.1 K		
R18	-80		100		
R19	-80		100		
R20	1010369-105		1 MEG	5 %	125MW
R21	1006750-56		10 K	2 %	250MW
R22	1006750-49		5.1 K	2 %	250MW
T1	1010344	TRANSFORMER			
T2	1010365				
T3	1010344				

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

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APPROVAL Robert J. [illegible]
APPROVAL
NASA APPROVAL W.J. [illegible] 2-27-63
MIT APPROVAL W [illegible] 27 Feb 63

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SCALE WT SHEET OF

1010041 B

8 7 6 5 4 3 2 1

INCHES
0 1 2
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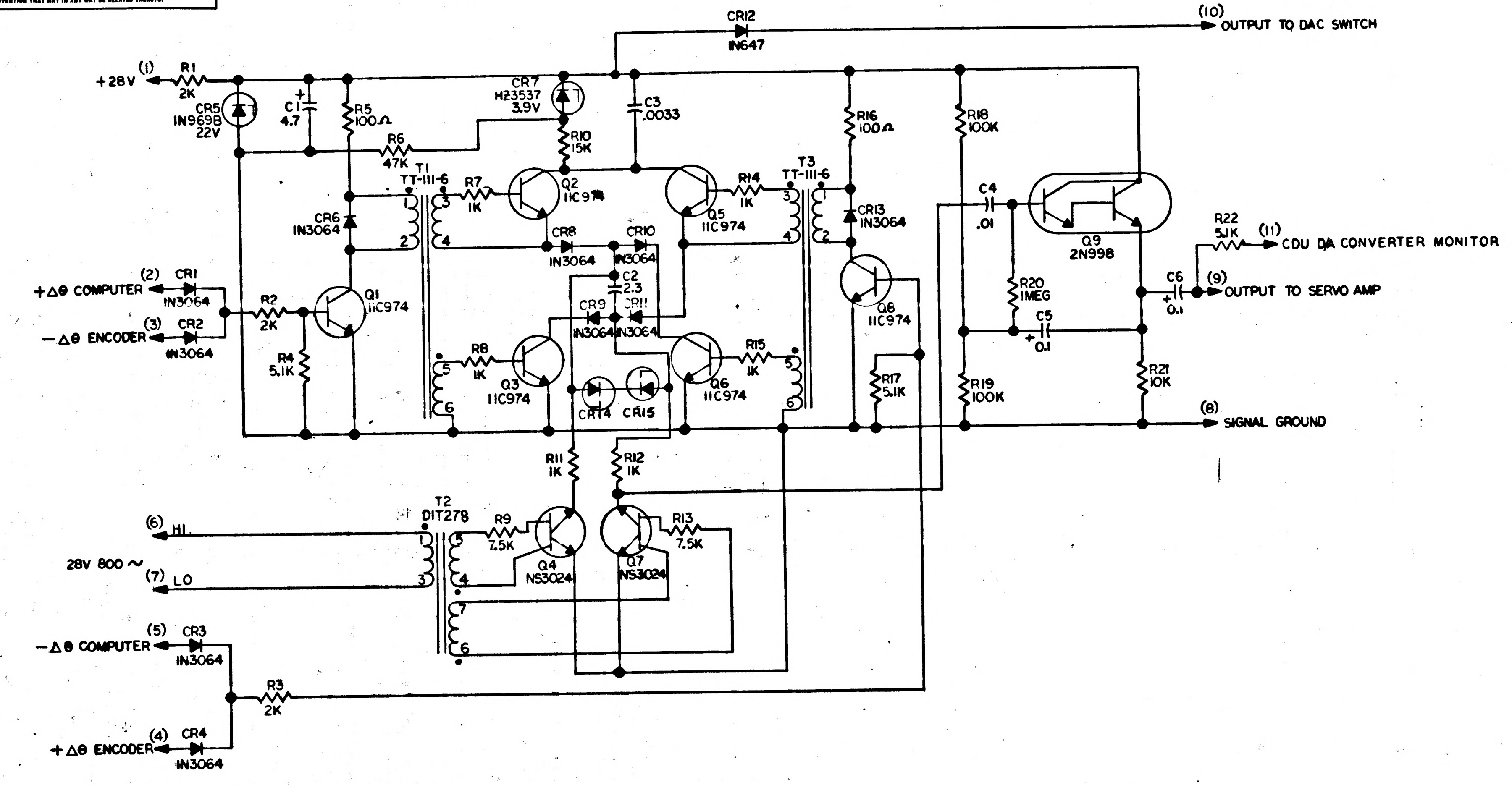
REVISIONS TDR 00447

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00979	4-20-63	R.J.T. WK.
B	REVISED PER TDRR 01312	5-20-63	WK
C	REVISED PER TDRR 05708	10 Jan 64	


CR12
IN647
(10) OUTPUT TO DAC SWITCH
+28V (1)
R1 2K
CR5 IN969B 22V
C1 4.7
R5 100Ω
R6 47K
CR7 H23537 3.9V
R10 15K
C3 .0033
R16 100Ω
R18 100K
T1 TT-111-6
T3 TT-111-6
R7 1K
Q2 11C974
Q5 11C974
R14 1K
CR6 IN3064
CR8 IN3064
CR10 IN3064
CR13 IN3064
C4 .01
Q9 2N998
R22 5.1K
(11) CDU DA CONVERTER MONITOR
C2 2.3
CR9 IN3064
CR11 IN3064
R20 1MEG
C5 0.1
C6 0.1
(9) OUTPUT TO SERVO AMP
+Δθ COMPUTER (2) CR1 IN3064
−Δθ ENCODER (3) CR2 IN3064
R2 2K
Q1 11C974
R4 5.1K
R8 1K
Q3 11C974
CR14 CR15
Q6 11C974
R15 1K
Q8 11C974
R17 5.1K
R19 100K
R21 10K
(8) SIGNAL GROUND
R11 1K
R12 1K
T2 DIT278
(6) HI
28V 800 ~
(7) LO
R9 7.5K
Q4 NS3024
Q7 NS3024
R13 7.5K
−Δθ COMPUTER (5) CR3 IN3064
R3 2K
+Δθ ENCODER (4) CR4 IN3064

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
C1	1010393-37	CAPACITOR	4.7 MF	10 %	50V
C2	1010279-236		2.3	10 %	35V
C3	1010359-23		.0033	20%	200V
C4	1010359-29		.01	20%	200V
C5	1006755-57		0.1	10%	35V
C6	1006755-57		0.1	10%	35V
CR1	1010370	DIODE			
CR2					
CR3					
CR4					
CR5	1010286-013	ZENER	22V	5 %	400MW
CR6	1010370				
CR7	1010372-8	ZENER	3.9V	5 %	250MW
CR8	1010370				
CR9					
CR10					
CR11					
CR12	1010362-2				
CR13	1010370				
CR14	1010372-18	ZENER	10V	5%	250MW
CR15	1010372-18	ZENER	10V	5%	250MW
Q1	1010343-1	TRANSISTOR			
Q2					
Q3					
Q4	1010367				
Q5	1010343-1				
Q6	1010343-1				
Q7	1010367				
Q8	1010343-1				
Q9	1010342				

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
R1	1010389-63	RESISTOR	2 K	1 %	3 W
R2	1006750-39		2	2 %	250MW
R3	-39		2		
R4	-49		5.1		
R5	-8		100Ω		
R6	-72		47 K		
R7	-32		1		
R8	-32		1		
R9	-53		7.5		
R10	-60		15		
R11	-32		1		
R12	-32		1		
R13	-53		7.5		
R14	-32		1		
R15	-32		1		
R16	-8		100Ω		
R17	-49		5.1 K		
R18	-80		100		
R19	-80		100		
R20	1010369-105		1 MEG	5 %	125MW
R21	1006750-56		10 K	2 %	250MW
R22	1006750-49		5.1 K	2 %	250MW
T1	1010344-1	TRANSFORMER			
T2	1010365				
T3	1010344-1				

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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NASA APPROVAL 2-27-63
MIT APPROVAL 27 Feb 63

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NASA DRAWING NO. 1010041
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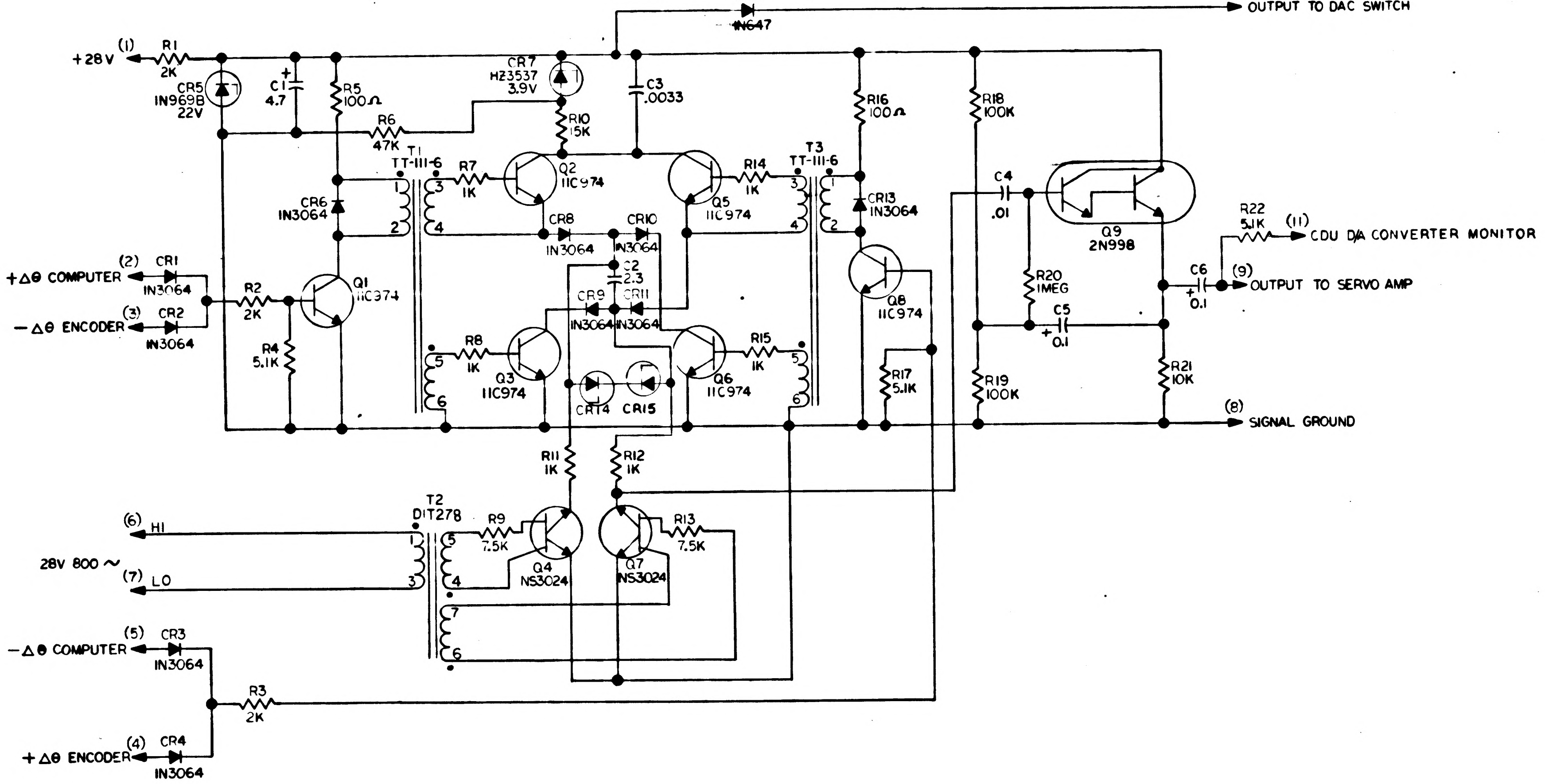
REVISIONS TDR 00447			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 00979	4-24-63	R.J.T. WK
B	REVISED PER TDRR 01312	5-20-63	WK
C	REVISED PER TDRR 05708	64	JWC
D	REVISED PER TDRR 17610	24 MAR 65	HTO CTP



+28V
(1)
R1
2K
CR5
IN969B
22V
C1
4.7
R5
100Ω
R6
47K
CR7
HZ3537
3.9V
R10
15K
C3
.0033
CR12
IN647
(10)
OUTPUT TO DAC SWITCH
T1
TT-111-6
R7
1K
Q2
11C974
R14
1K
Q5
11C974
T3
TT-111-6
R16
100Ω
R18
100K
C4
.01
Q9
2N998
CR6
IN3064
CR8
IN3064
CR10
IN3064
CR13
IN3064
R22
5.1K
(11)
CDU D/A CONVERTER MONITOR
+Δθ COMPUTER
(2)
CR1
IN3064
−Δθ ENCODER
(3)
CR2
IN3064
R2
2K
Q1
11C974
R4
5.1K
C2
2.3
CR9
IN3064
CR11
IN3064
Q8
11C974
R20
1MEG
C5
0.1
C6
0.1
(9)
OUTPUT TO SERVO AMP
R8
1K
Q3
11C974
CR14
CR15
Q6
11C974
R15
1K
R17
5.1K
R19
100K
R21
10K
(8)
SIGNAL GROUND
R11
1K
R12
1K
T2
DIT278
(6)
HI
28V 800 ~
(7)
LO
R9
7.5K
Q4
NS3024
Q7
NS3024
R13
7.5K
−Δθ COMPUTER
(5)
CR3
IN3064
R3
2K
+Δθ ENCODER
(4)
CR4
IN3064
1
2
3
4
5
6
7

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
C1	1010393-37	CAPACITOR	4.7 MF	10 %	50V
C2	1010279-236		2.3	10 %	35V
C3	1010359-23		.0033	20%	200V
C4	1010359-29		.01	20%	200V
C5	1006755-57		0.1	10%	35V
C6	1006755-57		0.1	10%	35V
CR1	1010370	DIODE			
CR2					
CR3					
CR4					
CR5	1010830-13	ZENER	22V	5 %	400MW
CR6	1010370				
CR7	1010372-8	ZENER	3.9V	5 %	250MW
CR8	1010370				
CR9					
CR10					
CR11					
CR12	1010362-2				
CR13	1010370				
CR14	1010372-18	ZENER	10V	5%	250MW
CR15	1010372-18	ZENER	10V	5%	250MW
Q1	1010343-1	TRANSISTOR			
Q2					
Q3					
Q4	1010367				
Q5	1010343-1				
Q6	1010343-1				
Q7	1010367				
Q8	1010343-1				
Q9	1010342				

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
R1	1010389-63	RESISTOR	2 K	1 %	3 W
R2	1006750-39		2	2 %	250MW
R3	-39		2		
R4	-49		5.1		
R5	-8		100Ω		
R6	-72		47 K		
R7	-32		1		
R8	-32		1		
R9	-53		7.5		
R10	-60		15		
R11	-32		1		
R12	-32		1		
R13	-53		7.5		
R14	-32		1		
R15	-32		1		
R16	-8		100Ω		
R17	-49		5.1 K		
R18	-80		100		
R19	-80		100		
R20	1010369-105		1 MEG	5 %	125MW
R21	1006750-56		10 K	2 %	250MW
R22	1006750-49		5.1 K	2 %	250MW
T1	1010344-1	TRANSFORMER			
T2	1010365				
T3	1010344-1				

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

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APPROVAL Robert J. Harris 2-26-63
APPROVAL

NASA APPROVAL W.J. Rhine 2-27-63
MIT APPROVAL W. Hoffer 27 Feb 63

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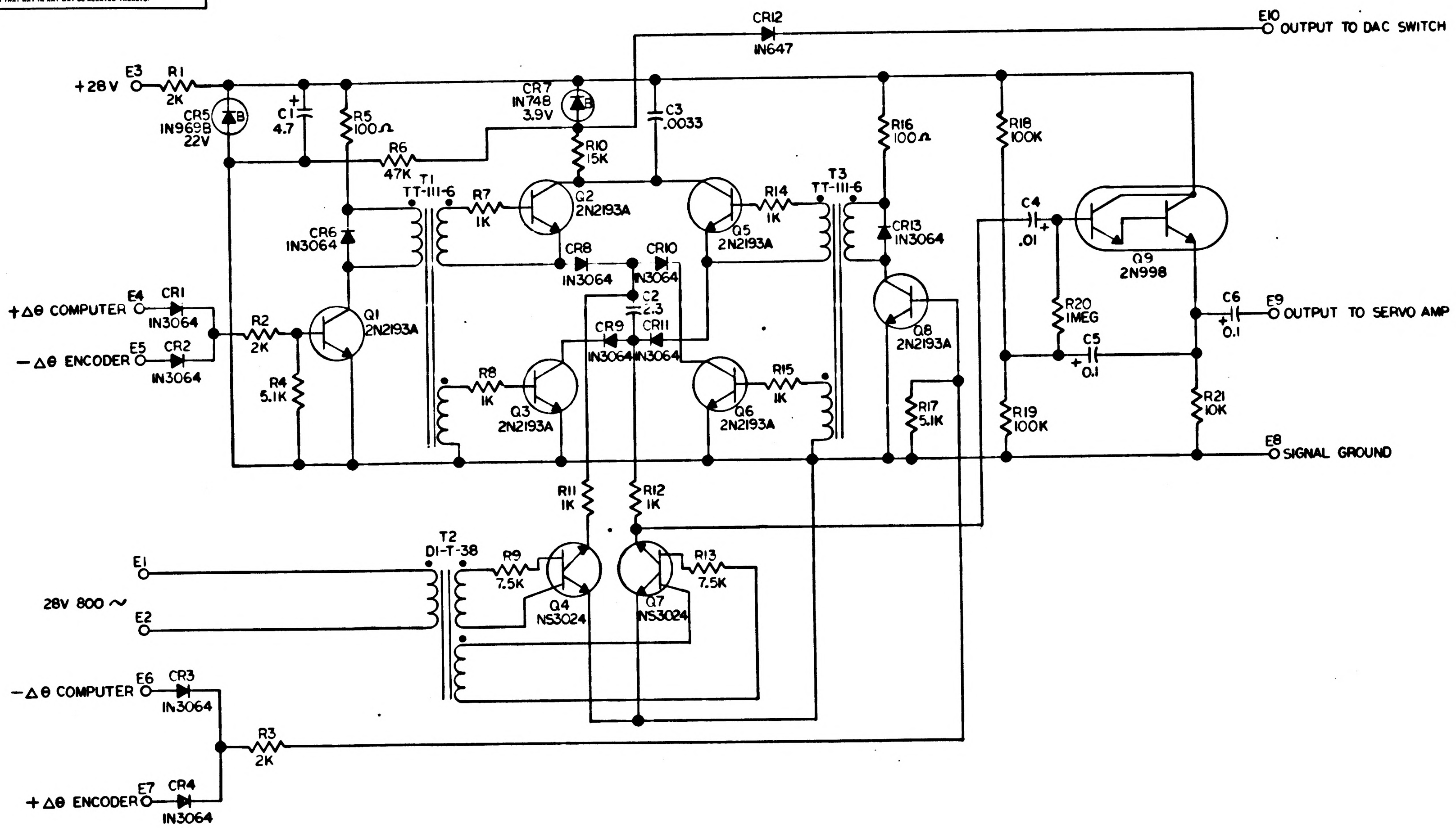
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



+28V
E3
R1
2K
CR5
IN969B
22V
B
C1
4.7
R5
100Ω
R6
47K
T1
TT-111-6
CR6
IN3064
CR7
IN748
3.9V
R10
15K
CR12
IN647
E10
OUTPUT TO DAC SWITCH
C3
.0033
R7
1K
Q2
2N2193A
CR8
IN3064
CR10
IN3064
C2
2.3
CR9
IN3064
CR11
IN3064
Q5
2N2193A
R14
1K
T3
TT-111-6
CR13
IN3064
R16
100Ω
R18
100K
C4
.01
Q9
2N998
R20
1MEG
C5
0.1
C6
0.1
E9
OUTPUT TO SERVO AMP
+Δθ COMPUTER
E4
CR1
IN3064
−Δθ ENCODER
E5
CR2
IN3064
R2
2K
R4
5.1K
Q1
2N2193A
R8
1K
Q3
2N2193A
R15
1K
Q6
2N2193A
Q8
2N2193A
R17
5.1K
R19
100K
R21
10K
E8
SIGNAL GROUND
R11
1K
R12
1K
T2
DI-T-38
E1
28V 800 ~
E2
R9
7.5K
Q4
NS3024
Q7
NS3024
R13
7.5K
−Δθ COMPUTER
E6
CR3
IN3064
R3
2K
+Δθ ENCODER
E7
CR4
IN3064

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
C1	1010393-37	CAPACITOR	4.7 MF		
C2	1010279-		2.3		
C3	1010359-23		.0033		
C4	1010359-29		.01		
C5	1006755-57		0.1		
C6	1006755-57		0.1		
CR1	1010370	DIODE			
CR2					
CR3					
CR4					
CR5	1010286	ZENER	22V		
CR6	1010370				
CR7		ZENER	3.9V		
CR8	1010370				
CR9					
CR10					
CR11					
CR12	1010362-2				
CR13	1010370				
Q1	1010343	TRANSISTOR			
Q2					
Q3					
Q4	1010367				
Q5	1010343				
Q6	1010343				
Q7	1010367				
Q8	1010343				
Q9	1010342				

REF DES	PART NO.	DESCRIPTION	VALUE	TOL %	RATING
R1	1010278	RESISTOR	2 K		
R2	1006750-39		2		
R3	-39		2		
R4	-49		5.1		
R5	- 8		100Ω		
R6	-72		47 K		
R7	-32		1		
R8	-32		1		
R9	-53		7.5		
R10	-60		15		
R11	-32		1		
R12	-32		1		
R13	-53		7.5		
R14	-32		1		
R15	-32		1		
R16	-8		100Ω		
R17	-49		5.1 K		
R18	-80		100		
R19	-80		100		
R20	-96		1 MEG		
R21	-56		10 K		
T1	1010344	TRANSFORMER			
T2	1010365				
T3	1010344				

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00447 DATE 27Feb63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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HEAT TREATMENT
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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN THENO DATE 2-21-63
CHECKED Glenn F. Cushman 2-27-63
APPROVAL Robert J. [illegible]
APPROVAL
NASA APPROVAL W.J. Rhine 2-27-63
MIT APPROVAL W Cuff 27Feb63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
CDU D TO A
CONVERTER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010041
SCALE
WT
SHEET OF

1010041

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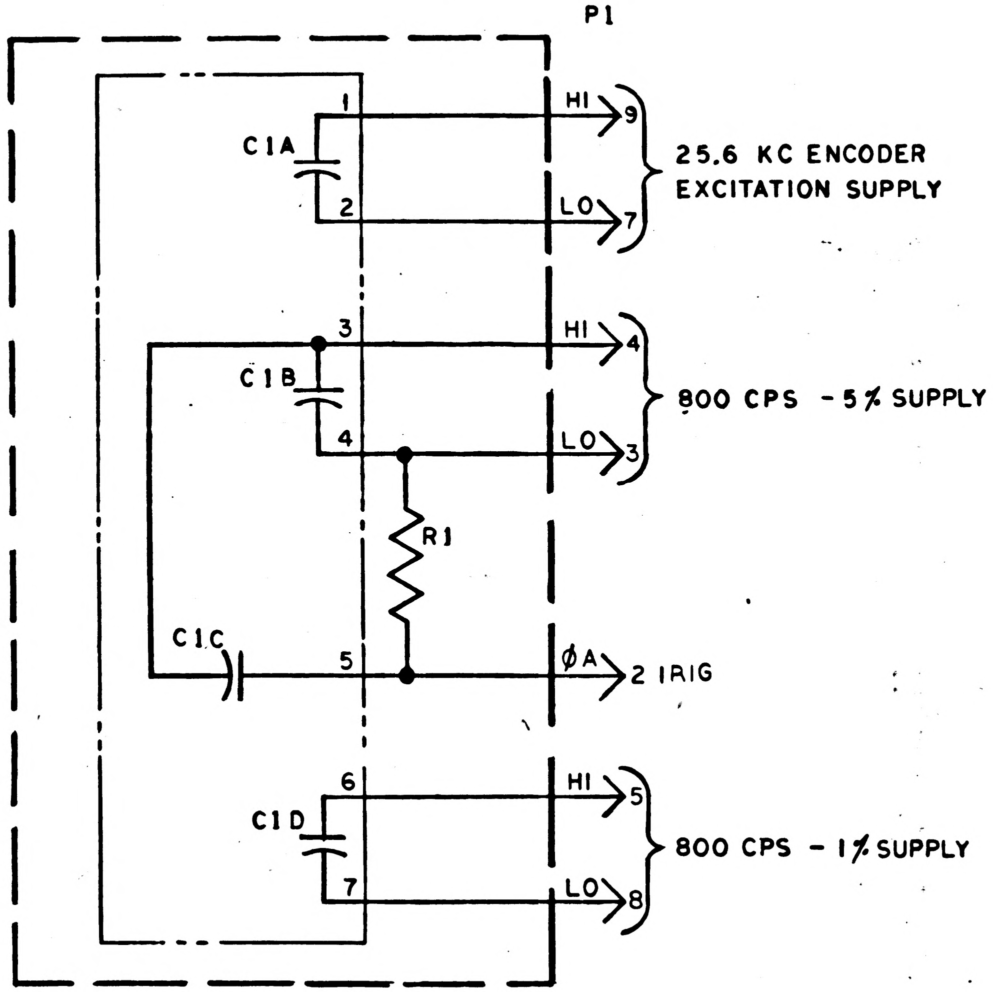
1010042 A

REVISIONS TDRR 01172

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01599	6/18/63	WK.



GYRO WHEEL TYPES	R1				C1				
	PART NO	VALUE	TOL	RATING	PART NO	CIA	CIB	CIC	CID
3 SIMONDS	1010262-3	272 Ω	±1%	6W	1010432-1	.13uf	3.8uf	2.4uf	3.6uf
2 SIMONDS & 1 GRAPHMO	1010262-4	260 Ω	↓	↓	1010432-2	↓	↓	2.6uf	↓
1 SIMONDS & 2 GRAPHMO	1010262-5	257 Ω	↓	↓	1010432-3	↓	↓	2.8uf	↓
3 GRAPHMO	1010262-6	250 Ω	↓	↓	1010432-4	↓	↓	2.9uf	↓

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. CAPACITANCE TOLERANCE ± 5%
3. CAPACITOR RATING 200 VDC

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN W. F. Troy DATE 3/12/63
CHECKED
APPROVAL John E. Miller 6/12/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 6 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC IMU & CDU LOAD COMPENSATION

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010042
SCALE —
WT —
SHEET 1 OF 1

MASTER

INCHES
0 1 2
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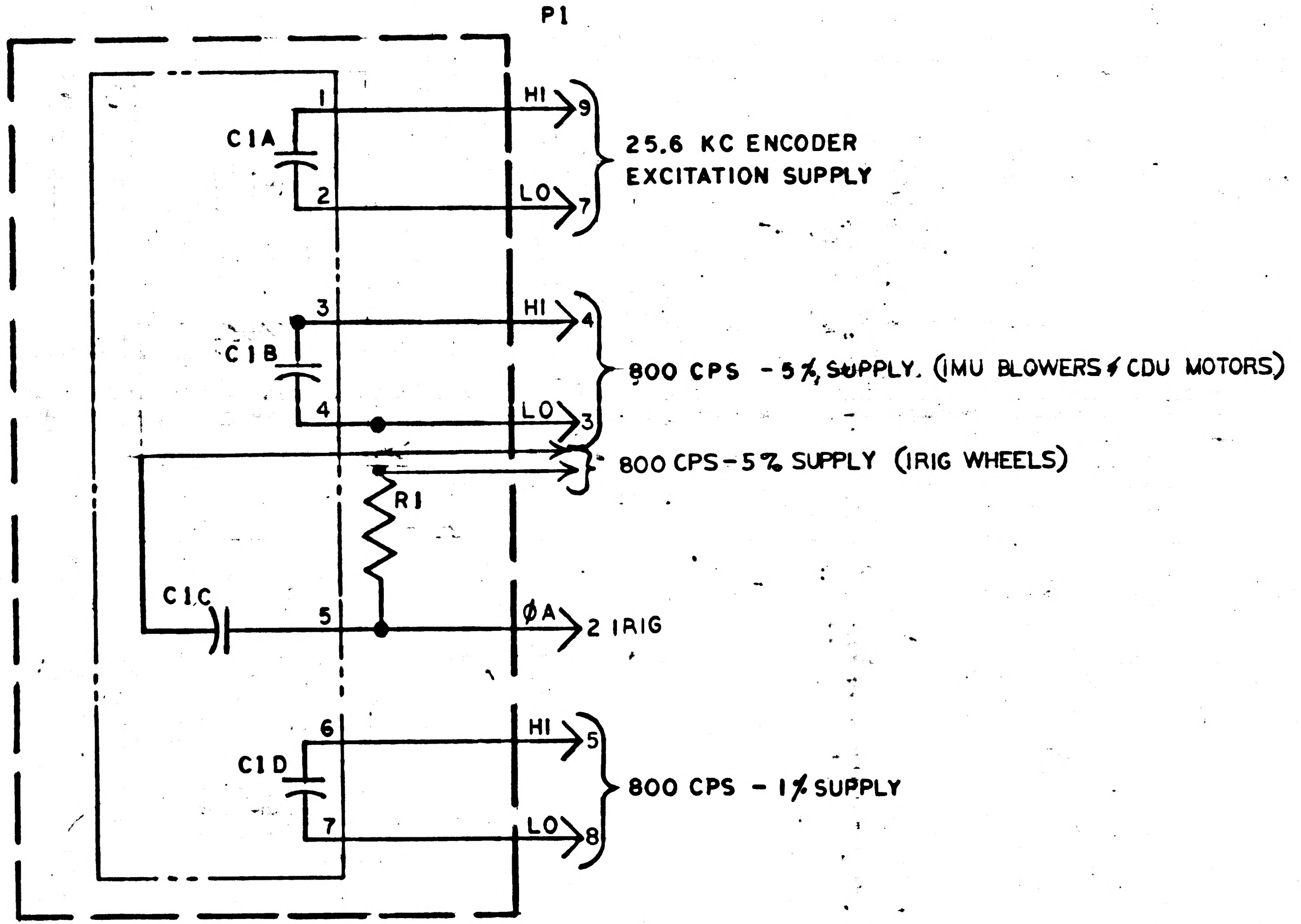
1010042 B

REVISIONS TDRR 01172

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01599	6/18/63	JSH WK.
B	REVISED PER TDRR 02346	9.31.63	J.J.A. WK


P1
C1A
1
2
HI
9
LO
7
25.6 KC ENCODER EXCITATION SUPPLY
C1B
3
4
HI
4
LO
3
800 CPS -5% SUPPLY (IMU BLOWERS & CDU MOTORS)
800 CPS-5% SUPPLY (IRIG WHEELS)
R1
C1C
5
ØA
2 IRIG
C1D
6
7
HI
5
LO
8
800 CPS - 1% SUPPLY

GYRO WHEEL TYPES	R1				C1				
	PART NO	VALUE	TOL	RATING	PART NO	C1A	C1B	C1C	C1D
3 SIMONDS	1010262-3	272 Ω	±1%	6W	1010432-1	.13uf	3.8uf	2.4uf	3.6uf
2 SIMONDS & 1 GRAPHMO	1010262-4	260 Ω	↓	↓	1010432-2	↓	↓	2.6uf	↓
1 SIMONDS & 2 GRAPHMO	1010262-5	257 Ω	↓	↓	1010432-3	↓	↓	2.8uf	↓
3 GRAPHMO	1010262-6	250 Ω	↓	↓	1010432-4	↓	↓	2.9uf	↓

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. CAPACITANCE TOLERANCE ± 5%
3. CAPACITOR RATING 200VDC

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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DWG. NO. CONTRACT
DRAWN W.F. Troy DATE 3/12/63
CHECKED
APPROVAL John E Miller 6/18/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 6 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU & CDU LOAD COMPENSATION

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010042
SCALE —
WT —
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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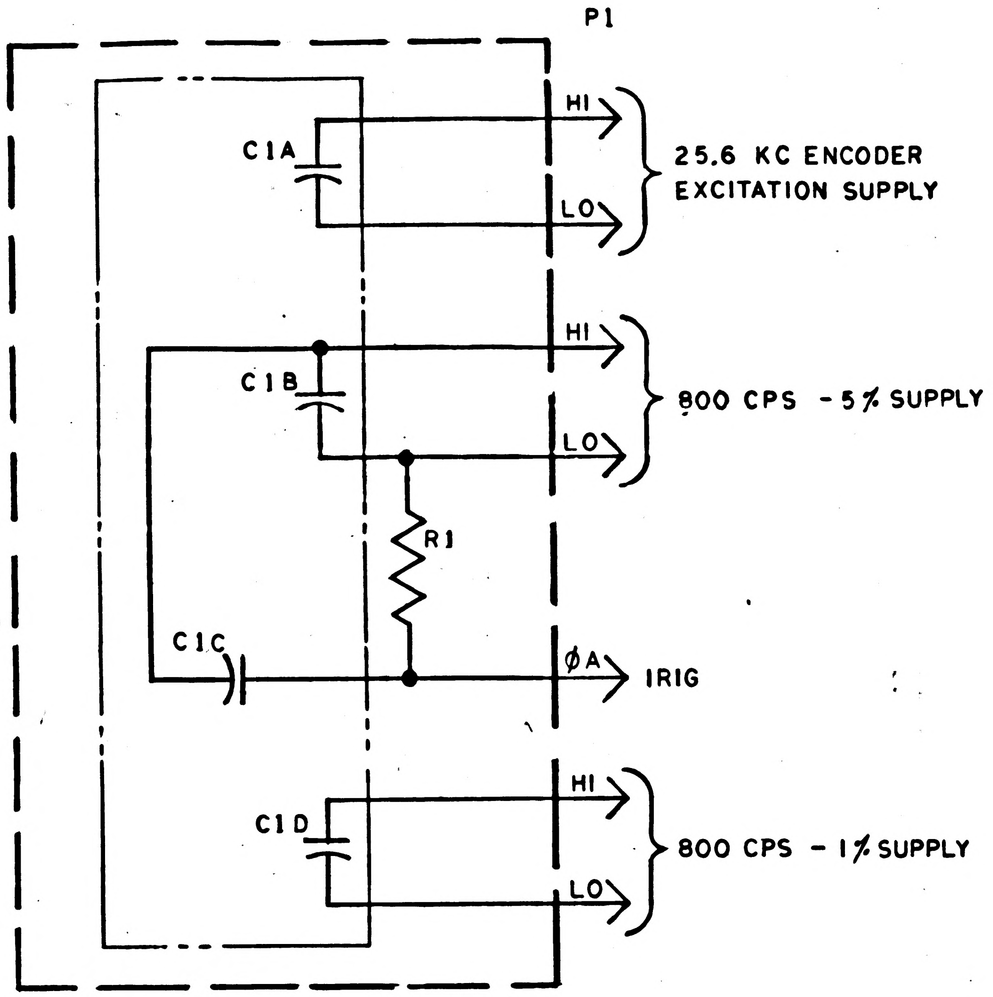
1010042

REVISIONS TDRR 0117			
SYM	DESCRIPTION	DATE	APPROVAL



GYRO WHEEL TYPES	R1				C1				
	PART NO	VALUE	TOL	RATING	PART NO	C1A	C1B	C1C	C1D
3 SIMONDS	1010262-3	272 Ω	±1%	6W	1010432-1	.13uf	3.8uf	2.4uf	3.6uf
2 SIMONDS & 1 GRAPHMO	1010262-4	260 Ω	↓	↓	1010432-2	↓	↓	2.6uf	↓
1 SIMONDS & 2 GRAPHMO	1010262-5	257 Ω	↓	↓	1010432-3	↓	↓	2.8uf	↓
3 GRAPHMO	1010262-6	250 Ω	↓	↓	1010432-4	↓	↓	2.9uf	↓

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. CAPACITANCE TOLERANCE ± 5%
3. CAPACITOR RATING 200 VDC

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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MATERIAL —
HEAT TREATMENT —
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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN W. F. Troy DATE 3/12/63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 9 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU CDU LOAD COMPENSATION

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010042
SCALE —
WT —
SHEET 1 OF 1

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010042

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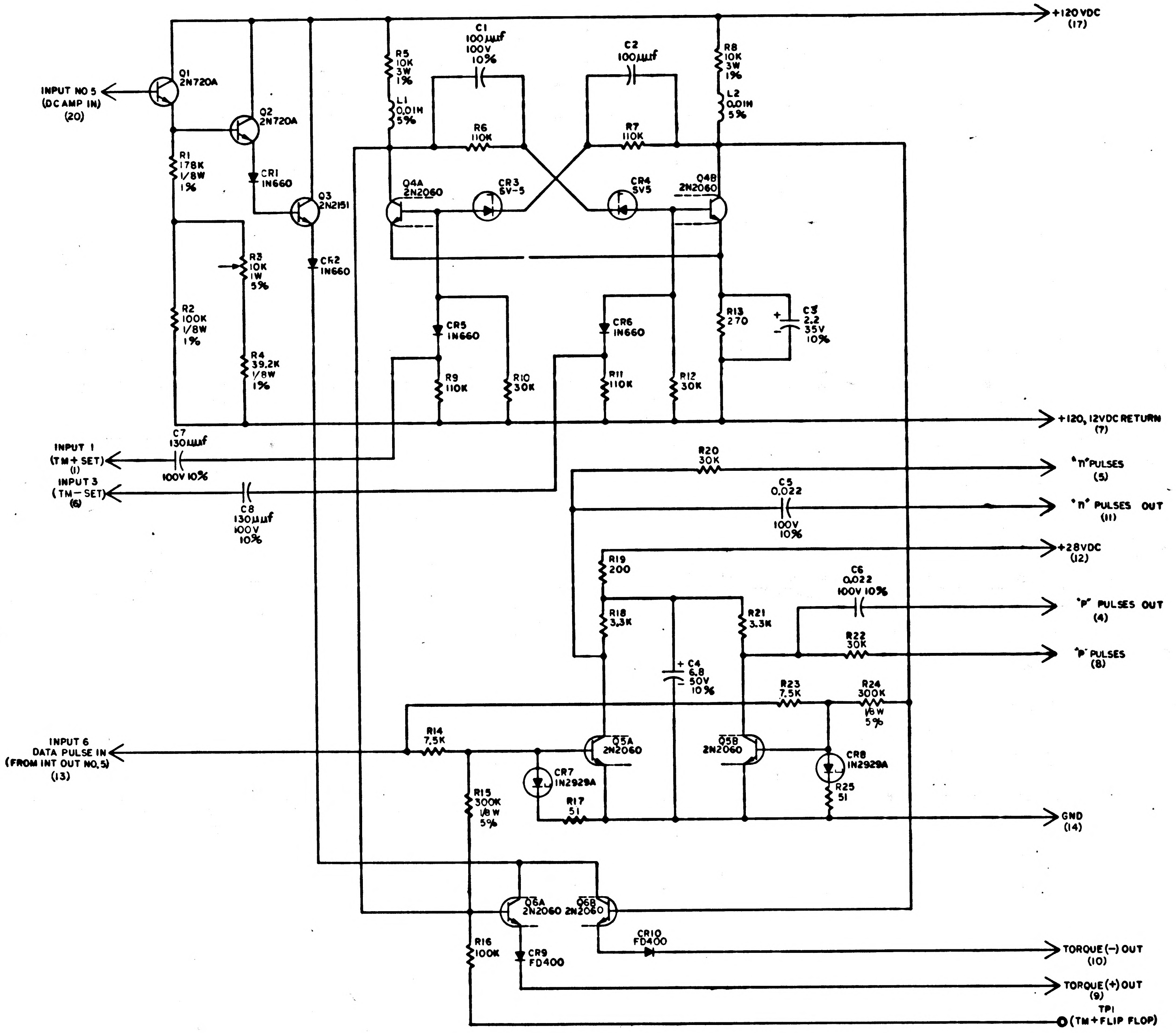
REVISIONS TDRR 00914

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006		WK


+120 VDC (17)
INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 178K 1/8W 1%
CR1 1N660
CR2 1N660
R3 10K 1W 5%
R2 100K 1/8W 1%
R4 39.2K 1/8W 1%
R5 10K 3W 1%
L1 0.01H 5%
C1 100 µµf 100V 10%
R6 110K
C2 100µµf
R7 110K
R8 10K 3W 1%
L2 0.01H 5%
Q4A 2N2060
CR3 SV-5
CR4 SV5
Q4B 2N2060
CR5 1N660
CR6 1N660
R9 110K
R10 30K
R11 110K
R12 30K
R13 270
C3 2.2 35V 10%
+120, 12VDC RETURN (7)
INPUT 1 (TM + SET) (1)
C7 130µµf 100V 10%
INPUT 3 (TM − SET) (6)
C8 130µµf 100V 10%
R20 30K
"n" PULSES (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (12)
R19 200
C6 0.022 100V 10%
"P" PULSES OUT (4)
R18 3.3K
R21 3.3K
R22 30K
"P" PULSES (8)
C4 6.8 50V 10%
R23 7.5K
R24 300K 1/8W 5%
INPUT 6 DATA PULSE IN (FROM INT OUT NO. 5) (13)
R14 7.5K
Q5A 2N2060
Q5B 2N2060
CR7 1N2929A
CR8 1N2929A
R15 300K 1/8W 5%
R17 51
R25 51
GND (14)
Q6A 2N2060
Q6B 2N2060
CR10 FD400
R16 100K
CR9 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)
TP1 (TM + FLIP FLOP)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1006750-81		110K	2%	1/4W
R7	1006750-81		110K	2%	1/4W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	1010369-92		300K	5%	1/8W
R16	1006750-80		100K	2%	1/4W
R17	-1		51		
R18	-44		3.3K		
R19	-15		200		
R20	-67		30K		
R21	-44		3.3K		
R22	-67		30K		
R23	-53		7.5K		
R24	1010369-92		300K	5%	1/8W
R25	1006750-1		51	2%	1/4W
C1	1006777-13	CAPACITOR	100µµf	10%	100V
C2	1006777-13		100µµf	10%	100V
C3	1006755-73		2.2µf	10%	35V
C4	1010393-033		6.8µf	10%	50V
C5	1006777-33		0.022µf	10%	100V
C6	1006777-33		0.022µf	10%	100V
C7	1006777-14		130µµf	10%	100V
C8	1006777-14		130µµf	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010255				
CR4	1010255-039				
CR5	1010385				
CR6	1010385				
CR7	1010390				
CR8	1010390				
CR9	1010394				
CR10	1010394				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269				
Q4	1010376-1				
Q5					
Q6					

REF DWG:
1. BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN W. F. Troy DATE 3/14/63
CHECKED 3/22/63
APPROVAL 3/29/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 3/29/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
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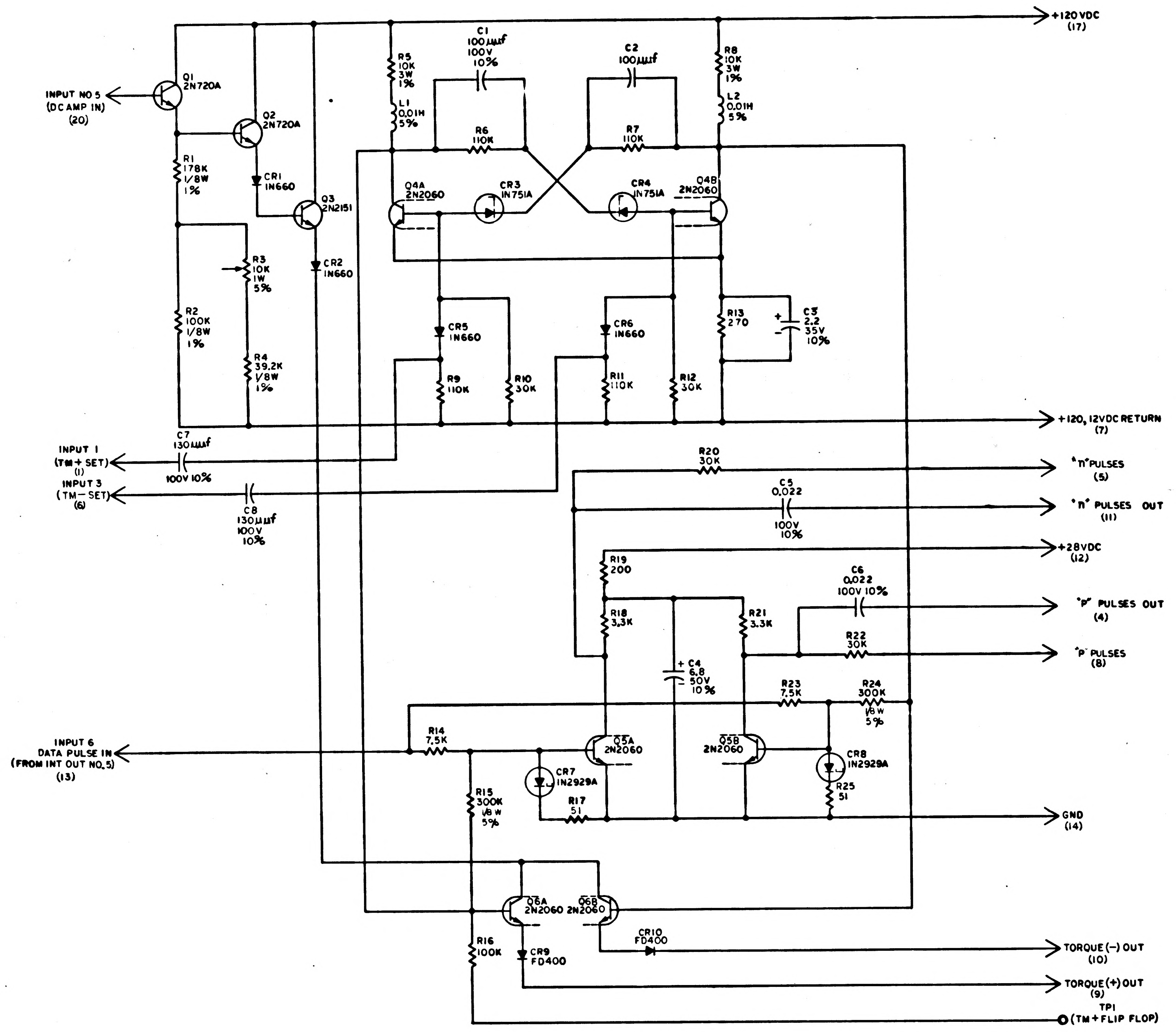
REVISIONS TDRR 00914

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006		
B	REVISED PER TDRR 01356		



+120 VDC (17)
INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 178K 1/8W 1%
CR1 1N660
CR2 1N660
R3 10K 1W 5%
R2 100K 1/8W 1%
R4 39.2K 1/8W 1%
R5 10K 3W 1%
L1 0.01H 5%
C1 100µµf 100V 10%
R6 110K
C2 100µµf
R7 110K
R8 10K 3W 1%
L2 0.01H 5%
Q4A 2N2060
CR3 1N751A
CR4 1N751A
Q4B 2N2060
CR5 1N660
CR6 1N660
R13 270
C3 2.2 35V 10%
R9 110K
R10 30K
R11 110K
R12 30K
+120, 12VDC RETURN (7)
INPUT 1 (TM + SET) (1)
C7 130µµf 100V 10%
INPUT 3 (TM − SET) (6)
C8 130µµf 100V 10%
R20 30K
"n" PULSES (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (12)
R19 200
R18 3.3K
R21 3.3K
C6 0.022 100V 10%
"P" PULSES OUT (4)
R22 30K
"P" PULSES (8)
C4 6.8 50V 10%
R23 7.5K
R24 300K 1/8W 5%
INPUT 6 DATA PULSE IN (FROM INT OUT NO. 5) (13)
R14 7.5K
Q5A 2N2060
Q5B 2N2060
CR7 1N2929A
CR8 1N2929A
R25 51
R15 300K 1/8W 5%
R17 51
GND (14)
Q6A 2N2060
Q6B 2N2060
CR10 FD400
R16 100K
CR9 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)
TP1 (TM + FLIP FLOP)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1006750-81		110K	2%	1/4W
R7	1006750-81		110K	2%	1/4W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	1010369-92		300K	5%	1/8W
R16	1006750-80		100K	2%	1/4W
R17	-1		51		
R18	-44		3.3K		
R19	-15		200		
R20	-67		30K		
R21	-44		3.3K		
R22	-67		30K		
R23	-53		7.5K		
R24	1010369-92		300K	5%	1/8W
R25	1006750-1		51	2%	1/4W
C1	1006777-13	CAPACITOR	100µµf	10%	100V
C2	1006777-13		100µµf	10%	100V
C3	1006755-73		2.2µf	10%	35V
C4	1010393-039		6.8µf	10%	50V
C5	1006777-33		0.022µf	10%	100V
C6	1006777-33		0.022µf	10%	100V
C7	1006777-14		130µµf	10%	100V
C8	1006777-14		130µµf	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462				
CR4	1010462				
CR5	1010385				
CR6	1010385				
CR7	1010390				
CR8	1010390				
CR9	1010394				
CR10	1010394				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269				
Q4	1010376-1				
Q5					
Q6					

REF DWG:
1. BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 3/14/63
CHECKED 3/29/63
APPROVAL 3/29/63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

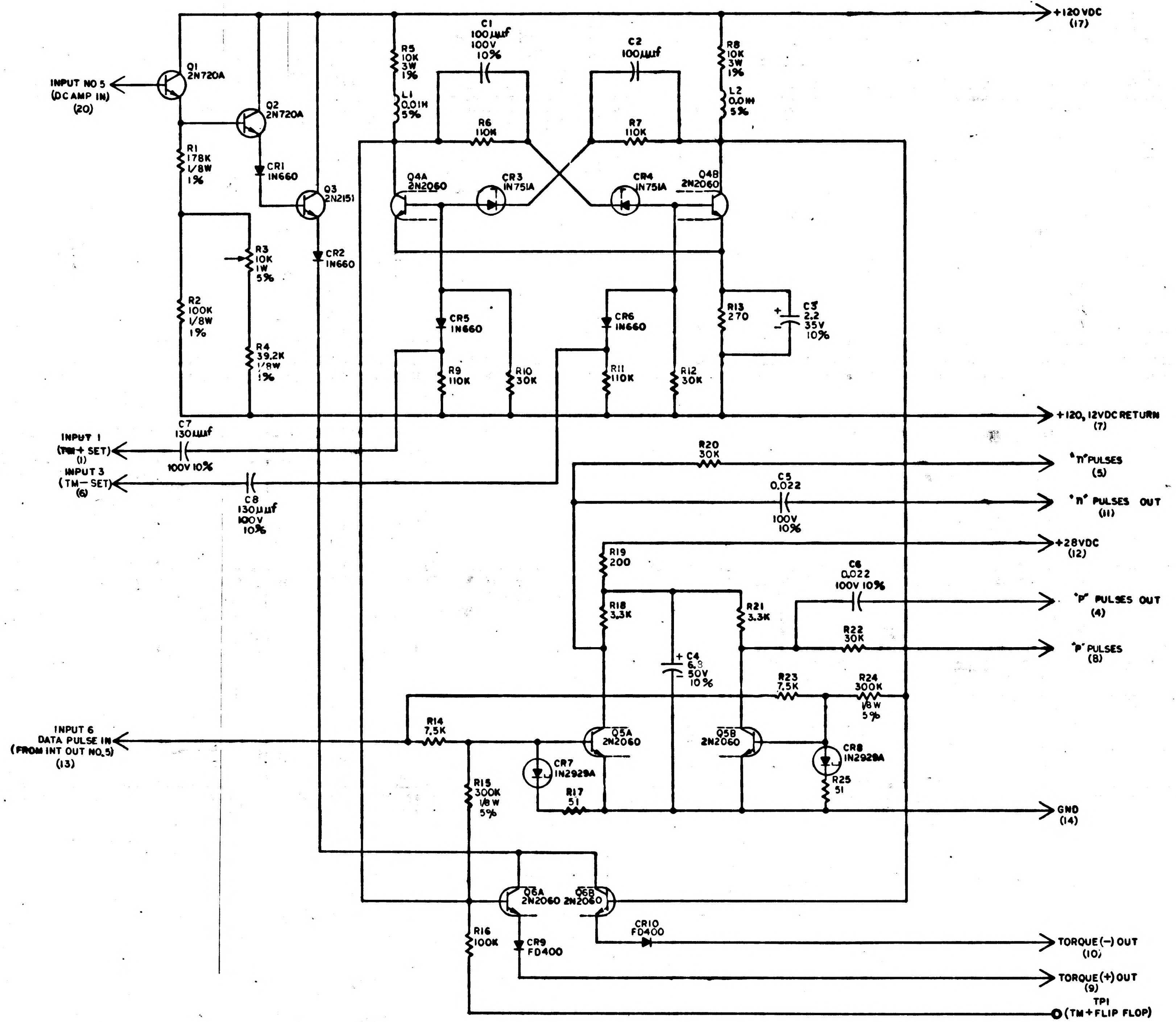
SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010043
SCALE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00914

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006	[illegible]	WK
B	REVISED PER TDRR 01356	[illegible]	WK
C	REVISED PER TDRR 01650	7-2-63	JJM WK


+120 VDC
(17)
INPUT NO 5
(DC AMP IN)
(20)
Q1
2N720A
Q2
2N720A
Q3
2N2151
R1
178K
1/8W
1%
CR1
1N660
CR2
1N660
R3
10K
1W
5%
R2
100K
1/8W
1%
R4
39.2K
1/8W
1%
R5
10K
3W
1%
L1
0.01H
5%
C1
100µµf
100V
10%
C2
100µµf
R6
110K
R7
110K
R8
10K
3W
1%
L2
0.01H
5%
Q4A
2N2060
CR3
1N751A
CR4
1N751A
Q4B
2N2060
CR5
1N660
CR6
1N660
R9
110K
R10
30K
R11
110K
R12
30K
R13
270
C3
2.2
35V
10%
+120, 12VDC RETURN
(7)
INPUT 1
(TM+ SET)
(1)
C7
130µµf
100V 10%
INPUT 3
(TM− SET)
(6)
C8
130µµf
100V
10%
R20
30K
"n" PULSES
(5)
C5
0.022
100V
10%
"n" PULSES OUT
(11)
+28VDC
(12)
R19
200
C6
0.022
100V 10%
R18
3.3K
R21
3.3K
"P" PULSES OUT
(4)
R22
30K
"P" PULSES
(8)
C4
6.8
50V
10%
R23
7.5K
R24
300K
1/8W
5%
INPUT 6
DATA PULSE IN
(FROM INT OUT NO. 5)
(13)
R14
7.5K
Q5A
2N2060
Q5B
2N2060
CR7
1N2929A
CR8
1N2929A
R15
300K
1/8W
5%
R17
51
R25
51
GND
(14)
Q6A
2N2060
Q6B
2N2060
CR10
FD400
R16
100K
CR9
FD400
TORQUE(−) OUT
(10)
TORQUE(+) OUT
(9)
TP1
(TM+FLIP FLOP)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1006750-81		110K	2%	1/4W
R7	1006750-81		110K	2%	1/4W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	1010369-92		300K	5%	1/8W
R16	1006750-80		100K	2%	1/4W
R17	-1		51		
R18	-44		3.3K		
R19	-15		200		
R20	-67		30K		
R21	-44		3.3K		
R22	-67		30K		
R23	-53		7.5K		
R24	1010369-92		300K	5%	1/8W
R25	1006750-1		51	2%	1/4W
C1	1006777-13	CAPACITOR	100µµf	10%	100V
C2	1006777-13		100µµf	10%	100V
C3	1006755-73		2.2µf	10%	35V
C4	1010393-039		6.8µf	10%	50V
C5	1006777-33		0.022µf	10%	100V
C6	1006777-33		0.022µf	10%	100V
C7	1006777-14		130µµf	10%	100V
C8	1006777-14		130µµf	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462				
CR4	1010462				
CR5	1010385				
CR6	1010385				
CR7	1010390				
CR8	1010390				
CR9	1010394				
CR10	1010394				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269				
Q4	1010376-4				
Q5					
Q6					

REF DWG:
1. BINARY CURRENT SWITCH
COMPUTER OUTPUT ASSEM
1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

1010043 C

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN W. F. Tory DATE 3/14/63
CHECKED 3/29/63
APPROVAL 3/29/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 3/29/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

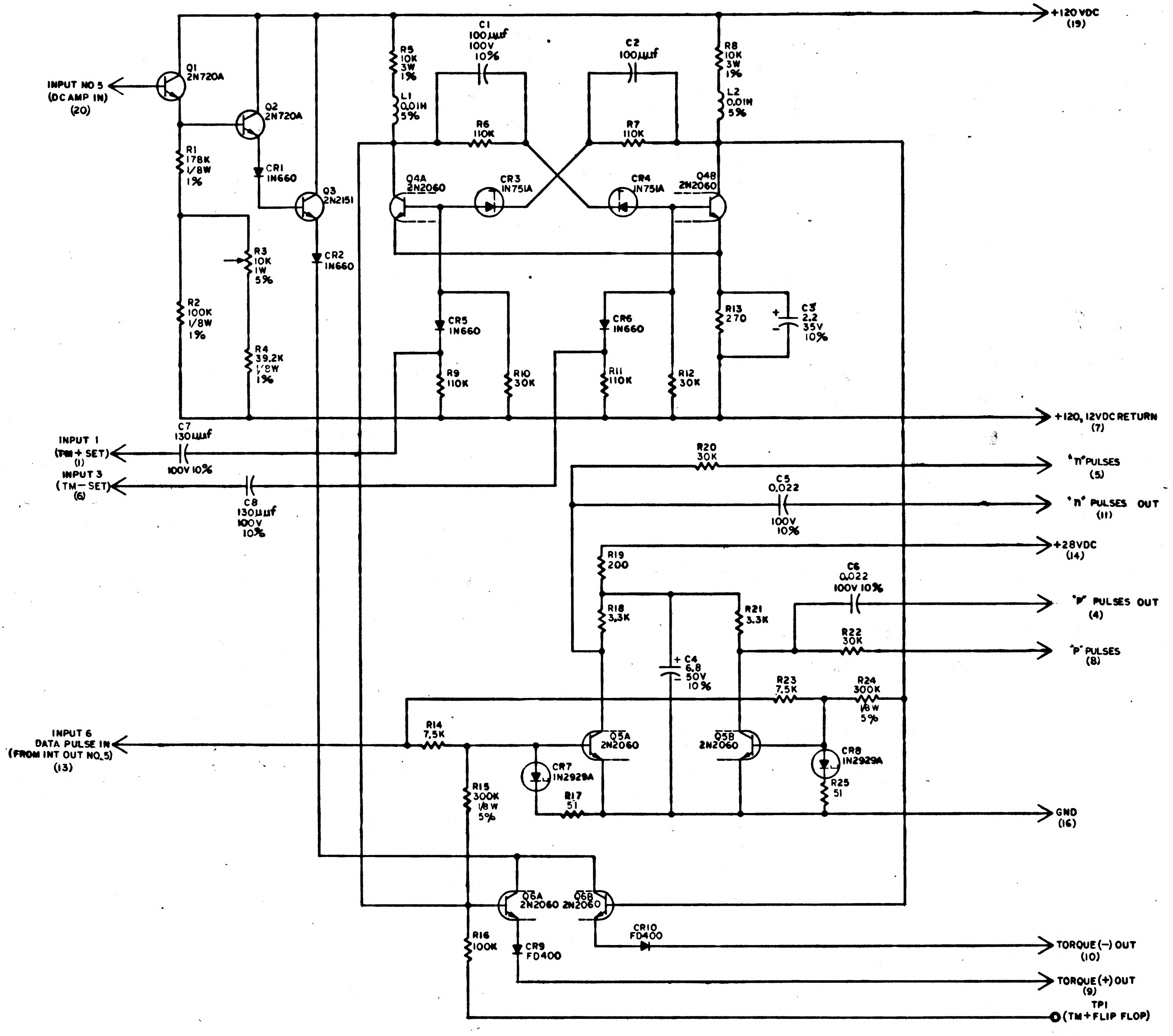
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRW 00814

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006	[illegible]	WK
B	REVISED PER TDRR 01356	[illegible]	WK
C	REVISED PER TDRR 01850	7-2-63	JJM WK
D	REVISED PER TDRR 01964	[illegible]	WK


INPUT NO 5
(DC AMP IN)
(20)
Q1
2N720A
Q2
2N720A
R1
178K
1/8W
1%
CR1
1N660
Q3
2N2151
R3
10K
1W
5%
CR2
1N660
R2
100K
1/8W
1%
R4
39.2K
1/8W
1%
R5
10K
3W
1%
L1
0.01H
5%
C1
100µµf
100V
10%
R6
110K
C2
100µµf
R7
110K
R8
10K
3W
1%
L2
0.01H
5%
Q4A
2N2060
CR3
1N751A
CR4
1N751A
Q4B
2N2060
CR5
1N660
CR6
1N660
R9
110K
R10
30K
R11
110K
R12
30K
R13
270
C3
2.2
35V
10%
+120 VDC
(19)
+120, 12VDC RETURN
(7)
INPUT 1
(TM + SET)
(1)
C7
130µµf
100V 10%
INPUT 3
(TM − SET)
(6)
C8
130µµf
100V
10%
R20
30K
"n" PULSES
(5)
C5
0.022
100V
10%
"n" PULSES OUT
(11)
+28VDC
(14)
R19
200
C6
0.022
100V 10%
"P" PULSES OUT
(4)
R18
3.3K
R21
3.3K
R22
30K
"P" PULSES
(8)
C4
6.8
50V
10%
R23
7.5K
R24
300K
1/8W
5%
INPUT 6
DATA PULSE IN
(FROM INT OUT NO. 5)
(13)
R14
7.5K
Q5A
2N2060
Q5B
2N2060
CR7
1N2929A
CR8
1N2929A
R15
300K
1/8W
5%
R17
51
R25
51
GND
(16)
Q6A
2N2060
Q6B
2N2060
CR10
FD400
R16
100K
CR9
FD400
TORQUE (−) OUT
(10)
TORQUE (+) OUT
(9)
TP1
(TM + FLIP FLOP)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1006750-81		110K	2%	1/4 W
R7	1006750-81		110K	2%	1/4 W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	↓ -53		7.5K	↓	↓
R15	1010369-92		300K	5%	1/8 W
R16	1006750-80		100K	2%	1/4 W
R17	-1		51		
R18	-44		3.3K		
R19	-15		200		
R20	-67		30K		
R21	-44		3.3K		
R22	-67		30K		
R23	↓ -53		7.5K	↓	↓
R24	1010369-92		300K	5%	1/8 W
R25	1006750-1	↓	51	2%	1/4 W
C1	1006777-13	CAPACITOR	100µµf	10%	100V
C2	1006777-13		100µµf	10%	100V
C3	1006755-73		2.2µf	10%	35V
C4	1010393-039		6.8µf	10%	50V
C5	1006777-33		0.022µf	10%	100V
C6	1006777-33		0.022µf	10%	100V
C7	1006777-14	↓	130µµf	10%	100V
C8	1006777-14		130µµf	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462				
CR4	1010462				
CR5	1010385				
CR6	1010385				
CR7	1010390				
CR8	1010390				
CR9	1010394				
CR10	1010394	↓			
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269				
Q4	1010376-4				
Q5	-4				
Q6	↓ -4	↓			

REF DWG:
1. BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERFRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN W. F. Tracy DATE 3/14/63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

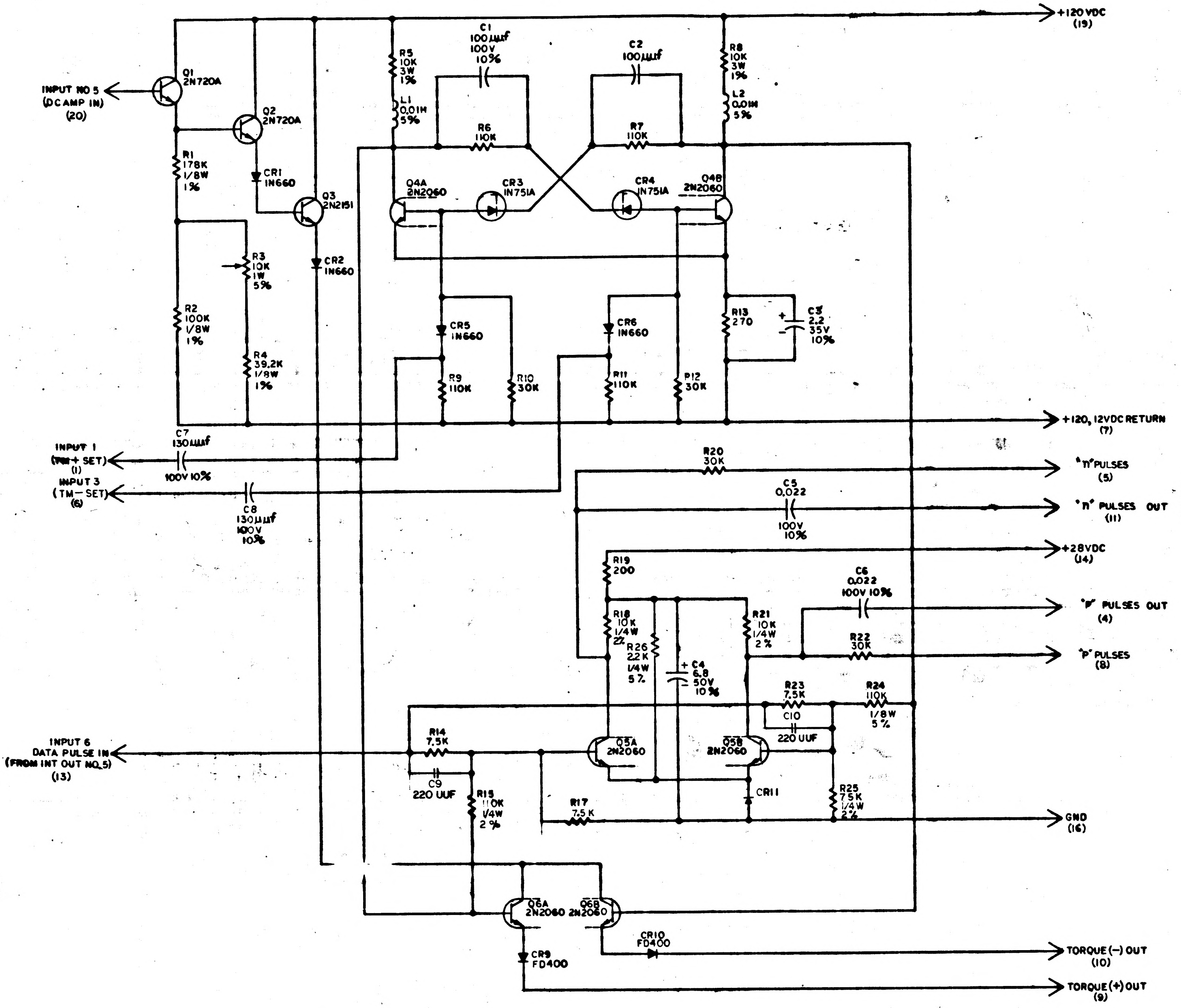
1010043 D

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00114

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006	[illegible]	WH
B	REVISED PER TDRR 01356	[illegible]	WK
C	REVISED PER TDRR 01850	7-2-63	WK
D	REVISED PER TDRR 01964	[illegible]	WK
E	REVISED PER TDRR 02166	[illegible]	WK


+120 VDC (19)
INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 178K 1/8W 1%
R2 100K 1/8W 1%
R3 10K 1W 5%
R4 39.2K 1/8W 1%
CR1 1N660
CR2 1N660
R5 10K 3W 1%
L1 0.01H 5%
C1 100µµf 100V 10%
C2 100µµf
R6 110K
R7 110K
R8 10K 3W 1%
L2 0.01H 5%
Q4A 2N2060
Q4B 2N2060
CR3 1N751A
CR4 1N751A
CR5 1N660
CR6 1N660
R9 110K
R10 30K
R11 110K
R12 30K
R13 270
C3 2.2 35V 10%
+120, 12VDC RETURN (7)
C7 130µµf 100V 10%
INPUT 1 (TM+ SET) (1)
INPUT 3 (TM− SET) (6)
C8 130µµf 100V 10%
R20 30K
"n" PULSES (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (14)
R19 200
C6 0.022 100V 10%
"P" PULSES OUT (4)
R18 10K 1/4W 2%
R26 2.2K 1/4W 5%
C4 6.8 50V 10%
R21 10K 1/4W 2%
R22 30K
"P" PULSES (8)
R23 7.5K
C10 220 UUF
R24 110K 1/8W 5%
INPUT 6 DATA PULSE IN (FROM INT OUT NO.5) (13)
R14 7.5K
C9 220 UUF
R15 110K 1/4W 2%
Q5A 2N2060
Q5B 2N2060
R17 7.5K
CR11
R25 7.5K 1/4W 2%
GND (16)
Q6A 2N2060
Q6B 2N2060
CR9 FD400
CR10 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1006750-81		110K	2%	1/4W
R7	1006750-81		110K	2%	1/4W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	81		110 K		
R25	1006750-53		7.5K	2%	1/4 W
R26	1006750-40		2.2K	2%	1/4W
C1	1006777-13	CAPACITOR	100µµf	10%	100V
C2	1006777-13		100µµf	10%	100V
C3	1006755-73		2.2µf	10%	35V
C4	1010393-039		6.8µf	10%	50V
C5	1006777-33		0.022µf	10%	100V
C6	1006777-33		0.022µf	10%	100V
C7	1006777-14		130µµf	10%	100V
C8	1006777-14		130µµf	10%	100V
C9	1006777-16		220UUF	10%	100V
C10	1006777-16		220UUF	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462				
CR4	1010462				
CR5	1010385				
CR6	1010385				
CR9	1010394				
CR10	1010394				
CR11	1010372-6				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269				
Q4	1010376-4				
Q5	-4				
Q6	-4				

REF DWG:
1. BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
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6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN W. F. Tracy DATE 3/14/63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

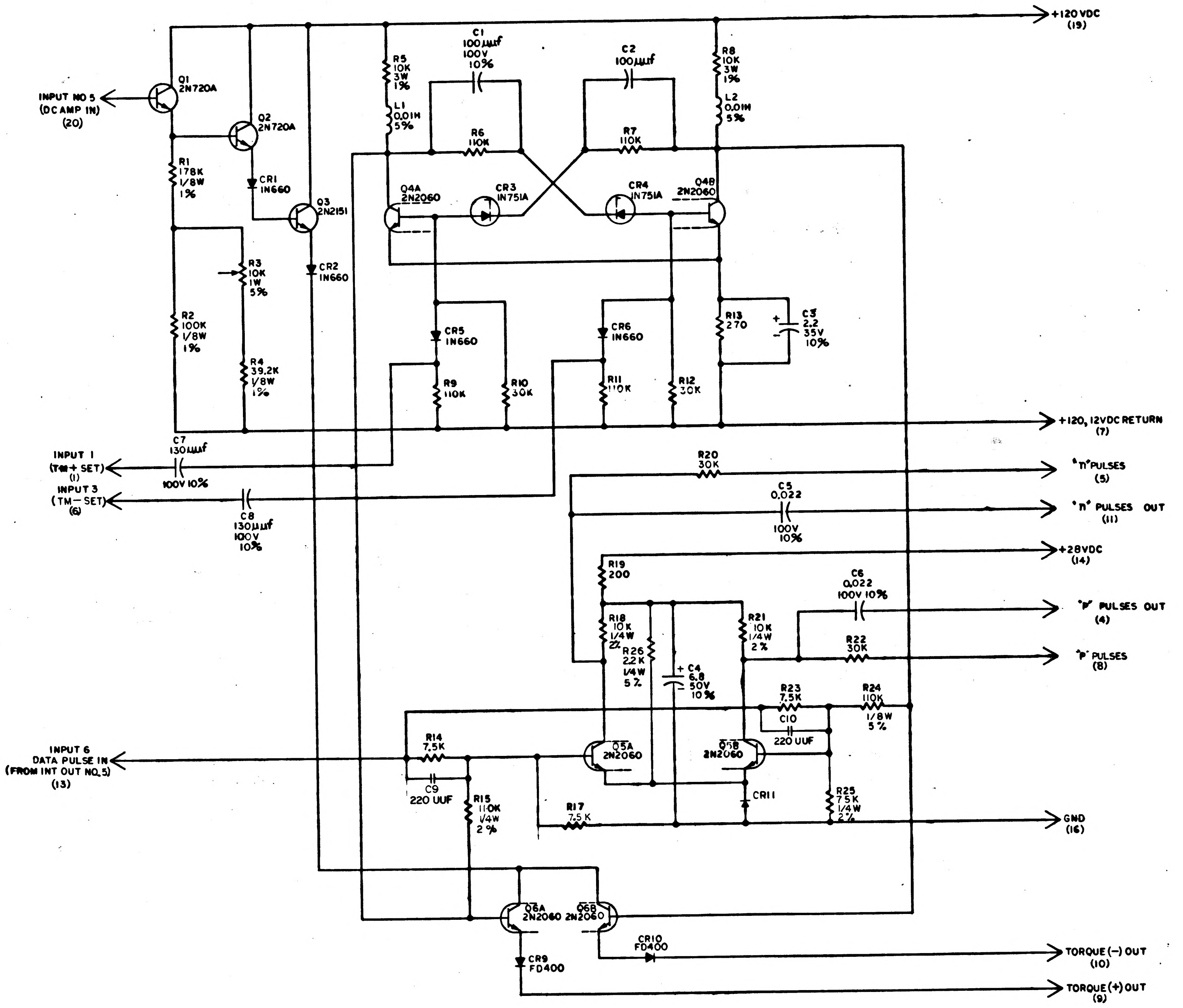
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

1010043 E

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006	[illegible]	[illegible]
B	REVISED PER TDRR 01356	[illegible]	[illegible]
C	REVISED PER TDRR 01850	7-2-63	[illegible]
D	REVISED PER TDRR 01964	[illegible]	[illegible]
E	REVISED PER TDRR 02166	[illegible]	[illegible]
F	REVISED PER TDRR 02713	[illegible]	[illegible]

REVISIONS TDRR 00914


INPUT NO 5
(DC AMP IN)
(20)
Q1
2N720A
Q2
2N720A
Q3
2N2151
R1
178K
1/8W
1%
CR1
1N660
CR2
1N660
R2
100K
1/8W
1%
R3
10K
1W
5%
R4
39.2K
1/8W
1%
R5
10K
3W
1%
L1
0.01H
5%
C1
100 µµf
100V
10%
R6
110K
C2
100 µµf
R7
110K
R8
10K
3W
1%
L2
0.01H
5%
Q4A
2N2060
CR3
1N751A
CR4
1N751A
Q4B
2N2060
CR5
1N660
CR6
1N660
R9
110K
R10
30K
R11
110K
R12
30K
R13
270
C3
2.2
35V
10%
+120 VDC
(19)
+120, 12VDC RETURN
(7)
INPUT 1
(TM+ SET)
(1)
C7
130 µµf
100V 10%
INPUT 3
(TM− SET)
(6)
C8
130 µµf
100V
10%
R20
30K
"n" PULSES
(5)
C5
0.022
100V
10%
"n" PULSES OUT
(11)
+28VDC
(14)
R19
200
R18
10K
1/4W
2%
R26
2.2K
1/4W
5%
C4
6.8
50V
10%
R21
10K
1/4W
2%
C6
0.022
100V 10%
"P" PULSES OUT
(4)
R22
30K
"P" PULSES
(8)
R23
7.5K
C10
220 UUF
R24
110K
1/8W
5%
INPUT 6
DATA PULSE IN
(FROM INT OUT NO. 5)
(13)
R14
7.5K
C9
220 UUF
R15
110K
1/4W
2%
Q5A
2N2060
Q5B
2N2060
CR11
R17
7.5K
R25
7.5K
1/4W
2%
GND
(16)
Q6A
2N2060
Q6B
2N2060
CR9
FD400
CR10
FD400
TORQUE (−) OUT
(10)
TORQUE (+) OUT
(9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1006750-81		110K	2%	1/4W
R7	1006750-81		110K	2%	1/4W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5 K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	81		110 K		
R25	1006750-53		7.5K	2%	1/4 W
R26	1006750-40		2.2K	2%	1/4W
C1	1006777-13	CAPACITOR	100 µµf	10%	100V
C2	1006777-13		100 µµf	10%	100V
C3	1006755-73		2.2 µf	10%	35V
C4	1010393-039		6.8 µf	10%	50V
C5	1006777-33		0.022 µf	10%	100V
C6	1006777-33		0.022 µf	10%	100V
C7	1006777-14		130 µµf	10%	100V
C8	1006777-14		130 µµf	10%	100V
C9	1006777-16		220 UUF	10%	100V
C10	1006777-16		220 UUF	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462				
CR4	1010462				
CR5	1010385				
CR6	1010385				
CR9	1010394				
CR10	1010394				
CR11	1010372-6				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269-1				
Q4	1010376-4				
Q5	-4				
Q6	-4				

REF DWG:

1. BINARY CURRENT SWITCH
   COMPUTER OUTPUT ASSEM
   1007027

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT
DRAWN W. F. Toy DATE 3/14/63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

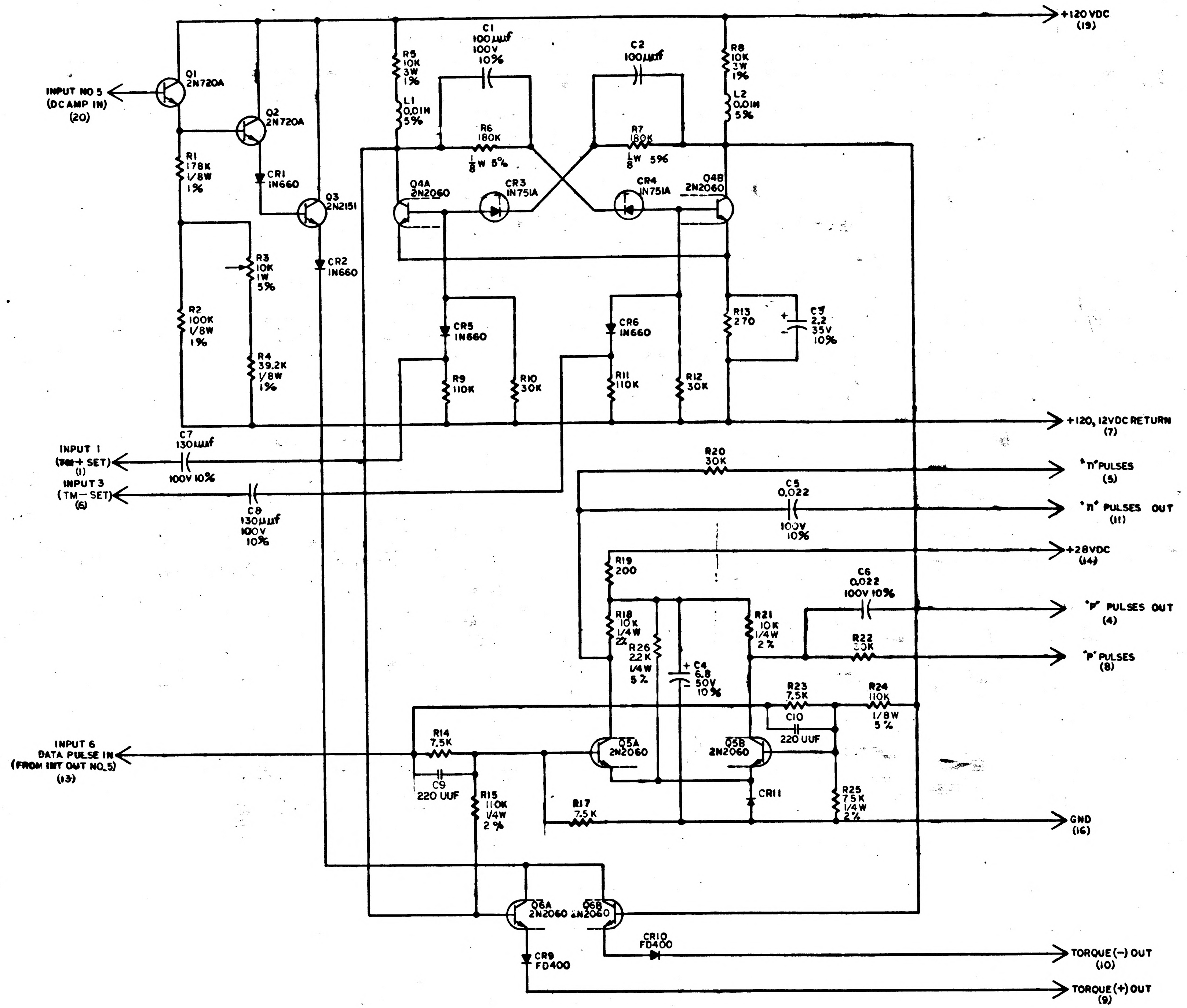
1010043 E

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00814

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006	[illegible]	WK
B	REVISED PER TDRR 01356	[illegible]	WK
C	REVISED PER TDRR 01850	[illegible]	WK
D	REVISED PER TDRR 01964	[illegible]	WK
E	REVISED PER TDRR 02166	[illegible]	WK
F	REVISED PER TDRR 02713	[illegible]	WK
G	REVISED PER TDRR 05260	[illegible]	W.


+120 VDC (19)
INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 178K 1/8W 1%
CR1 1N660
CR2 1N660
R3 10K 1W 5%
R2 100K 1/8W 1%
R4 39.2K 1/8W 1%
R5 10K 3W 1%
L1 0.01H 5%
C1 100µµf 100V 10%
R6 180K 1/8W 5%
C2 100µµf
R7 180K 1/8W 5%
R8 10K 3W 1%
L2 0.01H 5%
Q4A 2N2060
CR3 1N751A
CR4 1N751A
Q4B 2N2060
CR5 1N660
CR6 1N660
R9 110K
R10 30K
R11 110K
R12 30K
R13 270
C3 2.2 35V 10%
+120, 12VDC RETURN (7)
INPUT 1 (TM+ SET) (1)
C7 130µµf 100V 10%
INPUT 3 (TM− SET) (6)
C8 130µµf 100V 10%
R20 30K
"n" PULSES (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (14)
R19 200
C6 0.022 100V 10%
R18 10K 1/4W 2%
R26 2.2K 1/4W 5%
C4 6.8 50V 10%
R21 10K 1/4W 2%
"P" PULSES OUT (4)
R22 30K
"P" PULSES (8)
R23 7.5K
C10 220 UUF
R24 110K 1/8W 5%
INPUT 6 DATA PULSE IN (FROM INT OUT NO.5) (13)
R14 7.5K
C9 220 UUF
Q5A 2N2060
Q5B 2N2060
R15 110K 1/4W 2%
R17 7.5K
CR11
R25 7.5K 1/4W 2%
GND (16)
Q6A 2N2060
Q6B 2N2060
CR10 FD400
CR9 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1010369-87		180K	5%	1/8 W
R7	1010369-87		180K	5%	1/8 W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5 K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	81		110 K		
R25	1006750-53		7.5K	2%	1/4 W
R26	1006750-40		2.2K	2%	1/4W
C1	1006777-13	CAPACITOR	100µµf	10%	100V
C2	1006777-13		100µµf	10%	100V
C3	1006755-73		2.2µf	10%	35V
C4	1010393-039		6.8µf	10%	50V
C5	1006777-33		0.022µf	10%	100V
C6	1006777-33		0.022µf	10%	100V
C7	1006777-14		130µµf	10%	100V
C8	1006777-14		130µµf	10%	100V
C9	1006777-16		220UUF	10%	100V
C10	1006777-16		220UUF	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462				
CR4	1010462				
CR5	1010385				
CR6	1010385				
CR9	1010394				
CR10	1010394				
CR11	1010372-6				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269-1				
Q4	1010376-4				
Q5	-4				
Q6	-4				

REF DWG:
1. BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN W. [illegible] DATE 3/14/63
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL W. [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

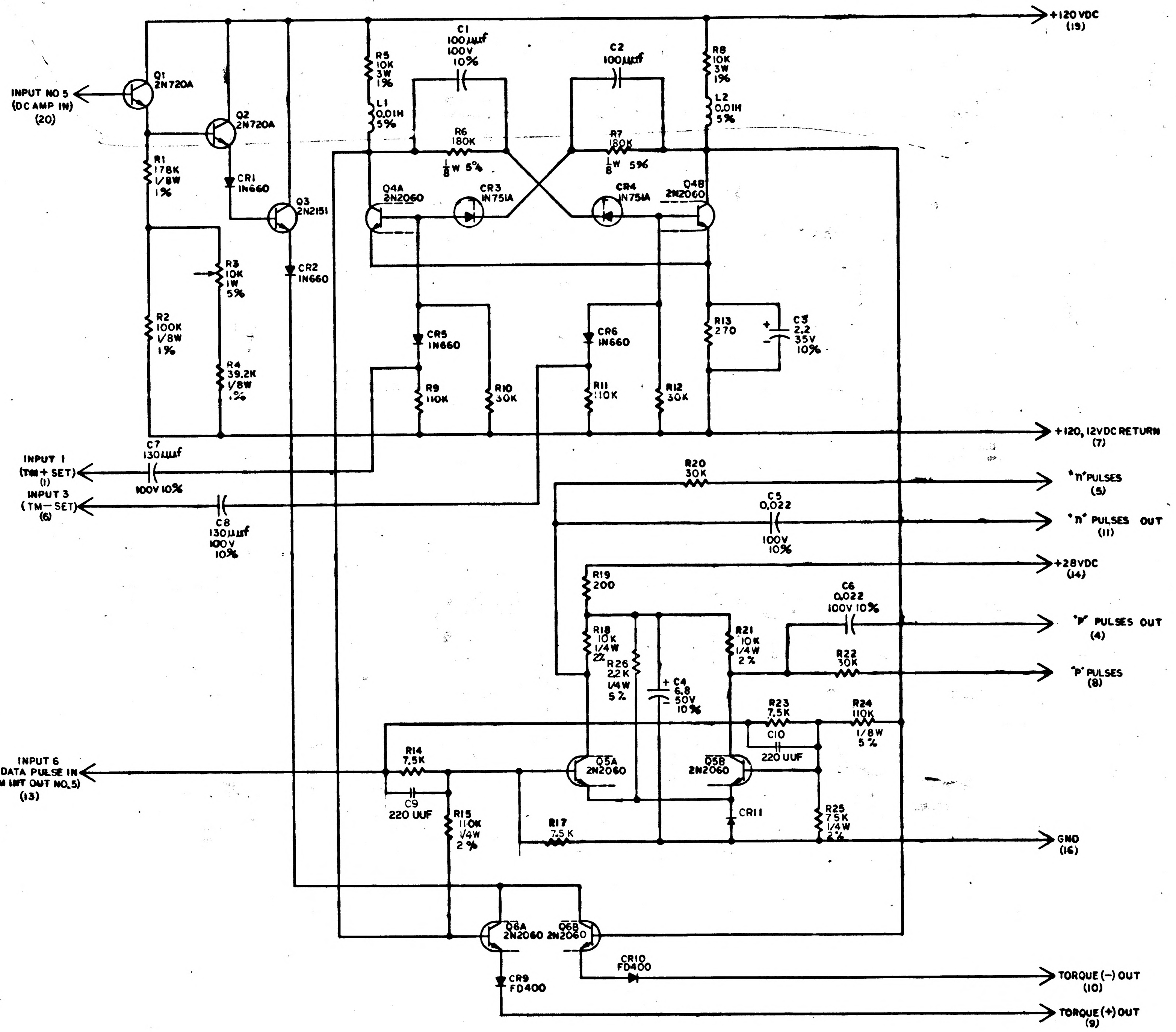
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

1010043 G

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00914

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR [illegible]	[illegible]	[illegible] WK
B	REVISED PER TDRR 01356	[illegible]	[illegible] WK
C	REVISED PER TDRR 01850	7-2-63	JJM WK
D	REVISED PER TDRR 01964	8-20-63	[illegible] WK
E	REVISED PER TDRR 02166	[illegible]	JJM WK
F	REVISED PER TDRR 02713	[illegible]	[illegible] WK
G	REVISED PER TDRR 05260	[illegible]	[illegible] WK
H	REVISED PER TDRR 06458	[illegible]	[illegible]


+120VDC
(19)
INPUT NO 5
(DC AMP IN)
(20)
Q1
2N720A
Q2
2N720A
Q3
2N2151
R1
178K
1/8W
1%
CR1
1N660
CR2
1N660
R2
100K
1/8W
1%
R3
10K
1W
5%
R4
39.2K
1/8W
1%
R5
10K
3W
1%
L1
0.01H
5%
C1
100μμf
100V
10%
R6
180K
1/8W 5%
C2
100μμf
R7
180K
1/8W 5%
R8
10K
3W
1%
L2
0.01H
5%
Q4A
2N2060
CR3
1N751A
CR4
1N751A
Q4B
2N2060
CR5
1N660
CR6
1N660
R9
110K
R10
30K
R11
110K
R12
30K
R13
270
C3
2.2
35V
10%
+120, 12VDC RETURN
(7)
C7
130μμf
100V 10%
INPUT 1
(TM+ SET)
(1)
INPUT 3
(TM− SET)
(6)
C8
130μμf
100V
10%
R20
30K
"n" PULSES
(5)
C5
0.022
100V
10%
"n" PULSES OUT
(11)
+28VDC
(14)
R19
200
C6
0.022
100V 10%
"P" PULSES OUT
(4)
R18
10K
1/4W
2%
R26
2.2K
1/4W
5%
C4
6.8
50V
10%
R21
10K
1/4W
2%
R22
30K
"P" PULSES
(8)
R23
7.5K
C10
220 UUF
R24
110K
1/8W
5%
INPUT 6
DATA PULSE IN
(FROM IMT OUT NO.5)
(13)
R14
7.5K
C9
220 UUF
Q5A
2N2060
Q5B
2N2060
CR11
R15
110K
1/4W
2%
R17
7.5K
R25
7.5K
1/4W
2%
GND
(16)
Q6A
2N2060
Q6B
2N2060
CR10
FD400
TORQUE (−) OUT
(10)
CR9
FD400
TORQUE (+) OUT
(9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1010369-87		180K	5%	1/8 W
R7	1010369-87		180K	5%	1/8 W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5 K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	81		110 K		
R25	1006750-53		7.5K	2%	1/4 W
R26	1006750-40		2.2K	2%	1/4W
C1	1006777-13	CAPACITOR	100μμf	10%	100V
C2	1006777-13		100μμf	10%	100V
C3	1006755-73		2.2μf	10%	35V
C4	1010393-039		6.8μf	10%	50V
C5	1006777-33		0.022μf	10%	100V
C6	1006777-33		0.022μf	10%	100V
C7	1006777-14		130μμf	10%	100V
C8	1006777-14		130μμf	10%	100V
C9	1006777-16		220UUF	10%	100V
C10	1006777-16		220UUF	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462-6				
CR4	1010462-6				
CR5	1010385				
CR6	1010385				
CR9	1010394				
CR10	1010394				
CR11	1010372-6				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357-1	TRANSISTOR			
Q2	1010357-1				
Q3	1010269-1				
Q4	1010376-4				
Q5	-4				
Q6	-4				

REF DWG:
1. BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN W. F. Troy DATE 3/14/63
CHECKED [illegible] 3/29/63
APPROVAL [illegible] 3/29/63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL W Kupfer [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

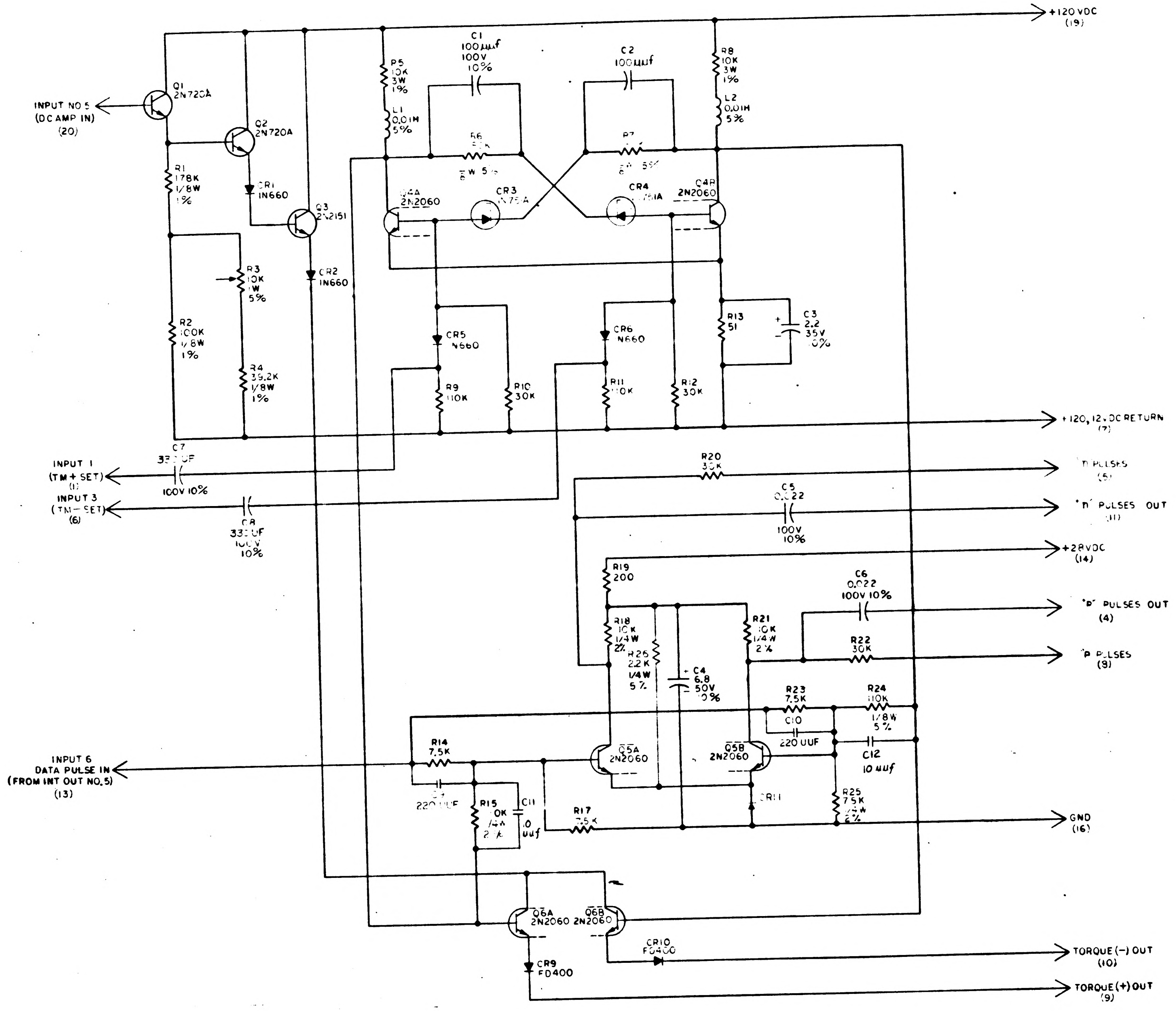
SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 00914

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006	[illegible]	WR
B	REVISED PER TDRR 01356	[illegible]	WR
C	REVISED PER TDRR 01850	[illegible]	WR
D	REVISED PER TDRR 01964	[illegible]	WR
E	REVISED PER TDRR 02166	7-30-63	WR
F	REVISED PER TDRR 02273	[illegible]	WR
G	REVISED PER TDRR 05260	[illegible]	WR
H	REVISED PER TDRR 06455	[illegible]	WR
J	REVISED PER TDRR 12205	[illegible]	CW



INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 178K 1/8W 1%
R2 100K 1/8W 1%
R3 10K 1W 5%
R4 39.2K 1/8W 1%
CR1 IN660
CR2 IN660
R5 10K 3W 1%
L1 0.01H 5%
C1 100μμf 100V 10%
C2 100μμf
R6 1/8W 5%
R7 5%
R8 10K 3W 1%
L2 0.01H 5%
Q4A 2N2060
Q4B 2N2060
CR3
CR4
CR5 IN660
CR6 IN660
R9 110K
R10 30K
R11 110K
R12 30K
R13 51
C3 2.2 35V 10%
+120 VDC (19)
+120, 12VDC RETURN (7)
INPUT 1 (TM + SET) (1)
C7 330 UF 100V 10%
INPUT 3 (TM − SET) (6)
C8 330 UF 100V 10%
R20 30K
"n" PULSES (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (14)
R19 200
C6 0.022 100V 10%
"p" PULSES OUT (4)
R18 10K 1/4W 2%
R26 2.2K 1/4W 5%
C4 6.8 50V 10%
R21 10K 1/4W 2%
R22 30K
"p" PULSES (9)
R23 7.5K
R24 110K 1/8W 5%
C10 220 UUF
C12 10 uuf
INPUT 6 DATA PULSE IN (FROM INT OUT NO.5) (13)
R14 7.5K
C9 220 UUF
R15 10K 1/4W 2%
C11 10 uuf
Q5A 2N2060
Q5B 2N2060
R17 7.5K
CR11
R25 7.5K 1/4W 2%
GND (16)
Q6A 2N2060
Q6B 2N2060
CR9 FD400
CR10 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1W
R4	1010364-557		39.2K	1%	1/8W
R5	[illegible]		10K	1%	3W
R6	[illegible]-87		[illegible] K	5%	1/8W
R7	[illegible]-87		18 K	5%	1/8W
R8	1010389-4[illegible]		10K	1%	3W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-1		51		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	81		110 K		
R25	1006750-53		7.5K	[illegible]	[illegible]
R26	1006750-40		2.2K	2%	1/4W
C1	1006777-13	CAPACITOR	100μμf	10%	100V
C2	1006777-13		100μμf	10%	100V
C3	1006755-73		2.2μf	10%	35V
C4	1010393-039		6.8μf	10%	50V
C5	1006777-33		0.022μf	10%	100V
C6	1006777-33		0.022μf	10%	100V
C7	1006777-18		330 uf	10%	100V
C8	1006777-18		330 μf	10%	100V
C9	1006777-16		220UUF	10%	100V
C10	1006777-16		220UUF	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462-6				
CR4	1010462-6				
CR5	1010385				
CR6	1010385				
CR9	1010394				
CR10	1010394				
CR11	1010372-6				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357-1				
Q3	1010269-1				
Q4	1010376-4				
Q5	-4				
Q6	-4				
C11	1006777-1	CAPACITOR	10 uuf	10%	100V
C12					

REF DWG
1 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED. CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

LIST OF MATERIALS
NEXT ASSY | USED ON
APPLICATION
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN DATE 3/17/63
CHECKED 3/22/63
APPROVAL 3/21/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer

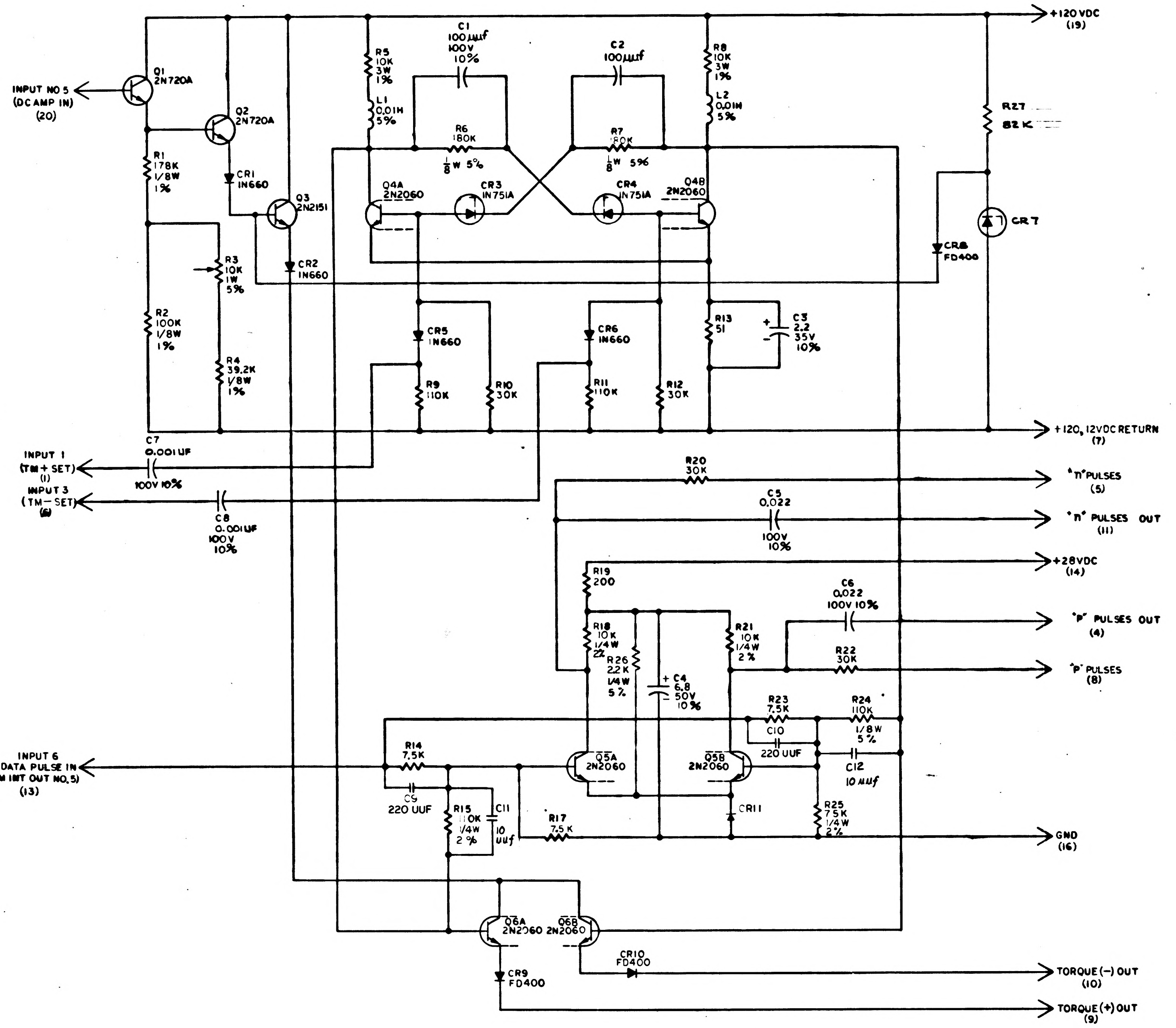
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO | SIZE E | NASA DRAWING NO 1010043
SCALE | WT | SHEET 1 OF 1

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01006	[illegible]	WK
B	REVISED PER TDRR 01356	[illegible]	WK
C	REVISED PER TDRR 01850	7-2-63	WK
D	REVISED PER TDRR 01964	[illegible]	WK
E	REVISED PER TDRR 02166	7-30-63	WK
F	REVISED PER TDRR 02713	8-21-63	WK
G	REVISED PER TDRR 05260	[illegible]	WK
H	REVISED PER TDRR 06458	[illegible]	WK
J	REVISED PER TDRR 12205	17 SEP 64	[illegible]
K	REVISED PER TDRR 12754	29 SEPT	[illegible]

REVISIONS TDRR 00914



INPUT NO 5
(DC AMP IN)
(20)
Q1
2N720A
Q2
2N720A
R1
178K
1/8W
1%
CR1
1N660
Q3
2N2151
R3
10K
1W
5%
CR2
1N660
R2
100K
1/8W
1%
R4
39.2K
1/8W
1%
R5
10K
3W
1%
L1
0.01H
5%
C1
100μμf
100V
10%
R6
180K
1/8 W 5%
Q4A
2N2060
CR3
1N751A
C2
100μμf
R7
180K
1/8 W 5%
CR4
1N751A
Q4B
2N2060
R8
10K
3W
1%
L2
0.01H
5%
+120 VDC
(19)
R27
82 K
CR7
CR8
FD400
CR5
1N660
CR6
1N660
R13
51
C3
2.2
35V
10%
R9
110K
R10
30K
R11
110K
R12
30K
+120, 12VDC RETURN
(7)
C7
0.001UF
100V 10%
INPUT 1
(TM + SET)
(1)
INPUT 3
(TM − SET)
(6)
C8
0.001UF
100V
10%
R20
30K
"n" PULSES
(5)
C5
0.022
100V
10%
"n" PULSES OUT
(11)
+28VDC
(14)
R19
200
C6
0.022
100V 10%
"P" PULSES OUT
(4)
R18
10K
1/4W
2%
R26
2.2K
1/4W
5%
C4
6.8
50V
10%
R21
10K
1/4W
2%
R22
30K
"P" PULSES
(8)
R23
7.5K
C10
220 UUF
R24
110K
1/8W
5%
C12
10 μμf
INPUT 6
DATA PULSE IN
(FROM INT OUT NO.5)
(13)
R14
7.5K
C9
220 UUF
R15
110K
1/4W
2%
C11
10
uuf
Q5A
2N2060
Q5B
2N2060
R17
7.5 K
CR11
R25
7.5K
1/4W
2%
GND
(16)
Q6A
2N2060
Q6B
2N2060
CR9
FD400
CR10
FD400
TORQUE (−) OUT
(10)
TORQUE (+) OUT
(9)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-80		10K	1%	3 W
R6	1010369-87		180K	5%	1/8 W
R7	1010369-87		180K	5%	1/8 W
R8	1010389-80		10K	1%	3 W
R9	1006750-81		110K	2%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-1		51		
R14	-53		7.5K		
R15	-81		110 K		
R17	-53		7.5 K		
R18	-56		10 K		
R19	-15		200		
R20	-67		30K		
R21	-56		10K		
R22	-67		30K		
R23	-53		7.5K		
R24	81		110 K		
R25	1006750-53		7.5 K	2%	1/4 W
R26	1006750-40		2.2K	2%	1/4W
R27	1006750-78		82 K	2%	1/4 W
C1	1006777-13	CAPACITOR	100μμf	10%	100V
C2	1006777-13		100μμf	10%	100V
C3	1006755-73		2.2μf	10%	35V
C4	1010393-039		6.8μf	10%	50V
C5	1006777-33		0.022μf	10%	100V
C6	1006777-33		0.022μf	10%	100V
C7	1006777-24		0.001 μf	10%	100V
C8	1006777-24		0.001 μf	10%	100V
C9	1006777-16		220UUF	10%	100V
C10	1006777-16		220UUF	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010462-6				
CR4	1010462 6				
CR5	1010385				
CR6	1010385				
CR7	1010286-20	, ZENER	43 V	5%	1/4 W
CR8	1010394	FD400			
CR9	1010394				
CR10	1010394				
CR11	1010372-6				
L1	1010388-39	INDUCTOR	0.01HY	5%	75MA
L2	1010388-39	INDUCTOR	0.01HY	5%	75MA
Q1	1010357-1	TRANSISTOR			
Q2	1010357-1				
Q3	1010269-1				
Q4	1010376-4				
Q5	-4				
Q6	-4				
C11	1006777-1	CAPACITOR	10 uuf	10%	100V
C12					

REF DWG:
1. BINARY CURRENT SWITCH
COMPUTER OUTPUT ASSEM
1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ± 2% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT. TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN W. F. Troy DATE 3/14/63
CHECKED 3/29/63
APPROVAL 3/29/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 3 Sep 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

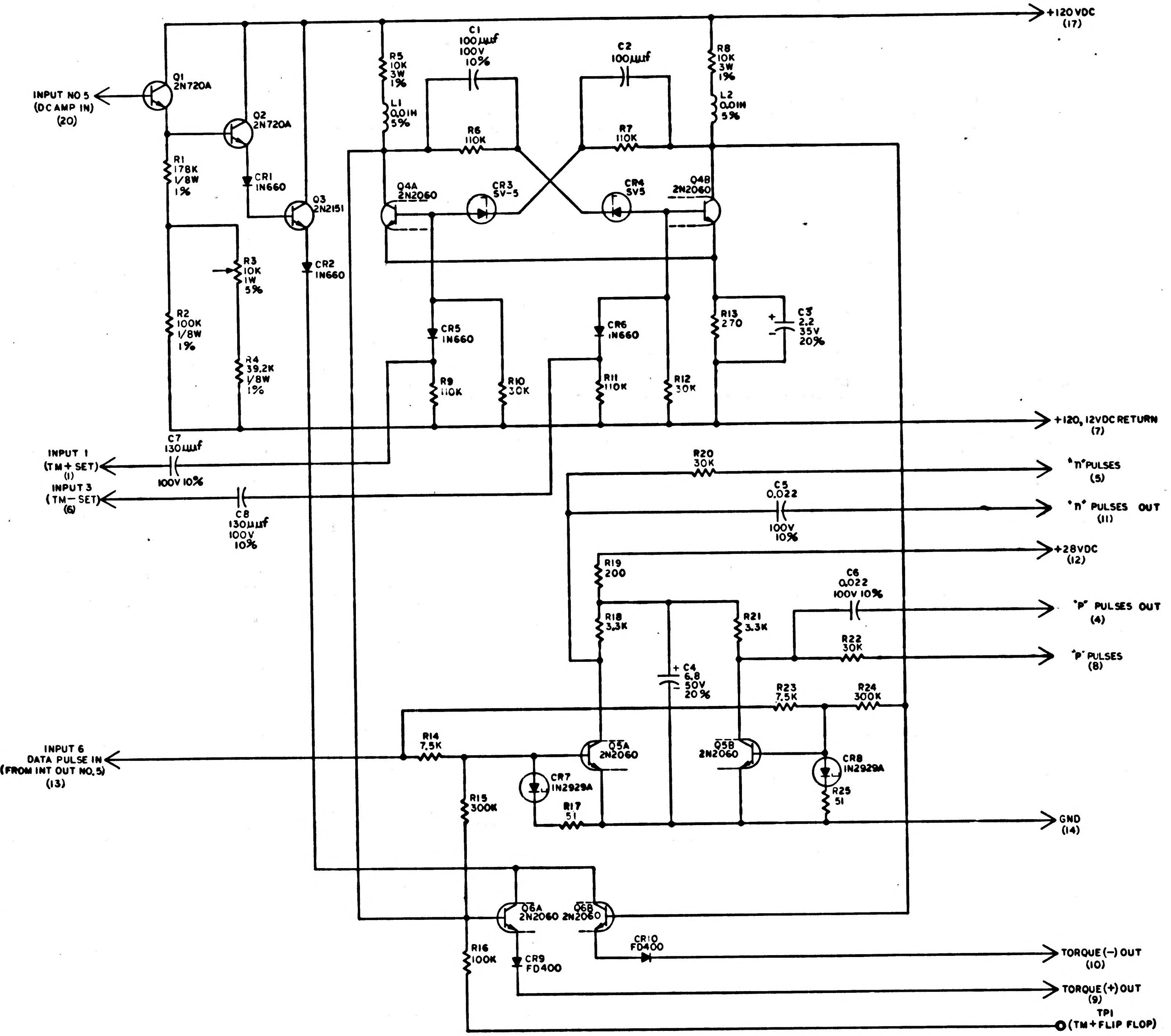
SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010043
SCALE
WT
SHEET 1 OF 1

1010043 K

REVISIONS TDRR 00914

SYM	DESCRIPTION	DATE	APPROVAL



+120 VDC (17)
INPUT NO 5 (DC AMP IN) (20)
Q1 2N720A
Q2 2N720A
Q3 2N2151
R1 178K 1/8W 1%
CR1 1N660
CR2 1N660
R2 100K 1/8W 1%
R3 10K 1W 5%
R4 39.2K 1/8W 1%
R5 10K 3W 1%
L1 0.01H 5%
C1 100µµf 100V 10%
C2 100µµf
R6 110K
R7 110K
R8 10K 3W 1%
L2 0.01H 5%
Q4A 2N2060
CR3 SV-5
CR4 SV5
Q4B 2N2060
CR5 1N660
CR6 1N660
R9 110K
R10 30K
R11 110K
R12 30K
R13 270
C3 2.2 35V 20%
+120, 12VDC RETURN (7)
INPUT 1 (TM+ SET) (1)
C7 130µµf 100V 10%
INPUT 3 (TM− SET) (6)
C8 130µµf 100V 10%
R20 30K
"n" PULSES (5)
C5 0.022 100V 10%
"n" PULSES OUT (11)
+28VDC (12)
R19 200
R18 3.3K
R21 3.3K
C6 0.022 100V 10%
"P" PULSES OUT (4)
R22 30K
"P" PULSES (8)
C4 6.8 50V 20%
R23 7.5K
R24 300K
INPUT 6 DATA PULSE IN (FROM INT OUT NO.5) (13)
R14 7.5K
Q5A 2N2060
Q5B 2N2060
CR7 1N2929A
CR8 1N2929A
R25 51
R15 300K
R17 51
GND (14)
Q6A 2N2060
Q6B 2N2060
R16 100K
CR9 FD400
CR10 FD400
TORQUE (−) OUT (10)
TORQUE (+) OUT (9)
TP1 (TM+FLIP FLOP)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-683	RESISTOR	178K	1%	1/8W
R2	1010364-635		100K	1%	1/8W
R3	1010373-10		10K	5%	1 W
R4	1010364-557		39.2K	1%	1/8W
R5	1010389-		10K	1%	3 W
R6	1006750-81		110K	5%	1/4W
R7	1006750-81		110K	5%	1/4W
R8	1010389-		10K	1%	3 W
R9	1006750-81		110K	5%	1/4W
R10	-67		30K		
R11	-81		110K		
R12	-67		30K		
R13	-18		270		
R14	-53		7.5K		
R15	1010369-92		300K		
R16	1006750-80		100K		
R17	-1		51		
R18	-44		3.3K		
R19	-15		200		
R20	-67		30K		
R21	-44		3.3K		
R22	-67		30K		
R23	-53		7.5K		
R24	1010369-92		300K		
R25	1006750-1		51		
C1	1006777-13	CAPACITOR	100µµf	10%	100V
C2	1006777-13		100µµf	10%	100V
C3	1006755-73		2.2µf	20%	35V
C4	1010393-		6.8µf	20%	50V
C5	1006777-33		0.022µf	10%	100V
C6	1006777-33		0.022µf	10%	100V
C7	1006777-14		130µµf	10%	100V
C8	1006777-14		130µµf	10%	100V
CR1	1010385	DIODE			
CR2	1010385				
CR3	1010255				
CR4	1010255				
CR5	1010385				
CR6	1010385				
CR7	1010390				
CR8	1010390				
CR9	1010394				
CR10	1010394				
L1	1010388-	INDUCTOR	0.01HY	5%	75MA
L2	1010388-	INDUCTOR	0.01HY	5%	75MA
Q1	1010357	TRANSISTOR			
Q2	1010357				
Q3	1010269				
Q4	1010376-1				
Q5					
Q6					

REF DWG:
1. BINARY CURRENT SWITCH COMPUTER OUTPUT ASSEM 1007027

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS
4. REFERENCE DESIGNATIONS ARE ABBRIEVIATED, PREFIX THE PARTS DESIGNATION WITH THE SUBASSEMBLY DESIGNATION
5. ALL RESISTORS TO BE 1/4W ±5% UNLESS OTHERWISE SPECIFIED
6. PARTS LIST TO BE FOR REFERENCE ONLY

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN W.F.T. DATE 3/14/63
CHECKED 3/29/63
APPROVAL 3/29/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 3 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

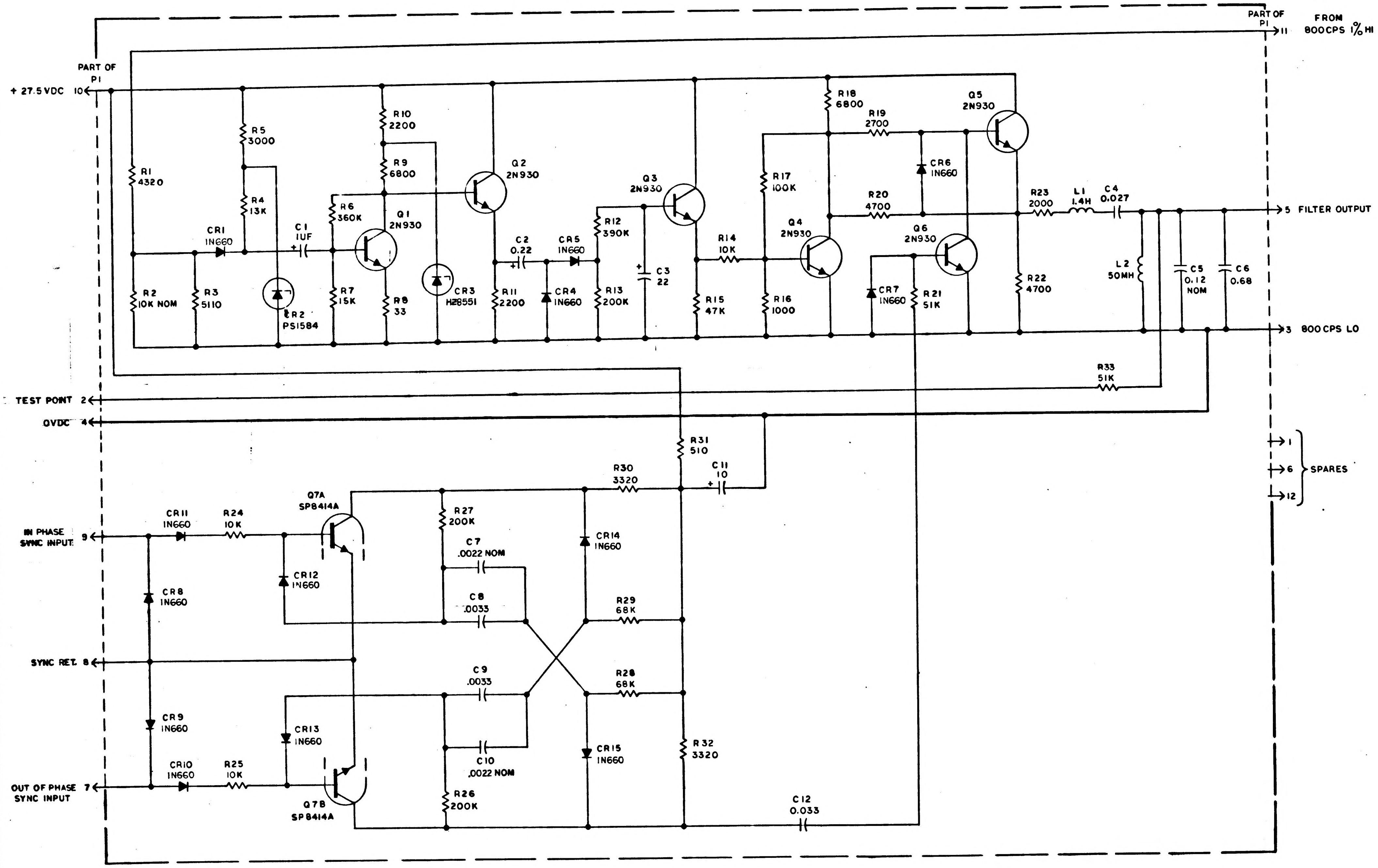
SCHEMATIC
BINARY CURRENT SWITCH

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010043
SCALE
WT
SHEET 1 OF 1

1010043

INCHES
PHOTOGRAPHIC SCALE ONLY

	TDRR 00296 REVISIONS 4/10/63		
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02162	7/24/63	



PART OF P1
FROM 800CPS 1% HI
11
PART OF P1
+27.5VDC 10
R1 4320
R2 10K NOM
R3 5110
CR1 1N660
R5 3000
R4 13K
CR2 PS1584
C1 1UF
R6 360K
R7 15K
Q1 2N930
R8 33
R10 2200
R9 6800
CR3 HZ8551
Q2 2N930
R11 2200
C2 0.22
CR5 1N660
CR4 1N660
R12 390K
R13 200K
Q3 2N930
C3 22
R14 10K
R15 47K
R17 100K
R16 1000
Q4 2N930
R18 6800
R19 2700
CR6 1N660
R20 4700
Q6 2N930
CR7 1N660
R21 51K
Q5 2N930
R22 4700
R23 2000
L1 1.4H
C4 0.027
L2 50MH
C5 0.12 NOM
C6 0.68
5 FILTER OUTPUT
3 800CPS LO
R33 51K
TEST POINT 2
OVDC 4
R31 510
R30 3320
C11 10
1
6 SPARES
12
IN PHASE SYNC INPUT 9
CR11 1N660
R24 10K
Q7A SP8414A
CR12 1N660
CR8 1N660
R27 200K
C7 .0022 NOM
C8 .0033
CR14 1N660
R29 68K
SYNC RET. 8
C9 .0033
R28 68K
CR9 1N660
CR13 1N660
CR15 1N660
R32 3320
OUT OF PHASE SYNC INPUT 7
CR10 1N660
R25 10K
C10 .0022 NOM
R26 200K
Q7B SP8414A
C12 0.033

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010363-373	RESISTOR	4320	±1%	1/4 W
R2	1010364		SEE NOTE		1/8 W
R3	-387		5110		
R4	-465		13K		
R5	1006750-43		3000	±2%	1/4 W
R6	1010369-94		360K	±5%	1/8 W
R7	1006750-60		15K	±2%	1/4 W
R8	1010369-140		33	±5%	1/8 W
R9	1006750-52		6800	±2%	1/4 W
R10	-40		2200		
R11	-40		2200		
R12	1010369-95		390K	±5%	1/8W
R13	1010369-88		200K	±5%	1/8W
R14	1006750-56		10K	±2%	1/4W
R15	-72		47K		
R16	-32		1000		
R17	-80		100K		
R18	-52		6800		
R19	-42		2700		
R20	-48		4700		
R21	-73		51K		
R22	-48		4700		
R23	-39		2000		
R24	-56		10K		
R25	-56		10K		
R26	1010364-693		200K	±1%	1/8W
R27	1010364-693		200K	±1%	1/8W
R28	1006750-76		68K	±2%	1/4W
R29	1006750-76		68K	±2%	1/4W
R30	1010364-351		3320	±1%	1/8W
R31	1010389-49		510	±1%	3W
R32	1010364-351		3320	±1%	1/8W
R33	1006750-73		51K	±2%	1/4W
C1	1006755-69	CAPACITOR	1	±10%	35V
C2	1006755-61		0.22		35V
C3	1006755-85		22		35V
C4	1010375-18		0.027		50V
C5	1010264		SEE NOTE	±5%	200V
C6	1010264-35		0.68	±5%	200VDC
C7	1010264		SEE NOTE		200V
C8	1010264-7		0.0033		
C9	1010264-7		0.0033		
C10	1010264		SEE NOTE		
C11	1006755-81		10	±10%	35V
C12	1010375-19		0.033	±10%	50V
L1	1010277-004	COIL	1.4H		
L2	1010427	COIL	50MH		
CR1	1010385	DIODE	1N660		
CR2	1010346		PS1584		250MW
CR3	1010372-22		HZ8551		200MW
CR4	1010385		1N660		
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15			1N660		
Q1	1010397	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6			2N930		
Q7	1010431		SP8414A		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. CONNECT 800 CPS LO TO OVDC AT ONE POINT ONLY AS SHOWN
5. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

C5	C7	C10	R2	
.039	.001	.001	6.04K	10.5K
.047	.0012	.0012	6.49K	11K
.056	.0015	.0015	6.98K	11.5K
.068	.0018	.0018	7.5K	12.1K
.082	.0022	.0022	8.06K	12.7K
.100	.0027	.0027	8.45K	13K
.120	.0033	.0033	9.09K	13.7K
.150	.0039	.0039	9.53K	14K
	.0047	.0047	10K	

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT

DRAWN Q. D. Leo DATE 31JAN63
CHECKED Manuel Kramer 10Apr63
APPROVAL Manuel Kramer 10Apr63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, AAC, FILTER & MULTIVIBRATOR 800 CPS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010044
SCALE —
WT —
SHEET 1 OF 1

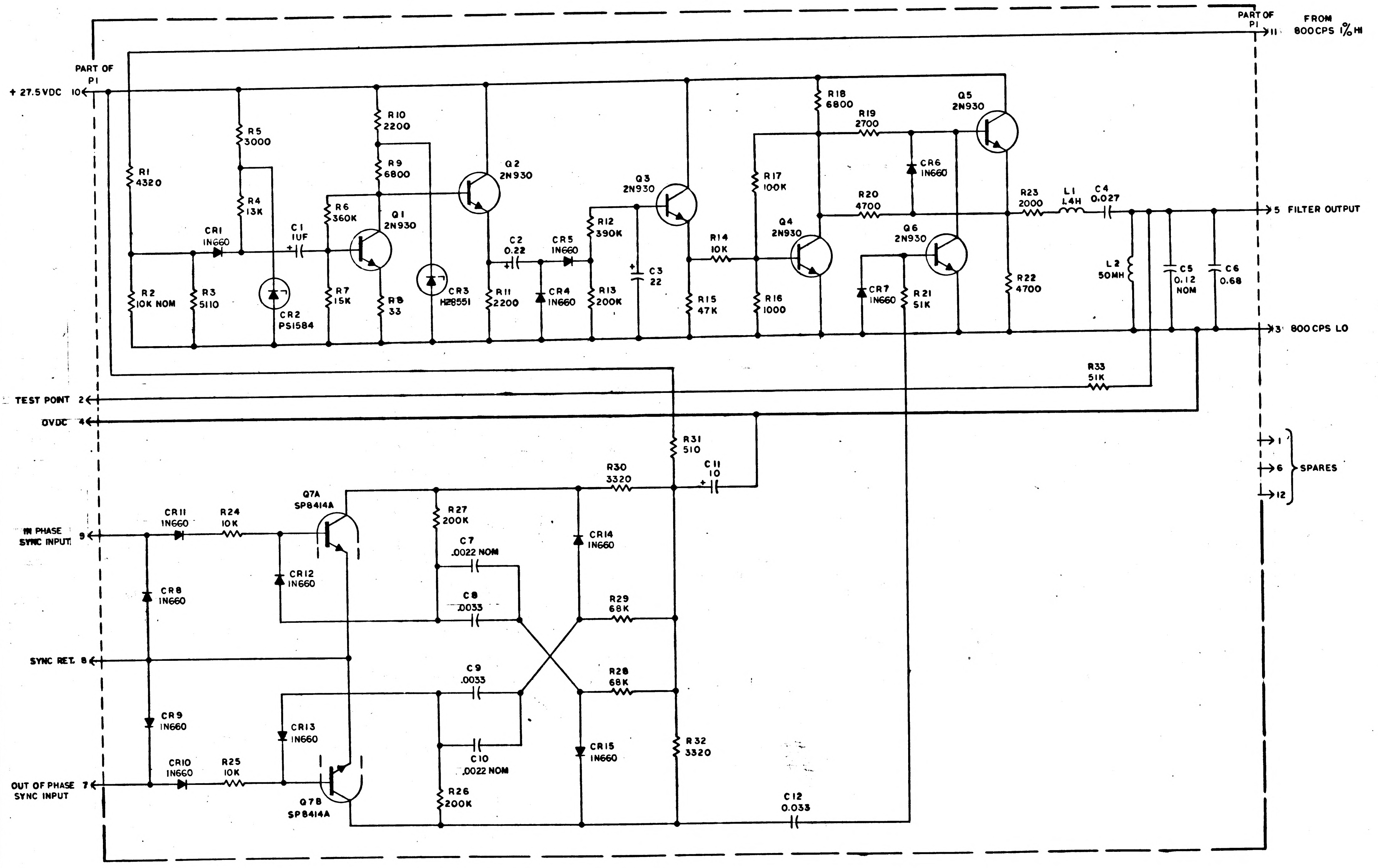
1010044 A

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TDRR 00796 REVISIONS 9/19/63

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02162	7/24	
B	REVISED PER TDRR 06798		


PART OF P1
+ 27.5VDC 10
R1 4320
R2 10K NOM
R3 5110
CR1 1N660
R5 3000
R4 13K
CR2 PS1584
C1 1UF
R6 360K
R7 15K
Q1 2N930
R8 33
R10 2200
R9 6800
CR3 HZ8551
Q2 2N930
C2 0.22
R11 2200
CR5 1N660
CR4 1N660
R12 390K
R13 200K
C3 22
Q3 2N930
R14 10K
R15 47K
R17 100K
R16 1000
Q4 2N930
R18 6800
R19 2700
R20 4700
CR6 1N660
Q5 2N930
Q6 2N930
CR7 1N660
R21 51K
R22 4700
R23 2000
L1 1.4H
C4 0.027
L2 50MH
C5 0.12 NOM
C6 0.68
PART OF P1
FROM 800CPS 1% HI
11
5 FILTER OUTPUT
3 800 CPS LO
R33 51K
TEST POINT 2
0VDC 4
R31 510
C11 10
R30 3320
1
6
12
SPARES
Q7A SP8414A
IN PHASE SYNC INPUT 9
CR11 1N660
R24 10K
CR12 1N660
R27 200K
C7 .0022 NOM
C8 .0033
CR14 1N660
R29 68K
CR8 1N660
SYNC RET. 8
CR9 1N660
C9 .0033
R28 68K
CR13 1N660
C10 .0022 NOM
CR15 1N660
R32 3320
OUT OF PHASE SYNC INPUT 7
CR10 1N660
R25 10K
Q7B SP8414A
R26 200K
C12 0.033

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010363-373	RESISTOR	4320	±1%	1/4 W
R2	1010364		SEE NOTE		1/8 W
R3	-387		5110		
R4	↓ -465		13K	↓	↓
R5	1006750-43		3000	±2%	/4 W
R6	1010369-94		360K	±5%	1/8 W
R7	1006750-60		15K	±2%	1/4 W
R8	1010369-140		33	±5%	1/8 W
R9	1006750-52		6800	±2%	/4 W
R10	-40		2200		
R11	↓ -40		2200	↓	↓
R12	1010369-95		390K	±5%	1/8W
R13	1010369-88		200K	±5%	1/8W
R14	1006750-56		10K	±2%	1/4W
R15	-72		47K		
R16	-32		1000		
R17	-80		100K		
R18	-52		6800		
R19	-42		2700		
R20	-48		4700		
R21	-73		51K		
R22	-48		4700		
R23	-39		2000		
R24	-56		10K		
R25	↓ -56		10K	↓	↓
R26	1010364-693		200K	±1%	1/8W
R27	1010364-693		200K	±1%	1/8W
R28	1006750-76		68K	±2%	1/4W
R29	1006750-76		68K	±2%	1/4W
R30	1010364-351		3320	±1%	1/8W
R31	1010389-49		510	±1%	3W
R32	1010364-351		3320	±1%	1/8W
R33	1006750-73	↓	51K	±2%	1/4W
C1	1006755-69	CAPACITOR	1	±10%	35V
C2	1006755-61		0.22		35V
C3	1006755-85		22		35V
C4	1010375-18		0.027	↓	50V
C5	1010264		SEE NOTE	±5%	200V
C6	1010264-35		0.68	±5%	200VDC
C7	1010264		SEE NOTE		200V
C8	1010264-7		0.0033		
C9	1010264-7		0.0033		
C10	1010264		SEE NOTE	↓	↓
C11	1006755-81		10	±10%	35V
C12	1010375-19	↓	0.033	±10%	50V
L1	1010277-004	COIL	1.4H		
L2	1010427	COIL	50MH		
CR1	1010385	DIODE	1N660		
CR2	1010346-1		PS1584		250MW
CR3	1010372-22		HZ8551		200MW
CR4	1010385		1N660		
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14			↓		
CR15	↓	↓	1N660		
Q1	1010397	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5			↓		
Q6	↓		2N930		
Q7	1010431	↓	SP8414A		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. CONNECT 800 CPS LO TO 0VDC AT ONE POINT ONLY AS SHOWN
5. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

C5	C7	C10	R2	
.039	.001	.001	6.04K	10.5K
.047	.0012	.0012	6.49K	11K
.056	.0015	.0015	6.98K	11.5K
.068	.0018	.0018	7.5K	12.1K
.082	.0022	.0022	8.06K	12.7K
.100	.0027	.0027	8.45K	13K
.120	.0033	.0033	9.09K	13.7K
.150	.0039	.0039	9.53K	14K
	.0047	.0047	10K	

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. D. Leo DATE 31 JAN 63
CHECKED 10 Apr 63
APPROVAL 10 Apr 63
APPROVAL
NASA APPROVAL
MIT APPROVAL

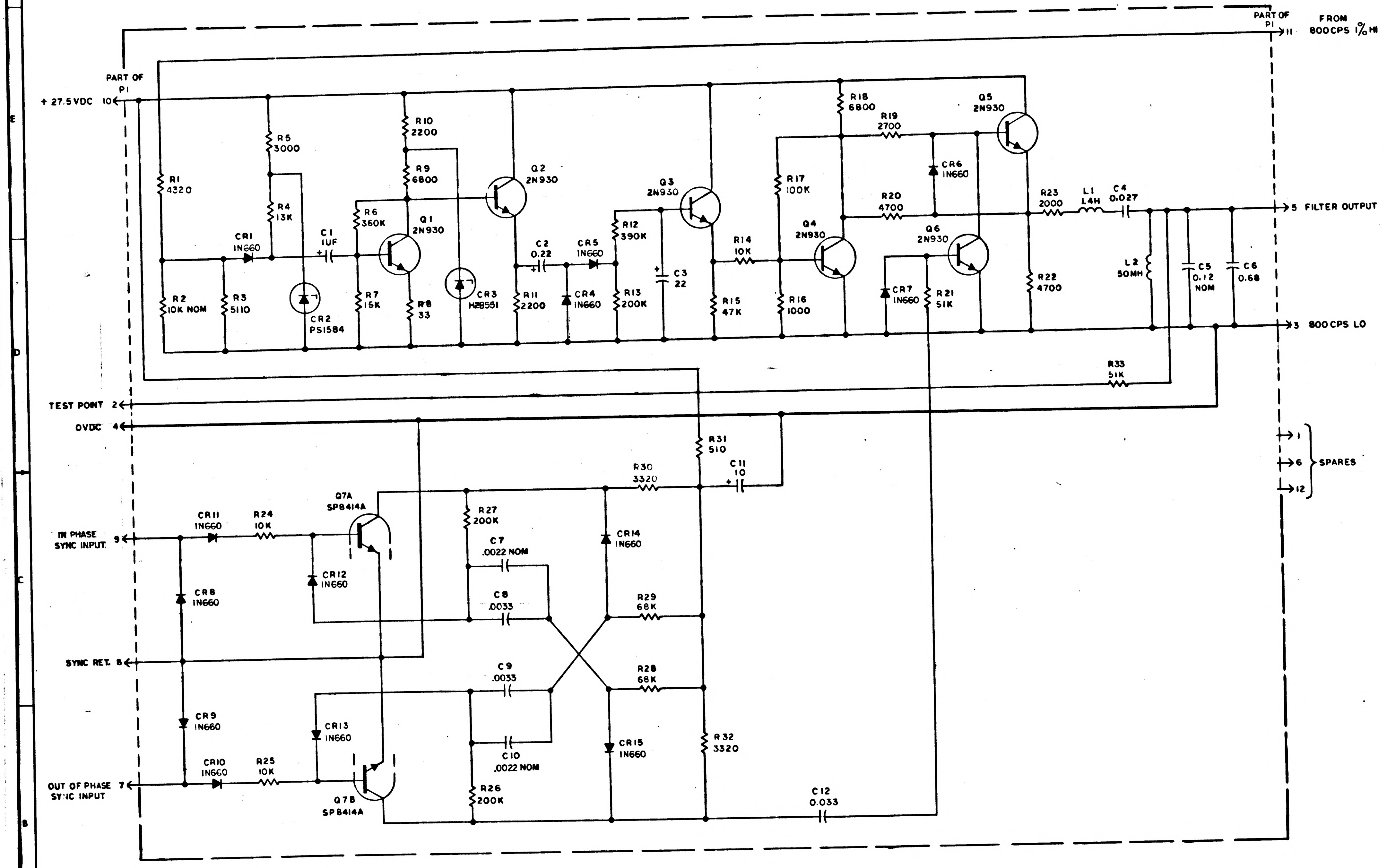
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
AAC, FILTER &
MULTIVIBRATOR 800 CPS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010044
SCALE — WT — SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	TDRR 00796 REVISIONS 4/10/63 DESCRIPTION	DATE	APPROVAL


PART OF P1
FROM 800CPS 1% HI
11
PART OF P1
+ 27.5VDC 10
R1 4320
R2 10K NOM
R3 5110
R4 13K
R5 3000
CR1 1N660
CR2 PS1584
C1 1UF
R6 360K
R7 15K
Q1 2N930
R8 33
R9 6800
R10 2200
CR3 HZ8551
Q2 2N930
C2 0.22
R11 2200
CR5 1N660
CR4 1N660
R12 390K
R13 200K
Q3 2N930
C3 22
R14 10K
R15 47K
R16 1000
R17 100K
R18 6800
R19 2700
Q4 2N930
R20 4700
CR6 1N660
Q5 2N930
Q6 2N930
CR7 1N660
R21 51K
R22 4700
R23 2000
L1 1.4H
C4 0.027
5 FILTER OUTPUT
L2 50MH
C5 0.12 NOM
C6 0.68
3 800 CPS LO
R33 51K
TEST POINT 2
OVDC 4
R31 510
R30 3320
C11 10
1
6
12
SPARES
IN PHASE SYNC INPUT 9
CR11 1N660
R24 10K
Q7A SP8414A
R27 200K
C7 .0022 NOM
CR14 1N660
CR12 1N660
CR8 1N660
C8 .0033
R29 68K
SYNC RET. 8
C9 .0033
R28 68K
CR9 1N660
CR13 1N660
C10 .0022 NOM
CR15 1N660
R32 3320
OUT OF PHASE SYNC INPUT 7
CR10 1N660
R25 10K
Q7B SP8414A
R26 200K
C12 0.033

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010363-373	RESISTOR	4320	±1%	1/4 W
R2	1010364		SEE NOTE		1/8 W
R3	-387		5110		
R4	-465		13K		
R5	1006750-43		3000	±2%	1/4 W
R6	1010369-94		360K	±5%	1/8 W
R7	1006750-60		15K	±2%	1/4 W
R8	1010369-140		33	±5%	1/8 W
R9	1006750-52		6800	±2%	1/4 W
R10	-40		2200		
R11	-40		2200		
R12	1010369-95		390K	±5%	1/8 W
R13	1010369-88		200K	±5%	1/8 W
R14	1006750-56		10K	±2%	1/4 W
R15	-72		47K		
R16	-32		1000		
R17	-80		100K		
R18	-52		6800		
R19	-42		2700		
R20	-48		4700		
R21	-73		51K		
R22	-48		4700		
R23	-39		2000		
R24	-56		10K		
R25	-56		10K		
R26	1010364-693		200K	±1%	1/8 W
R27	1010364-693		200K	±1%	1/8 W
R28	1006750-76		68K	±2%	1/4 W
R29	1006750-76		68K	±2%	1/4 W
R30	1010364-351		3320	±1%	1/8 W
R31	1010389-49		510	±1%	3 W
R32	1010364-351		3320	±1%	1/8 W
R33	1006750-73		51K	±2%	1/4 W
C1	1006755-69	CAPACITOR	1	±10%	35 V
C2	1006755-61		0.22		35 V
C3	1006755-85		22		35 V
C4	1010375-18		0.027		50 V
C5	1010264		SEE NOTE	±5%	200 V
C6	1010264-35		0.68	±5%	200 VDC
C7	1010264		SEE NOTE		200 V
C8	1010264-7		0.0033		
C9	1010264-7		0.0033		
C10	1010264		SEE NOTE		
C11	1006755-81		10	±10%	35 V
C12	1010375-19		0.033	±10%	50 V
L1	1010277-004	COIL	1.4H		
L2	1010427	COIL	50MH		
CR1	1010385	DIODE	1N660		
CR2	1010346		PS1584		250MW
CR3	1010372-22		HZ8551		200MW
CR4	1010385		1N660		
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15			1N660		
Q1	1010397	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6			2N930		
Q7	1010431		SP8414A		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. CONNECT 800 CPS LO TO OVDC AT ONE POINT ONLY AS SHOWN
5. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

C5	C7	C10	R2	
.039	.001	.001	6.04K	10.5K
.047	.0012	.0012	6.49K	11K
.056	.0015	.0015	6.98K	11.5K
.068	.0018	.0018	7.5K	12.1K
.082	.0022	.0022	8.06K	12.7K
.100	.0027	.0027	8.45K	13K
.120	.0033	.0033	9.09K	13.7K
.150	.0039	.0039	9.53K	14K
	.0047	.0047	10K	

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO
CONTRACT
DRAWN A. B. Lee DATE 31 JAN 63
CHECKED Manuel Kramer 10 Apr 63
APPROVAL Manuel Kramer 10 Apr 63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
AAC, FILTER &
MULTIVIBRATOR 800 CPS

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010044
SCALE —
WT —
SHEET 1 OF 1

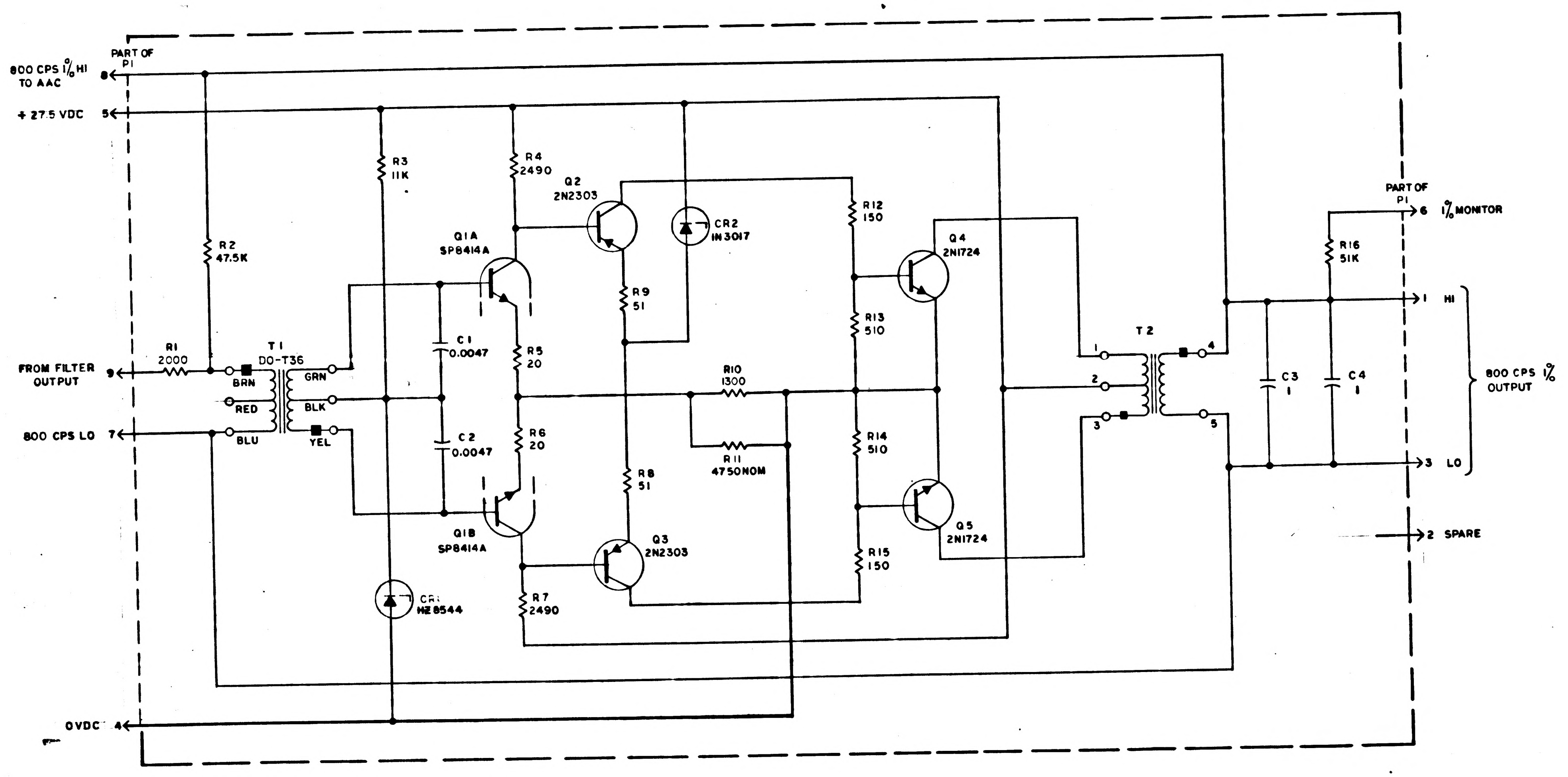
1010044

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

TDRR 00296 REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 014-5	5-31-63	



PART OF P1
800 CPS 1% HI TO AAC 8
+ 27.5 VDC 5
FROM FILTER OUTPUT 9
800 CPS LO 7
0VDC 4
R1 2000
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
R2 47.5K
R3 11K
R4 2490
R5 20
R6 20
R7 2490
R8 51
R9 51
R10 1300
R11 4750NOM
R12 150
R13 510
R14 510
R15 150
R16 51K
C1 0.0047
C2 0.0047
C3 1
C4 1
Q1A SP8414A
Q1B SP8414A
Q2 2N2303
Q3 2N2303
Q4 2N1724
Q5 2N1724
CR1 HZ8544
CR2 1N3017
T2
1
2
3
4
5
PART OF P1
6 1% MONITOR
1 HI
3 LO
800 CPS 1% OUTPUT
2 SPARE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	± 1%	1/8 W
R2	1010364-573		47.5K	± 1%	1/8 W
R3	1006750-57		11 K	± 2%	1/4 W
R4	1010364-327		2490	± 1%	1/8 W
R5	1010369-148		20	± 5%	
R6	1010369-148		20	± 5%	
R7	1010364-327		2490	± 1%	
R8	1006750-1		51	± 2%	1/4 W
R9	1006750-1		51	± 2%	1/4 W
R10	1010364-273		1300	± 1%	1/8 W
R11	1010364		SEE NOTE	± 1%	1/8 W
R12	1006750-12		150	± 2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	-73		51K		
C1	1010264-9	CAPACITOR	0.0047	± 5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37		1		
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010265-2	DIODE	1N3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010273-2		2N1724		
Q5			2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307				

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 TO BE DETERMINED BY ELECTRICAL TEST COMPONENT TO BE SUPPLIED PER TABLE

R11
2430
2550
2800
3010
3320
3480
3740
4020
4220
4420
4530
4750
4990
5110
5360
5620
5900
6190
6340
6650

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN Q. D. Lee DATE 1-28-63
CHECKED Manuel Romero
APPROVAL Manuel Romero
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

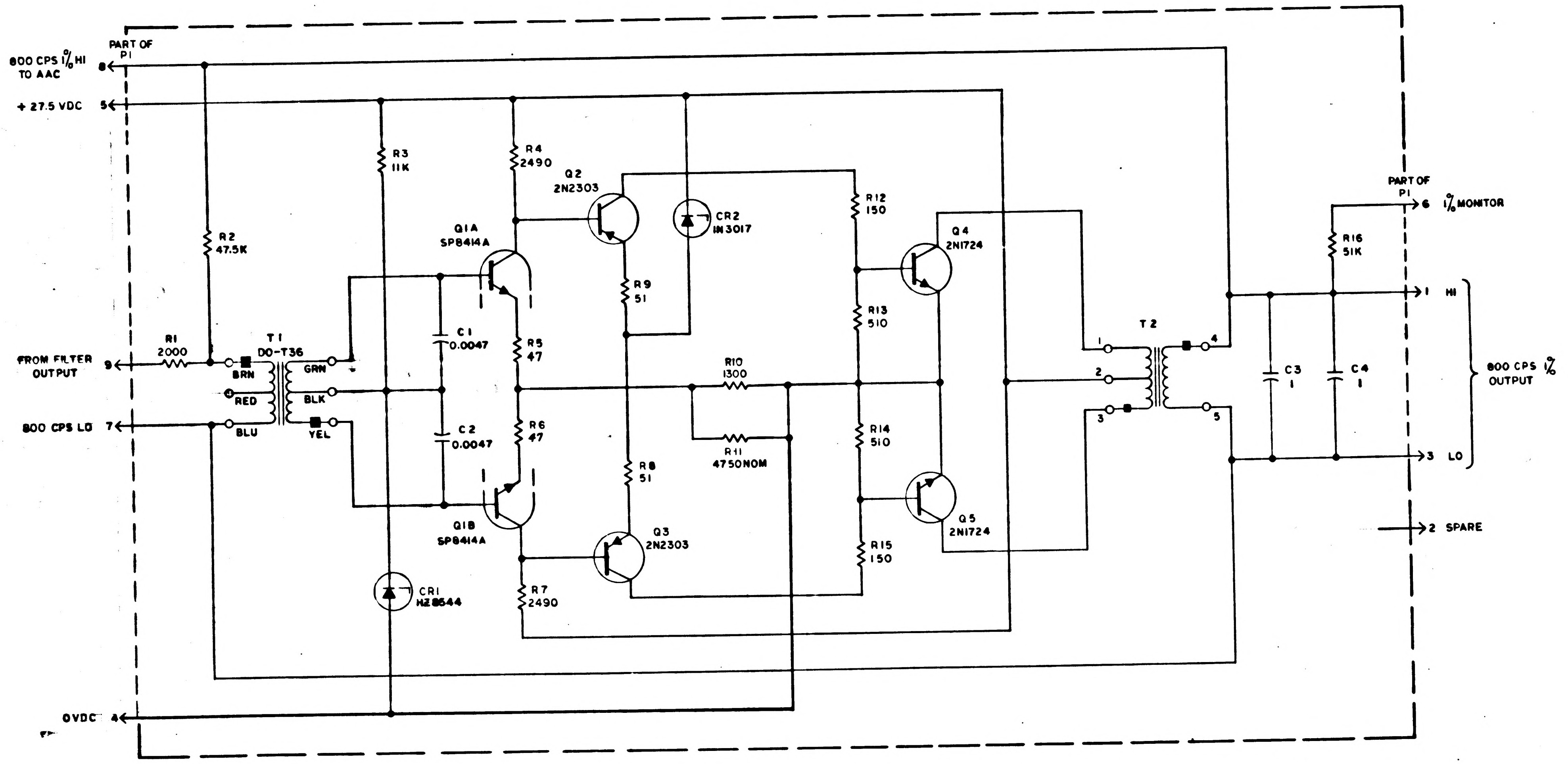
SCHEMATIC,
800CPS 1% AMPLIFIER

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010045
SCALE — WT — SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TDRR 00796 REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 0N65	5-31-63	
B	REVISED PER TDRR 08492	2 JUN	


PART OF P1
800 CPS 1% HI TO AAC 8
+ 27.5 VDC 5
FROM FILTER OUTPUT 9
800 CPS LO 7
0VDC 4
R1 2000
R2 47.5K
R3 11K
R4 2490
R5 47
R6 47
R7 2490
R8 51
R9 51
R10 1300
R11 4750NOM
R12 150
R13 510
R14 510
R15 150
R16 51K
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
C1 0.0047
C2 0.0047
C3 1
C4 1
Q1A SP8414A
Q1B SP8414A
Q2 2N2303
Q3 2N2303
Q4 2N1724
Q5 2N1724
CR1 HZ8544
CR2 1N3017
T2
1 2 3 4 5
PART OF P1
6 1% MONITOR
1 HI
3 LO
800 CPS 1% OUTPUT
2 SPARE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	±1%	1/8 W
R2	1010364-573		47.5K	±1%	1/8 W
R3	1006750-57		11 K	±2%	1/4 W
R4	1010364-327		2490	±1%	1/8 W
R5	1010369-1		47	±5%	
R6	1010369-1		47	±5%	
R7	1010364-327		2490	±1%	
R8	1006750-1		51	±2%	1/4 W
R9	1006750-1		51	±2%	1/4 W
R10	1010364-273		1300	±1%	1/8 W
R11	1010364		SEE NOTE	±1%	1/8 W
R12	1006750-12		150	±2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	-73		51K		
C1	1010264-9	CAPACITOR	0.0047	±5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37		1		
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010265-2	DIODE	1N3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010273-2		2N1724		
Q5			2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307				

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 TO BE DETERMINED BY ELECTRICAL TEST COMPONENT TO BE SUPPLIED PER TABLE

R11
2430
2550
2800
3010
3320
3480
3740
4020
4220
4420
4530
4750
4990
5110
5360
5620
5900
6190
6340
6650

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO. CONTRACT
DRAWN Q. Di Leo DATE 1 FEB 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

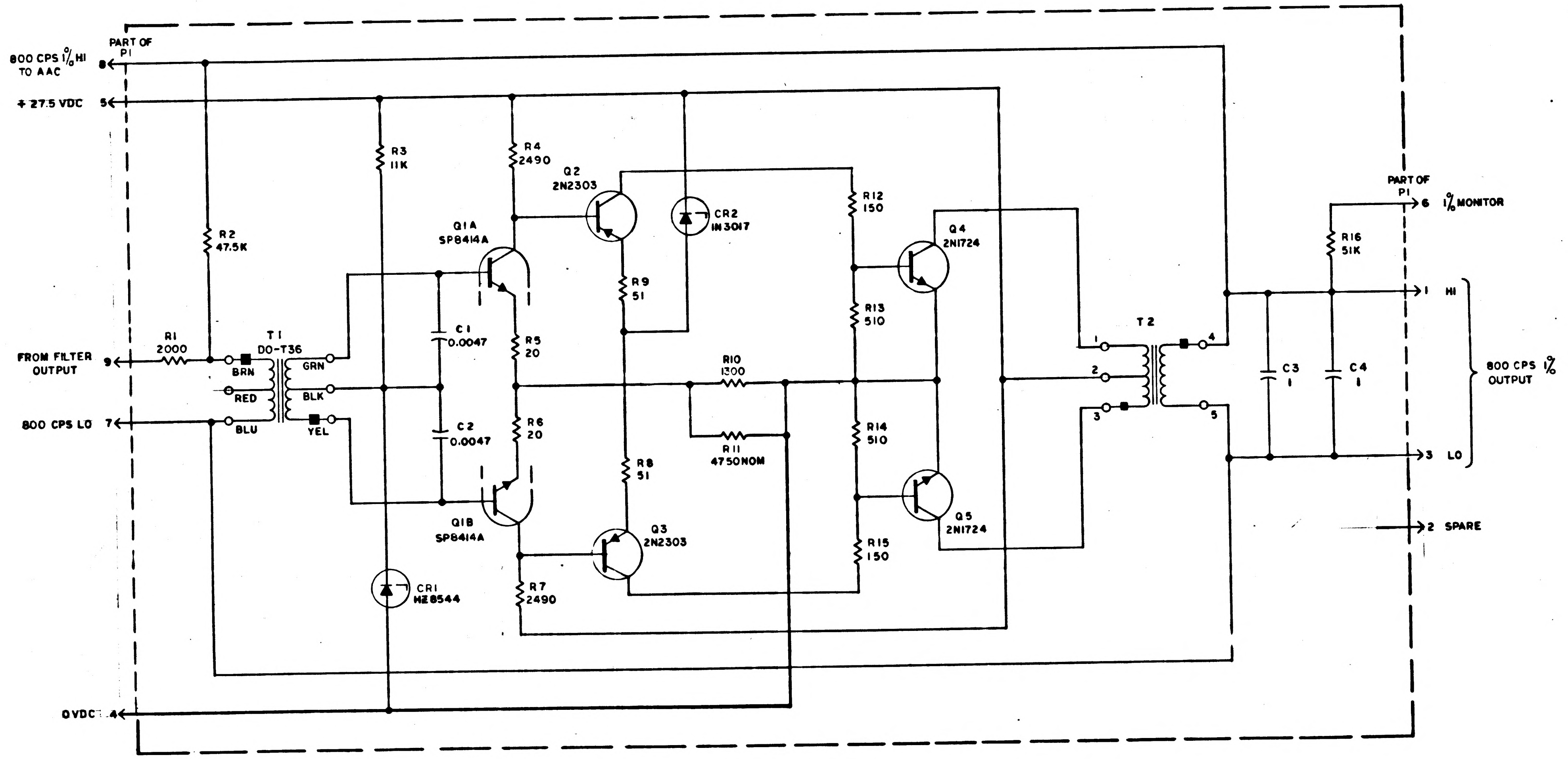
SCHEMATIC, 800CPS 1% AMPLIFIER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010045
SCALE // WT // SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

TDRR 00391 REVISIONS 9/10/63

SYM	DESCRIPTION	DATE	APPROVAL


PART OF P1
800 CPS 1% HI TO AAC
8
+ 27.5 VDC
5
FROM FILTER OUTPUT
9
800 CPS LO
7
OVDC
4
R1 2000
R2 47.5K
R3 11K
R4 2490
R5 20
R6 20
R7 2490
R8 51
R9 51
R10 1300
R11 4750NOM
R12 150
R13 510
R14 510
R15 150
R16 51K
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
C1 0.0047
C2 0.0047
C3 1
C4 1
Q1A SP8414A
Q1B SP8414A
Q2 2N2303
Q3 2N2303
Q4 2N1724
Q5 2N1724
CR1 HZ8544
CR2 IN3017
T2
1
2
3
4
5
PART OF P1
6 1% MONITOR
1 HI
3 LO
2 SPARE
800 CPS 1% OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-309	RESISTOR	2000	± 1%	1/8 W
R2	1010364-573		47.5K	± 1%	1/8 W
R3	1006750-57		11 K	± 2%	1/4 W
R4	1010364-327		2490	± 1%	1/8 W
R5	1010369-148		20	± 5%	
R6	1010369-148		20	± 5%	
R7	1010364-327		2490	± 1%	↓
R8	1006750-1		51	± 2%	1/4 W
R9	1006750-1		51	± 2%	1/4 W
R10	1010364-273		1300	± 1%	1/8 W
R11	1010364		SEE NOTE	± 1%	1/8 W
R12	1006750-12		150	± 2%	1/4 W
R13	-25		510		
R14	-25		510		
R15	-12		150		
R16	↓ -73	↓	51K	↓	↓
C1	1010264-9	CAPACITOR	0.0047	± 5%	200VDC
C2	1010264-9		0.0047		
C3	1010264-37		1		
C4	1010264-37	↓	1	↓	↓
CR1	1010372-15	DIODE	HZ8544		200MW
CR2	1010265-2	DIODE	IN3017		1WATT
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345		2N2303		
Q3	1010345		2N2303		
Q4	1010273		2N1724		
Q5	1010273	↓	2N1724		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010307	↓			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. VALUE OF R11 TO BE DETERMINED BY ELECTRICAL TEST COMPONENT TO BE SUPPLIED PER TABLE

R11
2430
2550
2800
3010
3320
3480
3740
4020
4220
4420
4530
4750
4990
5110
5360
5620
5900
6190
6340
6650

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Q. Di Leo DATE 1 FEB 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800CPS 1% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010045
SCALE — WT — SHEET 1 OF

1010045

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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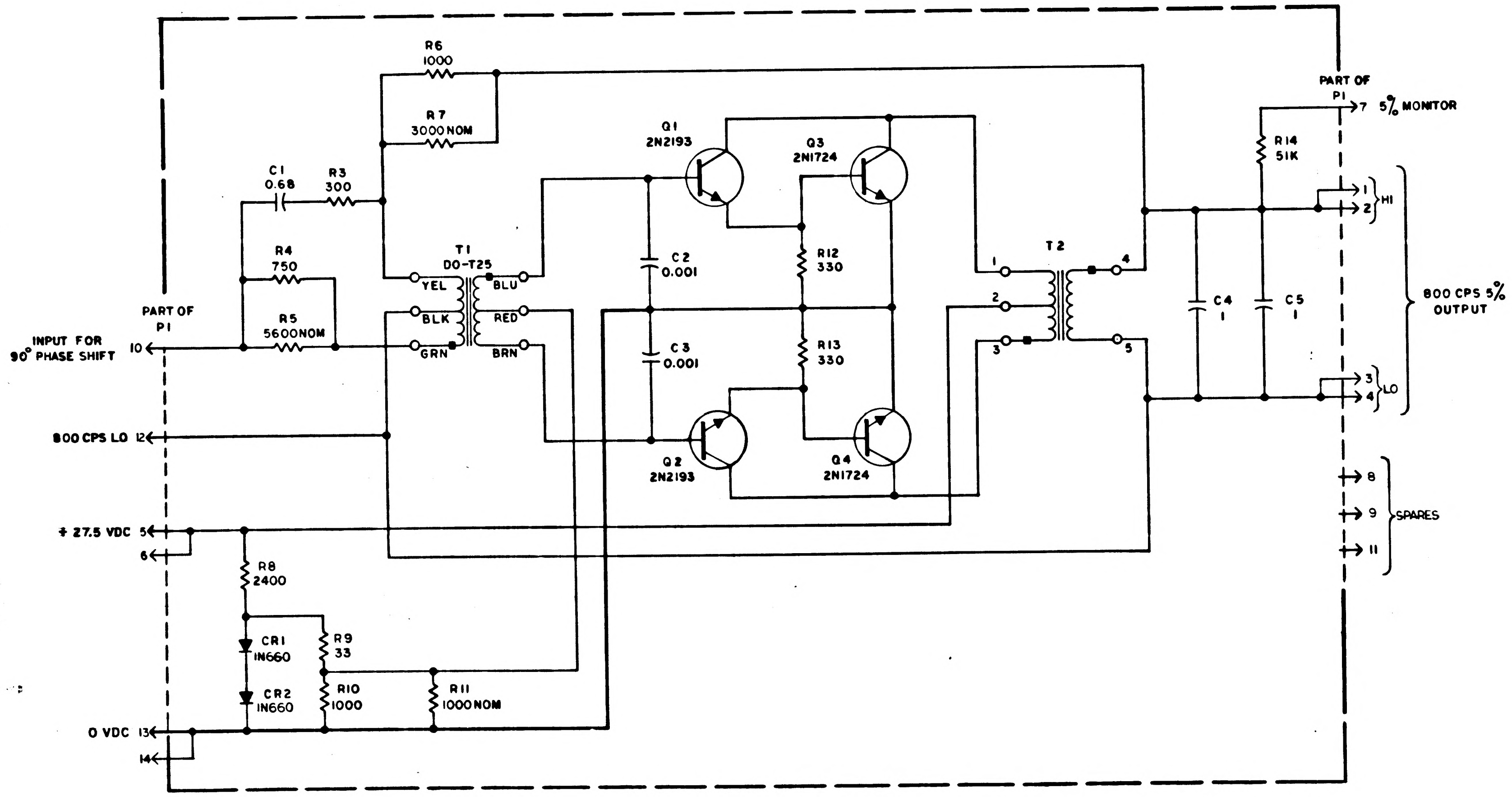
TDRR 00296 REVISIONS 7/14/63

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01117	1 Apr 63	WRT WK



R6
1000
R7
3000 NOM
C1
0.68
R3
300
R4
750
R5
5600 NOM
PART OF
P1
INPUT FOR
90° PHASE SHIFT
10
T1
DO-T25
YEL
BLK
GRN
BLU
RED
BRN
Q1
2N2193
Q3
2N1724
C2
0.001
C3
0.001
R12
330
R13
330
Q2
2N2193
Q4
2N1724
T2
1
2
3
4
5
C4
1
C5
1
R14
51K
PART OF
P1
7
5% MONITOR
1
2
HI
800 CPS 5%
OUTPUT
3
4
LO
800 CPS LO 12
+ 27.5 VDC 5
6
R8
2400
CR1
1N660
CR2
1N660
R9
33
R10
1000
R11
1000 NOM
0 VDC 13
14
8
9
11
SPARES

R5	R11	R7
2800	510	1500
3000	560	1600
3300	620	1800
3600	680	2000
3900	750	2200
4100	820	2300
4300	910	2400
4500	1000	2600
4900	1100	2800
5100	1200	3000
5300	1300	3100
5600	1400	3300
5800	1500	3500
6100		3600
6300		3900
6600		4100
6900		4300
7200		4500
7500		
7800		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	——	NOT USED	——	—	—
R2	——	NOT USED	——	—	—
R3	1010389-43	RESISTOR	300	± 1%	3 W
R4	1010389-53		750		
R5	1010389		SEE NOTE		
R6	1010389-56		1000		
R7	1010389		SEE NOTE		
R8	1010389-65		2400	↓	↓
R9	1010369-140		33	± 5%	1/8W
R10	1010364-251		1000	± 1%	
R11	1010364		SEE NOTE	± 1%	↓
R12	1006750-20		330	± 2%	1/4 W
R13	1006750-20		330		
R14	1006750-73	↓	51K	↓	↓
C1	1010264-35	CAPACITOR	0.68	± 5%	200VDC
C2	1010264-1		0.001	± 5%	200VDC
C3	1010264-1		0.001	± 5%	200VDC
C4	1010264-37		1	± 5%	200VDC
C5	1010264-37	↓	1	± 5%	200VDC
CR1	1010385	DIODE	1N660		
CR2	1010385	↓	1N660		
Q1	1010398-2	TRANSISTOR	2N2193		
Q2	1010398-2		2N2193		
Q3	1010273		2N1724		
Q4	1010273	↓	2N1724		
T1	1010407	TRANSFORMER	DO-T25		
T2	1010308	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN G. Di Leo DATE 6 FEB 63
CHECKED Manuel Kramer 10 Apr 63
APPROVAL Manuel Kramer 10 Apr 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 10 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800 CPS 5% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010046
SCALE —
WT —
SHEET 1 OF 1

A1010046

INCHES
0 1
PHOTOGRAPHIC SCALE ONLY

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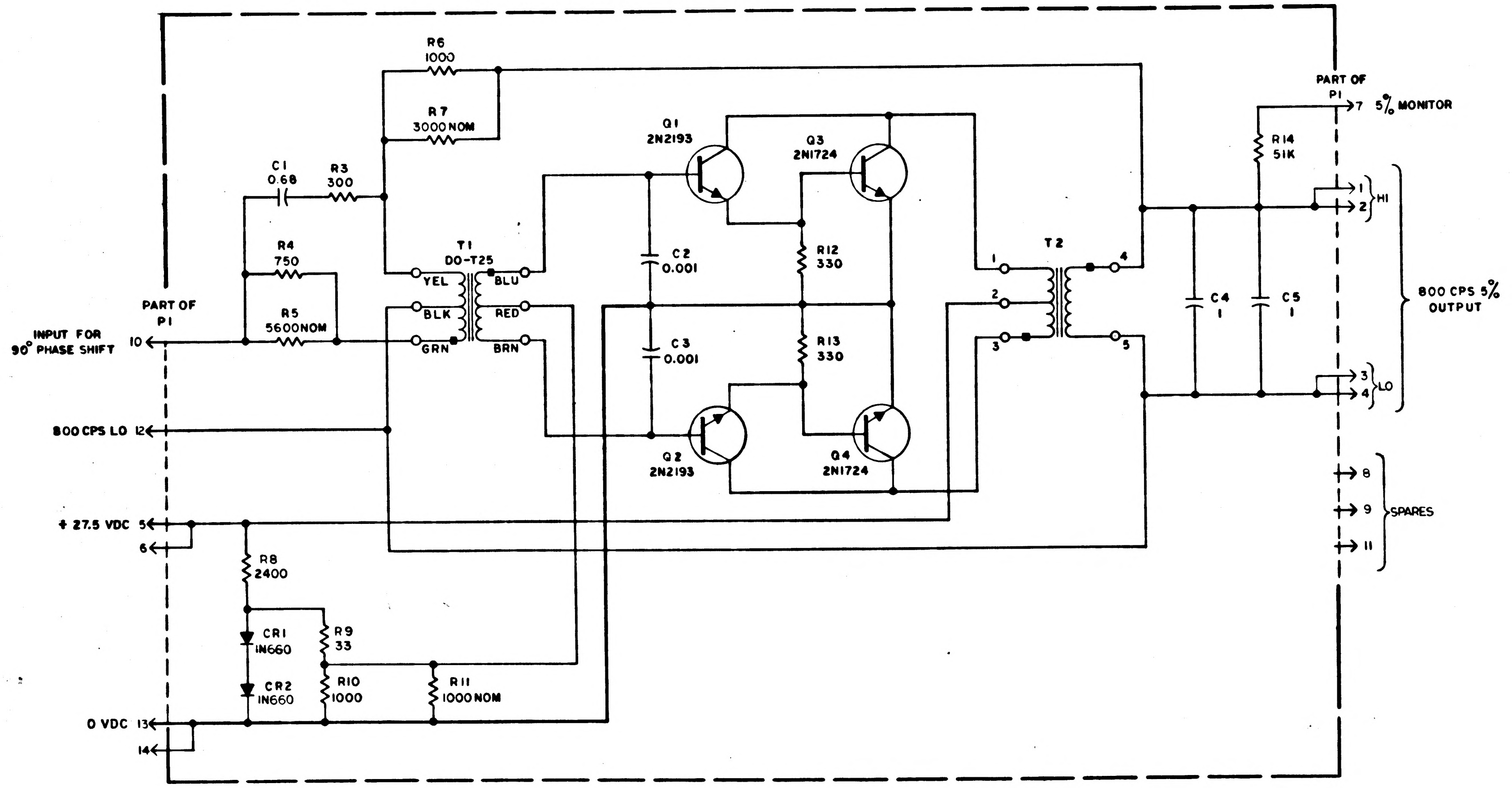
TDRR 00296 REVISIONS 4/11/63

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01117	1 MAY 63	WK
B	REVISED PER TDRR 01539	6.19.63	WK



R6
1000
R7
3000 NOM
C1
0.68
R3
300
R4
750
R5
5600 NOM
T1
DO-T25
YEL
BLK
GRN
BLU
RED
BRN
PART OF
P1
INPUT FOR
90° PHASE SHIFT
10
800 CPS LO 12
+ 27.5 VDC 5
6
R8
2400
CR1
1N660
CR2
1N660
R9
33
R10
1000
R11
1000 NOM
0 VDC 13
14
Q1
2N2193
Q2
2N2193
Q3
2N1724
Q4
2N1724
C2
0.001
C3
0.001
R12
330
R13
330
T2
1
2
3
4
5
C4
1
C5
1
R14
51K
PART OF
P1
7 5% MONITOR
1
2
HI
3
4
LO
800 CPS 5%
OUTPUT
8
9
11
SPARES

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	————	NOT USED	——	—	—
R2	————	NOT USED	——	—	—
R3	1010389-43	RESISTOR	300	± 1%	3 W
R4	1010389-53		750		
R5	1010389		SEE NOTE		
R6	1010389-56		1000		
R7	1010389		SEE NOTE		
R8	1010389-65		2400	↓	↓
R9	1010369-140		33	± 5%	1/8 W
R10	1010364-251		1000	± 1%	
R11	1010364		SEE NOTE	± 1%	↓
R12	1006750-20		330	± 2%	1/4 W
R13	1006750-20		330		
R14	1006750-73	↓	51K	↓	↓
C1	1010264-35	CAPACITOR	0.68	± 5%	200VDC
C2	1010264-1		0.001	± 5%	200VDC
C3	1010264-1		0.001	± 5%	200VDC
C4	1010264-37		1	± 5%	200VDC
C5	1010264-37	↓	1	± 5%	200VDC
CR1	1010385	DIODE	1N660		
CR2	1010385	↓	1N660		
Q1	1010398-4	TRANSISTOR	2N2193		
Q2	1010398-4		2N2193		
Q3	1010273		2N1724		
Q4	1010273	↓	2N1724		
T1	1010407	TRANSFORMER	DO-T25		
T2	1010308	↓			

R5	R11	R7
2800	511	1500
3000	562	1600
3300	619	1800
3600	681	2000
3900	750	2200
4100	825	2300
4300	909	2400
4500	1000	2600
4900	1100	2800
5100	1210	3000
5300	1300	3100
5600	1400	3300
5800	1500	3500
6100		3600
6300		3900
6600		4100
6900		4300
7200		4500
7500		
7800		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN G. D. Lee DATE 6 FEB 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800 CPS 5% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010046
SCALE —
WT —
SHEET 1 OF 1

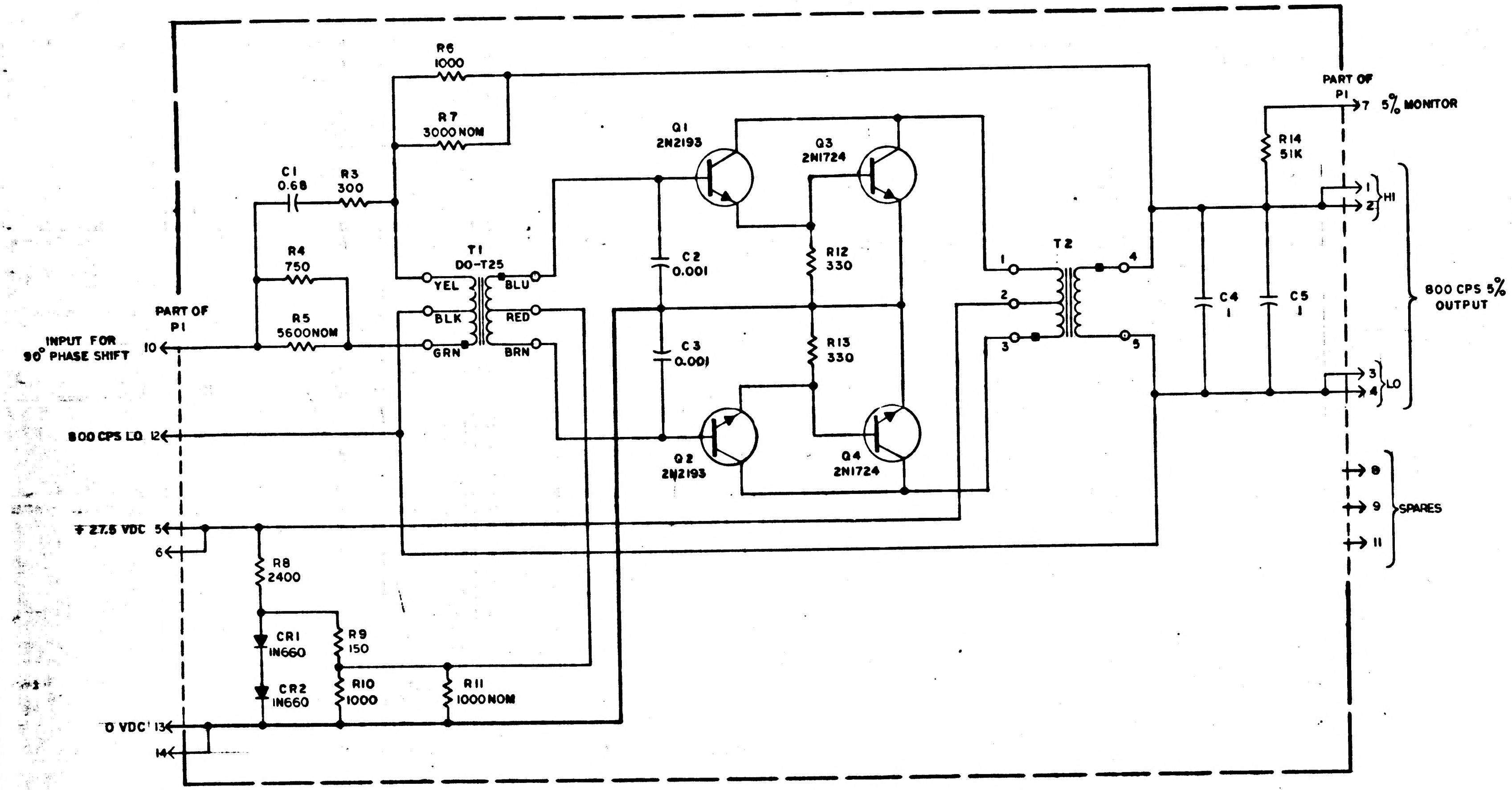
1010046 B

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

TDRR 00796 REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01117	1 MAY 63	WK
B	REVISED PER TDRR 01539	6-19-63	WK
C	REVISED PER TDRR 02734	8-27-63	


R6
1000
R7
3000 NOM
C1
0.68
R3
300
R4
750
R5
5600 NOM
T1
DO-T25
YEL
BLK
GRN
BLU
RED
BRN
PART OF
P1
INPUT FOR
90° PHASE SHIFT
10
800 CPS LO 12
+ 27.5 VDC 5
6
R8
2400
CR1
IN660
CR2
IN660
R9
150
R10
1000
R11
1000 NOM
0 VDC 13
14
Q1
2N2193
Q2
2N2193
Q3
2N1724
Q4
2N1724
C2
0.001
C3
0.001
R12
330
R13
330
T2
1
2
3
4
5
C4
1
C5
1
R14
51K
PART OF
P1
7 5% MONITOR
1
2
HI
3
4
LO
800 CPS 5%
OUTPUT
8
9
11
SPARES

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	—	NOT USED	—	—	—
R2	—	NOT USED	—	—	—
R3	1010389-43	RESISTOR	300	± 1%	3 W
R4	1010389-53	↓	750	↓	↓
R5	1010389		SEE NOTE		
R6	1010389-56		1000		
R7	1010389		SEE NOTE		
R8	1010389-65		2400		
R9	1006750-12		150	±2 %	1/4 W
R10	1010364-251		1000	± 1%	1/8W
R11	1010364		SEE NOTE	± 1%	1/8W
R12	1006750-20		330	± 2%	1/4 W
R13	1006750-20		330	↓	↓
R14	1006750-73	↓	51K		
C1	1010264-36	CAPACITOR	0.68	± 5%	200VDC
C2	1010264 -1	↓	0.001	± 5%	200VDC
C3	1010264 -1		0.001	± 5%	200VDC
C4	1010264-37		1	± 5%	200VDC
C5	1010264-37	↓	1	± 5%	200VDC
CR1	1010385	DIODE	IN660		
CR2	1010385	↓	IN660		
Q1	1010398-4	TRANSISTOR	2N2193		
Q2	1010398-4	↓	2N2193		
Q3	1010273-2		2N1724		
Q4		↓	2N1724		
T1	1010407	TRANSFORMER	DO-T25		
T2	1010308	↓			

R5	R11	R7
2800	511	1500
3000	562	1600
3300	619	1800
3600	681	2000
3900	750	2200
4100	825	2300
4300	909	2400
4500	1000	2600
4900	1100	2800
5100	1210	3000
5300	1300	3100
5600	1400	3300
5800	1500	3500
6100		3600
6300		3900
6600		4100
6900		4300
7200		4500
7500		
7800		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN G. Di Leo DATE 6 FEB 63
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
800CPS 5% AMPLIFIER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010046
SCALE — WT — SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

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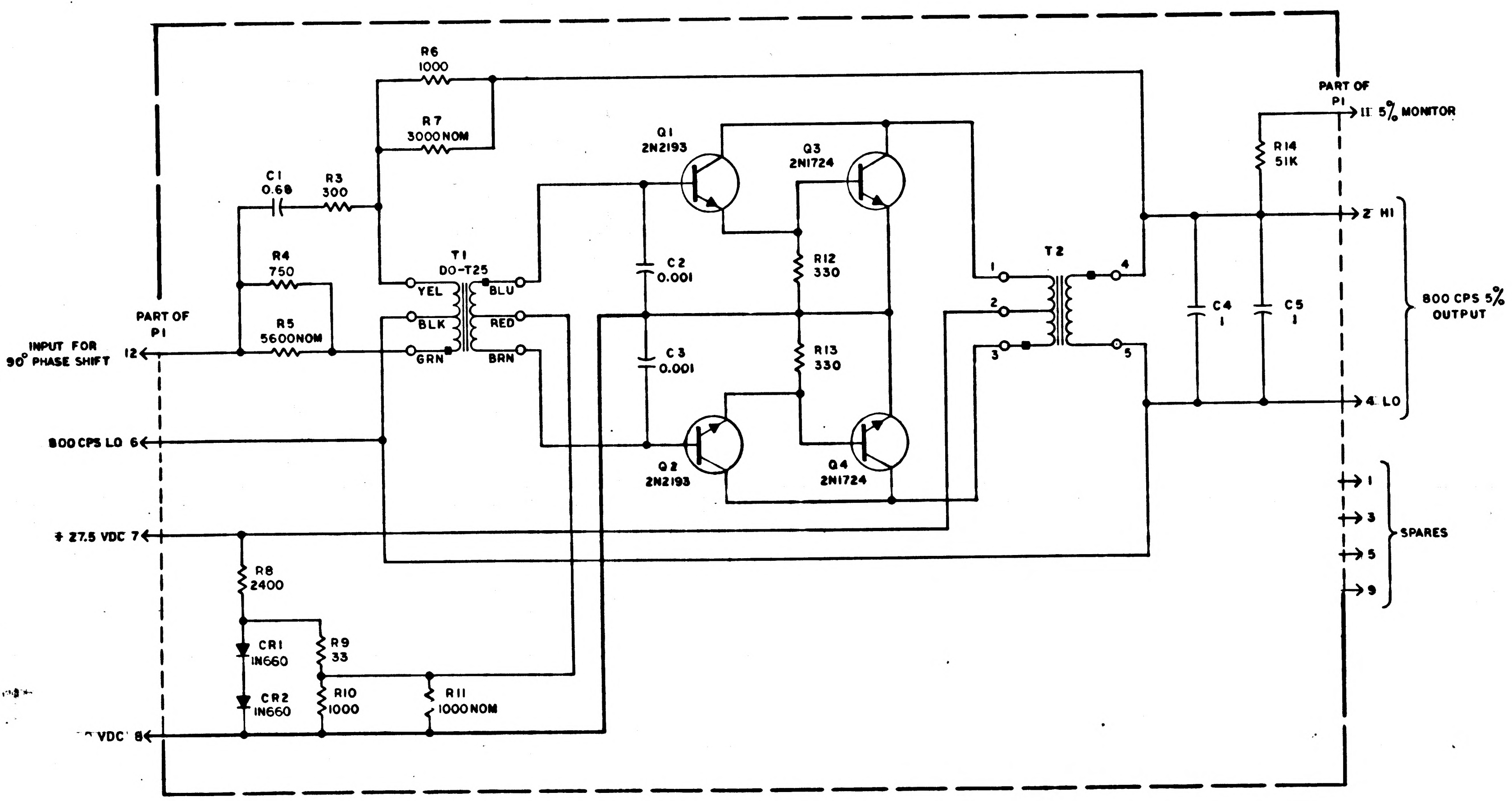
REVISIONS			
TDRR 00296		7/14/63	
SYM	DESCRIPTION	DATE	APPROVAL


R6
1000
R7
3000 NOM
C1
0.68
R3
300
R4
750
R5
5600 NOM
PART OF
P1
INPUT FOR
90° PHASE SHIFT 12
T1
DO-T25
YEL
BLK
GRN
BLU
RED
BRN
Q1
2N2193
Q2
2N2193
Q3
2N1724
Q4
2N1724
C2
0.001
C3
0.001
R12
330
R13
330
T2
1
2
3
4
5
800 CPS LO 6
+ 27.5 VDC 7
R8
2400
CR1
1N660
CR2
1N660
R9
33
R10
1000
R11
1000 NOM
VDC 8
PART OF
P1
11 5% MONITOR
R14
51K
2 HI
C4
1
C5
1
800 CPS 5%
OUTPUT
4 LO
1
3
5
9
SPARES

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	———	NOT USED	——	—	—
R2	———	NOT USED	——	—	—
R3	1010389-43	RESISTOR	300	± 1%	3 W
R4	1010389-53	↓	750	↓	↓
R5	1010389	↓	SEE NOTE	↓	↓
R6	1010389-56	↓	1000	↓	↓
R7	1010389	↓	SEE NOTE	↓	↓
R8	1010389-65	↓	2400	↓	↓
R9	1010369-140	↓	33	± 5%	1/8 W
R10	1010364-251	↓	1000	± 1%	↓
R11	1010364	↓	SEE NOTE	± 1%	↓
R12	1006750-20	↓	330	± 2%	1/4 W
R13	1006750-20	↓	330	↓	↓
R14	1006750-73	↓	51K	↓	↓
C1	1010264-36	CAPACITOR	0.68	± 5%	200VDC
C2	1010264 - 1	↓	0.001	± 5%	200VDC
C3	1010264 - 1	↓	0.001	± 5%	200VDC
C4	1010264-37	↓	1	± 5%	200VDC
C5	1010264-37	↓	1	± 5%	200VDC
CR1	1010385	DIODE	1N660		
CR2	1010385	↓	1N660		
Q1	1010398-2	TRANSISTOR	2N2193		
Q2	1010398-2	↓	2N2193		
Q3	1010273	↓	2N1724		
Q4	1010273	↓	2N1724		
T1	1010407	TRANSFORMER	DO-T25		
T2	1010308	↓			

R5	R11	R7
2800	510	1500
3000	560	1600
3300	620	1800
3600	680	2000
3900	750	2200
4100	820	2300
4300	910	2400
4500	1000	2600
4900	1100	2800
5100	1200	3000
5300	1300	3100
5600	1400	3300
5800	1500	3500
6100		3600
6300		3900
6600		4100
6900		4300
7200		4500
7500		
7800		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. FINAL VALUES TO BE DETERMINED BY ELECTRICAL TEST COMPONENTS TO BE SUPPLIED PER TABLE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN G. Di Leo DATE 6 FEB 63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

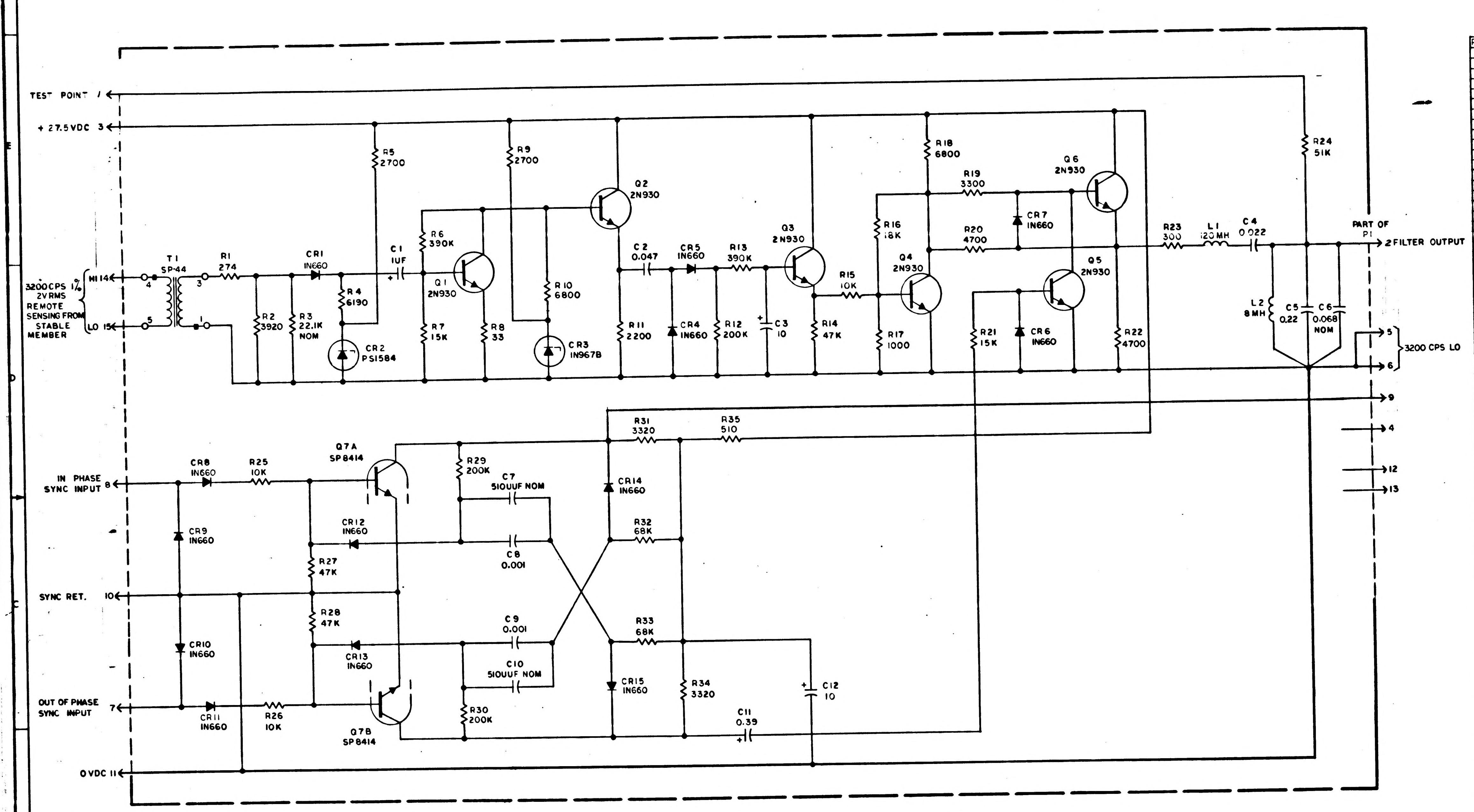
SCHEMATIC,
800 CPS 5% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010046
SCALE —
WT —
SHEET 1 OF 1

1010046

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 00841			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01114	[illegible] 63	[illegible]


TEST POINT 1
+27.5VDC 3
3200CPS 1/4
2V RMS
REMOTE
SENSING FROM
STABLE
MEMBER
HI 14
LO 15
T1
SP-44
R1
274
CR1
IN660
C1
1UF
R2
3920
R3
22.1K
NOM
R4
6190
CR2
PS1584
R5
2700
R6
390K
Q1
2N930
R7
15K
R8
33
R9
2700
R10
6800
CR3
IN967B
Q2
2N930
R11
2200
C2
0.047
CR5
IN660
CR4
IN660
R13
390K
R12
200K
C3
10
Q3
2N930
R14
47K
R15
10K
R16
18K
R17
1000
Q4
2N930
R18
6800
R19
3300
R20
4700
CR7
IN660
Q6
2N930
Q5
2N930
R21
15K
CR6
IN660
R22
4700
R23
300
L1
120MH
C4
0.022
R24
51K
PART OF
P1
2 FILTER OUTPUT
L2
8MH
C5
0.22
C6
0.068
NOM
5
6
3200 CPS LO
9
4
12
13
IN PHASE
SYNC INPUT 8
CR8
IN660
R25
10K
Q7A
SP8414
R29
200K
C7
510UUF NOM
R31
3320
R35
510
CR14
IN660
CR12
IN660
C8
0.001
R32
68K
CR9
IN660
R27
47K
SYNC RET. 10
R28
47K
C9
0.001
R33
68K
CR10
IN660
CR13
IN660
C10
510UUF NOM
CR15
IN660
R34
3320
C12
10
OUT OF PHASE
SYNC INPUT 7
CR11
IN660
R26
10K
Q7B
SP8414
R30
200K
C11
0.39
OVDC 11

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-143	RESISTOR	274	± %	/8 W
R2	1010364-365		3920	%	1/8 W
R3	1010364		SEE NOTE	%	1/8 W
R4	1010364-403		6190	1%	1/8 W
R5	1006750-42		2700	±2%	1/4 W
R6	1010369-95		390K	±5%	1/8 W
R7	1006750-60		15K	±2%	1/4 W
R8	1010369-140		33	±5%	1/8 W
R9	1006750-42		2700	±2%	1/4 W
R10	1006750-52		6800	±2%	1/4 W
R11	1006750-40		2200	±2%	1/4 W
R12	1010369-88		200K	±5%	1/8 W
R13	1010369-95		390K	±5%	1/8 W
R14	1006750-72		47K	±2%	1/4 W
R15	1006750-56		10K	±2%	1/4 W
R16	1006750-62		18K	±2%	1/4 W
R17	1006750-32		1000	±2%	1/4 W
R18	1006750-52		6800	±2%	1/4 W
R19	1006750-44		3300	±2%	1/4 W
R20	1006750-48		4700	±2%	1/4 W
R21	1006750-60		15K	±2%	1/4 W
R22	1006750-48		4700	±2%	1/4 W
R23	1006750-19		300	±2%	1/4 W
R24	1006750-73		51K	±2%	1/4 W
R25	1006750-56		10K	±2%	1/4 W
R26	1006750-56		10K	±2%	1/4 W
R27	1006750-72		47K	±2%	1/4 W
R28	1006750-72		47K	±2%	1/4 W
R29	1010364-693		200K	±1%	1/8 W
R30	1010364-693		200K	±1%	1/8 W
R31	1010363-351		3320	±1%	1/4 W
R32	1006750-76		68K	±2%	1/4 W
R33	1006750-76		68K	±2%	1/4 W
R34	1010363-351		3320	±1%	1/4 W
R35	1010278-56		510	±5%	1/2 W
C1	1006755-69	CAPACITOR	1.0	±10%	35 VDC
C2	1010264-21		0.047	±5%	200VDC
C3	1006755-31		10.0	±10%	20VDC
C4	1010264-17		0.022	±5%	200VDC
C5	1010264-29		0.22	±5%	200VDC
C6	1010264		SEE NOTE 4	±5%	200VDC
C7	1010410		SEE NOTE 4	±2%	
C8	1006793-007		0.001	±2%	500VDC
C9	1006793-007		0.001	±2%	500VDC
C10	1010410		SEE NOTE 4	±2%	
C11	1006755-64		0.39	±10%	35VDC
C12	1006755-81		10.0	±10%	35VDC
L1	1010309-8	COIL	120 MH		
L2	1010309-3	COIL	8 MH		
CR1	1010385	DIODE	IN660		
CR2	1010346		PS-1584		250MW
CR3	1010286-11		IN967B		400MW
CR4	1010385		IN660		
CR5	1010385		IN660		
CR6	1010385		IN660		
CR7	1010385		IN660		
CR8	1010385		IN660		
CR9	1010385		IN660		
CR10	1010385		IN660		
CR11	1010385		IN660		
CR12	1010385		IN660		
CR13	1010385		IN660		
CR14	1010385		IN660		
CR15	1010385		N660		
Q1	1010397	TRANSISTOR	2N930		
Q2	1010397		2N930		
Q3	1010397		2N930		
Q4	1010397		2N930		
Q5	1010397		2N930		
Q6	1010397		2N930		
Q7	1010431		SP8414A		
T1	1010291-2	TRANSFORMER	SP-44		

R3			
PART NO.	VALUE	PART NO.	VALUE
1010364-451	11 K	1010364-517	24.3 K
-457	11.8 K	-521	25.5 K
-461	12.4 K	-525	26.7 K
-465	13 K	-529	28 K
-469	13.7 K	-533	29.4 K
-475	14.7 K	-537	30.9 K
-479	15.4 K	-541	32.4 K
-483	16.2 K	-545	34 K
-487	16.9 K	-549	35.7 K
-491	17.8 K	-553	37.4 K
-495	18.7 K	-557	39.2 K
-501	20 K	-561	41.2 K
-505	21 K	-565	43,2 K
-509	22.1 K	-569	45.3 K
-513	23.2		

C6		C7 & C10	
PART NO.	VALUE - UF	PART NO.	VALUE - PF
1010264-21	.047	1010410-2	240
1010264-22	.056	1010410-3	270
1010264-23	.068	1010410-4	300
1010264-24	.082	1010410-5	330
1010264-25	.100	1010410-6	360
		1010410-7	390
		1010410-8	430
		1010410-9	470
		1010410-10	510
		1010410-11	560
		1010410-12	620
		1010410-13	680
		1010410-14	750
		1010410-15	820
		1010410-16	910
		1010410-17	1000

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R3, C6, C7, C10 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT L2, C5, C6 TO 3200 CPS LO AT ONE POINT ONLY AS SHOWN
6. CONNECT 3200 CPS LO TO OVDC AT ONE POINT ONLY AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN A. D. Lee DATE [illegible]
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 [illegible] 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, 3200 CPS AAC, FILTER & MULTIVIBRATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO 1010047
SCALE — WT — SHEET 1 OF 1

1010047

INCHES
PHOTOGRAPHIC SCALE ONLY

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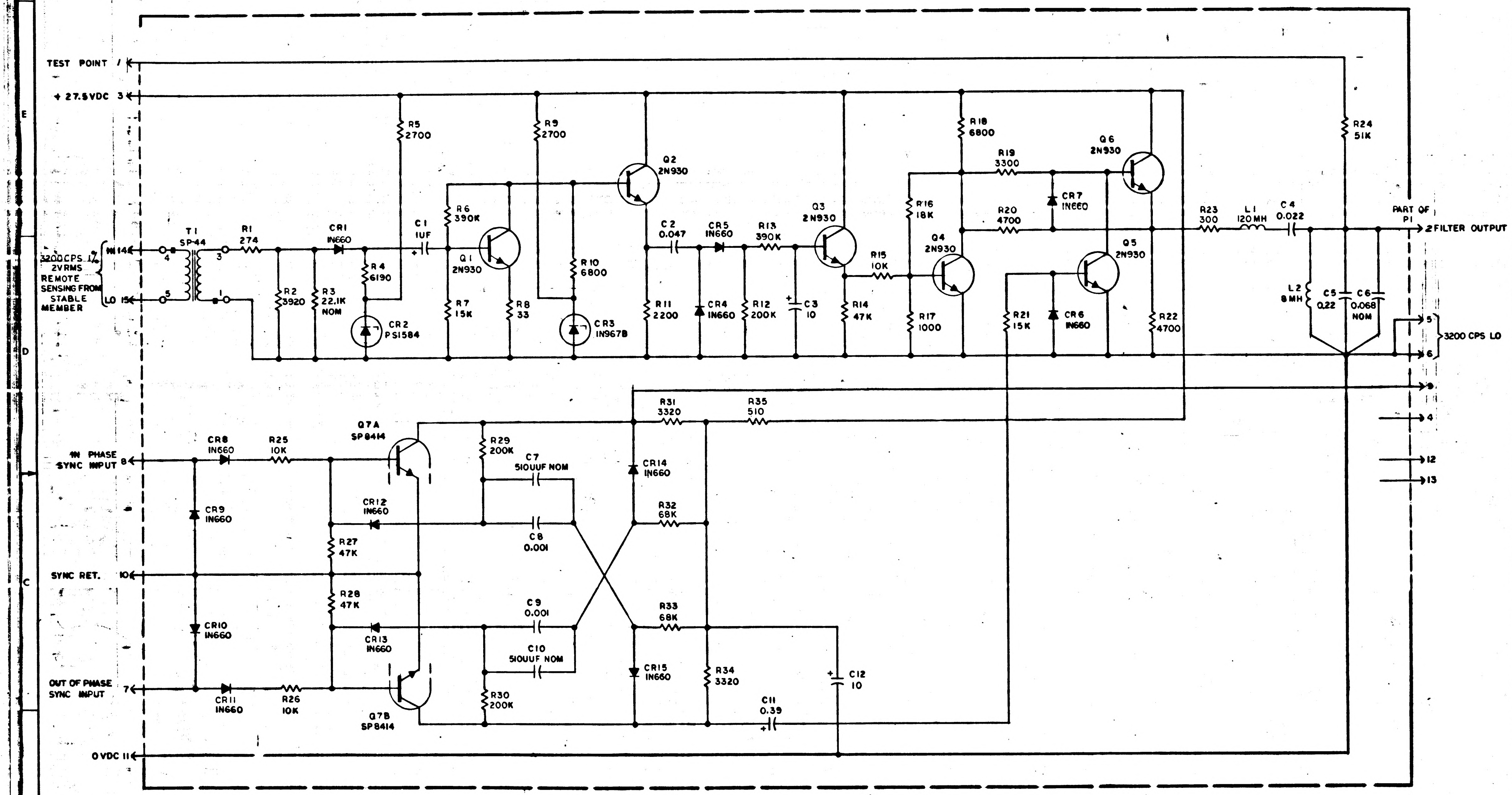
REVISIONS TDRR 00 841			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01114	1 MAY 63	NDT WK
B	REVISED PER TDRR 02397	7 5 63	WK


TEST POINT 1
+27.5VDC 3
3200CPS 1% 2VRMS REMOTE SENSING FROM STABLE MEMBER
HI 14
LO 15
T1 SP-44
4
5
3
1
R1 274
R2 3920
R3 22.1K NOM
CR1 IN660
R4 6190
CR2 PS1584
R5 2700
C1 1UF
R6 390K
Q1 2N930
R7 15K
R8 33
R9 2700
R10 6800
CR3 IN967B
Q2 2N930
C2 0.047
R11 2200
CR5 IN660
CR4 IN660
R13 390K
R12 200K
C3 10
Q3 2N930
R14 47K
R15 10K
R16 18K
R17 1000
Q4 2N930
R18 6800
R19 3300
CR7 IN660
R20 4700
Q6 2N930
Q5 2N930
R21 15K
CR6 IN660
R22 4700
R23 300
L1 120MH
C4 0.022
R24 51K
L2 8MH
C5 0.22
C6 0.068 NOM
PART OF P1
2 FILTER OUTPUT
5
6
3200 CPS LO
9
4
12
13
IN PHASE SYNC INPUT 8
CR8 IN660
R25 10K
CR9 IN660
SYNC RET. 10
CR10 IN660
OUT OF PHASE SYNC INPUT 7
CR11 IN660
R26 10K
Q7A SP8414
Q7B SP8414
R27 47K
R28 47K
CR12 IN660
CR13 IN660
R29 200K
R30 200K
C7 510UUF NOM
C8 0.001
C9 0.001
C10 510UUF NOM
R31 3320
R35 510
CR14 IN660
R32 68K
R33 68K
CR15 IN660
R34 3320
C11 0.39
C12 10
0VDC 11

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364 - 143	RESISTOR	274	±1 %	1/8 W
R2	1010364 - 365		3920	1 %	1/8 W
R3	1010364		SEE NOTE	1 %	1/8 W
R4	1010364 - 403		6190	1 %	1/8 W
R5	1006750-42		2700	±2 %	1/4 W
R6	1010369 - 95		390K	±5 %	1/8 W
R7	1006750-60		15K	±2 %	1/4 W
R8	1010369 - 140		33	±5 %	1/8 W
R9	1006750-42		2700	±2 %	1/4 W
R10	1006750-52		6800	±2 %	1/4 W
R11	1006750-40		2200	±2 %	1/4 W
R12	1010369 - 88		200K	±5 %	1/8 W
R13	1010369 - 95		390K	±5 %	1/8 W
R14	1006750-72		47K	±2 %	1/4 W
R15	1006750- 56		10K	±2 %	1/4 W
R16	1006750- 62		18K	±2 %	1/4 W
R17	1006750- 32		1000	±2 %	1/4 W
R18	1006750- 52		6800	±2 %	1/4 W
R19	1006750- 44		3300	±2 %	1/4 W
R20	1006750-48		4700	±2 %	1/4 W
R21	1006750- 60		15K	±2 %	1/4 W
R22	1006750-48		4700	±2 %	1/4 W
R23	1006750- 19		300	±2 %	1/4 W
R24	1006750- 73		51 K	±2 %	1/4 W
R25	1006750- 56		10K	±2 %	1/4 W
R26	1006750- 56		10K	±2 %	1/4 W
R27	1006750- 72		47K	±2 %	1/4 W
R28	1006750- 72		47K	±2 %	1/4 W
R29	1010364 -693		200K	±1 %	1/8 W
R30	1010364 -693		200K	±1 %	1/8 W
R31	1010363 -351		3320	±1 %	1/4 W
R32	1006750-76		68K	±2 %	1/4 W
R33	1006750-76		68K	±2 %	1/4 W
R34	1010363 -351		3320	±1 %	1/4 W
R35	1010278 -56		510	±5 %	1/2 W
C1	1006755- 69	CAPACITOR	1.0	±10 %	35 VDC
C2	1010264 - 21		0.047	±5 %	200VDC
C3	1006755- 31		10.0	±10 %	20VDC
C4	1010264 - 17		0.022	±5 %	200VDC
C5	1010264 - 29		0.22	±5 %	200VDC
C6	1010264		SEE NOTE 4	±5 %	200VDC
C7	1010410		SEE NOTE 4	±2 %	
C8	1006793-007		0.001	±2 %	500VDC
C9	1006793-007		0.001	±2 %	500VDC
C10	1010410		SEE NOTE 4	±2 %	
C11	1006755 - 64		0.39	±10 %	35VDC
C12	1006755 - 81		10.0	±10 %	35VDC
L1	1010309-8	COIL	120 MH		
L2	1010309-3	COIL	8 MH		
CR1	1010385	DIODE	IN660		
CR2	1010346		PS-1584		250MW
CR3	1010286 - 11		IN967B		400MW
CR4	1010385		IN660		
CR5	1010385		IN660		
CR6	1010385		IN660		
CR7	1010385		IN660		
CR8	1010385		IN660		
CR9	1010385		IN660		
CR10	1010385		IN660		
CR11	1010385		IN660		
CR12	1010385		IN660		
CR13	1010385		IN660		
CR14	1010385		IN660		
CR15	1010385		IN660		
Q1	1010397	TRANSISTOR	2N930		
Q2	1010397		2N930		
Q3	1010397		2N930		
Q4	1010397		2N930		
Q5	1010397		2N930		
Q6	1010397		2N930		
Q7	1010431		SP8414A		
T1	1010291-2	TRANSFORMER	SP-44		

R3			
PART NO.	VALUE	PART NO.	VALUE
1010364-451	11 K	1010364-517	24.3 K
-457	11.8 K	-521	25.5 K
-461	12.4 K	-525	26.7 K
-465	13 K	-529	28 K
-469	13.7 K	-533	29.4 K
-475	14.7 K	-537	30.9 K
-479	15.4 K	-541	32.4 K
-483	16.2 K	-545	34 K
-487	16.9 K	-549	35.7 K
-491	17.8 K	-553	37.4 K
-495	18.7 K	-557	39.2 K
-501	20 K	-561	41.2 K
-505	21 K	-565	43.2 K
-509	22.1 K	-569	45.3 K
-513	23.2		

C6		C7 & C10	
PART NO.	VALUE - UF	PART NO.	VALUE - PF
1010264- 21	.047	1010410 - 2	240
1010264 - 22	.056	1010410 - 3	270
1010264 - 23	.068	1010410 - 4	300
1010264 - 24	.082	1010410 - 5	330
1010264-25	.100	1010410 - 6	360
		1010410 - 7	390
		1010410 - 8	430
		1010410 - 9	470
		1010410 - 10	510
		1010410 - 11	560
		1010410 - 12	620
		1010410 - 13	680
		1010410 - 14	750
		1010410 - 15	820
		1010410 - 16	910
		1010410 - 17	1000

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R3, C6, C7, C10 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT L2, C5, C6 TO 3200 CPS LO AT ONE POINT ONLY AS SHOWN
6. CONNECT 3200 CPS LO TO 0VDC AT ONE POINT ONLY AS SHOWN

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN A. Dilan DATE 25 MAR 63
CHECKED Manuel Fernandez
APPROVAL Manuel Fernandez
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 17 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, 3200 CPS AAC, FILTER & MULTIVIBRATOR

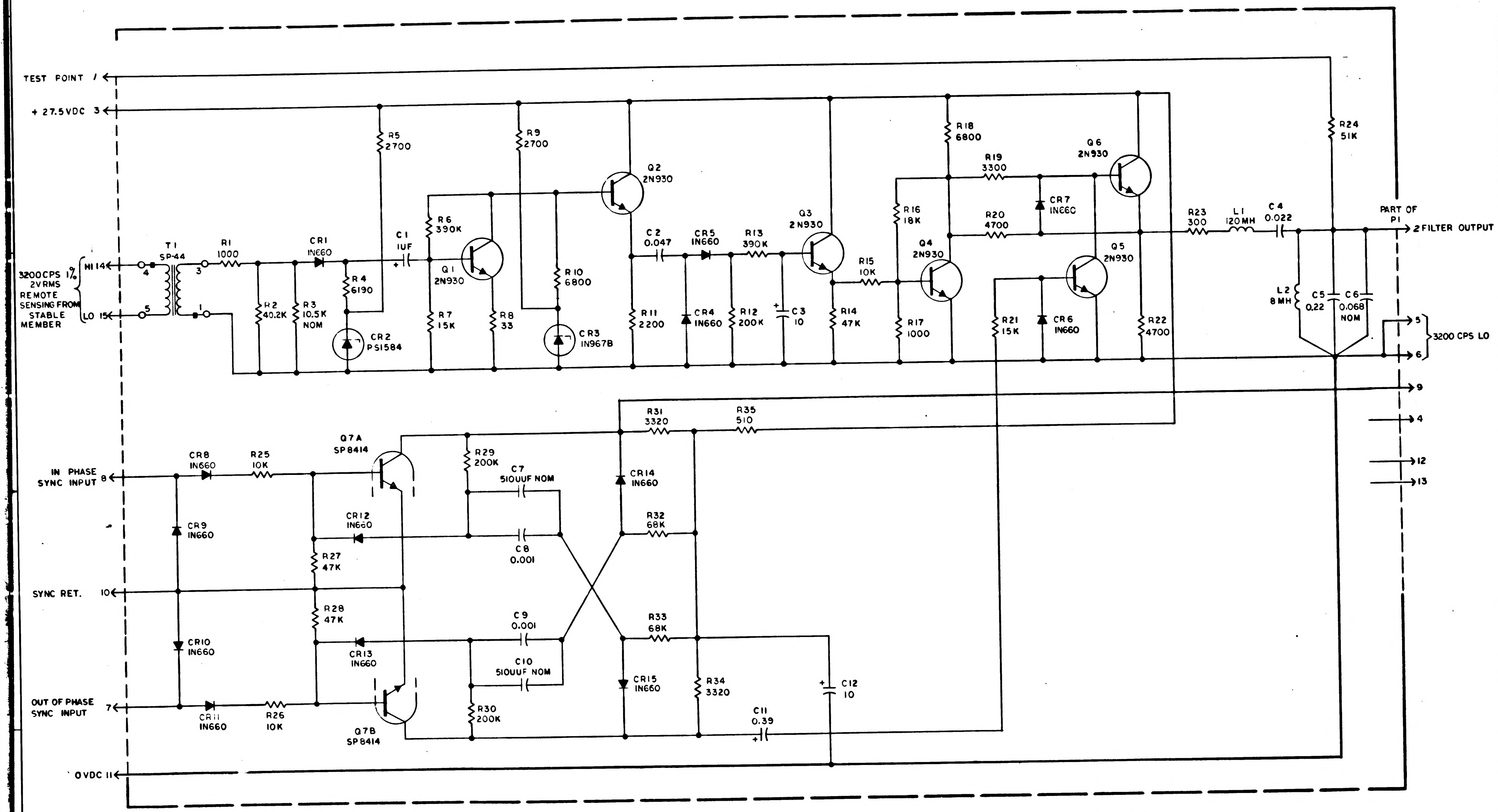
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010047
SCALE —
WT —
SHEET 1 OF 1

MASTER

1010047 B

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR 00841		
A	REVISED PER TDRR 01114	1 MAY 63	NCT WK
B	REVISED PER TDRR 02347	7 3 63	WK
C	REVISED PER TDRR 11637	31 AUG 64	JND


TEST POINT 1
+ 27.5 VDC 3
3200 CPS 1% 2VRMS REMOTE SENSING FROM STABLE MEMBER
HI 14
LO 15
T1 SP-44
4
5
3
1
R1 1000
R2 40.2K
R3 10.5K NOM
CR1 IN660
R4 6190
CR2 PS1584
R5 2700
C1 1UF
R6 390K
R7 15K
Q1 2N930
R8 33
R9 2700
R10 6800
CR3 IN967B
Q2 2N930
C2 0.047
CR5 IN660
R11 2200
CR4 IN660
R12 200K
R13 390K
C3 10
Q3 2N930
R14 47K
R15 10K
R16 18K
R17 1000
Q4 2N930
R18 6800
R19 3300
CR7 IN660
R20 4700
Q6 2N930
Q5 2N930
R21 15K
CR6 IN660
R22 4700
R23 300
L1 120MH
C4 0.022
R24 51K
L2 8MH
C5 0.22
C6 0.068 NOM
PART OF P1
2 FILTER OUTPUT
5
6
3200 CPS LO
9
4
12
13
IN PHASE SYNC INPUT 8
CR8 IN660
R25 10K
CR9 IN660
SYNC RET. 10
CR10 IN660
OUT OF PHASE SYNC INPUT 7
CR11 IN660
R26 10K
Q7A SP8414
Q7B SP8414
CR12 IN660
R27 47K
R28 47K
CR13 IN660
R29 200K
C7 510UUF NOM
C8 0.001
C9 0.001
C10 510UUF NOM
R30 200K
R31 3320
R35 510
CR14 IN660
R32 68K
R33 68K
CR15 IN660
R34 3320
C11 0.39
C12 10
0VDC 11

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364 - 251	RESISTOR	1000	±1 %	1/8 W
R2	1010364 - 559		40.2K	1 %	1 8 W
R3	1010364		SEENOTE	1 %	1 8 W
R4	1010364 - 403		6190	1 %	1 8 W
R5	1006750-42		2700	±2 %	1/4 W
R6	1010369 - 95		390K	±5 %	1 8 W
R7	1006750-60		15K	±2 %	1/4 W
R8	1010369 - 140		33	±5 %	1/8 W
R9	1006750-42		2700	±2 %	1/4 W
R10	1006750-52		6800	±2 %	1/4 W
R11	1006750-40		2200	±2 %	1/4 W
R12	1010369 - 88		200K	±5 %	1/8 W
R13	1010369 - 95		390K	±5 %	1/8 W
R14	1006750-72		47K	±2 %	1/4 W
R15	1006750 56		10K	±2 %	1/4 W
R16	1006750- 62		18K	±2 %	1/4 W
R17	1006750- 32		1000	±2 %	1/4 W
R18	1006750 52		6800	±2 %	1/4 W
R19	1006750- 44		3300	±2 %	1/4 W
R20	1006750- 48		4700	±2 %	1/4 W
R21	1006750 - 60		15K	±2 %	1/4 W
R22	1006750-48		4700	±2 %	1/4 W
R23	1006750- 19		300	±2 %	1/4 W
R24	1006750- 73		51K	±2 %	1/4 W
R25	1006750- 56		10K	±2 %	1/4 W
R26	1006750- 56		10K	±2 %	1/4 W
R27	1006750- 72		47K	±2 %	1/4 W
R28	1006750-72		47K	±2 %	1/4 W
R29	1010364 -693		200K	±1 %	1/8 W
R30	1010364 -693		200K	±1 %	1/8 W
R31	1010363 -351		3320	±1 %	1/4 W
R32	1006750-76		68K	±2 %	1/4 W
R33	1006750-76		68K	±2 %	1/4 W
R34	1010363 -351		3320	±1 %	1/4 W
R35	1010278 -56		510	±5 %	1/2 W
C1	1006755- 69	CAPACITOR	1.0	±10 %	35 VDC
C2	1010264 - 21		0.047	± 5 %	200VDC
C3	1006755- 31		10.0	±10 %	20VDC
C4	1010264 - 17		0.022	± 5 %	200VDC
C5	1010264 - 29		0.22	± 5 %	200VDC
C6	1010264		SEENOTE4	± 5 %	200VDC
C7	1010410		SEENOTE4	± 2 %	
C8	1006793-007		0.001	± 2 %	500VDC
C9	1006793-007		0.001	± 2 %	500VDC
C10	1010410		SEENOTE4	± 2 %	
C11	1006755 - 64		0.39	±10 %	35VDC
C12	1006755 - 81		10.0	±10 %	35VDC
L1	1010309-8	COIL	120 MH		
L2	1010309-3	COIL	8 MH		
CR1	1010385	DIODE	IN660		
CR2	1010346		PS-1584		250MW
CR3	1010286 - 11		IN967B		400MW
CR4	1010385		IN660		
CR5	1010385		IN660		
CR6	1010385		IN660		
CR7	1010385		IN660		
CR8	1010385		IN660		
CR9	1010385		IN660		
CR10	1010385		IN660		
CR11	1010385		IN660		
CR12	1010385		IN660		
CR13	1010385		IN660		
CR14	1010385		IN660		
CR15	1010385		N660		
Q1	1010397	TRANSISTOR	2N930		
Q2	1010397		2N930		
Q3	1010397		2N930		
Q4	1010397		2N930		
Q5	1010397		2N930		
Q6	1010397		2N930		
Q7	1010431		SP8414 A		
T1	1010291-2	TRANSFORMER	SP- 44		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R3, C6, C7, C10 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT L2, C5, C6 TO 3200 CPS LO AT ONE POINT ONLY AS SHOWN
6. CONNECT 3200 CPS LO TO OVDC AT ONE POINT ONLY AS SHOWN

R3			
PART NO.	VALUE	PART NO.	VALUE
1010364-397	5.76K	1010364-457	11.8K
-399	5.90K	-461	12.4K
-401	6.04K	-465	13.0K
-403	6.19K	-469	13.7K
-405	6.34K	-475	14.7K
-407	6.49K	-479	15.4K
-409	6.65K	-483	16.2K
-411	6.81K	-487	16.9K
-413	6.98K	-491	17.8K
-415	7.15K	-495	18.7K
-417	7.32K	-501	20.0K
-419	7.50K	-505	21.0K
-421	7.68K	-509	22.1K
-423	7.87K	-517	24.3K
-425	8.06K	-525	26.7K
-427	8.25K	-533	29.4K
-429	8.45K	-543	33.2K
-431	8.66K	-553	37.4K
-433	8.87K	-565	43.2K
-435	9.09K	-577	49.9K
-439	9.53K	-593	60.4K
-443	10.0K	-609	73.2K
-447	10.5K	-635	100.0K
-451	11.0K	-673	158.0K
-455	11.5K		

C6		C7 & C10	
PART NO.	VALUE - UF	PART NO.	VALUE - PF
1010264 - 21	.047	1010410 - 2	240
1010264 - 22	.056	1010410 - 3	270
1010264 - 23	.068	1010410 - 4	300
1010264 - 24	.082	1010410 - 5	330
1010264-25	.100	1010410 - 6	360
		1010410 - 7	390
		1010410 - 8	430
		1010410 - 9	470
		1010410-10	510
		1010410-11	560
		1010410-12	620
		1010410-13	680
		1010410-14	750
		1010410-15	820
		1010410-16	910
		1010410-17	1000

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN A. D. Lee DATE 25 MAR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL Jack Brand
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

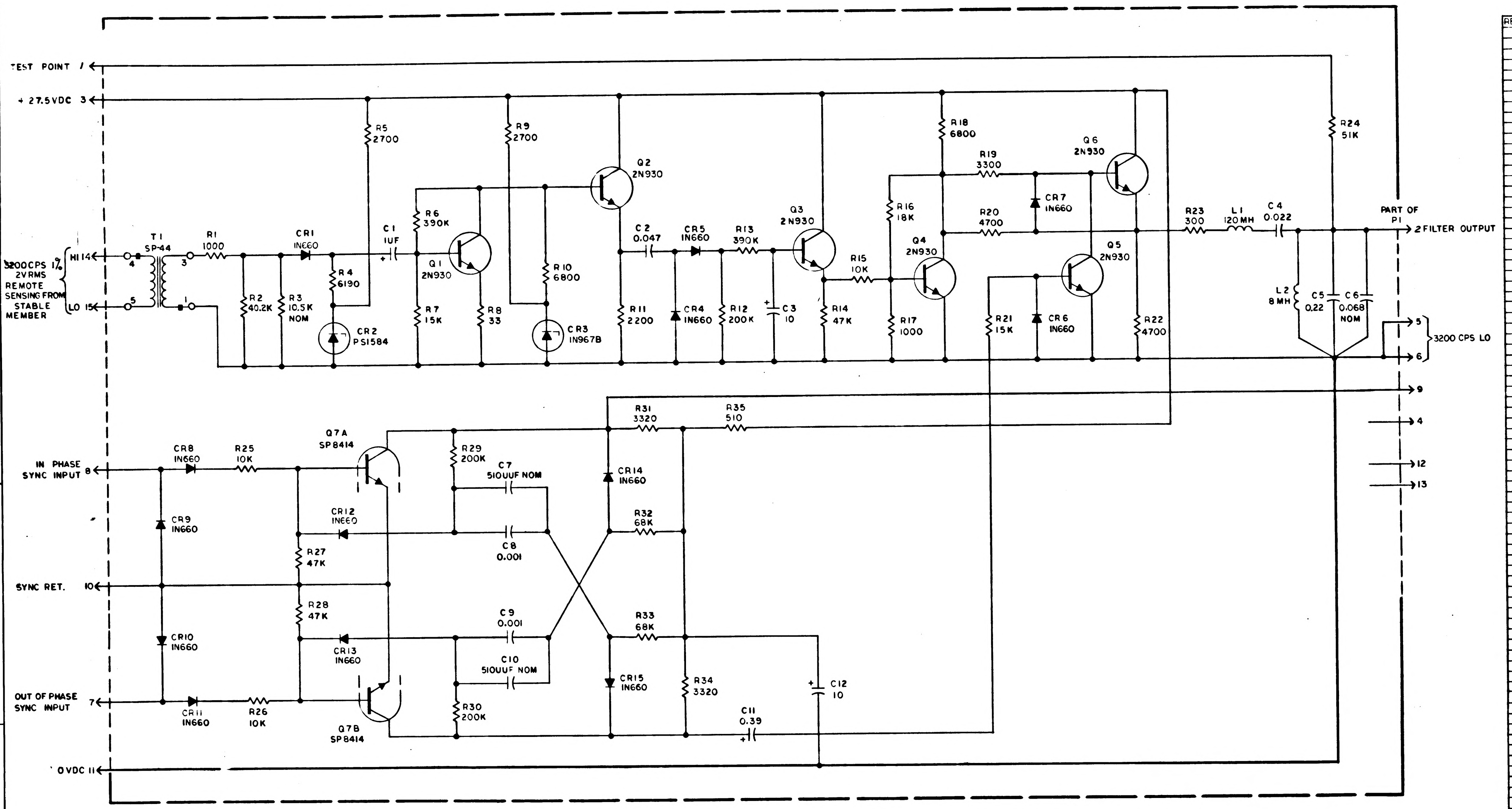
SCHEMATIC, 3200 CPS AAC, FILTER & MULTIVIBRATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010047
SCALE —
WT —
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00841

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01114	[illegible]	WTT WR
B	REVISED PER TDRR 02347	9 31 63	[illegible] WK
C	REVISED PER TDRR 11637	31 AUG 64	JWP
D	REVISED PER TDRR 17610	24 MAR 65	HTO


TEST POINT 1
+27.5VDC 3
3200CPS 1% 2VRMS REMOTE SENSING FROM STABLE MEMBER
HI 14
LO 15
T1 SP-44
R1 1000
CR1 IN660
R2 40.2K
R3 10.5K NOM
R4 6190
CR2 PS1584
R5 2700
C1 1UF
R6 390K
Q1 2N930
R7 15K
R8 33
R9 2700
R10 6800
CR3 IN967B
Q2 2N930
C2 0.047
CR5 IN660
R11 2200
CR4 IN660
R13 390K
R12 200K
C3 10
Q3 2N930
R14 47K
R15 10K
R16 18K
Q4 2N930
R17 1000
R18 6800
R19 3300
CR7 IN660
R20 4700
R21 15K
CR6 IN660
Q5 2N930
Q6 2N930
R22 4700
R23 300
L1 120MH
C4 0.022
R24 51K
L2 8MH
C5 0.22
C6 0.068 NOM
PART OF P1
2 FILTER OUTPUT
5
6
3200 CPS LO
9
4
12
13
IN PHASE SYNC INPUT 8
CR8 IN660
R25 10K
CR9 IN660
Q7A SP8414
R29 200K
C7 510UUF NOM
CR12 IN660
C8 0.001
R27 47K
SYNC RET. 10
R28 47K
C9 0.001
CR10 IN660
CR13 IN660
C10 510UUF NOM
OUT OF PHASE SYNC INPUT 7
CR11 IN660
R26 10K
Q7B SP8414
R30 200K
R31 3320
R35 510
CR14 IN660
R32 68K
R33 68K
CR15 IN660
R34 3320
C11 0.39
C12 10
OVDC 11

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-251	RESISTOR	1000	±1%	1/8 W
R2	1010364-559		40.2K	1%	1/8 W
R3	1010364		SEENOTE	1%	1/8 W
R4	1010364-403		6190	1%	1/8 W
R5	1006750-42		2700	±2%	1/4 W
R6	1010369-95		390K	±5%	1/8 W
R7	1006750-60		15K	±2%	1/4 W
R8	1010369-140		33	±5%	1/8 W
R9	1006750-42		2700	±2%	1/4 W
R10	1006750-52		6800	±2%	1/4 W
R11	1006750-40		2200	±2%	1/4 W
R12	1010369-88		200K	±5%	1/8 W
R13	1010369-95		390K	±5%	1/8 W
R14	1006750-72		47K	±2%	1/4 W
R15	1006750-56		10K	±2%	1/4 W
R16	1006750-62		18K	±2%	1/4 W
R17	1006750-32		1000	±2%	1/4 W
R18	1006750-52		6800	±2%	1/4 W
R19	1006750-44		3300	±2%	1/4 W
R20	1006750-48		4700	±2%	1/4 W
R21	1006750-60		15K	±2%	1/4 W
R22	1006750-48		4700	±2%	1/4 W
R23	1006750-19		300	±2%	1/4 W
R24	1006750-73		51K	±2%	1/4 W
R25	1006750-56		10K	±2%	1/4 W
R26	1006750-56		10K	±2%	1/4 W
R27	1006750-72		47K	±2%	1/4 W
R28	1006750-72		47K	±2%	1/4 W
R29	1010364-693		200K	±1%	1/8 W
R30	1010364-693		200K	±1%	1/8 W
R31	1010363-351		3320	±1%	1/4 W
R32	1006750-76		68K	±2%	1/4 W
R33	1006750-76		68K	±2%	1/4 W
R34	1010363-351		3320	±1%	1/4 W
R35	1010278-56		510	±5%	1/2 W
C1	1006755-69	CAPACITOR	1.0	±10%	35 VDC
C2	1010264-21		0.047	±5%	200VDC
C3	1006755-31		10.0	±10%	20VDC
C4	1010264-17		0.022	±5%	200VDC
C5	1010264-29		0.22	±5%	200VDC
C6	1010264		SEENOTE4	±5%	200VDC
C7	1010410		SEE NOTE4	±2%	
C8	1006793-007		0.001	±2%	500VDC
C9	1006793-007		0.001	±2%	500VDC
C10	1010410		SEENOTE4	±2%	
C11	1006755-64		0.39	±10%	35VDC
C12	1006755-81		10.0	±10%	35VDC
L1	1010309-8	COIL	120 MH		
L2	1010309-3	COIL	8 MH		
CR1	1010385	DIODE	IN660		
CR2	1010346		PS-1584		250MW
CR3	1010830-11		IN967B		400MW
CR4	1010385		IN660		
CR5	1010385		IN660		
CR6	1010385		IN660		
CR7	1010385		IN660		
CR8	1010385		IN660		
CR9	1010385		IN660		
CR10	1010385		IN660		
CR11	1010385		IN660		
CR12	1010385		IN660		
CR13	1010385		IN660		
CR14	1010385		IN660		
CR15	1010385		IN660		
Q1	1010397	TRANSISTOR	2N930		
Q2	1010397		2N930		
Q3	1010397		2N930		
Q4	1010397		2N930		
Q5	1010397		2N930		
Q6	1010397		2N930		
Q7	1010431		SP8414A		
T1	1010291-2	TRANSFORMER	SP-44		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R3, C6, C7, C10 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT L2, C5, C6 TO 3200 CPS LO AT ONE POINT ONLY AS SHOWN
6. CONNECT 3200 CPS LO TO OVDC AT ONE POINT ONLY AS SHOWN

R 3			
PART NO.	VALUE	PART NO.	VALUE
1010364-397	5.76K	1010364-457	11.8K
-399	5.90K	-461	12.4K
-401	6.04K	-465	13.0K
-403	6.19K	-469	13.7K
-405	6.34K	-475	14.7K
-407	6.49K	-479	15.4K
-409	6.65K	-483	16.2K
-411	6.81K	-487	16.9K
-413	6.98K	-491	17.8K
-415	7.15K	-495	18.7K
-417	7.32K	-501	20.0K
-419	7.50K	-505	21.0K
-421	7.68K	-509	22.1K
-423	7.87K	-517	24.3K
-425	8.06K	-525	26.7K
-427	8.25K	-533	29.4K
-429	8.45K	-543	33.2K
-431	8.66K	-553	37.4K
-433	8.87K	-565	43.2K
-435	9.09K	-577	49.9K
-439	9.53K	-593	60.4K
-443	10.0K	-609	73.2K
-447	10.5K	-635	100.0K
-451	11.0K	-673	158.0K
-455	11.5K		

C 6		C7 & C10	
PART NO.	VALUE - UF	PART NO.	VALUE - PF
1010264-21	.047	1010410-2	240
1010264-22	.056	1010410-3	270
1010264-23	.068	1010410-4	300
1010264-24	.082	1010410-5	330
1010264-25	.100	1010410-6	360
		1010410-7	390
		1010410-8	430
		1010410-9	470
		1010410-10	510
		1010410-11	560
		1010410-12	620
		1010410-13	680
		1010410-14	750
		1010410-15	820
		1010410-16	910
		1010410-17	1000

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN A. D. Lao DATE 25 MAR 63
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

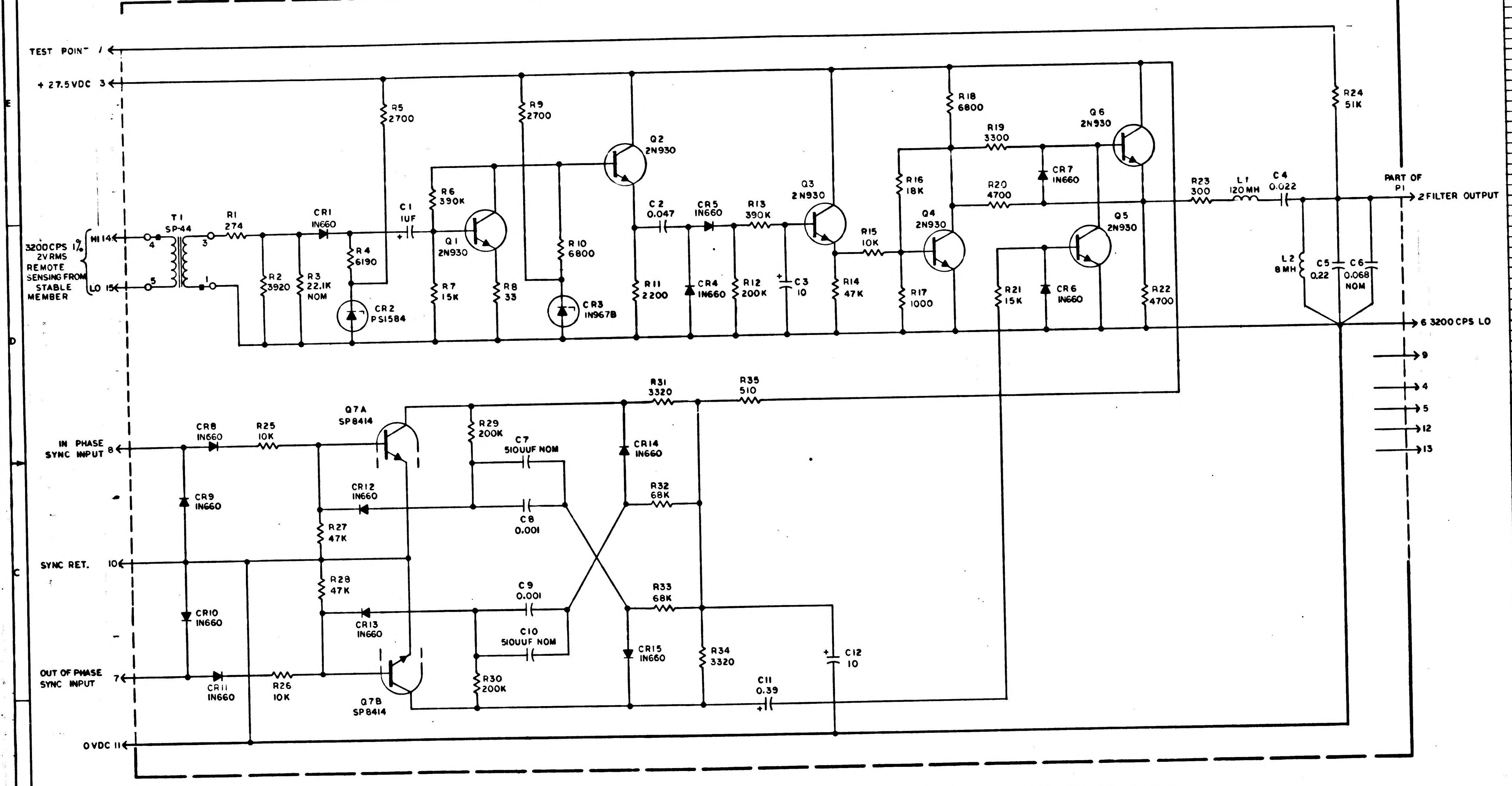
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, 3200 CPS AAC, FILTER & MULTIVIBRATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010047
SCALE —
WT —
SHEET 1 OF 1

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL


TEST POINT 1
+ 27.5 VDC 3
3200 CPS 1% 2V RMS REMOTE SENSING FROM STABLE MEMBER
HI 14
LO 15
T1 SP-44
4
5
3
1
R1 274
CR1 IN660
R2 3920
R3 22.1K NOM
R4 6190
CR2 PS1584
R5 2700
C1 1UF
R6 390K
Q1 2N930
R7 15K
R8 33
R9 2700
R10 6800
CR3 IN967B
Q2 2N930
C2 0.047
CR5 IN660
R13 390K
R11 2200
CR4 IN660
R12 200K
C3 10
Q3 2N930
R14 47K
R15 10K
R16 18K
R17 1000
R18 6800
R19 3300
CR7 IN660
R20 4700
Q4 2N930
Q5 2N930
Q6 2N930
R21 15K
CR6 IN660
R22 4700
R23 300
L1 120 MH
C4 0.022
R24 51K
L2 8 MH
C5 0.22
C6 0.068 NOM
PART OF P1
2 FILTER OUTPUT
6 3200 CPS LO
9
4
5
12
13
IN PHASE SYNC INPUT 8
CR8 IN660
R25 10K
CR9 IN660
SYNC RET. 10
CR10 IN660
OUT OF PHASE SYNC INPUT 7
CR11 IN660
R26 10K
OVDC 11
Q7A SP8414
Q7B SP8414
CR12 IN660
CR13 IN660
R27 47K
R28 47K
R29 200K
R30 200K
C7 510UUF NOM
C8 0.001
C9 0.001
C10 510UUF NOM
R31 3320
R35 510
CR14 IN660
R32 68K
R33 68K
CR15 IN660
R34 3320
C11 0.39
C12 10

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364 - 143	RESISTOR	274	±1%	1/8 W
R2	1010364 - 365		3920	±1%	1/8 W
R3	1010364		SEE NOTE	±1%	1/8 W
R4	1010364 - 403		6190	±1%	1/8 W
R5	1006750-42		2700	±2%	1/4 W
R6	1010369 - 95		390K	±5%	1/8 W
R7	1006750-60		15K	±2%	1/4 W
R8	1010369 - 140		33	±5%	1/8 W
R9	1006750-42		2700	±2%	1/4 W
R10	1006750-52		6800	±2%	1/4 W
R11	1006750-40		2200	±2%	1/4 W
R12	1010369 - 88		200K	±5%	1/8 W
R13	1010369 - 95		390K	±5%	1/8 W
R14	1006750-72		47K	±2%	1/4 W
R15	1006750-56		10K	±2%	1/4 W
R16	1006750-62		18K	±2%	1/4 W
R17	1006750-32		1000	±2%	1/4 W
R18	1006750-52		6800	±2%	1/4 W
R19	1006750-44		3300	±2%	1/4 W
R20	1006750-48		4700	±2%	1/4 W
R21	1006750-60		15K	±2%	1/4 W
R22	1006750-48		4700	±2%	1/4 W
R23	1006750-19		300	±2%	1/4 W
R24	1006750-73		51K	±2%	1/4 W
R25	1006750-56		10K	±2%	1/4 W
R26	1006750-56		10K	±2%	1/4 W
R27	1006750-72		47K	±2%	1/4 W
R28	1006750-72		47K	±2%	1/4 W
R29	1010364 -693		200K	±1%	1/8 W
R30	1010364 -693		200K	±1%	1/8 W
R31	1010363 -351		3320	±1%	1/4 W
R32	1006750-76		68K	±2%	1/4 W
R33	1006750-76		68K	±2%	1/4 W
R34	1010363 -351		3320	±1%	1/4 W
R35	1010278 -56		510	±5%	1/2 W
C1	1006755-69	CAPACITOR	1.0	±10%	35 VDC
C2	1010264 - 21		0.047	±5%	200VDC
C3	1006755-31		10.0	±10%	20VDC
C4	1010264 - 17		0.022	±5%	200VDC
C5	1010264 - 29		0.22	±5%	200VDC
C6	1010264		SEE NOTE 4	±5%	200VDC
C7	1010410		SEE NOTE 4	±2%	
C8	1006793-007		0.001	±2%	500VDC
C9	1006793-007		0.001	±2%	500VDC
C10	1010410		SEE NOTE 4	±2%	
C11	1006755 - 64		0.39	±10%	35VDC
C12	1006755 - 81		10.0	±10%	35VDC
L1	1010309-8	COIL	120 MH		
L2	1010309-3	COIL	8 MH		
CR1	1010385	DIODE	IN660		
CR2	1010346		PS-1584		250MW
CR3	1010286 - 11		IN967B		400MW
CR4	1010385		IN660		
CR5	1010385		IN660		
CR6	1010385		IN660		
CR7	1010385		IN660		
CR8	1010385		IN660		
CR9	1010385		IN660		
CR10	1010385		IN660		
CR11	1010385		IN660		
CR12	1010385		IN660		
CR13	1010385		IN660		
CR14	1010385		IN660		
CR15	1010385		IN660		
Q1	1010397	TRANSISTOR	2N930		
Q2	1010397		2N930		
Q3	1010397		2N930		
Q4	1010397		2N930		
Q5	1010397		2N930		
Q6	1010397		2N930		
Q7	1010431		SP8414A		
T1	1010291-2	TRANSFORMER	SP-44		

R3

PART NO.	VALUE	PART NO.	VALUE
1010364-451	11 K	1010364-517	24.3 K
-457	11.8 K	-521	25.5 K
-461	12.4 K	-525	26.7 K
-465	13 K	-529	28 K
-469	13.7 K	-533	29.4 K
-475	14.7 K	-537	30.9 K
-479	15.4 K	-541	32.4 K
-483	16.2 K	-545	34 K
-487	16.9 K	-549	35.7 K
-491	17.8 K	-553	37.4 K
-495	18.7 K	-557	39.2 K
-501	20 K	-561	41.2 K
-505	21 K	-565	43.2 K
-509	22.1 K	-569	45.3 K
-513	23.2		

C6		C7 & C10	
PART NO.	VALUE - UF	PART NO.	VALUE - PF
1010264 - 21	.047	1010410 - 2	240
1010264 - 22	.056	1010410 - 3	270
1010264 - 23	.068	1010410 - 4	300
1010264 - 24	.082	1010410 - 5	330
1010264-25	.100	1010410 - 6	360
		1010410 - 7	390
		1010410 - 8	430
		1010410 - 9	470
		1010410-10	510
		1010410-11	560
		1010410-12	620
		1010410-13	680
		1010410-14	750
		1010410-15	820
		1010410-16	910
		1010410-17	1000

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R3, C6, C7, C10 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLES
5. CONNECT L2, C5, C6 TO 3200 CPS LO AT ONE POINT ONLY AS SHOWN
6. CONNECT 3200 CPS LO TO OVDC AT ONE POINT ONLY AS SHOWN

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT

DRAWN A. D. Lee DATE 25 MAR
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Jun 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

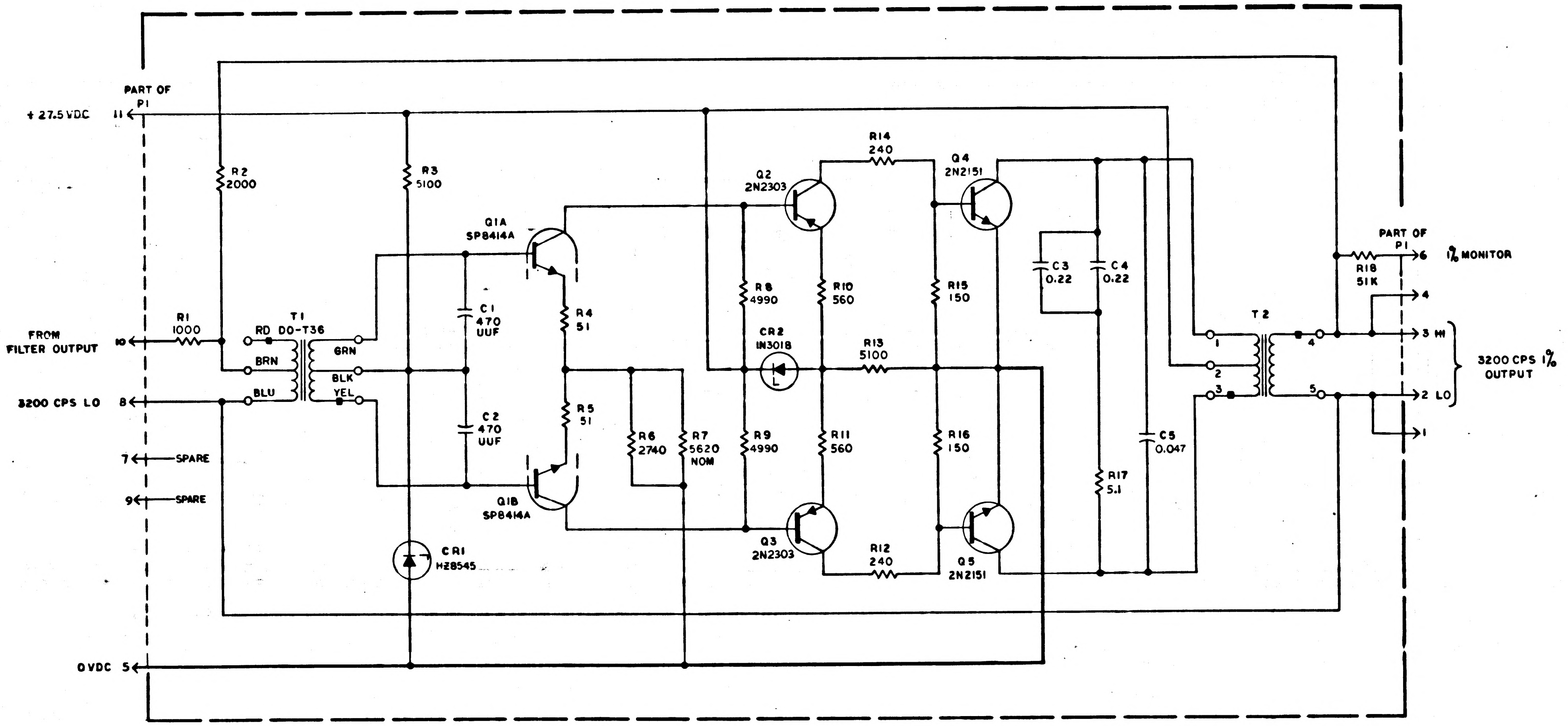
SCHEMATIC, 3200 CPS AAC, FILTER & MULTIVIBRATOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010047
SCALE —
WT —
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00841			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01407	5-31-63	DT. LK


PART OF P1
+27.5 VDC 11
FROM FILTER OUTPUT 10
3200 CPS LO 8
7 SPARE
9 SPARE
0VDC 5
R1 1000
T1 DO-T36
RD
BRN
BLU
GRN
BLK
YEL
R2 2000
R3 5100
Q1A SP8414A
Q1B SP8414A
C1 470 UUF
C2 470 UUF
R4 51
R5 51
CR1 HZ8545
R6 2740
R7 5620 NOM
Q2 2N2303
Q3 2N2303
R8 4990
R9 4990
CR2 1N3018
R10 560
R11 560
R14 240
R12 240
R13 5100
Q4 2N2151
Q5 2N2151
R15 150
R16 150
C3 0.22
C4 0.22
R17 5.1
C5 0.047
T2
1
2
3
4
5
PART OF P1
R18 51K
6 1% MONITOR
4
3 HI
2 LO
1
3200 CPS 1% OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-251	RESISTOR	1000	±1 %	1/8 W
R2	1010364-309		2000	±1 %	1/8 W
R3	1006750-49		5100	±2 %	1/4 W
R4	1006750-1		51	±2 %	1/4 W
R5	1006750-1		51	±2 %	1/4 W
R6	1010364-335		2740	±1 %	1/8 W
R7	1010364		SEE NOTE	±1 %	1/8 W
R8	1010364-385		4990	±1 %	1/8 W
R9	1010364-385		4990	±1 %	1/8 W
R10	1006750-26		560	±2 %	1/4 W
R11	1006750-26		560	±2 %	1/4 W
R12	1006750-17		[illegible]	2 %	1/4 W
R13	1010278-80		[illegible]	5 %	1/2 W
R14	1006750-17		[illegible]	±2 %	1/4 W
R15	1006750-12		[illegible]	±2 %	1/4 W
R16	1006750-12		150	±2 %	1/4 W
R17	1010278-8		5.1	±5 %	1/2 W
R18	1006750-73		51K	±2 %	1/4 W
C1	1010410-9	CAPACITOR	470 UUF	±2 %	500VDC
C2	1010410-9		470 UUF	±2 %	500VDC
C3	1010264-29		0.22	±5 %	200VDC
C4	1010264-29		0.22	±5 %	200VDC
C5	1010264-21		0.047	±5 %	200VDC
CR1	1010372-16	DIODE	HZ8545	±5 %	200 MA
CR2	1010265-3	DIODE	1N3018	±5 %	1W
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010269-2		2N2151		
Q5			2N2151		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010337				

FART NO.	R7
1010364-337	2800
-345	3090
-351	3320
-359	3650
-365	3920
-371	4220
-377	4530
-381	4750
-387	5110
-391	5360
-395	5620
-397	5760
-401	6040
-405	6340
-409	6650
-411	6810
-415	7150
-419	7500
-421	7680
-425	8060

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R7 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN A. Di Lea DATE [illegible]
CHECKED Manuel Kramer
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

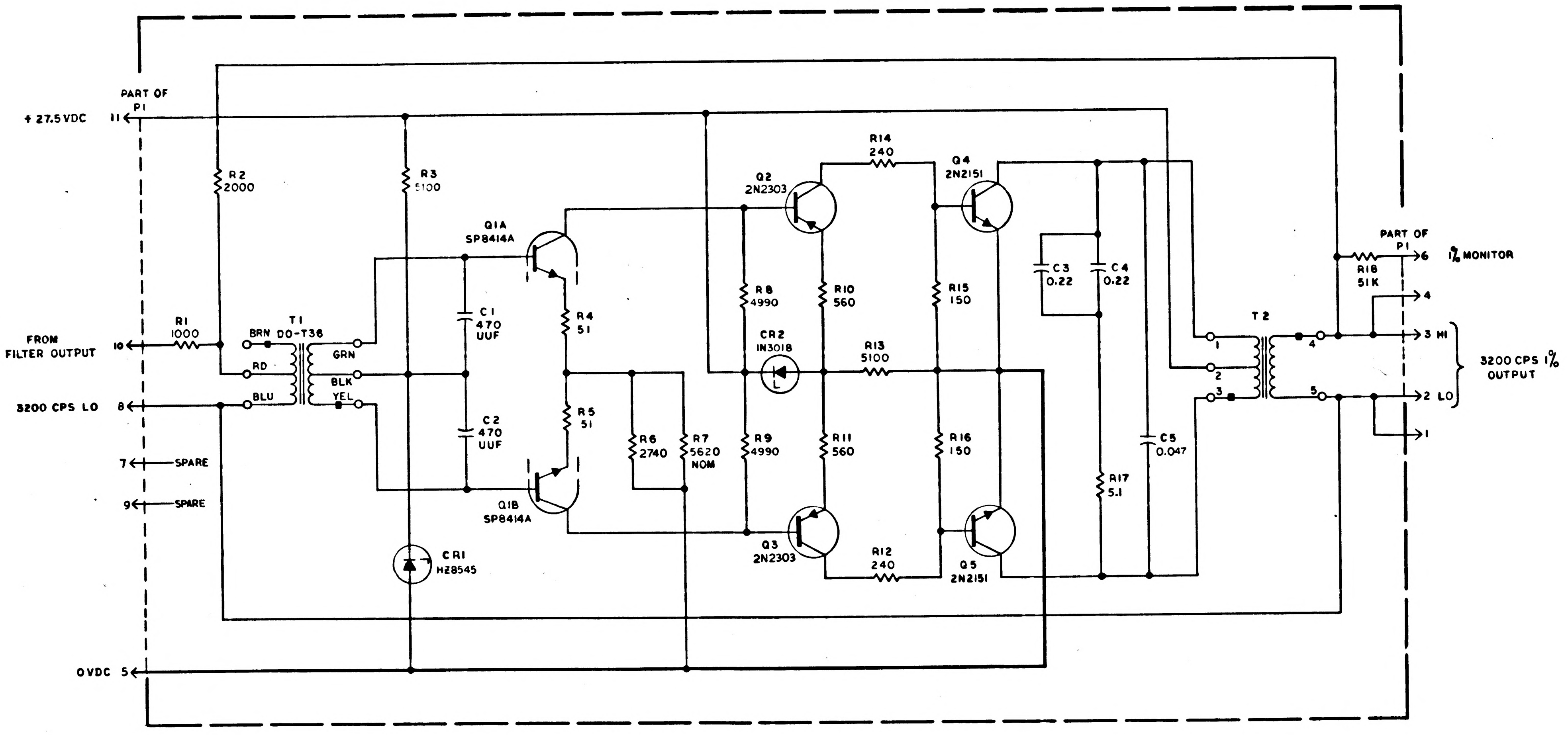
SCHEMATIC, 3200 CPS 1% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010048
SCALE — WT — SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS TDRR 00841			
A	REVISED PER TDRR 01407	5-31-63	QT wK
B	REVISED PER TDRR 0598	[illegible]	[illegible] wK


PART OF P1
+27.5 VDC
11
R2
2000
R3
5100
Q1A
SP8414A
R1
1000
T1
DO-T36
BRN
RD
BLU
GRN
BLK
YEL
FROM FILTER OUTPUT
10
3200 CPS LO
8
7
SPARE
9
SPARE
C1
470 UUF
C2
470 UUF
R4
51
R5
51
Q1B
SP8414A
CR1
HZ8545
R6
2740
R7
5620 NOM
Q2
2N2303
R8
4990
R9
4990
CR2
IN3018
R10
560
R11
560
R13
5100
R14
240
Q4
2N2151
R15
150
R16
150
Q3
2N2303
R12
240
Q5
2N2151
C3
0.22
C4
0.22
C5
0.047
R17
5.1
T2
1
2
3
4
5
PART OF P1
R18
51K
6
1% MONITOR
4
3 HI
2 LO
1
3200 CPS 1% OUTPUT
OVDC 5

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-251	RESISTOR	1000	±1%	1/8 W
R2	1010364-309		2000	±1%	1/8 W
R3	1006750-49		5100	±2%	1/4 W
R4	1006750-1		51	±2%	1/4 W
R5	1006750-1		51	±2%	1/4 W
R6	1010364-335		2740	±1%	1/8 W
R7	1010364		SEE NOTE	±1%	1/8 W
R8	1010364-385		4990	±1%	1/8 W
R9	1010364-385		4990	±1%	1/8 W
R10	1006750-26		560	±2%	1/4 W
R11	1006750-26		560	±2%	1/4 W
R12	1006750-17		240	±2%	1/4 W
R13	1010278-80		5100	±5%	1/2 W
R14	1006750-17		240	±2%	1/4 W
R15	1006750-12		150	±2%	1/4 W
R16	1006750-12		150	±2%	1/4 W
R17	1010278-8		5.1	±5%	1/2 W
R18	1006750-73		51K	±2%	1/4 W
C1	1010410-9	CAPACITOR	470 UUF	±2%	500VDC
C2	1010410-9		470 UUF	±2%	500VDC
C3	1010264-29		0.22	±5%	200VDC
C4	1010264-29		0.22	±5%	200VDC
C5	1010264-21		0.047	±5%	200VDC
CR1	1010372-16	DIODE	HZ8545	±5%	200 MA
CR2	1010265-3	DIODE	IN3018	±5%	1W
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010269-2		2N2151		
Q5			2N2151		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010337				

PART NO.	R7
1010364-337	2800
-345	3090
-351	3320
-359	3650
-365	3920
371	4220
-377	4530
-381	4750
-387	5110
-391	5360
-395	5620
-397	5760
-401	6040
-405	6340
-409	6650
-411	6810
415	7150
-419	7500
-421	7680
-425	8060

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R7 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN A. Di Leo DATE [illegible]
CHECKED Manuel Kramer [illegible]
APPROVAL Manuel Kramer [illegible]
APPROVAL

NASA APPROVAL 4/17/63
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, 3200 CPS 1% AMPLIFIER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010048
SCALE — WT — SHEET 1 OF 1

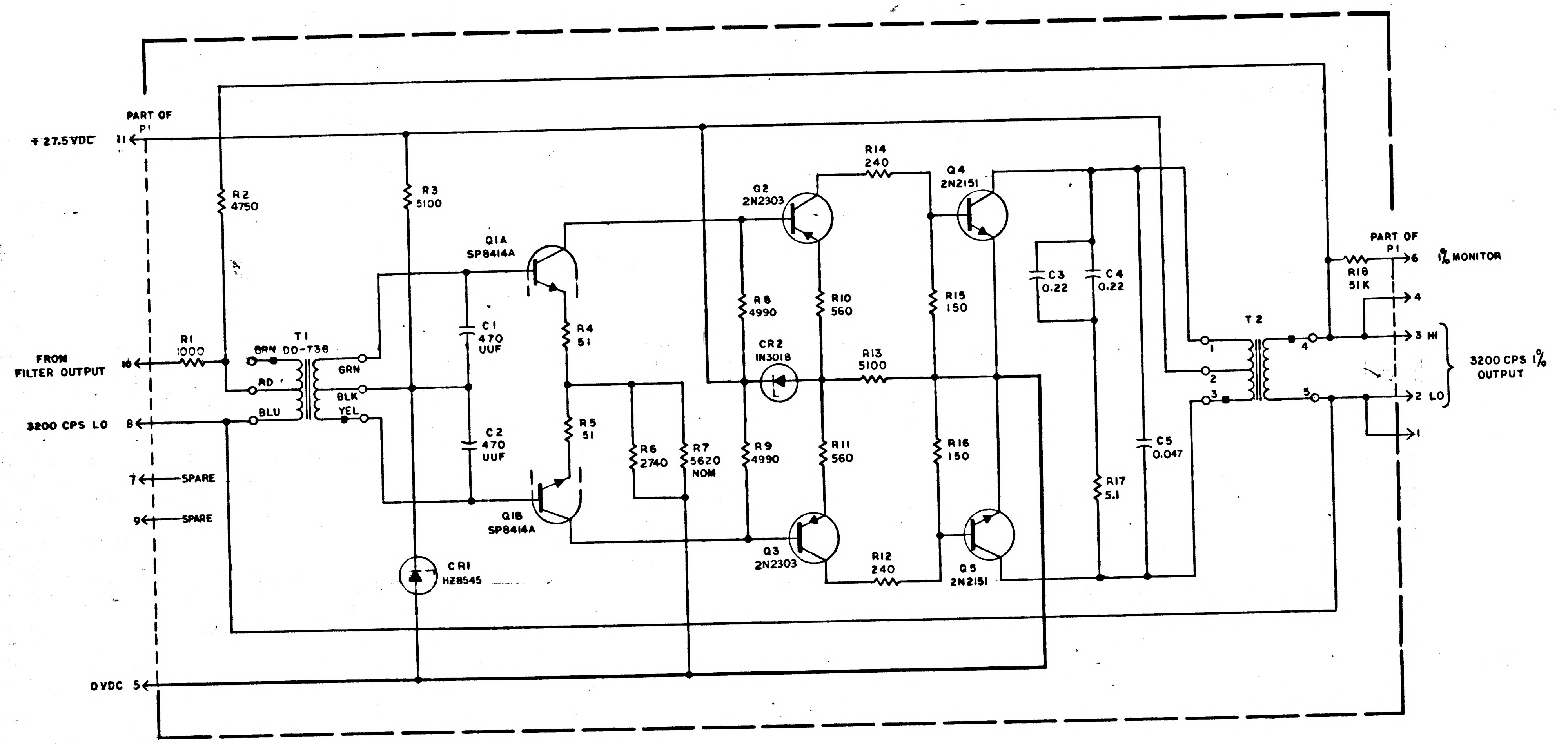
1010048 B

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00841

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01407	5-31-63	DT. WK
B	REVISED PER TDRR 01598	6-19-63	JA WK
C	REVISED PER TDRR 03275	9-11-63	[illegible] WK


PART OF
P1
+27.5 VDC
11
R2
4750
R3
5100
Q1A
SP8414A
R1
1000
FROM
FILTER OUTPUT
10
T1
BRN DO-T36
RD
BLU
GRN
BLK
YEL
3200 CPS LO
8
7
SPARE
9
SPARE
C1
470
UUF
C2
470
UUF
R4
51
R5
51
Q1B
SP8414A
CR1
HZ8545
R6
2740
R7
5620
NOM
0VDC 5
Q2
2N2303
R8
4990
R9
4990
CR2
1N3018
R10
560
R11
560
Q3
2N2303
R14
240
R13
5100
R12
240
Q4
2N2151
R15
150
R16
150
Q5
2N2151
C3
0.22
C4
0.22
R17
5.1
C5
0.047
T2
1
2
3
4
5
PART OF
P1
6
1% MONITOR
R18
51K
4
3 HI
2 LO
1
3200 CPS 1%
OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-251	RESISTOR	1000	±1 %	1/8 W
R2	1010364-381		4750	±1 %	1/8 W
R3	1006750-49		5100	±2 %	1/4 W
R4	1006750-1		51	±2 %	1/4 W
R5	1006750-1		51	±2 %	1/4 W
R6	1010364-335		2740	±1 %	1/8 W
R7	1010364		SEE NOTE	±1 %	1/8 W
R8	1010364-385		4990	±1 %	1/8 W
R9	1010364-385		4990	±1 %	1/8 W
R10	1006750-26		560	±2 %	1/4 W
R11	1006750-26		560	±2 %	1/4 W
R12	1006750-17		240	±2 %	1/4 W
R13	1010278-80		5100	±5 %	1/2 W
R14	1006750-17		240	±2 %	1/4 W
R15	1006750-12		150	±2 %	1/4 W
R16	1006750-12		150	±2 %	1/4 W
R17	1010278-8		5.1	±5 %	1/2 W
R18	1006750-73		51K	±2 %	1/4 W
C1	1010410-9	CAPACITOR	470 UUF	±2 %	500VDC
C2	1010410-9		470 UUF	±2 %	500VDC
C3	1010264-29		0.22	±5 %	200VDC
C4	1010264-29		0.22	±5 %	200VDC
C5	1010264-21		0.047	±5 %	200VDC
CR1	1010372-16	DIODE	HZ8545	±5 %	200 MA
CR2	1010265-3	DIODE	1N3018	±5 %	1W
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1010345-2		2N2303		
Q3			2N2303		
Q4	1010269-2		2N2151		
Q5			2N2151		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010337				

PART NO.	R7
1010364-337	2800
-345	3090
-351	3320
-359	3650
-365	3920
-371	4220
-377	4530
-381	4750
-387	5110
-391	5360
-395	5620
-397	5760
-401	6040
405	6340
-409	6650
-411	6810
-415	7150
-419	7500
-421	7680
-425	8060

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R7 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN A. Di Leo DATE [illegible]
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
3200CPS 1% AMPLIFIER

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010048
SCALE — | WT — | SHEET 1 OF 1

1010048 C

INCHES
PHOTOGRAPHIC SCALE ONLY

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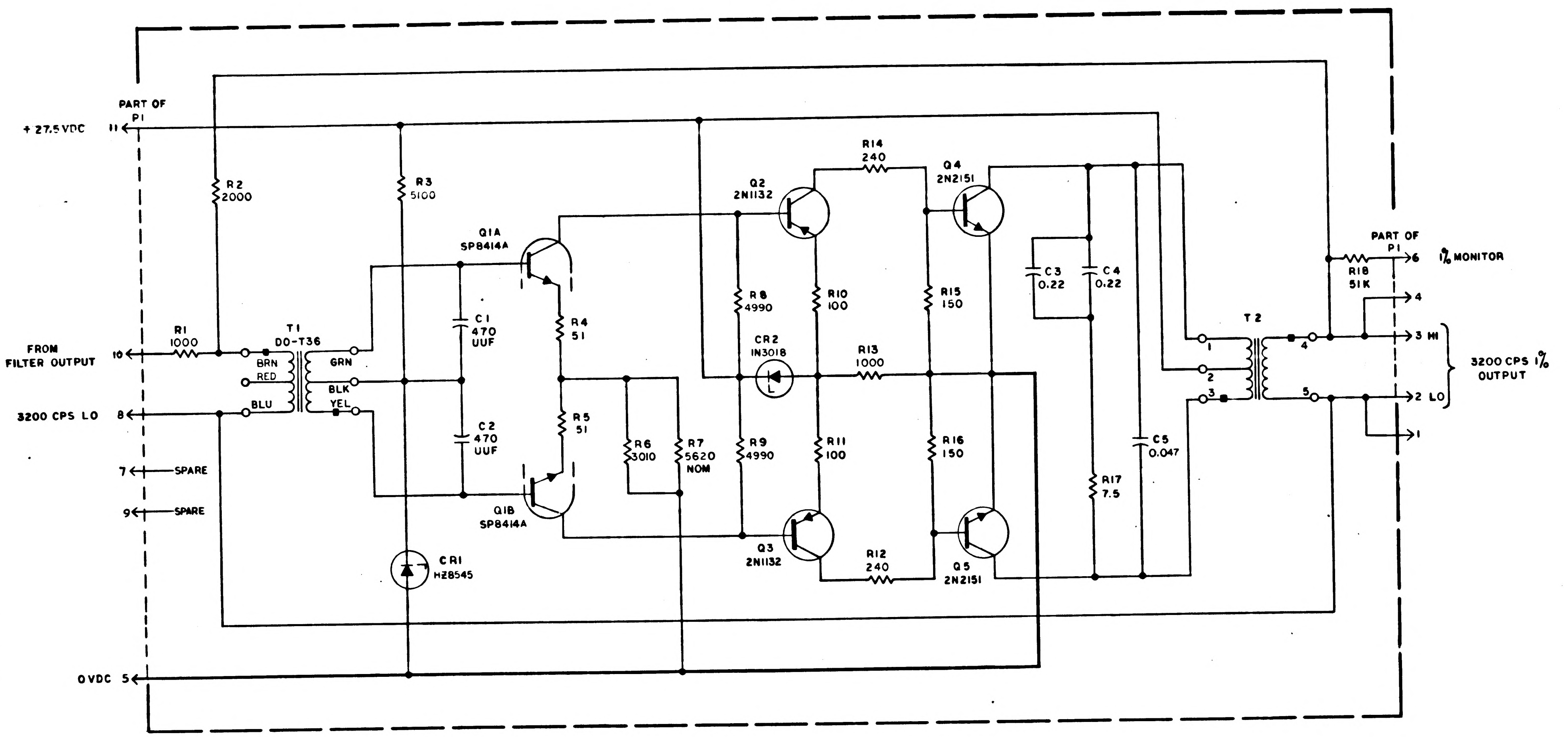
REVISIONS TDRR 00841

SYM	DESCRIPTION	DATE	APPROVAL


PART OF P1
+ 27.5 VDC 11
R2 2000
R3 5100
Q1A SP8414A
R1 1000
T1 DO-T36
BRN
RED
BLU
GRN
BLK
YEL
FROM FILTER OUTPUT 10
3200 CPS LO 8
7 SPARE
9 SPARE
C1 470 UUF
C2 470 UUF
R4 51
R5 51
Q1B SP8414A
CR1 HZ8545
R6 3010
R7 5620 NOM
Q2 2N1132
R8 4990
CR2 IN3018
R9 4990
Q3 2N1132
R10 100
R11 100
R13 1000
R14 240
R12 240
Q4 2N2151
Q5 2N2151
R15 150
R16 150
C3 0.22
C4 0.22
R17 7.5
C5 0.047
T2
1
2
3
4
5
PART OF P1
R18 51K
6 1% MONITOR
4
3 HI
2 LO
1
3200 CPS 1% OUTPUT
0VDC 5

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-251	RESISTOR	1000	±1 %	1/8 W
R2	1010364-309		2000	±1 %	1/8 W
R3	1006750-49		5100	±2 %	1/4 W
R4	1006750-1		51	±2 %	1/4 W
R5	1006750-1		51	±2 %	1/4 W
R6	1010364-343		3010	±1 %	1/8 W
R7	1010364		SEE NOTE	± %	1/8 W
R8	1010364-385		4990	±1 %	1/8 W
R9	1010364-385		4990	±1 %	1/8 W
R10	1006750-8		100	±2 %	1/4 W
R11	1006750-8		100	±2 %	1/4 W
R12	1006750-17		240	±2 %	1/4 W
R13	1010278-63		1000	±5 %	1/2 W
R14	1006750-17		240	±2 %	1/4 W
R15	1006750-12		150	±2 %	1/4 W
R16	1006750-12		150	±2 %	1/4 W
R17	1010278-12		7.5	±5 %	1/2 W
R18	1006750-73		51K	±2 %	1/4 W
C1	1010410-9	CAPACITOR	470 UUF	±2 %	500VDC
C2	1010410-9		470 UUF	±2 %	500VDC
C3	1010264-29		0.22	±5 %	200VDC
C4	1010264-29		0.22	±5 %	200VDC
C5	1010264-21		0.047	±5 %	200VDC
CR1	1010372-16	DIODE	HZ8545	±5 %	200 MA
CR2	1010265-3	DIODE	IN3018	±5 %	1W
Q1	1010431	TRANSISTOR	SP8414A		
Q2	1006804		2N1132		
Q3	1006804		2N1132		
Q4	1010269-1		2N2151		
Q5	1010269-1		2N2151		
T1	1010324	TRANSFORMER	DO-T36		
T2	1010337				

PART NO.	R7
1010364-337	2800
-345	3090
-351	3320
-359	3650
-365	3920
-371	4220
-377	4530
-381	4750
-387	5110
-391	5360
-395	5620
-397	5760
-401	6040
-405	6340
-409	6650
-411	6810
-415	7150
-419	7500
-421	7680
-425	8060

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R7 TO BE DETERMINED BY ELECTRICAL TEST SEE TABLE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
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APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Sep 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, 3200 CPS 1% AMPLIFIER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010048
SCALE — WT — SHEET 1 OF 1

1010048

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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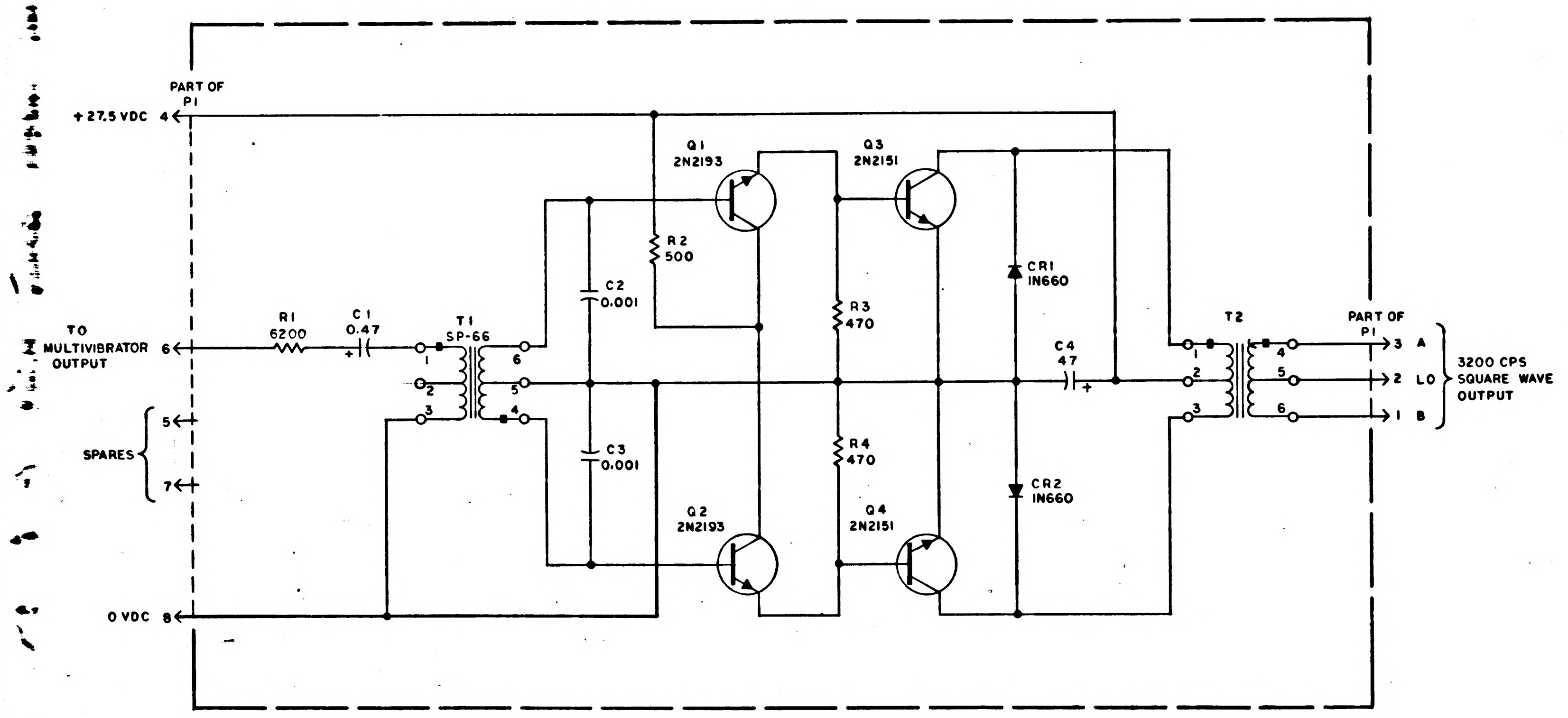
REVISIONS TDRR 00841

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01960	7/11/63	


PART OF
P1
+27.5 VDC 4
Q1
2N2193
Q3
2N2151
R2
500
C2
0.001
R3
470
CR1
IN660
TO
MULTIVIBRATOR
OUTPUT
6
R1
6200
C1
0.47
T1
SP-66
1
2
3
6
5
4
C4
47
T2
1
2
3
4
5
6
PART OF
P1
3 A
2 LO
1 B
3200 CPS
SQUARE WAVE
OUTPUT
SPARES
5
7
C3
0.001
R4
470
CR2
IN660
Q2
2N2193
Q4
2N2151
0 VDC 8

	REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
	R1	1006750-51	RESISTOR	6200	± 2%	1/4 W
	R2	1010312-029	↓	500	± 1%	2 W
	R3	1006750-24	↓	470	± 2%	1/4 W
	R4	1006750-24	↓	470	± 2%	1/4 W
	C1	1006755-65	CAPACITOR	0.47	±10%	35V
	C2	1010264-1	↓	0.001	± 5%	200V
	C3	1010264-1	↓	0.001	± 5%	200V
	C4	1006789-002	↓	47	±10%	50V
	CR1	1010385	DIODE	IN660		
	CR2	1010385	DIODE	IN660		
-4	Q1	1010398-4	TRANSISTOR	2N2193		
-4	Q2	1010398-4	↓	2N2193		
-2	Q3	1010269-2	↓	2N2151		
-2	Q4	1010269-2	↓	2N2151		
	T1	1010329	TRANSFORMER	SP-66		
	T2	1010338	↓			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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DWG NO
CONTRACT
DRAWN A. Di Leo DATE 15 MAR 63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY
3200 CPS 20V SQUARE WAVE

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010049
SCALE —
WT —
SHEET 1 OF 1

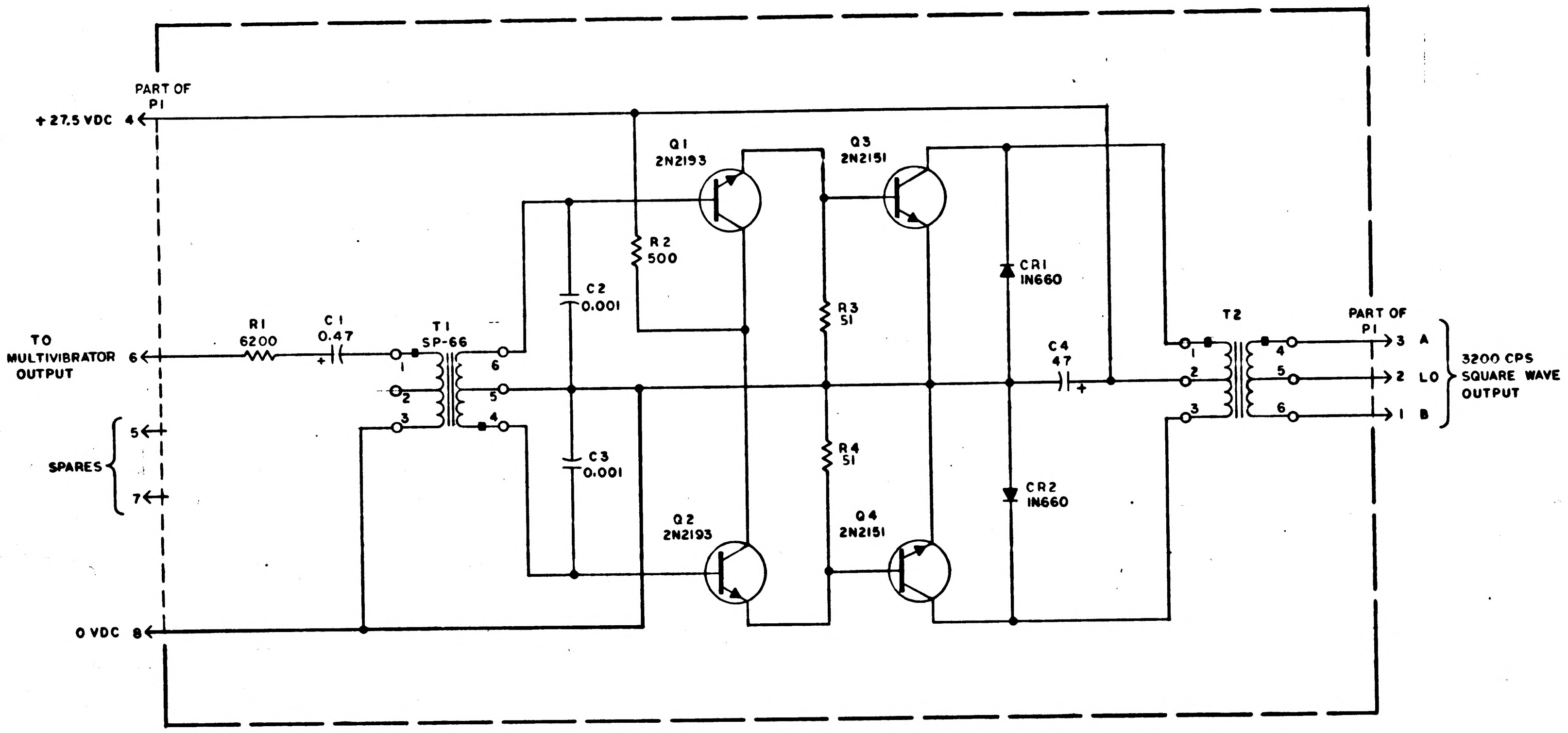
1010049 A

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00B41

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01960	7/10/63	
B	REVISED PER TDRR 02161	7/20/63	WK


PART OF P1
+27.5 VDC 4
TO MULTIVIBRATOR OUTPUT 6
SPARES 5 7
0 VDC 8
R1 6200
C1 0.47
T1 SP-66
1 2 3 6 5 4
C2 0.001
C3 0.001
R2 500
Q1 2N2193
Q2 2N2193
Q3 2N2151
Q4 2N2151
R3 51
R4 51
CR1 IN660
CR2 IN660
C4 47
T2
1 2 3 4 5 6
PART OF P1
3 A
2 LO
1 B
3200 CPS SQUARE WAVE OUTPUT

	REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
	R1	1006750-51	RESISTOR	6200	± 2%	1/4 W
	R2	1010312 -029		500	± 1%	2 W
	R3	1006750- 1		51	± 2%	1/4 W
	R4	1006750- 1		51	± 2%	1/4 W
	C1	1006755-65	CAPACITOR	0.47	±10%	35V
	C2	1010264-1		0.001	± 5%	200V
	C3	1010264-1		0.001	± 5%	200V
	C4	1006789-002		47	±10%	50V
	CR1	1010385	DIODE	IN660		
	CR2	1010385	DIODE	IN660		
-4	Q1	1010398-4	TRANSISTOR	2N2193		
-4	Q2	1010398-4		2N2193		
-2	Q3	1010269-2		2N2151		
-2	Q4	1010269-2		2N2151		
	T1	1010329	TRANSFORMER	SP-66		
	T2	1010338				

NOTES:

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QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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DWG. NO. CONTRACT
DRAWN A. Di Leo DATE 15 MAR 63
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APPROVAL
NASA APPROVAL Jack Bernard
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY
3200 CPS 20V SQUARE WAVE

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010049
SCALE — WT — SHEET 1 OF 1

1010049 B

INCHES
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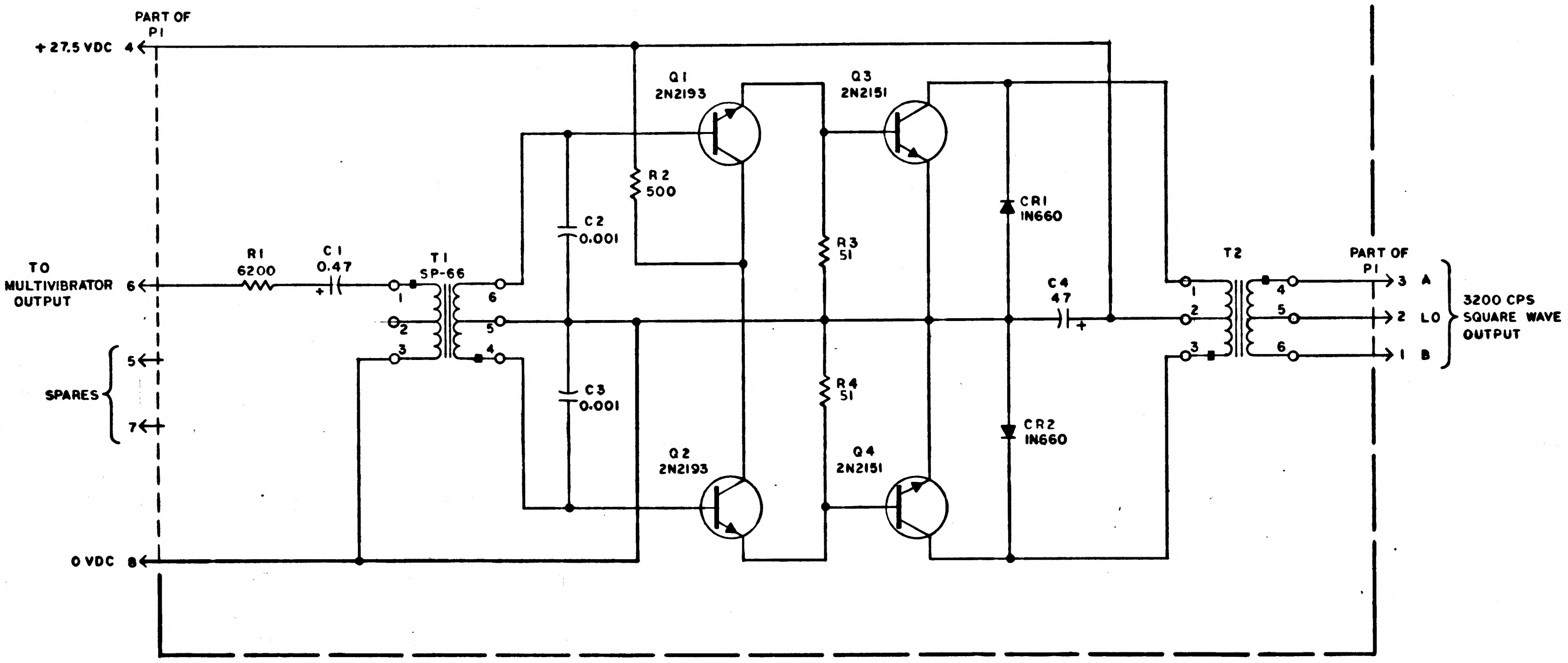
REVISIONS TDRR 00841

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01960	7/10/63	
B	REVISED PER TDRR 02161	7/24/63	WK
C	REVISED PER TDRR 02990	9-5-63	WK


PART OF P1
+27.5 VDC 4
TO MULTIVIBRATOR OUTPUT 6
SPARES
5
7
0 VDC 8
R1 6200
C1 0.47
T1 SP-66
1
2
3
6
5
4
C2 0.001
C3 0.001
R2 500
Q1 2N2193
Q2 2N2193
R3 51
R4 51
Q3 2N2151
Q4 2N2151
CR1 IN660
CR2 IN660
C4 47
T2
1
2
3
4
5
6
PART OF P1
3 A
2 LO
1 B
3200 CPS SQUARE WAVE OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-51	RESISTOR	6200	± 2%	1/4 W
R2	1010312-029	↓	500	± 1%	2 W
R3	1006750-1	↓	51	± 2%	1/4 W
R4	1006750-1	↓	51	± 2%	1/4 W
C1	1006755-65	CAPACITOR	0.47	±10%	35V
C2	1010264-1	↓	0.001	±5%	200V
C3	1010264-1	↓	0.001	±5%	200V
C4	1006789-002	↓	47	±10%	50V
CR1	1010385	DIODE	IN660		
CR2	1010385	DIODE	IN660		
Q1	1010398-4	TRANSISTOR	2N2193		
Q2	1010398-4	↓	2N2193		
Q3	1010269-2	↓	2N2151		
Q4	1010269-2	↓	2N2151		
T1	1010329	TRANSFORMER	SP-66		
T2	1010338	↓			

NOTES:

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2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE NOTED CAPACITOR VALUES ARE IN MICROFARADS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN a. D'Leo DATE 15 MAR
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY
3200 CPS 20V SQUARE WAVE

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010049
SCALE — WT — SHEET 1 OF 1

1010049 C

MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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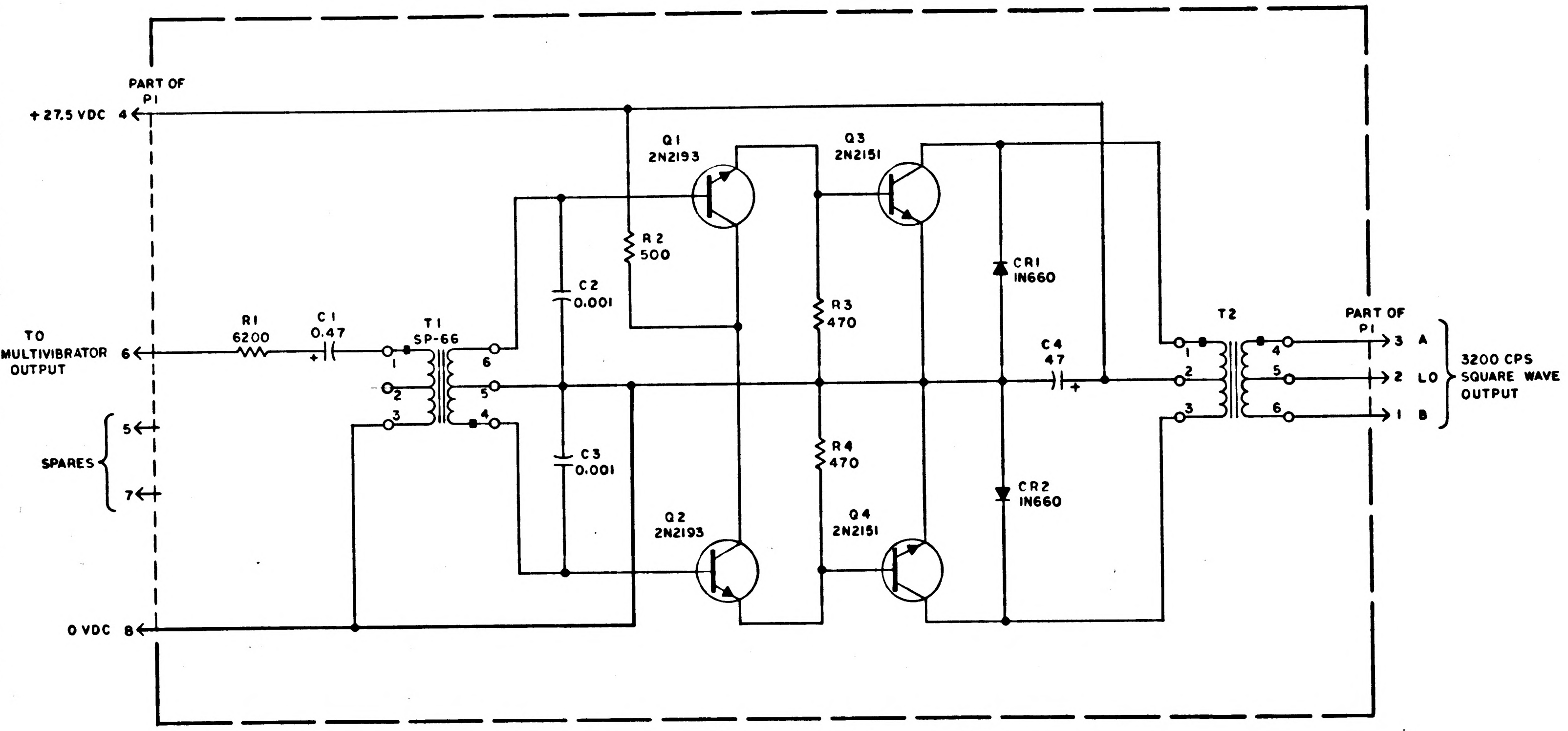
REVISIONS TPRR 00841

SYM	DESCRIPTION	DATE	APPROVAL


PART OF P1
+27.5 VDC 4
TO MULTIVIBRATOR OUTPUT 6
SPARES 5 7
0 VDC 8
R1 6200
C1 0.47
T1 SP-66
1
2
3
6
5
4
C2 0.001
C3 0.001
Q1 2N2193
Q2 2N2193
R2 500
R3 470
R4 470
Q3 2N2151
Q4 2N2151
CR1 1N660
CR2 1N660
C4 47
T2
1
2
3
4
5
6
PART OF P1
3 A
2 LO
1 B
3200 CPS SQUARE WAVE OUTPUT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-51	RESISTOR	6200	± 2%	1/4 W
R2	1010312-029	↓	500	± 1%	2 W
R3	1006750-24	↓	470	± 2%	1/4 W
R4	1006750-24	↓	470	± 2%	1/4 W
C1	1006755-65	CAPACITOR	0.47	±10%	35V
C2	1010264-1	↓	0.001	± 5%	200V
C3	1010264-1	↓	0.001	± 5%	200V
C4	1006789-002	↓	47	±10%	50V
CR1	1010385	DIODE	IN660		
CR2	1010385	DIODE	IN660		
Q1	1010398-1	TRANSISTOR	2N2193		
Q2	1010398-1	↓	2N2193		
Q3	1010269-1	↓	2N2151		
Q4	1010269-1	↓	2N2151		
T1	1010329	TRANSFORMER	SP-66		
T2	1010338	↓			

NOTES:

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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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CAMBRIDGE MASS
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CONTRACT
DRAWN A. Di Leo DATE 15 MAR 63
CHECKED Manuel Kramer 16 Apr 63
APPROVAL Manuel Kramer 16 Apr 63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
POWER SUPPLY
3200 CPS 20V SQUARE WAVE

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010049
SCALE — WT — SHEET 1 OF 1

1010049

INCHES
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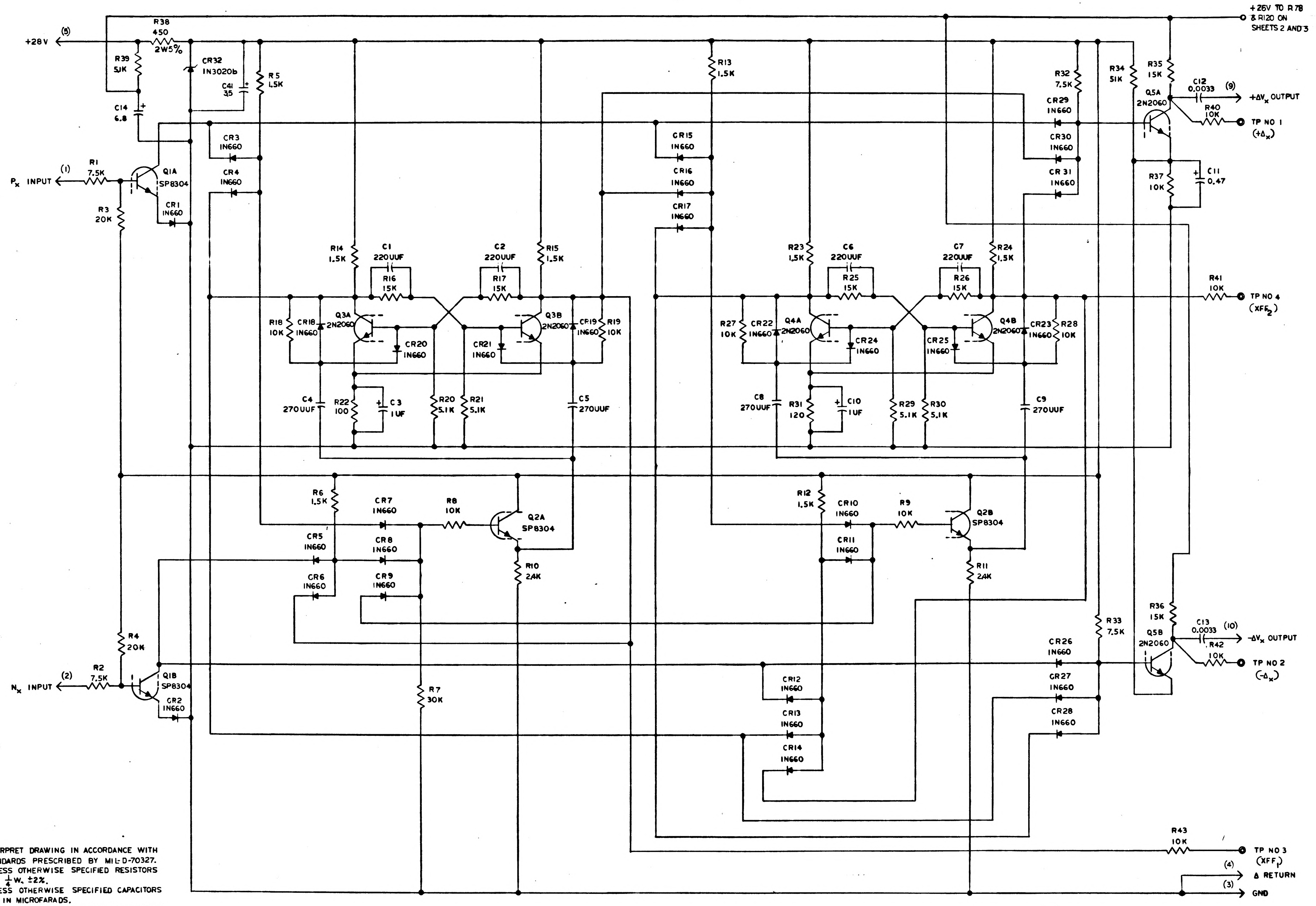
REVISIONS TORR 00441

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01375	9-20-63	WK


+28V
(5)
R38
450
2W5%
R39
5.1K
CR32
1N3020b
C41
35
R5
1.5K
C14
6.8
CR3
1N660
CR4
1N660
P_x INPUT
(1)
R1
7.5K
Q1A
SP8304
CR1
1N660
R3
20K
R14
1.5K
C1
220UUF
R16
15K
C2
220UUF
R17
15K
R15
1.5K
R18
10K
CR18
1N660
Q3A
2N2060
CR20
1N660
CR21
1N660
Q3B
2N2060
CR19
1N660
R19
10K
C4
270UUF
R22
100
C3
1UF
R20
5.1K
R21
5.1K
C5
270UUF
R13
1.5K
CR15
1N660
CR16
1N660
CR17
1N660
R23
1.5K
C6
220UUF
R25
15K
C7
220UUF
R26
15K
R24
1.5K
R27
10K
CR22
1N660
Q4A
2N2060
CR24
1N660
CR25
1N660
Q4B
2N2060
CR23
1N660
R28
10K
C8
270UUF
R31
120
C10
1UF
R29
5.1K
R30
5.1K
C9
270UUF
+26V TO R78
& R120 ON
SHEETS 2 AND 3
R32
7.5K
CR29
1N660
CR30
1N660
CR31
1N660
R34
51K
R35
15K
Q5A
2N2060
C12
0.0033
(9)
+ΔV_x OUTPUT
R40
10K
TP NO 1
(+Δ_x)
R37
10K
C11
0.47
R41
10K
TP NO 4
(XFF₂)
R6
1.5K
CR7
1N660
R8
10K
Q2A
SP8304
CR5
1N660
CR8
1N660
CR6
1N660
CR9
1N660
R10
2.4K
R12
1.5K
CR10
1N660
R9
10K
Q2B
SP8304
CR11
1N660
R11
2.4K
R4
20K
N_x INPUT
(2)
R2
7.5K
Q1B
SP8304
CR2
1N660
R7
30K
CR12
1N660
CR13
1N660
CR14
1N660
R33
7.5K
CR26
1N660
CR27
1N660
CR28
1N660
R36
15K
Q5B
2N2060
C13
0.0033
(10)
-ΔV_x OUTPUT
R42
10K
TP NO 2
(-Δ_x)
R43
10K
TP NO 3
(XFF₁)
(4)
Δ RETURN
(3)
GND

NOTES—
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W, ±2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN R J [illegible] DATE 4/3/63
CHECKED M [illegible] 4/8/63
APPROVAL J [illegible] 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 17Apr63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER
AND COMPUTER OUTPUT
PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE —
WT
SHEET 1 OF 4

1010050 A

INCHES
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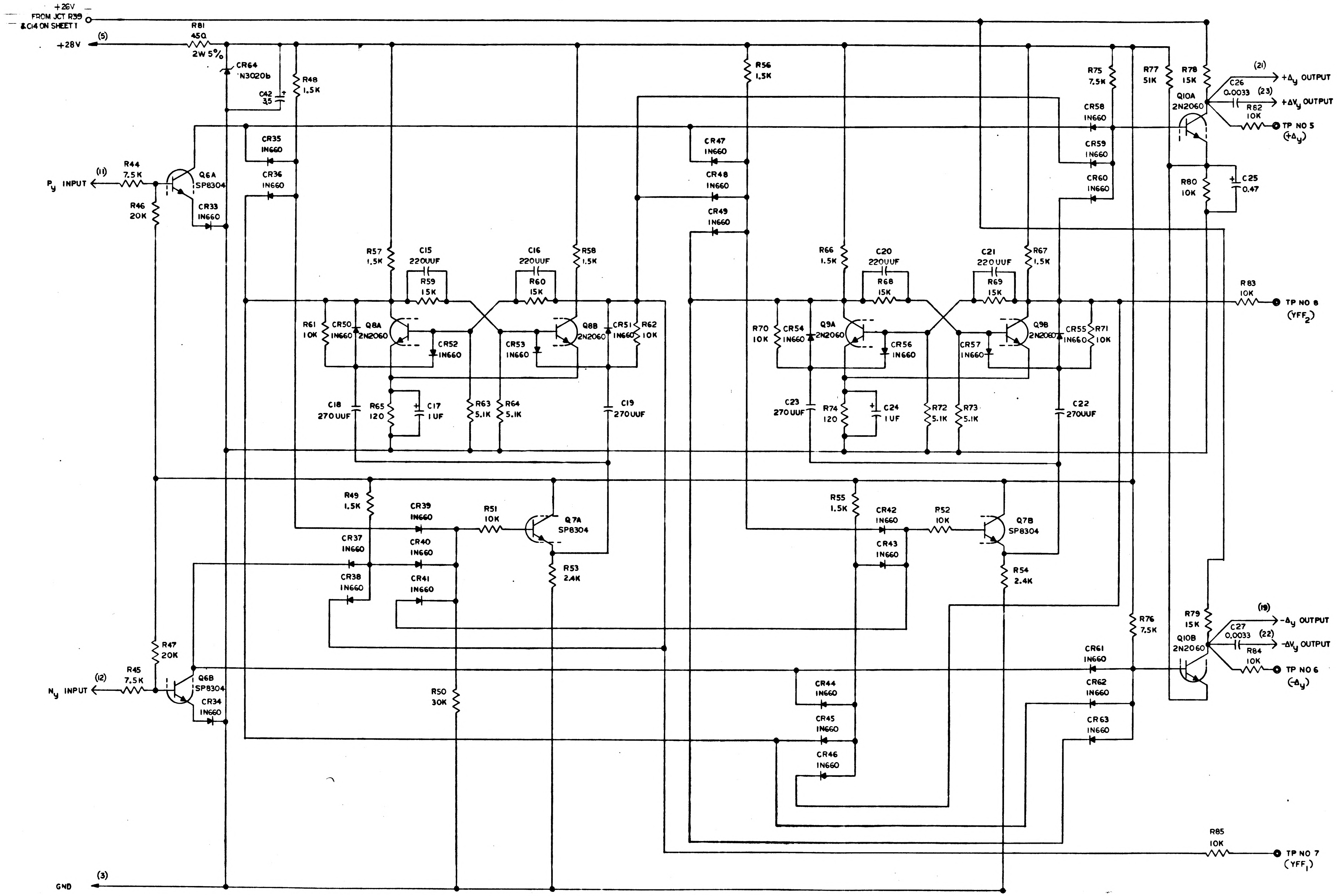
(M)

REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 0875	7-24-63	WK



+26V
FROM JCT R39
&C14 ON SHEET 1
+28V
(5)
R81
45Ω
2W 5%
CR64
1N3020b
C42
35
R48
1.5K
CR35
1N660
CR36
1N660
Py INPUT
(11)
R44
7.5K
Q6A
SP8304
R46
20K
CR33
1N660
R56
1.5K
CR47
1N660
CR48
1N660
CR49
1N660
R57
1.5K
C15
220UUF
R59
15K
C16
220UUF
R60
15K
R58
1.5K
R61
10K
CR50
1N660
Q8A
2N2060
CR52
1N660
CR53
1N660
Q8B
2N2060
CR51
1N660
R62
10K
C18
270UUF
R65
120
C17
1UF
R63
5.1K
R64
5.1K
C19
270UUF
R66
1.5K
C20
220UUF
R68
15K
C21
220UUF
R69
15K
R67
1.5K
R70
10K
CR54
1N660
Q9A
2N2060
CR56
1N660
CR57
1N660
Q9B
2N2060
CR55
1N660
R71
10K
C23
270UUF
R74
120
C24
1UF
R72
5.1K
R73
5.1K
C22
270UUF
R75
7.5K
R77
51K
R78
15K
CR58
1N660
CR59
1N660
CR60
1N660
Q10A
2N2060
(21)
+Δy OUTPUT
C26
0.0033
(23)
+ΔVy OUTPUT
R82
10K
TP NO 5
(+Δy)
R80
10K
C25
0.47
R83
10K
TP NO 8
(YFF2)
R49
1.5K
CR39
1N660
R51
10K
Q7A
SP8304
CR37
1N660
CR40
1N660
CR38
1N660
CR41
1N660
R53
2.4K
R55
1.5K
CR42
1N660
R52
10K
Q7B
SP8304
CR43
1N660
R54
2.4K
R47
20K
Ny INPUT
(12)
R45
7.5K
Q6B
SP8304
CR34
1N660
R50
30K
CR44
1N660
CR45
1N660
CR46
1N660
R76
7.5K
R79
15K
Q10B
2N2060
(19)
-Δy OUTPUT
C27
0.0033
(22)
-ΔVy OUTPUT
R84
10K
TP NO 6
(-Δy)
CR61
1N660
CR62
1N660
CR63
1N660
R85
10K
TP NO 7
(YFF1)
GND
(3)

1010050 A

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DO NOT SCALE THIS DRAWING
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FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN R.J. Smith DATE 4/3/63
CHECKED M. Lewis 4/8/63
APPROVAL J. Stone 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 17 Apr 63

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FORWARD-BACKWARD COUNTER
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PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
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SHEET 2 OF 4

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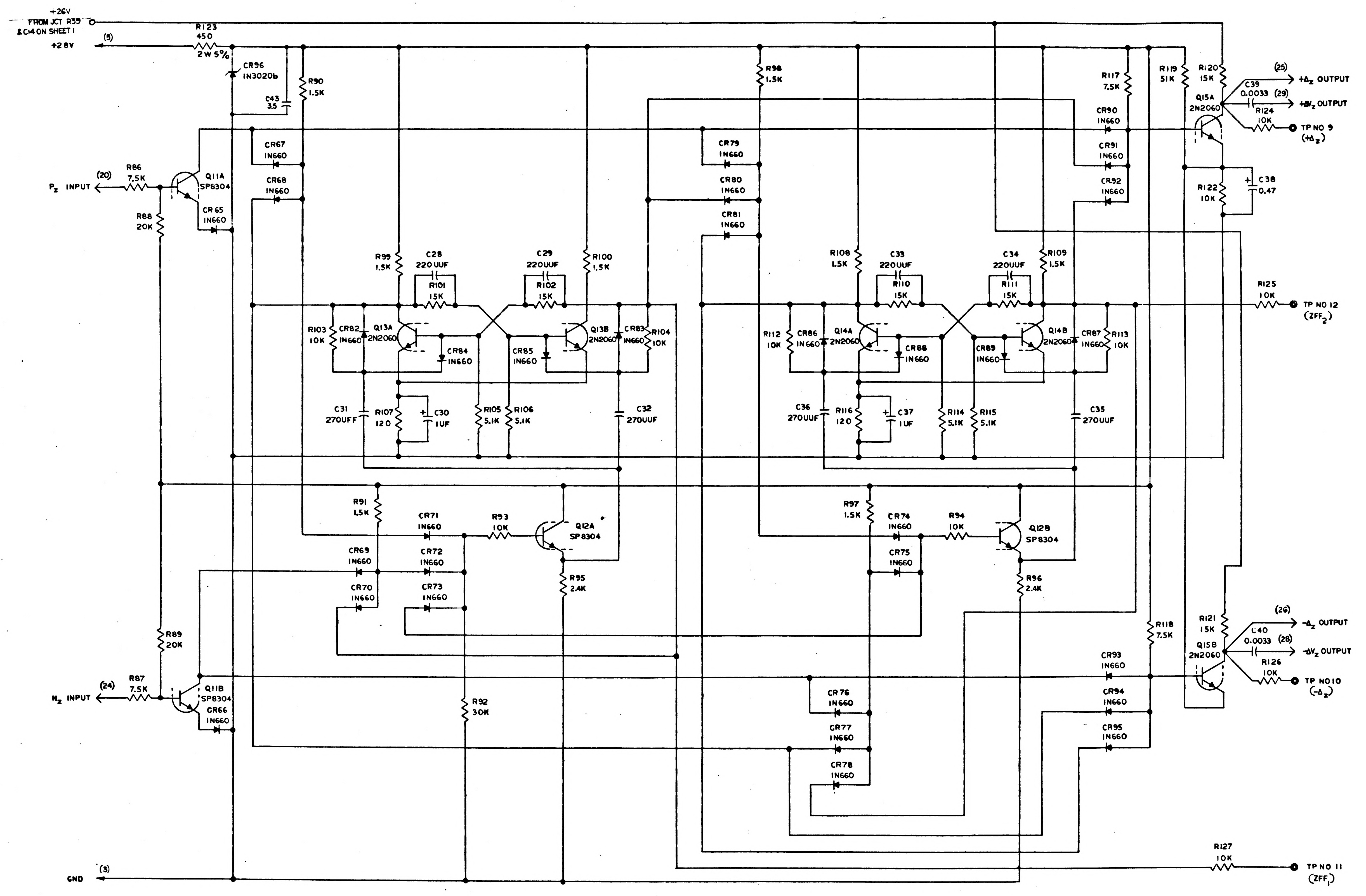
(4)

REVISIONS TDRR 00661

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	9-20-63	JJ9


+26V
FROM JCT R39
& C14 ON SHEET 1
+28V
(5)
R123
450
2W 5%
CR96
1N3020b
C43
3.5
R90
1.5K
Pz INPUT
(20)
R86
7.5K
Q11A
SP8304
CR65
1N660
R88
20K
CR67
1N660
CR68
1N660
R99
1.5K
C28
220UUF
R101
15K
C29
220UUF
R102
15K
R100
1.5K
R103
10K
CR82
1N660
Q13A
2N2060
CR84
1N660
CR85
1N660
Q13B
2N2060
CR83
1N660
R104
10K
C31
270UFF
R107
120
C30
1UF
R105
5.1K
R106
5.1K
C32
270UUF
R98
1.5K
CR79
1N660
CR80
1N660
CR81
1N660
R108
1.5K
C33
220UUF
R110
15K
C34
220UUF
R111
15K
R109
1.5K
R112
10K
CR86
1N660
Q14A
2N2060
CR88
1N660
CR89
1N660
Q14B
2N2060
CR87
1N660
R113
10K
C36
270UUF
R116
120
C37
1UF
R114
5.1K
R115
5.1K
C35
270UUF
R117
7.5K
R119
51K
R120
15K
(25)
+Δz OUTPUT
C39
0.0033
(29)
+ΔVz OUTPUT
Q15A
2N2060
R124
10K
TP NO 9
(+Δz)
CR90
1N660
CR91
1N660
CR92
1N660
R122
10K
C38
0.47
R125
10K
TP NO 12
(ZFF2)
R91
1.5K
CR71
1N660
R93
10K
Q12A
SP8304
CR69
1N660
CR72
1N660
CR70
1N660
CR73
1N660
R95
2.4K
R97
1.5K
CR74
1N660
R94
10K
Q12B
SP8304
CR75
1N660
R96
2.4K
R89
20K
Nz INPUT
(24)
R87
7.5K
Q11B
SP8304
CR66
1N660
R92
30K
CR76
1N660
CR77
1N660
CR78
1N660
R118
7.5K
CR93
1N660
CR94
1N660
CR95
1N660
R121
15K
(26)
-Δz OUTPUT
C40
0.0033
(28)
-ΔVz OUTPUT
Q15B
2N2060
R126
10K
TP NO 10
(-Δz)
R127
10K
TP NO 11
(ZFF1)
GND
(3)

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DO NOT SCALE THIS DRAWING
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HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT

DRAWN E.L. Scrudgio DATE 4/3/63
CHECKED M. Loss 4/8/63
APPROVAL E.S. Stemm 4/8/63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL W Ruffles 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE —
WT
SHEET 3 OF 4

E 1010050 A

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REVISIONS TDRR 00FE

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875		J.M. WR

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -53	RESISTOR	7,5K	2%	1/4W
R2	-53		7.5K		
R3	-63		20K		
R4	-63		20K		
R5	-36		1.5K		
R6	-36		1.5K		
R7	-67		30K		
R8	-56		10K		
R9	-56		10K		
R10	-41		2.4K		
R11	-41		2.4K		
R12	-36		1.5K		
R13	-36		1.5K		
R14	-36		1.5K		
R15	-36		1.5K		
R16	-60		15K		
R17	-60		15K		
R18	-56		10K		
R19	-56		10K		
R20	-49		5.1K		
R21	-49		5.1K		
R22	-10		120		
R23	-36		1.5K		
R24	-36		1.5K		
R25	-60		15K		
R26	-60		15K		
R27	-56		10K		
R28	-56		10K		
R29	-49		5.1K		
R30	-49		5.1K		
R31	-10		120		
R32	-53		7.5K		
R33	-53		7.5K		
R34	-73		51K		
R35	-60		15K		
R36	-60		15K		
R37	↓ -56		10K	↓	↓
R38	1010312-034		450	5%	2W
R39	1006750-49		5.1K	2%	1/4W
R40	-56		10K		
R41	-56		10K		
R42	-56		10K		
R43	-56		10K		
R44	-53		7.5K		
R45	-53		7.5K		
R46	-63		20K		
R47	-63		20K		
R48	-36		1.5K		
R49	-36		1.5K		
R50	-67		30K		
R51	-56		10K		
R52	-56		10K		
R53	-41		2.4K		
R54	-41		2.4K		
R55	-36		1.5K		
R56	-36		1.5K		
R57	-36		1.5K		
R58	-36		1.5K		
R59	-60		15K		
R60	-60		15K		
R61	-56		10K		
R62	-56		10K		
R63	-49		5.1K		
R64	-49		5.1K		
R65	-10		120		
R66	-36		1.5K		
R67	-36		1.5K		
R68	-60		15K		
R69	-60		15K		
R70	-56		10K		
R71	-56		10K		
R72	-49		5.1K		
R73	-49		5.1K		
R74	-10		120		
R75	-53		7.5K		
R76	-53		7.5K		
R77	-73		51K		
R78	-60		15K		
R79	-60		15K		
R80	↓ -56	↓	10K	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R81	1010312-034	RESISTOR	450	5%	2W
R82	1006750-56		10K	2%	1/4W
R83	-56		10K		
R84	-56		10K		
R85	-56		10K		
R86	-53		7.5K		
R87	-53		7.5K		
R88	-63		20K		
R89	-63		20K		
R90	-36		1.5K		
R91	-36		1.5K		
R92	-67		30K		
R93	-56		10K		
R94	-56		10K		
R95	-41		2.4K		
R96	-41		2.4K		
R97	-36		1.5K		
R98	-36		1.5K		
R99	-36		1.5K		
R100	-36		1.5K		
R101	-60		15K		
R102	-60		15K		
R103	-56		10K		
R104	-56		10K		
R105	-49		5.1K		
R106	-49		5.1K		
R107	-10		120		
R108	-36		1.5K		
R109	-36		1.5K		
R110	-60		15K		
R111	-60		15K		
R112	-56		10K		
R113	-56		10K		
R114	-49		5.1K		
R115	-49		5.1K		
R116	-10		120		
R117	-53		7.5K		
R118	-53		7.5K		
R119	-73		51K		
R120	-60		15K		
R121	-60		15K		
R122	↓ -56		10K	↓	
R123	1010312-034		450	5%	2W
R124	1006750-56		10K	2%	1/4W
R125	-56		10K		
R126	-56		10K		
R127	↓ -56	↓	10K	↓	
C1	1006777-16	CAPACITOR	220UUF	10%	100V
C2	↓ -16		220UUF	10%	100V
C3	1006755 -69		1	10%	35V
C4	1006777-17		270UUF	10%	100V
C5	-17		270UUF		
C6	-16		220UUF		
C7	-16		220UUF		
C8	-17		270UUF		
C9	↓ -17		270UUF	↓	↓
C10	1006755-69		1	10%	35V
C11	-65		0.47	↓	↓
C12	1006777-27		0.0033	10%	100V
C13	↓ -27		0.0033	↓	↓
C14	1010393-039		6.8	10%	50V
C15	1006777-16		220UUF	10%	100V
C16	↓ -16		220UUF	↓	↓
C17	1006755-69		1	10%	35V
C18	1006777-17		270UUF	10%	100V
C19	-17		270UUF		
C20	-16		220UUF		
C21	-16		220UUF		
C22	-17		270UUF		
C23	↓ -17		270UUF	↓	↓
C24	1006755-69		1	10%	35V
C25	↓ -65		0.47	↓	↓
C26	1006777-27		0.0033	10%	100V
C27	-27		0.0033		
C28	↓ -16	↓	220UUF	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C29	1006777-16	CAPACITOR	220UUF	10%	100V
C30	1006755 -69		1	10%	35V
C31	1006777-17		270UUF	10%	100V
C32	-17		270UUF		
C33	-16		220UUF		
C34	-16		220UUF		
C35	-17		270UUF		
C36	↓ -17		270UUF	↓	↓
C37	1006755-69		1	10%	35V
C38	↓ -65		0.47	↓	↓
C39	1006777-27		0.0033	10%	100V
C40	↓		0.0033	↓	↓
C41	1006755-79		3.5	10%	3.5V
C42					
C43	↓	↓	↓	↓	↓
CR1	1010385	IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31	↓	↓			
CR32	1010265-5	IN3020b			
CR33	1010385	IN660			
CR34					
CR35					
CR36					
CR37					
CR38					
CR39					
CR40					
CR41					
CR42					
CR43					
CR44					
CR45					
CR46					
CR47					
CR48					
CR49					
CR50					
CR51					
CR52					
CR53					
CR54					
CR55					
CR56					
CR57					
CR58					
CR59					
CR60					
CR61					
CR62					
CR63	↓	↓			

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR64	1010265-5	IN3020b			
CR65	1010385	IN660			
CR66					
CR67					
CR68					
CR69					
CR70					
CR71					
CR72					
CR73					
CR74					
CR75					
CR76					
CR77					
CR78					
CR79					
CR80					
CR81					
CR82					
CR83					
CR84					
CR85					
CR86					
CR87					
CR88					
CR89					
CR90					
CR91					
CR92					
CR93					
CR94					
CR95	↓	↓			
CR96	1010265-5	IN3020b			
Q1	1010395	SP8304			
Q2	↓	↓			
Q3	1010376-1	2N2060			
Q4					
Q5	↓	↓			
Q6	1010395	SP8304			
Q7	↓	↓			
Q8	1010376-1	2N2060			
Q9					
Q10	↓	↓			
Q11	1010395	SP8304			
Q12	↓	↓			
Q13	1010376-1	2N2060			
Q14					
Q15	↓	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
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TOLERANCES ON
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HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN RJ [illegible] DATE 4/8/63
CHECKED [illegible] 4/8/63
APPROVAL [illegible] 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL [illegible] 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER
AND COMPUTER OUTPUT
PIPA

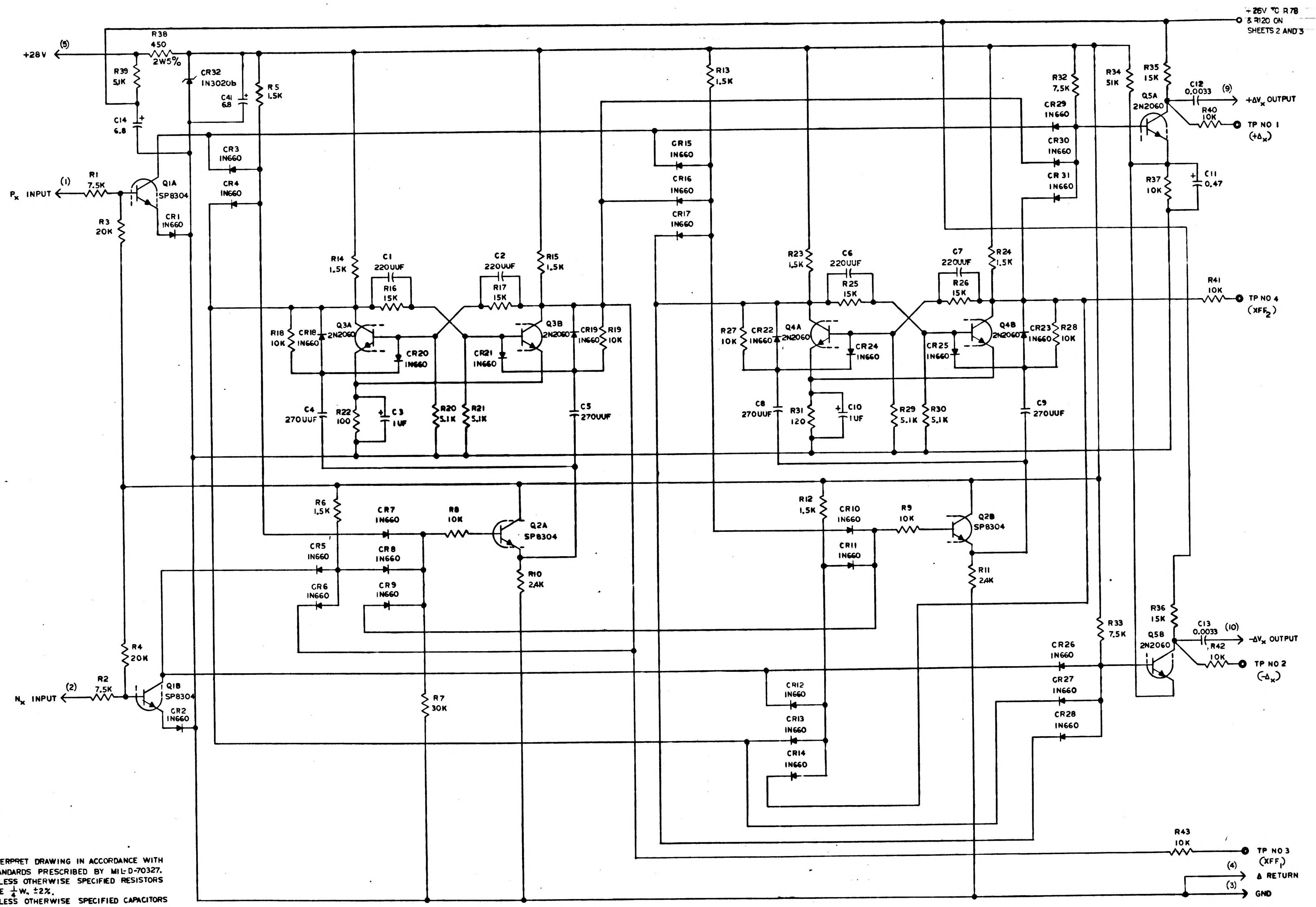
CODE IDENT NO. SIZE E NASA DRAWING NO. 1010050
SCALE — WT SHEET 4 OF 4

1010050 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00441

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01375	7-2-63	JJP WK
B	REVISED PER TDRR 03957	10-17-63	


+28V
(5)
R38
450
2W5%
R39
5.1K
CR32
1N3020b
C41
6.8
R5
1.5K
C14
6.8
CR3
1N660
CR4
1N660
(1)
Px INPUT
R1
7.5K
Q1A
SP8304
CR1
1N660
R3
20K
R14
1.5K
C1
220UUF
R16
15K
C2
220UUF
R17
15K
R15
1.5K
R18
10K
CR18
1N660
Q3A
2N2060
CR20
1N660
CR21
1N660
Q3B
2N2060
CR19
1N660
R19
10K
C4
270UUF
R22
100
C3
1UF
R20
5.1K
R21
5.1K
C5
270UUF
R6
1.5K
CR7
1N660
R8
10K
Q2A
SP8304
CR5
1N660
CR8
1N660
CR6
1N660
CR9
1N660
R10
2.4K
R4
20K
(2)
Nx INPUT
R2
7.5K
Q1B
SP8304
CR2
1N660
R7
30K
R13
1.5K
CR15
1N660
CR16
1N660
CR17
1N660
R23
1.5K
C6
220UUF
R25
15K
C7
220UUF
R26
15K
R24
1.5K
R27
10K
CR22
1N660
Q4A
2N2060
CR24
1N660
CR25
1N660
Q4B
2N2060
CR23
1N660
R28
10K
C8
270UUF
R31
120
C10
1UF
R29
5.1K
R30
5.1K
C9
270UUF
R12
1.5K
CR10
1N660
R9
10K
Q2B
SP8304
CR11
1N660
R11
2.4K
CR12
1N660
CR13
1N660
CR14
1N660
+26V TO R78
& R120 ON
SHEETS 2 AND 3
R32
7.5K
R34
51K
R35
15K
C12
0.0033
(9)
+ΔVx OUTPUT
Q5A
2N2060
R40
10K
TP NO 1
(+Δx)
CR29
1N660
CR30
1N660
CR31
1N660
R37
10K
C11
0.47
R41
10K
TP NO 4
(XFF2)
R36
15K
C13
0.0033
(10)
-ΔVx OUTPUT
Q5B
2N2060
R42
10K
TP NO 2
(-Δx)
R33
7.5K
CR26
1N660
CR27
1N660
CR28
1N660
R43
10K
TP NO 3
(XFF1)
(4)
Δ RETURN
(3)
GND

NOTES-
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$ W, ±2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO.
CONTRACT
DRAWN R J Snyder DATE 4/3/63
CHECKED M Lein 4/8/63
APPROVAL J J SK 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1C10050
SCALE
WT
SHEET 1 OF 4

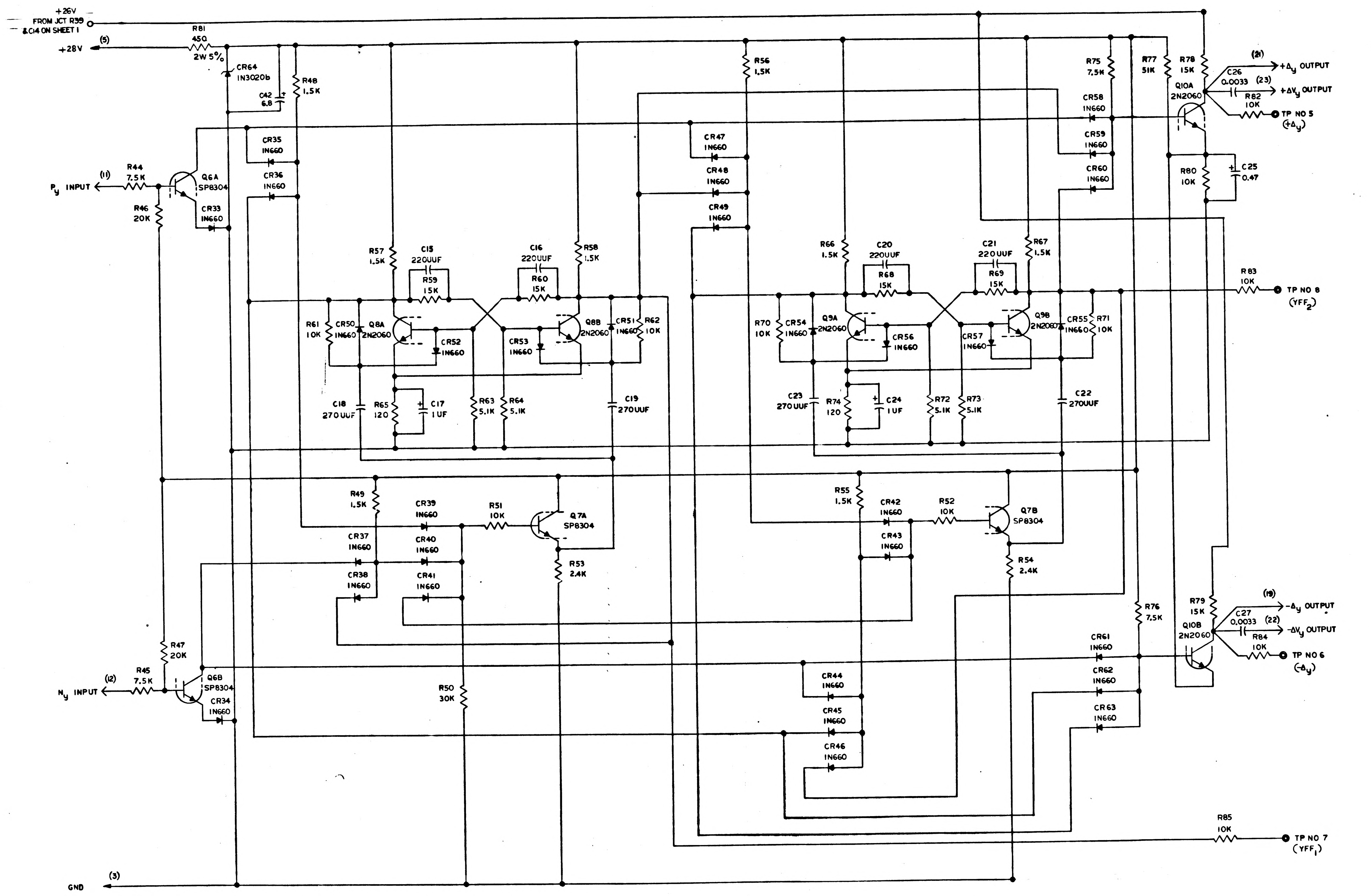
1C10050 B

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	9-24-63	WK
B	REVISED PER TDRR 03957	10-17-63	WK


+26V
FROM JCT R39
& C14 ON SHEET 1
(5)
+28V
R81
450
2W 5%
CR64
1N3020b
C42
6.8
R48
1.5K
CR35
1N660
CR36
1N660
(11)
Py INPUT
R44
7.5K
Q6A
SP8304
R46
20K
CR33
1N660
R57
1.5K
C15
220UUF
R59
15K
C16
220UUF
R60
15K
R58
1.5K
R61
10K
CR50
1N660
Q8A
2N2060
CR52
1N660
CR53
1N660
Q8B
2N2060
CR51
1N660
R62
10K
C18
270UUF
R65
120
C17
1UF
R63
5.1K
R64
5.1K
C19
270UUF
R56
1.5K
CR47
1N660
CR48
1N660
CR49
1N660
R66
1.5K
C20
220UUF
R68
15K
C21
220UUF
R69
15K
R67
1.5K
R70
10K
CR54
1N660
Q9A
2N2060
CR56
1N660
CR57
1N660
Q9B
2N2060
CR55
1N660
R71
10K
C23
270UUF
R74
120
C24
1UF
R72
5.1K
R73
5.1K
C22
270UUF
R75
7.5K
R77
51K
R78
15K
Q10A
2N2060
C26
0.0033
(21)
+Δy OUTPUT
(23)
+ΔVy OUTPUT
R82
10K
TP NO 5
(+Δy)
CR58
1N660
CR59
1N660
CR60
1N660
R80
10K
C25
0.47
R83
10K
TP NO 8
(YFF2)
R49
1.5K
CR39
1N660
R51
10K
Q7A
SP8304
CR37
1N660
CR40
1N660
CR38
1N660
CR41
1N660
R53
2.4K
R55
1.5K
CR42
1N660
R52
10K
Q7B
SP8304
CR43
1N660
R54
2.4K
R76
7.5K
R79
15K
Q10B
2N2060
C27
0.0033
(19)
-Δy OUTPUT
(22)
-ΔVy OUTPUT
R84
10K
TP NO 6
(-Δy)
CR61
1N660
CR62
1N660
CR63
1N660
R47
20K
(12)
Ny INPUT
R45
7.5K
Q6B
SP8304
CR34
1N660
R50
30K
CR44
1N660
CR45
1N660
CR46
1N660
R85
10K
TP NO 7
(YFF1)
(3)
GND

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTER

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN R.T. Aquino DATE 4/3/63
CHECKED M. Fein 4/8/63
APPROVAL R. Stone 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 2 OF 4

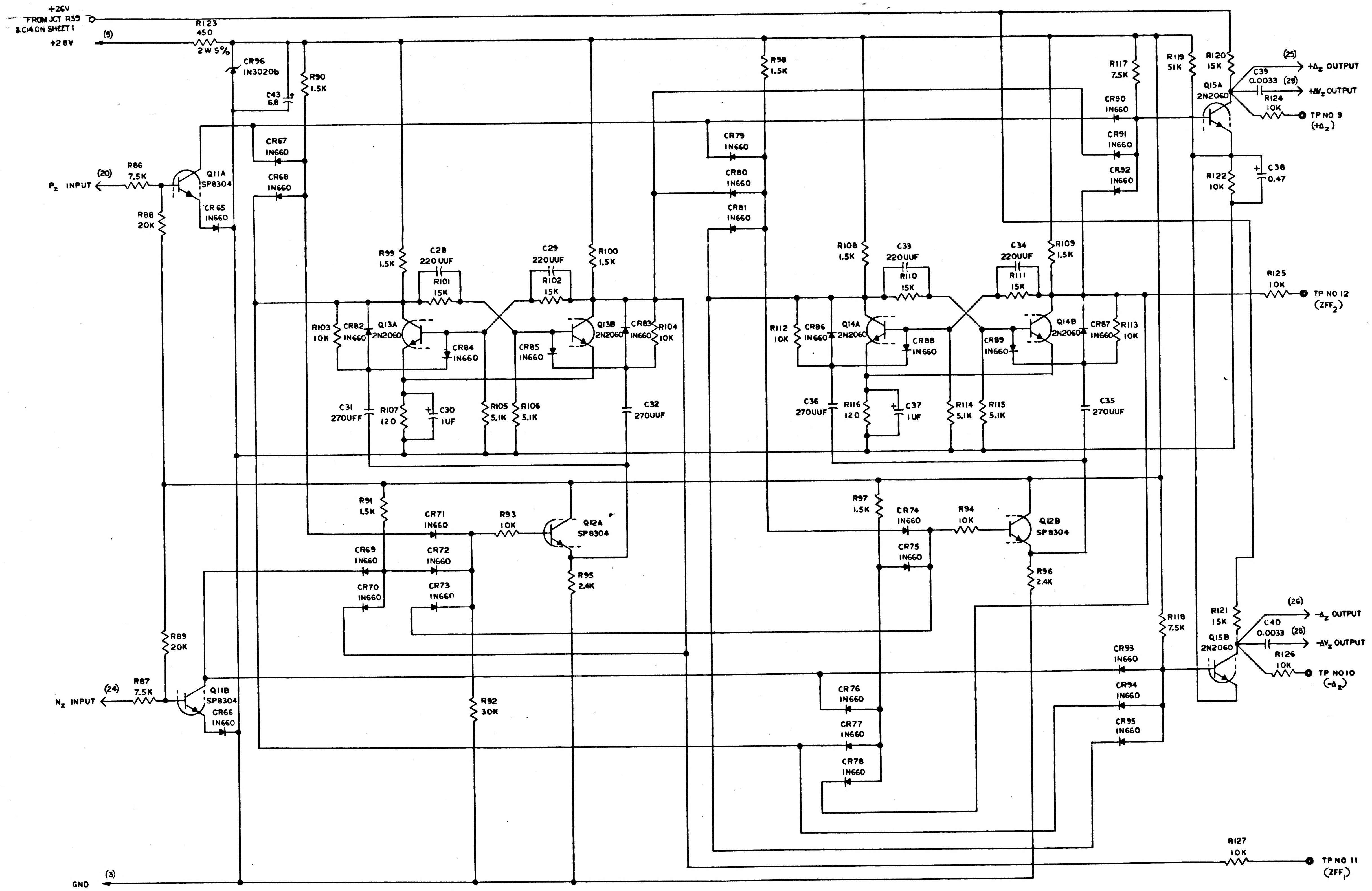
1010050 B

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	9-24-63	JJ4
B	REVISED PER TDRR 03957	10-17-63	


+26V
FROM JCT R39
& C14 ON SHEET 1
+28V
(5)
R123
450
2W 5%
CR96
1N3020b
C43
6.8
R90
1.5K
CR67
1N660
CR68
1N660
(20)
Pz INPUT
R86
7.5K
Q11A
SP8304
CR65
1N660
R88
20K
R99
1.5K
C28
220 UUF
R101
15K
C29
220UUF
R102
15K
R100
1.5K
R103
10K
CR82
1N660
Q13A
2N2060
CR84
1N660
CR85
1N660
Q13B
2N2060
CR83
1N660
R104
10K
C31
270UFF
R107
120
C30
1UF
R105
5.1K
R106
5.1K
C32
270UUF
R91
1.5K
CR71
1N660
R93
10K
Q12A
SP8304
CR69
1N660
CR72
1N660
CR70
1N660
CR73
1N660
R95
2.4K
R89
20K
(24)
Nz INPUT
R87
7.5K
Q11B
SP8304
CR66
1N660
R92
30K
GND
(3)
R98
1.5K
CR79
1N660
CR80
1N660
CR81
1N660
R108
1.5K
C33
220UUF
R110
15K
C34
220UUF
R111
15K
R109
1.5K
R112
10K
CR86
1N660
Q14A
2N2060
CR88
1N660
CR89
1N660
Q14B
2N2060
CR87
1N660
R113
10K
C36
270UUF
R116
120
C37
1UF
R114
5.1K
R115
5.1K
C35
270UUF
R97
1.5K
CR74
1N660
R94
10K
Q12B
SP8304
CR75
1N660
R96
2.4K
CR76
1N660
CR77
1N660
CR78
1N660
R117
7.5K
CR90
1N660
CR91
1N660
CR92
1N660
R119
51K
R120
15K
Q15A
2N2060
(25)
+Δz OUTPUT
C39
0.0033
(29)
+ΔVz OUTPUT
R124
10K
TP NO 9
(+Δz)
R122
10K
C38
0.47
R125
10K
TP NO 12
(ZFF2)
R118
7.5K
CR93
1N660
CR94
1N660
CR95
1N660
R121
15K
Q15B
2N2060
(26)
-Δz OUTPUT
C40
0.0033
(28)
-ΔVz OUTPUT
R126
10K
TP NO 10
(-Δz)
R127
10K
TP NO 11
(ZFF1)

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 4/3/63
CHECKED 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 17 Oct 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER
AND COMPUTER OUTPUT
PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 3 OF 4

1010050 B

INCHES
PHOTOGRAPHIC SCALE ONLY

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REVISIONS TDRR 00FB

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7-26-63	JJM. WR
B	REVISED PER TDRR 03957	6-17-63	WR

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -53	RESISTOR	7,5K	2%	1/4W
R2	-53		7.5K		
R3	-63		20K		
R4	-63		20K		
R5	-36		1.5K		
R6	-36		1.5K		
R7	-67		30K		
R8	-56		10K		
R9	-56		10K		
R10	-41		2.4K		
R11	-41		2.4K		
R12	-36		1.5K		
R13	-36		1.5K		
R14	-36		1.5K		
R15	-36		1.5K		
R16	-60		15K		
R17	-60		15K		
R18	-56		10K		
R19	-56		10K		
R20	-49		5.1K		
R21	-49		5.1K		
R22	-10		120		
R23	-36		1.5K		
R24	-36		1.5K		
R25	-60		15K		
R26	-60		15K		
R27	-56		10K		
R28	-56		10K		
R29	-49		5.1K		
R30	-49		5.1K		
R31	-10		120		
R32	-53		7.5K		
R33	-53		7.5K		
R34	-73		51K		
R35	-60		15K		
R36	-60		15K		
R37	-56		10K		
R38	1010312-034		450	5%	2W
R39	1006750-49		5.1K	2%	1/4W
R40	-56		10K		
R41	-56		10K		
R42	-56		10K		
R43	-56		10K		
R44	-53		7.5K		
R45	-53		7.5K		
R46	-63		20K		
R47	-63		20K		
R48	-36		1.5K		
R49	-36		1.5K		
R50	-67		30K		
R51	-56		10K		
R52	-56		10K		
R53	-41		2.4K		
R54	-41		2.4K		
R55	-36		1.5K		
R56	-36		1.5K		
R57	-36		1.5K		
R58	-36		1.5K		
R59	-60		15K		
R60	-60		15K		
R61	-56		10K		
R62	-56		10K		
R63	-49		5.1K		
R64	-49		5.1K		
R65	-10		120		
R66	-36		1.5K		
R67	-36		1.5K		
R68	-60		15K		
R69	-60		15K		
R70	-56		10K		
R71	-56		10K		
R72	-49		5.1K		
R73	-49		5.1K		
R74	-10		120		
R75	-53		7.5K		
R76	-53		7.5K		
R77	-73		51K		
R78	-60		15K		
R79	-60		15K		
R80	-56		10K		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R81	1010312-034	RESISTOR	450	5%	2W
R82	1006750-56		10K	2%	1/4W
R83	-56		10K		
R84	-56		10K		
R85	-56		10K		
R86	-53		7.5K		
R87	-53		7.5K		
R88	-63		20K		
R89	-63		20K		
R90	-36		1.5K		
R91	-36		1.5K		
R92	-67		30K		
R93	-56		10K		
R94	-56		10K		
R95	-41		2.4K		
R96	-41		2.4K		
R97	-36		1.5K		
R98	-36		1.5K		
R99	-36		1.5K		
R100	-36		1.5K		
R101	-60		15K		
R102	-60		15K		
R103	-56		10K		
R104	-56		10K		
R105	-49		5.1K		
R106	-49		5.1K		
R107	-10		120		
R108	-36		1.5K		
R109	-36		1.5K		
R110	-60		15K		
R111	-60		15K		
R112	-56		10K		
R113	-56		10K		
R114	-49		5.1K		
R115	-49		5.1K		
R116	-10		120		
R117	-53		7.5K		
R118	-53		7.5K		
R119	-73		51K		
R120	-60		15K		
R121	-60		5K		
R122	-56		10K		
R123	1010312-034		450	5%	2W
R124	1006750-56		10K	2%	1/4W
R125	-56		10K		
R126	-56		10K		
R127	-56		10K		
C1	1006777-16	CAPACITOR	220UUF	10%	100V
C2	-16		220UUF	10%	100V
C3	1006755 -69		1	10%	35V
C4	1006777-17		270UUF	10%	100V
C5	-17		270UUF		
C6	-16		220UUF		
C7	-16		220UUF		
C8	-17		270UUF		
C9	-17		270UUF		
C10	1006755-69		1	10%	35V
C11	-65		0.47		
C12	1006777-27		0.0033	10%	100V
C13	-27		0.0033		
C14	1010393-039		6.8	10%	50V
C15	1006777-16		220UUF	10%	100V
C16	-16		220UUF		
C17	1006755-69		1	10%	35V
C18	1006777-17		270UUF	10%	100V
C19	-17		270UUF		
C20	-16		220UUF		
C21	-16		220UUF		
C22	-17		270UUF		
C23	-17		270UUF		
C24	1006755-69		1	10%	35V
C25	-65		0.47		
C26	1006777-27		0.0033	10%	100V
C27	-27		0.0033		
C28	-16		220UUF		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C29	1006777-16	CAPACITOR	220UUF	10%	100V
C30	1006755 -69		1	10%	35V
C31	1006777-17		270UUF	10%	100V
C32	-17		270UUF		
C33	-16		220UUF		
C34	-16		220UUF		
C35	-17		270UUF		
C36	-17		270UUF		
C37	1006755-69		1	10%	35V
C38	-65		0.47		
C39	1006777-27		0.0033	10%	100V
C40			0.0033		
C41	1006755-79		6.8	10%	35V
C42					
C43					
CR1	1010385	IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	1010265-5	IN3020b			
CR33	1010385	IN660			
CR34					
CR35					
CR36					
CR37					
CR38					
CR39					
CR40					
CR41					
CR42					
CR43					
CR44					
CR45					
CR46					
CR47					
CR48					
CR49					
CR50					
CR51					
CR52					
CR53					
CR54					
CR55					
CR56					
CR57					
CR58					
CR59					
CR60					
CR61					
CR62					
CR63					

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR64	1010265-5	IN3020b			
CR65	1010385	IN660			
CR66					
CR67					
CR68					
CR69					
CR70					
CR71					
CR72					
CR73					
CR74					
CR75					
CR76					
CR77					
CR78					
CR79					
CR80					
CR81					
CR82					
CR83					
CR84					
CR85					
CR86					
CR87					
CR88					
CR89					
CR90					
CR91					
CR92					
CR93					
CR94					
CR95					
CR96	1010265-5	IN3020b			
Q1	1010395	SP8304			
Q2					
Q3	1010376 -1	2N2060			
Q4					
Q5					
Q6	1010395	SP8304			
Q7					
Q8	1010376 -1	2N2060			
Q9					
Q10					
Q11	1010395	SP8304			
Q12					
Q13	1010376 -1	2N2060			
Q14					
Q15					

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CHECKED M [illegible] 4/8/63
APPROVAL [illegible] 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER
AND COMPUTER OUTPUT
PIPA

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010050
SCALE | WT | SHEET 4 OF 4

1010050 B

INCHES
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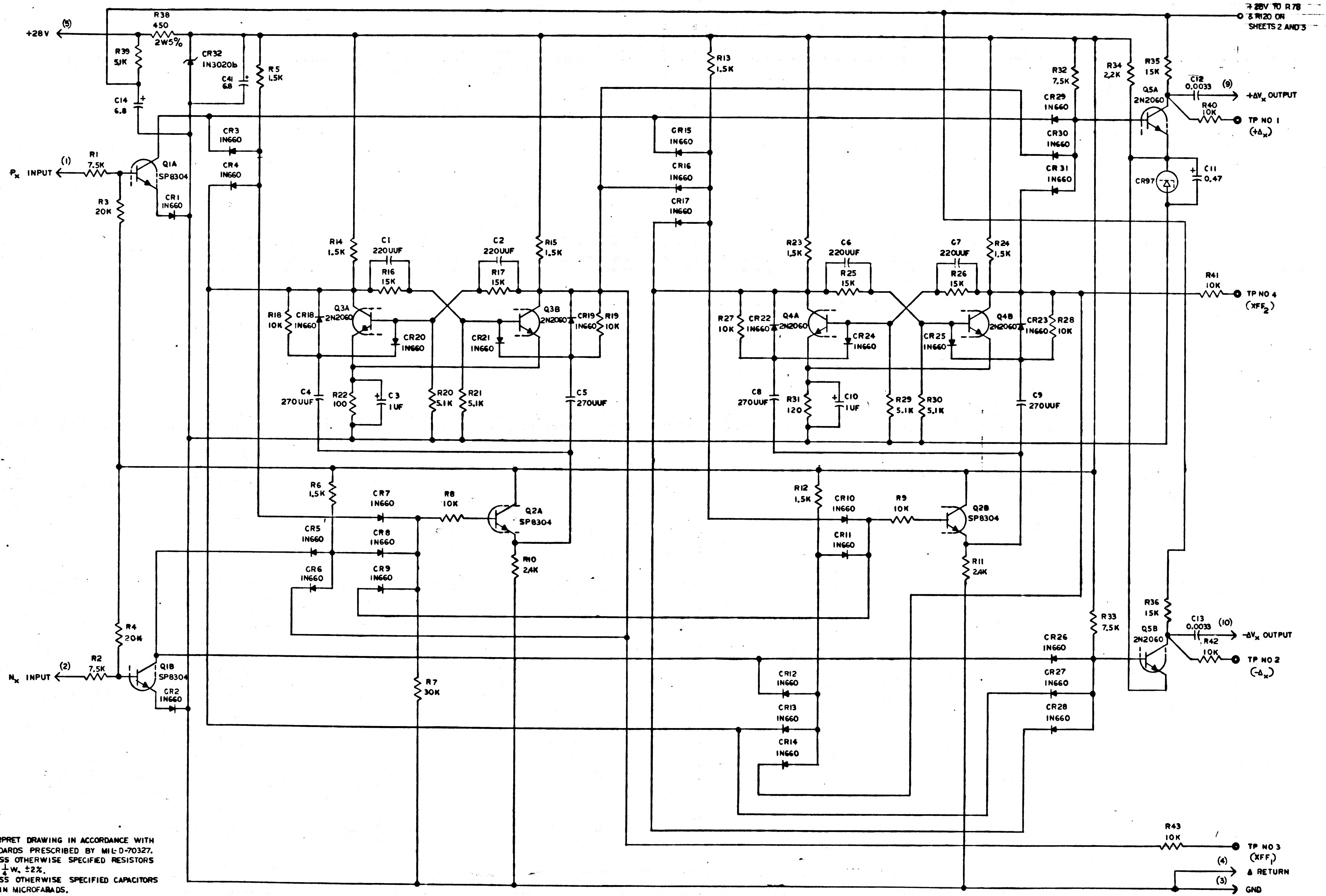
REVISIONS TORR 00441

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	9-20-63	WK
B	REVISED PER TDRR C3957	12-7-63	WK
C	REVISED PER TDRR 06645	27 FEB 64	WK


+28V (5)
R38 450 2W5%
R39 5.1K
C14 6.8
CR32 1N3020b
C41 68
R5 1.5K
CR3 1N660
CR4 1N660
P_x INPUT (1)
R1 7.5K
Q1A SP8304
CR1 1N660
R3 20K
R14 1.5K
C1 220UUF
R16 15K
C2 220UUF
R17 15K
R15 1.5K
R18 10K
CR18 1N660
Q3A 2N2060
CR20 1N660
CR21 1N660
Q3B 2N2060
CR19 1N660
R19 10K
C4 270UUF
R22 100
C3 1UF
R20 5.1K
R21 5.1K
C5 270UUF
R13 1.5K
CR15 1N660
CR16 1N660
CR17 1N660
R23 1.5K
C6 220UUF
R25 15K
C7 220UUF
R26 15K
R24 1.5K
R27 10K
CR22 1N660
Q4A 2N2060
CR24 1N660
CR25 1N660
Q4B 2N2060
CR23 1N660
R28 10K
C8 270UUF
R31 120
C10 1UF
R29 5.1K
R30 5.1K
C9 270UUF
+28V TO R78 & R120 ON SHEETS 2 AND 3
R32 7.5K
R34 2.2K
R35 15K
C12 0.0033
(9) +ΔV_x OUTPUT
Q5A 2N2060
R40 10K
TP NO 1 (+Δ_x)
CR29 1N660
CR30 1N660
CR31 1N660
CR97
C11 0.47
R41 10K
TP NO 4 (XFF_2)
R6 1.5K
CR7 1N660
R8 10K
Q2A SP8304
CR5 1N660
CR8 1N660
CR6 1N660
CR9 1N660
R10 2.4K
R12 1.5K
CR10 1N660
R9 10K
Q2B SP8304
CR11 1N660
R11 2.4K
R4 20K
N_x INPUT (2)
R2 7.5K
Q1B SP8304
CR2 1N660
R7 30K
CR12 1N660
CR13 1N660
CR14 1N660
R33 7.5K
CR26 1N660
CR27 1N660
CR28 1N660
R36 15K
Q5B 2N2060
C13 0.0033
(10) -ΔV_x OUTPUT
R42 10K
TP NO 2 (-Δ_x)
R43 10K
TP NO 3 (XFF_1)
(4) Δ RETURN
(3) GND

NOTES-
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE ¼ W, ±2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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DRAWN R J Snyder DATE 4/3/63
CHECKED M Fein 4/8/63
APPROVAL J S K 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

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FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 1 OF 4

1010050 C

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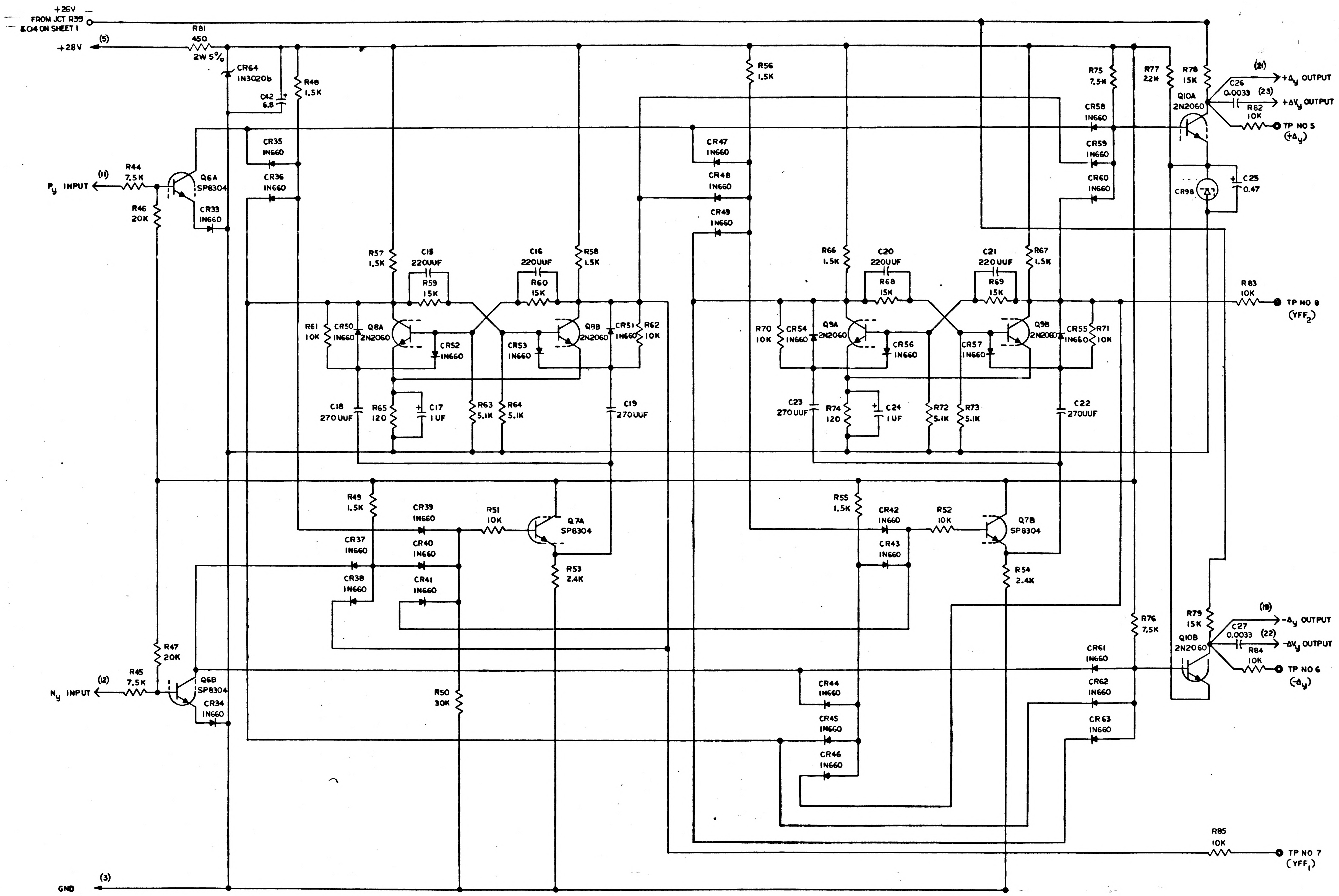
REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7-24-63	WK
B	REVISED PER TDRR 03957	10-17-63	WK
C	REVISED PER TDRR 06645	25 FEB 64	WK


+26V
FROM JCT R39
& C14 ON SHEET 1
R81
45Ω
2W 5%
(5)
+28V
CR64
1N3020b
C42
6.8
R48
1.5K
CR35
1N660
CR36
1N660
(11)
P_y INPUT
R44
7.5K
R46
20K
Q6A
SP8304
CR33
1N660
R57
1.5K
C15
220UUF
R59
15K
C16
220UUF
R60
15K
R58
1.5K
R61
10K
CR50
1N660
Q8A
2N2060
CR52
1N660
CR53
1N660
Q8B
2N2060
CR51
1N660
R62
10K
C18
270UUF
R65
120
C17
1UF
R63
5.1K
R64
5.1K
C19
270UUF
R56
1.5K
CR47
1N660
CR48
1N660
CR49
1N660
R66
1.5K
C20
220UUF
R68
15K
C21
220UUF
R69
15K
R67
1.5K
R70
10K
CR54
1N660
Q9A
2N2060
CR56
1N660
CR57
1N660
Q9B
2N2060
CR55
1N660
R71
10K
C23
270UUF
R74
120
C24
1UF
R72
5.1K
R73
5.1K
C22
270UUF
R75
7.5K
R77
22K
R78
15K
Q10A
2N2060
C26
0.0033
(21)
$+\Delta_y$ OUTPUT
(23)
$+\Delta V_y$ OUTPUT
R82
10K
TP NO 5
$(+\Delta_y)$
CR58
1N660
CR59
1N660
CR60
1N660
CR98
C25
0.47
R83
10K
TP NO 8
(YFF_2)
R49
1.5K
CR39
1N660
R51
10K
Q7A
SP8304
CR37
1N660
CR40
1N660
CR38
1N660
CR41
1N660
R53
2.4K
R55
1.5K
CR42
1N660
R52
10K
Q7B
SP8304
CR43
1N660
R54
2.4K
R76
7.5K
R79
15K
(19)
$-\Delta_y$ OUTPUT
C27
0.0033
(22)
$-\Delta V_y$ OUTPUT
Q10B
2N2060
R84
10K
TP NO 6
$(-\Delta_y)$
CR61
1N660
CR62
1N660
CR63
1N660
R47
20K
(12)
N_y INPUT
R45
7.5K
Q6B
SP8304
CR34
1N660
R50
30K
CR44
1N660
CR45
1N660
CR46
1N660
R85
10K
TP NO 7
(YFF_1)
(3)
GND

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QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CHECKED M. Feis 4/8/63
APPROVAL J.R. Stone 4/8/63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 17 Apr 63

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FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
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SHEET 2 OF 4

1010050 (C)

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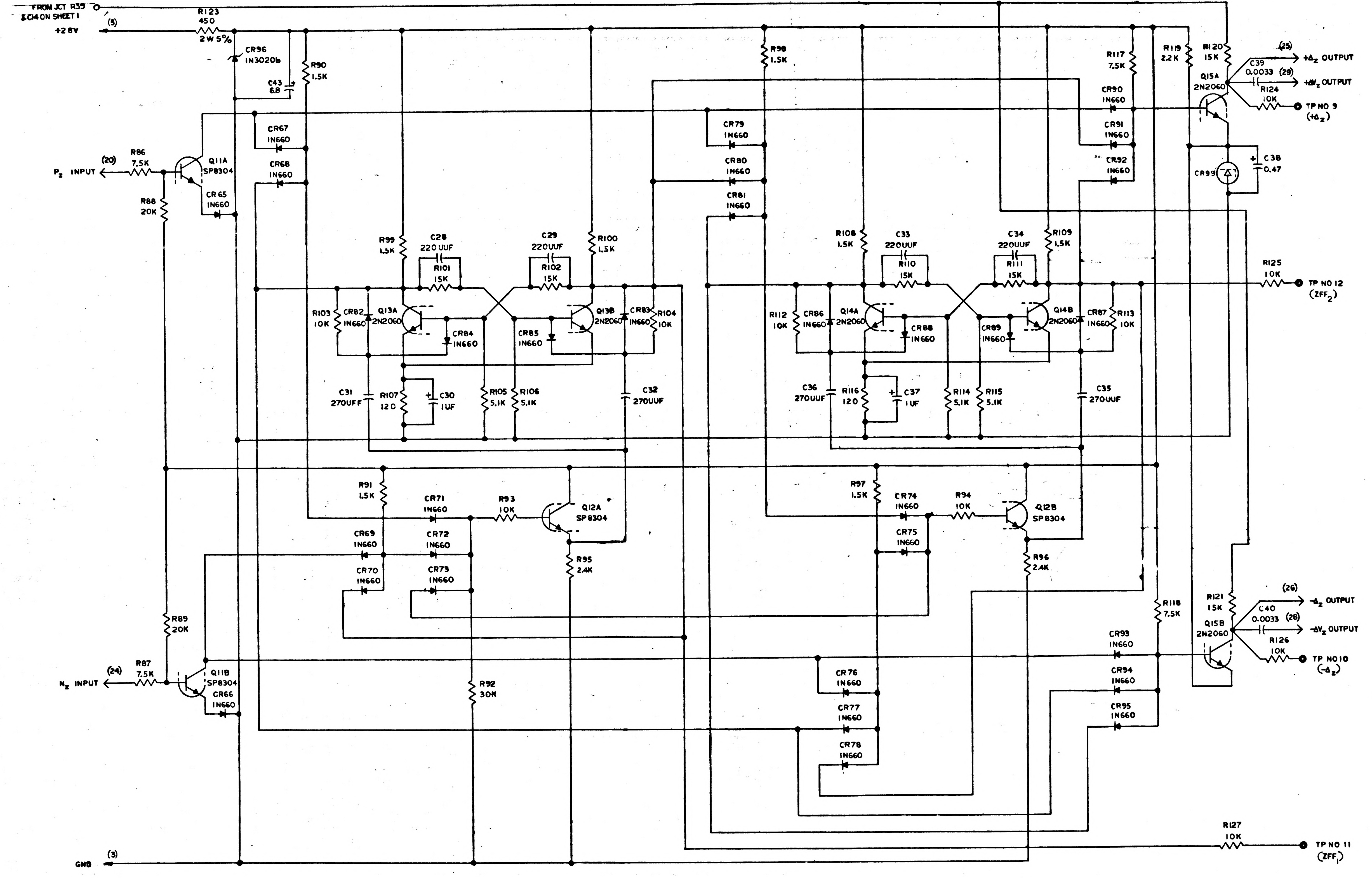
REVISIONS TDRR 60051

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7-[illegible]-63	[illegible]
B	REVISED PER TDRR 03957	[illegible]-7-63	WK
C	REVISED PER TDRR 06645	28 FEB 64	[illegible]



+26V
FROM JCT R55 & C14 ON SHEET 1
+28V
(5)
R123 450 2W 5%
CR96 1N3020b
C43 6.8
R90 1.5K
R98 1.5K
R117 7.5K
R119 2.2K
R120 15K
(25)
+Δz OUTPUT
C39 0.0033
(29)
+ΔVz OUTPUT
Q15A 2N2060
R124 10K
TP NO 9 (+Δz)
CR90 1N660
CR91 1N660
CR92 1N660
C38 0.47
CR99
CR67 1N660
CR68 1N660
CR79 1N660
CR80 1N660
CR81 1N660
Pz INPUT
(20)
R86 7.5K
Q11A SP8304
CR65 1N660
R88 20K
R99 1.5K
C28 220UUF
R101 15K
C29 220UUF
R102 15K
R100 1.5K
R108 1.5K
C33 220UUF
R110 15K
C34 220UUF
R111 15K
R109 1.5K
R125 10K
TP NO 12 (ZFF2)
R103 10K
CR82 1N660
Q13A 2N2060
CR84 1N660
CR85 1N660
Q13B 2N2060
CR83 1N660
R104 10K
R112 10K
CR86 1N660
Q14A 2N2060
CR88 1N660
CR89 1N660
Q14B 2N2060
CR87 1N660
R113 10K
C31 270UFF
R107 120
C30 1UF
R105 5.1K
R106 5.1K
C32 270UUF
C36 270UUF
R116 120
C37 1UF
R114 5.1K
R115 5.1K
C35 270UUF
R91 1.5K
CR71 1N660
R93 10K
Q12A SP8304
R97 1.5K
CR74 1N660
R94 10K
Q12B SP8304
CR69 1N660
CR72 1N660
CR75 1N660
R95 2.4K
R96 2.4K
CR70 1N660
CR73 1N660
R118 7.5K
R121 15K
(26)
-Δz OUTPUT
C40 0.0033
(28)
-ΔVz OUTPUT
Q15B 2N2060
R126 10K
TP NO10 (-Δz)
R89 20K
CR93 1N660
CR76 1N660
CR94 1N660
Nz INPUT
(24)
R87 7.5K
Q11B SP8304
CR66 1N660
R92 30K
CR77 1N660
CR95 1N660
CR78 1N660
R127 10K
TP NO 11 (ZFF1)
GND
(3)

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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CHECKED [illegible] 4/4/63
APPROVAL [illegible] 4/8/63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL W Kupfer 17Apr63

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FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 3 OF 4

E 1010050 C

INCHES
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REVISIONS TDRR 0050

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875		
B	REVISED PER TDRR 03957	10-17-63	
C	REVISED PER TDRR 06645	25 Feb 64	

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -53	RESISTOR	7.5K	2%	1/4W
R2	-53		7.5K		
R3	-63		20K		
R4	-63		20K		
R5	-36		1.5K		
R6	-36		1.5K		
R7	-67		30K		
R8	-56		10K		
R9	-56		10K		
R10	-41		2.4K		
R11	-41		2.4K		
R12	-36		1.5K		
R13	-36		1.5K		
R14	-36		1.5K		
R15	-36		1.5K		
R16	-60		15K		
R17	-60		15K		
R18	-56		10K		
R19	-56		10K		
R20	-49		5.1K		
R21	-49		5.1K		
R22	-10		120		
R23	-36		1.5K		
R24	-36		1.5K		
R25	-60		15K		
R26	-60		15K		
R27	-56		10K		
R28	-56		10K		
R29	-49		5.1K		
R30	-49		5.1K		
R31	-10		120		
R32	-53		7.5K		
R33	-53		7.5K		
R34	-40		2.2K		
R35	-60		15K		
R36	-60		15K		
~~R37~~	~~-56~~		~~10K~~		
R38	1010312 -034		450	5%	2 W
R39	1006750-49		5.1K	2%	1/4 W
R40	-56		10K		
R41	-56		10K		
R42	-56		10K		
R43	-56		10K		
R44	-53		7.5K		
R45	-53		7.5K		
R46	-63		20K		
R47	-63		20K		
R48	-36		1.5K		
R49	-36		1.5K		
R50	-67		30K		
R51	-56		10K		
R52	-56		10K		
R53	-41		2.4K		
R54	-41		2.4K		
R55	-36		1.5K		
R56	-36		1.5K		
R57	-36		1.5K		
R58	-36		1.5K		
R59	-60		15K		
R60	-60		15K		
R61	-56		10K		
R62	-56		10K		
R63	-49		5.1K		
R64	-49		5.1K		
R65	-10		120		
R66	-36		1.5K		
R67	-36		1.5K		
R68	-60		15K		
R69	-60		15K		
R70	-56		10K		
R71	-56		10K		
R72	-49		5.1K		
R73	-49		5.1K		
R74	-10		120		
R75	-53		7.5K		
R76	-53		7.5K		
R77	-40		2.2K		
R78	-60		15K		
R79	-60		15K		
~~R80~~	~~-56~~		~~10K~~		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R81	1010312-034	RESISTOR	450	5%	2 W
R82	1006750-56		10K	2%	1/4W
R83	-56		10K		
R84	-56		10K		
R85	-56		10K		
R86	-53		7.5K		
R87	-53		7.5K		
R88	-63		20K		
R89	-63		20K		
R90	-36		1.5K		
R91	-36		1.5K		
R92	-67		30K		
R93	-56		10K		
R94	-56		10K		
R95	-41		2.4K		
R96	-41		2.4K		
R97	-36		1.5K		
R98	-36		1.5K		
R99	-36		1.5K		
R100	-36		1.5K		
R101	-60		15K		
R102	-60		15K		
R103	-56		10K		
R104	-56		10K		
R105	-49		5.1K		
R106	-49		5.1K		
R107	-10		120		
R108	-36		1.5K		
R109	-36		1.5K		
R110	-60		15K		
R111	-60		15K		
R112	-56		10K		
R113	-56		10K		
R114	-49		5.1K		
R115	-49		5.1K		
R116	-10		120		
R117	-53		7.5K		
R118	-53		7.5K		
R119	-40		2.2K		
R120	-60		15K		
R121	-60		15K		
~~R122~~	~~-56~~		~~10K~~		
R123	1010312-034		450	5%	2 W
R124	1006750-56		10K	2%	1/4W
R125	-56		10K		
R126	-56		10K		
R127	-56		10K		
C1	1006777-16	CAPACITOR	220UUF	10%	100V
C2	-16		220UUF	10%	100V
C3	1006755 -69		1	10%	35 V
C4	1006777-17		270UUF	10%	100V
C5	-17		270UUF		
C6	-16		220UUF		
C7	-16		220UUF		
C8	-17		270UUF		
C9	-17		270UUF		
C10	1006755-69		1	10%	35 V
C11	-65		0.47		
C12	1006777-27		0.0033	10%	100V
C13	-27		0.0033		
C14	1010393-039		6.8	10%	50V
C15	1006777-16		220UUF	10%	100V
C16	-16		220UUF		
C17	1006755-69		1	10%	35V
C18	1006777-17		270UUF	10%	100V
C19	-17		270UUF		
C20	-16		220UUF		
C21	-16		220UUF		
C22	-17		270UUF		
C23	-17		270UUF		
C24	1006755-69		1	10%	35V
C25	-65		0.47		
C26	1006777-27		0.0033	10%	100V
C27	-27		0.0033		
C28	-16		220UUF		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C29	1006777-16	CAPACITOR	220UUF	10%	100V
C30	1006755 -69		1	10%	35 V
C31	1006777-17		270UUF	10%	100V
C32	-17		270UUF		
C33	-16		220UUF		
C34	-16		220UUF		
C35	-17		270 UUF		
C36	-17		270 UUF		
C37	1006755-69		1	10%	35 V
C38	-65		0.47		
C39	1006777-27		0.0033	10%	100V
C40			0.0033		
C41	1006755-79		6.8	10%	35V
C42					
C43					
CR1	1010385	IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	1010265-5	IN3020b			
CR33	1010385	IN660			
CR34					
CR35					
CR36					
CR37					
CR38					
CR39					
CR40					
CR41					
CR42					
CR43					
CR44					
CR45					
CR46					
CR47					
CR48					
CR49					
CR50					
CR51					
CR52					
CR53					
CR54					
CR55					
CR56					
CR57					
CR58					
CR59					
CR60					
CR61					
CR62					
CR63					

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR64	1010265-5	IN3020b			
CR65	1010385	IN660			
CR66					
CR67					
CR68					
CR69					
CR70					
CR71					
CR72					
CR73					
CR74					
CR75					
CR76					
CR77					
CR78					
CR79					
CR80					
CR81					
CR82					
CR83					
CR84					
CR85					
CR86					
CR87					
CR88					
CR89					
CR90					
CR91					
CR92					
CR93					
CR94					
CR95					
CR96	1010265-5	IN3020b			
CR97	1010372-12		56V	5%	250MW
CR98					
CR99					
Q1	1010395	SP8304			
Q2					
Q3	1010376 -1	2N2060			
Q4					
Q5					
Q6	1010395	SP8304			
Q7					
Q8	1010376 -1	2N2060			
Q9					
Q10					
Q11	1010395	SP8304			
Q12					
Q13	1010376 -1	2N2060			
Q14					
Q15					

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DWG NO
CONTRACT

DRAWN DATE 4/8/63
CHECKED 4/10/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 4 OF 4

1010050

INCHES
PHOTOGRAPHING SCALE ONLY

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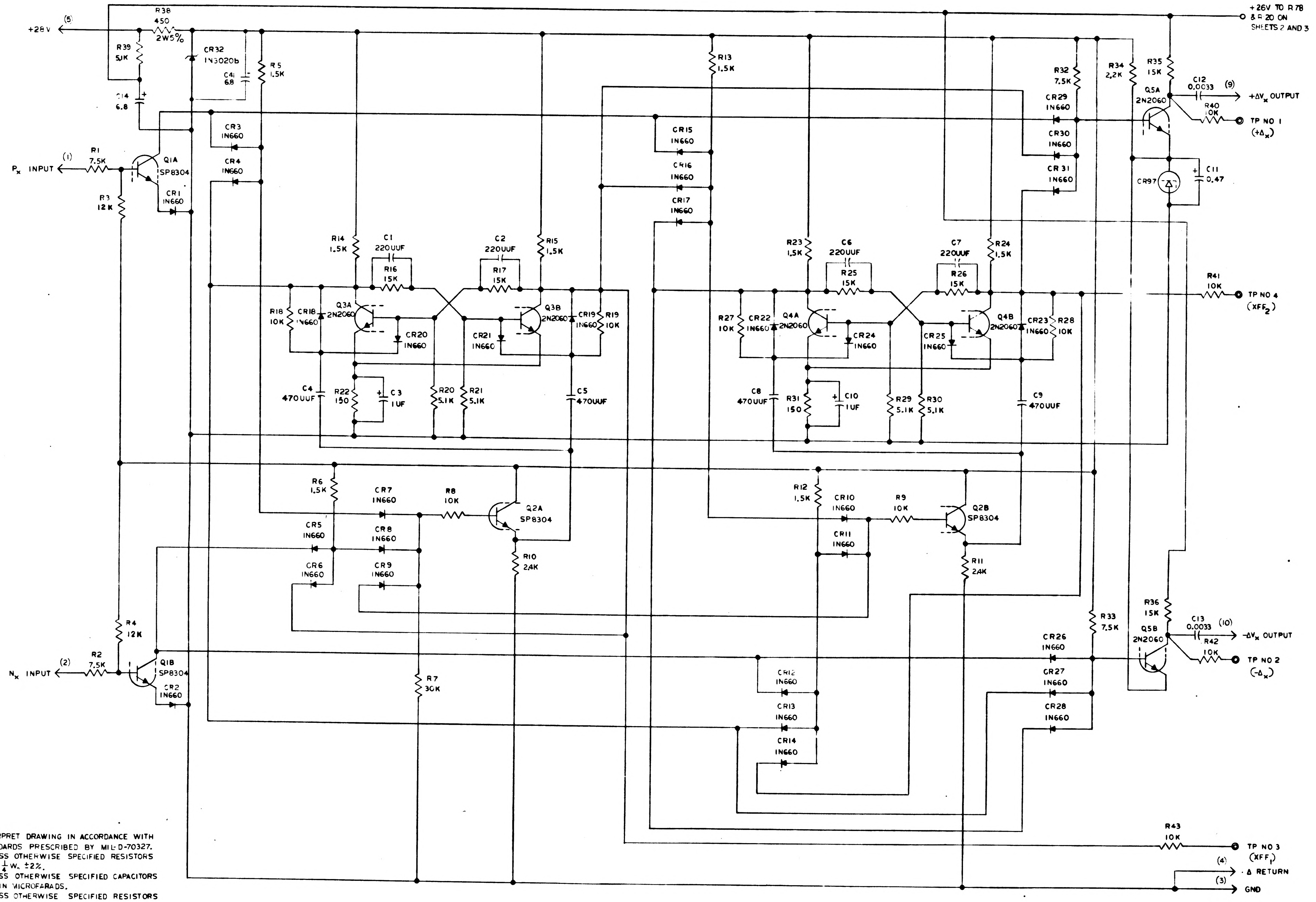
REVISIONS TDRR 00481

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 75	[illegible]	[illegible]
B	REVISED PER TDRR 957	[illegible]	[illegible]
C	REVISED PER TDRR 645	[illegible]	[illegible]
D	REVISED PER TDRR 8072	[illegible]	[illegible]



+28V
(5)
R38
450
2W5%
R39
5.1K
C14
6.8
CR32
1N3020B
C41
6.8
R5
1.5K
CR3
1N660
CR4
1N660
Px INPUT
(1)
R1
7.5K
Q1A
SP8304
CR1
1N660
R3
12K
R14
1.5K
C1
220UUF
R16
15K
C2
220UUF
R17
15K
R15
1.5K
R18
10K
CR18
1N660
Q3A
2N2060
CR20
1N660
CR21
1N660
Q3B
2N2060
CR19
1N660
R19
10K
C4
470UUF
R22
150
C3
1UF
R20
5.1K
R21
5.1K
C5
470UUF
R13
1.5K
CR15
1N660
CR16
1N660
CR17
1N660
R23
1.5K
C6
220UUF
R25
15K
C7
220UUF
R26
15K
R24
1.5K
R27
10K
CR22
1N660
Q4A
2N2060
CR24
1N660
CR25
1N660
Q4B
2N2060
CR23
1N660
R28
10K
C8
470UUF
R31
150
C10
1UF
R29
5.1K
R30
5.1K
C9
470UUF
+26V TO R78
& R20 ON
SHEETS 2 AND 3
R32
7.5K
R34
2.2K
R35
15K
Q5A
2N2060
C12
0.0033
(9)
+ΔVx OUTPUT
R40
10K
TP NO 1
(+Δx)
CR29
1N660
CR30
1N660
CR31
1N660
CR97
C11
0.47
R41
10K
TP NO 4
(XFF2)
R6
1.5K
CR7
1N660
R8
10K
Q2A
SP8304
CR5
1N660
CR8
1N660
CR6
1N660
CR9
1N660
R10
2.4K
R12
1.5K
CR10
1N660
R9
10K
Q2B
SP8304
CR11
1N660
R11
2.4K
R33
7.5K
R36
15K
Q5B
2N2060
C13
0.0033
(10)
-ΔVx OUTPUT
R42
10K
TP NO 2
(-Δx)
CR26
1N660
CR27
1N660
CR28
1N660
R4
12K
Nx INPUT
(2)
R2
7.5K
Q1B
SP8304
CR2
1N660
R7
30K
CR12
1N660
CR13
1N660
CR14
1N660
R43
10K
TP NO 3
(XFF1)
(4)
Δ RETURN
(3)
GND

NOTES–

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W. ±2%.
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

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CONTRACT

DRAWN [illegible] DATE 4/3/63
CHECKED M. [illegible] 4/8/63
APPROVAL [illegible] 4/8/63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 17Apr63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER
AND COMPUTER OUTPUT
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE —
WT
SHEET 1 OF 4

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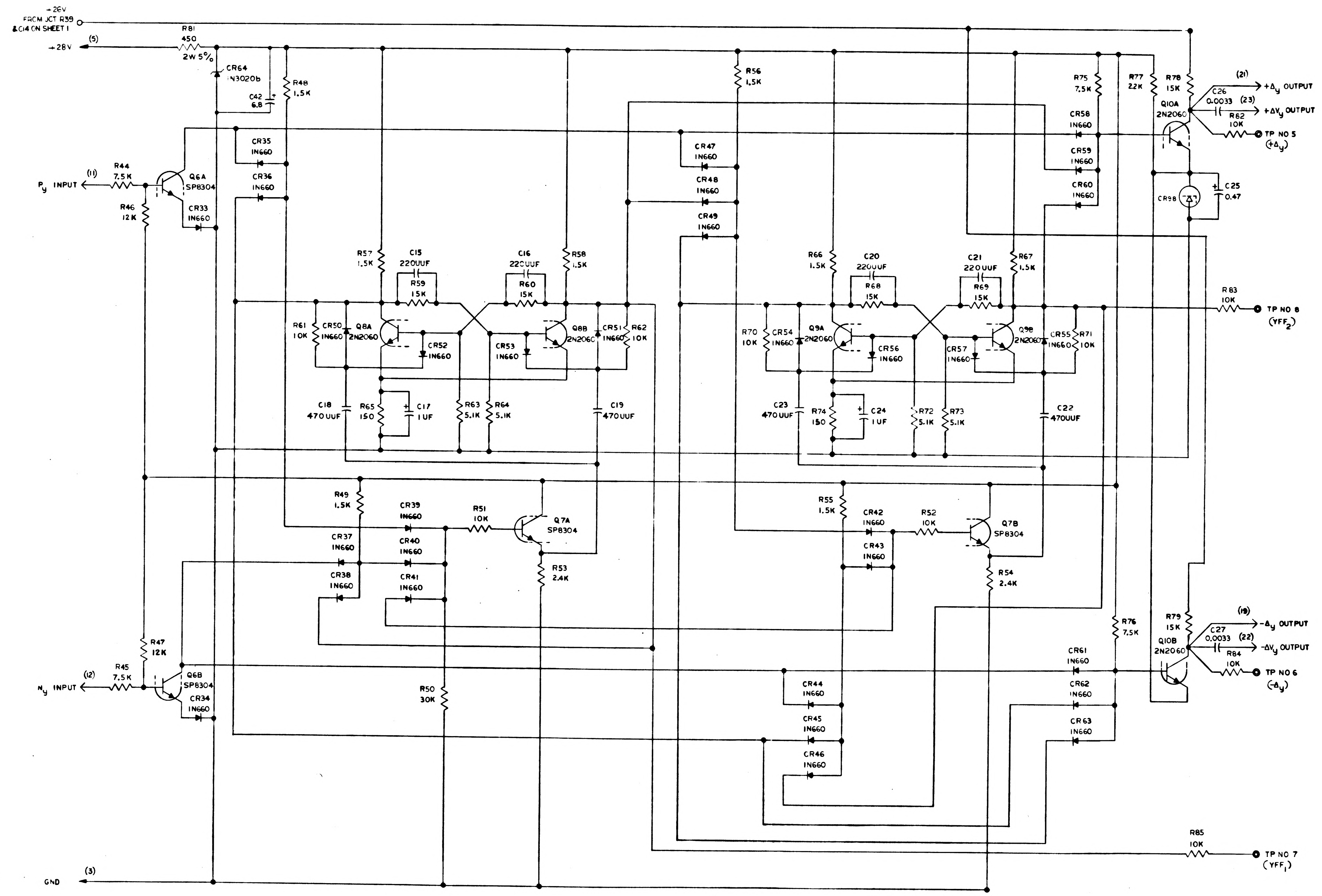
REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7-20-63	WK
B	REVISED PER TDRR 03957	7-63	WK
C	REVISED PER TDRR 06645	[illegible]	[illegible]
D	REVISED PER TDRR 08072	[illegible]	[illegible]


+26V
FROM JCT R39
& C14 ON SHEET 1
(5)
+28V
R81
450
2W 5%
CR64
1N3020b
C42
6.8
R48
1.5K
CR35
1N660
CR36
1N660
(11)
Py INPUT
R44
7.5K
R46
12K
Q6A
SP8304
CR33
1N660
R56
1.5K
CR47
1N660
CR48
1N660
CR49
1N660
R75
7.5K
R77
22K
R78
15K
(21)
+Δy OUTPUT
C26
0.0033
(23)
+ΔVy OUTPUT
Q10A
2N2060
R62
10K
TP NO 5
(+Δy)
CR58
1N660
CR59
1N660
CR60
1N660
CR98
C25
0.47
R57
1.5K
C15
220UUF
R59
15K
C16
220UUF
R60
15K
R58
1.5K
R61
10K
CR50
1N660
Q8A
2N2060
CR52
1N660
CR53
1N660
Q8B
2N2060
CR51
1N660
R62
10K
C18
470UUF
R65
150
C17
1UF
R63
5.1K
R64
5.1K
C19
470UUF
R66
1.5K
C20
220UUF
R68
15K
C21
220UUF
R69
15K
R67
1.5K
R70
10K
CR54
1N660
Q9A
2N2060
CR56
1N660
CR57
1N660
Q9B
2N2060
CR55
1N660
R71
10K
R83
10K
TP NO 8
(YFF2)
C23
470UUF
R74
150
C24
1UF
R72
5.1K
R73
5.1K
C22
470UUF
R49
1.5K
CR39
1N660
R51
10K
Q7A
SP8304
CR37
1N660
CR40
1N660
CR38
1N660
CR41
1N660
R53
2.4K
R55
1.5K
CR42
1N660
R52
10K
Q7B
SP8304
CR43
1N660
R54
2.4K
R76
7.5K
R79
15K
(19)
-Δy OUTPUT
C27
0.0033
(22)
-ΔVy OUTPUT
Q10B
2N2060
R84
10K
TP NO 6
(-Δy)
CR61
1N660
CR62
1N660
CR63
1N660
R47
12K
(12)
Ny INPUT
R45
7.5K
Q6B
SP8304
CR34
1N660
R50
30K
CR44
1N660
CR45
1N660
CR46
1N660
R85
10K
TP NO 7
(YFF1)
(3)
GND

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
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DWG NO
CONTRACT

DRAWN R. L. Alonso DATE 4/3/63
CHECKED M. Fein 4/8/63
APPROVAL E. Stone 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W. 17 Apr 63

MANNED SPACECRAFT CENTER
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FORWARD-BACKWARD COUNTER
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PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 2 OF 4

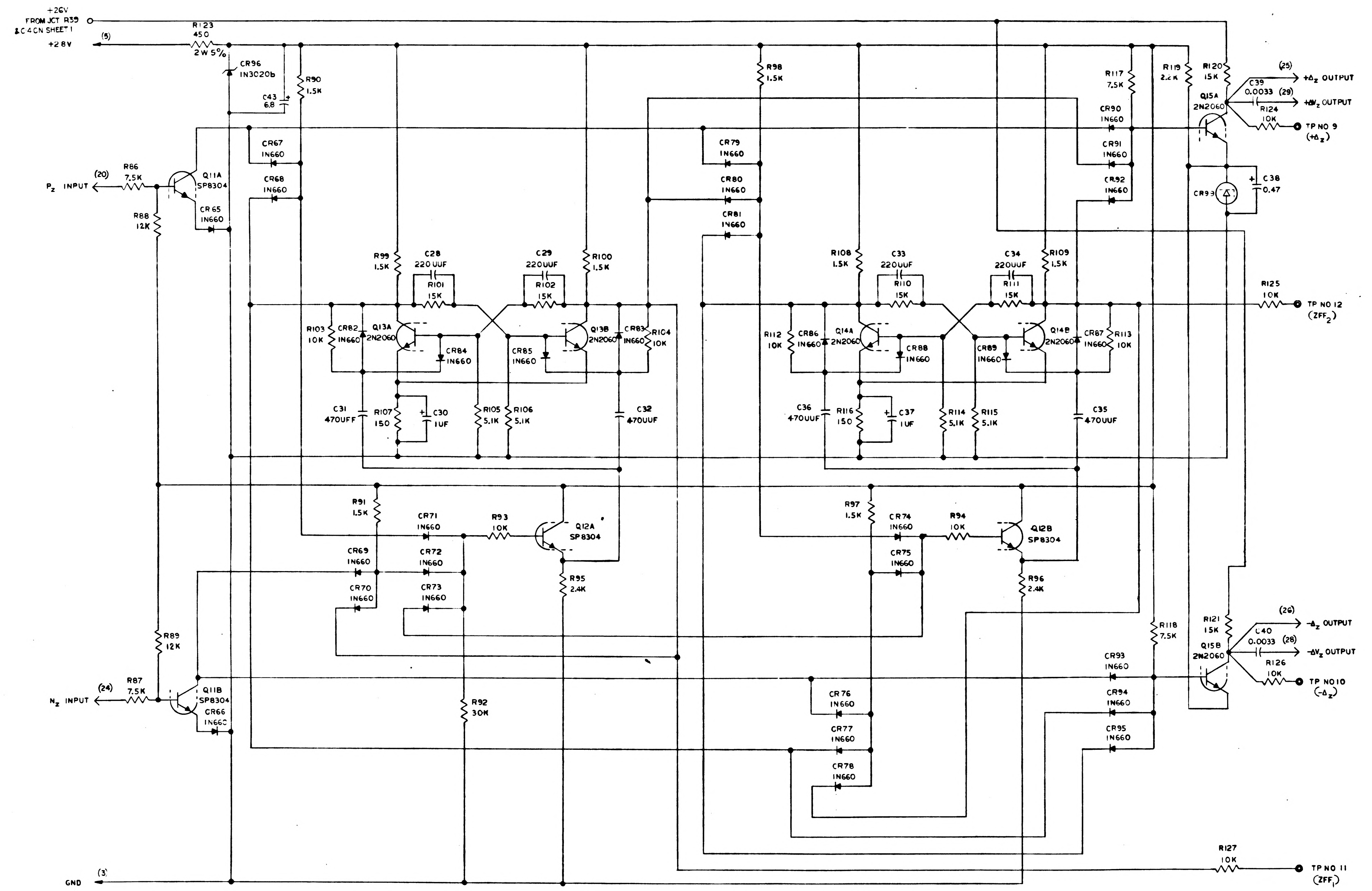
1010050 D

9-M

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	[illegible]-63	
B	REVISED PER TDRR 0[illegible]57	10-17-63	
C	REVISED PER TDRR 03645	[illegible]64	
D	REVISED PER TDRR 08072	[illegible]64	


+26V
FROM JCT R39
& C4 ON SHEET 1
(5)
+28V
R123
450
2W 5%
CR96
1N3020b
C43
6.8
R90
1.5K
CR67
1N660
CR68
1N660
(20)
P_z INPUT
R86
7.5K
Q11A
SP8304
CR65
1N660
R88
12K
R99
1.5K
C28
220UUF
R101
15K
C29
220UUF
R102
15K
R100
1.5K
R103
10K
CR82
1N660
Q13A
2N2060
CR84
1N660
CR85
1N660
Q13B
2N2060
CR83
1N660
R104
10K
C31
470UUF
R107
150
C30
1UF
R105
5.1K
R106
5.1K
C32
470UUF
R91
1.5K
CR71
1N660
R93
10K
Q12A
SP8304
CR69
1N660
CR72
1N660
CR70
1N660
CR73
1N660
R95
2.4K
R89
12K
(24)
N_z INPUT
R87
7.5K
Q11B
SP8304
CR66
1N660
R92
30K
GND
(3)
R98
1.5K
CR79
1N660
CR80
1N660
CR81
1N660
R108
1.5K
C33
220UUF
R110
15K
C34
220UUF
R111
15K
R109
1.5K
R112
10K
CR86
1N660
Q14A
2N2060
CR88
1N660
CR89
1N660
Q14B
2N2060
CR87
1N660
R113
10K
C36
470UUF
R116
150
C37
1UF
R114
5.1K
R115
5.1K
C35
470UUF
R97
1.5K
CR74
1N660
R94
10K
Q12B
SP8304
CR75
1N660
R96
2.4K
CR76
1N660
CR77
1N660
CR78
1N660
R117
7.5K
R119
2.2K
R120
15K
(25)
+Δ_z OUTPUT
C39
0.0033
(29)
+ΔV_z OUTPUT
Q15A
2N2060
R124
10K
TP NO 9
(+Δ_z)
CR90
1N660
CR91
1N660
CR92
1N660
CR99
C38
0.47
R125
10K
TP NO 12
(ZFF_2)
R118
7.5K
R121
15K
(26)
-Δ_z OUTPUT
C40
0.0033
(28)
-ΔV_z OUTPUT
Q15B
2N2060
R126
10K
TP NO 10
(-Δ_z)
CR93
1N660
CR94
1N660
CR95
1N660
R127
10K
TP NO 11
(ZFF_1)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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CAMBRIDGE, MASS.
DWG NO CONTRACT
DRAWN DATE 4/3/63
CHECKED 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 [illegible] 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 3 OF 4

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR [illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	[illegible]	
B	REVISED PER TDRR 03957	[illegible]-63	
	REVISED PER TDRR 06645	[illegible]	
D	REVISED PER TDRR 08072	MAY [illegible]	

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -53	RESISTOR	7.5K	2%	1/4W
R2	-53		7.5K		
R3	-58		12K		
R4	-58		12K		
R5	-36		1.5K		
R6	-36		1.5K		
R7	-67		30K		
R8	-56		10K		
R9	-56		10K		
R10	-41		2.4K		
R11	-41		2.4K		
R12	-36		1.5K		
R13	-36		1.5K		
R14	-36		1.5K		
R15	-36		1.5K		
R16	-60		15K		
R17	-60		15K		
R18	-56		10K		
R19	-56		10K		
R20	-49		5.1K		
R21	-49		5.1K		
R22	-12		150		
R23	-36		1.5K		
R24	-36		1.5K		
R25	-60		15K		
R26	-60		15K		
R27	-56		10K		
R28	-56		10K		
R29	-49		5.1K		
R30	-49		5.1K		
R31	-12		150		
R32	-53		7.5K		
R33	-53		7.5K		
R34	-40		2.2K		
R35	-60		15K		
R36	-60		15K		
~~R37~~	~~-56~~		~~10K~~		
R38	1010312 – 034		450	5%	2 W
R39	1006750-49		5.1K	2%	1/4 W
R40	-56		10K		
R41	-56		10K		
R42	-56		10K		
R43	-56		10K		
R44	-53		7.5K		
R45	-53		7.5K		
R46	-58		12K		
R47	-58		12K		
R48	-36		1.5K		
R49	-36		1.5K		
R50	-67		30K		
R51	-56		10K		
R52	-56		10K		
R53	-41		2.4K		
R54	-41		2.4K		
R55	-36		1.5K		
R56	-36		1.5K		
R57	-36		1.5K		
R58	-36		1.5K		
R59	-60		15K		
R60	-60		15K		
R61	-56		10K		
R62	-56		10K		
R63	-49		5.1K		
R64	-49		5.1K		
R65	-12		150		
R66	-36		1.5K		
R67	-36		1.5K		
R68	-60		15K		
R69	-60		15K		
R70	-56		10K		
R71	-56		10K		
R72	-49		5.1K		
R73	-49		5.1K		
R74	-12		150		
R75	-53		7.5K		
R76	-53		7.5K		
R77	-40		2.2K		
R78	-60		15K		
R79	-60		15K		
~~R80~~	~~-56~~		~~10K~~		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R81	1010312-034	RESISTOR	450	5%	2W
R82	1006750-56		10K	2%	1/4W
R83	-56		10K		
R84	-56		10K		
R85	-56		10K		
R86	-53		7.5K		
R87	-53		7.5K		
R88	-58		12K		
R89	-58		12K		
R90	-36		1.5K		
R91	-36		1.5K		
R92	-67		30K		
R93	-56		10K		
R94	-56		10K		
R95	-41		2.4K		
R96	-41		2.4K		
R97	-36		1.5K		
R98	-36		1.5K		
R99	-36		1.5K		
R100	-36		1.5K		
R101	-60		15K		
R102	-60		15K		
R103	-56		10K		
R104	-56		10K		
R105	-49		5.1K		
R106	-49		5.1K		
R107	-12		150		
R108	-36		1.5K		
R109	-36		1.5K		
R110	-60		15K		
R111	-60		15K		
R112	-56		10K		
R113	-56		10K		
R114	-49		5.1K		
R115	-49		5.1K		
R116	-12		150		
R117	-53		7.5K		
R118	-53		7.5K		
R119	-40		2.2K		
R120	-60		15K		
R121	-60		15K		
~~R122~~	~~-56~~		~~10K~~		
R123	1010312–034		450	5%	2 W
R124	1006750-56		10K	2%	1/4W
R125	-56		10K		
R126	-56		10K		
R127	-56		10K		
C1	1006777-16	CAPACITOR	220UUF	10%	100V
C2	-16		220UUF	10%	100V
C3	1006755 -69		1	10%	35 V
C4	1006777-20		470UUF	10%	100V
C5	-20		470UUF		
C6	-16		220UUF		
C7	-16		220UUF		
C8	-20		470 UUF		
C9	-20		470UUF		
C10	1006755 -69		1	10%	35 V
C11	-65		0.47		
C12	1006777-27		0.0033	10%	100V
C13	-27		0.0033		
C14	1010393-039		6.8	10%	50V
C15	1006777 -16		220UUF	10%	100V
C16	-16		220UUF		
C17	1006755-69		1	10%	35V
C18	1006777-20		470UUF	10%	100V
C19	-20		470UUF		
C20	-16		220UUF		
C21	-16		220UUF		
C22	-20		470UUF		
C23	-20		470UUF		
C24	1006755 -69		1	10%	35V
C25	-65		0.47		
C26	1006777-27		0.0033	10%	100V
C27	-27		0.0033		
C28	-16		220UUF		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C29	1006777 -16	CAPACITOR	220UUF	10%	100V
C30	1006755 -69		1	10%	35 V
C31	1006777-20		470UUF	10%	100V
C32	-20		470UUF		
C33	-16		220UUF		
C34	-16		220UUF		
C35	-20		470 UUF		
C36	-20		470 UUF		
C37	1006755 -69		1	10%	35 V
C38	-65		0.47		
C39	1006777-27		0.0033	10%	100V
C40			0.0033		
C41	1006755-79		6.8	10%	35V
C42					
C43					
CR1	1010385	IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	1010265-5	IN3020b			
CR33	1010385	IN660			
CR34					
CR35					
CR36					
CR37					
CR38					
CR39					
CR40					
CR41					
CR42					
CR43					
CR44					
CR45					
CR46					
CR47					
CR48					
CR49					
CR50					
CR51					
CR52					
CR53					
CR54					
CR55					
CR56					
CR57					
CR58					
CR59					
CR60					
CR61					
CR62					
CR63					

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR64	1010265-5	IN3020b			
CR65	1010385	IN660			
CR66					
CR67					
CR68					
CR69					
CR70					
CR71					
CR72					
CR73					
CR74					
CR75					
CR76					
CR77					
CR78					
CR79					
CR80					
CR81					
CR82					
CR83					
CR84					
CR85					
CR86					
CR87					
CR88					
CR89					
CR90					
CR91					
CR92					
CR93					
CR94					
CR95					
CR96	1010265-5	IN3020b			
CR97	1010372-12		56V	5%	250MW
CR98					
CR99					
Q1	1010395	SP8304			
Q2					
Q3	1010376 -1	2N2060			
Q4					
Q5					
Q6	1010395	SP8304			
Q7					
Q8	1010376 -1	2N2060			
Q9					
Q10					
Q11	1010395	SP8304			
Q12					
Q13	1010376 -1	2N2060			
Q14					
Q15					

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DWG NO CONTRACT
DRAWN DATE 4/8/63
CHECKED 4/9/63
APPROVAL 4/9/63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
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WT
SHEET 4 OF 4

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1010050

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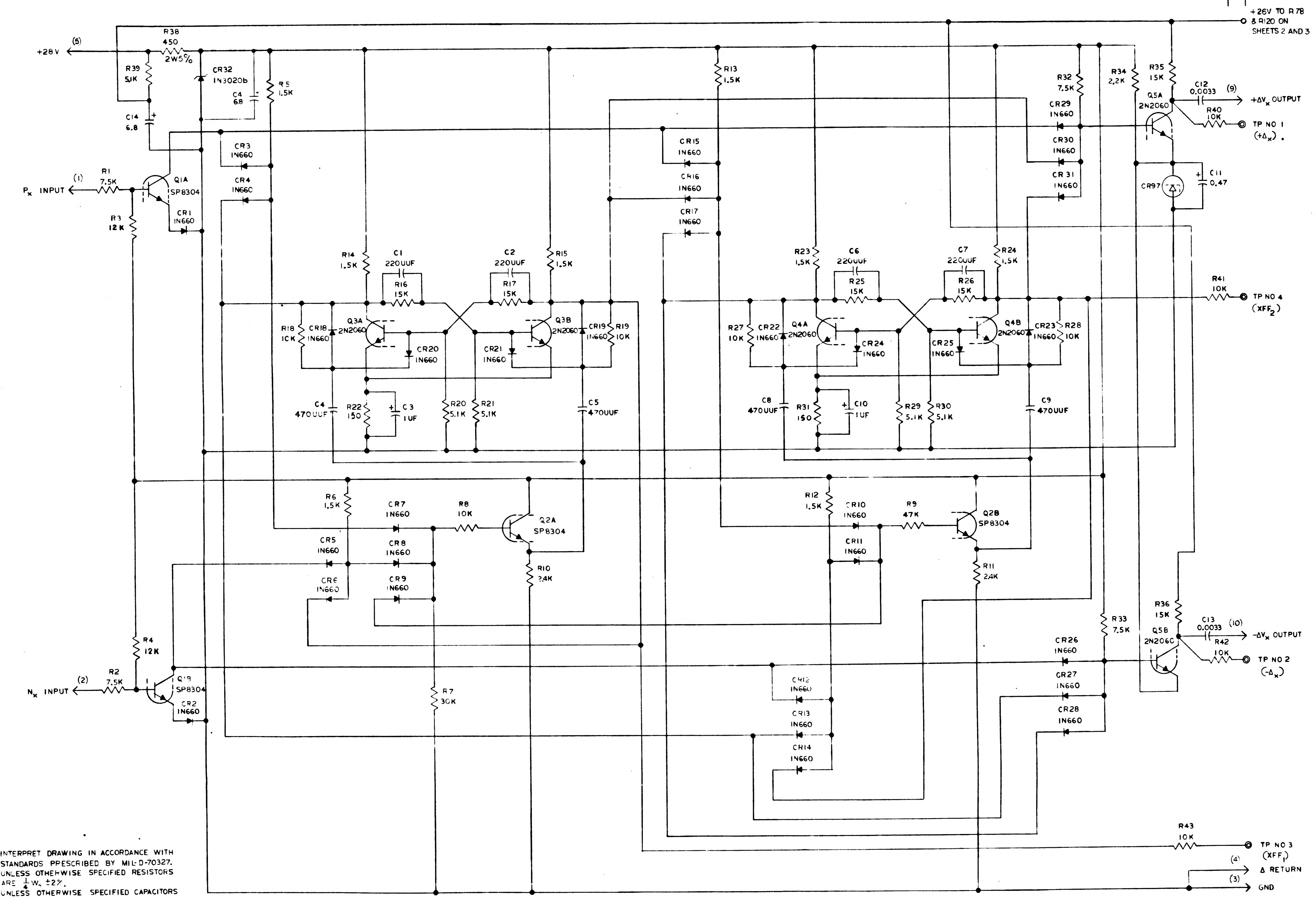
REVISIONS TDRR 00441

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR [illegible]75	[illegible]	[illegible]
B	REVISED PER TDRR C3957	12-17-63	[illegible]
C	REVISED PER TDRR 0[illegible]45	25 FEB 64	[illegible]
D	REVISED PER TDRR C8072	11 MAY 64	[illegible]
E	REVISED PER TDRR [illegible]5229	15 OCT 64	[illegible]


+28V
(5)
R38 450 2W5%
R39 5.1K
C14 6.8
CR32 1N3020b
C4 68
R5 1.5K
CR3 1N660
CR4 1N660
Px INPUT
(1)
R1 7.5K
Q1A SP8304
CR1 1N660
R3 12K
R14 1.5K
C1 220UUF
R16 15K
Q3A 2N2060
R18 10K
CR18 1N660
CR20 1N660
C4 470UUF
R22 150
C3 1UF
R20 5.1K
R21 5.1K
C2 220UUF
R17 15K
CR21 1N660
Q3B 2N2060
R15 1.5K
CR19 1N660
R19 10K
C5 470UUF
R13 1.5K
CR15 1N660
CR16 1N660
CR17 1N660
R23 1.5K
C6 220UUF
R25 15K
Q4A 2N2060
R27 10K
CR22 1N660
CR24 1N660
C8 470UUF
R31 150
C10 1UF
R29 5.1K
R30 5.1K
C7 220UUF
R26 15K
Q4B 2N2060
CR25 1N660
R24 1.5K
CR23 1N660
R28 10K
C9 470UUF
R32 7.5K
R34 2.2K
R35 15K
CR29 1N660
CR30 1N660
CR31 1N660
Q5A 2N2060
C12 0.0033
(9)
+ΔVx OUTPUT
R40 10K
TP NO 1 (+Δx)
CR97
C11 0.47
+26V TO R 78 & R120 ON SHEETS 2 AND 3
R41 10K
TP NO 4 (XFF2)
R6 1.5K
CR7 1N660
R8 10K
Q2A SP8304
CR5 1N660
CR8 1N660
CR6 1N660
CR9 1N660
R10 2.4K
R7 30K
R12 1.5K
CR10 1N660
R9 47K
Q2B SP8304
CR11 1N660
R11 2.4K
R4 12K
R2 7.5K
(2)
Nx INPUT
Q1B SP8304
CR2 1N660
CR12 1N660
CR13 1N660
CR14 1N660
R33 7.5K
CR26 1N660
CR27 1N660
CR28 1N660
R36 15K
Q5B 2N2060
C13 0.0033
(10)
-ΔVx OUTPUT
R42 10K
TP NO 2 (-Δx)
R43 10K
TP NO 3 (XFF1)
(4)
Δ RETURN
(3)
GND

NOTES-
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PPESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$ W, ±2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIN NO

LIST OF MATERIALS

NEXT ASSY	USED ON

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APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

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CODE IDENT NO
SIZE E
NASA DRAWING NO 010050
SCALE —
WT
SHEET 1 OF 4

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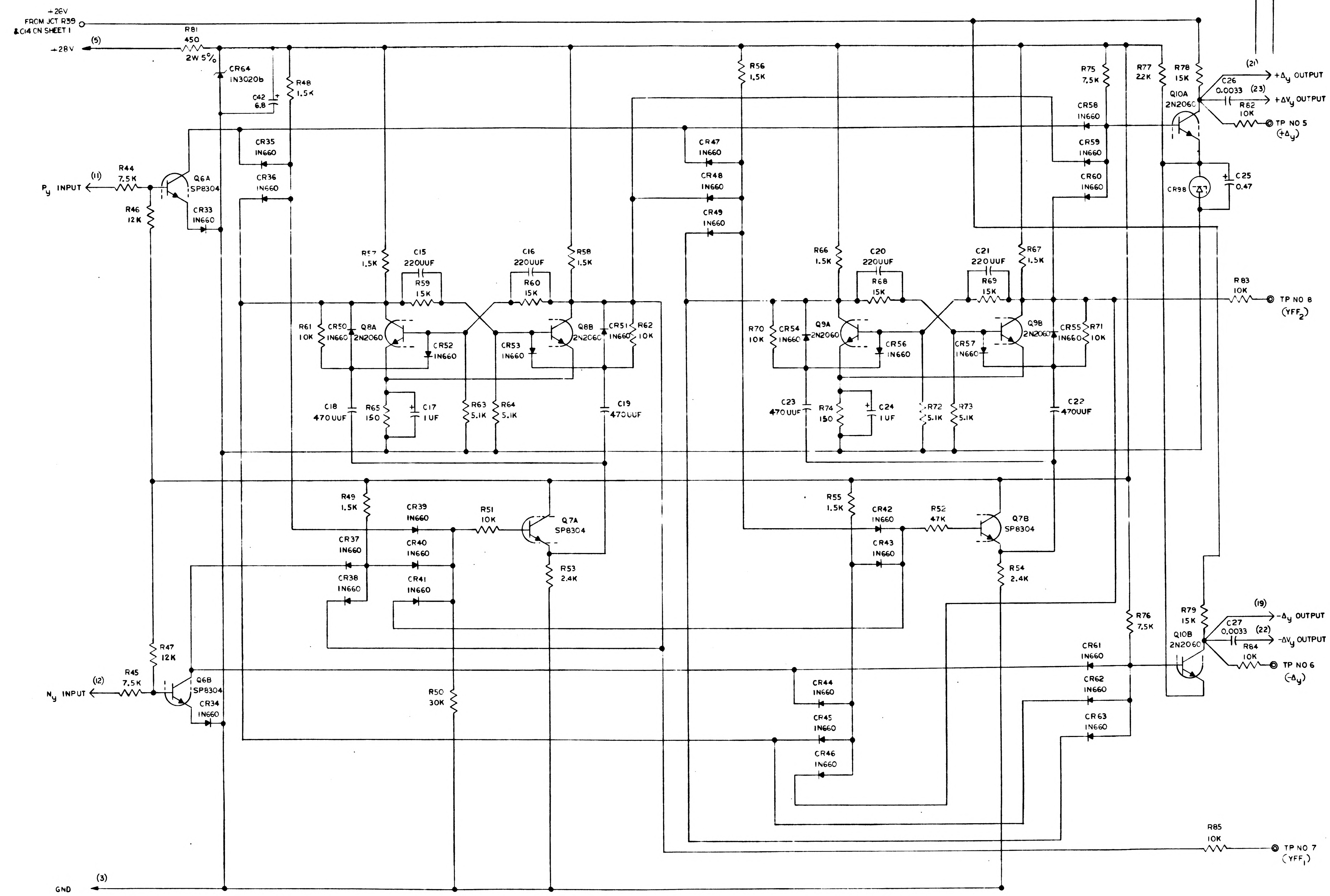
REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7-26-63	WK
B	REVISED PER TDRR 03957	10-7-63	WK
C	REVISED PER TDRR 06645	5 FEB 64	[illegible]
D	REVISED PER TDRR 08072	11 MAY 64	[illegible]
E	REVISED PER TDRR 13229	15 OCT 64	[illegible]



+26V
FROM JCT R39
& C14 ON SHEET 1
+28V
(5)
R81
450
2W 5%
CR64
1N3020B
C42
6.8
R48
1.5K
CR35
1N660
CR36
1N660
Py INPUT
(11)
R44
7.5K
Q6A
SP8304
R46
12K
CR33
1N660
R57
1.5K
C15
220UUF
R59
15K
C16
220UUF
R60
15K
R58
1.5K
R61
10K
CR50
1N660
Q8A
2N2060
CR52
1N660
CR53
1N660
Q8B
2N2060
CR51
1N660
R62
10K
C18
470UUF
R65
150
C17
1UF
R63
5.1K
R64
5.1K
C19
470UUF
R56
1.5K
CR47
1N660
CR48
1N660
CR49
1N660
R66
1.5K
C20
220UUF
R68
15K
C21
220UUF
R69
15K
R67
1.5K
R70
10K
CR54
1N660
Q9A
2N2060
CR56
1N660
CR57
1N660
Q9B
2N2060
CR55
1N660
R71
10K
C23
470UUF
R74
150
C24
1UF
R72
5.1K
R73
5.1K
C22
470UUF
R75
7.5K
R77
22K
R78
15K
Q10A
2N2060
CR58
1N660
CR59
1N660
CR60
1N660
CR98
C25
0.47
(21)
+Δy OUTPUT
C26
0.0033
(23)
+ΔVy OUTPUT
R62
10K
TP NO 5
(+Δy)
R83
10K
TP NO 8
(YFF2)
R49
1.5K
CR39
1N660
R51
10K
Q7A
SP8304
CR37
1N660
CR40
1N660
CR38
1N660
CR41
1N660
R53
2.4K
R55
1.5K
CR42
1N660
R52
47K
Q7B
SP8304
CR43
1N660
R54
2.4K
R76
7.5K
R79
15K
Q10B
2N2060
(19)
-Δy OUTPUT
C27
0.0033
(22)
-ΔVy OUTPUT
R84
10K
TP NO 6
(-Δy)
CR61
1N660
CR62
1N660
CR63
1N660
R47
12K
R45
7.5K
Ny INPUT
(12)
Q6B
SP8304
CR34
1N660
R50
30K
CR44
1N660
CR45
1N660
CR46
1N660
R85
10K
TP NO 7
(YFF1)
GND
(3)

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DWG NO CONTRACT
DRAWN R.J. [illegible] DATE 4/3/63
CHECKED M. [illegible] 4/8/63
APPROVAL [illegible] 4/8/63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL W [illegible] 17 [illegible] 63

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CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE
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SHEET 2 OF 4

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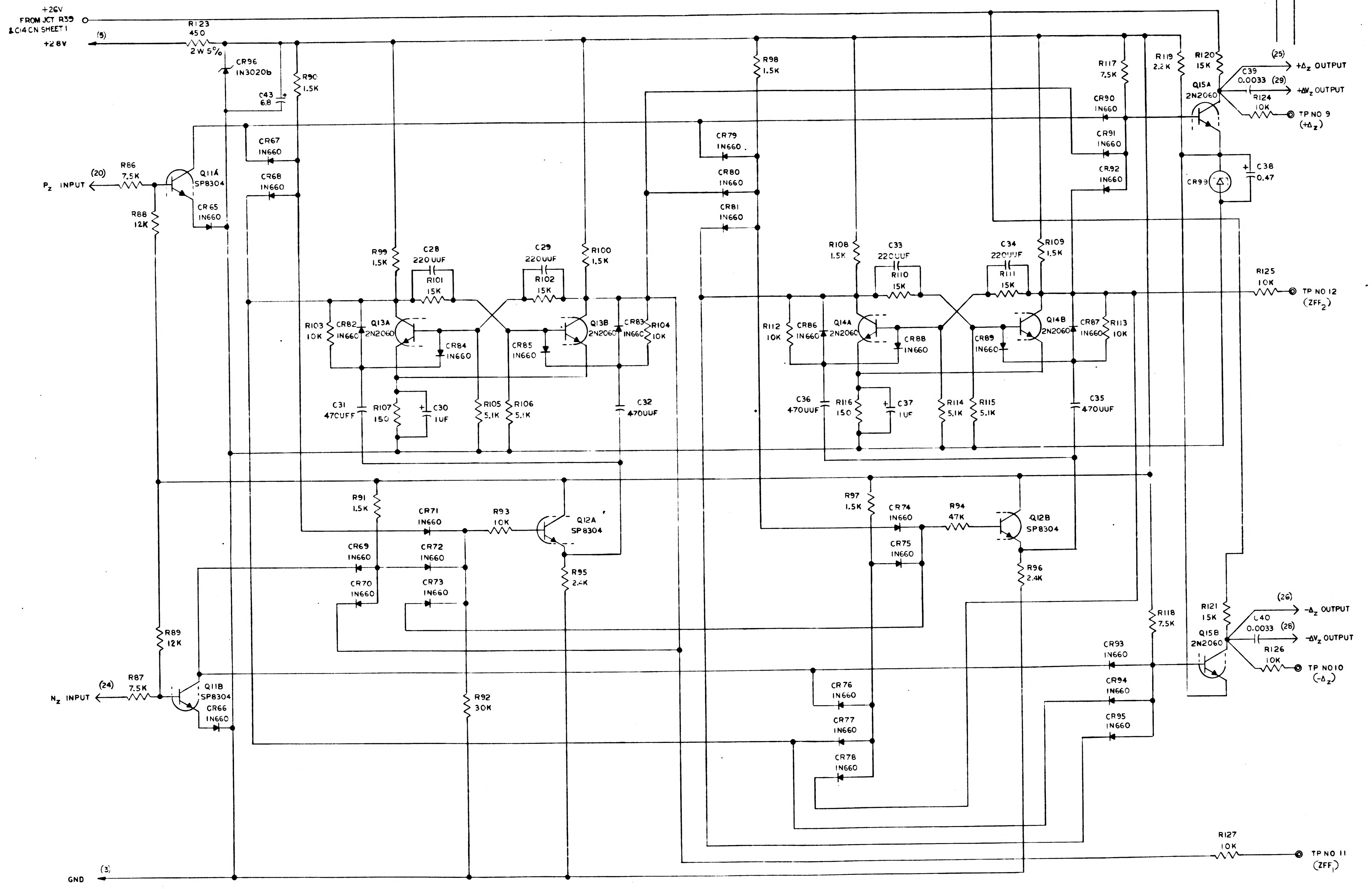
REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01975	[illegible]-63	
B	REVISED PER TDRR C3957	10-17-63	
C	REVISED PER TDRR 06645	26 FEB 64	
D	REVISED PER TDRR 08072	11 MAY 64	
E	REVISED PER TDRR 13229	15 OCT 64	



6
5
4
3
2
1
+26V
FROM JCT R39 & C14 CN SHEET 1
+28V
(5)
R123
450
2W 5%
CR96
IN3020b
C43
6.8
R90
1.5K
CR67
IN660
CR68
IN660
(20)
Pz INPUT
R86
7.5K
Q11A
SP8304
CR65
IN660
R88
12K
R99
1.5K
C28
220UUF
R101
15K
C29
220UUF
R102
15K
R100
1.5K
R103
10K
CR82
IN660
Q13A
2N2060
CR84
IN660
CR85
IN660
Q13B
2N2060
CR83
IN660
R104
10K
C31
47CUFF
R107
150
C30
1UF
R105
5.1K
R106
5.1K
C32
470UUF
R98
1.5K
CR79
IN660
CR80
IN660
CR81
IN660
R108
1.5K
C33
220UUF
R110
15K
C34
220UUF
R111
15K
R109
1.5K
R112
10K
CR86
IN660
Q14A
2N2060
CR88
IN660
CR89
IN660
Q14B
2N2060
CR87
IN660
R113
10K
C36
470UUF
R116
150
C37
1UF
R114
5.1K
R115
5.1K
C35
470UUF
R117
7.5K
R119
2.2K
R120
15K
CR90
IN660
CR91
IN660
CR92
IN660
Q15A
2N2060
(25)
+Δz OUTPUT
C39
0.0033
(29)
+ΔVz OUTPUT
R124
10K
TP NO 9
(+Δz)
CR99
C38
0.47
R125
10K
TP NO 12
(ZFF2)
R91
1.5K
CR71
IN660
R93
10K
Q12A
SP8304
CR69
IN660
CR72
IN660
CR70
IN660
CR73
IN660
R95
2.4K
R97
1.5K
CR74
IN660
R94
47K
Q12B
SP8304
CR75
IN660
R96
2.4K
R118
7.5K
R121
15K
Q15B
2N2060
(26)
-Δz OUTPUT
C40
0.0033
(28)
-ΔVz OUTPUT
R126
10K
TP NO 10
(-Δz)
CR93
IN660
CR94
IN660
CR95
IN660
R89
12K
(24)
Nz INPUT
R87
7.5K
Q11B
SP8304
CR66
IN660
R92
30K
CR76
IN660
CR77
IN660
CR78
IN660
R127
10K
TP NO 11
(ZFF1)
GND
(3)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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CONTRACT

DRAWN Ed. Anglis DATE 4/3/63
CHECKED M. Levy 4/8/63
APPROVAL J. Stone 4/8/63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL W. Kupfer 17 Jun 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER
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PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE —
WT
SHEET 3 OF 4

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875		WR
B	REVISED PER TDRR 03957	10-17-63	WR
C	REVISED PER TDRR 06645	FEB 64	
D	REVISED PER TDRR 08072	MAY	
E	REVISED PER TDRR 13229		

REVISIONS TDRR 3064

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R	1006750-53	RESISTOR	7.5K	2%	1/4W
R2	-53		7.5K		
R3	-58		12K		
R4	-58		12K		
R5	-36		1.5K		
R6	-36		1.5K		
R7	-67		30K		
R8	-56		10K		
R9	-72		47K		
R10	-41		2.4K		
R11	-41		2.4K		
R12	-36		1.5K		
R13	-36		1.5K		
R14	-36		1.5K		
R15	-36		1.5K		
R16	-60		15K		
R17	-60		15K		
R18	-56		10K		
R19	-56		10K		
R20	-49		5.1K		
R21	-49		5.1K		
R22	-12		150		
R23	-36		1.5K		
R24	-36		1.5K		
R25	-60		15K		
R26	-60		15K		
R27	-56		10K		
R28	-56		10K		
R29	-49		5.1K		
R30	-49		5.1K		
R31	-12		150		
R32	-53		7.5K		
R33	-53		7.5K		
R34	-40		2.2K		
R35	-60		15K		
R36	-60		15K		
~~R37~~	↓ ~~-56~~		~~10K~~	↓	↓
R38	1010312-034		450	5%	2 W
R39	1006750-49		5.1K	2%	1/4 W
R40	-56		10K		
R41	-56		10K		
R42	56		10K		
R43	-56		10K		
R44	-53		7.5K		
R45	-53		7.5K		
R46	-58		12K		
R47	-58		12K		
R48	-36		1.5K		
R49	-36		1.5K		
R50	-67		30K		
R51	-56		10K		
R52	-72		47K		
R53	-41		2.4K		
R54	-41		2.4K		
R55	-36		1.5K		
R56	-36		1.5K		
R57	-36		1.5K		
R58	-36		1.5K		
R59	-60		15K		
R60	-60		15K		
R61	-56		10K		
R62	-56		10K		
R63	-49		5.1K		
R64	-49		5.1K		
R65	-12		150		
R66	-36		1.5K		
R67	-36		1.5K		
R68	-60		15K		
R69	-60		15K		
R70	-56		10K		
R71	-56		10K		
R72	-49		5.1K		
R73	-49		5.1K		
R74	-12		150		
R75	-53		7.5K		
R76	-53		7.5K		
R77	-40		2.2K		
R78	-60		15K		
R79	-60		15K		
~~R80~~	↓ ~~-56~~	↓	~~10K~~	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R81	1010312-034	RESISTOR	450	5%	2 W
R82	1006750-56		10K	2%	1/4W
R83	-56		10K		
R84	-56		10K		
R85	-56		10K		
R86	-53		7.5K		
R87	-53		7.5K		
R88	-58		12K		
R89	-58		12K		
R90	-36		1.5K		
R91	-36		1.5K		
R92	-67		30K		
R93	-56		10K		
R94	-72		47K		
R95	-41		2.4K		
R96	-41		2.4K		
R97	-36		1.5K		
R98	-36		1.5K		
R99	-36		1.5K		
R100	-36		1.5K		
R101	-60		15K		
R102	-60		15K		
R103	-56		10K		
R104	-56		10K		
R105	-49		5.1K		
R106	-49		5.1K		
R107	-12		150		
R108	-36		1.5K		
R109	-36		1.5K		
R110	-60		15K		
R111	-60		15K		
R112	-56		10K		
R113	-56		10K		
R114	-49		5.1K		
R115	-49		5.1K		
R116	-12		150		
R117	-53		7.5K		
R118	-53		7.5K		
R119	-40		2.2K		
R120	-60		15K		
R121	-60		15K		
~~R122~~	↓ ~~-56~~		~~10K~~	↓	
R123	1010312-034		450	5%	2 W
R124	1006750-56		10K	2%	1/4W
R125	-56		10K		
R126	-56		10K		
R127	↓ -56	↓	10K	↓	
C1	1006777-16	CAPACITOR	220UUF	10%	100V
C2	↓ -16		220UUF	10%	100V
C3	1006755-69		1	10%	35 V
C4	1006777-20		470UUF	10%	100V
C5	-20		470UUF		
C6	-16		220UUF		
C7	-16		220UUF		
C8	-20		470UUF		
C9	↓ -20		470UUF	↓	↓
C10	1006755-69		1	10%	35 V
C11	-65		0.47	↓	↓
C12	1006777-27		0.0033	10%	100V
C13	↓ -27		0.0033	↓	↓
C14	1010393-039		6.8	10%	50V
C15	1006777-16		220UUF	10%	100V
C16	↓ -16		220UUF	↓	↓
C17	1006755-69		1	10%	35V
C18	1006777-20		470UUF	10%	100V
C19	-20		470UUF		
C20	-16		220UUF		
C21	-16		220UUF		
C22	-20		470UUF		
C23	↓ -20		470UUF	↓	↓
C24	1006755-69		1	10%	35V
C25	↓ -65		0.47	↓	↓
C26	1006777-27		0.0033	10%	100V
C27	-27		0.0033		
C28	↓ -16	↓	220UUF	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C29	1006777-16	CAPACITOR	220UUF	10%	100V
C30	1006755-69		1	10%	35 V
C31	1006777-20		470UUF	10%	100V
C32	-20		470UUF		
C33	-16		220UUF		
C34	-16		220UUF		
C35	-20		470 UUF		
C36	↓ -20		470 UUF	↓	↓
C37	1006755-69		1	10%	35 V
C38	↓ -65		0.47	↓	↓
C39	1006777-27		0.0033	10%	100V
C40	↓		0.0033	↓	↓
C41	1006755-79		6.8	10%	35V
C42					
C43	↓	↓	↓	↓	↓
CR1	1010385	IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31	↓	↓			
CR32	1010265-5	IN3020b			
CR33	1010385	IN660			
CR34					
CR35					
CR36					
CR37					
CR38					
CR39					
CR40					
CR41					
CR42					
CR43					
CR44					
CR45					
CR46					
CR47					
CR48					
CR49					
CR50					
CR51					
CR52					
CR53					
CR54					
CR55					
CR56					
CR57					
CR58					
CR59					
CR60					
CR61					
CR62					
CR63	↓	↓			

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR64	1010265-5	IN3020b			
CR65	1010385	IN660			
CR66					
CR67					
CR68					
CR69					
CR70					
CR71					
CR72					
CR73					
CR74					
CR75					
CR76					
CR77					
CR78					
CR79					
CR80					
CR81					
CR82					
CR83					
CR84					
CR85					
CR86					
CR87					
CR88					
CR89					
CR90					
CR91					
CR92					
CR93					
CR94					
CR95	↓	↓			
CR96	1010265-5	IN3020b			
CR97	1010372-12		5.6V	5%	250MW
CR98					
CR99	↓		↓	↓	↓
Q1	1010395	SP8304			
Q2	↓	↓			
Q3	1010376-1	2N2060			
Q4					
Q5	↓	↓			
Q6	1010395	SP8304			
Q7	↓	↓			
Q8	1010376-1	2N2060			
Q9					
Q10	↓	↓			
Q11	1010395	SP8304			
Q12	↓	↓			
Q13	1010376-1	2N2060			
Q14					
Q15	↓	↓			

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MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

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CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 4/8/63
CHECKED M. 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE —
WT
SHEET 4 OF 4

1010050 E

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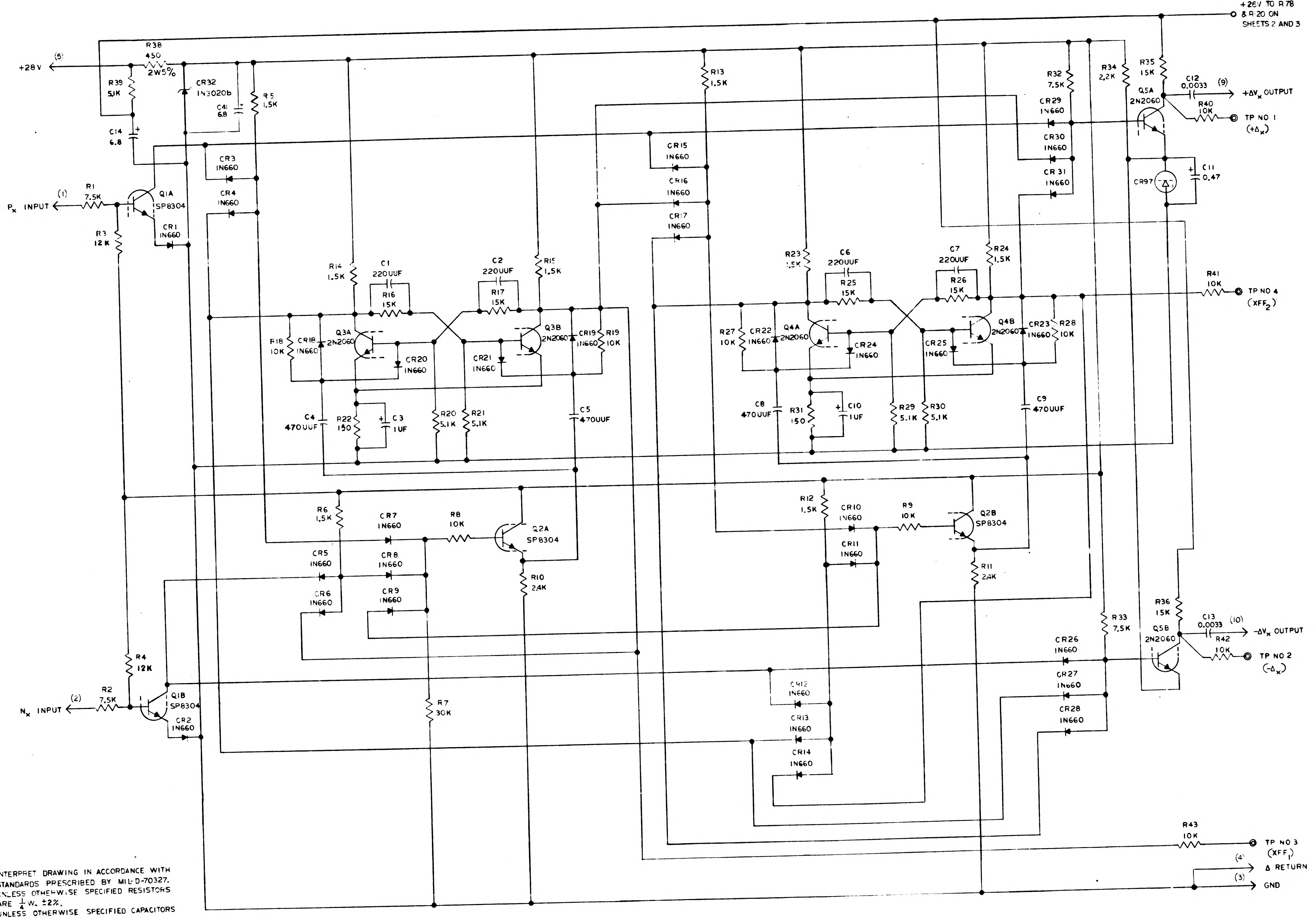
REVISIONS TDRR 00111

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7-2-63	UK
B	REVISED PER TDRR 03957	10-1-63	
C	REVISED PER TDRR 06645	64	PPR WK
D	REVISED PER TDRR 08072	11 MAY 64	
E	REVISED PER TDRR 13229	15 OCT 64	
F	REVISED PER TDRR 14714	12 DEC 64	


+26V TO R78
& R20 ON
SHEETS 2 AND 3
+28V
(5)
R38
450
2W5%
R39
5.1K
CR32
1N3020b
C41
6.8
R5
1.5K
C14
6.8
CR3
1N660
CR4
1N660
R1
7.5K
(1)
P_x INPUT
Q1A
SP8304
CR1
1N660
R3
12K
R14
1.5K
C1
220UUF
R16
15K
C2
220UUF
R17
15K
R15
1.5K
Q3A
2N2060
Q3B
2N2060
R18
10K
CR18
1N660
CR20
1N660
CR21
1N660
CR19
1N660
R19
10K
C4
470UUF
R22
150
C3
1UF
R20
5.1K
R21
5.1K
C5
470UUF
R6
1.5K
CR7
1N660
R8
10K
Q2A
SP8304
CR5
1N660
CR8
1N660
CR6
1N660
CR9
1N660
R10
2.4K
R7
30K
R4
12K
R2
7.5K
(2)
N_x INPUT
Q1B
SP8304
CR2
1N660
R13
1.5K
CR15
1N660
CR16
1N660
CR17
1N660
R23
1.5K
C6
220UUF
R25
15K
C7
220UUF
R26
15K
R24
1.5K
R27
10K
CR22
1N660
Q4A
2N2060
CR24
1N660
CR25
1N660
Q4B
2N2060
CR23
1N660
R28
10K
C8
470UUF
R31
150
C10
1UF
R29
5.1K
R30
5.1K
C9
470UUF
R12
1.5K
CR10
1N660
R9
10K
Q2B
SP8304
CR11
1N660
R11
2.4K
CR12
1N660
CR13
1N660
CR14
1N660
R32
7.5K
R34
2.2K
R35
15K
CR29
1N660
CR30
1N660
CR31
1N660
Q5A
2N2060
C12
0.0033
(9)
+ΔV_x OUTPUT
R40
10K
TP NO 1
(+Δ_x)
CR97
C11
0.47
R41
10K
TP NO 4
(XFF_2)
R33
7.5K
R36
15K
CR26
1N660
CR27
1N660
CR28
1N660
Q5B
2N2060
C13
0.0033
(10)
-ΔV_x OUTPUT
R42
10K
TP NO 2
(-Δ_x)
R43
10K
TP NO 3
(XFF_1)
(4)
Δ RETURN
(3)
GND

NOTES—
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$ W., ±2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

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TOLERANCES ON
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CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 4/3/63
CHECKED M 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL WKoplan 17Apr63

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FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 010C[illegible]0
SCALE —
WT
SHEET OF 4

6 5 4 3 2 1

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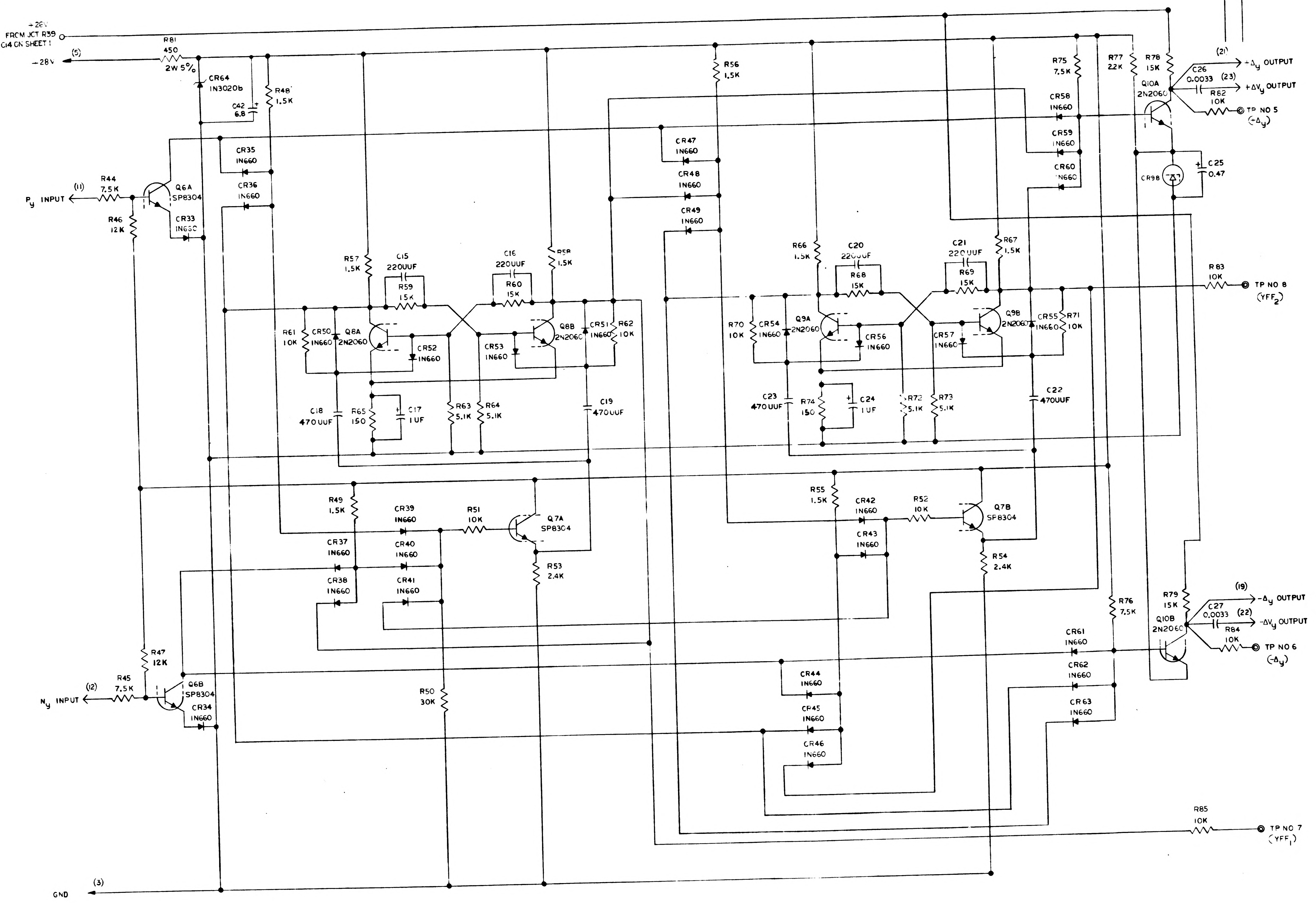
REVISIONS TDRR 00821

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	2-20-63	[illegible]
B	REVISED PER TDRR 03957	[illegible]-63	[illegible]
C	REVISED PER TDRR 06645	FEB 64	[illegible]
D	REVISED PER TDRR 08072	[illegible]	[illegible]
E	REVISED PER TDRR 13229	15 OCT 64	[illegible]
F	REVISED PER TDRR 147.4	[illegible]	[illegible]


+28V
FROM JCT R39
& C14 ON SHEET 1
(5)
-28V
R81
450
2W 5%
CR64
1N3020b
C42
6.8
R48
1.5K
CR35
1N660
CR36
1N660
(11)
Py INPUT
R44
7.5K
Q6A
SP8304
R46
12K
CR33
1N660
R57
1.5K
C15
220UUF
R59
15K
C16
220UUF
R60
15K
R58
1.5K
R61
10K
CR50
1N660
Q8A
2N2060
CR52
1N660
CR53
1N660
Q8B
2N2060
CR51
1N660
R62
10K
C18
470UUF
R65
150
C17
1UF
R63
5.1K
R64
5.1K
C19
470UUF
R49
1.5K
CR39
1N660
R51
10K
Q7A
SP8304
CR37
1N660
CR40
1N660
CR38
1N660
CR41
1N660
R53
2.4K
R47
12K
(12)
Ny INPUT
R45
7.5K
Q6B
SP8304
CR34
1N660
R50
30K
(3)
GND
R56
1.5K
CR47
1N660
CR48
1N660
CR49
1N660
R66
1.5K
C20
220UUF
R68
15K
C21
220UUF
R69
15K
R67
1.5K
R70
10K
CR54
1N660
Q9A
2N2060
CR56
1N660
CR57
1N660
Q9B
2N2060
CR55
1N660
R71
10K
C23
470UUF
R74
150
C24
1UF
R72
5.1K
R73
5.1K
C22
470UUF
R55
1.5K
CR42
1N660
R52
10K
Q7B
SP8304
CR43
1N660
R54
2.4K
CR44
1N660
CR45
1N660
CR46
1N660
R75
7.5K
R77
22K
R78
15K
CR58
1N660
CR59
1N660
CR60
1N660
Q10A
2N2060
(21)
+Δy OUTPUT
C26
0.0033
(23)
+ΔVy OUTPUT
R82
10K
TP NO 5
(+Δy)
CR98
C25
0.47
R83
10K
TP NO 8
(YFF2)
R76
7.5K
R79
15K
Q10B
2N2060
(19)
-Δy OUTPUT
C27
0.0033
(22)
-ΔVy OUTPUT
R84
10K
TP NO 6
(-Δy)
CR61
1N660
CR62
1N660
CR63
1N660
R85
10K
TP NO 7
(YFF1)

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

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NEXT ASSY | USED ON
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FRACTIONS ± DECIMALS ± ANGLES ±
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HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R.L. Genicko DATE 2/3/63
CHECKED M. Fees 4/8/63
APPROVAL J.S. Stone 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W. Kupfer 17 Apr 63

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AND COMPUTER OUTPUT
PIPA

CODE IDENT NO | SIZE E | NASA DRAWING NO 1010050
SCALE | WT | SHEET OF 4

J.M.

1010050

6 5 4 3 2 1

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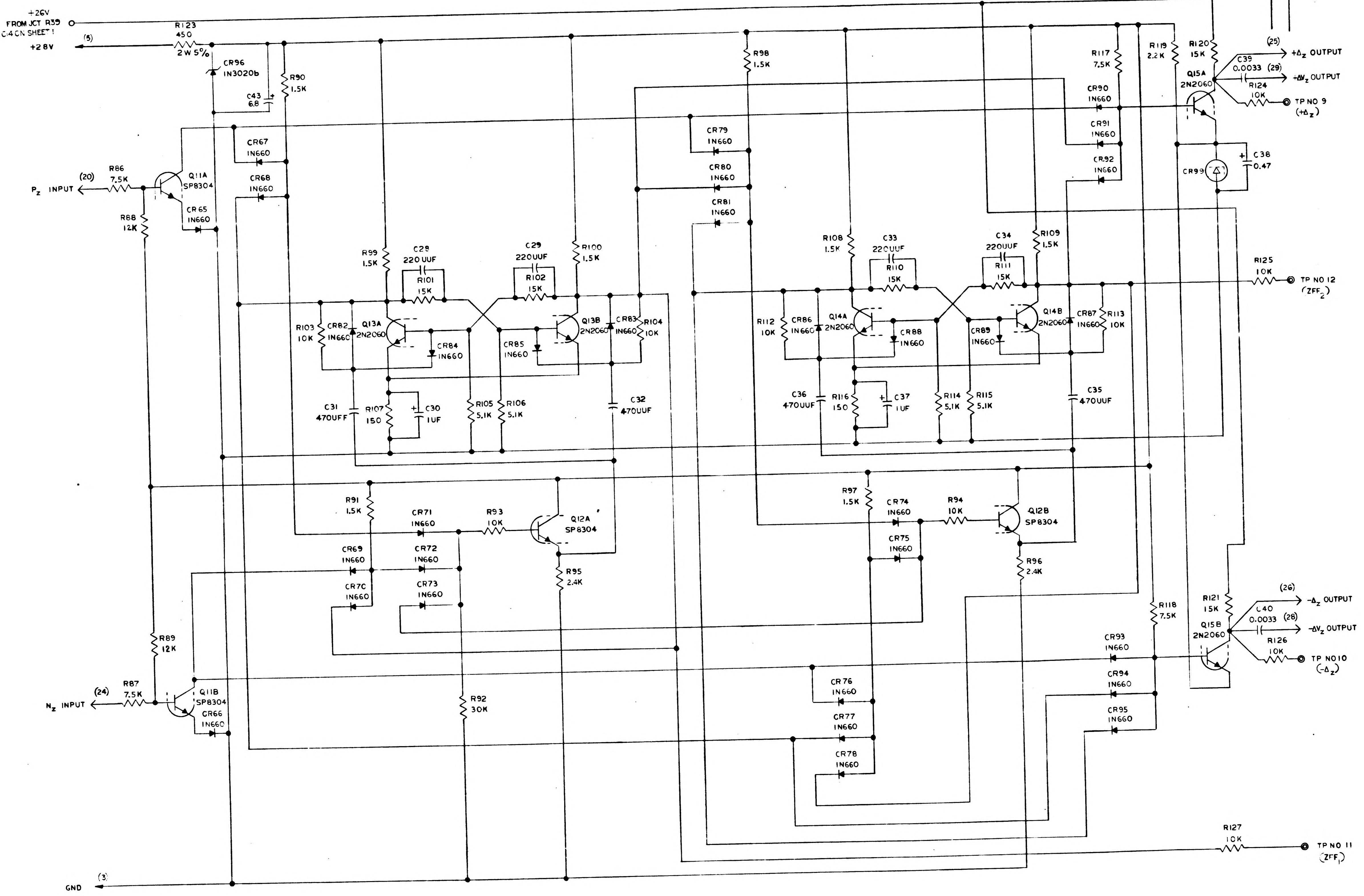
REVISIONS TDRR 00881

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7 Jun 63	WR
B	REVISED PER TDRR 03957	10-7-63	WK
C	REVISED PER TDRR 06645	26 FEB 64	WK
D	REVISED PER TDRR 08072	11 MAY 64	
E	REVISED PER TDRR 13229	15 OCT 64	
F	REVISED PER TDRR 14714	14 DEC 64	



+26V
FROM JCT R39
& C14 ON SHEET 1
+28V
(5)
R123
450
2W 5%
CR96
1N3020b
C43
6.8
R90
1.5K
CR67
1N660
CR68
1N660
R86
7.5K
(20)
Pz INPUT
Q11A
SP8304
CR65
1N660
R88
12K
R99
1.5K
C28
220UUF
R101
15K
C29
220UUF
R102
15K
R100
1.5K
R103
10K
CR82
1N660
Q13A
2N2060
CR84
1N660
CR85
1N660
Q13B
2N2060
CR83
1N660
R104
10K
C31
470UFF
R107
150
C30
1UF
R105
5.1K
R106
5.1K
C32
470UUF
R98
1.5K
CR79
1N660
CR80
1N660
CR81
1N660
R108
1.5K
C33
220UUF
R110
15K
C34
220UUF
R111
15K
R109
1.5K
R112
10K
CR86
1N660
Q14A
2N2060
CR88
1N660
CR89
1N660
Q14B
2N2060
CR87
1N660
R113
10K
C36
470UUF
R116
150
C37
1UF
R114
5.1K
R115
5.1K
C35
470UUF
R117
7.5K
R119
2.2K
R120
15K
CR90
1N660
CR91
1N660
CR92
1N660
Q15A
2N2060
C39
0.0033
(25)
+Δz OUTPUT
(29)
-ΔVz OUTPUT
R124
10K
TP NO 9
(+Δz)
CR99
C38
0.47
R125
10K
TP NO 12
(ZFF2)
R91
1.5K
CR71
1N660
R93
10K
Q12A
SP8304
CR69
1N660
CR72
1N660
CR70
1N660
CR73
1N660
R95
2.4K
R97
1.5K
CR74
1N660
R94
10K
Q12B
SP8304
CR75
1N660
R96
2.4K
R118
7.5K
R121
15K
Q15B
2N2060
C40
0.0033
(26)
-Δz OUTPUT
(28)
-ΔVz OUTPUT
R126
10K
TP NO10
(-Δz)
CR93
1N660
CR94
1N660
CR95
1N660
R89
12K
R87
7.5K
(24)
Nz INPUT
Q11B
SP8304
CR66
1N660
R92
30K
CR76
1N660
CR77
1N660
CR78
1N660
R127
10K
TP NO 11
(ZFF1)
GND
(3)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 4/3/63
CHECKED 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTE AND COMPUTER OUTPUT
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE
WT
SHEET 3 OF 4

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REVISIONS TDRR 0880

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 018		
B	REVISED PER TDRR 03957	10-63	
C	REVISED PER TDRR 06645	25 FEB 64	
D	REVISED PER TDRR 06072	11 MAY 64	
E	REVISED PER TDRR 13229	64	JW
F	REVISED PER TDRR 14714	16 DEC 64	

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R	1006750-53	RESISTOR	7.5K	2%	1/4W
R2	-53		7.5K		
R3	-58		12K		
R4	-58		12K		
R5	-36		1.5K		
R6	-36		1.5K		
R7	-67		30K		
R8	-56		10K		
R9	-56		10K		
R10	-41		2.4K		
R11	-41		2.4K		
R12	-36		1.5K		
R13	-36		1.5K		
R14	-36		1.5K		
R15	-36		1.5K		
R16	-60		15K		
R17	-60		15K		
R18	-56		10K		
R19	-56		10K		
R20	-49		5.1K		
R21	-49		5.1K		
R22	-12		150		
R23	-36		1.5K		
R24	-36		1.5K		
R25	-60		15K		
R26	-60		15K		
R27	-56		10K		
R28	-56		10K		
R29	-49		5.1K		
R30	-49		5.1K		
R31	-12		150		
R32	-53		7.5K		
R33	-53		7.5K		
R34	-40		2.2K		
R35	-60		15K		
R36	-60		15K		
~~R37~~	~~-56~~		~~10K~~		
R38	1010312-034		450	5%	2W
R39	1006750-49		5.1K	2%	1/4W
R40	-56		10K		
R41	-56		10K		
R42	-56		10K		
R43	-56		10K		
R44	-53		7.5K		
R45	-53		7.5K		
R46	-58		12K		
R47	-58		12K		
R48	-36		1.5K		
R49	-36		1.5K		
R50	-67		30K		
R51	-56		10K		
R52	-56		10K		
R53	-41		2.4K		
R54	-41		2.4K		
R55	-36		1.5K		
R56	-36		1.5K		
R57	-36		1.5K		
R58	-36		1.5K		
R59	-60		15K		
R60	-60		15K		
R61	-56		10K		
R62	-56		10K		
R63	-49		5.1K		
R64	-49		5.1K		
R65	-12		150		
R66	-36		1.5K		
R67	-36		1.5K		
R68	-60		15K		
R69	-60		15K		
R70	-56		10K		
R71	-56		10K		
R72	-49		5.1K		
R73	-49		5.1K		
R74	-12		150		
R75	-53		7.5K		
R76	-53		7.5K		
R77	-40		2.2K		
R78	-60		15K		
R79	-60		15K		
~~R80~~	~~-56~~		~~10K~~		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R81	1010312-034	RESISTOR	450	5%	2W
R82	1006750-56		10K	2%	1/4W
R83	-56		10K		
R84	-56		10K		
R85	-56		10K		
R86	-53		7.5K		
R87	-53		7.5K		
R88	-58		12K		
R89	-58		12K		
R90	-36		1.5K		
R91	-36		1.5K		
R92	-67		30K		
R93	-56		10K		
R94	-56		10K		
R95	-41		2.4K		
R96	-41		2.4K		
R97	-36		1.5K		
R98	-36		1.5K		
R99	-36		1.5K		
R100	-36		1.5K		
R101	-60		15K		
R102	-60		15K		
R103	-56		10K		
R104	-56		10K		
R105	-49		5.1K		
R106	-49		5.1K		
R107	-12		150		
R108	-36		1.5K		
R109	-36		1.5K		
R110	-60		15K		
R111	-60		15K		
R112	-56		10K		
R113	-56		10K		
R114	-49		5.1K		
R115	-49		5.1K		
R116	-12		150		
R117	-53		7.5K		
R118	-53		7.5K		
R119	-40		2.2K		
R120	-60		15K		
R121	-60		15K		
~~R122~~	~~-56~~		~~10K~~		
R123	1010312-034		450	5%	2W
R124	1006750-56		10K	2%	1/4W
R125	-56		10K		
R126	-56		10K		
R127	-56		10K		
C1	1006777-16	CAPACITOR	220UUF	10%	100V
C2	-16		220UUF	10%	100V
C3	1006755-69		1	10%	35V
C4	1006777-20		470UUF	10%	100V
C5	-20		470UUF		
C6	-16		220UUF		
C7	-16		220UUF		
C8	-20		470UUF		
C9	-20		470UUF		
C10	1006755-69		1	10%	35V
C11	-65		0.47		
C12	1006777-27		0.0033	10%	100V
C13	-27		0.0033		
C14	1010393-039		6.8	10%	50V
C15	1006777-16		220UUF	10%	100V
C16	-16		220UUF		
C17	1006755-69		1	10%	35V
C18	1006777-20		470UUF	10%	100V
C19	-20		470UUF		
C20	-16		220UUF		
C21	-16		220UUF		
C22	-20		470UUF		
C23	-20		470UUF		
C24	1006755-69		1	10%	35V
C25	-65		0.47		
C26	1006777-27		0.0033	10%	100V
C27	-27		0.0033		
C28	-16		220UUF		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C29	1006777-16	CAPACITOR	220UUF	10%	100V
C30	1006755-69		1	10%	35V
C31	1006777-20		470UUF	10%	100V
C32	-20		470UUF		
C33	-16		220UUF		
C34	-16		220UUF		
C35	-20		470UUF		
C36	-20		470UUF		
C37	1006755-69		1	10%	35V
C38	-65		0.47		
C39	1006777-27		0.0033	10%	100V
C40			0.0033		
C41	1006755-79		6.8	10%	35V
C42					
C43					
CR1	1010385	1N660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	1010265-5	1N3020B			
CR33	1010385	1N660			
CR34					
CR35					
CR36					
CR37					
CR38					
CR39					
CR40					
CR41					
CR42					
CR43					
CR44					
CR45					
CR46					
CR47					
CR48					
CR49					
CR50					
CR51					
CR52					
CR53					
CR54					
CR55					
CR56					
CR57					
CR58					
CR59					
CR60					
CR61					
CR62					
CR63					

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR64	1010265-5	1N3020B			
CR65	1010385	1N660			
CR66					
CR67					
CR68					
CR69					
CR70					
CR71					
CR72					
CR73					
CR74					
CR75					
CR76					
CR77					
CR78					
CR79					
CR80					
CR81					
CR82					
CR83					
CR84					
CR85					
CR86					
CR87					
CR88					
CR89					
CR90					
CR91					
CR92					
CR93					
CR94					
CR95					
CR96	1010265-5	1N3020B			
CR97	1010372-12		56V	5%	250MW
CR98					
CR99					
Q1	1010395	SP8304			
Q2					
Q3	1010376-2	2N2060			
Q4	-2				
Q5	-1				
Q6	1010395	SP8304			
Q7					
Q8	1010376-2	2N2060			
Q9	-2				
Q10	-1				
Q11	1010395	SP8304			
Q12					
Q13	1010376-2	2N2060			
Q14	-2				
Q15	-1				

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 4/8/63
CHECKED M. 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

FORWARD-BACKWARD COUNT
AND COMPUTER OUTPU
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE —
WT
SHEET 4 OF

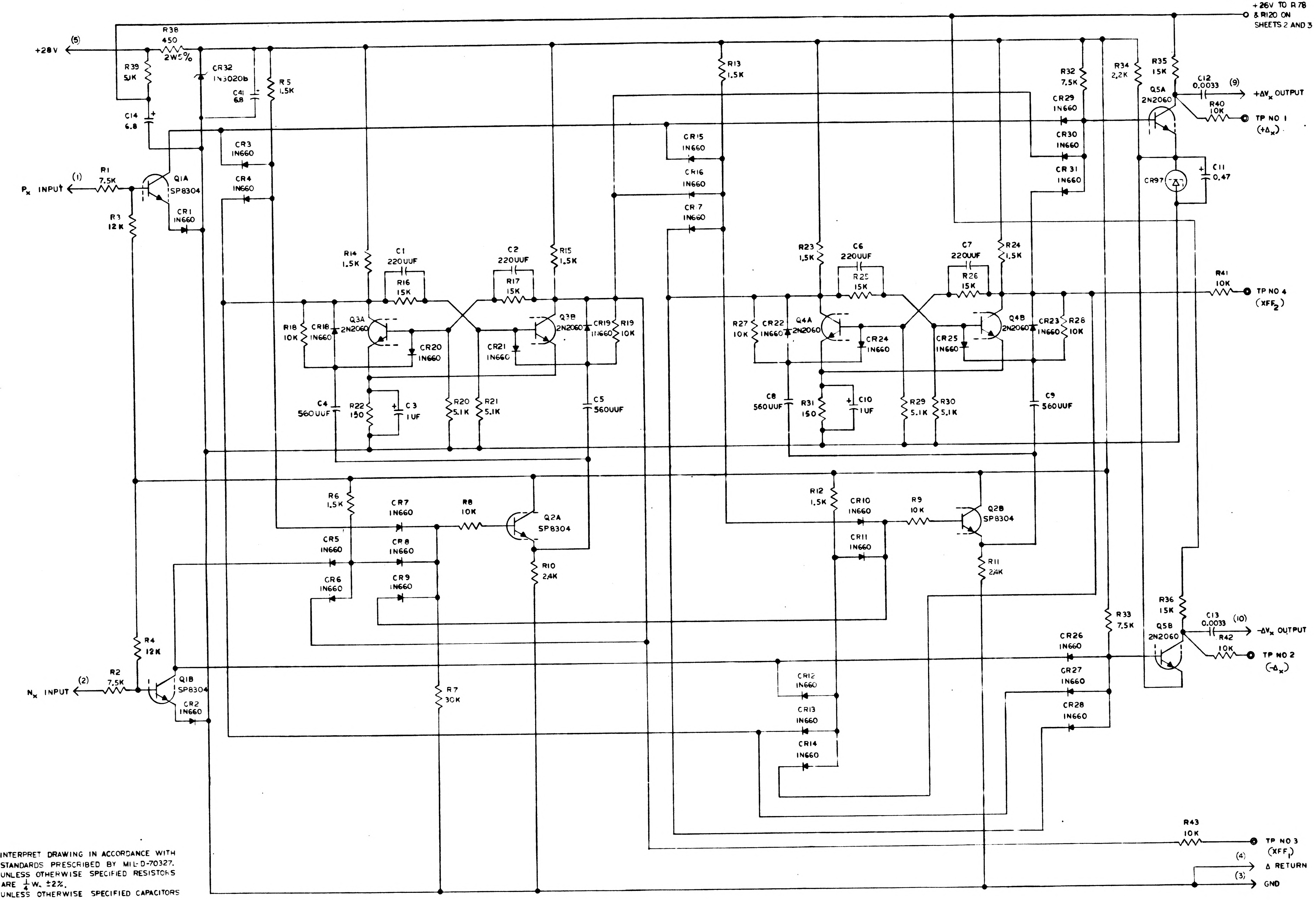
1010050 F

81

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00441

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	7-2-63	[illegible]
B	REVISED PER TDRR 03957	[illegible] 63	[illegible]
C	REVISED PER TDRR 00045	25 Feb 64	[illegible]
D	REVISED PER TDRR 08072	11 May 64	[illegible]
E	REVISED PER TDRR 13229	15 Oct 64	[illegible]
F	REVISED PER TDRR 14714	14 Dec 64	[illegible]
G	REVISED PER TDRR 15246	12 [illegible] 65	[illegible]



+26V TO R78 & R120 ON SHEETS 2 AND 3
+28V
(5)
R38 450 2W 5%
R39 5.1K
CR32 1N3020b
C41 6.8
R5 1.5K
C14 6.8
CR3 1N660
CR4 1N660
Px INPUT
(1)
R1 7.5K
Q1A SP8304
CR1 1N660
R3 12K
R13 1.5K
CR15 1N660
CR16 1N660
CR7 1N660
R14 1.5K
C1 220UUF
R16 15K
C2 220UUF
R17 15K
R15 1.5K
R18 10K
CR18 1N660
Q3A 2N2060
CR20 1N660
CR21 1N660
Q3B 2N2060
CR19 1N660
R19 10K
C4 560UUF
R22 150
C3 1UF
R20 5.1K
R21 5.1K
C5 560UUF
R23 1.5K
C6 220UUF
R25 15K
C7 220UUF
R26 15K
R24 1.5K
R27 10K
CR22 1N660
Q4A 2N2060
CR24 1N660
CR25 1N660
Q4B 2N2060
CR23 1N660
R28 10K
C8 560UUF
R31 150
C10 1UF
R29 5.1K
R30 5.1K
C9 560UUF
R32 7.5K
R34 2.2K
R35 15K
C12 0.0033
(9)
+ΔVx OUTPUT
Q5A 2N2060
R40 10K
TP NO 1 (+Δx)
CR29 1N660
CR30 1N660
CR31 1N660
CR97
C11 0.47
R41 10K
TP NO 4 (XFF2)
R6 1.5K
CR7 1N660
R8 10K
Q2A SP8304
CR5 1N660
CR8 1N660
CR6 1N660
CR9 1N660
R10 2.4K
R12 1.5K
CR10 1N660
R9 10K
Q2B SP8304
CR11 1N660
R11 2.4K
R33 7.5K
R36 15K
C13 0.0033
(10)
-ΔVx OUTPUT
Q5B 2N2060
R42 10K
TP NO 2 (-Δx)
CR26 1N660
CR27 1N660
CR28 1N660
CR12 1N660
CR13 1N660
CR14 1N660
R4 12K
R2 7.5K
Nx INPUT
(2)
Q1B SP8304
CR2 1N660
R7 30K
R43 10K
TP NO 3 (XFF1)
(4)
Δ RETURN
(3)
GND

NOTES-
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$ W, ±2%.
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN R. J. [illegible] DATE 4/3/63
CHECKED M. [illegible] 4/8/63
APPROVAL [illegible] 4/8/63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL W. Kaplan 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

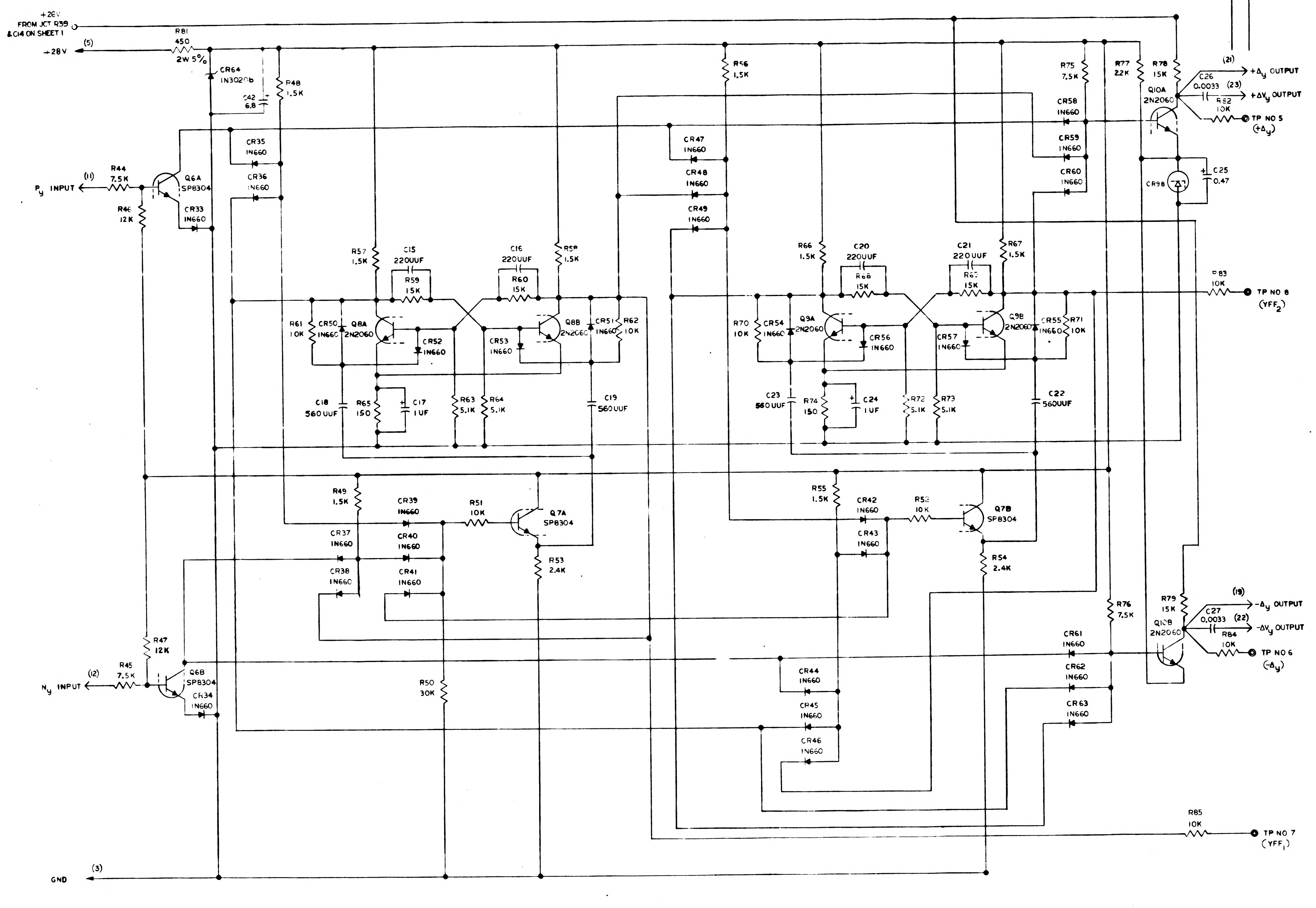
FORWARD-BACKWARD COUNTER
AND COMPUTER OUTPUT
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE —
WT
SHEET 1 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00821

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	24·63	
B	REVISED PER TDRR 03957	63	
C	REVISED PER TDRR 06845	FEB 64	
D	REVISED PER TDRR 3072	MAY	
E	REVISED PER TDRR 13029	15 OCT 64	
F	REVISED PER TDRR 14714	14 DEC 64	
G	REVISED PER TDRR 246	12 JAN 65	


+26V
FROM JCT R39 & C14 ON SHEET 1
(5)
+28V
R81
450
2W 5%
CR64
1N3020B
C42
6.8
R48
1.5K
CR35
1N660
CR36
1N660
(11)
R44
7.5K
Py INPUT
Q6A
SP8304
R46
12K
CR33
1N660
R57
1.5K
C15
220UUF
R59
15K
C16
220UUF
R60
15K
R58
1.5K
R61
10K
CR50
1N660
Q8A
2N2060
CR52
1N660
CR53
1N660
Q8B
2N2060
CR51
1N660
R62
10K
C18
560UUF
R65
150
C17
1UF
R63
5.1K
R64
5.1K
C19
560UUF
R49
1.5K
CR39
1N660
R51
10K
Q7A
SP8304
CR37
1N660
CR40
1N660
R53
2.4K
CR38
1N660
CR41
1N660
R47
12K
(12)
R45
7.5K
Ny INPUT
Q6B
SP8304
CR34
1N660
R50
30K
(3)
GND
R56
1.5K
CR47
1N660
CR48
1N660
CR49
1N660
R66
1.5K
C20
220UUF
R68
15K
C21
220UUF
R69
15K
R67
1.5K
R70
10K
CR54
1N660
Q9A
2N2060
CR56
1N660
CR57
1N660
Q9B
2N2060
CR55
1N660
R71
10K
C23
560UUF
R74
150
C24
1UF
R72
5.1K
R73
5.1K
C22
560UUF
R55
1.5K
CR42
1N660
R52
10K
Q7B
SP8304
CR43
1N660
R54
2.4K
CR44
1N660
CR45
1N660
CR46
1N660
R75
7.5K
R77
22K
R78
15K
CR58
1N660
CR59
1N660
CR60
1N660
Q10A
2N2060
C26
0.0033
(21)
+Δy OUTPUT
(23)
+ΔVy OUTPUT
R82
10K
TP NO 5
(+Δy)
C25
0.47
CR98
R83
10K
TP NO 8
(YFF2)
R76
7.5K
R79
15K
(19)
-Δy OUTPUT
C27
0.0033
(22)
-ΔVy OUTPUT
Q10B
2N2060
R84
10K
TP NO 6
(-Δy)
CR61
1N660
CR62
1N660
CR63
1N660
R85
10K
TP NO 7
(YFF1)

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT

DRAWN DATE 4/3/63
CHECKED 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17Apr63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

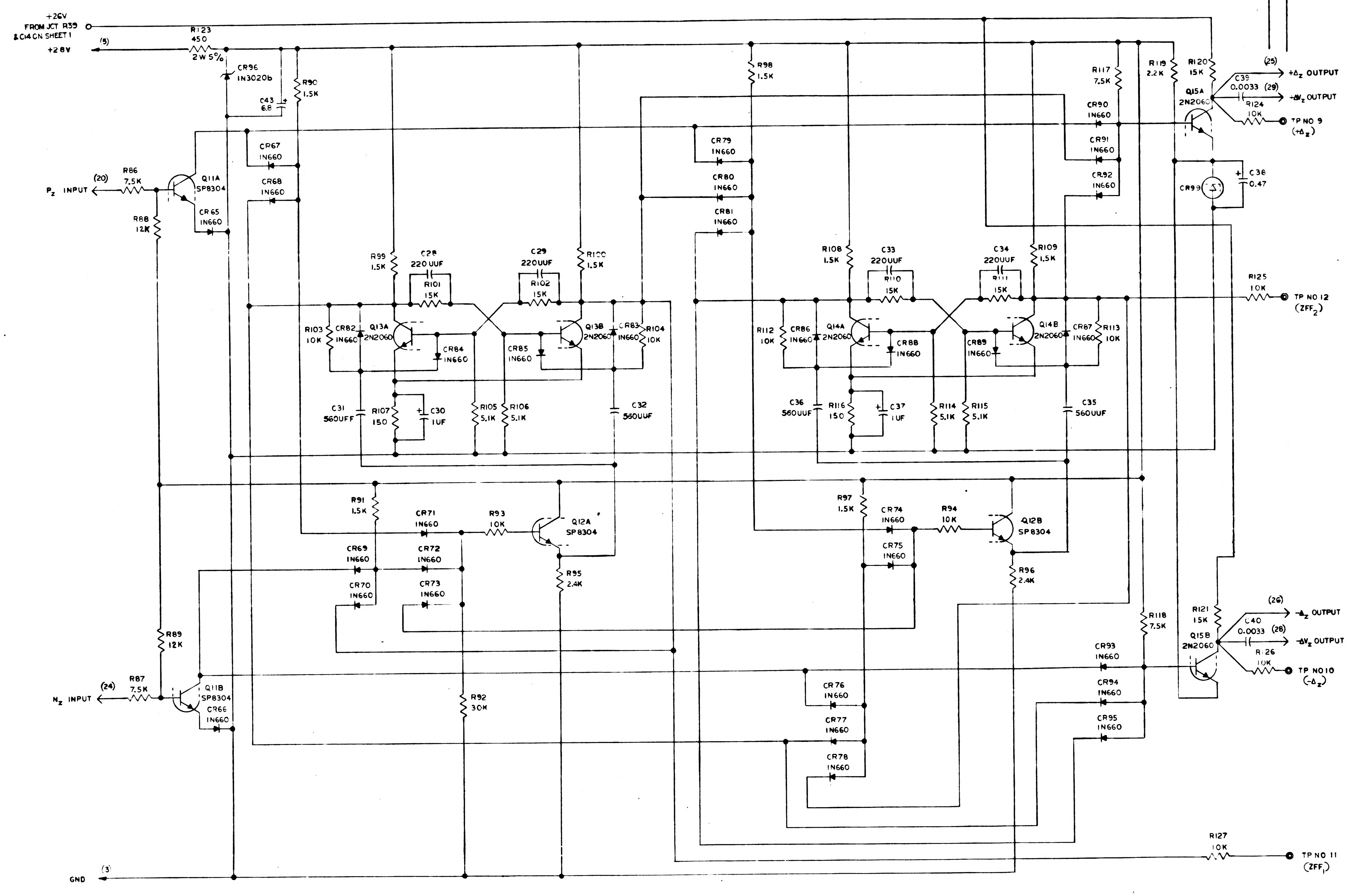
CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE
WT
SHEET 2 OF 4

91

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00681

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01775	7-[illegible]-63	WR
B	REVISED PER TDRR 03157	10-17-63	WR
C	REVISED PER TDRR 03645	26 FEB 64	WR
D	REVISED PER TDRR 06072	[illegible] MAR 64	
E	REVISED PER TDRR 13229	15 OCT 64	
F	REVISED PER TDRR 14714	14 DEC 64	
G	REVISED PER TDRR 15[illegible]	12 JAN 65	


+26V FROM JCT R39 & C14 ON SHEET 1
+28V
(5)
R123 450 2W 5%
CR96 1N3020b
C43 6.8
R90 1.5K
CR67 1N660
CR68 1N660
(20)
P_z INPUT
R86 7.5K
Q11A SP8304
CR65 1N660
R88 12K
R99 1.5K
C28 220UUF
R101 15K
C29 220UUF
R102 15K
R100 1.5K
R103 10K
CR82 1N660
Q13A 2N2060
CR84 1N660
CR85 1N660
Q13B 2N2060
CR83 1N660
R104 10K
C31 560UFF
R107 150
C30 1UF
R105 5.1K
R106 5.1K
C32 560UUF
R98 1.5K
CR79 1N660
CR80 1N660
CR81 1N660
R108 1.5K
C33 220UUF
R110 15K
C34 220UUF
R111 15K
R109 1.5K
R112 10K
CR86 1N660
Q14A 2N2060
CR88 1N660
CR89 1N660
Q14B 2N2060
CR87 1N660
R113 10K
C36 560UUF
R116 150
C37 1UF
R114 5.1K
R115 5.1K
C35 560UUF
R117 7.5K
R119 2.2K
R120 15K
CR90 1N660
CR91 1N660
CR92 1N660
Q15A 2N2060
(25) +Δz OUTPUT
C39 0.0033 (29) +ΔVz OUTPUT
R124 10K
TP NO 9 (+Δz)
CR99
C38 0.47
R125 10K
TP NO 12 (ZFF2)
R91 1.5K
CR71 1N660
R93 10K
Q12A SP8304
CR69 1N660
CR72 1N660
CR70 1N660
CR73 1N660
R95 2.4K
R97 1.5K
CR74 1N660
R94 10K
Q12B SP8304
CR75 1N660
R96 2.4K
R89 12K
(24)
N_z INPUT
R87 7.5K
Q11B SP8304
CR66 1N660
R92 30K
CR76 1N660
CR77 1N660
CR78 1N660
R118 7.5K
R121 15K
Q15B 2N2060
(26) −Δz OUTPUT
C40 0.0033 (28) −ΔVz OUTPUT
R126 10K
TP NO 10 (−Δz)
CR93 1N660
CR94 1N660
CR95 1N660
R127 10K
TP NO 11 (ZFF1)
GND
(3)

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 4/3/63
CHECKED 4/8/63
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

FORWARD-BACKWARD COUNTER AND COMPUTER OUTPUT
PIPA

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010050
SCALE —
WT
SHEET 3 OF 4

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 30[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01875	[illegible]	[illegible]
B	REVISED PER TDRR 03957	10-17-63	[illegible]
C	REVISED PER TDRR 06645	[illegible]	[illegible]
D	REVISED PER TDRR 08072	[illegible] MAY [illegible]	[illegible]
E	REVISED PER TDRR 13229	[illegible]	JWP
F	REVISED PER TDRR 14714	[illegible] DEC [illegible]	[illegible]
G	REVISED PER TDRR 13246	2[illegible] JAN 65	JWP

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -53	RESISTOR	7.5K	2%	1/4W
R2	-53		7.5K		
R3	-58		12K		
R4	-58		12K		
R5	-36		1.5K		
R6	-36		1.5K		
R7	-67		30K		
R8	-56		10K		
R9	-56		10K		
R10	-41		2.4K		
R11	-41		2.4K		
R12	-36		1.5K		
R13	-36		1.5K		
R14	-36		1.5K		
R15	-36		1.5K		
R16	-60		15K		
R17	-60		15K		
R18	-56		10K		
R19	-56		10K		
R20	-49		5.1K		
R21	-49		5.1K		
R22	-12		150		
R23	-36		1.5K		
R24	-36		1.5K		
R25	-60		15K		
R26	-60		15K		
R27	-56		10K		
R28	-56		10K		
R29	-49		5.1K		
R30	-49		5.1K		
R31	-12		150		
R32	-53		7.5K		
R33	-53		7.5K		
R34	-40		2.2K		
R35	-60		15K		
R36	-60		15K		
~~R37~~	~~-56~~		~~10K~~		
R38	1010312 - 034		450	5%	2 W
R39	1006750-49		5.1K	2%	1/4 W
R40	-56		10K		
R41	-56		10K		
R42	-56		10K		
R43	-56		10K		
R44	-53		7.5K		
R45	-53		7.5K		
R46	-58		12K		
R47	-58		12K		
R48	-36		1.5K		
R49	-36		1.5K		
R50	-67		30K		
R51	-56		10K		
R52	-56		10K		
R53	-41		2.4K		
R54	-41		2.4K		
R55	-36		1.5K		
R56	-36		1.5K		
R57	-36		1.5K		
R58	-36		1.5K		
R59	-60		15K		
R60	-60		15K		
R61	-56		10K		
R62	-56		10K		
R63	-49		5.1K		
R64	-49		5.1K		
R65	-12		150		
R66	-36		1.5K		
R67	-36		1.5K		
R68	-60		15K		
R69	-60		15K		
R70	-56		10K		
R71	-56		10K		
R72	-49		5.1K		
R73	-49		5.1K		
R74	-12		150		
R75	-53		7.5K		
R76	-53		7.5K		
R77	-40		2.2K		
R78	-60		15K		
R79	-60		15K		
~~R80~~	~~-56~~		~~10K~~		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R81	1010312-034	RESISTOR	450	5%	2 W
R82	1006750-56		10K	2%	1/4W
R83	-56		10K		
R84	-56		10K		
R85	-56		10K		
R86	-53		7.5K		
R87	-53		7.5K		
R88	-58		12K		
R89	-58		12K		
R90	-36		1.5K		
R91	-36		1.5K		
R92	-67		30K		
R93	-56		10K		
R94	-56		10K		
R95	-41		2.4K		
R96	-41		2.4K		
R97	-36		1.5K		
R98	-36		1.5K		
R99	-36		1.5K		
R100	-36		1.5K		
R101	-60		15K		
R102	-60		15K		
R103	-56		10K		
R104	-56		10K		
R105	-49		5.1K		
R106	-49		5.1K		
R107	-12		150		
R108	-36		1.5K		
R109	-36		1.5K		
R110	-60		15K		
R111	-60		15K		
R112	-56		10K		
R113	-56		10K		
R114	-49		5.1K		
R115	-49		5.1K		
R116	-12		150		
R117	-53		7.5K		
R118	-53		7.5K		
R119	-40		2.2K		
R120	-60		15K		
R121	-60		15K		
~~R122~~	~~-56~~		~~10K~~		
R123	1010312-034		450	5%	2 W
R124	1006750-56		10K	2%	1/4W
R125	-56		10K		
R126	-56		10K		
R127	-56		10K		
C1	1006777-16	CAPACITOR	220UUF	10%	100V
C2	-16		220UUF	10%	100V
C3	1006755 -69		1	10%	35 V
C4	1006777-21		560UUF	10%	100V
C5	-21		560UUF		
C6	-16		220UUF		
C7	-16		220UUF		
C8	-21		560UUF		
C9	-21		560UUF		
C10	1006755 -69		1	10%	35 V
C11	-65		0.47		
C12	1006777-27		0.0033	10%	100V
C13	-27		0.0033		
C14	1010393-039		6.8	10%	50V
C15	1006777-16		220UUF	10%	100V
C16	-16		220UUF		
C17	1006755-69		1	10%	35V
C18	1006777-21		560UUF	10%	100V
C19	-21		560UUF		
C20	-16		220UUF		
C21	-16		220UUF		
C22	-21		560UUF		
C23	-21		560UUF		
C24	1006755-69		1	10%	35 V
C25	-65		0.47		
C26	1006777-27		0.0033	10%	100V
C27	-27		0.0033		
C28	-16		220UUF		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C29	1006777-16	CAPACITOR	220UUF	10%	100V
C30	1006755 -69		1	10%	35 V
C31	1006777-21		560UUF	10%	100V
C32	-21		560UUF		
C33	-16		220UUF		
C34	-16		220UUF		
C35	-21		560 UUF		
C36	-21		560 UUF		
C37	1006755-69		1	10%	35 V
C38	-65		0.47		
C39	1006777-27		0.0033	10%	100V
C40			0.0033		
C41	1006755-79		6.8	10%	35V
C42					
C43					
CR1	1010385	IN660			
CR2					
CR3					
CR4					
CR5					
CR6					
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25					
CR26					
CR27					
CR28					
CR29					
CR30					
CR31					
CR32	1010265-5	IN3020b			
CR33	1010385	IN660			
CR34					
CR35					
CR36					
CR37					
CR38					
CR39					
CR40					
CR41					
CR42					
CR43					
CR44					
CR45					
CR46					
CR47					
CR48					
CR49					
CR50					
CR51					
CR52					
CR53					
CR54					
CR55					
CR56					
CR57					
CR58					
CR59					
CR60					
CR61					
CR62					
CR63					

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
CR64	1010265-5	IN3020b			
CR65	1010385	IN660			
CR66					
CR67					
CR68					
CR69					
CR70					
CR71					
CR72					
CR73					
CR74					
CR75					
CR76					
CR77					
CR78					
CR79					
CR80					
CR81					
CR82					
CR83					
CR84					
CR85					
CR86					
CR87					
CR88					
CR89					
CR90					
CR91					
CR92					
CR93					
CR94					
CR95					
CR96	1010265-5	IN3020b			
CR97	1010372-12		5 6V	5%	250MW
CR98					
CR99					
Q1	1010395	SP8304			
Q2					
Q3	1010376 -2	2N2060			
Q4	-2				
Q5	-1				
Q6	1010395	SP8304			
Q7					
Q8	1010376 -2	2N2060			
Q9	-2				
Q10	-1				
Q11	1010395	SP8304			
Q12					
Q13	1010376 -2	2N2060			
Q14	-2				
Q15	-1				

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

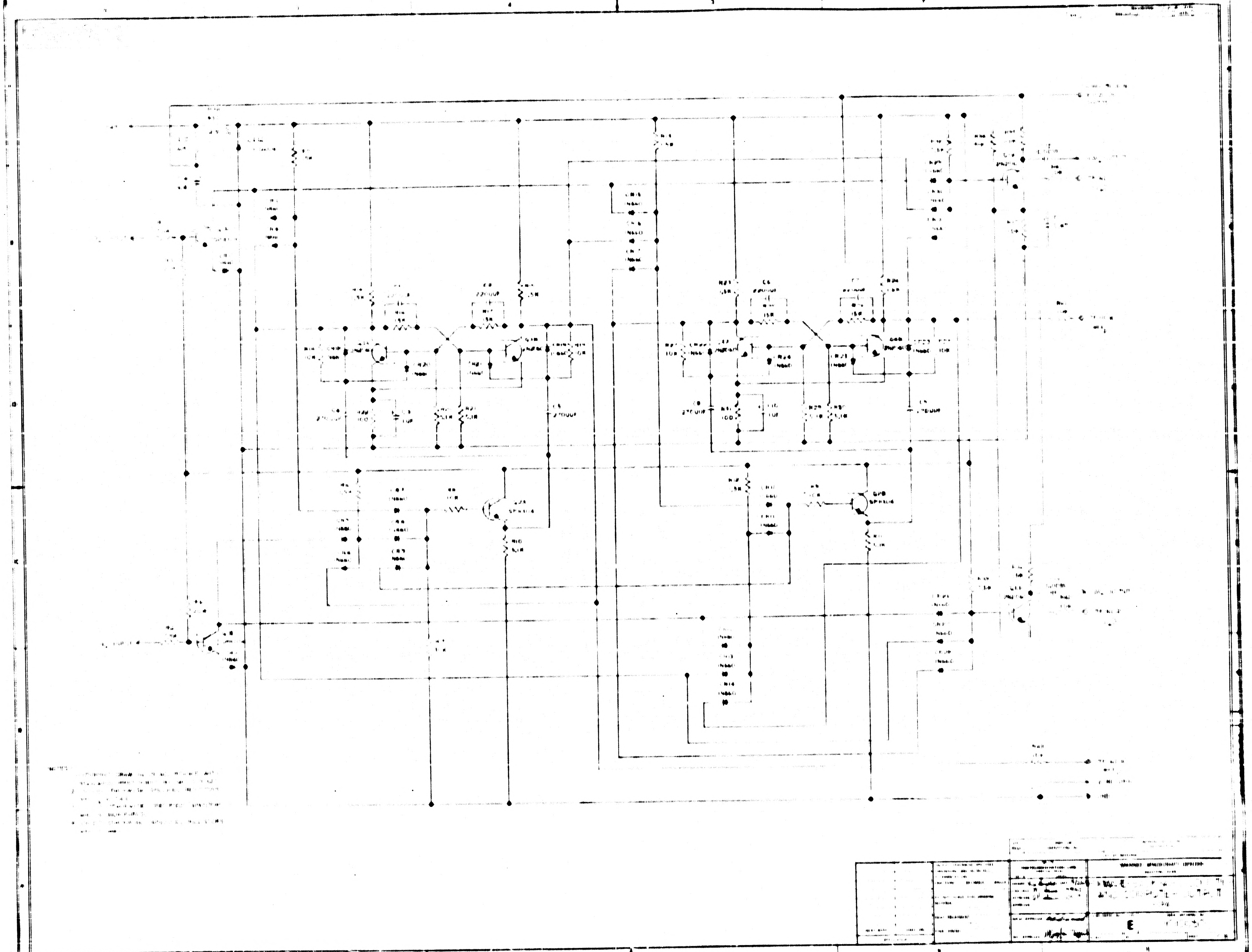
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

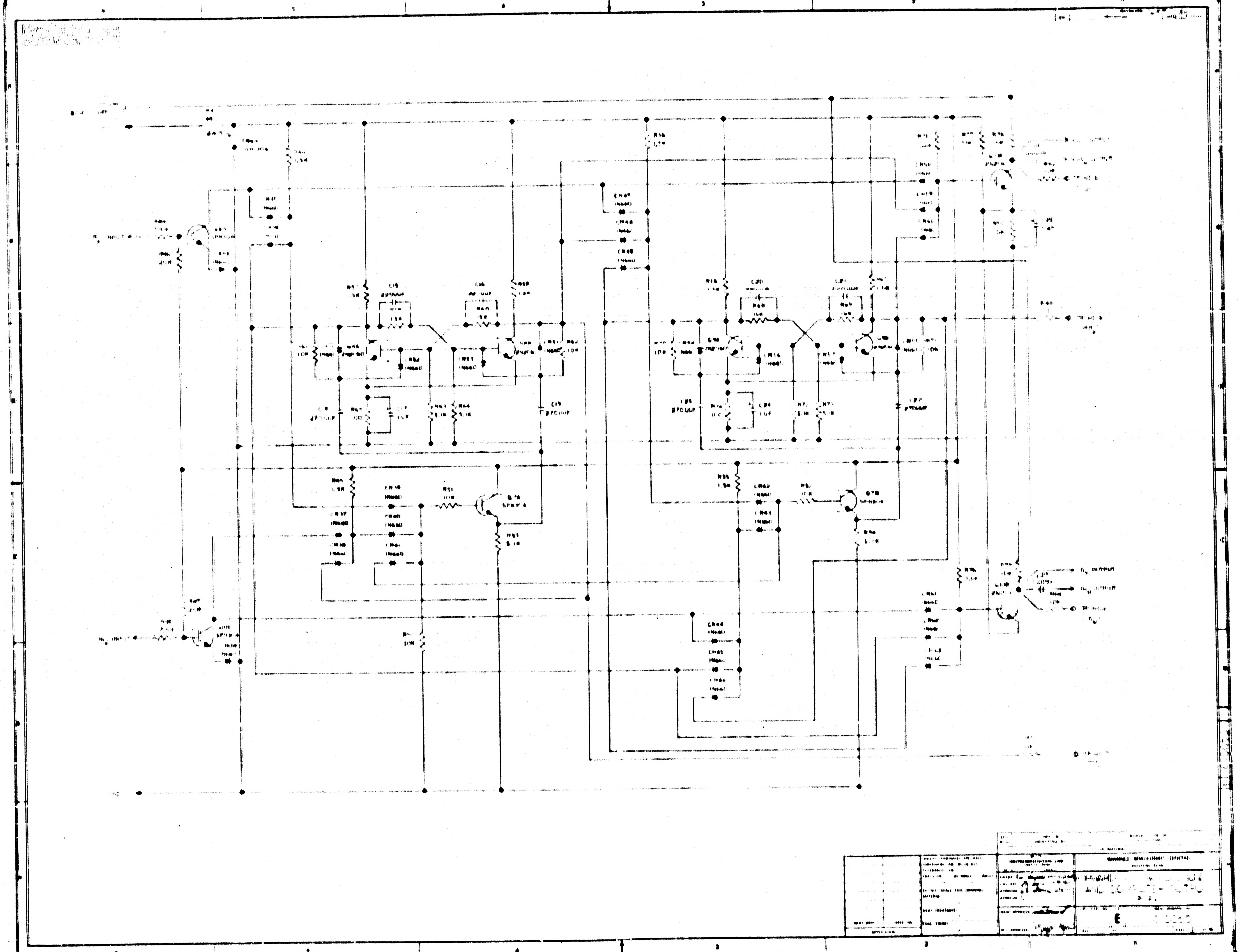
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN [illegible] DATE 4/8/63
CHECKED [illegible] 4/9/63
APPROVAL [illegible] 4/[illegible]/63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

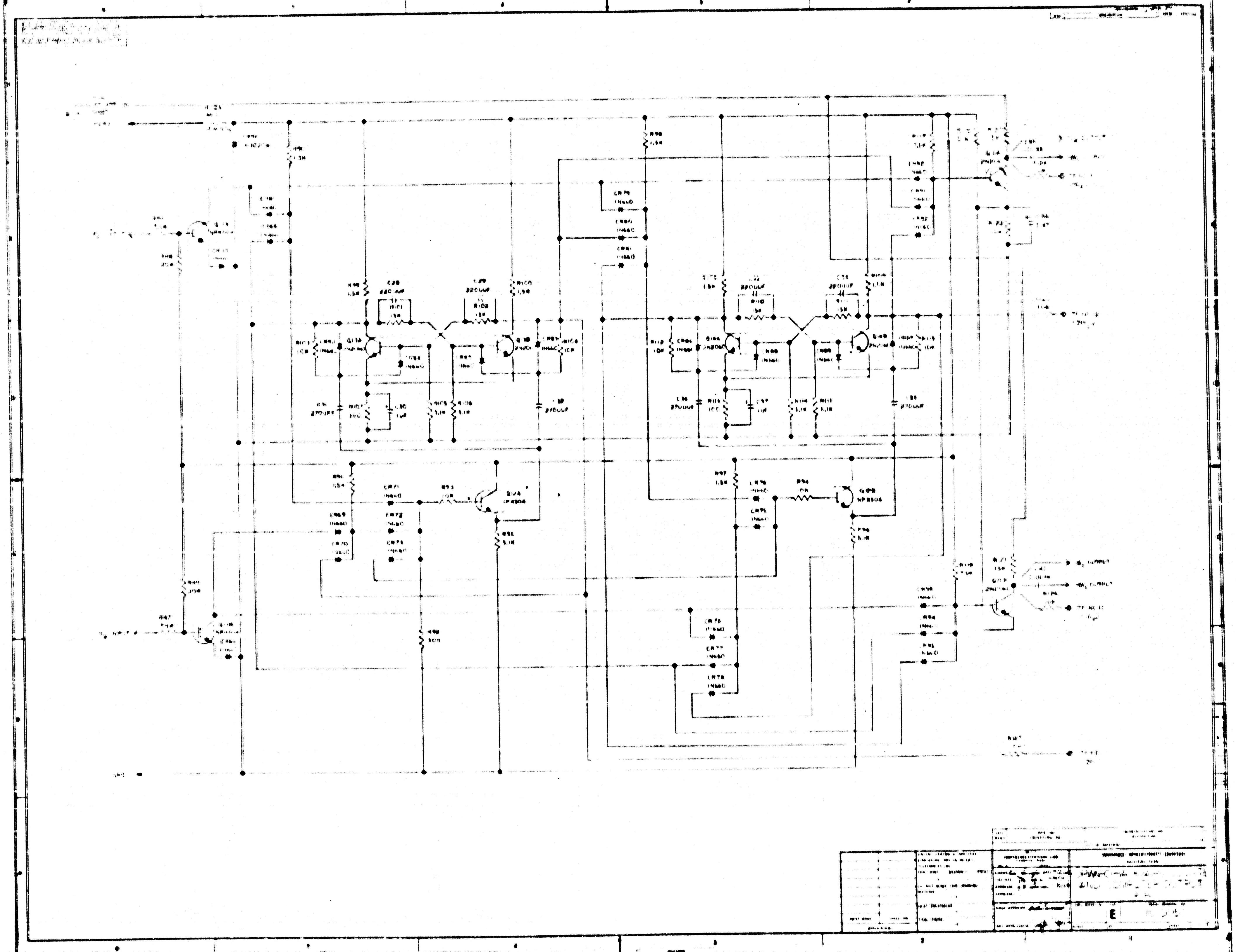
FORWARD-BACKWARD COUNTER
AND COMPUTER OUTPUT
PIPA

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010050
SCALE
WT
SHEET 4 OF 4


2700UF
E



C15
15K
C16
15K
R50
CR51
1N660
C19
270UUF
R63
5.1K
R64
5.1K
R51
10K
Q7A
CR19
Q7B
C20
C21
C25
270UUF
C24
1UF
E


R99
1.5K
C28
220UUF
R101
1.5K
C29
270UUF
R102
1.5K
R100
1.5K
Q13A
R103
10K
Q13B
R104
10K
CR84
1N660
CR87
1N660
C31
270UUF
R107
100
C30
1UF
R105
5.1K
R106
5.1K
C32
270UUF
R94
1.5K
CR71
1N660
R93
10K
Q12A
SP8304
CR72
1N660
CR73
1N660
R95
5.1K
R98
1.5K
C33
270UUF
R110
1.5K
C34
270UUF
R111
1.5K
R112
10K
Q16A
Q16B
R113
10K
CR88
1N660
CR89
1N660
C36
270UUF
R116
100
C37
1UF
R114
5.1K
R115
5.1K
C35
270UUF
R97
1.5K
CR74
1N660
R96
10K
Q12B
SP8304
CR75
1N660
R96
5.1K
CR76
1N660
CR77
1N660
CR78
1N660
CR79
1N660
CR80
1N660
CR81
1N660
R90
50K
E

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
[illegible]	[illegible]	RESISTOR	[illegible]	2%	1/4W

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
[illegible]	1010512-034	RESISTOR	680	5%	2W
[illegible]	1006750-56		10K	2%	1/4W

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C9	1006777-16	CAPACITOR	220UUF	10%	100V
C10	1006755-69			10%	35V
C11	1006777		270UUF	10%	100V

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
[illegible]	1010386-5	1N3020B			
[illegible]	1010385	1N460			

LIST OF MATERIAL

AND COMPUTER OUTPUT

E

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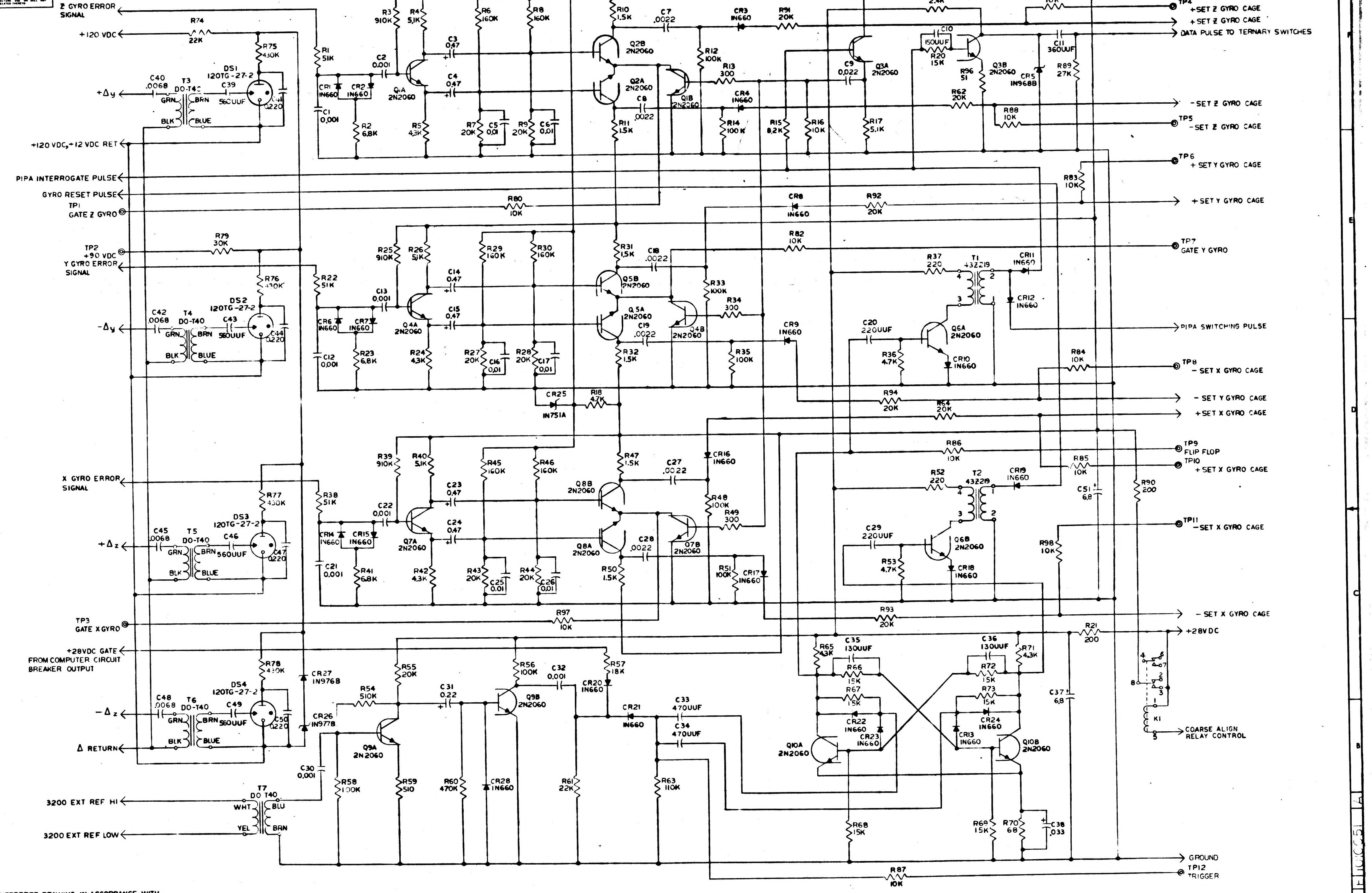
REVISIONS TDRR 00882

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISE PER TDRR 01359	5-20-63	



Z GYRO ERROR SIGNAL
+120 VDC
R74 22K
R75 430K
DS1 120TG-27-2
C40 .0068
T3 DO-T40
C39 560UUF
C41 .0220
+Δy
GRN
BRN
BLK
BLUE
+120 VDC, +12 VDC RET
PIPA INTERROGATE PULSE
GYRO RESET PULSE
TP1 GATE Z GYRO
TP2 +90 VDC
Y GYRO ERROR SIGNAL
R79 30K
R76 430K
DS2 120TG-27-2
C42 .0068
T4 DO-T40
C43 560UUF
C44 .0220
-Δy
X GYRO ERROR SIGNAL
R77 430K
DS3 120TG-27-2
C45 .0068
T5 DO-T40
C46 560UUF
C47 .0220
+Δz
TP3 GATE X GYRO
+28VDC GATE FROM COMPUTER CIRCUIT BREAKER OUTPUT
R78 430K
DS4 120TG-27-2
C48 .0068
T6 DO-T40
C49 560UUF
C50 .0220
CR27 IN9768
CR26 IN9778
-Δz
Δ RETURN
3200 EXT REF HI
3200 EXT REF LOW
T7 DO T40
WHT
BLU
YEL
BRN
R1 51K
R3 910K
R4 5.1K
C2 0.001
C1 0.001
CR1 IN660
CR2 IN660
R2 6.8K
Q1A 2N2060
C3 .047
C4 .047
R5 4.3K
R6 160K
R8 160K
R7 20K
C5 0.01
R9 20K
C6 0.01
R10 1.5K
Q2B 2N2060
Q2A 2N2060
Q1B 2N2060
R11 1.5K
C7 .0022
C8 .0022
R12 100K
R13 300
R14 100K
CR3 IN660
CR4 IN660
R91 20K
R15 8.2K
R16 10K
C9 0.022
Q3A 2N2060
R17 5.1K
R19 2.4K
C10 150UUF
R20 15K
R96 51
Q3B 2N2060
CR5 IN968B
C11 360UUF
R89 27K
R62 20K
R88 10K
R81 10K
TP4 +SET Z GYRO CAGE
+SET Z GYRO CAGE
DATA PULSE TO TERNARY SWITCHES
-SET Z GYRO CAGE
TP5 -SET Z GYRO CAGE
TP6 +SET Y GYRO CAGE
R83 10K
+SET Y GYRO CAGE
R80 10K
CR8 IN660
R92 20K
R82 10K
TP7 GATE Y GYRO
R22 51K
R25 910K
R26 5.1K
C13 0.001
C12 0.001
CR6 IN660
CR7 IN660
R23 6.8K
Q4A 2N2060
C14 .047
C15 .047
R24 4.3K
R29 160K
R30 160K
R27 20K
C16 0.01
R28 20K
C17 0.01
R31 1.5K
Q5B 2N2060
Q5A 2N2060
Q4B 2N2060
C18 .0022
C19 .0022
R32 1.5K
R33 100K
R34 300
R35 100K
CR9 IN660
R37 220
T1 432219
CR11 IN660
CR12 IN660
C20 220UUF
Q6A 2N2060
R36 4.7K
CR10 IN660
PIPA SWITCHING PULSE
R84 10K
TP8 -SET X GYRO CAGE
CR25 IN751A
R18 4.7K
R94 20K
R64 20K
-SET Y GYRO CAGE
+SET X GYRO CAGE
R86 10K
TP9 FLIP FLOP
TP10 +SET X GYRO CAGE
R85 10K
R38 51K
R39 910K
R40 5.1K
C22 0.001
C21 0.001
CR14 IN660
CR15 IN660
R41 6.8K
Q7A 2N2060
C23 .047
C24 .047
R42 4.3K
R45 160K
R46 160K
R43 20K
C25 0.01
R44 20K
C26 0.01
R47 1.5K
Q8B 2N2060
Q8A 2N2060
Q7B 2N2060
C27 .0022
C28 .0022
R50 1.5K
CR16 IN660
R48 100K
R49 300
R51 100K
CR17 IN660
R52 220
T2 432219
CR19 IN660
C29 220UUF
Q6B 2N2060
R53 4.7K
CR18 IN660
C51 6.8
R90 200
TP11 -SET X GYRO CAGE
R98 10K
R97 10K
R93 20K
-SET X GYRO CAGE
R21 200
+28VDC
R55 20K
R54 510K
Q9A 2N2060
R58 100K
R59 510
C30 0.001
C31 0.22
Q9B 2N2060
R56 100K
C32 0.001
R60 470K
CR28 IN660
R61 22K
R57 18K
CR20 IN660
CR21 IN660
C33 470UUF
C34 470UUF
R63 110K
R65 4.3K
C35 130UUF
R66 15K
R67 15K
CR22 IN660
CR23 IN660
Q10A 2N2060
R68 15K
C36 130UUF
R71 4.3K
R72 15K
R73 15K
CR13 IN660
CR24 IN660
Q10B 2N2060
R69 15K
R70 68
C38 .033
C37 6.8
K1
COARSE ALIGN RELAY CONTROL
GROUND
TP12 TRIGGER
R87 10K

NOTES—
1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W ±2%
3 UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 9/6/62
CHECKED M Lain
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO
SIZE E
NASA DRAWING NO 1C10051
SCALE —
WT
SHEET 1 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00882

① SYM	DESCRIPTION	DATE	APPROVAL
A	RIVISED PER TDRR 01359	5-20-63	LW WK

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTER	51 K	2 %	1/4 W
R2	1006750-52		6.8 K	2 %	1/4 W
R3	1010369-104		910 K	5 %	1/8 W
R4	1006750-49		5.1 K	2 %	1/4 W
R5	1006750-47		4.3 K	2 %	1/4 W
R6	1010369-86		160K	5 %	1/8 W
R7	1006750-63		20 K	2 %	1/4 W
R8	1010369-86		160 K	5 %	1/8 W
R9	1006750-63		20 K	2 %	1/4 W
R10	1006750-36		1.5 K		
R11	36		1.5 K		
R12	80		100K		
R13	19		300		
R14	80		100K		
R15	54		8.2 K		
R16	56		10 K		
R17	49		5.1 K		
R18	48		4.7 K		
R19	41		2.4 K		
R20	60		15 K		
R21	15		200		
R22	73		51 K		
R23	52		6.8 K		
R24	↓ 47		4.3 K	↓	↓
R25	1010369-104		910 K	5 %	1/8 W
R26	1006750-49		5.1 K	2 %	1/4 W
R27	63		20 K		
R28	↓ 63		20 K	↓	↓
R29	1010369-104		160 K	5 %	1/8 W
R30	1010369-104		160 K	5 %	1/8 W
R31	1006750-36		1.5 K	2 %	1/4 W
R32	36		1.5 K		
R33	80		100 K		
R34	19		300		
R35	80		100 K		
R36	48		4.7 K		
R37	16		220		
R38	↓ 73		51 K	↓	↓
R39	1010369-104		910 K	5 %	1/8 W
R40	1006750-49		5.1 K	2 %	1/4 W
R41	52		6.8 K		
R42	47		4.3 K		
R43	63		20 K		
R44	↓ 63		20 K	↓	↓
R45	1010369-104		160 K	5 %	1/8 W
R46	1010369-104		160 K	5 %	1/8 W
R47	1006750-36		1.5 K	2 %	1/4 W
R48	80		100 K		
R49	19		300		
R50	36		1.5 K		
R51	80		100K		
R52	↓ 16		220	↓	↓
R53	1006750-48		4.7 K	2 %	1/4 W
R54	1010369-98		510 K	5 %	1/8 W
R55	1006750-63		20 K	2 %	1/4 W
R56	80		100 K		
R57	62		18 K		
R58	80		100 K		
R59	↓ 25		510	↓	↓
R60	1010369-97		470 K	5 %	1/8 W
R61	1006750-64		22 K	2 %	1/4 W
R62	63		20 K		
R63	81		110 K		
R64	63		20 K		
R65	47		4.3 K		
R66	60		15 K		
R67	60		15 K		
R68	60		15 K		
R69	60		15 K		
R70	4		68		
R71	47		4.3 K		
R72	60		15 K		
R73	60		15 K		
R74	↓ 64		22 K	↓	↓
R75	1010369-96		430K	5 %	1/8 W
R76	96		430K		
R77	96		430K		
R78	↓ 96		430K	↓	↓
R79	1006750-67		30 K	2 %	1/4 W
R80	1006750-56		10 K	2 %	1/4 W
R81	56		10 K		
R82	56		10 K		
R83	56		10 K		
R84	56		10 K		
R85	56		10 K		
R86	56		10 K		
R87	56		10 K		
R88	56		10 K		
R89	66		27 K		
R90	15		200		
R91	63		20 K		
R92	63		20 K		
R93	63		20 K		
R94	63		20 K		
R95	56		10 K		
R96	1		51		
R97	56		10 K		
R98	↓ 56	↓	10 K	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1006777-24	CAPACITORS	.001	±10 %	100 V
C2	1006777-24		.001		100 V
C3	1006755-65		.47		35 VDC
C4	1006755-65		.47		35 VDC
C5	1006777-31		.01		100 V
C6	31		.01		
C7	26		.0022		
C8	26		.0022		
C9	33		.022		
C10	15		150 UUF		
C11	19		360 UUF		
C12	24		.001		
C13	↓ 24		.001		↓
C14	1006755-65		.47		35 VDC
C15	1006755-65		.47		35 VDC
C16	1006777-31		.01		100V
C17	31		.01		
C18	26		.0022		
C19	26		.0022		
C20	16		220 UUF		
C21	24		.001		
C22	↓ 24		.001		↓
C23	1006755-65		.47		35 VDC
C24	1006755-65		.47		35 VDC
C25	1006777-31		.01		100 V
C26	1006777-31		.01		100 V
C27	1006777-26		.0022		
C28	1006777-26		.0022		
C29	16		220 UUF		
C30	↓ 24		.001		↓
C31	1010393-021		.22		50 VDC
C32	1006777-24		.001		100V
C33	20		470 UUF		
C34	20		470 UUF		
C35	14		130 UUF		
C36	↓ 14		130 UUF		↓
C37	1010393-039		6.8		50 VDC
C38	1006755-51		.033	↓	35 VDC
C39	1010359-14		560 UUF	±20 %	200 V
C40	1006777-30		.0068	±10 %	100 VDC
C41	1010264-29		.220	±5 %	200 V
C42	1006777-30		.0068	±10 %	100 V
C43	1010359-14		560 UUF	±20 %	200 V
C44	1010264-29		.220	±5 %	200 V
C45	1006777-30		.0068	±10 %	100 V
C46	1010359-14		560 UUF	±20 %	200 V
C47	1010264-29		.220	±5 %	200 VDC
C48	1006777-30		.0068	±10 %	100 V
C49	1010359-14		560 UUF	±20 %	200 V
C50	1010264-29		.220	±5 %	200 VDC
C51	1010393-039	↓	6.8	±10 %	50 VDC
CR1	1010385	DIODE			
CR2					
CR3					
CR4	↓				
CR5	1010286-12				
CR6	1010385				
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	↓				
CR25	1010462				
CR26	1010286-21				
CR27	1010286-20				
CR28	1010385	↓			
T1	1006762	TRANSFORMER			
T2	1006762				
T3	1010315				
T4					
T5					
T6					
T7	↓	↓			
Q1	1010376-1	TRANSISTOR			
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8					
Q9					
Q10	↓	↓			
K1	1010353-1	RELAYS			
DS1	1010465	LAMP			
DS2					
DS3					
DS4	↓				

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. Cowdrey DATE 4-3-63
CHECKED
APPROVAL J. Stevens 4/5/63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

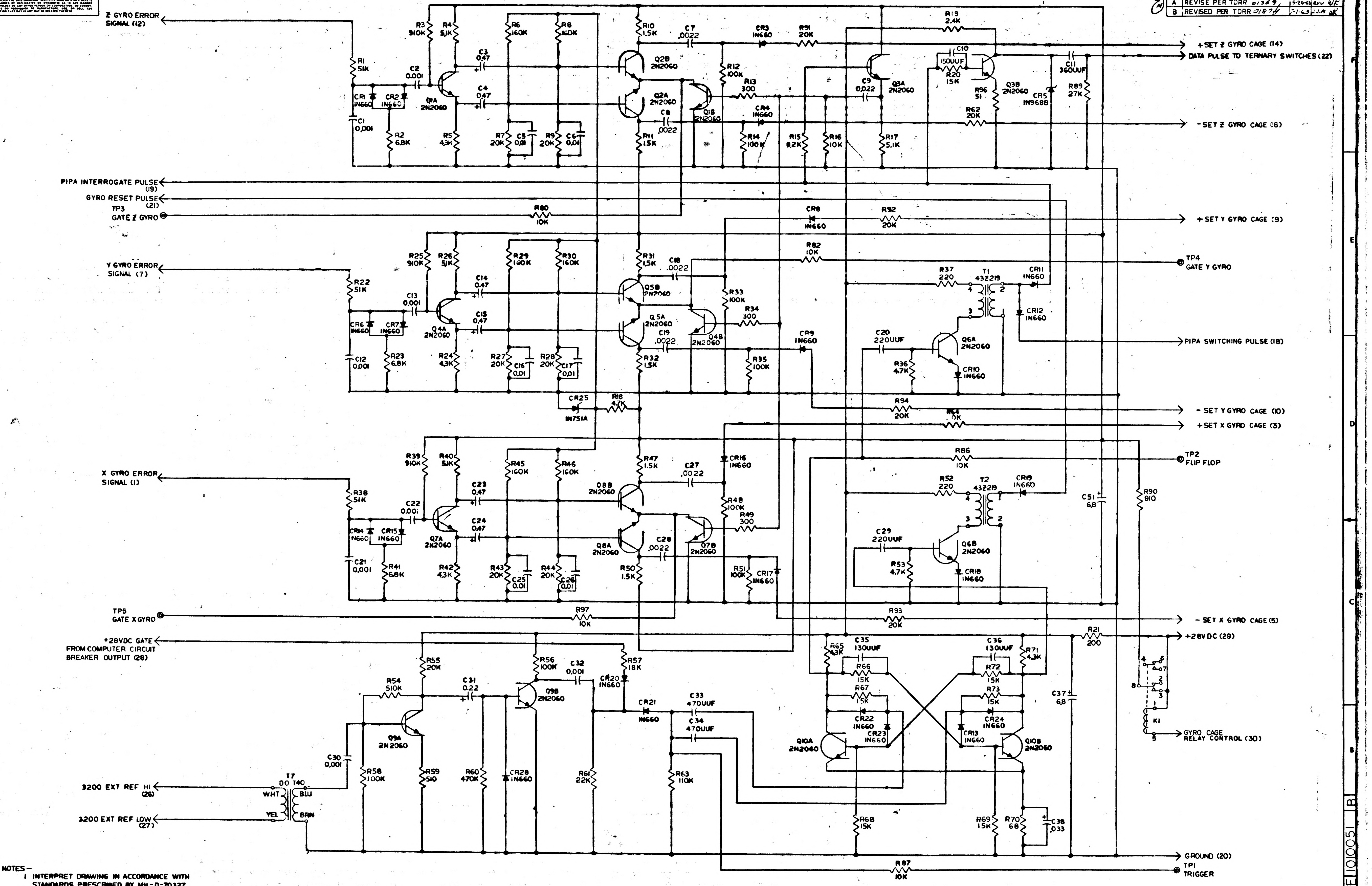
BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010051
SCALE
WT
SHEET 2 OF 2

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 01882

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISE PER TDRR 01359	5-20-63	RVV
B	REVISED PER TDRR 01874	7-1-63	J.J.A.


Z GYRO ERROR SIGNAL (12)
PIPA INTERROGATE PULSE (19)
GYRO RESET PULSE (21)
TP3 GATE Z GYRO
Y GYRO ERROR SIGNAL (7)
X GYRO ERROR SIGNAL (1)
TP5 GATE X GYRO
+28VDC GATE FROM COMPUTER CIRCUIT BREAKER OUTPUT (28)
3200 EXT REF HI (26)
3200 EXT REF LOW (27)
+SET Z GYRO CAGE (14)
DATA PULSE TO TERNARY SWITCHES (22)
-SET Z GYRO CAGE (6)
+SET Y GYRO CAGE (9)
TP4 GATE Y GYRO
PIPA SWITCHING PULSE (18)
-SET Y GYRO CAGE (10)
+SET X GYRO CAGE (3)
TP2 FLIP FLOP
-SET X GYRO CAGE (5)
+28V DC (29)
GYRO CAGE RELAY CONTROL (30)
GROUND (20)
TP1 TRIGGER
R1 51K
C1 0.001
CR1 1N660
CR2 1N660
C2 0.001
R2 6.8K
R3 910K
R4 5.1K
Q1A 2N2060
C3 0.47
C4 0.47
R5 4.3K
R6 160K
R7 20K
C5 0.01
R8 160K
R9 20K
C6 0.01
R10 1.5K
Q2B 2N2060
Q2A 2N2060
R11 1.5K
C7 .0022
C8 .0022
Q1B 2N2060
R12 100K
R13 300
CR3 1N660
CR4 1N660
R14 100K
R91 20K
R15 8.2K
R16 10K
C9 0.022
Q3A 2N2060
R17 5.1K
R19 2.4K
C10 150UUF
R20 15K
R96 51
Q3B 2N2060
CR5 1N968B
C11 360UUF
R89 27K
R62 20K
R80 10K
CR8 1N660
R92 20K
R22 51K
C13 0.001
CR6 1N660
CR7 1N660
C12 0.001
R23 6.8K
R25 910K
R26 5.1K
Q4A 2N2060
C14 0.47
C15 0.47
R24 4.3K
R29 160K
R27 20K
C16 0.01
R30 160K
R28 20K
C17 0.01
R31 1.5K
C18 .0022
Q5B 2N2060
Q5A 2N2060
C19 .0022
Q4B 2N2060
R32 1.5K
R33 100K
R34 300
R35 100K
CR9 1N660
R82 10K
R37 220
T1 432219
CR11 1N660
CR12 1N660
C20 220UUF
Q6A 2N2060
R36 4.7K
CR10 1N660
CR25 1N751A
R18 4.7K
R94 20K
R64 10K
R39 910K
R40 5.1K
R45 160K
R46 160K
R47 1.5K
C27 .0022
CR16 1N660
R86 10K
R38 51K
C22 0.001
C23 0.47
C24 0.47
Q8B 2N2060
CR14 1N660
CR15 1N660
Q7A 2N2060
Q8A 2N2060
Q7B 2N2060
C21 0.001
R41 6.8K
R42 4.3K
R43 20K
C25 0.01
R44 20K
C26 0.01
R50 1.5K
C28 .0022
R48 100K
R49 300
R51 100K
CR17 1N660
R52 220
T2 432219
CR19 1N660
C29 220UUF
Q6B 2N2060
R53 4.7K
CR18 1N660
C51 6.8
R90 810
R97 10K
R93 20K
R21 200
R55 20K
R56 100K
R57 18K
C32 0.001
CR20 1N660
R54 510K
C31 0.22
Q9B 2N2060
Q9A 2N2060
CR21 1N660
C33 470UUF
C34 470UUF
C30 0.001
T7 DO T40
WHT
BLU
YEL
BRN
R58 100K
R59 510
R60 470K
CR28 1N660
R61 22K
R63 110K
R65 43K
C35 130UUF
R66 15K
R67 15K
CR22 1N660
CR23 1N660
Q10A 2N2060
C36 130UUF
R71 4.3K
R72 15K
R73 15K
CR24 1N660
CR13 1N660
Q10B 2N2060
C37 6.8
K1
R68 15K
R69 15K
R70 68
C38 .033
R87 10K

NOTES -
1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 UNLESS OTHERWISE SPECIFIED RESISTORS ARE 1/4 W ±2%
3 UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 4/6/62
CHECKED M. Lein
APPROVAL 4/1/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010051
SCALE —
WT
SHEET 1 OF 2

E 1010051 B

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01359	6-20-63	[illegible]
B	REVISED PER TDRR 01874	7-1-63	[illegible]

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTER	51 K	2%	1/4 W
R2	1006750-52		6.8 K	2%	1/4 W
R3	1010369-104		910 K	5%	1/8 W
R4	1006750-49		5.1 K	2%	1/4 W
R5	1006750-47		4.3 K	2%	1/4 W
R6	1010369-86		160K	5%	1/8 W
R7	1006750-63		20 K	2%	1/4 W
R8	1010369-86		160K	5%	1/8 W
R9	1006750-63		20 K	2%	1/4 W
R10	1006750-36		1.5 K		
R11	36		1.5 K		
R12	80		100K		
R13	19		300		
R14	80		100 K		
R15	54		8.2 K		
R16	56		10 K		
R17	49		5.1 K		
R18	48		4.7 K		
R19	41		2.4 K		
R20	60		15 K		
R21	15		200		
R22	73		51 K		
R23	52		6.8 K		
R24	↓ 47		4.3 K	↓	↓
R25	1010369-104		910 K	5%	1/8 W
R26	1006750-49		5.1 K	2%	1/4 W
R27	63		20 K		
R28	↓ 63		20 K	↓	↓
R29	1010369-104		160 K	5%	1/8 W
R30	1010369-104		160 K	5%	1/8 W
R31	1006750-36		1.5 K	2%	1/4 W
R32	36		1.5 K		
R33	80		100 K		
R34	19		300		
R35	80		100 K		
R36	48		4.7 K		
R37	16		220		
R38	↓ 73		51 K	↓	↓
R39	1010369-104		910 K	5%	1/8 W
R40	1006750-49		5.1 K	2%	1/4 W
R41	52		6.8 K		
R42	47		4.3 K		
R43	63		20 K		
R44	↓ 63		20 K	↓	↓
R45	1010369-104		160 K	5%	1/8 W
R46	1010369-104		160 K	5%	1/8 W
R47	1006750-36		1.5 K	2%	1/4 W
R48	80		100 K		
R49	19		300		
R50	36		1.5 K		
R51	80		100K		
R52	↓ 16		220	↓	↓
R53	1006750-48		4.7 K	2%	1/4 W
R54	1010369-98		510 K	5%	1/8 W
R55	1006750-63		20 K	2%	1/4 W
R56	80		100 K		
R57	62		18 K		
R58	80		100 K		
R59	↓ 25		510	↓	↓
R60	1010369-97		470 K	5%	1/8 W
R61	1006750-64		22 K	2%	1/4 W
R62	63		20 K		
R63	81		110 K		
R64	63		20 K		
R65	47		4.3 K		
R66	60		15 K		
R67	60		15 K		
R68	60		15 K		
R69	60		15 K		
R70	4		68		
R71	47		4.3 K		
R72	60		15 K		
R73	↓ 60		15 K	↓	↓
R80	1006750-56		10 K	2%	1/4 W
R82	1006750-56		10 K	2%	1/4 W
R86	56		10 K		
R87	↓ 56		10 K	↓	↓
R89	66		27 K		
R90	31		910		
R91	63		20 K		
R92	63		20 K		
R93	63		20 K		
R94	63		20 K		
R95	56		10 K		
R96	1		51		
R97	↓ 56	↓	10 K	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1006777-24	CAPACITORS	.001	±10%	100 V
C2	1006777-24		.001		100 V
C3	1006755-65		.47		35 VDC
C4	1006755-65		.47		35 VDC
C5	1006777-31		.01		100 V
C6	31		.01		
C7	26		.0022		
C8	26		.0022		
C9	33		.022		
C10	15		150 UUF		
C11	19		360UUF		
C12	24		.001		
C13	↓ 24		.001		↓
C14	1006755-65		.47		35VDC
C15	1006755-65		.47		35VDC
C16	1006777-31		.01		100V
C17	31		.01		
C18	26		.0022		
C19	26		.0022		
C20	16		220UUF		
C21	24		.001		
C22	↓ 24		.001		↓
C23	1006755-65		.47		35VDC
C24	1006755-65		.47		35 VDC
C25	1006777-31		.01		100V
C26	1006777-31		.01		100 V
C27	1006777-26		.0022		
C28	1006777-26		.0022		
C29	16		220UUF		
C30	↓ 24		.001		↓
C31	1010393-021		.22		50 VDC
C32	1006777-24		.001		100V
C33	20		470 UUF		
C34	20		470 UUF		
C35	14		130 UUF		
C36	↓ 14		130 UUF		↓
C37	1010393-039		6.8		50 VDC
C38	1006755-51		.033	↓	35 VDC
C51	1010393-039	↓	6.8	±10%	50 VDC
CR1	1010385	DIODE			
CR2					
CR3					
CR4	↓				
CR5	1010286-12				
CR6	1010385				
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	↓				
CR25	1010462				
CR28	1010385	↓			
T1	1006762	TRANSFORMER			
T2	1006762				
T7	1010315	↓			
Q1	1010376-1	TRANSISTOR			
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8					
Q9					
Q10	↓	↓			
K1	1010353-1	RELAYS			

NOTES:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN [illegible] DATE 4-15-63
CHECKED
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

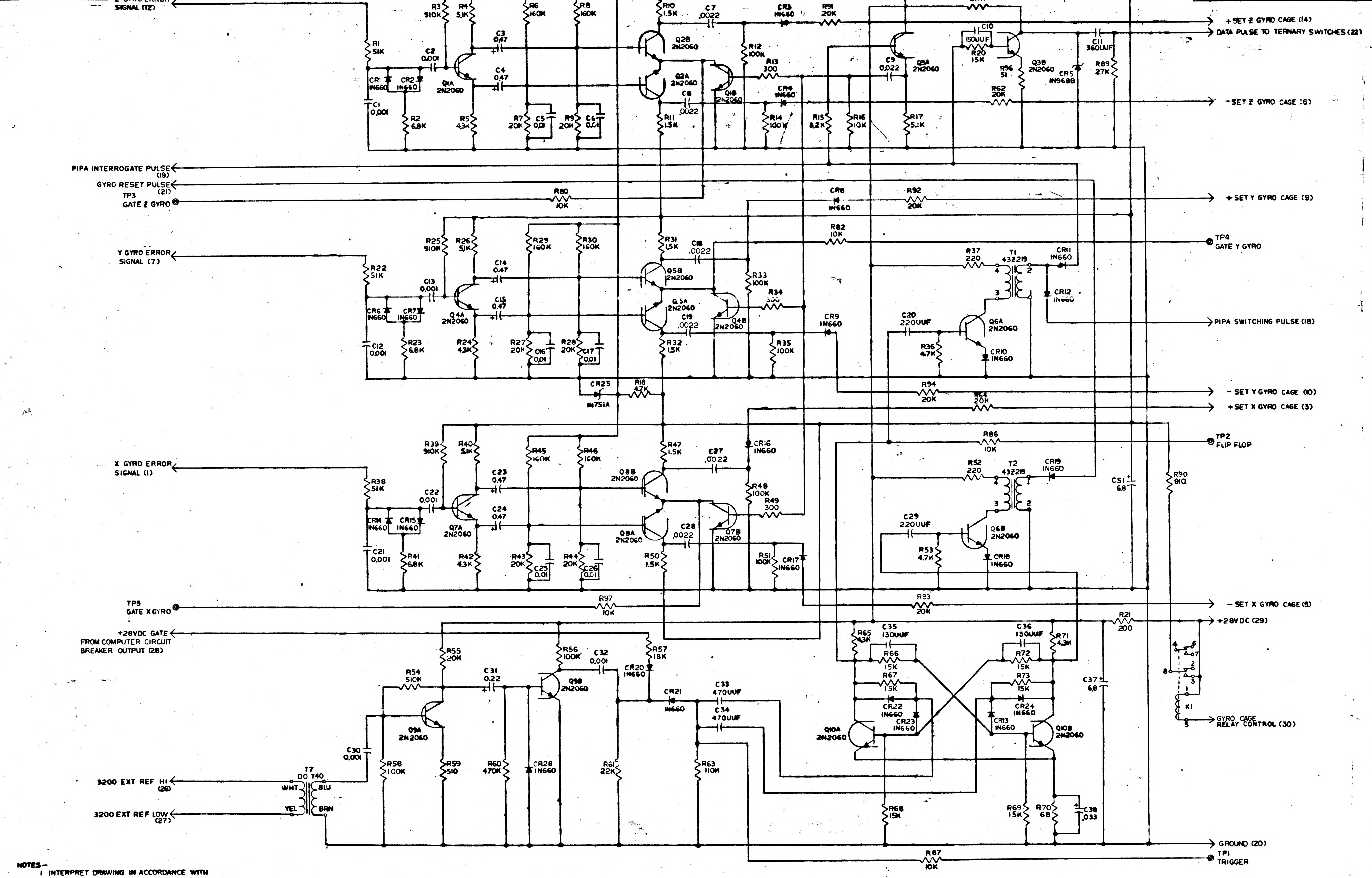
BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010051
SCALE
WT
SHEET 2 OF 2

1010051 B

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR# 00882		
A	REVISE PER TDRR 01359	5-20-63	AUV UK
B	REVISED PER TDRR 01874	7-1-63	J.J.A. UK
C	REVISED PER TDRR 02880	8-21-63	[illegible]


Z GYRO ERROR SIGNAL (12)
PIPA INTERROGATE PULSE (19)
GYRO RESET PULSE (21)
TP3 GATE Z GYRO
Y GYRO ERROR SIGNAL (7)
X GYRO ERROR SIGNAL (1)
TP5 GATE X GYRO
+28VDC GATE FROM COMPUTER CIRCUIT BREAKER OUTPUT (28)
3200 EXT REF HI (26)
3200 EXT REF LOW (27)
+SET Z GYRO CAGE (14)
DATA PULSE TO TERNARY SWITCHES (22)
-SET Z GYRO CAGE (6)
+SET Y GYRO CAGE (9)
TP4 GATE Y GYRO
PIPA SWITCHING PULSE (18)
-SET Y GYRO CAGE (10)
+SET X GYRO CAGE (3)
TP2 FLIP FLOP
-SET X GYRO CAGE (5)
+28VDC (29)
GYRO CAGE RELAY CONTROL (30)
GROUND (20)
TP1 TRIGGER
R1 51K
R2 6.8K
R3 910K
R4 5.1K
R5 4.3K
R6 160K
R7 20K
R8 160K
R9 20K
R10 1.5K
R11 1.5K
R12 100K
R13 300
R14 100K
R15 8.2K
R16 10K
R17 5.1K
R18 4.7K
R19 2.4K
R20 15K
R21 200
R22 51K
R23 6.8K
R24 4.3K
R25 910K
R26 5.1K
R27 20K
R28 20K
R29 160K
R30 160K
R31 1.5K
R32 1.5K
R33 100K
R34 300
R35 100K
R36 4.7K
R37 220
R38 51K
R39 910K
R40 5.1K
R41 6.8K
R42 4.3K
R43 20K
R44 20K
R45 160K
R46 160K
R47 1.5K
R48 100K
R49 300
R50 1.5K
R51 100K
R52 220
R53 4.7K
R54 510K
R55 20K
R56 100K
R57 18K
R58 100K
R59 510
R60 470K
R61 22K
R62 20K
R63 110K
R64 20K
R65 4.3K
R66 15K
R67 15K
R68 15K
R69 15K
R70 68
R71 4.3K
R72 15K
R73 15K
R80 10K
R82 10K
R86 10K
R87 10K
R89 27K
R90 810
R91 20K
R92 20K
R93 20K
R94 20K
R96 51
R97 10K
C1 0.001
C2 0.001
C3 0.47
C4 0.47
C5 0.01
C6 0.01
C7 .0022
C8 .0022
C9 0.022
C10 150UUF
C11 360UUF
C12 0.001
C13 0.001
C14 0.47
C15 0.47
C16 0.01
C17 0.01
C18 .0022
C19 .0022
C20 220UUF
C21 0.001
C22 0.001
C23 0.47
C24 0.47
C25 0.01
C26 0.01
C27 .0022
C28 .0022
C29 220UUF
C30 0.001
C31 0.22
C32 0.001
C33 470UUF
C34 470UUF
C35 130UUF
C36 130UUF
C37 6.8
C38 .033
C51 6.8
CR1 1N660
CR2 1N660
CR3 1N660
CR4 1N660
CR5 1N968B
CR6 1N660
CR7 1N660
CR8 1N660
CR9 1N660
CR10 1N660
CR11 1N660
CR12 1N660
CR13 1N660
CR14 1N660
CR15 1N660
CR16 1N660
CR17 1N660
CR18 1N660
CR19 1N660
CR20 1N660
CR21 1N660
CR22 1N660
CR23 1N660
CR24 1N660
CR25 1N751A
CR28 1N660
Q1A 2N2060
Q1B 2N2060
Q2A 2N2060
Q2B 2N2060
Q3A 2N2060
Q3B 2N2060
Q4A 2N2060
Q4B 2N2060
Q5A 2N2060
Q5B 2N2060
Q6A 2N2060
Q6B 2N2060
Q7A 2N2060
Q7B 2N2060
Q8A 2N2060
Q8B 2N2060
Q9A 2N2060
Q9B 2N2060
Q10A 2N2060
Q10B 2N2060
T1 432219
T2 432219
T7 DO T40
WHT
YEL
BLU
BRN
K1
MASTER

NOTES–
1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W, ±2%.
3 UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE
CHECKED
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010051
SCALE —
WT
SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

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REVISIONS TDRR 03882

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01359	5-20-63	WK
B	REVISED PER TDRR 01874	7-1-63	WK.
C	REVISED PER TDRR 02880	8-28-63	

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTER	51 K	2%	1/4 W
R2	1006750-52		6.8 K	2%	1/4 W
R3	1010369-104		910 K	5%	1/8 W
R4	1006750-49		5.1 K	2%	1/4 W
R5	1006750-47		4.3 K	2%	1/4 W
R6	1010369-86		160K	5%	1/8 W
R7	1006750-63		20 K	2%	1/4 W
R8	1010369-86		160 K	5%	1/8 W
R9	1006750-63		20 K	2%	1/4 W
R10	1006750-36		1.5 K		
R11	36		1.5 K		
R12	80		100K		
R13	19		300		
R14	80		100K		
R15	54		8.2 K		
R16	56		10 K		
R17	49		5.1 K		
R18	48		4.7 K		
R19	41		2.4 K		
R20	60		15 K		
R21	15		200		
R22	73		51 K		
R23	52		6.8 K		
R24	↓ 47		4.3 K	↓	↓
R25	1010369-104		910 K	5%	1/8 W
R26	1006750-49		5.1 K	2%	1/4 W
R27	63		20 K		
R28	↓ 63		20 K	↓	↓
R29	1010369-86		160 K	5%	1/8 W
R30	1010369-86		160 K	5%	1/8 W
R31	1006750-36		1.5 K	2%	1/4 W
R32	36		1.5 K		
R33	80		100K		
R34	19		300		
R35	80		100 K		
R36	48		4.7 K		
R37	16		220		
R38	↓ 73		51 K	↓	↓
R39	1010369 - 104		910 K	5%	1/8 W
R40	1006750-49		5.1 K	2%	1/4 W
R41	52		6.8 K		
R42	47		4.3 K		
R43	63		20 K		
R44	↓ 63		20 K	↓	↓
R45	1010369-86		160 K	5%	1/8 W
R46	1010369-86		160 K	5%	1/8 W
R47	1006750-36		1.5 K	2%	1/4 W
R48	80		100 K		
R49	19		300		
R50	36		1.5 K		
R51	80		100K		
R52	↓ 16		220	↓	↓
R53	1006750-48		4.7 K	2%	1/4 W
R54	1010369-98		510 K	5%	1/8 W
R55	1006750-63		20 K	2%	1/4 W
R56	80		100 K		
R57	62		18 K		
R58	80		100 K		
R59	↓ 25		510	↓	↓
R60	1010369-97		470 K	5%	1/8 W
R61	1006750-64		22 K	2%	1/4 W
R62	63		20 K		
R63	81		110 K		
R64	63		20 K		
R65	47		4.3 K		
R66	60		15 K		
R67	60		15 K		
R68	60		15 K		
R69	60		15 K		
R70	4		68		
R71	47		4.3 K		
R72	60		15 K		
R73	↓ 60		15 K	↓	↓
R80	1006750-56		10 K	2%	1/4 W
R82	1006750-56		10 K	2%	1/4 W
R86	56		10 K		
R87	↓ 56		10 K	↓	↓
R89	66		27 K		
R90	31		910		
R91	63		20 K		
R92	63		20 K		
R93	63		20 K		
R94	63		20 K		
R95	56		10 K		
R96	1		51		
R97	↓ 56	↓	10 K	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1006777-24	CAPACITORS	.001	±10%	100 V
C2	1006777-24		.001		100 V
C3	1006755-65		.47		35 VDC
C4	1006755-65		.47		35 VDC
C5	1006777-31		.01		100 V
C6	31		.01		
C7	26		.0022		
C8	26		.0022		
C9	33		.022		
C10	15		150 UUF		
C11	19		360UUF		
C12	24		.001		
C13	↓ 24		.001		↓
C14	1006755-65		.47		35 VDC
C15	1006755-65		.47		35 VDC
C16	1006777-31		.01		100V
C17	31		.01		
C18	26		.0022		
C19	26		.0022		
C20	16		220UUF		
C21	24		.001		
C22	↓ 24		.001		↓
C23	1006755-65		.47		35 VDC
C24	1006755-65		.47		35 VDC
C25	1006777-31		.01		100 V
C26	1006777-31		.01		100 V
C27	1006777-26		.0022		
C28	1006777-26		.0022		
C29	16		220UUF		
C30	↓ 24		.001		↓
C31	1010393-021		.22		50 VDC
C32	1006777-24		.001		100V
C33	20		470 UUF		
C34	20		470 UUF		
C35	14		130 UUF		
C36	↓ 14		130 UUF		↓
C37	1010393-039		6.8		50 VDC
C38	1006755-51		.033	↓	35 VDC
C51	1010393-039	↓	6.8	±10%	50 VDC
CR1	1010385	DIODE			
CR2					
CR3					
CR4	↓				
CR5	1010286-12				
CR6	1010385				
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	↓				
CR25	1010462				
CR28	1010385	↓			
T1	1006762	TRANSFORMER			
T2	1006762				
T7	1010315	↓			
Q1	1010376-1	TRANSISTOR			
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8					
Q9					
Q10	↓	↓			
K1	1010353-1	RELAYS			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 4-15-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010051
SCALE
WT
SHEET 2 OF 2

1010051 C

MASTER

INCHES
0 1
PHOTOGRAPHIC SCALE ONLY

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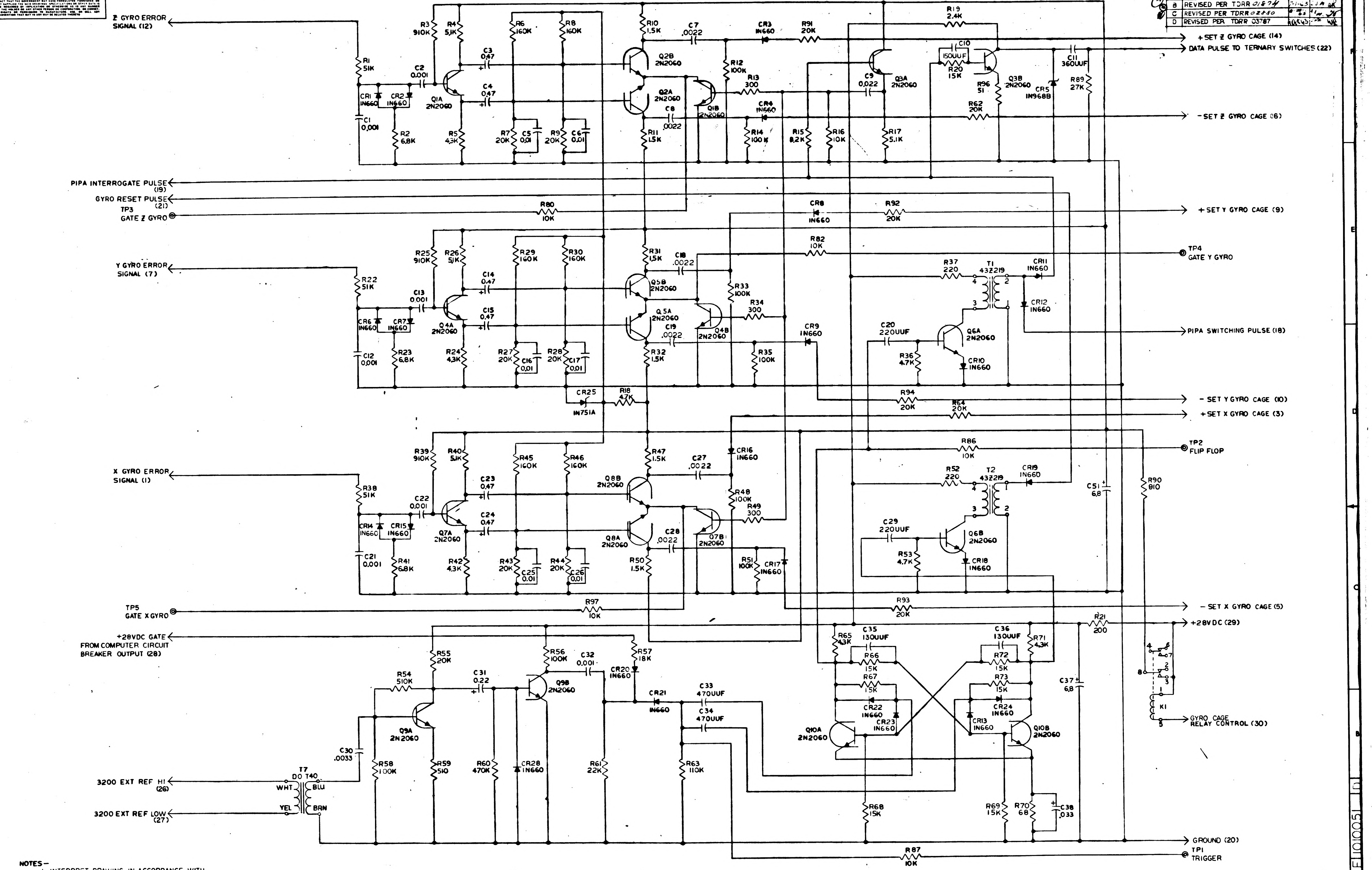
REVISIONS TDRR 00882

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISE PER TDRR 01359	5-20-63	RVV VK
B	REVISED PER TDRR 01874	7-1-63	JA VK
C	REVISED PER TDRR 02850	8-28-63	VK
D	REVISED PER TDRR 03787	10-15-63	VK


Z GYRO ERROR SIGNAL (12)
PIPA INTERROGATE PULSE (19)
GYRO RESET PULSE (21)
TP3 GATE Z GYRO
Y GYRO ERROR SIGNAL (7)
X GYRO ERROR SIGNAL (1)
TP5 GATE X GYRO
+28VDC GATE FROM COMPUTER CIRCUIT BREAKER OUTPUT (28)
3200 EXT REF HI (26)
3200 EXT REF LOW (27)
+SET Z GYRO CAGE (14)
DATA PULSE TO TERNARY SWITCHES (22)
-SET Z GYRO CAGE (6)
+SET Y GYRO CAGE (9)
TP4 GATE Y GYRO
PIPA SWITCHING PULSE (18)
-SET Y GYRO CAGE (10)
+SET X GYRO CAGE (3)
TP2 FLIP FLOP
-SET X GYRO CAGE (5)
+28VDC (29)
GYRO CAGE RELAY CONTROL (30)
GROUND (20)
TP1 TRIGGER
R1 51K
CR1 1N660
CR2 1N660
C1 0.001
R2 6.8K
C2 0.001
Q1A 2N2060
R3 910K
R4 5.1K
R5 4.3K
C3 .047
C4 .047
R6 160K
R7 20K
C5 0.01
R8 160K
R9 20K
C6 0.01
R10 1.5K
Q2B 2N2060
Q2A 2N2060
R11 1.5K
C7 .0022
C8 .0022
Q1B 2N2060
R12 100K
R13 300
CR3 1N660
CR4 1N660
R14 100K
R91 20K
R15 8.2K
R16 10K
C9 0.022
Q3A 2N2060
R17 5.1K
R19 2.4K
C10 1500UUF
R20 15K
R96 51
Q3B 2N2060
CR5 1N968B
C11 360UUF
R89 27K
R62 20K
R80 10K
CR8 1N660
R92 20K
R22 51K
CR6 1N660
CR7 1N660
C12 0.001
R23 6.8K
C13 0.001
Q4A 2N2060
R25 910K
R26 5.1K
R24 4.3K
C14 .047
C15 .047
R29 160K
R27 20K
C16 0.01
R30 160K
R28 20K
C17 0.01
R31 1.5K
Q5B 2N2060
Q5A 2N2060
R32 1.5K
C18 .0022
C19 .0022
Q4B 2N2060
R33 100K
R34 300
R35 100K
CR9 1N660
R82 10K
R37 220
T1 432219
CR11 1N660
CR12 1N660
C20 220UUF
Q6A 2N2060
R36 4.7K
CR10 1N660
CR25 1N751A
R18 4.7K
R94 20K
R64 20K
R38 51K
CR14 1N660
CR15 1N660
C21 0.001
R41 6.8K
C22 0.001
Q7A 2N2060
R39 910K
R40 5.1K
R42 4.3K
C23 .047
C24 .047
R45 160K
R43 20K
C25 0.01
R46 160K
R44 20K
C26 0.01
R47 1.5K
Q8B 2N2060
Q8A 2N2060
R50 1.5K
C27 .0022
C28 .0022
Q7B 2N2060
CR16 1N660
R48 100K
R49 300
R51 100K
CR17 1N660
R86 10K
R52 220
T2 432219
CR19 1N660
C29 220UUF
Q6B 2N2060
R53 4.7K
CR18 1N660
C51 6.8
R90 810
R97 10K
R93 20K
R21 200
R55 20K
R54 510K
Q9A 2N2060
C30 .0033
R58 100K
R59 510
C31 0.22
R60 470K
CR28 1N660
R56 100K
Q9B 2N2060
C32 0.001
R57 18K
CR20 1N660
CR21 1N660
C33 470UUF
C34 470UUF
R61 22K
R63 110K
T7 DO T40
WHT
YEL
BLU
BRN
R65 4.3K
C35 130UUF
R66 15K
R67 15K
CR22 1N660
CR23 1N660
Q10A 2N2060
R68 15K
C36 130UUF
R71 4.3K
R72 15K
R73 15K
CR24 1N660
CR13 1N660
Q10B 2N2060
R69 15K
R70 68
C38 .033
C37 6.8
K1
R87 10K

NOTES—
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE 1/4 W ±2%
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN D. Jelnk DATE 4/1/63
CHECKED M. Lais
APPROVAL J. J. Sitomer 4/8/63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010051
SCALE — WT SHEET 1 OF 2

E 1010051 D

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 06812

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01359	5-20-63	WK
B	REVISED PER TDRR 01874	7-1-63	WK.
C	REVISED PER TDRR 02880	[illegible]	
D	REVISED PER TDRR 03787	[illegible]	EDL WK

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTER	51 K	2 %	1/4 W
R2	1006750-52		6.8 K	2 %	1/4 W
R3	1010369-104		910 K	5 %	1/8 W
R4	1006750-49		5.1 K	2 %	1/4 W
R5	1006750-47		4.3 K	2 %	1/4 W
R6	1010369-86		160K	5 %	1/8 W
R7	1006750-63		20 K	2 %	1/4 W
R8	1010369-86		160K	5 %	1/8 W
R9	1006750-63		20 K	2 %	1/4 W
R10	1006750-36		1.5 K		
R11	36		1.5 K		
R12	80		100K		
R13	19		300		
R14	80		100K		
R15	54		8.2 K		
R16	56		10 K		
R17	49		5.1 K		
R18	48		4.7 K		
R19	41		2.4 K		
R20	60		15 K		
R21	15		200		
R22	73		51 K		
R23	52		6.8 K		
R24	↓ 47		4.3 K	↓	↓
R25	1010369-104		910 K	5 %	1/8 W
R26	1006750-49		5.1 K	2 %	1/4 W
R27	63		20 K		
R28	↓ 63		20 K	↓	↓
R29	1010369-86		160 K	5 %	1/8 W
R30	1010369-86		160 K	5 %	1/8 W
R31	1006750-36		1.5 K	2 %	1/4 W
R32	36		1.5 K		
R33	80		100K		
R34	19		300		
R35	80		100K		
R36	48		4.7 K		
R37	16		220		
R38	↓ 73		51 K	↓	↓
R39	1010369 - 104		910 K	5 %	1/8 W
R40	1006750-49		5.1 K	2 %	1/4 W
R41	52		6.8 K		
R42	47		4.3 K		
R43	63		20 K		
R44	↓ 63		20 K	↓	↓
R45	1010369-86		160 K	5 %	1/8 W
R46	1010369-86		160 K	5 %	1/8 W
R47	1006750-36		1.5 K	2 %	1/4 W
R48	80		100 K		
R49	19		300		
R50	36		1.5 K		
R51	80		100K		
R52	↓ 16		220	↓	↓
R53	1006750-48		4.7 K	2 %	1/4 W
R54	1010369-98		510 K	5 %	1/8 W
R55	1006750-63		20 K	2 %	1/4 W
R56	80		100 K		
R57	62		18 K		
R58	80		100 K		
R59	↓ 25		510	↓	↓
R60	1010369 - 97		470 K	5 %	1/8 W
R61	1006750-64		22 K	2 %	1/4 W
R62	63		20 K		
R63	81		110 K		
R64	63		20 K		
R65	47		4.3 K		
R66	60		15 K		
R67	60		15 K		
R68	60		15 K		
R69	60		15 K		
R70	4		68		
R71	47		4.3 K		
R72	60		15 K		
R73	↓ 60		15 K	↓	↓
R80	1006750-56		10 K	2 %	1/4 W
R82	1006750-56		10 K	2 %	1/4 W
R86	56		10 K		
R87	↓ 56		10 K	↓	↓
R89	66		27 K		
R90	31		910		
R91	63		20 K		
R92	63		20 K		
R93	63		20 K		
R94	63		20 K		
R95	56		10 K		
R96	1		51		
R97	↓ 56	↓	10 K	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1006777-24	CAPACITORS	.001	±10 %	100 V
C2	1006777-24		.001		100 V
C3	1006755-65		.47		35 VDC
C4	1006755-65		.47		35 VDC
C5	1006777-31		.01		100 V
C6	31		.01		
C7	26		.0022		
C8	26		.0022		
C9	33		.022		
C10	15		150 UUF		
C11	19		360 UUF		
C12	24		.001		
C13	↓ 24		.001		↓
C14	1006755-65		.47		35 VDC
C15	1006755-65		.47		35 VDC
C16	1006777-31		.01		100V
C17	31		.01		
C18	26		.0022		
C19	26		.0022		
C20	16		220 UUF		
C21	24		.001		
C22	↓ 24		.001		↓
C23	1006755-65		.47		35 VDC
C24	1006755-65		.47		35 VDC
C25	1006777-31		.01		100 V
C26	1006777-31		.01		100 V
C27	1006777-26		.0022		
C28	1006777-26		.0022		
C29	16		220 UUF		
C30	↓ 27		.0033		↓
C31	1010393-021		.22		50 VDC
C32	1006777-24		.001		100V
C33	20		470 UUF		
C34	20		470 UUF		
C35	14		130 UUF		
C36	↓ 14		130 UUF		↓
C37	1010393-039		6.8		50 VDC
C38	1006755-51		.033	↓	35 VDC
C51	1010393-039	↓	6.8	±10 %	50 VDC
CR1	1010385	DIODE			
CR2					
CR3					
CR4	↓				
CR5	1010286-12				
CR6	1010385				
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	↓				
CR25	1010462				
CR28	1010385	↓			
T1	1006762	TRANSFORMER			
T2	1006762				
T7	1010315	↓			
Q1	1010376-1	TRANSISTOR			
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8					
Q9					
Q10	↓	↓			
K1	1010353-1	RELAYS			

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS
PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
APPROVAL 4/15/63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010051
SCALE
WT
SHEET 2 OF 2

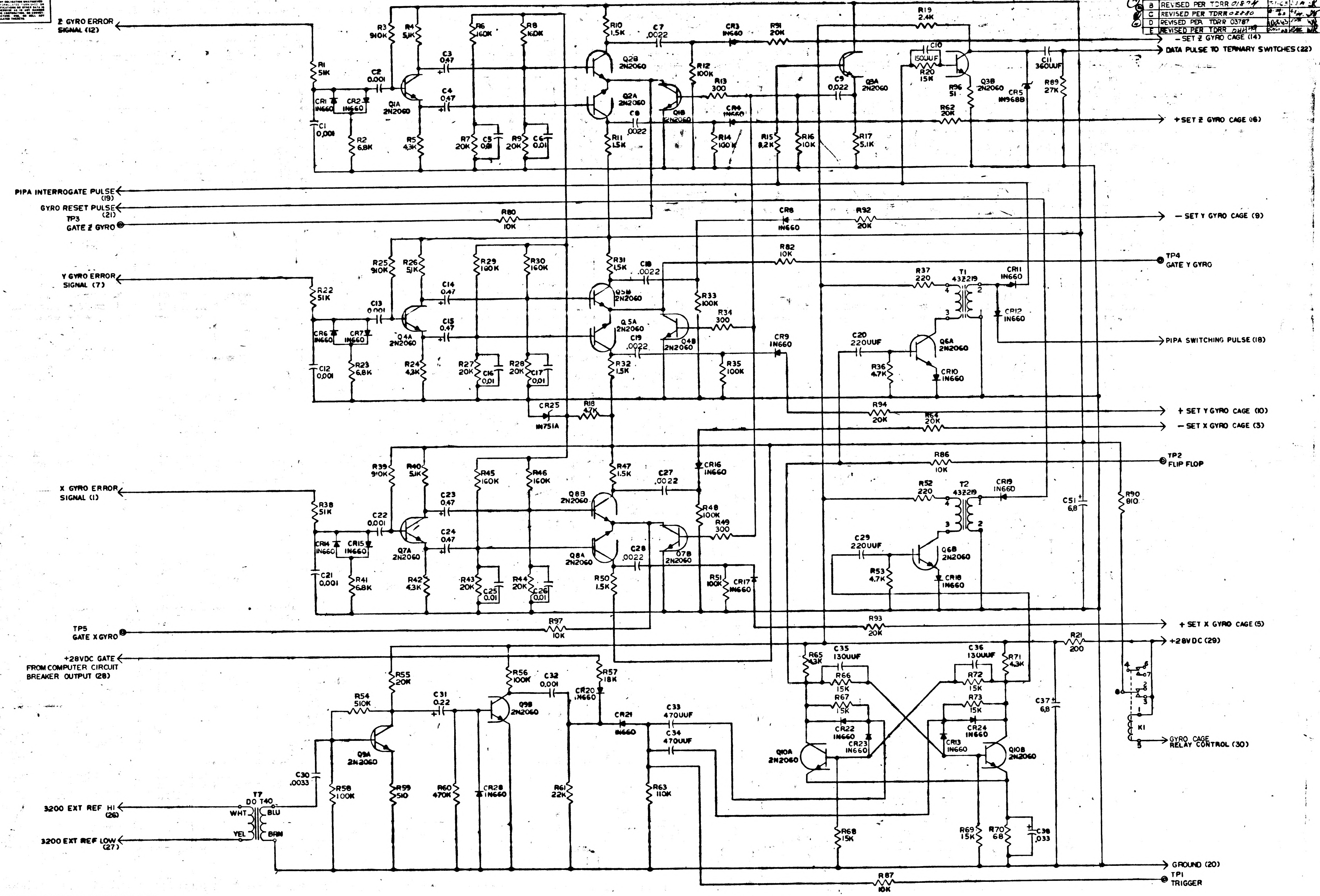
1010051 D

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR [illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISE PER TDRR 01359	5-20-63	[illegible]
B	REVISED PER TDRR 01874	7-1-63	[illegible]
C	REVISED PER TDRR 02880	[illegible] 63	[illegible]
D	REVISED PER TDRR 03787	[illegible] 63	[illegible]
E	REVISED PER TDRR 0444	5 Nov 63	[illegible]


Z GYRO ERROR SIGNAL (12)
PIPA INTERROGATE PULSE (19)
GYRO RESET PULSE (21)
TP3 GATE Z GYRO
Y GYRO ERROR SIGNAL (7)
X GYRO ERROR SIGNAL (1)
TP5 GATE X GYRO
+28VDC GATE FROM COMPUTER CIRCUIT BREAKER OUTPUT (28)
3200 EXT REF HI (26)
3200 EXT REF LOW (27)
— SET Z GYRO CAGE (14)
DATA PULSE TO TERNARY SWITCHES (22)
+ SET Z GYRO CAGE (16)
— SET Y GYRO CAGE (9)
TP4 GATE Y GYRO
PIPA SWITCHING PULSE (18)
+ SET Y GYRO CAGE (10)
— SET X GYRO CAGE (3)
TP2 FLIP FLOP
+ SET X GYRO CAGE (5)
+28VDC (29)
GYRO CAGE RELAY CONTROL (30)
GROUND (20)
TP1 TRIGGER
R1 51K
R3 910K
R4 5.1K
C2 0.001
C3 0.47
C4 0.47
R6 160K
R8 160K
R10 1.5K
C7 .0022
CR3 1N660
R91 20K
R19 2.4K
C10 150UUF
R20 15K
C11 360UUF
R89 27K
CR1 1N660
CR2 1N660
C1 0.001
Q1A 2N2060
R2 6.8K
R5 4.3K
R7 20K
C5 0.01
R9 20K
C6 0.01
Q2B 2N2060
Q2A 2N2060
Q1B 2N2060
C8 .0022
R11 1.5K
R12 100K
R13 300
CR4 1N660
R14 100K
R15 8.2K
R16 10K
C9 0.022
Q3A 2N2060
R17 5.1K
R36 51
Q3B 2N2060
CR5 1N968B
R62 20K
R80 10K
CR8 1N660
R92 20K
R25 910K
R26 5.1K
R29 160K
R30 160K
R31 1.5K
C18 .0022
R82 10K
R22 51K
C13 0.001
C14 0.47
C15 0.47
Q5B 2N2060
Q5A 2N2060
Q4B 2N2060
R33 100K
R34 300
R37 220
T1 432219
CR11 1N660
CR12 1N660
CR6 1N660
CR7 1N660
Q4A 2N2060
C12 0.001
R23 6.8K
R24 4.3K
R27 20K
C16 0.01
R28 20K
C17 0.01
C19 .0022
R32 1.5K
R35 100K
CR9 1N660
C20 220UUF
Q6A 2N2060
R36 4.7K
CR10 1N660
CR25 1N751A
R18 4.7K
R94 20K
R64 20K
R39 910K
R40 5.1K
R45 160K
R46 160K
R47 1.5K
C27 .0022
CR16 1N660
R86 10K
R52 220
T2 432219
CR19 1N660
C51 6.8
R90 810
R38 51K
C22 0.001
C23 0.47
C24 0.47
Q8B 2N2060
Q8A 2N2060
Q7B 2N2060
R48 100K
R49 300
C29 220UUF
Q6B 2N2060
CR14 1N660
CR15 1N660
Q7A 2N2060
C21 0.001
R41 6.8K
R42 4.3K
R43 20K
C25 0.01
R44 20K
C26 0.01
C28 .0022
R50 1.5K
R51 100K
CR17 1N660
R53 4.7K
CR18 1N660
R97 10K
R93 20K
R21 200
R55 20K
R56 100K
R57 18K
R54 510K
C31 0.22
Q9B 2N2060
C32 0.001
CR20 1N660
CR21 1N660
C33 470UUF
C34 470UUF
Q9A 2N2060
C30 .0033
T7 DO T40
WHT
BLU
YEL
BRN
R58 100K
R59 510
R60 470K
CR28 1N660
R61 22K
R63 110K
R65 4.3K
C35 130UUF
R66 15K
R67 15K
CR22 1N660
CR23 1N660
Q10A 2N2060
C36 130UUF
R71 4.3K
R72 15K
R73 15K
CR24 1N660
CR13 1N660
Q10B 2N2060
C37 6.8
K1
R68 15K
R69 15K
R70 68
C38 .033
R87 10K

NOTES—

1 INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W, ±2%.
3 UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4 UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT
DRAWN D. [illegible] DATE 4/8/63
CHECKED [illegible] M. [illegible]
APPROVAL [illegible] 4/8/63
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010051
SCALE —
WT
SHEET 1 OF 2

MASTER

E 1010051 E

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REVISIONS TCRR 00[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01359	5-20-63	WK
B	REVISED PER TDRR 01874	7-1-63	WK
C	REVISED PER TDRR 02890	7-[illegible]-63	
D	REVISED PER TDRR 03787	9 Oct 63	WK
E	REVISED PER TDRR 04449	5 Nov 63	WK

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTER	51 K	2 %	1/4 W
R2	1006750-52		6.8 K	2 %	1/4 W
R3	1010369-104		910 K	5 %	1/8 W
R4	1006750-49		5.1 K	2 %	1/4 W
R5	1006750-47		4.3 K	2 %	1/4 W
R6	1010369-86		160K	5 %	1/8 W
R7	1006750-63		20 K	2 %	1/4 W
R8	1010369-86		160K	5 %	1/8 W
R9	1006750-63		20 K	2 %	1/4 W
R10	1006750-36		1.5 K		
R11	36		1.5 K		
R12	80		100K		
R13	19		300		
R14	80		100K		
R15	54		8.2 K		
R16	56		10 K		
R17	49		5.1 K		
R18	48		4.7 K		
R19	41		2.4 K		
R20	60		15 K		
R21	15		200		
R22	73		51 K		
R23	52		6.8 K		
R24	47		4.3 K		
R25	1010369-104		910 K	5 %	1/8 W
R26	1006750-49		5.1 K	2 %	1/4 W
R27	63		20 K		
R28	63		20 K		
R29	1010369-86		160 K	5 %	1/8 W
R30	1010369-86		160 K	5 %	1/8 W
R31	1006750-36		1.5 K	2 %	1/4 W
R32	36		1.5 K		
R33	80		100 K		
R34	19		300		
R35	80		100 K		
R36	48		4.7 K		
R37	16		220		
R38	73		51 K		
R39	1010369-104		910 K	5 %	1/8 W
R40	1006750-49		5.1 K	2 %	1/4 W
R41	52		6.8 K		
R42	47		4.3 K		
R43	63		20 K		
R44	63		20 K		
R45	1010369-86		160 K	5 %	1/8 W
R46	1010369-86		160 K	5 %	1/8 W
R47	1006750-36		1.5 K	2 %	1/4 W
R48	80		100 K		
R49	19		300		
R50	36		1.5 K		
R51	80		100 K		
R52	16		220		
R53	1006750-48		4.7 K	2 %	1/4 W
R54	1010369-98		510 K	5 %	1/8 W
R55	1006750-63		20 K	2 %	1/4 W
R56	80		100 K		
R57	62		18 K		
R58	80		100 K		
R59	25		510		
R60	1010369-97		470 K	5 %	1/8 W
R61	1006750-64		22 K	2 %	1/4 W
R62	63		20 K		
R63	81		110 K		
R64	63		20 K		
R65	47		4.3 K		
R66	60		15 K		
R67	60		15 K		
R68	60		15 K		
R69	60		15 K		
R70	4		68		
R71	47		4.3 K		
R72	60		15 K		
R73	60		15 K		
R80	1006750-56		10 K	2 %	1/4 W
R82	1006750-56		10 K	2 %	1/4 W
R86	56		10 K		
R87	56		10 K		
R89	66		27 K		
R90	31		910		
R91	63		20 K		
R92	63		20 K		
R93	63		20 K		
R94	63		20 K		
R95	56		10 K		
R96	1		51		
R97	56		10 K		

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1006777-24	CAPACITORS	.001	±10 %	100 V
C2	1006777-24		.001		100 V
C3	1006755-65		.47		35 VDC
C4	1006755-65		.47		35 VDC
C5	1006777-31		.01		100 V
C6	31		.01		
C7	26		.0022		
C8	26		.0022		
C9	33		.022		
C10	15		150 UUF		
C11	19		360 UUF		
C12	24		.001		
C13	24		.001		
C14	1006755-65		.47		35 VDC
C15	1006755-65		.47		35 VDC
C16	1006777-31		.01		100V
C17	31		.01		
C18	26		.0022		
C19	26		.0022		
C20	16		220 UUF		
C21	24		.001		
C22	24		.001		
C23	1006755-65		.47		35 VDC
C24	1006755-65		.47		35 VDC
C25	1006777-31		.01		100 V
C26	1006777-31		.01		100 V
C27	1006777-26		.0022		
C28	1006777-26		.0022		
C29	16		220 UUF		
C30	27		.0033		
C31	1010393-021		.22		50 VDC
C32	1006777-24		.001		100V
C33	20		470 UUF		
C34	20		470 UUF		
C35	14		130 UUF		
C36	14		130 UUF		
C37	1010393-039		6.8		50 VDC
C38	1006755-51		.033		35 VDC
C51	1010393-039		6.8	±10 %	50 VDC
CR1	1010385	DIODE			
CR2					
CR3					
CR4					
CR5	1010286-12				
CR6	1010385				
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24					
CR25	1010462				
CR28	1010385				
T1	1006762	TRANSFORMER			
T2	1006762				
T7	1010315				
Q1	1010376-1	TRANSISTOR			
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8					
Q9					
Q10					
K1	1010353-1	RELAYS			

NOTES:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 4-15-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

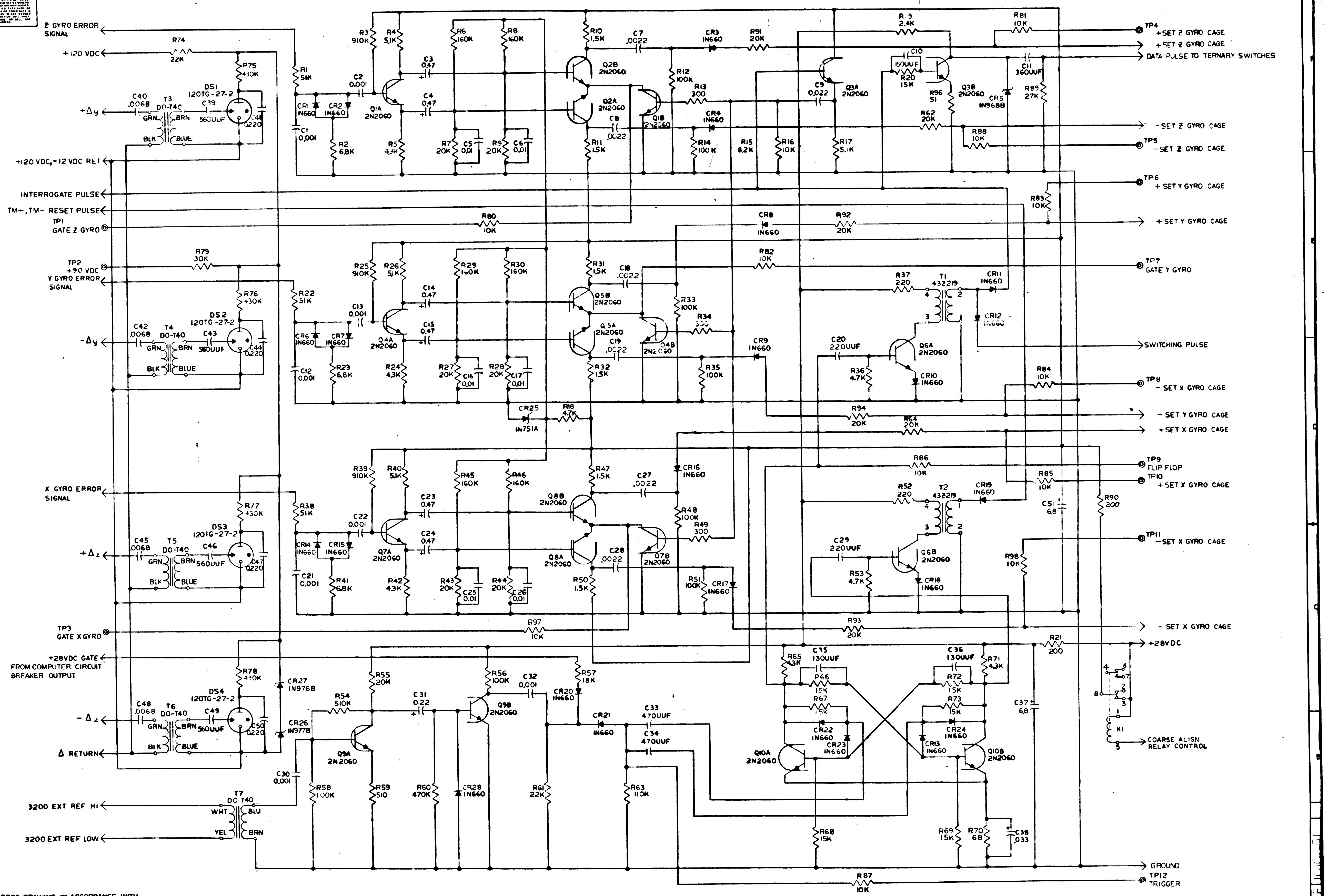
BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010051
SCALE
WT
SHEET 2 OF 2

MASTER

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS		


Z GYRO ERROR SIGNAL
+120 VDC
+Δy
+120 VDC, +12 VDC RET
INTERROGATE PULSE
TM+, TM- RESET PULSE
TP1 GATE Z GYRO
TP2 +90 VDC
Y GYRO ERROR SIGNAL
-Δy
X GYRO ERROR SIGNAL
+Δz
TP3 GATE X GYRO
+28VDC GATE FROM COMPUTER CIRCUIT BREAKER OUTPUT
-Δz
Δ RETURN
3200 EXT REF HI
3200 EXT REF LOW
R74 22K
R75 430K
DS1 120TG-27-2
C40 .0068
T3 DO-T40
C39 560UUF
C41 0.220
GRN
BRN
BLK
BLUE
R76 430K
DS2 120TG-27-2
C42 .0068
T4 DO-T40
C43 560UUF
C44 0.220
R77 430K
DS3 120TG-27-2
C45 .0068
T5 DO-T40
C46 560UUF
C47 0.220
R78 430K
DS4 120TG-27-2
C48 .0068
T6 DO-T40
C49 560UUF
C50 0.220
CR27 IN976B
CR26 IN977B
R79 30K
R80 10K
R97 10K
T7 DO T40
WHT
YEL
BLU
BRN
R1 51K
C1 0.001
CR1 IN660
CR2 IN660
C2 0.001
R2 6.8K
R3 910K
R4 5.1K
Q1A 2N2060
R5 4.3K
C3 0.47
C4 0.47
R6 160K
R7 20K
C5 0.01
R8 160K
R9 20K
C6 0.01
R10 1.5K
Q2B 2N2060
Q2A 2N2060
R11 1.5K
C7 .0022
C8 .0022
Q1B 2N2060
R12 100K
R13 300
CR3 IN660
CR4 IN660
R14 100K
R91 20K
R15 8.2K
R16 10K
R17 5.1K
C9 0.022
Q3A 2N2060
R9 2.4K
C10 150UUF
R20 15K
R96 51
Q3B 2N2060
R62 20K
R81 10K
C11 360UUF
CR5 IN968B
R89 27K
R88 10K
TP4 +SET Z GYRO CAGE
+SET Z GYRO CAGE
DATA PULSE TO TERNARY SWITCHES
-SET Z GYRO CAGE
TP5 -SET Z GYRO CAGE
TP6 +SET Y GYRO CAGE
R83 10K
CR8 IN660
R92 20K
+SET Y GYRO CAGE
TP7 GATE Y GYRO
R82 10K
R22 51K
C12 0.001
CR6 IN660
CR7 IN660
C13 0.001
R23 6.8K
R25 910K
R26 5.1K
Q4A 2N2060
R24 4.3K
C14 0.47
C15 0.47
R29 160K
R27 20K
C16 0.01
R30 160K
R28 20K
C17 0.01
R31 1.5K
Q5B 2N2060
Q5A 2N2060
R32 1.5K
C18 .0022
C19 .0022
Q4B 2N2060
R33 100K
R34 330
CR9 IN660
R35 100K
R37 220
T1 432219
CR11 IN660
CR12 IN660
C20 220UUF
R36 4.7K
Q6A 2N2060
CR10 IN660
SWITCHING PULSE
R84 10K
TP8 -SET X GYRO CAGE
CR25 IN751A
R18 4.7K
R94 20K
R64 20K
-SET Y GYRO CAGE
+SET X GYRO CAGE
R38 51K
C21 0.001
CR14 IN660
CR15 IN660
C22 0.001
R41 6.8K
R39 910K
R40 5.1K
Q7A 2N2060
R42 4.3K
C23 0.47
C24 0.47
R45 160K
R43 20K
C25 0.01
R46 160K
R44 20K
C26 0.01
R47 1.5K
Q8B 2N2060
Q8A 2N2060
R50 1.5K
C27 .0022
C28 .0022
Q7B 2N2060
CR16 IN660
R48 100K
R49 300
R51 100K
CR17 IN660
R86 10K
R52 220
T2 432219
CR19 IN660
C29 220UUF
R53 4.7K
Q6B 2N2060
CR18 IN660
TP9 FLIP FLOP
TP10 +SET X GYRO CAGE
R85 10K
C51 6.8
R90 200
TP11 -SET X GYRO CAGE
R98 10K
R93 20K
-SET X GYRO CAGE
R21 200
+28VDC
R54 510K
R55 20K
Q9A 2N2060
C30 0.001
R58 100K
R59 510
C31 0.22
R60 470K
CR28 IN660
Q9B 2N2060
R56 100K
C32 0.001
CR20 IN660
R57 18K
CR21 IN660
C33 470UUF
C34 470UUF
R61 22K
R63 110K
R65 4.3K
C35 130UUF
R66 15K
R67 15K
CR22 IN660
CR23 IN660
Q10A 2N2060
R68 15K
C36 130UUF
R71 4.3K
R72 15K
R73 15K
CR24 IN660
CR13 IN660
Q10B 2N2060
R69 15K
R70 68
C38 .033
C37 6.8
K1
COARSE ALIGN RELAY CONTROL
GROUND
R87 10K
TP12 TRIGGER

NOTES -
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE ¼W, ±2%.
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS.
4. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS.

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 4/4/63
CHECKED M Lais
APPROVAL 4/8/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO	SIZE	NASA DRAWING NO
	E	1010051
SCALE —	WT	SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS [illegible]			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-73	RESISTER	51 K	2 %	1/4 W
R2	1006750-52		6.8 K	2 %	1/4 W
R3	1010369-104		910 K	5 %	1/8 W
R4	1006750-49		5.1 K	2 %	1/4 W
R5	1006750-47		4.3 K	2 %	1/4 W
R6	1010369-86		160K	5 %	1/8 W
R7	1006750-63		20 K	2 %	1/4 W
R8	1010369-86		160K	5 %	1/8 W
R9	1006750-63		20 K	2 %	1/4 W
R10	1006750-36		1.5 K		
R11	36		1.5 K		
R12	80		100K		
R13	19		300		
R14	80		100 K		
R15	54		8.2 K		
R16	56		10 K		
R17	49		5.1 K		
R18	48		4.7 K		
R19	41		2.4 K		
R20	60		15 K		
R21	15		200		
R22	73		51 K		
R23	52		6.8 K		
R24	↓ 47		4.3 K	↓	↓
R25	1010369-104		910 K	5 %	1/8 W
R26	1006750-49		5.1 K	2 %	1/4 W
R27	63		20 K		
R28	↓ 63		20 K	↓	↓
R29	1010369-104		160 K	5 %	1/8 W
R30	1010369-104		160 K	5 %	1/8 W
R31	1006750-36		1.5 K	2 %	1/4 W
R32	36		1.5 K		
R33	80		100 K		
R34	19		300		
R35	80		100 K		
R36	48		4.7 K		
R37	16		220		
R38	↓ 73		51 K	↓	↓
R39	1010369-104		910 K	5 %	1/8 W
R40	1006750-49		5.1 K	2 %	1/4 W
R41	52		6.8 K		
R42	47		4.3 K		
R43	63		20 K		
R44	↓ 63		20 K	↓	↓
R45	1010369-104		160 K	5 %	1/8 W
R46	1010369-104		160 K	5 %	1/8 W
R47	1006750-36		1.5 K	2 %	1/4 W
R48	80		100 K		
R49	19		300		
R50	36		1.5 K		
R51	80		100 K		
R52	↓ 16		220	↓	↓
R53	1006750-48		4.7 K	2 %	1/4 W
R54	1010369-98		510 K	5 %	1/8 W
R55	1006750-63		20 K	2 %	1/4 W
R56	80		100 K		
R57	62		18 K		
R58	80		100 K		
R59	↓ 25		510	↓	↓
R60	1010369-97		470 K	5 %	1/8 W
R61	1006750-64		22 K	2 %	1/4 W
R62	63		20 K		
R63	81		110 K		
R64	63		20 K		
R65	47		4.3 K		
R66	60		15 K		
R67	60		15 K		
R68	60		15 K		
R69	60		15 K		
R70	4		68		
R71	47		4.3 K		
R72	60		15 K		
R73	60		15 K		
R74	↓ 64		22 K	↓	↓
R75	1010369-96		430K	5 %	1/8 W
R76	96		430K		
R77	96		430K		
R78	↓ 96		430K	↓	↓
R79	1006750-67		30 K	2 %	1/4 W
R80	1006750-56		10 K	2 %	1/4 W
R81	56		10 K		
R82	56		10 K		
R83	56		10 K		
R84	56		10 K		
R85	56		10 K		
R86	56		10 K		
R87	56		10 K		
R88	56		10 K		
R89	66		27 K		
R90	15		200		
R91	63		20 K		
R92	63		20 K		
R93	63		20 K		
R94	63		20 K		
R95	56		10 K		
R96	1		51		
R97	56		10 K		
R98	↓ 56	↓	10 K	↓	↓

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1006777-24	CAPACITORS	.001	±10 %	100 V
C2	1006777-24		.001		100 V
C3	1006755-65		.47		35 VDC
C4	1006755-65		.47		35 VDC
C5	1006777-31		.01		100 V
C6	31		.01		
C7	26		.0022		
C8	26		.0022		
C9	33		.022		
C10	15		150 UUF		
C11	19		360UUF		
C12	24		.001		
C13	↓ 24		.001		↓
C14	1006755-65		.47		35VDC
C15	1006755-65		.47		35VDC
C16	1006777-31		.01		100V
C17	31		.01		
C18	26		.0022		
C19	26		.0022		
C20	16		220UUF		
C21	24		.001		
C22	↓ 24		.001		↓
C23	1006755-65		.47		35VDC
C24	1006755-65		.47		35VDC
C25	1006777-31		.01		100V
C26	1006777-31		.01		100V
C27	1006777-26		.0022		
C28	1006777-26		.0022		
C29	16		220UUF		
C30	↓ 24		.001		↓
C31	1010393-021		.22		50 VDC
C32	1006777-24		.001		100V
C33	20		470 UUF		
C34	20		470 UUF		
C35	14		130 UUF		
C36	↓ 14		130 UUF		↓
C37	1010393-039		6.8		50 VDC
C38	1006755-51		.033	↓	35 VDC
C39	1010359-14		560UUF	±20%	200 V
C40	1006777-30		.0068	±10%	100 VDC
C41	1010264-29		.220	±5 %	200 V
C42	1006777-30		.0068	±10%	100 V
C43	1010359-14		560UUF	±20%	200 V
C44	1010264-29		.220	±5 %	200 V
C45	1006777-30		.0068	±10%	100 V
C46	1010359-14		560UUF	±20%	200V
C47	1010264-29		.220	±5 %	200 VDC
C48	1006777-30		.0068	±10%	100 V
C49	1010359-14		560UUF	±20%	200V
C50	1010264-29		.220	±5 %	200VDC
C51	1010393-039	↓	6.8	±10%	50 VDC
CR1	1010385	DIODE			
CR2					
CR3					
CR4	↓				
CR5	1010286-12				
CR6	1010385				
CR7					
CR8					
CR9					
CR10					
CR11					
CR12					
CR13					
CR14					
CR15					
CR16					
CR17					
CR18					
CR19					
CR20					
CR21					
CR22					
CR23					
CR24	↓				
CR25	1010467				
CR26	1010286-21				
CR27	1010286-20				
CR28	1010385	↓			
T1	1006762	TRANSFORMER			
T2	1006762				
T3	1010315				
T4					
T5					
T6					
T7	↓	↓			
Q1	1010376-1	TRANSISTOR			
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8					
Q9					
Q10	↓	↓			
K1	1010353-1	RELAYS			
DS1	1010465	LAMP			
DS2					
DS3					
DS4	↓				

NOTES:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 4-
CHECKED
APPROVAL 4/16/63
APPROVAL
NASA APPROVAL
MIT APPROVAL 17Ap63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

BACK UP MODE ELECTRONICS
PIPA-GYRO

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010051
SCALE
WT
SHEET 2 OF 2

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

1010051

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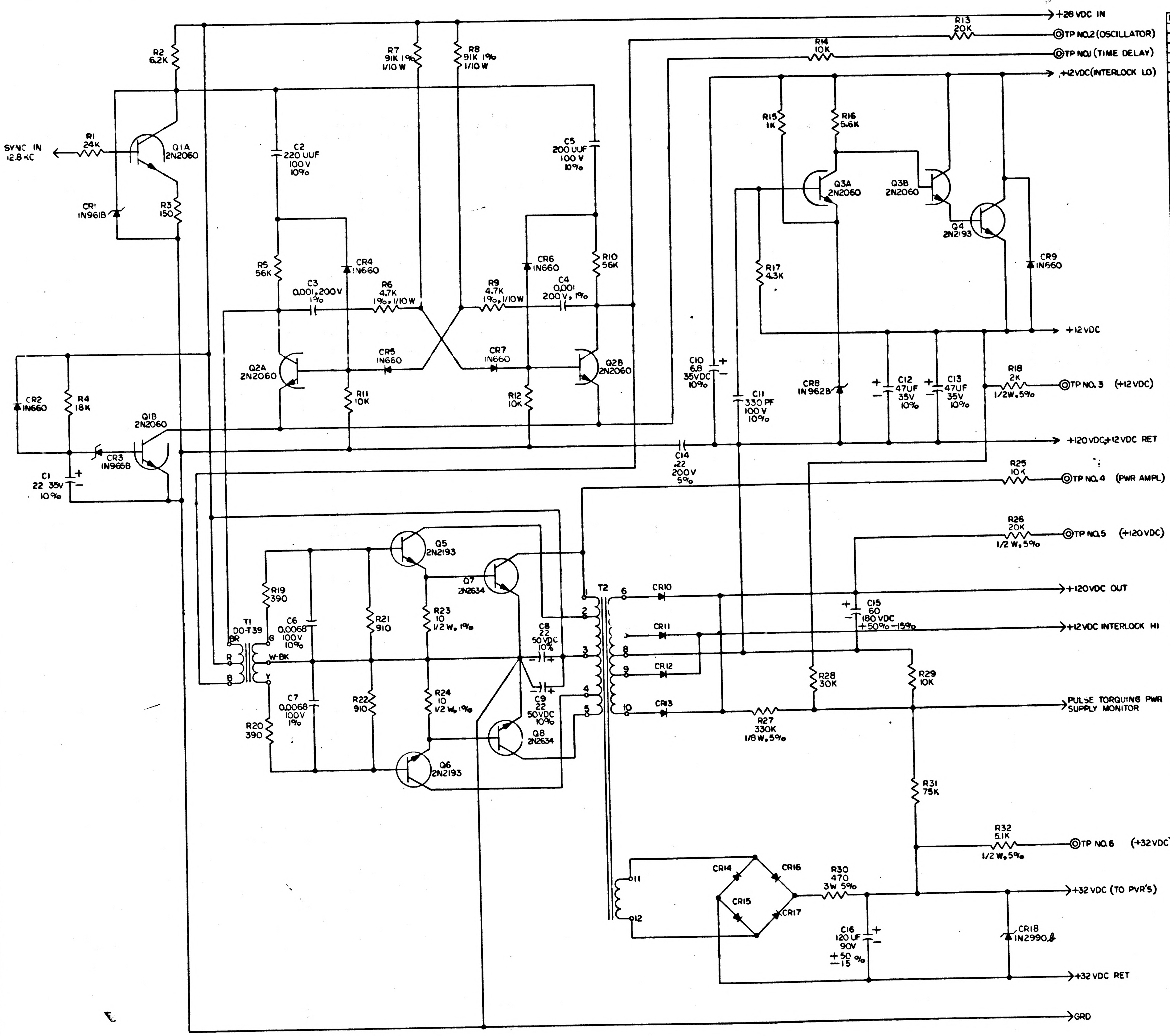
REVISIONS TDRR 00			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01542	4-2-63	



+28 VDC IN
R13 20K
TP NO.2 (OSCILLATOR)
R14 10K
TP NO.1 (TIME DELAY)
+12VDC (INTERLOCK LO)
R2 6.2K
R7 91K 1% 1/10 W
R8 91K 1% 1/10 W
SYNC IN 12.8 KC
R1 24K
Q1A 2N2060
CR1 1N961B
R3 150
C2 220 UUF 100 V 10%
C5 200 UUF 100 V 10%
R15 1K
R16 5.6K
Q3A 2N2060
Q3B 2N2060
Q4 2N2193
CR9 1N660
R5 56K
CR4 1N660
C3 0.001, 200V 1%
R6 4.7K 1% 1/10 W
R9 4.7K 1% 1/10W
C4 0.001 200 V, 1%
CR6 1N660
R10 56K
R17 4.3K
+12 VDC
Q2A 2N2060
CR5 1N660
CR7 1N660
Q2B 2N2060
R11 10K
R12 10K
C10 6.8 35VDC 10%
C11 330 PF 100 V 10%
CR8 1N962B
C12 47UF 35V 10%
C13 47UF 35V 10%
R18 2K 1/2W, 5%
TP NO. 3 (+12 VDC)
CR2 1N660
R4 18K
Q1B 2N2060
CR3 1N965B
C1 22 35V 10%
C14 .22 200 V 5%
+120 VDC +12 VDC RET
R25 10K
TP NO. 4 (PWR AMPL)
Q5 2N2193
Q7 2N2634
R26 20K 1/2 W, 5%
TP NO.5 (+120 VDC)
R19 390
T1 DO-T39
R
BR
B
W-BK
Y
G
C6 0.0068 100V 1%
R21 910
R23 10 1/2 W, 1%
C8 22 50VDC 10%
T2
CR10
+120 VDC OUT
C15 60 180 VDC +50% -15%
CR11
+12 VDC INTERLOCK HI
C7 0.0068 100V 1%
R22 910
R24 10 1/2 W, 1%
C9 22 50VDC 10%
CR12
R28 30K
R29 10K
CR13
R27 330K 1/8 W, 5%
PULSE TORQUING PWR SUPPLY MONITOR
R20 390
Q8 2N2634
Q6 2N2193
R31 75K
R32 5.1K 1/2 W, 5%
TP NO. 6 (+32 VDC)
CR14
CR16
CR15
CR17
R30 470 3W 5%
+32 VDC (TO PVR'S)
C16 120 UF 90V +50 -15 %
CR18 1N2990A
+32 VDC RET
GRD
1 2 3 4 5 6 7 8 9 10 11 12

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	-51	↓	6.2K	↓	↓
R3	-12	↓	150	↓	↓
R4	-62	↓	18K	↓	↓
R5	-74	↓	56K	↓	↓
R6	1010377-110	↓	4.7K	1%	1/10 W
R7	-111	↓	91K	↓	↓
R8	-111	↓	91K	↓	↓
R9	-110	↓	4.7K	↓	↓
R10	1006750-74	↓	56K	2%	1/4W
R11	-56	↓	10K	↓	↓
R12	-56	↓	10K	↓	↓
R13	-63	↓	20K	↓	↓
R14	-56	↓	10K	↓	↓
R15	-32	↓	1K	↓	↓
R16	-50	↓	5.6K	↓	↓
R17	-47	↓	4.3K	↓	↓
R18	1010278-70	↓	2K	5%	1/2W
R19	1006750-22	↓	390	2%	1/4W
R20	-22	↓	390	↓	↓
R21	-31	↓	910	↓	↓
R22	-31	↓	910	↓	↓
R23	1006802	↓	10	1%	1/2 W
R24	1006802	↓	10	1%	1/2 W
R25	1006750-56	↓	10K	2%	1/4 W
R26	1010278-94	↓	20K	5%	1/2 W
R27	1010369-93	↓	330K	5%	1/8 W
R28	1006750-67	↓	30K	2%	1/4 W
R29	1006750-56	↓	10K	2%	1/4 W
R30	1010389-48	↓	470	5%	3W
R31	1006750-77	↓	75K	5%	1/4 W
R32	1010278-80	↓	5.1K	5%	1/2 W
C1	1006755-85	CAPACITOR	22 UF	±10%	35VDC
C2	1006777-16	↓	220 UUF	±10%	100V
C3	1010316-36	↓	.001 UF	±1%	200V
C4	1010316-36	↓	.001 UF	±1%	200V
C5	1006777-16	↓	220UUF	±10%	100V
C6	1006777-30	↓	.0068UF	±10%	100V
C7	1006777-30	↓	.0068UF	±10%	100V
C8	1010393-045	↓	22 UF	±10%	50VDC
C9	1010393-045	↓	22UF	±10%	50VDC
C10	1006755-79	↓	6.8UF	±10%	35VDC
C11	1006777-18	↓	330PF	±10%	100V
C12	1006755-89	↓	47UF	±10%	35VDC
C13	1006755-89	↓	47UF	±10%	35VDC
C14	1010264-29	↓	.22UF	±5%	200V
C15	1010460-1	↓	60 UF	+50-15	180VDC
C16	1010460-2	↓	120 UF	+50-15	90VDC
CR1	1010286-5	DIODES			
CR2	1010385	↓			
CR3	1010286-9	↓			
CR4	1010385	↓			
CR5	↓	↓			
CR6	↓	↓			
CR7	↓	↓			
CR8	1010286-6	↓			
CR9	1010385	↓			
CR10	1010497	↓			
CR11	↓	↓			
CR12	↓	↓			
CR13	↓	↓			
CR14	1010384	↓			
CR15	↓	↓			
CR16	↓	↓			
CR17	↓	↓			
CR18	1010331-013				
Q1	1010376-1	TRANSISTORS			
Q2	1010376-4	↓			
Q3	1010376-1	↓			
Q4	1010398	↓			
Q5	↓	↓			
Q6	↓	↓			
Q7	1010499-2	↓			
Q8	1010499-2	↓			
T1	1010315-2	TRANSFORMERS			
T2	1010459				

NOTES-

1- INTERPRT DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2- UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3- UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4 UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ±2%

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN Mahoney DATE 2-1-63
CHECKED
APPROVAL 4-11-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PULSE TORQUING
POWER SUPPLY
(PIPA AND PULSE
TORQUED GYRO)

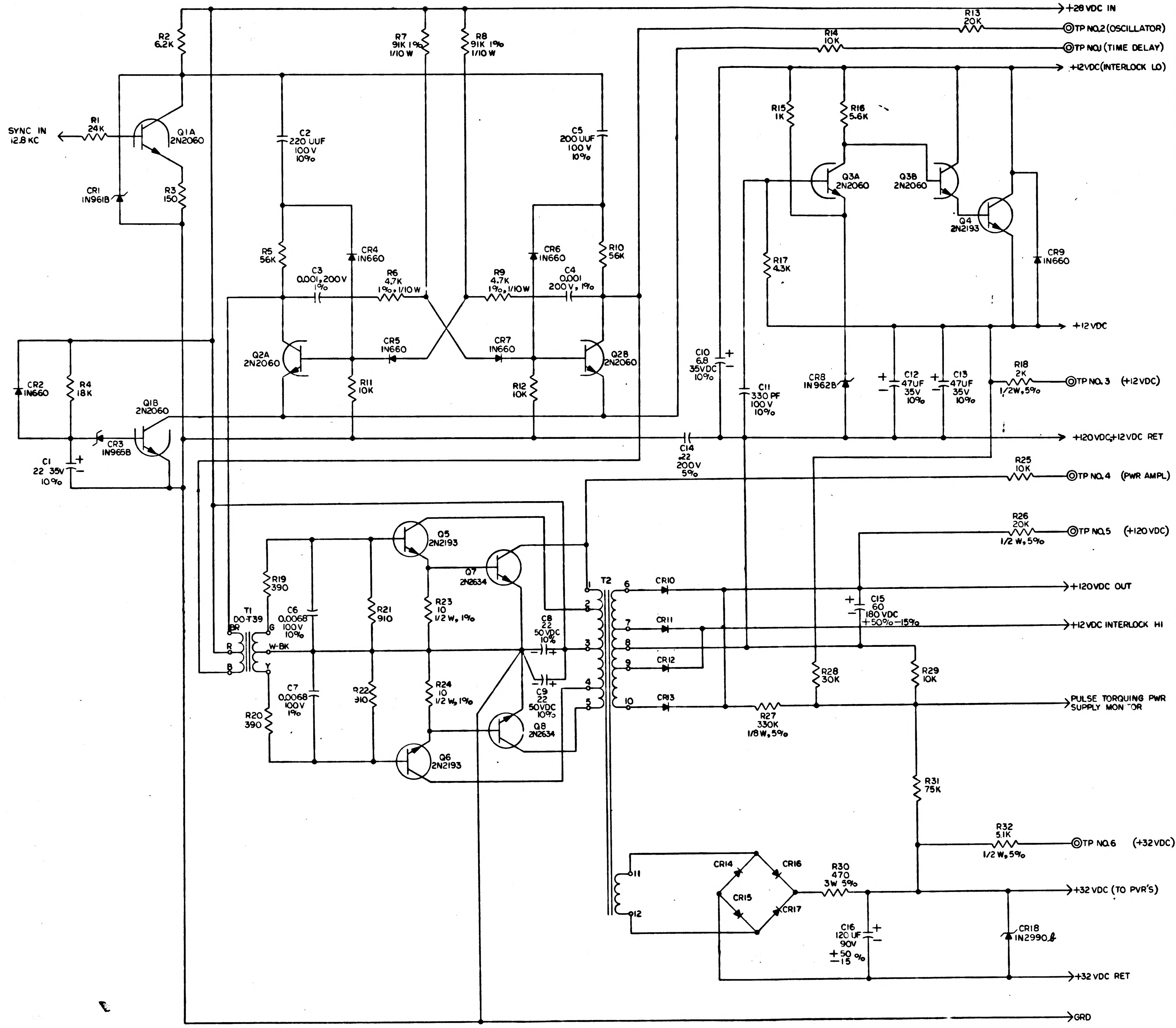
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010052
SCALE 2/1
WT
SHEET OF 1

1010052 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01542	6-12-63	
B	REVISED PER TDRR 01962	7-20-63	



+28 VDC IN
TP NO.2 (OSCILLATOR)
TP NO.1 (TIME DELAY)
+12VDC (INTERLOCK LO)
+12 VDC
TP NO. 3 (+12VDC)
+120 VDC, +12 VDC RET
TP NO. 4 (PWR AMPL)
TP NO.5 (+120 VDC)
+120VDC OUT
+12 VDC INTERLOCK HI
PULSE TORQUING PWR SUPPLY MONITOR
TP NO.6 (+32VDC)
+32 VDC (TO PVR'S)
+32 VDC RET
GRD
SYNC IN 12.8 KC
R1 24K
Q1A 2N2060
Q1B 2N2060
R2 6.2K
R3 150
CR1 1N961B
R7 91K 1% 1/10 W
R8 91K 1% 1/10 W
C2 220 UUF 100 V 10%
C5 200 UUF 100 V 10%
R5 56K
CR4 1N660
C3 0.001, 200V 1%
R6 4.7K 1%, 1/10W
R9 4.7K 1%, 1/10W
C4 0.001 200V, 1%
CR6 1N660
R10 56K
Q2A 2N2060
CR5 1N660
CR7 1N660
Q2B 2N2060
R11 10K
R12 10K
CR2 1N660
R4 18K
CR3 1N965B
C1 22 35V 10%
R13 20K
R14 10K
R15 1K
R16 5.6K
Q3A 2N2060
Q3B 2N2060
Q4 2N2193
R17 4.3K
CR9 1N660
C10 6.8 35VDC 10%
C11 330 PF 100 V 10%
CR8 1N962B
C12 47UF 35V 10%
C13 47UF 35V 10%
R18 2K 1/2W, 5%
C14 .22 200V 5%
R25 10K
R26 20K 1/2 W, 5%
Q5 2N2193
Q7 2N2634
T1 DO-T39
BR
R
B
G
W-BK
Y
R19 390
C6 0.0068 100V 10%
R21 910
R23 10 1/2 W, 1%
C8 22 50VDC 10%
C9 22 50VDC 10%
R20 390
C7 0.0068 100V 1%
R22 910
R24 10 1/2 W, 1%
Q8 2N2634
Q6 2N2193
T2
1
2
3
4
5
6
7
8
9
10
11
12
CR10
CR11
CR12
CR13
C15 60 180 VDC +50% -15%
R28 30K
R29 10K
R27 330K 1/8W, 5%
R31 75K
R32 5.1K 1/2 W, 5%
CR14
CR15
CR16
CR17
R30 470 3W 5%
C16 120 UF 90V +50 -15 %
CR18 1N2990

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	↓ -51	↓	6.2K	↓	↓
R3	↓ -12	↓	150	↓	↓
R4	↓ -62	↓	18K	↓	↓
R5	↓ -74	↓	56K	↓	↓
R6	1010377-110	↓	4.7K	1%	1/10 W
R7	↓ -111	↓	91K	↓	↓
R8	↓ -111	↓	91K	↓	↓
R9	↓ -110	↓	4.7K	↓	↓
R10	1006750-74	↓	56K	2%	1/4W
R11	↓ -56	↓	10K	↓	↓
R12	↓ -56	↓	10K	↓	↓
R13	↓ -63	↓	20K	↓	↓
R14	↓ -56	↓	10K	↓	↓
R15	↓ -32	↓	1K	↓	↓
R16	↓ -50	↓	5.6K	↓	↓
R17	↓ -47	↓	4.3K	↓	↓
R18	1010278-70	↓	2K	5%	1/2W
R19	1006750-22	↓	390	2%	1/4W
R20	↓ -22	↓	390	↓	↓
R21	↓ -31	↓	910	↓	↓
R22	↓ -31	↓	910	↓	↓
R23	1006802	↓	10	1%	1/2 W
R24	1006802	↓	10	1%	1/2 W
R25	1006750-56	↓	10K	2%	1/4 W
R26	1010278-94	↓	20K	5%	1/2 W
R27	1010369-93	↓	330K	5%	1/8 W
R28	1006750-67	↓	30K	2%	1/4 W
R29	1006750-56	↓	10K	2%	1/4 W
R30	1010389-48	↓	470	5%	3W
R31	1006750-77	↓	75K	5%	1/4 W
R32	1010278-80	↓	5.1K	5%	1/2 W
C1	1006755-85	CAPACITOR	22 UF	±10%	35VDC
C2	1006777-16	↓	220 UUF	±10%	100V
C3	1010316-36	↓	.001 UF	±1%	200V
C4	1010316-36	↓	.001 UF	±1%	200V
C5	1006777-16	↓	220UUF	±10%	100V
C6	1006777-30	↓	.0068UF	±10%	100V
C7	1006777-30	↓	.0068UF	±10%	100V
C8	1010393-045	↓	22 UF	±10%	50VDC
C9	1010393-045	↓	22UF	±10%	50VDC
C10	1006755-79	↓	6.8UF	±10%	35VDC
C11	1006777-18	↓	330PF	±10%	100V
C12	1006755-89	↓	47UF	±10%	35VDC
C13	1006755-89	↓	47UF	±10%	35VDC
C14	1010264-29	↓	.22UF	±5%	200V
C15	1010460-1	↓	60 UF	+50-15	180VDC
C16	1010460-2	↓	120 UF	+50-15	90VDC
CR1	1010286-5	DIODES			
CR2	1010385	↓			
CR3	1010286-9	↓			
CR4	1010385	↓			
CR5	↓	↓			
CR6	↓	↓			
CR7	↓	↓			
CR8	1010286-6	↓			
CR9	1010385	↓			
CR10	1010497	↓			
CR11	↓	↓			
CR12	↓	↓			
CR13	↓	↓			
CR14	1010384	↓			
CR15	↓	↓			
CR16	↓	↓			
CR17	↓	↓			
CR18	1010331-013				
Q1	1010376-1	TRANSISTORS			
Q2	1010376-4	↓			
Q3	1010376-1	↓			
Q4	1010398-1	↓			
Q5	1010398-3	↓			
Q6	1010398-3	↓			
Q7	1010499-2	↓			
Q8	1010499-2	↓			
T1	1010315-2	TRANSFORMERS			
T2	1010459				

NOTES-

1-INTERPRT DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4 UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ±2%

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Mahoney DATE 4-1-63
CHECKED
APPROVAL J.R. Stearns 4-11-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PULSE TORQUING
POWER SUPPLY
(PIPA AND PULSE
TORQUED GYRO)

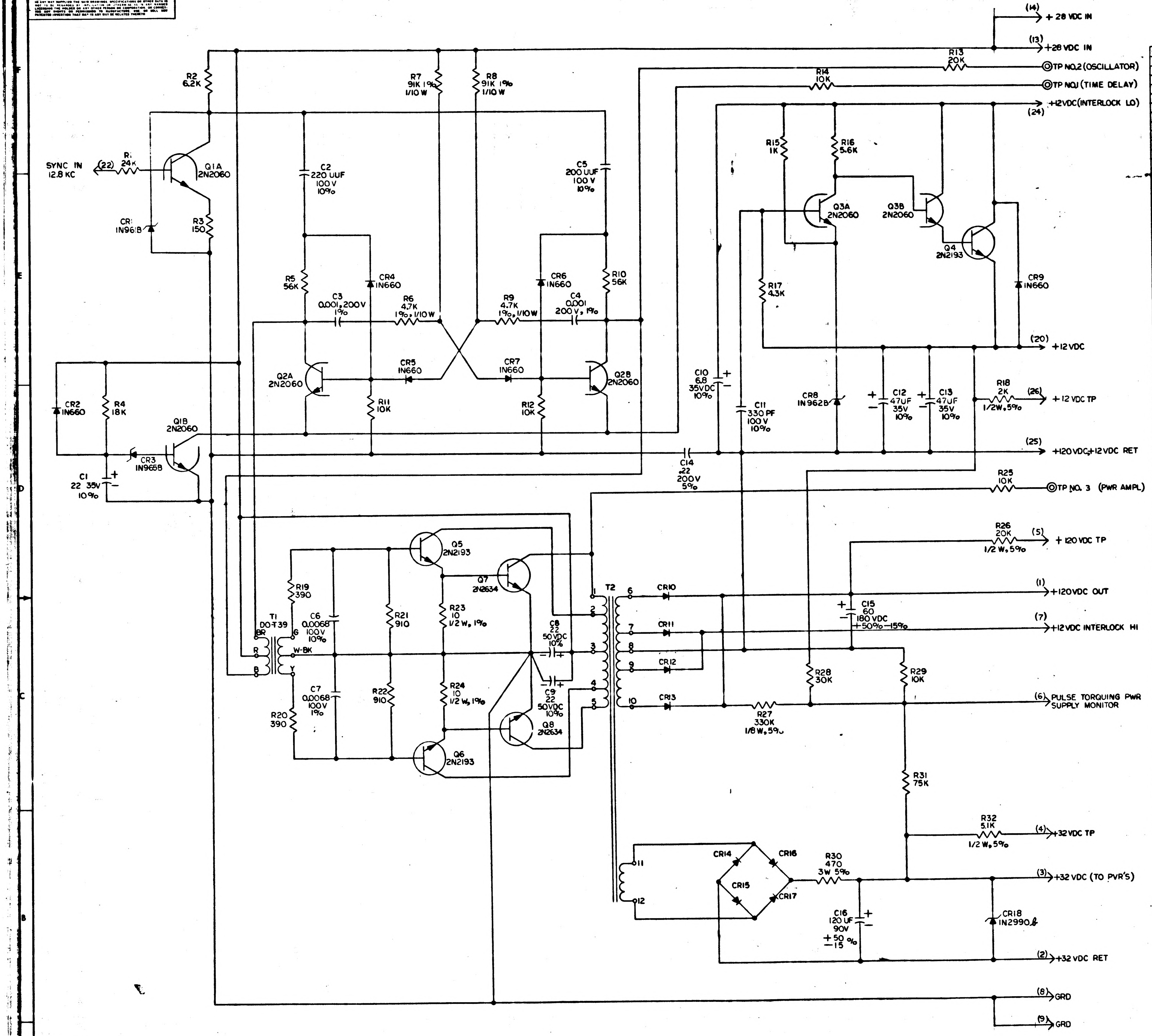
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010052
SCALE 2/1
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 0088

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01542	4-12-63	
B	REVISED PER TDRR 01962	7-20-63	
C	REVISED PER TDRR 02074	9-31-63	


(14) +28 VDC IN
(13) +28 VDC IN
R13 20K
(OTP NO.2 (OSCILLATOR)
R14 10K
TP NO.1 (TIME DELAY)
(24) +12VDC (INTERLOCK LO)
R2 6.2K
R7 91K 1% 1/10 W
R8 91K 1% 1/10 W
SYNC IN 12.8 KC
(22)
R1 24K
Q1A 2N2060
CR1 1N961B
R3 150
C2 220 UUF 100 V 10%
C5 200 UUF 100 V 10%
R15 1K
R16 5.6K
Q3A 2N2060
Q3B 2N2060
Q4 2N2193
R5 56K
CR4 1N660
C3 0.001, 200V 1%
R6 4.7K 1%, 1/10W
R9 4.7K 1%, 1/10W
C4 0.001 200V, 1%
CR6 1N660
R10 56K
R17 4.3K
CR9 1N660
(20) +12 VDC
Q2A 2N2060
CR5 1N660
CR7 1N660
Q2B 2N2060
C10 6.8 35VDC 10%
C11 330 PF 100 V 10%
CR8 1N962B
C12 47UF 35V 10%
C13 47UF 35V 10%
R18 2K 1/2W, 5%
(26) +12 VDC TP
CR2 1N660
R4 18K
R11 10K
R12 10K
Q1B 2N2060
CR3 1N965B
C1 22 35V 10%
(25) +120 VDC+12 VDC RET
C14 .22 200 V 5%
R25 10K
TP NO. 3 (PWR AMPL)
Q5 2N2193
Q7 2N2634
R26 20K 1/2 W, 5%
(5) +120 VDC TP
R19 390
T1 DO-T39
BR R W-BK 6 B
C6 0.0068 100 V 10%
R21 910
R23 10 1/2 W, 1%
C8 22 50VDC 10%
T2
CR10
(1) +120VDC OUT
C15 60 180 VDC +50% –15%
CR11
(7) +12 VDC INTERLOCK HI
C7 0.0068 100V 1%
R22 910
R24 10 1/2 W, 1%
C9 22 50VDC 10%
Q8 2N2634
CR12
CR13
R28 30K
R29 10K
(6) PULSE TORQUING PWR SUPPLY MONITOR
R20 390
Q6 2N2193
R27 330K 1/8 W, 5%
R31 75K
R32 5.1K 1/2 W, 5%
(4) +32 VDC TP
CR14
CR16
CR15
CR17
R30 470 3W 5%
(3) +32 VDC (TO PVR'S)
11
12
C16 120 UF 90V +50% –15
CR18 1N2990A
(2) +32 VDC RET
(8) GRD
(9) GRD

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	-51		6.2K		
R3	-12		150		
R4	-62		18K		
R5	-74		56K		
R6	1010377-110		4.7K	1%	1/10 W
R7	-111		91K		
R8	-111		91K		
R9	-110		4.7K		
R10	1006750-74		56K	2%	1/4W
R11	-56		10K		
R12	-56		10K		
R13	-63		20K		
R14	-56		10K		
R15	-32		1K		
R16	-50		5.6K		
R17	-47		4.3K		
R18	1010278-70		2K	5%	1/2W
R19	1006750-22		390	2%	1/4W
R20	-22		390		
R21	-31		910		
R22	-31		910		
R23	1006802		10	1%	1/2 W
R24	1006802		10	1%	1/2 W
R25	1006750-56		10K	2%	1/4 W
R26	1010278-94		20K	5%	1/2 W
R27	1010369-93		330K	5%	1/8 W
R28	1006750-67		30K	2%	1/4 W
R29	1006750-56		10K	2%	1/4 W
R30	1010389-48		470	5%	3W
R31	1006750-77		75K	5%	1/4 W
R32	1010278-80		5.1K	5%	1/2 W
C1	1006755-85	CAPACITOR	22UF	±10%	35VDC
C2	1006777-16		220UUF	±10%	100V
C3	1010316-36		.001UF	±1%	200V
C4	1010316-36		.001UF	±1%	200V
C5	1006777-16		220UUF	±10%	100V
C6	1006777-30		.0068UF	±10%	100V
C7	1006777-30		.0068UF	±10%	100V
C8	1010393-045		22UF	±10%	50VDC
C9	1010393-045		22UF	±10%	50VDC
C10	1006755-79		6.8UF	±10%	35VDC
C11	1006777-18		330PF	±10%	100V
C12	1006755-89		47UF	±10%	35VDC
C13	1006755-89		47UF	±10%	35VDC
C14	1010264-29		.22UF	±5%	200V
C15	1010460-1		60UF	+50-15	180VDC
C16	1010460-2		120UF	+50-15	90VDC
CR1	1010286-5	DIODES			
CR2	1010385				
CR3	1010286-9				
CR4	1010385				
CR5					
CR6					
CR7					
CR8	1010286-6				
CR9	1010385				
CR10	1010497				
CR11					
CR12					
CR13					
CR14	1010384				
CR15					
CR16					
CR17					
CR18	1010331-013				
Q1	1010376-1	TRANSISTORS			
Q2	1010376-4				
Q3	1010376-1				
Q4	1010398-1				
Q5	1010398-3				
Q6	1010398-3				
Q7	1010499-2				
Q8	1010499-2				
T1	1010315-2	TRANSFORMERS			
T2	1010459				

NOTES-

1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4 UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ±2%

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON	
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Mahoney DATE 4-1-63
CHECKED
APPROVAL 4-11-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

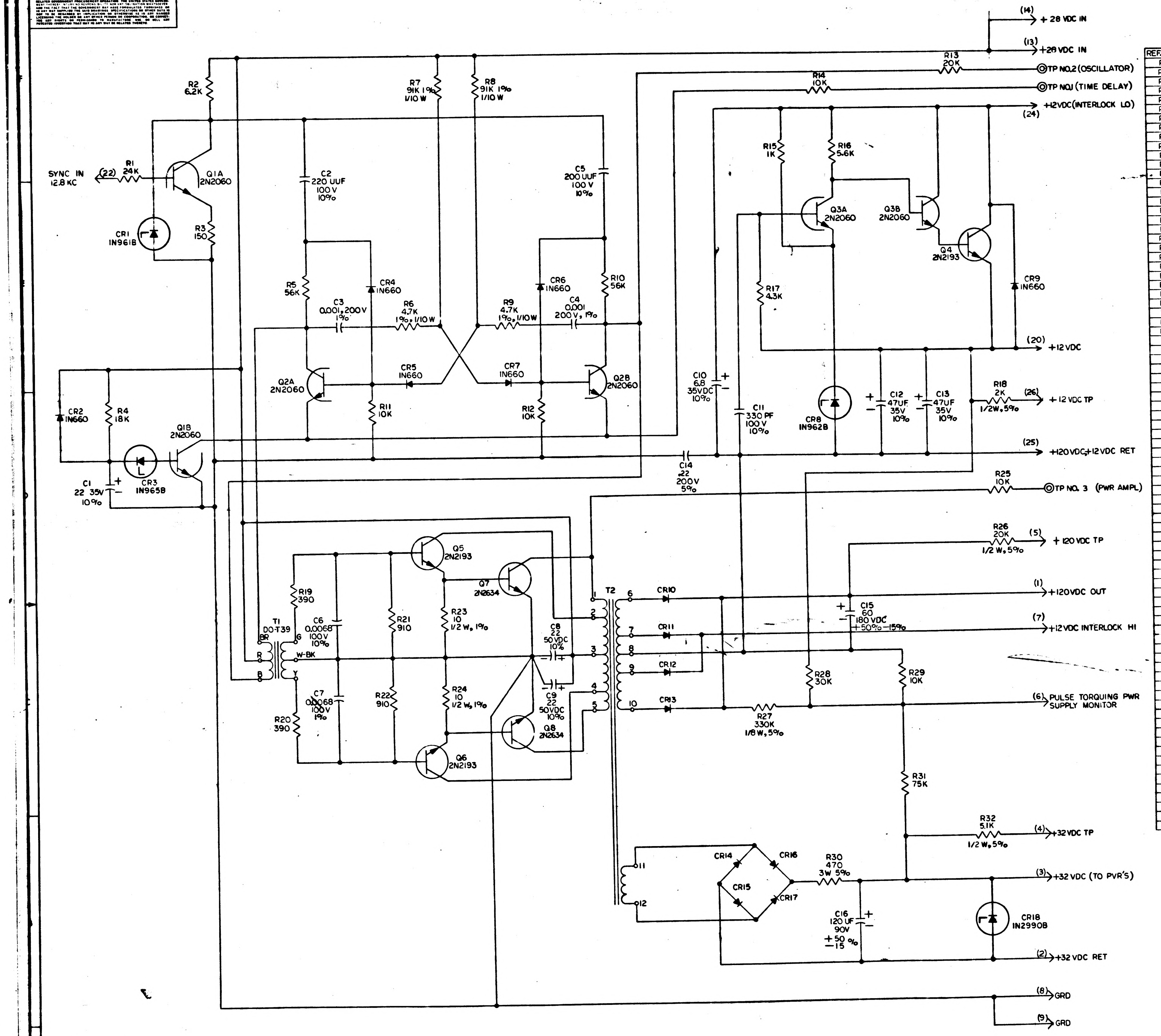
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PULSE TORQUING POWER SUPPLY (PIPA AND PULSE TORQUED GYRO)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010052
SCALE 2/1
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 0088			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01542	4-12-63	
B	REVISED PER TDRR 01962	7-20-63	
C	REVISED PER TDRR 02074	9-30-63	
D	REVISED PER TDRR 03777		


(14) +28 VDC IN
(13) +28 VDC IN
R13 20K
TP NO.2 (OSCILLATOR)
R14 10K
TP NO.1 (TIME DELAY)
+12VDC (INTERLOCK LO) (24)
R2 6.2K
R7 91K 1% 1/10 W
R8 91K 1% 1/10 W
SYNC IN 12.8 KC (22)
R1 24K
Q1A 2N2060
CR1 1N961B
R3 150
C2 220 UUF 100 V 10%
C5 200 UUF 100 V 10%
R15 1K
R16 5.6K
Q3A 2N2060
Q3B 2N2060
Q4 2N2193
R5 56K
CR4 1N660
C3 0.001, 200V 1%
R6 4.7K 1%, 1/10 W
R9 4.7K 1%, 1/10W
CR6 1N660
C4 0.001 200 V, 1%
R10 56K
R17 4.3K
CR9 1N660
(20) +12 VDC
Q2A 2N2060
CR5 1N660
CR7 1N660
Q2B 2N2060
C10 6.8 35VDC 10%
CR2 1N660
R4 18K
R11 10K
R12 10K
Q1B 2N2060
C11 330 PF 100 V 10%
CR8 1N962B
C12 47UF 35V 10%
C13 47UF 35V 10%
R18 2K 1/2W, 5%
(26) + 12 VDC TP
C1 22 35V 10%
CR3 1N965B
C14 .22 200V 5%
(25) +120 VDC & +12 VDC RET
R25 10K
TP NO. 3 (PWR AMPL)
Q5 2N2193
Q7 2N2634
R26 20K 1/2 W, 5%
(5) + 120 VDC TP
T2
(1) +120VDC OUT
R19 390
T1 DOT 39
BR G W-BK R Y
C6 0.0068 100V 10%
R21 910
R23 10 1/2 W, 1%
C8 22 50VDC 10%
CR10
C15 60 180 VDC +50% -15%
CR11
(7) +12 VDC INTERLOCK HI
CR12
C7 0.0068 100V 1%
R22 910
R24 10 1/2 W, 1%
C9 22 50VDC 10%
R28 30K
R29 10K
R20 390
Q8 2N2634
CR13
R27 330K 1/8W, 5%
(6) PULSE TORQUING PWR SUPPLY MONITOR
Q6 2N2193
R31 75K
R32 5.1K 1/2 W, 5%
(4) +32 VDC TP
CR14
CR16
R30 470 3W 5%
(3) +32 VDC (TO PVR'S)
CR15
CR17
C16 120 UF 90V +50% -15
CR18 1N2990B
(2) +32 VDC RET
(8) GRD
(9) GRD
1 2 3 4 5 6 7 8 9 10 11 12

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	-51		6.2K		
R3	-12		150		
R4	-62		18K		
R5	-74		56K		
R6	1010377-110		4.7K	1%	1/10 W
R7	-111		91K		
R8	-111		91K		
R9	-110		4.7K		
R10	1006750-74		56K	2%	1/4W
R11	-56		10K		
R12	-56		10K		
R13	-63		20K		
R14	-56		10K		
R15	-32		1K		
R16	-50		5.6K		
R17	-47		4.3K		
R18	1010278-70		2K	5%	1/2W
R19	1006750-22		390	2%	1/4W
R20	-22		390		
R21	-31		910		
R22	-31		910		
R23	1006802		10	1%	1/2 W
R24	1006802		10	1%	1/2 W
R25	1006750-56		10K	2%	1/4 W
R26	1010278-94		20K	5%	1/2 W
R27	1010369-93		330K	5%	1/8 W
R28	1006750-67		30K	2%	1/4 W
R29	1006750-56		10K	2%	1/4 W
R30	1010389-48		470	5%	3W
R31	1006750-77		75K	5%	1/4 W
R32	1010278-80		5.1K	5%	1/2 W
C1	1006755-85	CAPACITOR	22 UF	±10%	35VDC
C2	1006777-16		220 UUF	±10%	100V
C3	1010316-36		.001UF	±1%	200V
C4	1010316-36		.001UF	±1%	200V
C5	1006777-16		220UUF	±10%	100V
C6	1006777-30		.0068UF	±10%	100V
C7	1006777-30		.0068UF	±10%	100V
C8	1010393-045		22UF	±10%	50VDC
C9	1010393-045		22UF	±10%	50VDC
C10	1006755-79		6.8UF	±10%	35VDC
C11	1006777-18		330PF	±10%	100V
C12	1006755-89		47UF	±10%	35VDC
C13	1006755-89		47UF	±10%	35VDC
C14	1010264-29		.22UF	±5%	200V
C15	1010460-1		60UF	+50-15	180VDC
C16	1010460-2		120 UF	+50-15	90VDC
CR1	1010286-5	DIODES			
CR2	1010385				
CR3	1010286-9				
CR4	1010385				
CR5					
CR6					
CR7					
CR8	1010286-25				
CR9	1010385				
CR10	1010497				
CR11					
CR12					
CR13					
CR14	101[illegible]94				
CR15					
CR16					
CR17					
CR18	1010331-013				
Q1	1010376-1	TRANSISTORS			
Q2	1010376-4				
Q3	1010376-1				
Q4	1010398-1				
Q5	1010398-3				
Q6	1010398-3				
Q7	1010499-2				
Q8	1010499-2				
T1	1010315-2	TRANSFORMERS			
T2	1010459				

NOTES-
1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2-UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3-UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4 UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ± 2%

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN Mahoney DATE 4-1-63
CHECKED
APPROVAL J.L. Stone 4-11-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PULSE TORQUING POWER SUPPLY (PIPA AND PULSE TORQUED GYRO)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010052
SCALE 2/1
WT
SHEET 1 OF 1

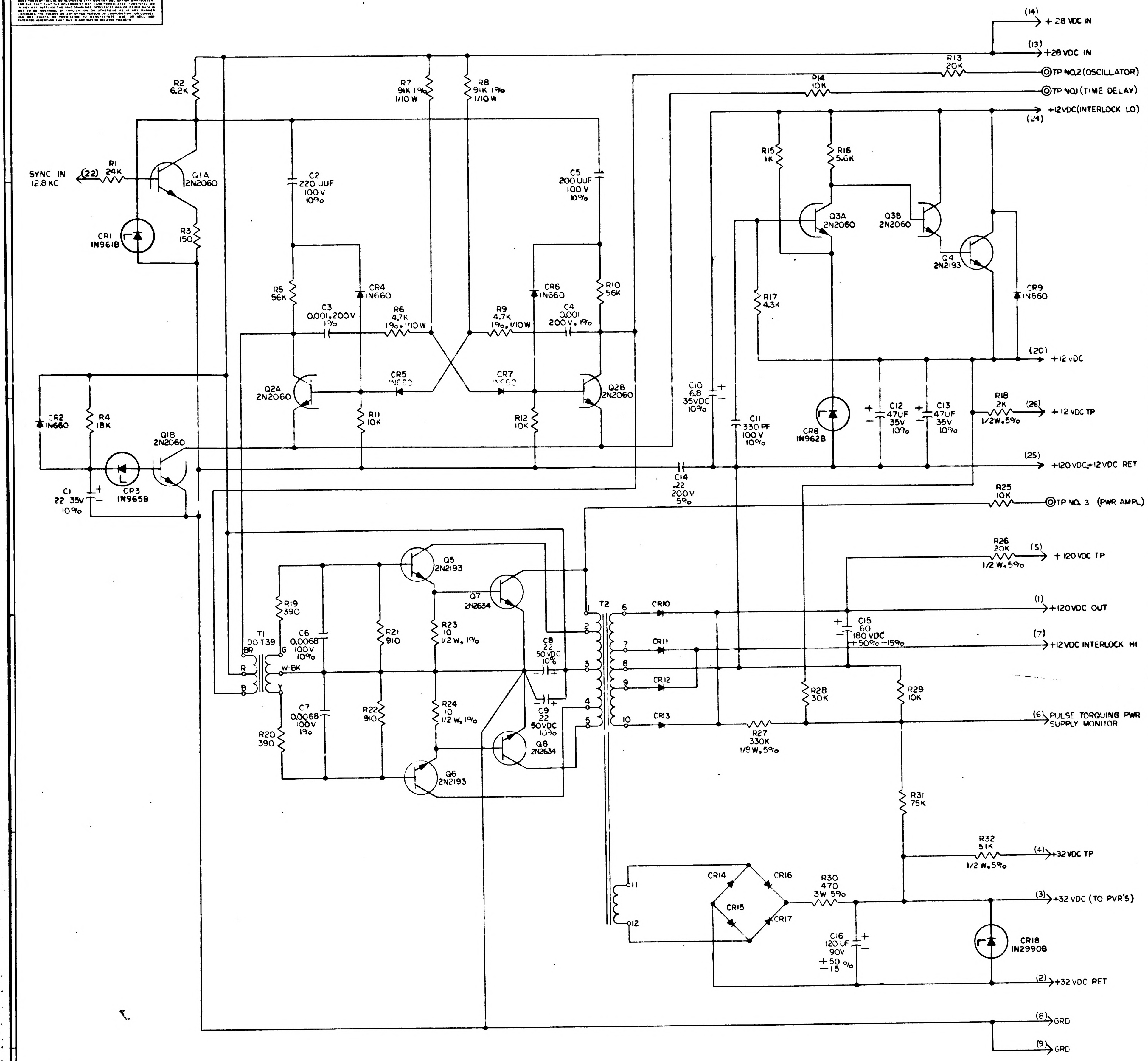
1010052 D

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 00[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01542	4-10-63	[illegible]
B	REVISED PER TDRR 01962	[illegible]	[illegible]
C	REVISED PER TDRR 02070	[illegible]	[illegible]
D	REVISED PER TDRR 03777	[illegible]	[illegible]
E	REVISED PER TDRR 3936	[illegible]	[illegible]


SYNC IN 12.8 KC
(22)
R1 24K
Q1A 2N2060
CR1 1N961B
R2 6.2K
R3 150
R7 91K 1% 1/10 W
R8 91K 1% 1/10 W
C2 220 UUF 100 V 10%
C5 200 UUF 100 V 10%
R5 56K
CR4 1N660
C3 0.001, 200 V 1%
R6 4.7K 1%, 1/10 W
R9 4.7K 1%, 1/10 W
C4 0.001 200 V, 1%
CR6 1N660
R10 56K
Q2A 2N2060
CR5 1N660
CR7 1N660
Q2B 2N2060
R11 10K
R12 10K
CR2 1N660
R4 18K
Q1B 2N2060
CR3 1N965B
C1 22 35V 10%
(14) +28 VDC IN
(13) +28 VDC IN
R13 20K
TP NO.2 (OSCILLATOR)
R14 10K
TP NO.1 (TIME DELAY)
+12VDC (INTERLOCK LO)
(24)
R15 1K
R16 5.6K
Q3A 2N2060
Q3B 2N2060
Q4 2N2193
R17 4.3K
CR9 1N660
(20) +12 VDC
C10 6.8 35VDC 10%
C11 330 PF 100 V 10%
CR8 1N962B
C12 47UF 35V 10%
C13 47UF 35V 10%
R18 2K 1/2W, 5%
(26) +12 VDC TP
C14 .22 200V 5%
(25) +120VDC, +12 VDC RET
R25 10K
TP NO. 3 (PWR AMPL)
R26 20K 1/2 W, 5%
(5) +120 VDC TP
Q5 2N2193
Q7 2N2634
T1 DO-T39
BR
R
B
G
W-BK
Y
R19 390
C6 0.0068 100V 10%
R21 910
R23 10 1/2 W, 1%
C8 22 50 VDC 10%
T2
1 2 3 4 5 6 7 8 9 10 11 12
C7 0.0068 100V 1%
R22 910
R24 10 1/2 W, 1%
C9 22 50VDC 10%
R20 390
Q6 2N2193
Q8 2N2634
CR10
CR11
CR12
CR13
(1) +120VDC OUT
C15 60 180 VDC +50% -15%
(7) +12 VDC INTERLOCK HI
R28 30K
R29 10K
R27 330K 1/8 W, 5%
(6) PULSE TORQUING PWR SUPPLY MONITOR
R31 75K
R32 51K 1/2 W, 5%
(4) +32 VDC TP
CR14
CR15
CR16
CR17
R30 470 3W 5%
(3) +32 VDC (TO PVR'S)
C16 120 UF 90V +50 -15 %
CR18 1N2990B
(2) +32 VDC RET
(8) GRD
(9) GRD

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	-51		6.2K		
R3	-12		150		
R4	-62		18K		
R5	-74		56K		
R6	1010377-110		4.7K	1%	1/10 W
R7	-111		91K		
R8	-111		91K		
R9	-110		4.7K		
R10	1006750-74		56K	2%	1/4W
R11	-56		10K		
R12	-56		10K		
R13	-63		20K		
R14	-56		10K		
R15	-32		1K		
R16	-50		5.6K		
R17	-47		4.3K		
R18	1010278-70		2K	5%	1/2W
R19	1006750-22		390	2%	1/4W
R20	-22		390		
R21	-31		910		
R22	-31		910		
R23	1006802-1		10	1%	1/2 W
R24	1006802-1		10	1%	1/2 W
R25	1006750-56		10K	2%	1/4 W
R26	1010278-94		20K	5%	1/2 W
R27	1010369-93		330K	5%	1/8 W
R28	1006750-67		30K	2%	1/4 W
R29	1006750-56		10K	2%	1/4 W
R30	1010389-48		470	5%	3W
R31	1006750-77		75K	5%	1/4 W
R32	1010278-80		5.1K	5%	1/2 W
C1	1006755-85	CAPACITOR	22 UF	±10%	35VDC
C2	1006777-16		220 UUF	±10%	100V
C3	1010316-36		.001UF	±1%	200V
C4	1010316-36		.001UF	±1%	200V
C5	1006777-16		220UUF	±10%	100V
C6	1006777-30		.0068UF	±10%	100V
C7	1006777-30		.0068UF	±10%	100V
C8	1010393-045		22 UF	±10%	50VDC
C9	1010393-045		22UF	±10%	50VDC
C10	1006755-79		6.8UF	±10%	35VDC
C11	1006777-18		330PF	±10%	100V
C12	1006755-89		47UF	±10%	35VDC
C13	1006755-89		47UF	±10%	35VDC
C14	1010264-29		.22UF	±5%	200V
C15	1010460-1		60 UF	+50-15	180VDC
C16	1010460-2		120 UF	+50-15	90VDC
CR1	1010286-5	DIODES			
CR2	1010385				
CR3	1010286-9				
CR4	1010385				
CR5					
CR6					
CR7					
CR8	1010286-25				
CR9	1010385				
CR10	1010497				
CR11					
CR12					
CR13					
CR14	1010384				
CR15					
CR16					
CR17					
CR18	1010331-013				
Q1	1010376-1	TRANSISTORS			
Q2	1010376-4				
Q3	1010376-1				
Q4	1010398-1				
Q5	1010398-3				
Q6	1010398-3				
Q7	1010499-2				
Q8	1010499-2				
T1	1010315-2	TRANSFORMERS			
T2	1010459				

NOTES -
1 - INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 - UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3 - UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4 UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ±2%

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 4-1-63
CHECKED
APPROVAL 4-11-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

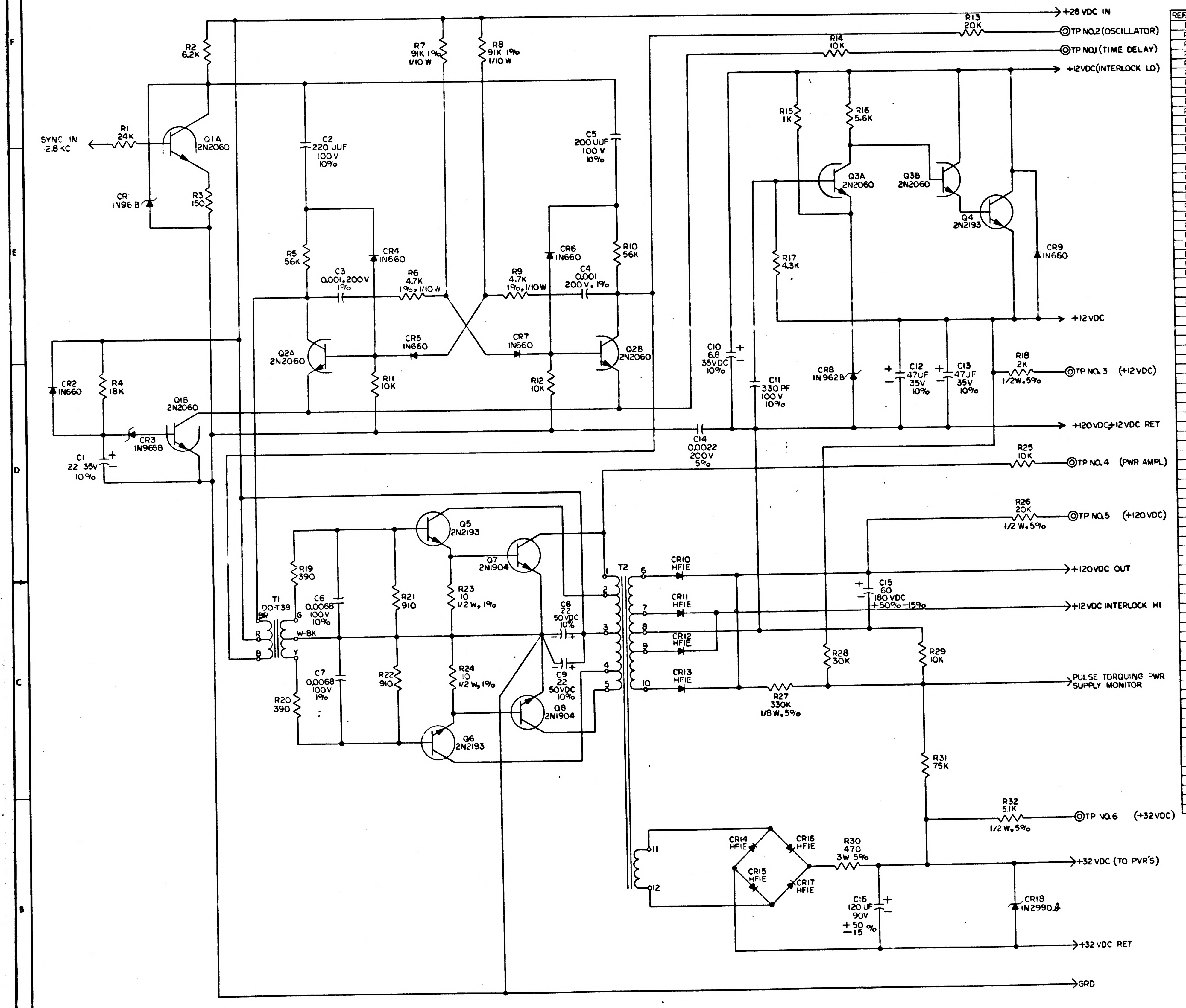
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PULSE TORQUING
POWER SUPPLY
(PIPA AND PULSE
TORQUED GYRO)

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010052
SCALE 2/1
WT
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS TDRR 00[illegible]			
SYM	DESCRIPTION	DATE	APPROVAL


+28 VDC IN
R13
20K
TP NO.2 (OSCILLATOR)
R14
10K
TP NO.1 (TIME DELAY)
+12VDC (INTERLOCK LO)
R2
6.2K
R7
91K 1%
1/10 W
R8
91K 1%
1/10 W
SYNC IN
12.8 KC
R1
24K
Q1A
2N2060
C2
220 UUF
100 V
10%
C5
200 UUF
100 V
10%
CR1
1N961B
R3
150
R5
56K
CR4
1N660
C3
0.001, 200V
1%
R6
4.7K
1%, 1/10W
R9
4.7K
1%, 1/10W
CR6
1N660
C4
0.001
200 V, 1%
R10
56K
R15
1K
R16
5.6K
Q3A
2N2060
Q3B
2N2060
Q4
2N2193
CR9
1N660
R17
4.3K
+12 VDC
Q2A
2N2060
CR5
1N660
CR7
1N660
Q2B
2N2060
CR2
1N660
R4
18K
R11
10K
R12
10K
Q1B
2N2060
CR3
1N965B
C1
22 35V
10%
C10
6.8
35VDC
10%
C11
330 PF
100 V
10%
CR8
1N962B
C12
47UF
35V
10%
C13
47UF
35V
10%
R18
2K
1/2W, 5%
TP NO. 3 (+12 VDC)
C14
0.0022
200 V
5%
+120 VDC +12 VDC RET
R25
10K
TP NO. 4 (PWR AMPL)
R26
20K
1/2 W, 5%
TP NO.5 (+120 VDC)
Q5
2N2193
Q7
2N1904
R19
390
T1
DO-T39
BR
R
B
G
W-BK
Y
C6
0.0068
100V
10%
R21
910
R23
10
1/2 W, 1%
C8
22
50 VDC
10%
T2
1
2
3
4
5
6
7
8
9
10
11
12
CR10
HFIE
+120 VDC OUT
C15
60
180 VDC
+50% -15%
CR11
HFIE
+12 VDC INTERLOCK HI
CR12
HFIE
CR13
HFIE
R28
30K
R29
10K
PULSE TORQUING PWR
SUPPLY MONITOR
R27
330K
1/8 W, 5%
C7
0.0068
100V
1%
R20
390
R22
910
R24
10
1/2 W, 1%
C9
22
50VDC
10%
Q8
2N1904
Q6
2N2193
R31
75K
R32
5.1K
1/2 W, 5%
TP NO.6 (+32 VDC)
CR14
HFIE
CR16
HFIE
CR15
HFIE
CR17
HFIE
R30
470
3W 5%
+32 VDC (TO PVR'S)
C16
120 UF
90V
+50 -15 %
CR18
1N2990B
+32 VDC RET
GRD

REF. DES.	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-65	RESISTOR	24K	2%	1/4W
R2	-51	↓	6.2K	↓	↓
R3	-12	↓	150	↓	↓
R4	-62	↓	18K	↓	↓
R5	-74	↓	56K	↓	↓
R6	1010377-110	↓	4.7K	1%	1/10 W
R7	-111	↓	91K	↓	↓
R8	-111	↓	91K	↓	↓
R9	-110	↓	4.7K	↓	↓
R10	1006750-74	↓	56K	2%	1/4W
R11	-56	↓	10K	↓	↓
R12	-56	↓	10K	↓	↓
R13	-63	↓	20K	↓	↓
R14	-56	↓	10K	↓	↓
R15	-32	↓	1K	↓	↓
R16	-50	↓	5.6K	↓	↓
R17	-47	↓	4.3K	↓	↓
R18	1010278-70	↓	2K	5%	1/2W
R 9	1006750-22	↓	390	2%	1/4W
R20	-22	↓	390	↓	↓
R21	-31	↓	910	↓	↓
R22	-31	↓	910	↓	↓
R23	1006802	↓	10	1%	1/2 W
R24	1006802	↓	10	1%	1/2 W
R25	1006750-56	↓	10K	2%	1/4 W
R26	1010278-94	↓	20K	5%	1/2 W
R27	1010369-93	↓	330K	5%	1/8 W
R28	1006750-67	↓	30K	2%	1/4 W
R29	1006750-56	↓	10K	2%	1/4 W
R30	1010339-43	↓	470	5%	3W
R31	1006750-77	↓	75K	5%	1/4 W
R32	1010278-80	↓	5.1K	5%	1/2 W
C1	1006755-85	CAPACITOP	22 UF	±10%	35VDC
C2	1006777-16	↓	220 UUF	±10%	100V
C3	1010316-36	↓	.001UF	±1%	200V
C4	1010316-36	↓	.001UF	±1%	200V
C5	1006777-16	↓	220UUF	±10%	100V
C6	1006777-30	↓	.0068UF	±10%	100V
C7	1006777-30	↓	.0068UF	±10%	100V
C8	1010393-045	↓	22 UF	±10%	50VDC
C9	1010393-045	↓	22UF	±10%	50VDC
C10	1006755-79	↓	6.8UF	±10%	35VDC
C11	1006777-18	↓	330PF	±10%	100V
C12	1006755-89	↓	47UF	±10%	35VDC
C13	1006755-89	↓	47UF	±10%	35VDC
C14	1010264-5	↓	.0022UF	±5%	200V
C15	1010460-	↓	60UF	+50 -15	180VDC
C16	1010460-	↓	120 UF	+50-15	90VDC
CR1	1010286-5	DIODES			
CR2	1010385	↓			
CR3	1010286-9	↓			
CR4	1010385	↓			
CR5	↓	↓			
CR6	↓	↓			
CR7	↓	↓			
CR8	1010286-6	↓			
CR9	1010385	↓			
CR10	1010423	↓			
CR11	↓	↓			
CR12	↓	↓			
CR13	↓	↓			
CR14	↓	↓			
CR15	↓	↓			
CR17	↓	↓			
CR18	1010331-013	↓			
Q1	1010376 1	TRANSISTORS			
Q2	↓				
Q3	↓				
Q4	1010398				
Q5	↓				
Q6	↓				
Q7	1010319				
Q8	1010319				
T1	1010315-2	TRANSFORMERS			
T2	1010459				

NOTES–

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. UNLESS OTHERWISE SPECIFIED RESISTORS 1/4 W ±2%

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN Mahoney DATE 4-1-63
CHECKED
APPROVAL J L Stone 4-16-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PULSE TORQUING
POWER SUPPLY
(PIPA AND PULSE
TORQUED GYRO)

CODE IDENT NO. | SIZE E | NASA DRAWING NO 1010052
SCALE 2/1 | WT | SHEET OF

1010052

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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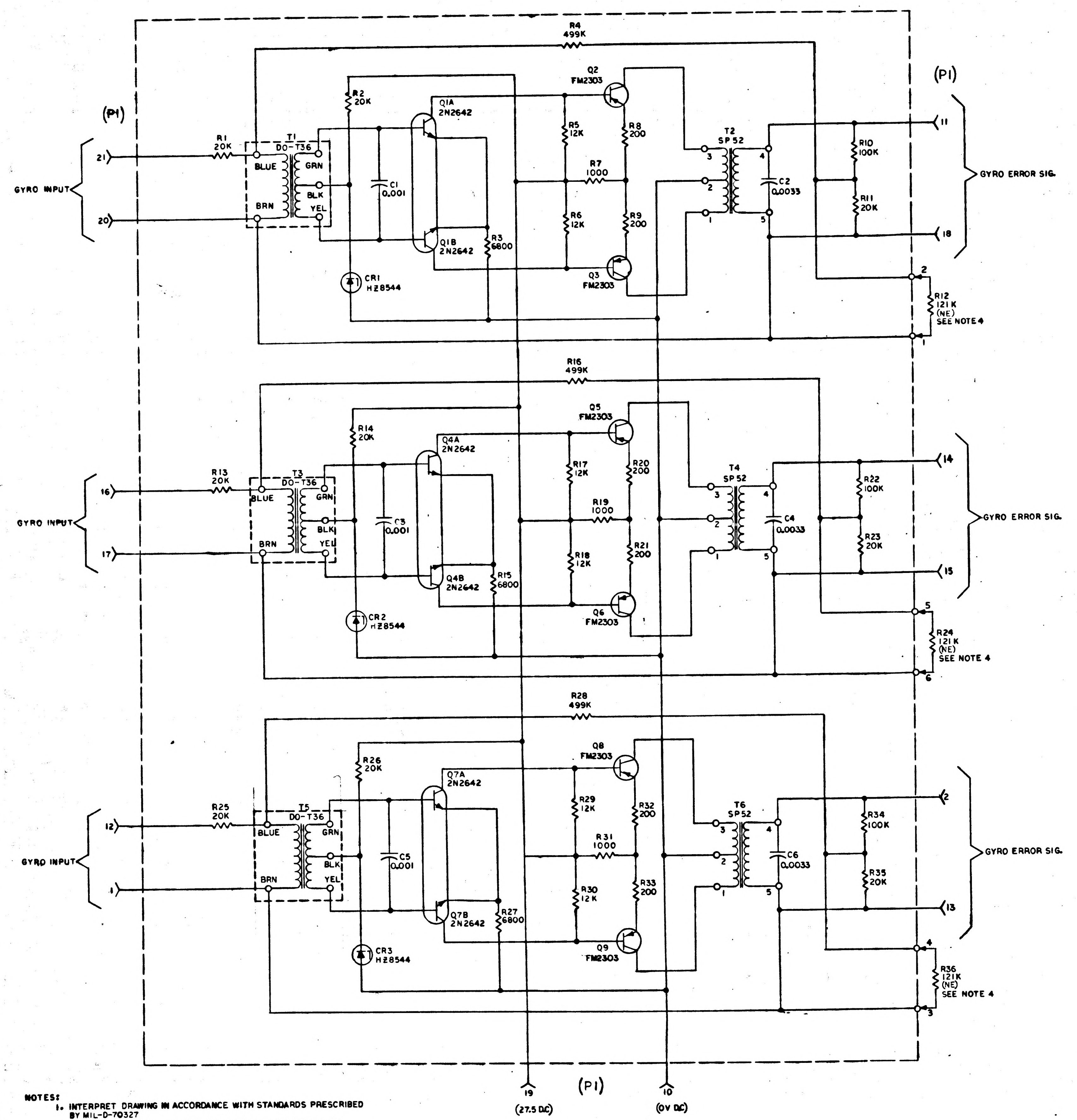
REVISIONS TQRR 03322

SYM	DESCRIPTION	DATE	APPROVAL


(P1)
GYRO INPUT
21
20
R1 20K
T1 DO-T36
BLUE
BRN
GRN
BLK
YEL
C1 0.001
R2 20K
Q1A 2N2642
Q1B 2N2642
R3 6800
CR1 HZ8544
R4 499K
Q2 FM2303
Q3 FM2303
R5 12K
R6 12K
R7 1000
R8 200
R9 200
T2 SP52
C2 0.0033
R10 100K
R11 20K
11
18
GYRO ERROR SIG.
R12 121K (NE) SEE NOTE 4
16
17
R13 20K
T3 DO-T36
C3 0.001
R14 20K
Q4A 2N2642
Q4B 2N2642
R15 6800
CR2 HZ8544
R16 499K
Q5 FM2303
Q6 FM2303
R17 12K
R18 12K
R19 1000
R20 200
R21 200
T4 SP52
C4 0.0033
R22 100K
R23 20K
14
15
R24 121K (NE) SEE NOTE 4
12
1
R25 20K
T5 DO-T36
C5 0.001
R26 20K
Q7A 2N2642
Q7B 2N2642
R27 6800
CR3 HZ8544
R28 499K
Q8 FM2303
Q9 FM2303
R29 12K
R30 12K
R31 1000
R32 200
R33 200
T6 SP52
C6 0.0033
R34 100K
R35 20K
2
13
R36 121K (NE) SEE NOTE 4
19 (27.5 DC)
10 (0V DC)

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-501	RESISTOR	20K	1%	1/8 W
R2	1006750-63		20K	2%	1/4 W
R3	1006750-52		6800	2%	1/4 W
R4	1010364-769		499K	1%	1/8 W
R5	1006750-58		12K	2%	1/4 W
R6	1006750-58		12K	2%	1/4 W
R7	1006750-32		1000	2%	1/4 W
R8	1006750-15		200	2%	1/4 W
R9	1006750-15		200	2%	1/4 W
R10	1010364-635		100K	1%	1/8 W
R11	1010364-501		20K	1%	1/8 W
R12	1010363		SEE NOTE 4	1%	1/4 W
R13	1010364-501		20K	1%	1/8 W
R14	1006750-63		20K	2%	1/4 W
R15	1006750-52		6800	2%	1/4 W
R16	1010364-769		499K	1%	1/8 W
R17	1006750-58		12K	2%	1/4 W
R18	1006750-58		12K	2%	1/4 W
R19	1006750-32		1000	2%	1/4 W
R20	1006750-15		200	2%	1/4 W
R21	1006750-15		200	2%	1/4 W
R22	1010364-635		100K	1%	1/8 W
R23	1010364-501		20K	1%	1/8 W
R24	1010363		SEE NOTE 4	1%	1/4 W
R25	1010364-501		20K	1%	1/8 W
R26	1006750-63		20K	2%	1/4 W
R27	1006750-52		6800	2%	1/4 W
R28	1010364-769		499K	1%	1/8 W
R29	1006750-58		12K	2%	1/4 W
R30	1006750-58		12K	2%	1/4 W
R31	1006750-32		1000	2%	1/4 W
R32	1006750-15		200	2%	1/4 W
R33	1006750-15		200	2%	1/4 W
R34	1010364-635		100K	1%	1/8 W
R35	1010364-501		20K	1%	1/8 W
R36	1010363	RESISTOR	SEE NOTE 4	1%	1/4 W
C1	1010359-17	CAPACITOR	0.001	20%	200V
C2	1010359-23		0.0033		
C3	1010359-17		0.001		
C4	1010359-23		0.0033		
C5	1010359-17		0.001		
C6	1010359-23	CAPACITOR	0.0033	20%	200V
Q1	1010252-1	TRANSISTOR	2N2642		
Q2 Q3	1010633-2		FM2303	MATCHED PAIRS	
Q4	1010252-1		2N2642		
Q5 Q6	1010633-2		FM2303	MATCHED PAIRS	
Q7	1010252-1		2N2642		
Q8 Q9	1010633 2	TRANSISTOR	FM2303	MATCHED PAIRS	
T1	1007080	XFMR ASSY	DO-T36		
T2	1010291-1	TRANSFORMER	SP-52		
T3	1007080	XFMR ASSY	DO-T36		
T4	1010291-1	TRANSFORMER	SP-52		
T5	1007080	XFMR ASSY	DO-T36		
T6	1010291-1	TRANSFORMER	SP-52		
CR1	1010372-15	DIODE	HZ8544	5%	7.5 V
CR2	1010372-15	DIODE	HZ8544	5%	7.5 V
CR3	1010372-15	DIODE	HZ8544	5%	7.5 V
P1	1010472-2	CONNECTOR			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. RANGE AND INCREMENTAL VALUES OF R12, R24 AND R36 (22K-220K) TO BE SELECTED PER A.I.P. ------

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN J.F. Wild DATE 9-12-63
CHECKED
APPROVAL M. Kramer 9/25/63
APPROVAL
NASA APPROVAL 9/26/63
MIT APPROVAL 9/26/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IRIG PRE-AMPLIFIER
(3 IN 1 MODULE)

CODE IDENT NO. SIZE E
NASA DRAWING NO. 1010053
SCALE WT SHEET 1 OF 1

1010053

INCHES
PHOTOGRAPHIC SCALE ONLY

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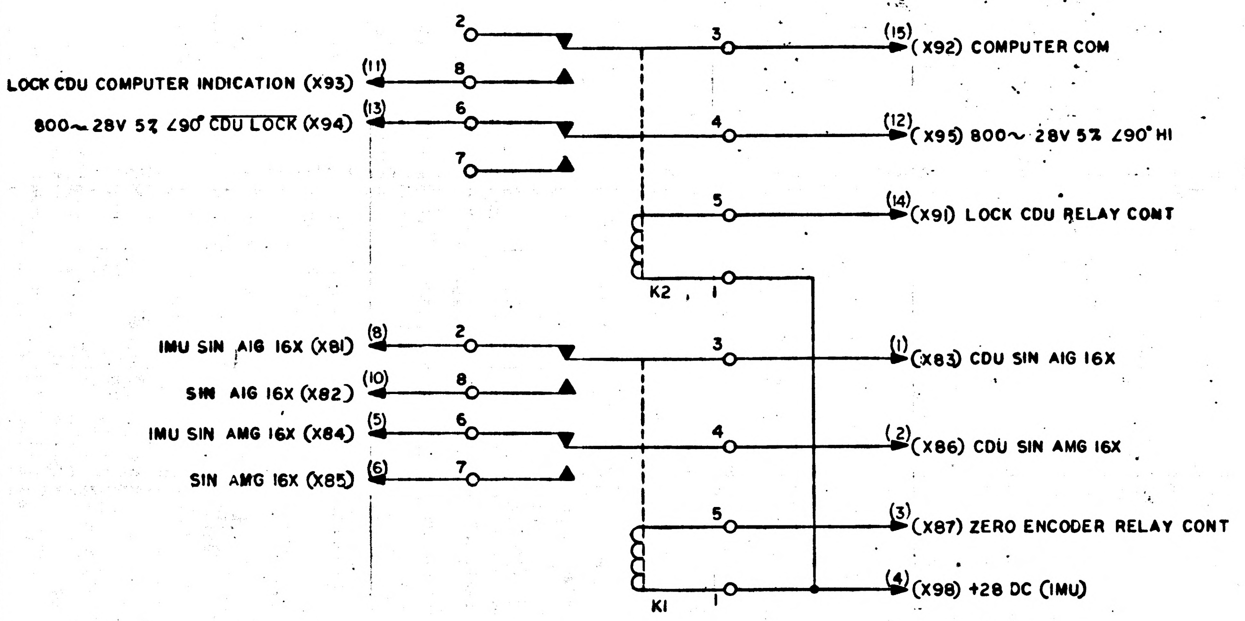
REVISIONS TDRR 01449

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02067	9/12/63	



2
8
6
7
3
4
5
1
K2
K1
(15) (X92) COMPUTER COM
(11) LOCK CDU COMPUTER INDICATION (X93)
(13) 800~ 28V 5% ∠90° CDU LOCK (X94)
(12) (X95) 800~ 28V 5% ∠90° HI
(14) (X91) LOCK CDU RELAY CONT
(8) IMU SIN AIG 16X (X81)
(10) SIN AIG 16X (X82)
(5) IMU SIN AMG 16X (X84)
(6) SIN AMG 16X (X85)
(1) (X83) CDU SIN AIG 16X
(2) (X86) CDU SIN AMG 16X
(3) (X87) ZERO ENCODER RELAY CONT
(4) (X98) +28 DC (IMU)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
K1	1010353-1	RELAY			
K2	1010353-1	RELAY			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN E. O'Connell DATE 5-20-63
CHECKED
APPROVAL R. J. Therrien 6/3/63
APPROVAL
NASA APPROVAL 5 June 63
MIT APPROVAL 5 June 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
CDU ZEROING AND LOCK RELAYS

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010054
SCALE
WT
SHEET 1 OF 1

1010054 A

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

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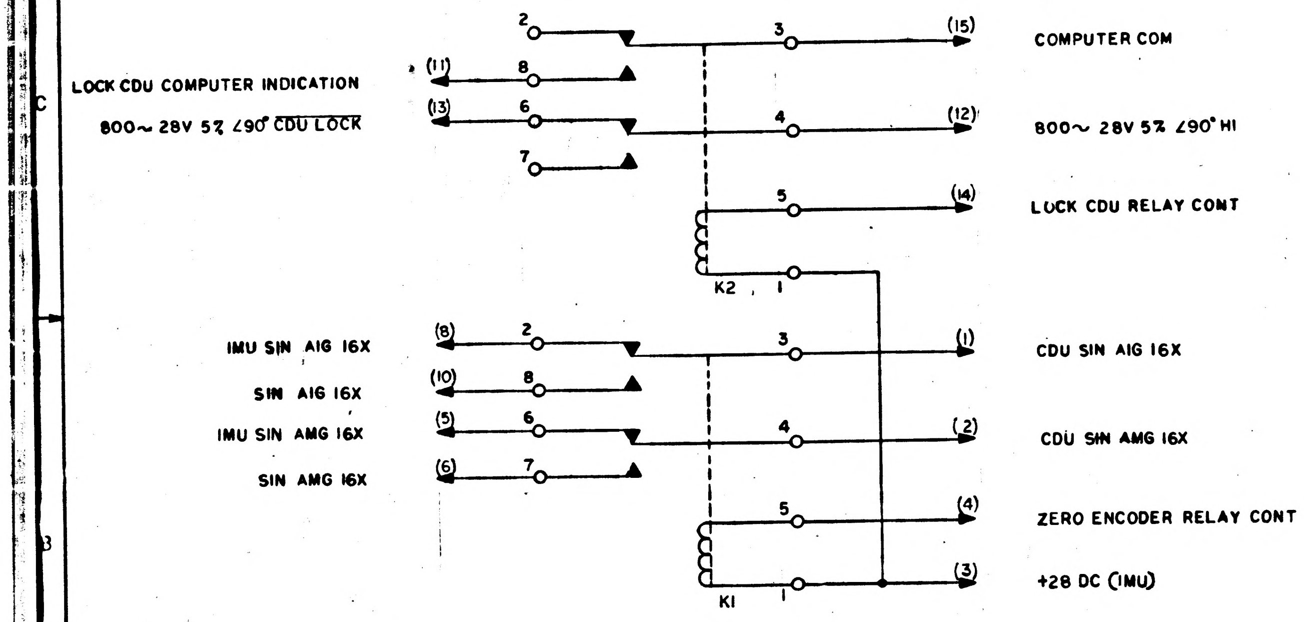
REVISIONS TDRR 01449

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02067	7-17-63	J.J.M.
B	REVISED PER TDRR 02536	7-14-63	J.J.M. WK



2
3
(15)
COMPUTER COM
LOCK CDU COMPUTER INDICATION
(11)
8
800~ 28V 5% ∠90° $\overline{\text{CDU LOCK}}$
(13)
6
4
(12)
800~ 28V 5% ∠90° HI
7
5
(14)
LOCK CDU RELAY CONT
K2
1
IMU SIN AIG 16X
(8)
2
3
(1)
CDU SIN AIG 16X
SIN AIG 16X
(10)
8
IMU SIN AMG 16X
(5)
6
4
(2)
CDU SIN AMG 16X
SIN AMG 16X
(6)
7
5
(4)
ZERO ENCODER RELAY CONT
K1
1
(3)
+28 DC (IMU)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
K1	1010353-1	RELAY			
K2	1010353-1	RELAY			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± //
DECIMALS ± //
ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN E. O'Connell DATE 5-20-63
CHECKED
APPROVAL R. J. [illegible] 6/3/63
APPROVAL
NASA APPROVAL [illegible] 5 June 63
MIT APPROVAL [illegible] 5 June 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
CDU ZEROING AND LOCK RELAYS

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010054
SCALE
WT
SHEET 1 OF 1

1010054 B

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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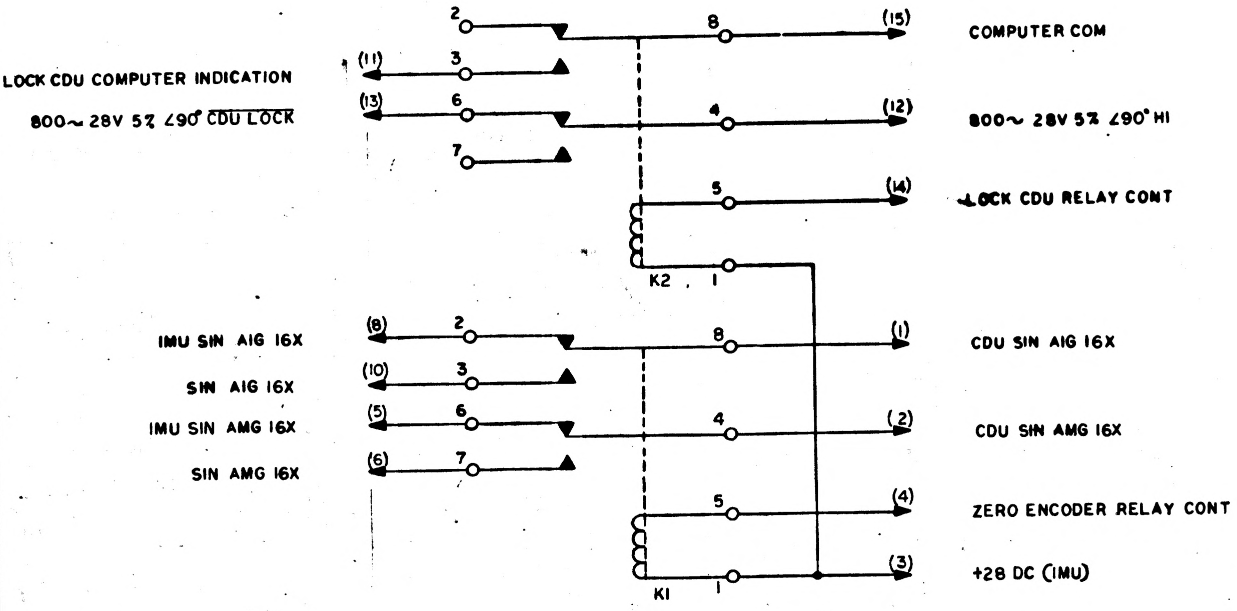
REVISIONS TDRR 01449

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02067	7-17-63	J.L.M.
B	REVISED PER TDRR 02536	7-14-63	J.L.M. WK
C	REVISED PER TDRR 04120	10-25-63	LK ERK WK



LOCK CDU COMPUTER INDICATION
800~ 28V 5% ∠90° CDU LOCK
IMU SIN AIG 16X
SIN AIG 16X
IMU SIN AMG 16X
SIN AMG 16X
(11)
(13)
(8)
(10)
(5)
(6)
2
3
6
7
8
4
5
1
K2
K1
(15)
(12)
(14)
(1)
(2)
(4)
(3)
COMPUTER COM
800~ 28V 5% ∠90° HI
LOCK CDU RELAY CONT
CDU SIN AIG 16X
CDU SIN AMG 16X
ZERO ENCODER RELAY CONT
+28 DC (IMU)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
K1	1010353-4	RELAY			
K2	1010353-4	RELAY			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
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DWG. NO. CONTRACT
DRAWN E. O'Connell DATE 5-20-63
CHECKED
APPROVAL R.J. Therrien 6/3/63
APPROVAL
NASA APPROVAL 5 June 63
MIT APPROVAL 5 June 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
CDU ZEROING AND LOCK RELAYS

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010054
SCALE
WT
SHEET 1 OF 1

1010054 C

INCHES
1 2
PHOTOGRAPHIC SCALE ONLY

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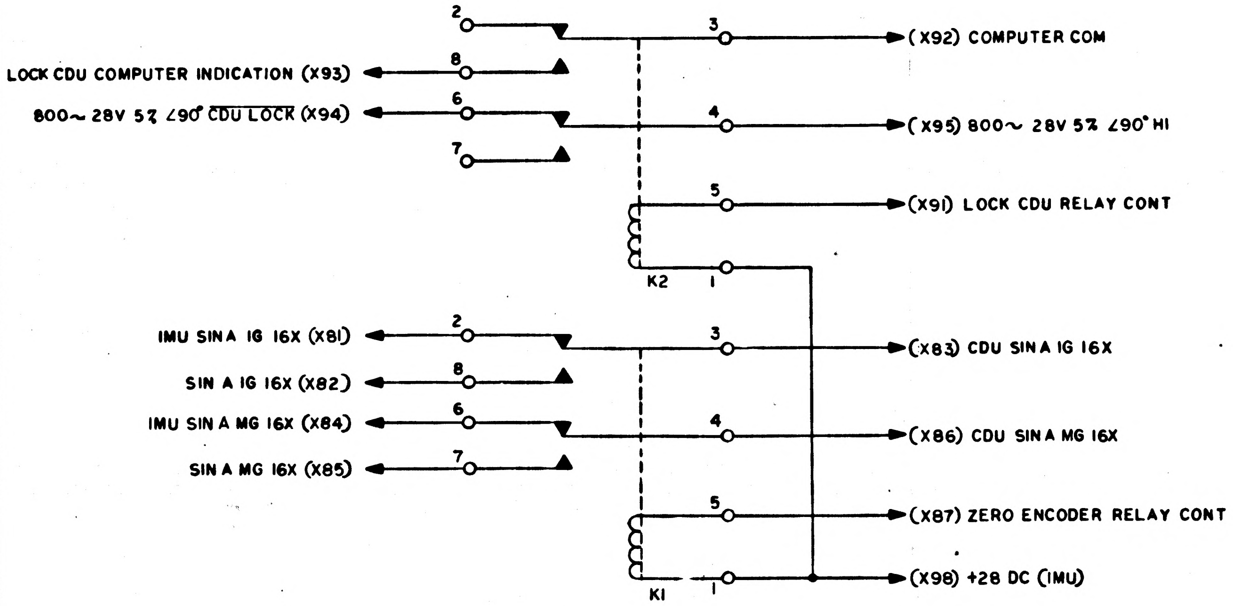
REVISIONS TDRR 01449

SYM	DESCRIPTION	DATE	APPROVAL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3
(X92) COMPUTER COM
LOCK CDU COMPUTER INDICATION (X93)
8
800~ 28V 5% ∠90° $\overline{\text{CDU LOCK}}$ (X94)
6
4
(X95) 800~ 28V 5% ∠90° HI
7
5
(X91) LOCK CDU RELAY CONT
K2
1
IMU SIN A IG 16X (X81)
2
3
(X83) CDU SIN A IG 16X
SIN A IG 16X (X82)
8
IMU SIN A MG 16X (X84)
6
4
(X86) CDU SIN A MG 16X
SIN A MG 16X (X85)
7
5
(X87) ZERO ENCODER RELAY CONT
K1
1
(X98) +28 DC (IMU)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
K1	1010353-1	RELAY			
K2	1010353-1	RELAY			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN E. O'Connell DATE 5-20-63
CHECKED
APPROVAL R. J. [illegible] 6/3/63
APPROVAL
NASA APPROVAL [illegible] 5 June 63
MIT APPROVAL W Kupfer 5 June 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
CDU ZEROING AND LOCK RELAYS

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010054
SCALE
WT
SHEET 1 OF 1

1010054

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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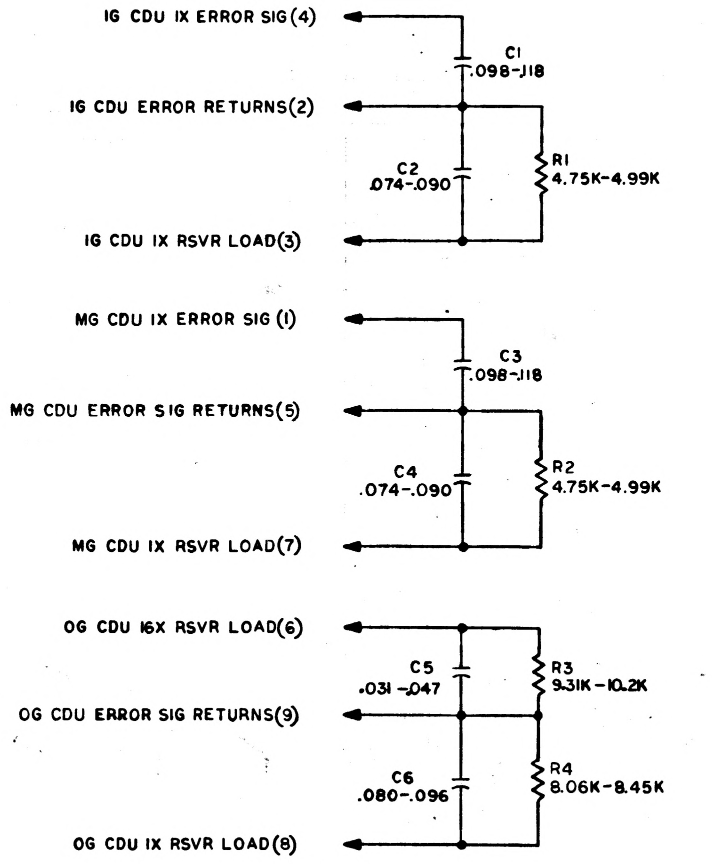
REVISIONS 10RR 01449

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01873	7-2-63	J.J.N. WK


IG CDU IX ERROR SIG(4)
C1
.098-.118
IG CDU ERROR RETURNS(2)
C2
.074-.090
R1
4.75K-4.99K
IG CDU IX RSVR LOAD(3)
MG CDU IX ERROR SIG (1)
C3
.098-.118
MG CDU ERROR SIG RETURNS(5)
C4
.074-.090
R2
4.75K-4.99K
MG CDU IX RSVR LOAD(7)
OG CDU 16X RSVR LOAD(6)
C5
.031-.047
R3
9.31K-10.2K
OG CDU ERROR SIG RETURNS(9)
C6
.080-.096
R4
8.06K-8.45K
OG CDU IX RSVR LOAD(8)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1010316-NE	CAP POLY	.098-.118UF	1%	100V
C2	↓	↓	.074-.090UF	↓	↓
C3	↓	↓	.098-.118UF	↓	↓
C4	↓	↓	.074-.090UF	↓	↓
C5	↓	↓	.031-.047UF	↓	↓
C6	↓	↓	.080-.096UF	↓	↓
R1	1010363-NE	RES F. F.	4.75K-4.99K	1%	1/4 W
R2	↓	↓	4.75K-4.99K	↓	↓
R3	↓	↓	9.31K-10.2 K	↓	↓
R4	↓	↓	8.06K-8.45K	↓	↓

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN E O'Connell DATE 5-20-63
CHECKED
APPROVAL R.J. Thissen 6/3/63
APPROVAL
NASA APPROVAL 6/5/63
MIT APPROVAL W Kupfer 5 June 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
RESOLVER LOADS

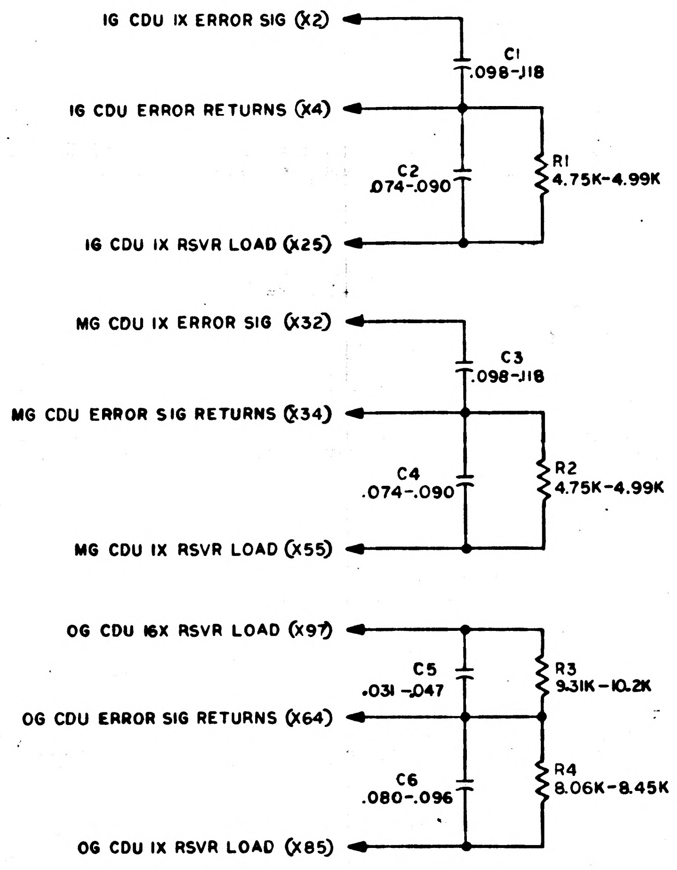
CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010055
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 10RR 01449

SYM	DESCRIPTION	DATE	APPROVAL


IG CDU IX ERROR SIG (X2)
C1
.098-.118
IG CDU ERROR RETURNS (X4)
C2
.074-.090
R1
4.75K-4.99K
IG CDU IX RSVR LOAD (X25)
MG CDU IX ERROR SIG (X32)
C3
.098-.118
MG CDU ERROR SIG RETURNS (X34)
C4
.074-.090
R2
4.75K-4.99K
MG CDU IX RSVR LOAD (X55)
OG CDU 16X RSVR LOAD (X97)
C5
.031-.047
R3
9.31K-10.2K
OG CDU ERROR SIG RETURNS (X64)
C6
.080-.096
R4
8.06K-8.45K
OG CDU IX RSVR LOAD (X85)

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1010316-NE	CAP POLY	.098-.118UF	1%	100V
C2	↓	↓	.074-.090UF	↓	↓
C3			.098-.118UF		
C4			.074-.090UF		
C5			.031-.047UF		
C6	↓	↓	.080-.096UF	↓	↓
R1	1010363-NE	RES F. F.	4.75K-4.99K	1%	1/4W
R2	↓	↓	4.75K-4.99K	↓	↓
R3			9.31K-10.2K		
R4	↓	↓	8.06K-8.45K	↓	↓

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED, CAPACITOR VALUES ARE IN MICROFARADS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN E O'Connell DATE 5-20-63
CHECKED
APPROVAL R J Thurier 6/3/63
APPROVAL
NASA APPROVAL 4/5/63
MIT APPROVAL W Kupfer 5 June 63

MANNED SPACECRAFT CENTER
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SCHEMATIC
RESOLVER LOADS

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010055
SCALE
WT
SHEET 1 OF 1

1010055

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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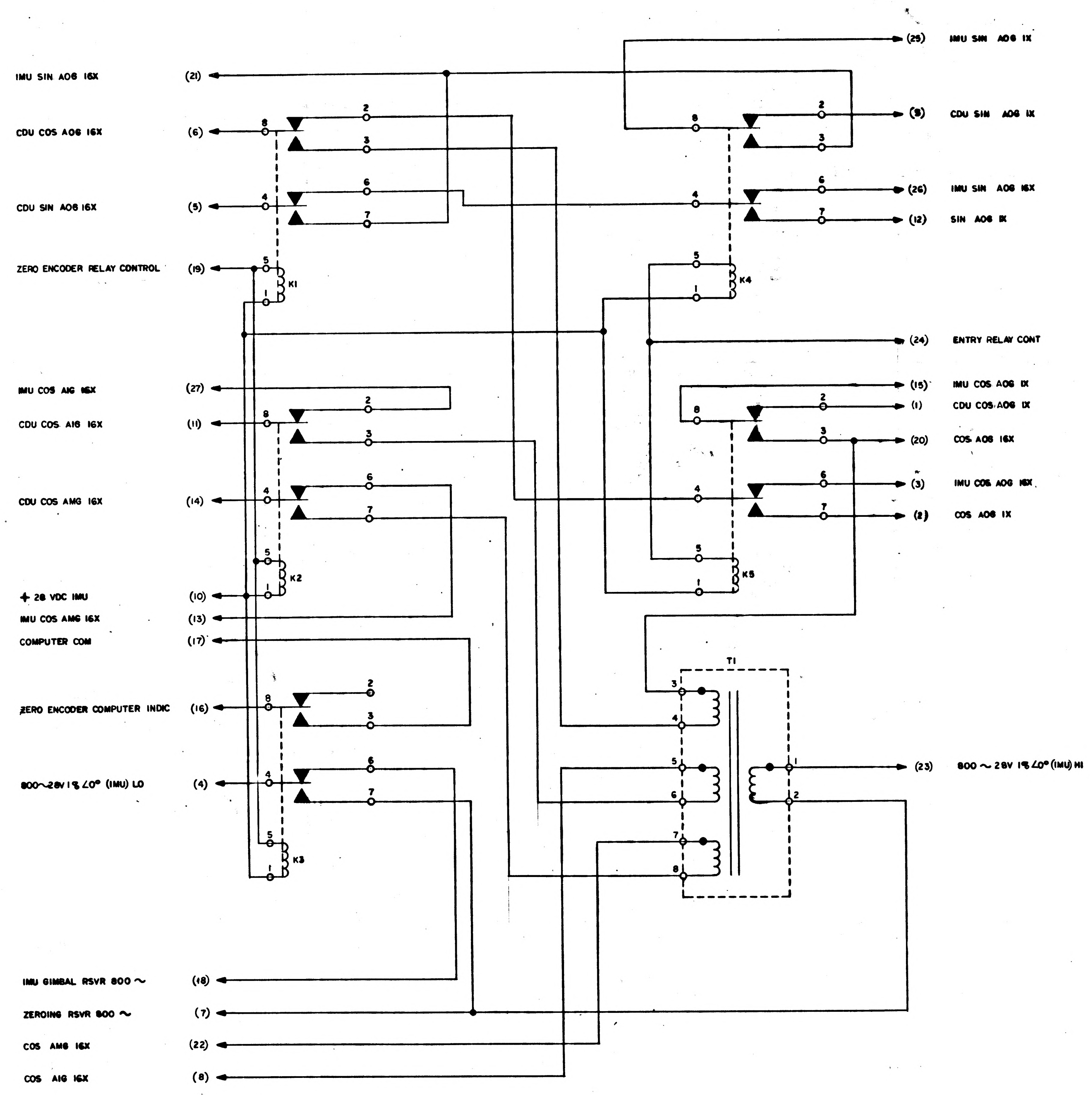
REVISIONS TDCR 01449

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01866	9-2-63	J.J.M. WK.



IMU SIN AOG 16X (21)
CDU COS AOG 16X (6)
CDU SIN AOG 16X (5)
ZERO ENCODER RELAY CONTROL (19)
K1
IMU COS AIG 16X (27)
CDU COS AIG 16X (11)
CDU COS AMG 16X (14)
K2
+ 28 VDC IMU (10)
IMU COS AMG 16X (13)
COMPUTER COM (17)
ZERO ENCODER COMPUTER INDIC (16)
800~28V 1% ∠0° (IMU) LO (4)
K3
IMU GIMBAL RSVR 800 ~ (18)
ZEROING RSVR 800 ~ (7)
COS AMG 16X (22)
COS AIG 16X (8)
(25) IMU SIN AOG 1X
(9) CDU SIN AOG 1X
(26) IMU SIN AOG 16X
(12) SIN AOG 1X
K4
(24) ENTRY RELAY CONT
(15) IMU COS AOG 1X
(1) CDU COS AOG 1X
(20) COS AOG 16X
(3) IMU COS AOG 16X
(2) COS AOG 1X
K5
T1
(23) 800 ~ 28V 1% ∠0° (IMU) HI

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING	CKT. NO. USED ON
T1	1010405	TRANSFORMER				
K1	1010353-1	RELAY				
K2	↓	↓				
K3	↓	↓				
K4	↓	↓				
K5	↓	↓				

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN J. Conley DATE 4-2-63
CHECKED
APPROVAL R. J. Therrien 4/3/63
APPROVAL
NASA APPROVAL 5 Jun 63
MIT APPROVAL 5 Jun 63

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CDU ZEROING TRANSFORMER, RELAYS AND ENTRY RELAYS

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010056
SCALE | WT | SHEET OF

1010056

MASTER

INCHES
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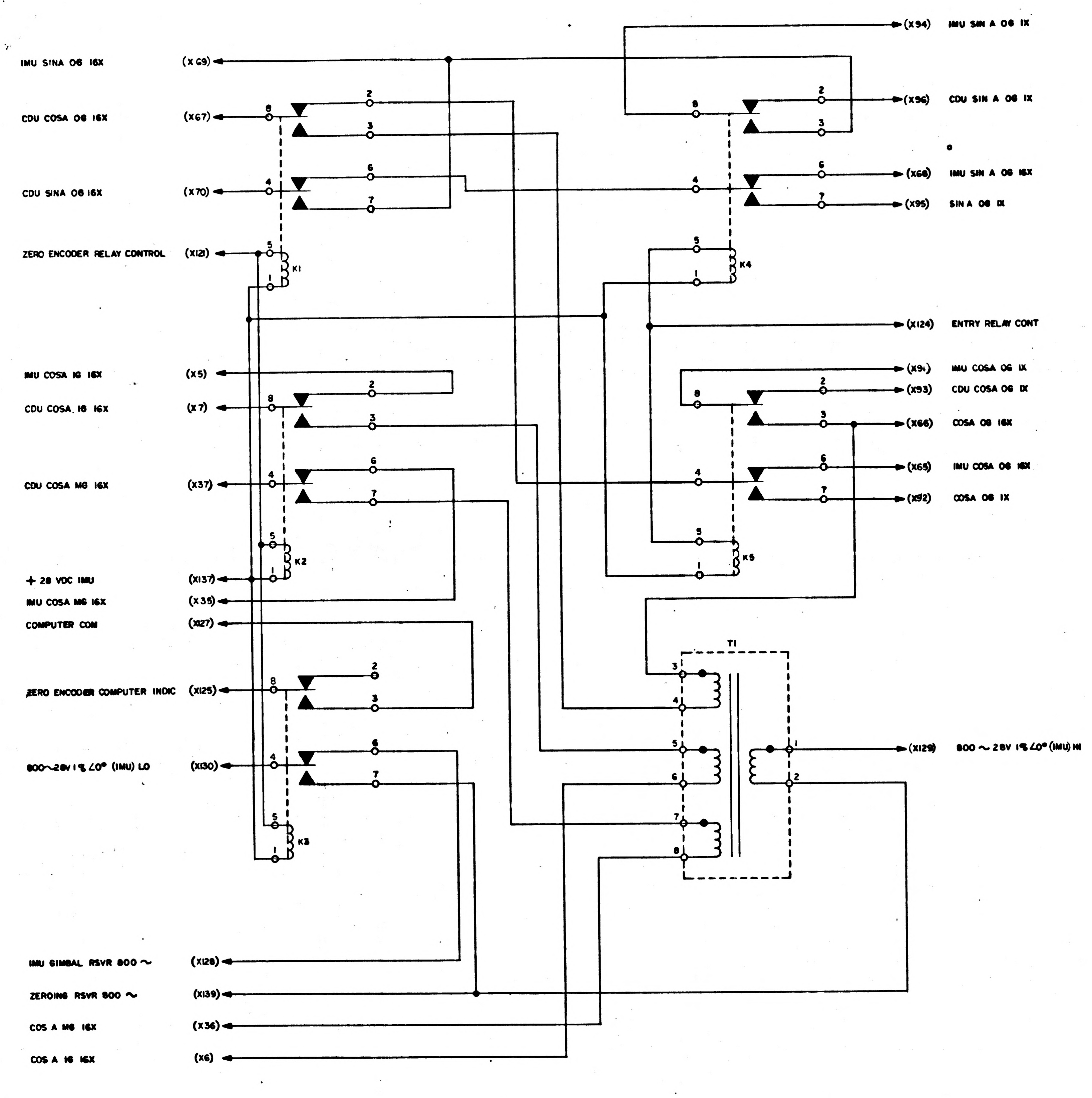
REVISIONS TDCC 01449

SYM	DESCRIPTION	DATE	APPROVAL


IMU SINA OG 16X (X69)
CDU COSA OG 16X (X67)
CDU SINA OG 16X (X70)
ZERO ENCODER RELAY CONTROL (X121)
IMU COSA IG 16X (X5)
CDU COSA. IG 16X (X7)
CDU COSA MG 16X (X37)
+ 28 VDC IMU (X137)
IMU COSA MG 16X (X35)
COMPUTER COM (X127)
ZERO ENCODER COMPUTER INDIC (X125)
800~28V 1% ∠0° (IMU) LO (X130)
IMU GIMBAL RSVR 800 ~ (X128)
ZEROING RSVR 800 ~ (X139)
COS A MG 16X (X36)
COS A IG 16X (X6)
(X94) IMU SIN A OG IX
(X96) CDU SIN A OG IX
(X68) IMU SIN A OG 16X
(X95) SIN A OG IX
(X124) ENTRY RELAY CONT
(X91) IMU COSA OG IX
(X93) CDU COSA OG IX
(X66) COSA OG 16X
(X65) IMU COSA OG 16X
(X92) COSA OG IX
(X129) 800 ~ 28V 1% ∠0° (IMU) HI
K1
K2
K3
K4
K5
T1

NOTES:
INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING	CKT. NO. USED ON
T1	1010405	TRANSFORMER				
K1	1010353-1	RELAY				
K2	↓	↓				
K3						
K4						
K5						

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. Conley DATE 4-3-63
CHECKED
APPROVAL R. J. [illegible] 4/3/63
APPROVAL
NASA APPROVAL [illegible] 5 Jun 63
MIT APPROVAL W. [illegible] 5 Jun 63

MANNED SPACECRAFT CENTER
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CDU ZEROING TRANSFORMER, RELAYS AND ENTRY RELAYS

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010056
SCALE
WT
SHEET OF

1010056

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

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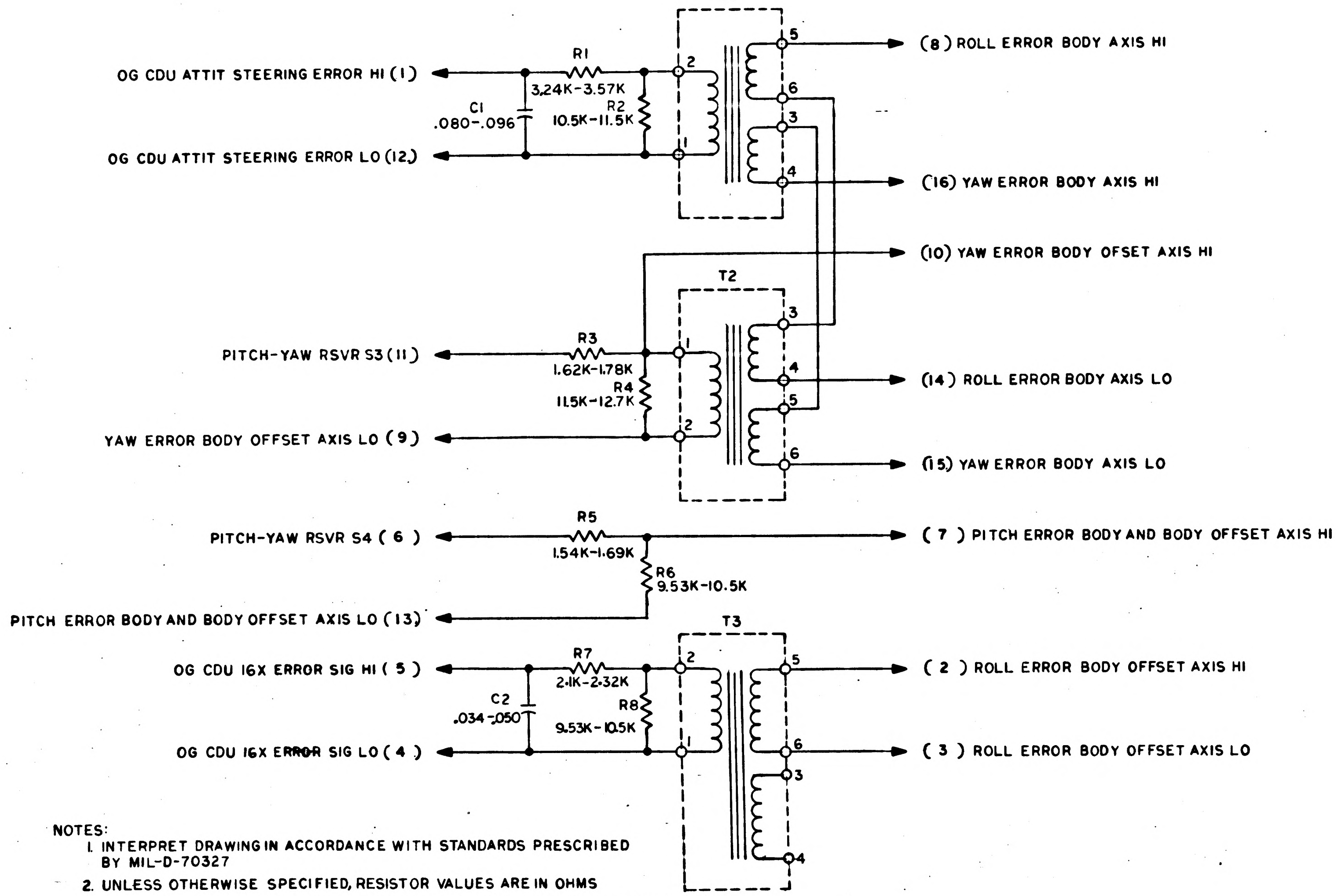
REVISIONS TDRR 01449

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02152	7-29-63	J.J.H. WR.


T1
R1
3.24K-3.57K
R2
10.5K-11.5K
C1
.080-.096
OG CDU ATTIT STEERING ERROR HI (1)
OG CDU ATTIT STEERING ERROR LO (12)
2
1
5
6
3
4
(8) ROLL ERROR BODY AXIS HI
(16) YAW ERROR BODY AXIS HI
(10) YAW ERROR BODY OFSET AXIS HI
T2
R3
1.62K-1.78K
R4
11.5K-12.7K
PITCH-YAW RSVR S3 (11)
YAW ERROR BODY OFFSET AXIS LO (9)
(14) ROLL ERROR BODY AXIS LO
(15) YAW ERROR BODY AXIS LO
R5
1.54K-1.69K
R6
9.53K-10.5K
PITCH-YAW RSVR S4 (6)
PITCH ERROR BODY AND BODY OFFSET AXIS LO (13)
(7) PITCH ERROR BODY AND BODY OFFSET AXIS HI
T3
R7
2.1K-2.32K
R8
9.53K-10.5K
C2
.034-.050
OG CDU 16X ERROR SIG HI (5)
OG CDU 16X ERROR SIG LO (4)
(2) ROLL ERROR BODY OFFSET AXIS HI
(3) ROLL ERROR BODY OFFSET AXIS LO

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-NE	RESISTOR	3.24K-3.57K	1%	1/8 W
R2	↓	↓	10.5K-11.5K	↓	↓
R3	↓	↓	1.62K-1.78K	↓	↓
R4	↓	↓	11.5K-12.7K	↓	↓
R5	↓	↓	1.54K-1.69K	↓	↓
R6	↓	↓	9.53K-10.5K	↓	↓
R7	↓	↓	2.1K-2.32K	↓	↓
R8	↓	↓	9.53K-10.5K	↓	↓
C1	1010316-NE	CAPACITOR	.080UF-.096UF	1%	100V
C2	↓ -NE	↓	.034UF-.050UF	↓	↓
T1	1010451-1	TRANSFORMER			
T2	↓	↓			
T3	↓	↓			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

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INSTRUMENTATION LAB
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CONTRACT
DRAWN E. O'Connell DATE 5-23-63
CHECKED
APPROVAL R.J. Therrien 6/3/63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
FIXED RESOLUTION TRANSFORMATION AND ENTRY MODE

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010057
SCALE
WT
SHEET 1 OF 1

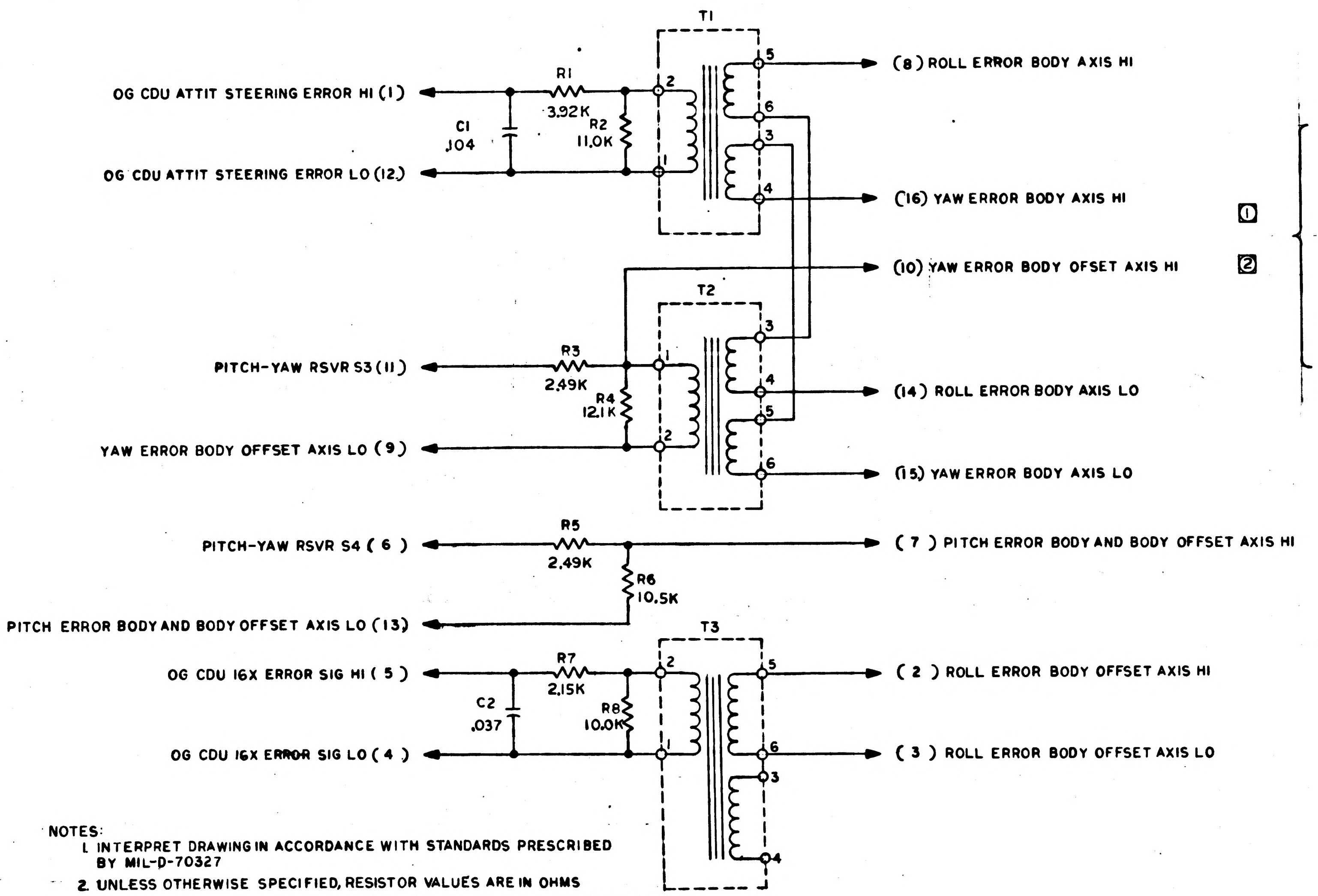
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010057 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TORR 01449

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02152	7-24-63	J.J.M. WH.
B	REVISED PER TDRR 09675	19 Nov 63	[illegible]


T1
R1
3.92K
C1
.104
R2
11.0K
OG CDU ATTIT STEERING ERROR HI (1)
OG CDU ATTIT STEERING ERROR LO (12)
(8) ROLL ERROR BODY AXIS HI
(16) YAW ERROR BODY AXIS HI
(10) YAW ERROR BODY OFSET AXIS HI
T2
R3
2.49K
R4
12.1K
PITCH-YAW RSVR S3 (11)
YAW ERROR BODY OFFSET AXIS LO (9)
(14) ROLL ERROR BODY AXIS LO
(15) YAW ERROR BODY AXIS LO
R5
2.49K
R6
10.5K
PITCH-YAW RSVR S4 (6)
PITCH ERROR BODY AND BODY OFFSET AXIS LO (13)
(7) PITCH ERROR BODY AND BODY OFFSET AXIS HI
T3
R7
2.15K
C2
.037
R8
10.0K
OG CDU 16X ERROR SIG HI (5)
OG CDU 16X ERROR SIG LO (4)
(2) ROLL ERROR BODY OFFSET AXIS HI
(3) ROLL ERROR BODY OFFSET AXIS LO
1
2
3
4
5
6

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-365	PESISTOR	3.92 K	1%	1/8 W
R2	-452		11.0 K		
R3	-328		2.49 K		
R4	-460		12.1 K		
R5	-328		2.49 K		
R6	-448		10.5 K		
R7	-316		2.15 K		
R8	-444		10.0 K		
C1	1010316-82	CAPACITOR	.104	1%	100V
C2	-94		.037		
T1	1010451-1	TRANSFORMER			
T2					
T3					

①
②

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

① COMPONET VALUES DETERMIND BY ICD MH01-0124-416
② COMPONET VALUES DETERMIND BY ICD MH01-0125-416

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
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TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

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APPROVAL R.J. Thurs 6/3/63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
FIXED RESOLUTION TRANSFORMATION
AND ENTRY MODE

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010057
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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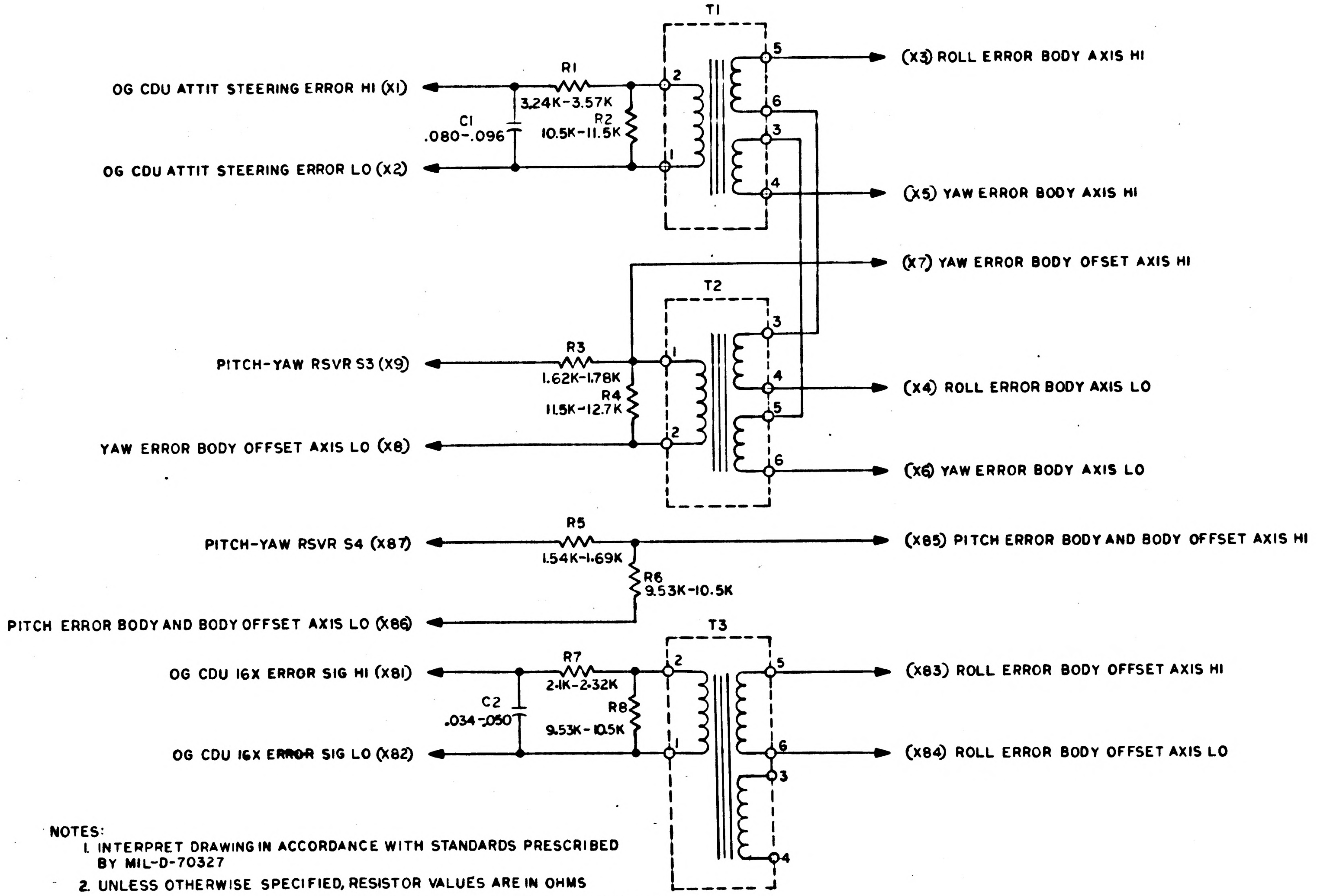
REVISIONS TO RR 01449

SYM	DESCRIPTION	DATE	APPROVAL


T1
R1
3.24K-3.57K
R2
10.5K-11.5K
C1
.080-.096
OG CDU ATTIT STEERING ERROR HI (X1)
OG CDU ATTIT STEERING ERROR LO (X2)
(X3) ROLL ERROR BODY AXIS HI
(X5) YAW ERROR BODY AXIS HI
(X7) YAW ERROR BODY OFSET AXIS HI
T2
R3
1.62K-1.78K
R4
11.5K-12.7K
PITCH-YAW RSVR S3 (X9)
YAW ERROR BODY OFFSET AXIS LO (X8)
(X4) ROLL ERROR BODY AXIS LO
(X6) YAW ERROR BODY AXIS LO
R5
1.54K-1.69K
R6
9.53K-10.5K
PITCH-YAW RSVR S4 (X87)
(X85) PITCH ERROR BODY AND BODY OFFSET AXIS HI
PITCH ERROR BODY AND BODY OFFSET AXIS LO (X86)
T3
R7
2.1K-2.32K
R8
9.53K-10.5K
C2
.034-.050
OG CDU 16X ERROR SIG HI (X81)
OG CDU 16X ERROR SIG LO (X82)
(X83) ROLL ERROR BODY OFFSET AXIS HI
(X84) ROLL ERROR BODY OFFSET AXIS LO
1
2
3
4
5
6

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED, RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-NE	RESISTOR	3.24K-3.57K	1%	1/8 W
R2	↓	↓	10.5K-11.5K	↓	↓
R3	↓	↓	1.62K-1.78K	↓	↓
R4	↓	↓	11.5K-12.7K	↓	↓
R5	↓	↓	1.54K-1.69K	↓	↓
R6	↓	↓	9.53K-10.5K	↓	↓
R7	↓	↓	2.1K-2.32K	↓	↓
R8	↓	↓	9.53K-10.5K	↓	↓
C1	1010316-NE	CAPACITOR	.080UF-.096UF	1%	100V
C2	↓ -NE	↓	.034UF-.050UF	↓	↓
T1	1010451-1	TRANSFORMER			
T2	↓	↓			
T3	↓	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

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CONTRACT
DRAWN E. O'Connell DATE 5-23-63
CHECKED
APPROVAL R. J. Thursion 6/3/63
APPROVAL
NASA APPROVAL
MIT APPROVAL

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SCHEMATIC
FIXED RESOLUTION TRANSFORMATION AND ENTRY MODE

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010057
SCALE
WT
SHEET 1 OF 1

1010057

MASTER

INCHES
0 1 2
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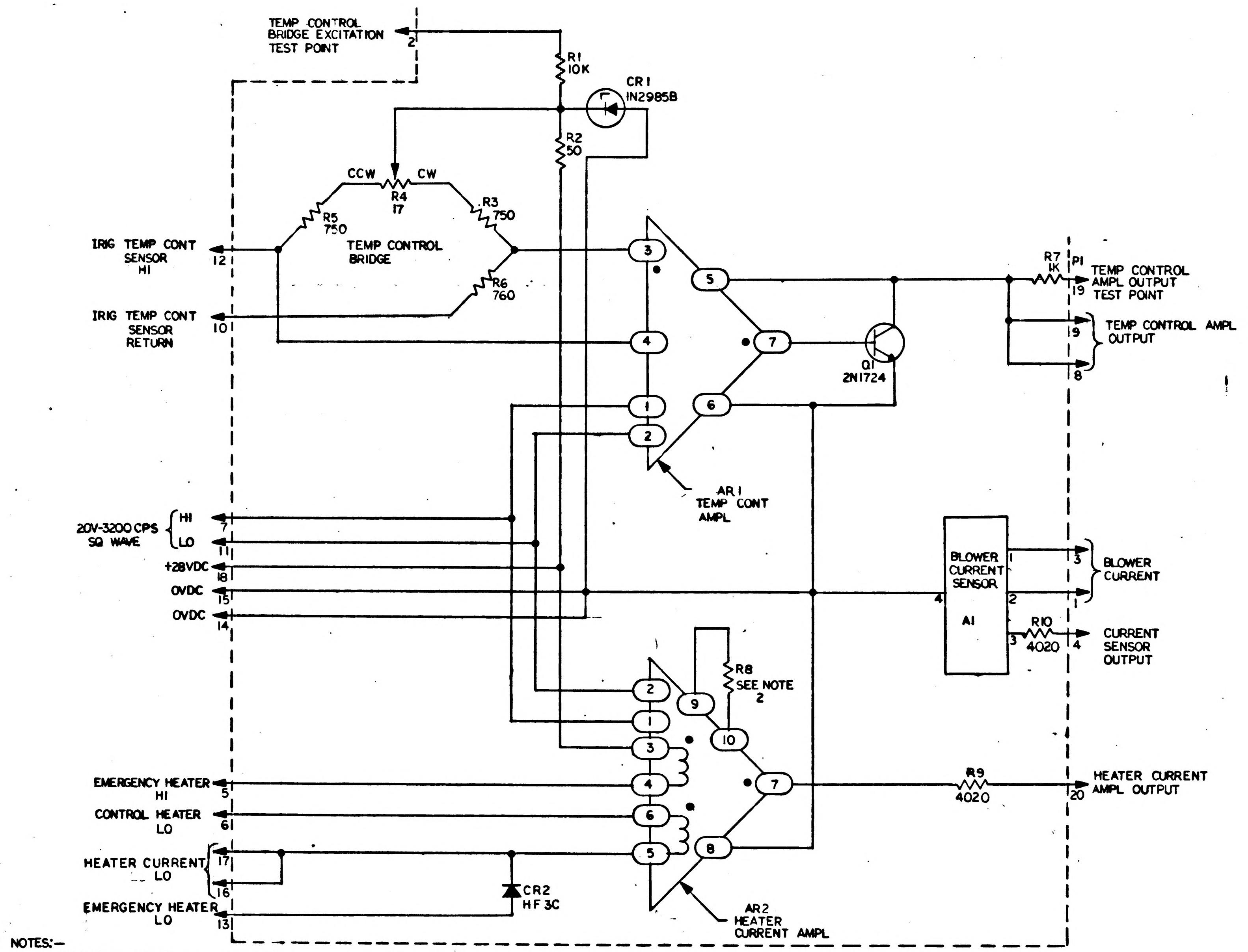
REVISIONS TDRR 01845

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02150	7-24-63	J.d.M. WK


TEMP CONTROL BRIDGE EXCITATION TEST POINT
2
R1 10K
CR1 IN2985B
R2 50
CCW
CW
R4 17
R5 750
R3 750
TEMP CONTROL BRIDGE
R6 760
IRIG TEMP CONT SENSOR HI
12
IRIG TEMP CONT SENSOR RETURN
10
3
4
1
2
5
6
7
Q1 2N1724
AR1 TEMP CONT AMPL
R7 1K
P1
19
TEMP CONTROL AMPL OUTPUT TEST POINT
9
TEMP CONTROL AMPL OUTPUT
8
20V-3200 CPS SQ WAVE
HI
LO
7
11
+28VDC
18
OVDC
15
OVDC
14
BLOWER CURRENT SENSOR
A1
BLOWER CURRENT
CURRENT SENSOR OUTPUT
R10 4020
R8 SEE NOTE 2
10
EMERGENCY HEATER HI
5
CONTROL HEATER LO
6
HEATER CURRENT LO
17
16
EMERGENCY HEATER LO
13
CR2 HF 3C
AR2 HEATER CURRENT AMPL
R9 4020
HEATER CURRENT AMPL OUTPUT
20

NOTES:—
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. EXTERNAL RESISTANCE SUPPLIED WITH AMPLIFIER
3. RESISTOR VALUES ARE IN OHMS

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-56	RESISTOR	10K	±2%	1/4W
R2	1010399 -16	↓	50	±5%	5W
R3	1010449 -1	↓	750	0.01%	3/4W
R4	1010453 -1	↓	17	±10%	1/4 W
R5	1010449 -1	↓	750	0.01%	3/4W
R6	1010449 -2	↓	760	↓	↓
R7	1010312 -36	↓	1K	5%	2W
R8	SEE NOTE 2	↓			1/10 W
R9	1010364-368	↓	4020	±1%	1/8W
R10	1010364-368	↓	4020	±1%	1/8W
CR1	1010331-009	DIODE	IN2985B	5%	10W
CR2	1010322 -001	↓	HF 3C		6 AMPS
Q1	1010273 -1	TRANSISTOR	2N1724		
AR1	1000285	AMPL			
AR2	1000286	AMPL			
A1	1000287	SEN			

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN Louis S. [illegible] DATE [illegible]
CHECKED
APPROVAL [illegible] 7-2-63
APPROVAL
NASA APPROVAL [illegible] 7/2/63
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU TEMP CONTROLLER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010058
SCALE #
WT
SHEET 1 OF 1

1010058 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

8 7 6 5 4 3 2 1

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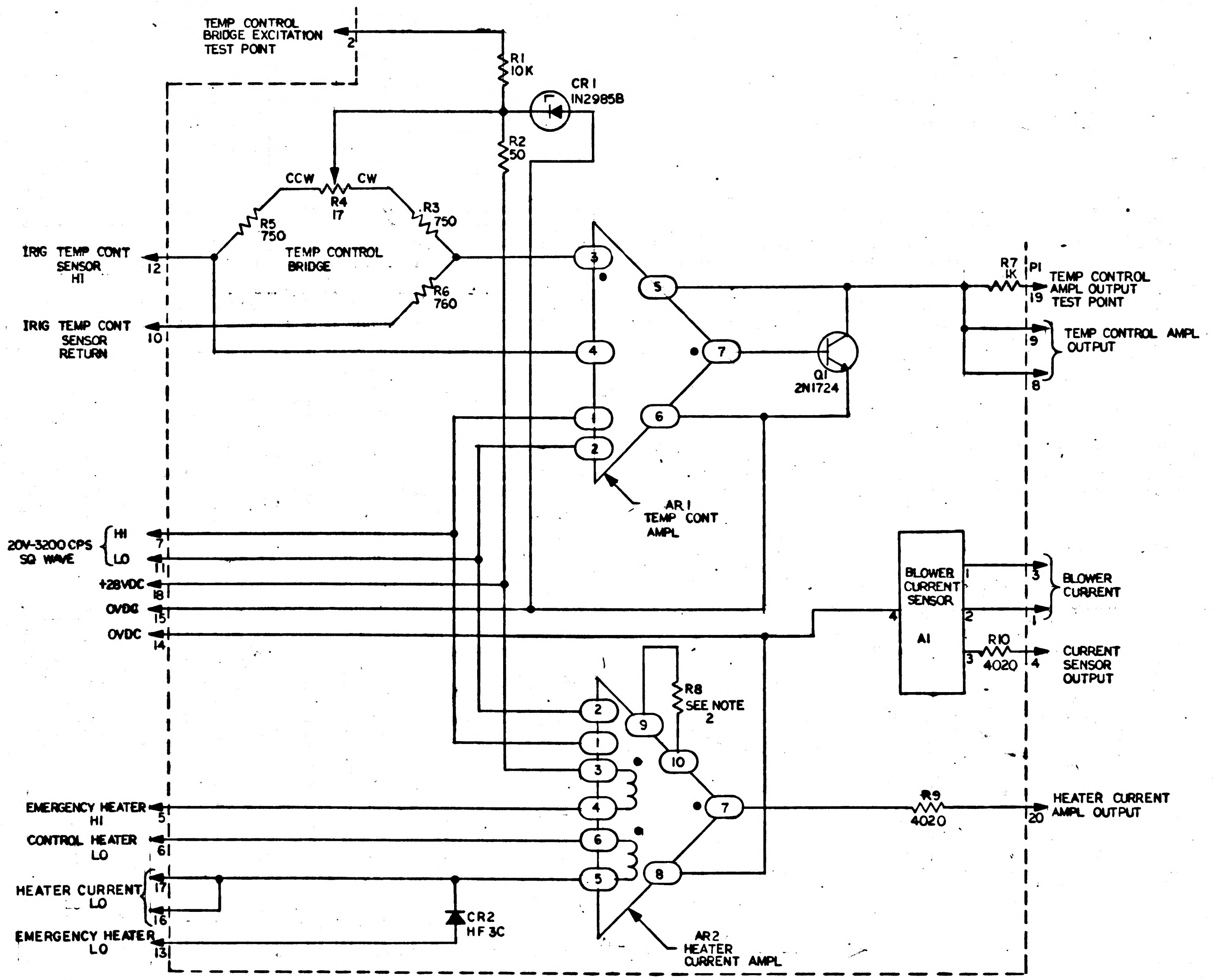
REVISIONS TDRR 01845

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02150	7-20-60	J.J.M.
B	REVISED PER TDRR 07300		
C	REVISED PER TDRR 05864	60	


TEMP CONTROL BRIDGE EXCITATION TEST POINT
2
R1 10K
CR1 IN2985B
R2 50
CCW
CW
R4 17
R5 750
R3 750
TEMP CONTROL BRIDGE
R6 760
IRIG TEMP CONT SENSOR HI
12
IRIG TEMP CONT SENSOR RETURN
10
3
4
1
2
5
7
6
AR1 TEMP CONT AMPL
Q1 2N1724
R7 1K
P1
TEMP CONTROL AMPL OUTPUT TEST POINT
19
TEMP CONTROL AMPL OUTPUT
9
8
20V-3200 CPS SQ WAVE
HI
LO
7
11
+28VDC
18
OVDC
15
OVDC
14
BLOWER CURRENT SENSOR
A1
1
2
3
4
BLOWER CURRENT
R10 4020
CURRENT SENSOR OUTPUT
R8 SEE NOTE 2
9
10
EMERGENCY HEATER HI
5
CONTROL HEATER LO
6
HEATER CURRENT LO
17
16
EMERGENCY HEATER LO
13
CR2 HF 3C
AR2 HEATER CURRENT AMPL
R9 4020
HEATER CURRENT AMPL OUTPUT
20

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -56	RESISTOR	10K	±2%	1/4W
R2	1010399 -16		50	±5%	5W
R3	1010449 -1		750	0.01%	3/4W
R4	1010453 -1		17	±10%	1/4 W
R5	1010449 -1		750	0.01%	3/4W
R6	1010449 -2		760		
R7	1010312 -36		1K	5%	2W
R8	SEE NOTE 2			± 1%	1/10 W
R9	1010364-368		4020	±1%	1/8W
R10	1010364-368		4020	±1%	1/8W
CR1	1010331-009	DIODE	IN2985B	5%	10W
CR2	1010322 -001		HF 3C		
Q1	1010273 -1	TRANSISTOR	2N1724		
AR1	1000285	AMPL			
AR2	1000286	AMPL			
A1	1000287	SEN			

NOTES:—

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R8 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO. AS MARKED ON AMPLIFIER. RANGE OF OF VALUES 499 THRU 2K OHMS PER PART ~~NO 1010311-97~~ THRU 1010311-155.
3. RESISTOR VALUES ARE IN OHMS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Louis Maul DATE
CHECKED
APPROVAL 7-2-63
APPROVAL
NASA APPROVAL 7/2/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU TEMP CONTROLLER

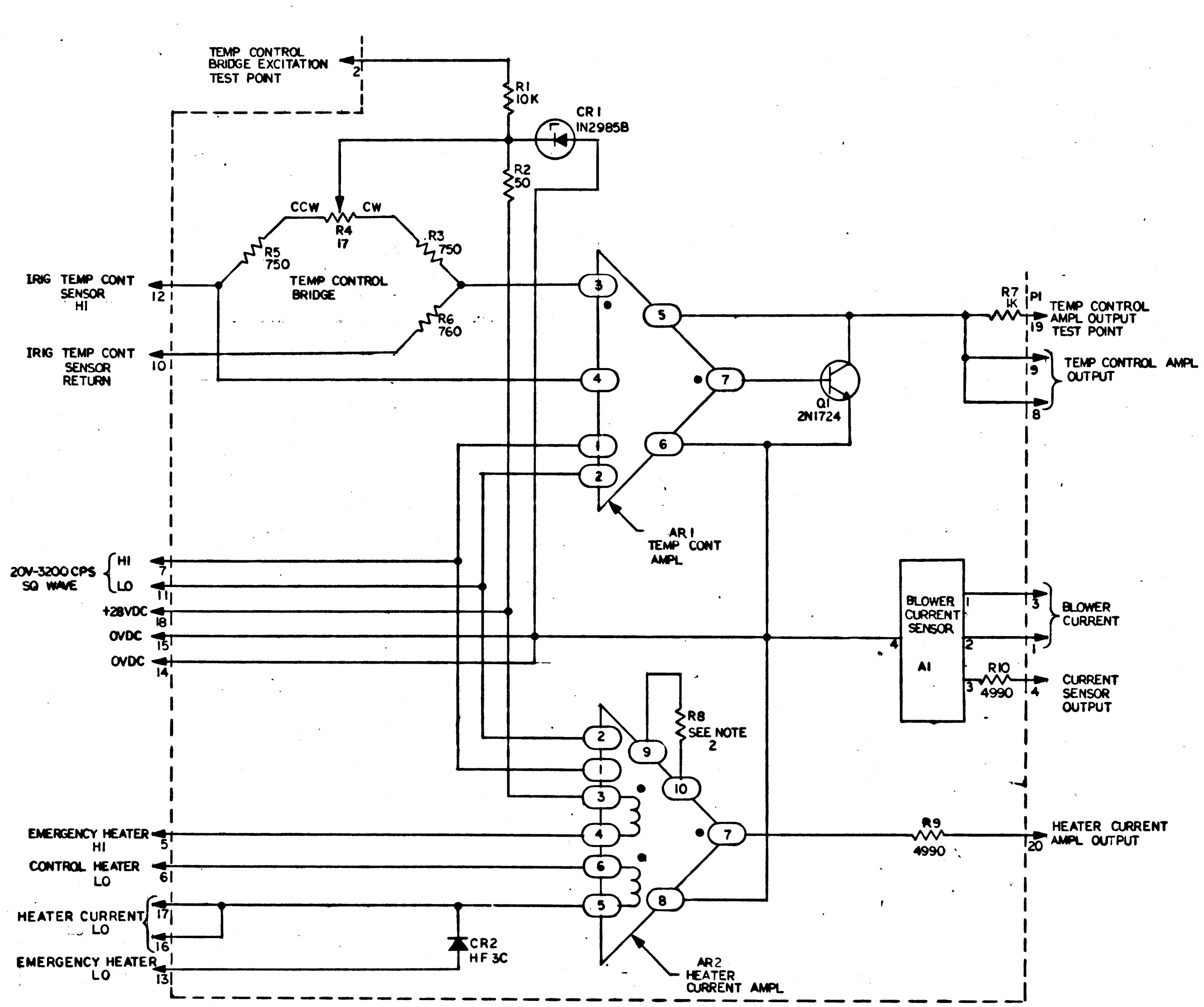
CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010058
SCALE —
WT
SHEET 1 OF 1

8 7 6 5 4 3 2 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TO RR 01845			
SYM	DESCRIPTION	DATE	APPROVAL


TEMP CONTROL BRIDGE EXCITATION TEST POINT
2
R1 10K
CR1 IN2985B
R2 50
CCW
CW
R4 17
R5 750
R3 750
TEMP CONTROL BRIDGE
R6 760
IRIG TEMP CONT SENSOR HI
12
IRIG TEMP CONT SENSOR RETURN
10
3
4
5
7
6
1
2
Q1 2N1724
AR1 TEMP CONT AMPL
R7 1K
P1
TEMP CONTROL AMPL OUTPUT TEST POINT
19
TEMP CONTROL AMPL OUTPUT
9
8
20V-3200 CPS SQ WAVE
HI
LO
7
11
+28VDC
18
OVDC
15
OVDC
14
BLOWER CURRENT SENSOR
A1
BLOWER CURRENT
R10 4990
CURRENT SENSOR OUTPUT
R8 SEE NOTE 2
9
10
EMERGENCY HEATER HI
5
CONTROL HEATER LO
6
HEATER CURRENT LO
17
16
EMERGENCY HEATER LO
13
CR2 HF 3C
AR2 HEATER CURRENT AMPL
R9 4990
HEATER CURRENT AMPL OUTPUT
20

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -56	RESISTOR	10K	±2%	1/4W
R2	1010399 -16	↓	50	±5%	5W
R3	1010449 -1		750	0.01%	3/4W
R4	1010453 -1		17	±10%	1/4 W
R5	1010449 -1		750	0.01%	3/4W
R6	1010449 -2		760	↓	↓
R7	1010312 -34		1K	5%	2W
R8	SEE NOTE 2				1/10 W
R9	1010364-386		4990	±1%	1/8W
R10	1010364-386	↓	4990	±1%	1/8W
CR1	1010331-009	DIODE	IN2985B	5%	10W
CR2	1010322 -001	↓	HF3C		6 AMPS
Q1	1010273 -1	TRANSISTOR	2N1724		
AR1	1000285	AMPL			
AR2	1000286	AMPL			
A1	1000287	SEN			

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. EXTERNAL RESISTANCE SUPPLIED WITH AMPLIFIER
3. RESISTOR VALUES ARE IN OHMS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Louis Novak DATE
CHECKED
APPROVAL Bart Hart 7-2-63
APPROVAL
NASA APPROVAL 7/2/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU TEMP CONTROLLER

CODE IDENT NO. | SIZE D | NASA DRAWING NO. 1010058
SCALE — | WT | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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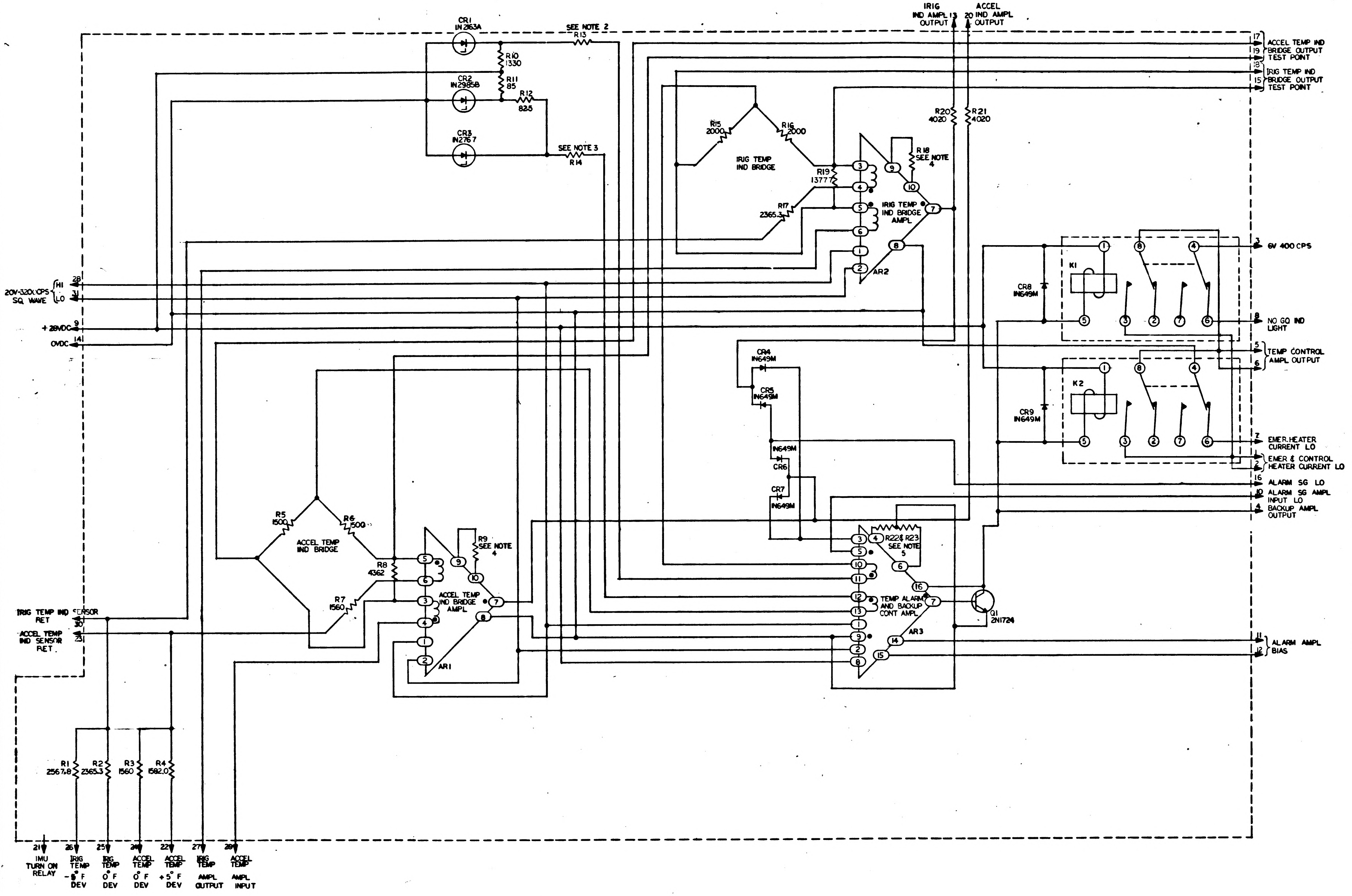
REVISIONS TDRR 01446			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02149	7-26-62	[illegible]


CR1
IN2163A
SEE NOTE 2
R13
R10
1330
CR2
IN2985B
R11
85
R12
825
CR3
IN2767
SEE NOTE 3
R14
IRIG IND AMPL OUTPUT 13
ACCEL 20 IND AMPL OUTPUT
17 ACCEL TEMP IND
19 BRIDGE OUTPUT TEST POINT
18 IRIG TEMP IND
15 BRIDGE OUTPUT TEST POINT
R15 2000
R16 2000
IRIG TEMP IND BRIDGE
R19 13777
R17 2365.3
R20 4020
R21 4020
R18 SEE NOTE 4
IRIG TEMP IND BRIDGE AMPL
AR2
3 6V 400 CPS
K1
CR8 IN649M
8 NO GO IND LIGHT
5 6 TEMP CONTROL AMPL OUTPUT
K2
CR9 IN649M
7 EMER HEATER CURRENT LO
1 EMER & CONTROL HEATER CURRENT LO
16 ALARM SG LO
10 ALARM SG AMPL INPUT LO
4 BACKUP AMPL OUTPUT
CR4 IN649M
CR5 IN649M
IN649M CR6
CR7 IN649M
20V-320 CPS SQ WAVE HI 28 LO 31
+28VDC 9
OVDC 14
R5 1500
R6 1500
ACCEL TEMP IND BRIDGE
R8 4362
R7 1560
R9 SEE NOTE 4
ACCEL TEMP IND BRIDGE AMPL
AR1
R22 R23 SEE NOTE 5
TEMP ALARM AND BACKUP CONT AMPL
AR3
Q1 2N1724
11 ALARM AMPL
12 BIAS
IRIG TEMP IND SENSOR RET 30
ACCEL TEMP IND SENSOR RET 23
R1 2567.8
R2 2365.3
R3 1560
R4 1582.0
21 IMU TURN ON RELAY
26 IRIG TEMP -5° F DEV
25 IRIG TEMP 0° F DEV
24 ACCEL TEMP 0° F DEV
22 ACCEL TEMP +5° F DEV
27 IRIG TEMP AMPL OUTPUT
29 ACCEL TEMP AMPL INPUT

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010450 -13	RESISTOR	2567.8	±.01%	1/8W
R2	-12	↓	2365.3	↓	↓
R3	-3	↓	1560	↓	↓
R4	-14	↓	1582	↓	↓
R5	-2	↓	1500	↓	↓
R6	-2	↓	1500	↓	↓
R7	-3	↓	1560	↓	↓
R8	↓ -11	↓	4362	↓	↓
R9	SEE NOTE 4	↓			1/10W
R10	1010452-167	↓	1330	±1%	1W
R11	1010361-112	↓	85	3%	5W
R12	1010364-44	↓	82.5	±1%	1/8W
R13	SEE NOTE 2	↓		±1%	1/10W
R14	SEE NOTE 3	↓		±1%	1/10W
R15	1010450 - 9	↓	2000	±.01%	1/8W
R16	-9	↓	2000	↓	↓
R17	↓ -12	↓	2365.3	↓	↓
R18	SEE NOTE 4	↓			1/10W
R19	1010450 -10	↓	13777	±.01%	1/8W
R20	1010364-368	↓	4020	±1%	↓
R21	↓ -368	↓	4020	↓	↓
R22	SEE NOTES 5	↓		±1%	1/10W
R23	SEE NOTE 5	↓		±1%	1/10W
CR1	1010440	DIODE	IN2163A	± 27"	3/4W
CR2	1010331-009	↓	IN2985B	± 5%	10W
CR3	1010441	↓	IN2767	± 5%	2W
CR4	1010362 -3	↓	IN649M		600 MW
CR5	↓	↓	↓		↓
CR6	↓	↓	↓		↓
CR7	↓	↓	↓		↓
CR8	↓	↓	↓		↓
CR9	↓	↓	↓		↓
Q1	1010273 -1	TRANSISTOR	2N1724		
K1	1010353 -1	RELAY	33WK-2		
K2	1010353 -1	RELAY	33WK-2		
AR1	1000284	AMPL			
AR2	1000284	AMPL			
AR3	1000283	AMPL			

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R13 TO BE SUPPLIED PER PART NO 1010377-113 THRU -206 IN 2 OHM INCREMENTS.
3. R14 " " " " " " 1010377-141 " -191 " " " "
4. EXTERNAL RESISTORS SUPPLIED WITH AMPL
5. R22 AND 23 TO BE SUPPLIED PER PART NO. 1010377-212 THRU -262 IN 10 OHM INCREMENTS
6 RESISTOR VALUES ARE IN OHMS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN [illegible] DATE [illegible]
CHECKED [illegible] 7-3-62
APPROVAL [illegible] 7-2-62
APPROVAL
NASA APPROVAL [illegible] 7/26/62
MIT APPROVAL [illegible] 2/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU TEMP INDICATOR ALARM AND BACKUP CONTROLLER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010059
SCALE — WT SHEET 1 OF 1

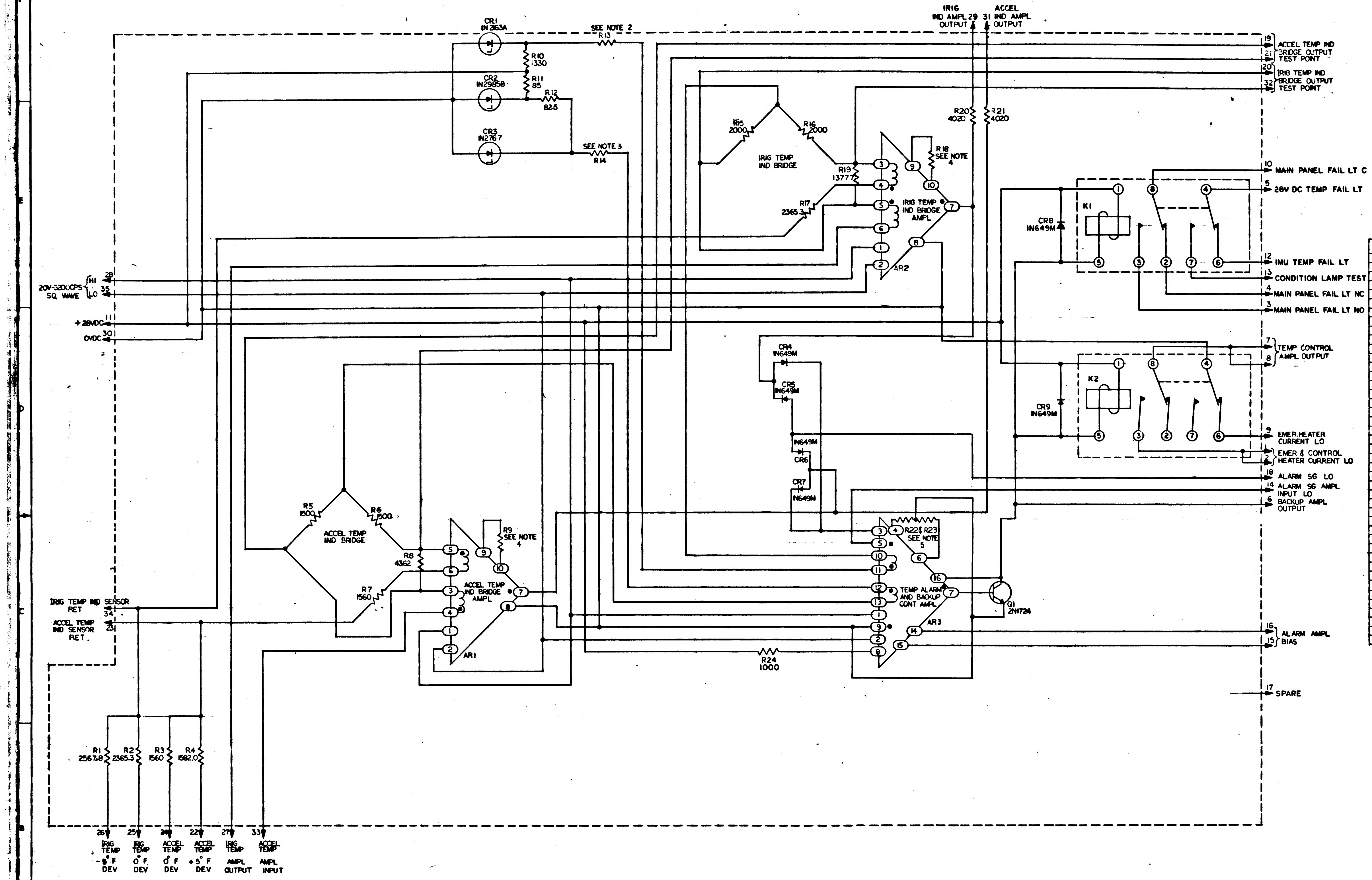
1010059 A

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 01446

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02149	7-4-63	JJH WR
B	REVISED PER TDRR 03084	9-12-63	WR


CR1
IN2163A
SEE NOTE 2
R13
R10
1330
CR2
IN2985B
R11
85
R12
825
CR3
IN2767
SEE NOTE 3
R14
IRIG
IND AMPL 29
OUTPUT
31 ACCEL
IND AMPL
OUTPUT
19
21
ACCEL TEMP IND BRIDGE OUTPUT TEST POINT
20
32
IRIG TEMP IND BRIDGE OUTPUT TEST POINT
R15
2000
R16
2000
IRIG TEMP IND BRIDGE
R19
13777
R17
2365.3
R18
SEE NOTE 4
IRIG TEMP IND BRIDGE AMPL
AR2
R20
4020
R21
4020
10
MAIN PANEL FAIL LT C
5
28V DC TEMP FAIL LT
K1
CR8
IN649M
12
IMU TEMP FAIL LT
13
CONDITION LAMP TEST
4
MAIN PANEL FAIL LT NC
3
MAIN PANEL FAIL LT NO
20V-3200CPS SQ WAVE
HI 28
LO 35
+28VDC 11
OVDC 30
7
8
TEMP CONTROL AMPL OUTPUT
K2
CR9
IN649M
9
EMER.HEATER CURRENT LO
1
2
EMER & CONTROL HEATER CURRENT LO
18
ALARM SG LO
14
ALARM SG AMPL INPUT LO
6
BACKUP AMPL OUTPUT
CR4
IN649M
CR5
IN649M
IN649M
CR6
CR7
IN649M
R5
1500
R6
1500
ACCEL TEMP IND BRIDGE
R8
4362
R7
1560
R9
SEE NOTE 4
ACCEL TEMP IND BRIDGE AMPL
AR1
R22 & R23
SEE NOTE 5
TEMP ALARM AND BACKUP CONT AMPL
AR3
Q1
2N1724
R24
1000
16
15
ALARM AMPL BIAS
17
SPARE
IRIG TEMP IND SENSOR RET 34
ACCEL TEMP IND SENSOR RET. 23
R1
2567.8
R2
2365.3
R3
1560
R4
1582.0
26 IRIG TEMP -5°F DEV
25 IRIG TEMP 0°F DEV
24 ACCEL TEMP 0°F DEV
22 ACCEL TEMP +5°F DEV
27 IRIG TEMP AMPL OUTPUT
33 ACCEL TEMP AMPL INPUT

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010450 -13	RESISTOR	2567.8	±.01%	1/8W
R2	-12		2365.3		
R3	-3		1560		
R4	-14		1582		
R5	-2		1500		
R6	-2		1500		
R7	-3		1560		
R8	↓ -11		4362	↓	↓
R9	SEE NOTE 4				1/10W
R10	1010452-167		1330	±1%	1W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	±1%	1/8W
R13	SEE NOTE 2			±1%	1/10W
R14	SEE NOTE 3			±1%	1/10W
R15	1010450 - 9		2000	±.01%	1/8W
R16	-9		2000		
R17	↓ -12		2365.3	↓	↓
R18	SEE NOTE 4				1/10W
R19	1010450 -10		13777	±.01%	1/8W
R20	1010364 368		4020	±1%	
R21	↓ -368		4020	↓	↓
R22	SEE NOTE 5			±.1%	1/10W
R23	SEE NOTE 5			±1%	1/10W
R24	1010604-22	↓	1000	± 1%	1W
CR1	1010440	DIODE	IN2163A	± 2%	3/4W
CR2	SEE NOTE 7		IN2985B	± 5%	10W
CR3	SEE NOTE 7		IN2767	± 5%	2W
CR4	1010362 -3		IN649M		600MW
CR5					
CR6					
CR7					
CR8					
CR9	↓	↓	↓		↓
Q1	1010273 -1	TRANSISTOR	2N1724		
K1	1010353 -1	RELAY	33WK-2		
K2	1010353 -1	RELAY	33WK-2		
AR1	1000284	AMPL			
AR2	1000284	AMPL			
AR3	1000283	AMPL			

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R13 TO BE SELECTED PER ATP 1007081. RANGE OF VALUES PER PART NO. 1010377-113 THRU-206 IN 2 OHM INCREMENTS
3. R14 TO BE SELECTED PER ATP 1007056. RANGE OF VALUES PER PART NO. 1010377-57 THRU-69 AND PART NO. 1010377-113 THRU-191
4. EXTERNAL RESISTORS SUPPLIED WITH AMPL
5. R22 AND 23 TO BE SELECTED PER ATP 1007056. RANGE OF VALUES PER PART NO. 1010377-212 THRU-262 IN 10 OHM INCREMENTS
6. RESISTOR VALUES ARE IN OHMS
7. CR2 1010331-009 AND CR3 1010441 SHALL BE SELECTED SUCH THAT CR2 ZENER VOLTAGE EXCEEDS CR3 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Louis S. Mark DATE 7-2-63
CHECKED 7-2-63
APPROVAL 7-2-63
APPROVAL
NASA APPROVAL 7/2/63
MIT APPROVAL 2 July 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
IMU TEMP INDICATOR ALARM
AND BACKUP CONTROLLER

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010059

SCALE — WT SHEET 1 OF 1

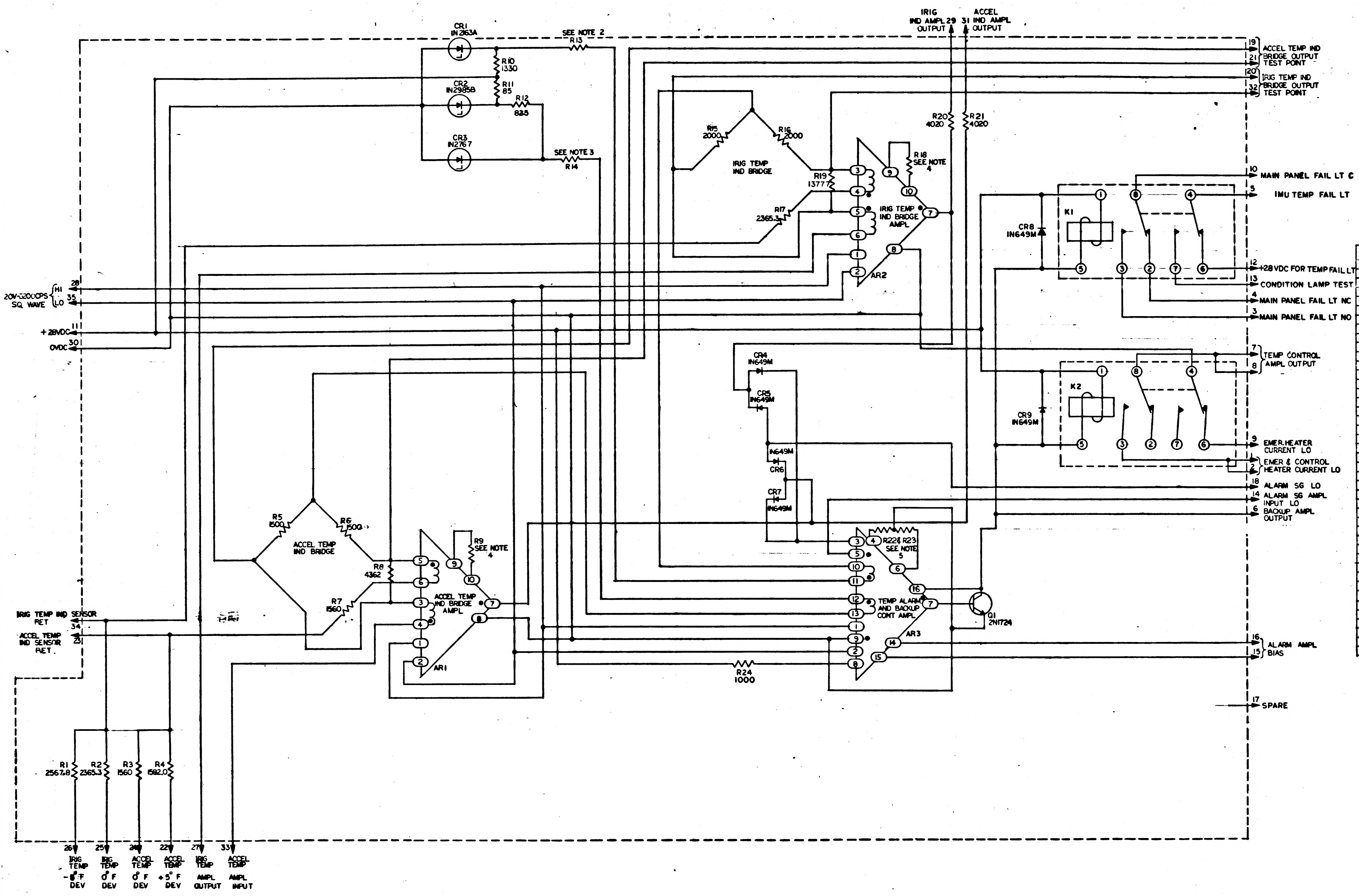
1010059 B

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02149	7-26-63	JJM WR
B	REVISED PER TDRR 03084	9-12-63	WR
C	REVISED PER TDPR 04667	19 Nov 63	[illegible]

REVISIONS TDRR 01446


CR1
IN2163A
SEE NOTE 2
R13
R10
1330
CR2
IN2985B
R11
85
R12
82.5
CR3
IN2767
SEE NOTE 3
R14
IRIG
IND AMPL 29
OUTPUT
ACCEL
31 IND AMPL
OUTPUT
19
21
ACCEL TEMP IND
BRIDGE OUTPUT
TEST POINT
20
32
IRIG TEMP IND
BRIDGE OUTPUT
TEST POINT
R15
2000
R16
2000
IRIG TEMP
IND BRIDGE
R19
13777
R17
2365.3
R18
SEE NOTE
4
IRIG TEMP
IND BRIDGE
AMPL
AR2
R20
4020
R21
4020
10
MAIN PANEL FAIL LT C
5
IMU TEMP FAIL LT
K1
CR8
IN649M
12
+28VDC FOR TEMP FAIL LT
13
CONDITION LAMP TEST
4
MAIN PANEL FAIL LT NC
3
MAIN PANEL FAIL LT NO
20V 3200CPS
SQ. WAVE
HI
LO
28
35
+28VDC
11
OVDC
30
7
8
TEMP CONTROL
AMPL OUTPUT
CR4
IN649M
CR5
IN649M
K2
CR9
IN649M
IN649M
CR6
CR7
IN649M
9
EMER.HEATER
CURRENT LO
1
2
EMER & CONTROL
HEATER CURRENT LO
18
ALARM SG LO
14
ALARM SG AMPL
INPUT LO
6
BACKUP AMPL
OUTPUT
R5
1500
R6
1500
ACCEL TEMP
IND BRIDGE
R8
4362
R7
1560
R9
SEE NOTE
4
ACCEL TEMP
IND BRIDGE
AMPL
AR1
R22 R23
SEE NOTE
5
TEMP ALARM
AND BACKUP
CONT AMPL
AR3
Q1
2N1724
16
15
ALARM AMPL
BIAS
R24
1000
17
SPARE
IRIG TEMP IND SENSOR
RET
34
ACCEL TEMP
IND SENSOR
RET.
23
R1
2567.8
R2
2365.3
R3
1560
R4
1582.0
26
IRIG
TEMP
-5°F
DEV
25
IRIG
TEMP
0°F
DEV
24
ACCEL
TEMP
0°F
DEV
22
ACCEL
TEMP
+5°F
DEV
27
IRIG
TEMP
AMPL
OUTPUT
33
ACCEL
TEMP
AMPL
INPUT

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010450 -13	RESISTOR	2567.8	±.01%	1/8W
R2	-12		2365.3		
R3	-3		1560		
R4	-14		1582		
R5	-2		1500		
R6	-2		1500		
R7	-3		1560		
R8	↓ -11		4362	↓	↓
R9	SEE NOTE 4				1/10W
R10	1010452-167		1330	±1%	1W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	±1%	1/8W
R13	SEE NOTE 2			±1%	1/10W
R14	SEE NOTE 3			±1%	1/10W
R15	1010450 - 9		2000	±.01%	1/8W
R16	-9		2000		
R17	↓ -12		2365.3	↓	↓
R18	SEE NOTE 4				1/10W
R19	1010450 -10		13777	±.01%	1/8W
R20	1010364-368		4020	±1%	
R21	↓ -368		4020	↓	↓
R22	SEE NOTE 5			±.1%	1/10W
R23	SEE NOTE 5			±1%	1/10W
R24	1010604-22	↓	1000	± 1%	1W
CR1	1010440	DIODE	IN2163A	± 2%	3/4W
CR2	SEE NOTE 7		IN2985B	± 5%	10W
CR3	SEE NOTE 7		IN2767	± 5%	2W
CR4	1010362 -3		IN649M		600MW
CR5					
CR6					
CR7					
CR8					
CR9	↓	↓	↓		↓
Q1	1010273 -1	TRANSISTOR	2N1724		
K1	1010353 -1	RELAY	33WK-2		
K2	1010353 -1	RELAY	33WK-2		
AR1	1000284	AMPL			
AR2	1000284	AMPL			
AR3	1000283	AMPL			

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R13 TO BE SELECTED PER ATP 1007081. RANGE OF VALUES PER PART NO. 1010377-113 THRU-206 IN 2 OHM INCREMENTS
3. R14 TO BE SELECTED PER ATP 1007056. RANGE OF VALUES PER PART NO. 1010377-57 THRU-69 AND PART NO. 1010377-113 THRU-191
4. EXTERNAL RESISTORS SUPPLIED WITH AMPL
5. R22 AND 23 TO BE SELECTED PER ATP 1007056. RANGE OF VALUES PER PART NO. 1010377-212 THRU-262 IN 10 OHM INCREMENTS
6. RESISTOR VALUES ARE IN OHMS
7. CR2 1010331-009 AND CR3 1010441 SHALL BE SELECTED SUCH THAT CR2 ZENER VOLTAGE EXCEEDS CR3 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN [illegible] DATE [illegible] 7-63
CHECKED [illegible] 7-2-63
APPROVAL [illegible] 7-2-63
APPROVAL
NASA APPROVAL [illegible] 7/2/63
MIT APPROVAL [illegible] 2 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

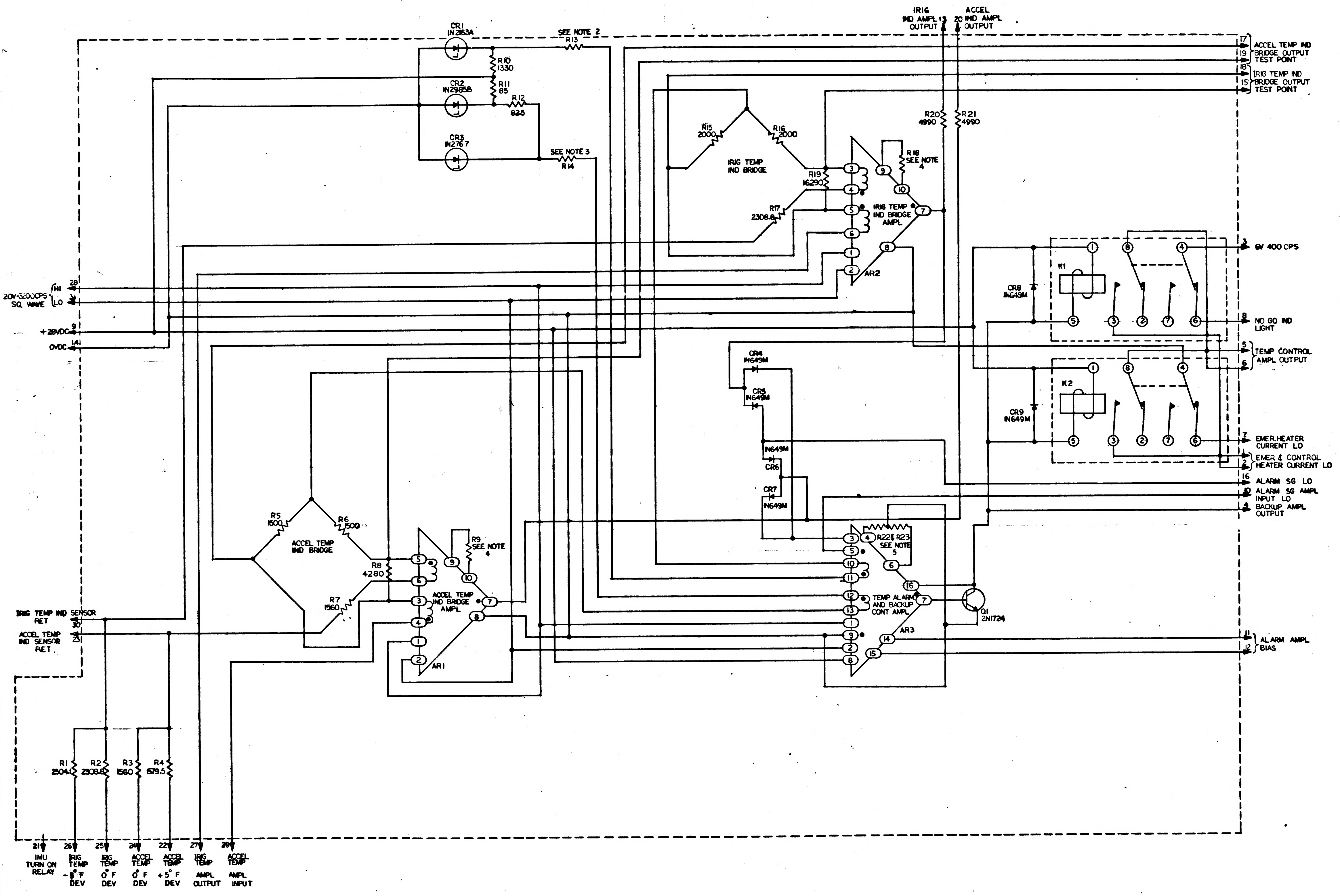
SCHEMATIC
IMU TEMP INDICATOR ALARM AND BACKUP CONTROLLER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010059
SCALE —
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS 7 ORR 01 #6

SYM	DESCRIPTION	DATE	APPROVAL



CR1 IN2163A
CR2 IN2985B
CR3 IN2767
R10 1330
R11 85
R12 825
SEE NOTE 2 R13
SEE NOTE 3 R14
IRIG IND AMPL 13 OUTPUT
ACCEL 20 IND AMPL OUTPUT
R15 2000
R16 2000
IRIG TEMP IND BRIDGE
R17 2308.8
R19 16290
R18 SEE NOTE 4
IRIG TEMP IND BRIDGE AMPL
AR2
R20 4990
R21 4990
17 19 ACCEL TEMP IND BRIDGE OUTPUT TEST POINT
18 15 IRIG TEMP IND BRIDGE OUTPUT TEST POINT
3 6V 400 CPS
K1
K2
CR8 IN649M
CR9 IN649M
8 NO GO IND LIGHT
5 6 TEMP CONTROL AMPL OUTPUT
7 EMER. HEATER CURRENT LO
2 EMER & CONTROL HEATER CURRENT LO
16 ALARM SG LO
10 ALARM SG AMPL INPUT LO
4 BACKUP AMPL OUTPUT
11 12 ALARM AMPL BIAS
CR4 IN649M
CR5 IN649M
IN649M CR6
CR7 IN649M
20V-3200CPS SQ WAVE 28 HI 1 LO
+28VDC 9
0VDC 141
R5 1500
R6 1500
ACCEL TEMP IND BRIDGE
R8 4280
R7 1560
R9 SEE NOTE 4
ACCEL TEMP IND BRIDGE AMPL
AR1
R22 & R23 SEE NOTE 5
TEMP ALARM AND BACKUP CONT AMPL
AR3
Q1 2N1724
IRIG TEMP IND SENSOR RET 30
ACCEL TEMP IND SENSOR RET. 31
R1 2504.1
R2 2308.8
R3 1560
R4 1579.5
21 IMU TURN ON RELAY
26 IRIG TEMP -5° F DEV
25 IRIG TEMP 0° F DEV
24 ACCEL TEMP 0° F DEV
22 ACCEL TEMP +5° F DEV
27 IRIG TEMP AMPL OUTPUT
29 ACCEL TEMP AMPL INPUT

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010450 -5	RESISTOR	2504.1	±.01%	1/8W
R2	-6	↓	2308.8	↓	↓
R3	-3	↓	1560	↓	↓
R4	-4	↓	1579.5	↓	↓
R5	-2	↓	1500	↓	↓
R6	-2	↓	1500	↓	↓
R7	-3	↓	1560	↓	↓
R8	-10	↓	4280	↓	↓
R9	SEE NOTE 4	↓			1/10W
R10	1010452-167	↓	1330	±1%	1W
R11	1010361-112	↓	85	3%	5W
R12	1010364-44	↓	82.5	±1%	1/8W
R13	SEE NOTE 2	↓		±1%	1/10W
R14	SEE NOTE 3	↓		±1%	1/10W
R15	1010450 - 9	↓	2000	±.01%	1/8W
R16	-9	↓	2000	↓	↓
R17	-6	↓	2308.8	↓	↓
R18	SEE NOTE 4	↓			1/10W
R19	1010450 -11	↓	16290	±.01%	1/8W
R20	1010364-386	↓	4990	±1%	↓
R21	-386	↓	4990	↓	↓
R22	SEE NOTE 5	↓		±1%	1/10W
R23	SEE NOTE 5	↓		±1%	1/10W
CR1	1010440	DIODE	IN2163A	± 27°	3/4W
CR2	1010331-009	↓	IN2985B	± 5%	10W
CR3	1010441	↓	IN2767	± 5%	3/4W
CR4	1010362 -3	↓	IN649M		600 MW
CR5	↓	↓	↓		↓
CR6	↓	↓	↓		↓
CR7	↓	↓	↓		↓
CR8	↓	↓	↓		↓
CR9	↓	↓	↓		↓
Q1	1010273 -1	TRANSISTOR	2N1724		
K1	1010353 -1	RELAY	33WK-2		
K2	1010353 -1	RELAY	33WK-2		
AR1	1000284	AMPL			
AR2	1000284	AMPL			
AR3	1000283	AMPL			

1010059

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R13 TO BE SUPPLIED PER PART NO 1010377-113 THRU -206 IN 2 OHM INCREMENTS.
3. R14 " " " " " " 1010377-141 " -191 " " " "
4. EXTERNAL RESISTORS SUPPLIED WITH AMPL
5. R22 AND 23 TO BE SUPPLIED PER PART NO 1010377-212 THRU -262 IN 10 OHM INCREMENTS
6. RESISTOR VALUES ARE IN OHMS

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Louis Alcock DATE 7-63
CHECKED 7-3-63
APPROVAL 7-2-63
APPROVAL
NASA APPROVAL 7/2/63
MIT APPROVAL 2 July 62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC IMU TEMP INDICATOR ALARM AND BACKUP CONTROLLER

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010059
SCALE —
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

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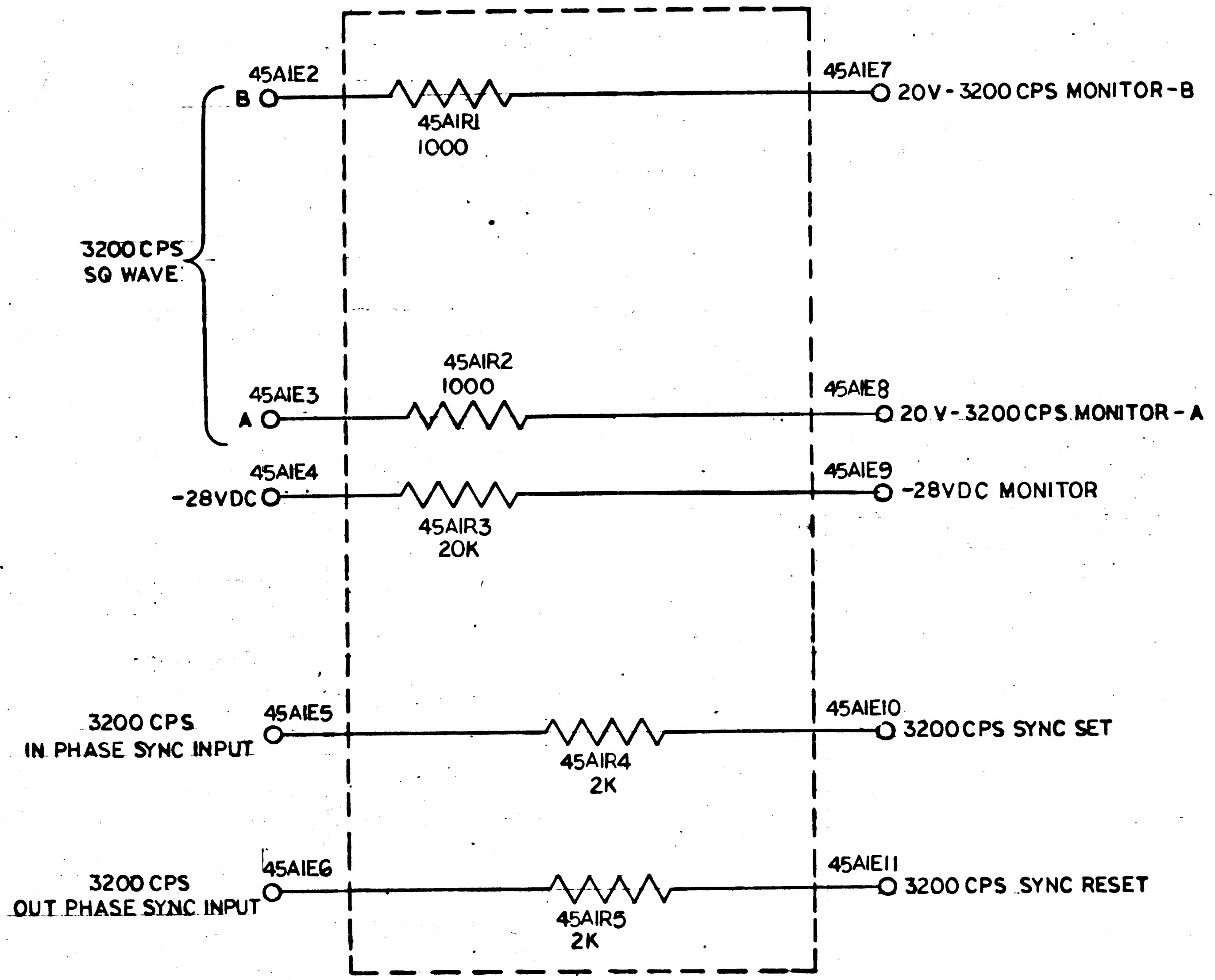
A 0900101

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02537	8-14-63	JJM WK



45A1E2
B
45A1R1
1000
45A1E7
20V-3200 CPS MONITOR-B
3200 CPS
SQ WAVE
45A1R2
1000
45A1E3
A
45A1E8
20 V-3200 CPS MONITOR-A
45A1E4
-28VDC
45A1R3
20K
45A1E9
-28VDC MONITOR
3200 CPS
IN PHASE SYNC INPUT
45A1E5
45A1R4
2K
45A1E10
3200 CPS SYNC SET
3200 CPS
OUT PHASE SYNC INPUT
45A1E6
45A1R5
2K
45A1E11
3200 CPS SYNC RESET

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 DATE 8-7-63

REF. DES.	PART NUMBER	DESCRIPTION	VALUE	TOL.	RATING
R1	1010267-155	RESISTOR	1000	±1%	1/2 W
R2	1010267-155		1000		1/2 W
R3	1010364-501		20K		1/8 W
R4	1010364-309	↓	2K	↓	1/8 W
R5	1010364-309		2K		1/8 W

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN C.J. Kostek DATE 7-11-63
CHECKED
APPROVAL 7-24-63
APPROVAL 8-6-63
NASA APPROVAL 8/7/63
MIT APPROVAL 7 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY #1

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010060
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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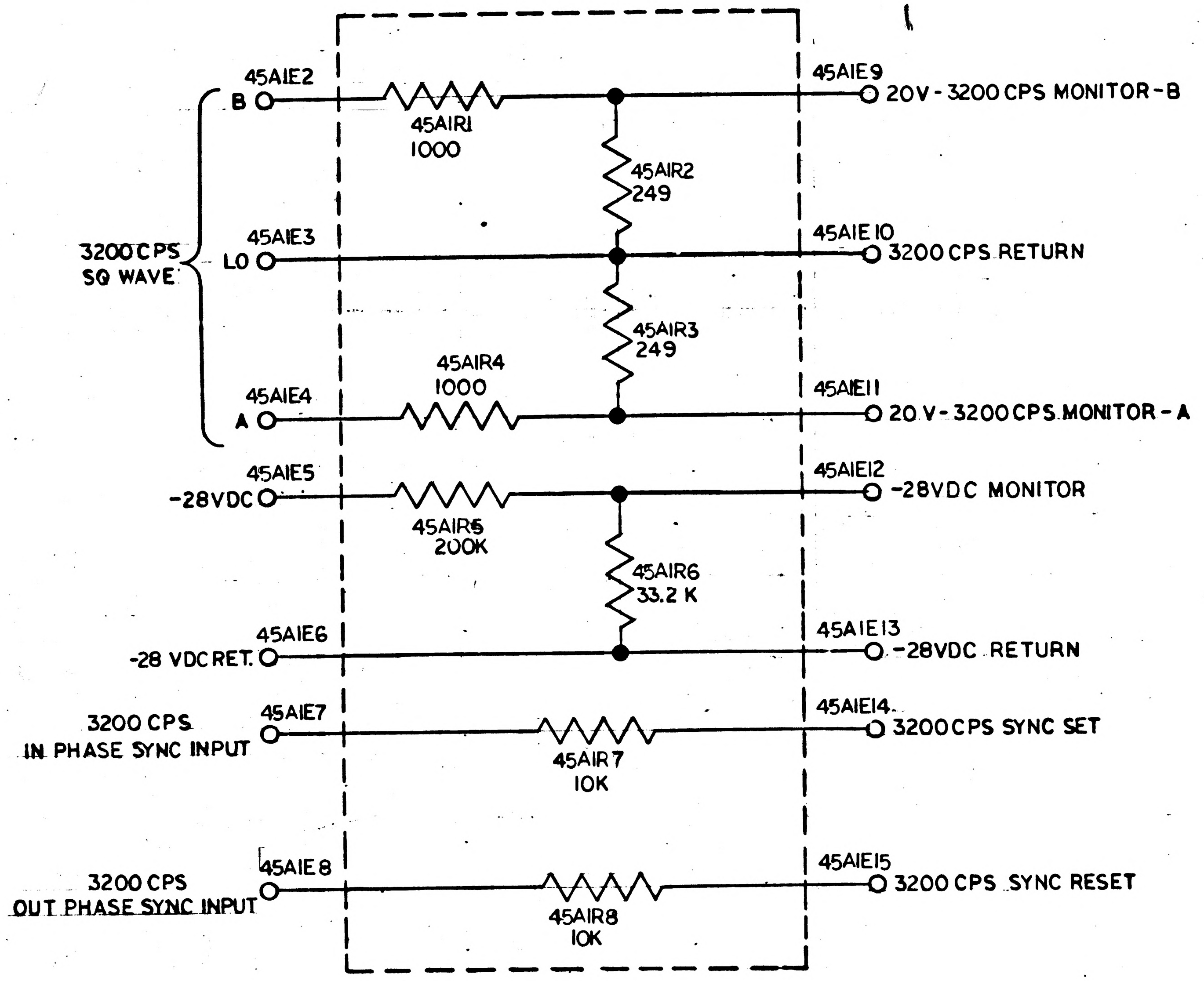
0900101

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS


45A1E2
B
45A1R1
1000
45A1E9
20V-3200 CPS MONITOR-B
45A1R2
249
3200 CPS
SQ WAVE
45A1E3
LO
45A1E10
3200 CPS RETURN
45A1R3
249
45A1R4
1000
45A1E4
A
45A1E11
20 V-3200 CPS MONITOR-A
45A1E5
-28VDC
45A1R5
200K
45A1E12
-28VDC MONITOR
45A1R6
33.2 K
45A1E6
-28 VDC RET.
45A1E13
-28VDC RETURN
3200 CPS
IN PHASE SYNC INPUT
45A1E7
45A1R7
10K
45A1E14
3200 CPS SYNC SET
3200 CPS
OUT PHASE SYNC INPUT
45A1E8
45A1R8
10K
45A1E15
3200 CPS SYNC RESET

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 DATE 8-9-63

REF DES.	PART NUMBER	DESCRIPTION	VALUE	TOL.	RATING
R1	1010267-155	RESISTOR	1000	± 1%	1/2 W
R2	1010364-135		249		1/8 W
R3	1010364-135		249		1/8 W
R4	1010267-155		1000		1/2 W
R5	1010364-693		200K		1/8 W
R6	1010364-543		33.2K		1/8 W
R7	1010364-443		10K		1/8 W
R8	1010364-443	↓	10K	↓	1/8 W

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN C.J. Kostak DATE 7-11-63
CHECKED
APPROVAL 7-24-63
APPROVAL 8-6-63
NASA APPROVAL 8/7/63
MIT APPROVAL 7 Aug 63

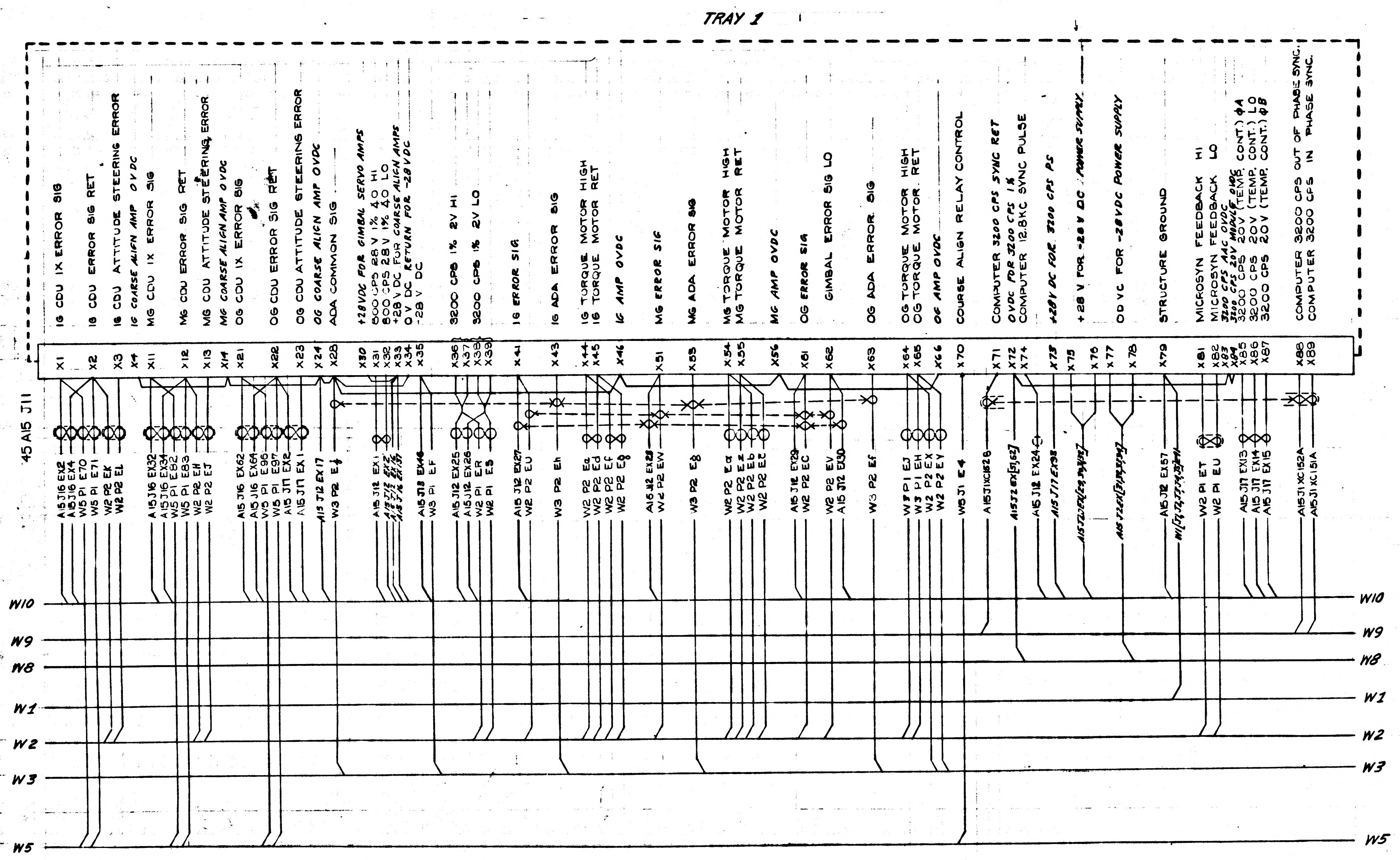
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY #1

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010060
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS				
	A	REVISED TDRR 01768	6-25 63	WK



TRAY 1
45 A15 J11
X1 IG CDU IX ERROR SIG
X2 IG CDU ERROR SIG RET
X3 IG CDU ATTITUDE STEERING ERROR
X4 IG COARSE ALIGN AMP 0 V DC
X11 MG CDU IX ERROR SIG
X12 MG CDU ERROR SIG RET
X13 MG CDU ATTITUDE STEERING ERROR
X14 MG COARSE ALIGN AMP 0 VDC
X21 OG CDU IX ERROR SIG
X22 OG CDU ERROR SIG RET
X23 OG CDU ATTITUDE STEERING ERROR
X24 OG COARSE ALIGN AMP OVDC
X28 ADA COMMON SIG
X30 +28VDC FOR GIMBAL SERVO AMPS
X31 800 CPS 28 V 1% 40 HI
X32 800 CPS 28 V 1% 40 LO
X33 +28 V DC FOR COARSE ALIGN AMPS
X34 0 V DC RETURN FOR -28 VDC
X35 -28 V DC
X36 X37 3200 CPS 1% 2V HI
X38 X39 3200 CPS 1% 2V LO
X41 IG ERROR SIG
X43 IG ADA ERROR SIG
X44 IG TORQUE MOTOR HIGH
X45 IG TORQUE MOTOR RET
X46 IG AMP OVDC
X51 MG ERROR SIG
X53 MG ADA ERROR SIG
X54 MG TORQUE MOTOR HIGH
X55 MG TORQUE MOTOR RET
X56 MG AMP OVDC
X61 OG ERROR SIG
X62 GIMBAL ERROR SIG LO
X63 OG ADA ERROR SIG
X64 OG TORQUE MOTOR HIGH
X65 OG TORQUE MOTOR RET
X66 OG AMP OVDC
X70 COURSE ALIGN RELAY CONTROL
X71 COMPUTER 3200 CPS SYNC RET
X72 OVDC FOR 3200 CPS 1K
X74 COMPUTER 12.8KC SYNC PULSE
X73 +28V DC FOR 3200 CPS PS
X75 X76 +28 V FOR -28 V DC POWER SUPPLY
X77 X78 OD VC FOR -28VDC POWER SUPPLY
X79 STRUCTURE GROUND
X81 MICROSYN FEEDBACK HI
X82 MICROSYN FEEDBACK LO
X83 3200 CPS AAC OVDC
X84 3200 CPS 20V MODULE OVDC
X85 3200 CPS 20V (TEMP. CONT.) ΦA
X86 3200 CPS 20V (TEMP. CONT.) LO
X87 3200 CPS 20V (TEMP. CONT.) ΦB
X88 COMPUTER 3200 CPS OUT OF PHASE SYNC.
X89 COMPUTER 3200 CPS IN PHASE SYNC.
A15 J16 EX2
A15 J16 EX4
W5 P1 E70
W5 P1 E71
W2 P2 EK
W2 P2 EL
A15 J16 EX32
A15 J16 EX34
W5 P1 E82
W5 P1 E83
W2 P2 EH
W2 P2 EJ
A15 J16 EX62
A15 J16 EX64
W5 P1 E96
W5 P1 E97
A15 J11 EX2
A15 J11 EX1
A15 J12 EX17
W3 P2 E4
A15 J18 EX46
W3 P1 EF
A15 J12 EX25
A15 J12 EX26
W2 P1 ER
W2 P1 ES
A15 J12 EX27
W1 P2 EU
W3 P2 Eh
W2 P2 Ea
W2 P2 Ed
W2 P2 Ef
W2 P2 Eg
A15 J12 EX28
W2 P2 EW
W3 P2 E8
W2 P2 Eα
W2 P2 Eb
A15 J12 EX29
W2 P2 EC
W2 P2 EV
A15 J12 EX30
W3 P2 Ef
W3 P1 EJ
W3 P1 EH
W2 P2 EX
W2 P2 EY
W5 J1 E4
A15 J11 XC152B
A15 J12 EX24
A15 J11 EX38
A15 J12 EX57
W2 P1 ET
W2 P1 EU
A15 J11 EX13
A15 J11 EX14
A15 J11 EX15
A15 J1 XC152A
A15 J1 XC151A
W10
W9
W8
W1
W2
W3
W5

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. DRAWINGS FOR REFERENCE:
   1014523 INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY.
   1010150 PSA FAMILY TREE.
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS.
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR.
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED.
6. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01484 DATE 6/5/63

1010061

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153
DATE
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC 6/5/63
BY DIRECTION MIT 5 June 63

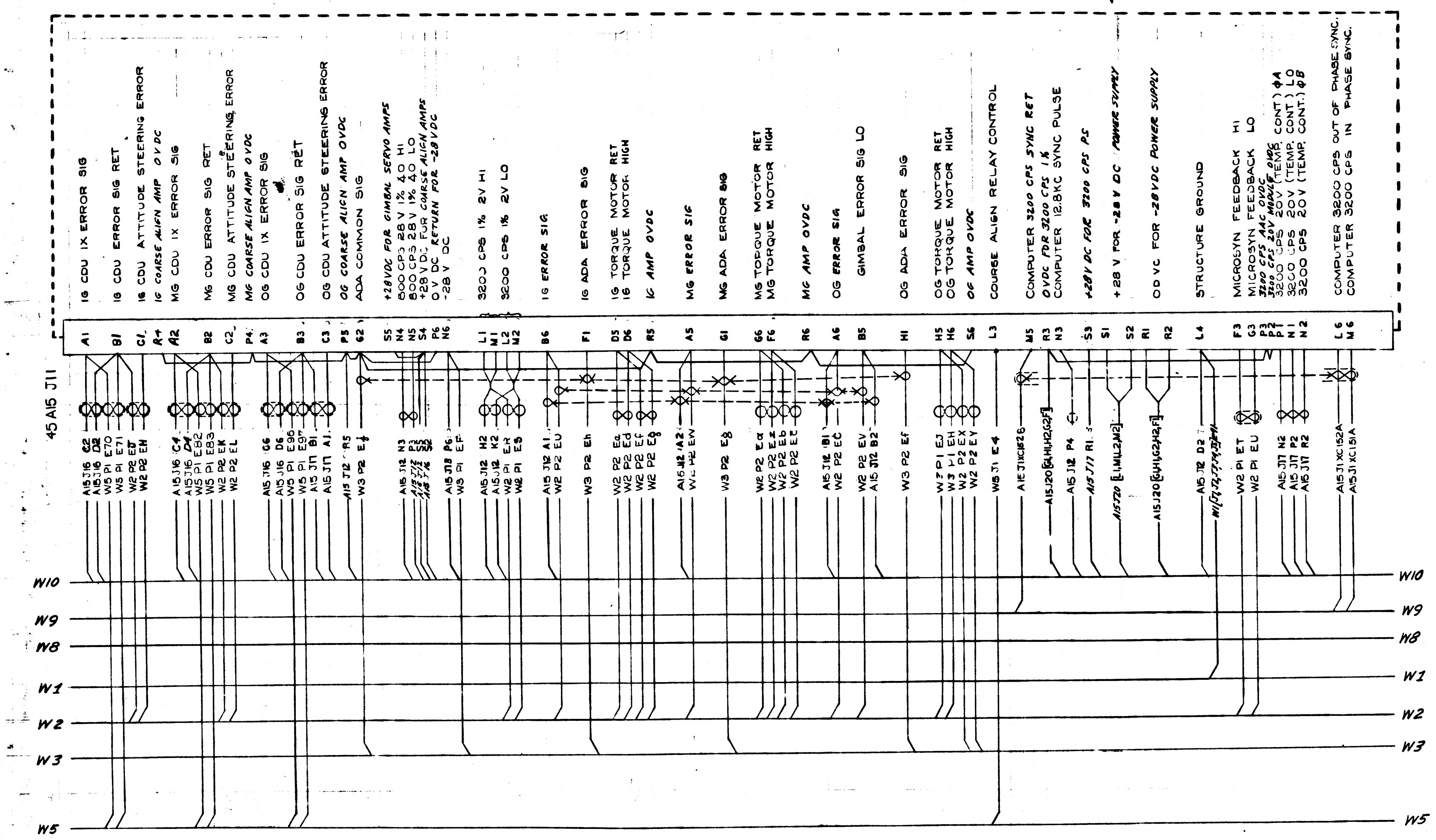
PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 1

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
1010061
SHEET OF

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 01763	6-25-63	wk
	B	REVISED PER TDRR 02491	8-7-63	wk

TRAY 1


45 A15 J11
IG CDU 1X ERROR SIG
IG CDU ERROR SIG RET
IG CDU ATTITUDE STEERING ERROR
IG COARSE ALIGN AMP 0 V DC
MG CDU 1X ERROR SIG
MG CDU ERROR SIG RET
MG CDU ATTITUDE STEERING ERROR
MG COARSE ALIGN AMP 0 VDC
OG CDU 1X ERROR SIG
OG CDU ERROR SIG RET
OG CDU ATTITUDE STEERING ERROR
OG COARSE ALIGN AMP OVDC
ADA COMMON SIG
+28VDC FOR GIMBAL SERVO AMPS
800 CPS 28 V 1% 40 HI
800 CPS 28 V 1% 40 LO
+28 V DC FOR COARSE ALIGN AMPS
0 V DC RETURN FOR -28 VDC
-28 V DC
3200 CPS 1% 2V HI
3200 CPS 1% 2V LO
IG ERROR SIG
IG ADA ERROR SIG
IG TORQUE MOTOR RET
IG TORQUE MOTOR HIGH
IG AMP OVDC
MG ERROR SIG
MG ADA ERROR SIG
MG TORQUE MOTOR RET
MG TORQUE MOTOR HIGH
MG AMP OVDC
OG ERROR SIG
GIMBAL ERROR SIG LO
OG ADA ERROR SIG
OG TORQUE MOTOR RET
OG TORQUE MOTOR HIGH
OG AMP OVDC
COURSE ALIGN RELAY CONTROL
COMPUTER 3200 CPS SYNC RET
OVDC FOR 3200 CPS 1%
COMPUTER 12.8KC SYNC PULSE
+28V DC FOR 3200 CPS PS
+28 V FOR -28 V DC POWER SUPPLY
OD VC FOR -28VDC POWER SUPPLY
STRUCTURE GROUND
MICROSYN FEEDBACK HI
MICROSYN FEEDBACK LO
3200 CPS AAC OVDC
3200 CPS 20V MODULE OVDC
3200 CPS 20V (TEMP. CONT) ΦA
3200 CPS 20V (TEMP. CONT.) LO
3200 CPS 20V (TEMP. CONT.) ΦB
COMPUTER 3200 CPS OUT OF PHASE SYNC.
COMPUTER 3200 CPS IN PHASE SYNC.
A1 B1 C1 R4 A2 B2 C2 P4 A3 B3 C3 P5 G2 S5 N4 N5 S4 P6 N6 L1 M1 L2 M2 B6 F1 D5 D6 R5 A5 G1 G6 F6 R6 A6 B5 H1 H5 H6 S6 L3 M5 R3 N3 S3 S1 S2 R1 R2 L4 F3 G3 P3 P2 P1 N1 N2 L6 M6
W10
W9
W8
W1
W2
W3
W5

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01484 DATE 6/5/63

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB CONTRACT NAS 9-153
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC 6/5/63
BY DIRECTION MIT 5 June 63

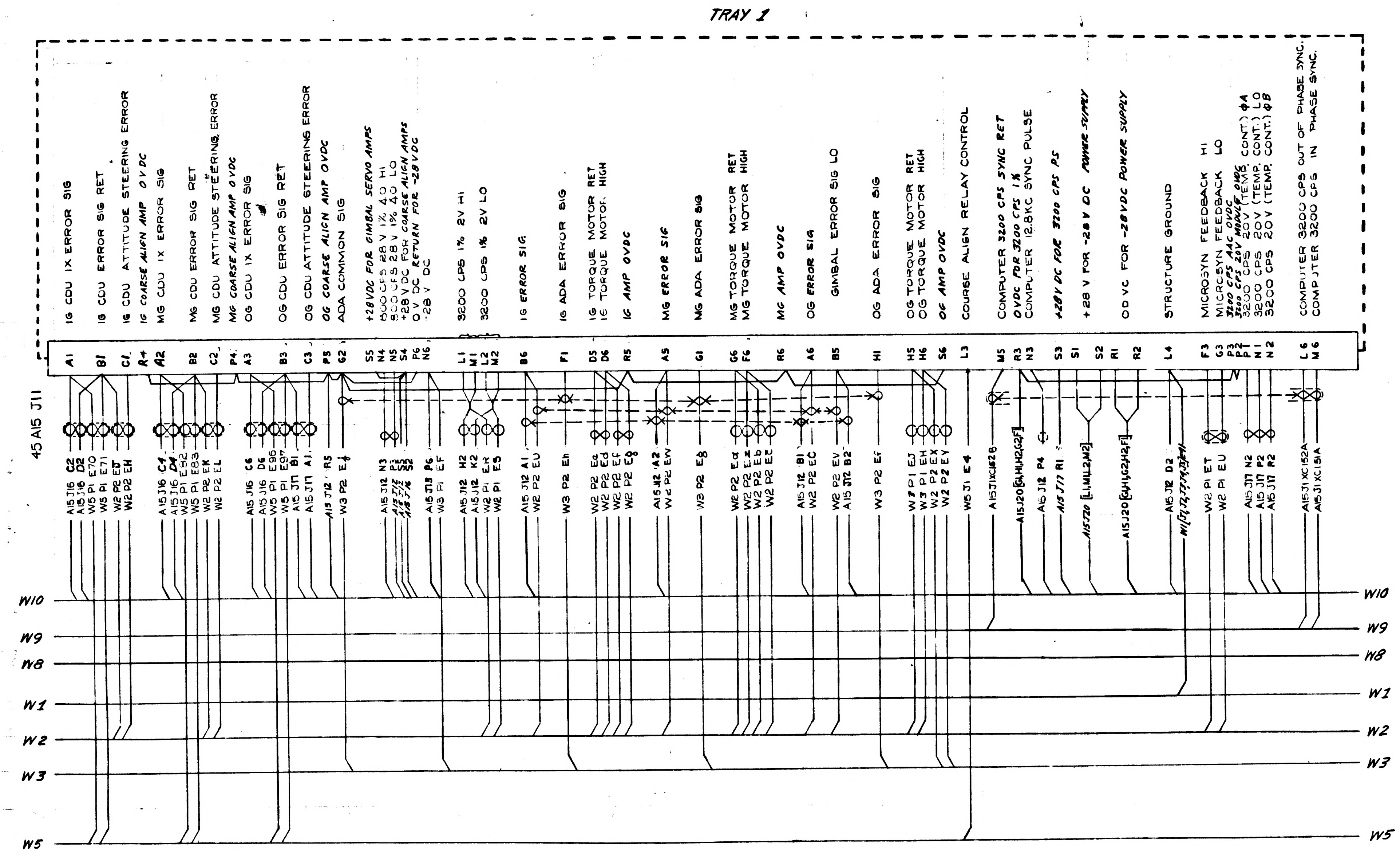
PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 1

SCALE
UNIT WT.
CODE IDENT.

MIT INSTRUMENTATION LABORATORY CAMBRIDGE, MASS.
DWG. NO.
MANNED SPACECRAFT CENTER HOUSTON TEXAS
NASA DRAWING NO. 1010061
SHEET OF

1010061 B

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 01768	6-25 63	WK
	B	REVISED PER TDRR 02491	8-7-63	WK
	C	REVISED PER TDRR 04054	[illegible]	WK


TRAY 1
45 A15 J11
IG CDU IX ERROR SIG
IG CDU ERROR SIG RET
IG CDU ATTITUDE STEERING ERROR
IG COARSE ALIGN AMP 0 V DC
MG CDU IX ERROR SIG
MG CDU ERROR SIG RET
MG CDU ATTITUDE STEERING ERROR
MG COARSE ALIGN AMP 0 VDC
OG CDU IX ERROR SIG
OG CDU ERROR SIG RET
OG CDU ATTITUDE STEERING ERROR
OG COARSE ALIGN AMP OVDC
ADA COMMON SIG
+28VDC FOR GIMBAL SERVO AMPS
800 CPS 28 V 1% 40 HI
800 CPS 28 V 1% 40 LO
+28 V DC FOR COARSE ALIGN AMPS
0 V DC RETURN FOR -28 VDC
-28 V DC
3200 CPS 1% 2V HI
3200 CPS 1% 2V LO
IG ERROR SIG
IG ADA ERROR SIG
IG TORQUE MOTOR RET
IG TORQUE MOTOR HIGH
IG AMP OVDC
MG ERROR SIG
MG ADA ERROR SIG
MG TORQUE MOTOR RET
MG TORQUE MOTOR HIGH
MG AMP OVDC
OG ERROR SIG
GIMBAL ERROR SIG LO
OG ADA ERROR SIG
OG TORQUE MOTOR RET
OG TORQUE MOTOR HIGH
OG AMP OVDC
COURSE ALIGN RELAY CONTROL
COMPUTER 3200 CPS SYNC RET
OVDC FOR 3200 CPS 1%
COMPUTER 12.8KC SYNC PULSE
+28V DC FOR 3200 CPS PS
+28 V FOR -28 V DC POWER SUPPLY
OD VC FOR -28VDC POWER SUPPLY
STRUCTURE GROUND
MICROSYN FEEDBACK HI
MICROSYN FEEDBACK LO
3200 CPS AAC OVDC
3200 CPS 20V MODULE OVDC
3200 CPS 20V (TEMP. CONT.) ΦA
3200 CPS 20V (TEMP. CONT.) LO
3200 CPS 20V (TEMP. CONT.) ΦB
COMPUTER 3200 CPS OUT OF PHASE SYNC.
COMPUTER 3200 CPS IN PHASE SYNC.
A1
B1
C1
R4
A2
B2
C2
P4
A3
B3
C3
P5
G2
S5
N4
N5
S4
P6
N6
L1
M1
L2
M2
B6
F1
D5
D6
R5
A5
G1
G6
F6
R6
A6
B5
H1
H5
H6
S6
L3
M5
R3
N3
S3
S1
S2
R1
R2
L4
F3
G3
P3
P2
P1
N1
N2
L6
M6
A15 J16 C2
A15 J16 D2
W5 P1 E70
W5 P1 E71
W2 P2 EJ
W2 P2 EH
A15 J16 C4
A15 J16 D4
W5 P1 E82
W5 P1 E83
W2 P2 EK
W2 P2 EL
A15 J16 C6
A15 J16 D6
W5 P1 E96
W5 P1 E97
A15 J17 B1
A15 J17 A1
A15 J12 R5
W3 P2 E
A15 J12 N3
A15 J12 P3
A15 J15 S5
A15 J16 S2
A15 J13 P6
W3 P1 EF
A15 J12 H2
A15 J12 K2
W2 P1 ER
W2 P1 ES
A15 J12 A1
W2 P2 EU
W3 P2 Eh
W2 P2 Ea
W2 P2 Ed
W2 P2 Ef
W2 P2 Eg
A15 J12 A2
W2 P2 EW
W3 P2 Eg
W2 P2 Eα
W2 P2 Ez
W2 P2 Eb
W2 P2 Ec
A15 J12 B1
W2 P2 EC
W2 P2 EV
A15 J12 B2
W3 P2 Ef
W3 P1 EJ
W3 P1 EH
W2 P2 EX
W2 P2 EY
W5 J1 E4
A15 J1 XC152B
A15 J20 [G1,H1,H2,G2,F]
A15 J12 P4
A15 J17 R1
A15 J20 [L1,M1,L2,M2]
A15 J20 [G1,H1,G2,H2,F1]
A15 J12 D2
W1 [J1,J2,J3,J4,J5,J11]
W2 P1 ET
W2 P1 EU
A15 J17 N2
A15 J17 P2
A15 J17 R2
A15 J1 XC152A
A15 J1 XC151A
W10
W9
W8
W1
W2
W3
W5

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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01484 DATE 6/5/63

Ⓒ REPLACED WITH CHANGE BY REV D

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
DATE
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC
6/5/63
BY DIRECTION MIT
5 June 63

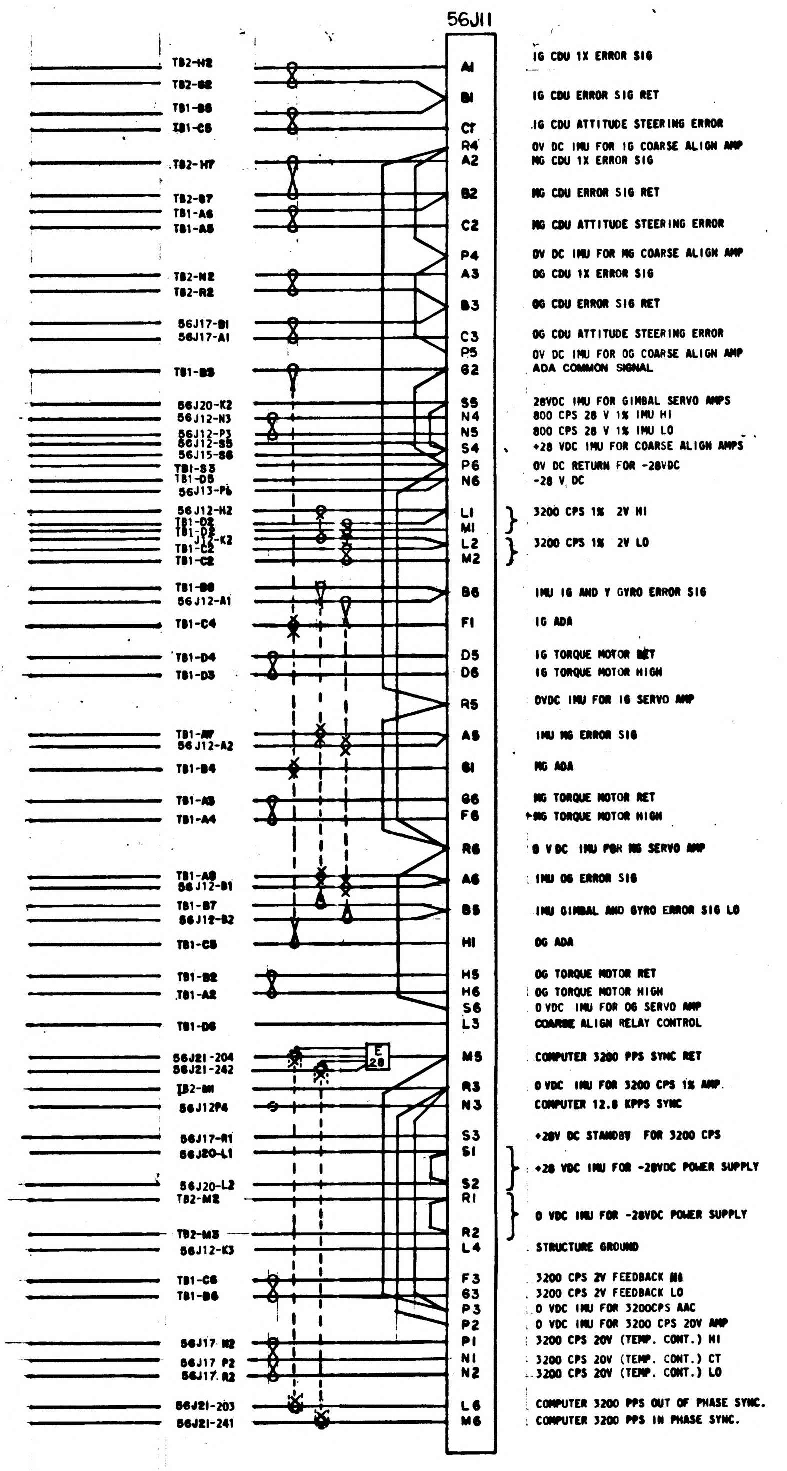
PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 1

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
1010061
SHEET OF

1010061 C

INCHES
PHOTOGRAPHIC SCALE ONLY


56J11
TB2-H2
TB2-G2
TB1-B5
TB1-C5
TB2-H7
TB2-B7
TB1-A6
TB1-A5
TB2-N2
TB2-R2
56J17-B1
56J17-A1
TB1-B3
56J20-K2
56J12-N3
56J12-P3
56J12-S5
56J15-S6
TB1-S3
TB1-D5
56J13-P6
56J12-H2
TB1-D2
TB1-D2
J12-K2
TB1-C2
TB1-C2
TB1-B8
56J12-A1
TB1-C4
TB1-D4
TB1-D3
TB1-A7
56J12-A2
TB1-B4
TB1-A3
TB1-A4
TB1-A8
56J12-B1
TB1-B7
56J12-B2
TB1-C3
TB1-B2
TB1-A2
TB1-D6
56J21-204
56J21-242
TB2-M1
56J12P4
56J17-R1
56J20-L1
56J20-L2
TB2-M2
TB2-M3
56J12-K3
TB1-C6
TB1-B6
56J17 N2
56J17 P2
56J17 R2
56J21-203
56J21-241
E 28
A1
B1
C1
R4
A2
B2
C2
P4
A3
B3
C3
P5
G2
S5
N4
N5
S4
P6
N6
L1
M1
L2
M2
B6
F1
D5
D6
R5
A5
G1
G6
F6
R6
A6
B5
H1
H5
H6
S6
L3
M5
R3
N3
S3
S1
S2
R1
R2
L4
F3
G3
P3
P2
P1
N1
N2
L6
M6
IG CDU 1X ERROR SIG
IG CDU ERROR SIG RET
IG CDU ATTITUDE STEERING ERROR
0V DC IMU FOR IG COARSE ALIGN AMP
MG CDU 1X ERROR SIG
MG CDU ERROR SIG RET
MG CDU ATTITUDE STEERING ERROR
0V DC IMU FOR MG COARSE ALIGN AMP
OG CDU 1X ERROR SIG
OG CDU ERROR SIG RET
OG CDU ATTITUDE STEERING ERROR
0V DC IMU FOR OG COARSE ALIGN AMP
ADA COMMON SIGNAL
28VDC IMU FOR GIMBAL SERVO AMPS
800 CPS 28 V 1% IMU HI
800 CPS 28 V 1% IMU LO
+28 VDC IMU FOR COARSE ALIGN AMPS
0V DC RETURN FOR -28VDC
-28 V DC
3200 CPS 1% 2V HI
3200 CPS 1% 2V LO
IMU IG AND Y GYRO ERROR SIG
IG ADA
IG TORQUE MOTOR RET
IG TORQUE MOTOR HIGH
0VDC IMU FOR IG SERVO AMP
IMU MG ERROR SIG
MG ADA
MG TORQUE MOTOR RET
+MG TORQUE MOTOR HIGH
0 VDC IMU FOR MG SERVO AMP
IMU OG ERROR SIG
IMU GIMBAL AND GYRO ERROR SIG LO
OG ADA
OG TORQUE MOTOR RET
OG TORQUE MOTOR HIGH
0 VDC IMU FOR OG SERVO AMP
COARSE ALIGN RELAY CONTROL
COMPUTER 3200 PPS SYNC RET
0 VDC IMU FOR 3200 CPS 1% AMP.
COMPUTER 12.8 KPPS SYNC
+28V DC STANDBY FOR 3200 CPS
+28 VDC IMU FOR -28VDC POWER SUPPLY
0 VDC IMU FOR -28VDC POWER SUPPLY
STRUCTURE GROUND
3200 CPS 2V FEEDBACK HI
3200 CPS 2V FEEDBACK LO
0 VDC IMU FOR 3200CPS AAC
0 VDC IMU FOR 3200 CPS 20V AMP
3200 CPS 20V (TEMP. CONT.) HI
3200 CPS 20V (TEMP. CONT.) CT
3200 CPS 20V (TEMP. CONT.) LO
COMPUTER 3200 PPS OUT OF PHASE SYNC.
COMPUTER 3200 PPS IN PHASE SYNC.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
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   1010150-PSA FAMILY TREE
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4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM END CONNECTOR DESIGNATION (56) WHEN NEEDED

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGE PER TDRR 09054		

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01434 DATE 6/5/63

Ⓓ REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
	LIST OF MATERIALS		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —/— DECIMALS ± —/— ANGLES ± —/—
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

NEXT ASSY | USED ON
APPLICATION

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

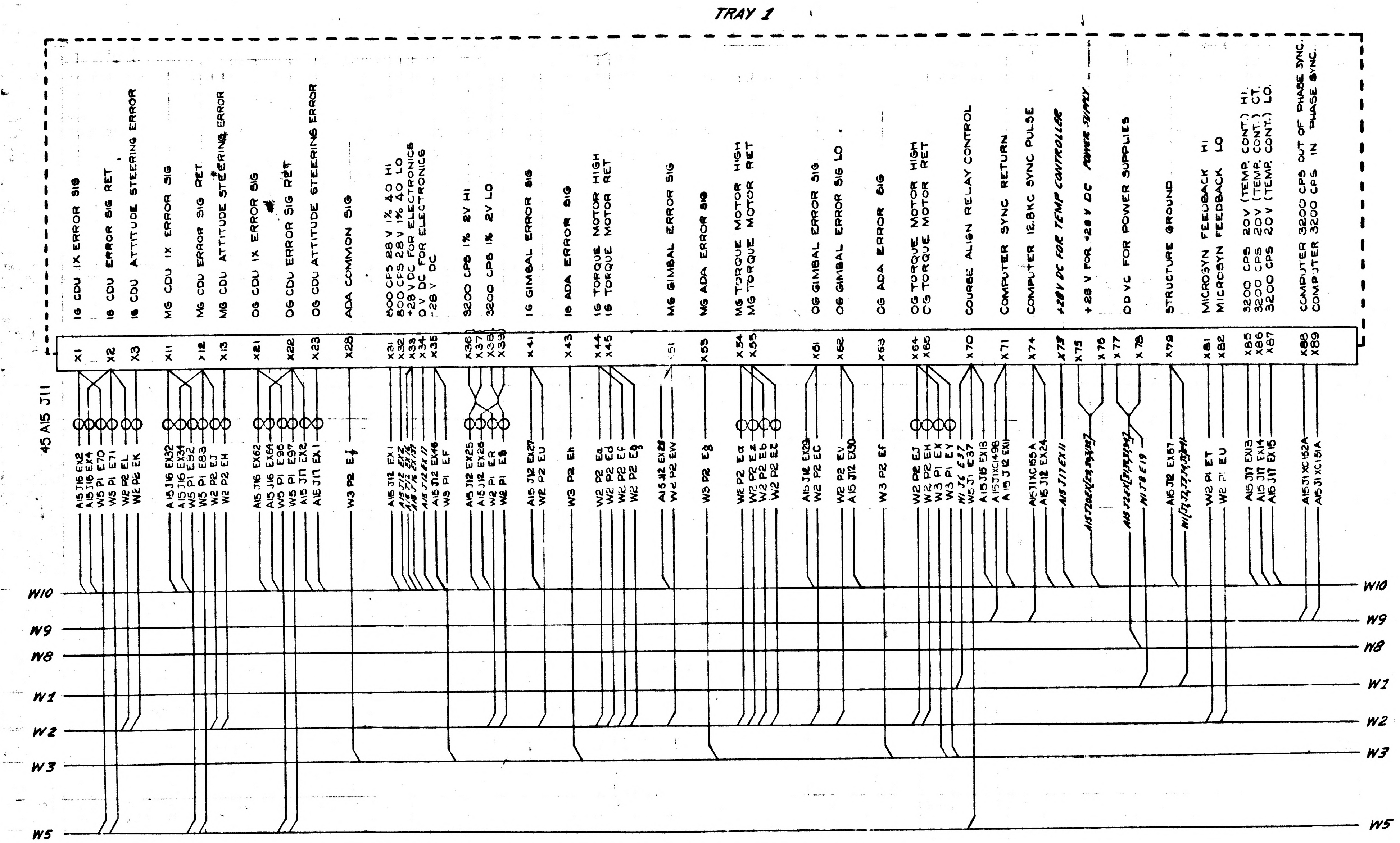
PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
TRAY 1

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010061
SCALE —/— | WT | SHEET 1 OF 1

1010061

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY


TRAY 1
IG CDU IX ERROR SIG
IG CDU ERROR SIG RET
IG CDU ATTITUDE STEERING ERROR
MG CDU IX ERROR SIG
MG CDU ERROR SIG RET
MG CDU ATTITUDE STEERING ERROR
OG CDU IX ERROR SIG
OG CDU ERROR SIG RET
OG CDU ATTITUDE STEERING ERROR
ADA COMMON SIG
800 CPS 28 V 1% 40 HI
800 CPS 28 V 1% 40 LO
+28 V DC FOR ELECTRONICS
0 V DC FOR ELECTRONICS
-28 V DC
3200 CPS 1% 2V HI
3200 CPS 1% 2V LO
IG GIMBAL ERROR SIG
IG ADA ERROR SIG
IG TORQUE MOTOR HIGH
IG TORQUE MOTOR RET
MG GIMBAL ERROR SIG
MG ADA ERROR SIG
MG TORQUE MOTOR HIGH
MG TORQUE MOTOR RET
OG GIMBAL ERROR SIG
OG GIMBAL ERROR SIG LO
OG ADA ERROR SIG
OG TORQUE MOTOR HIGH
OG TORQUE MOTOR RET
COURSE ALIGN RELAY CONTROL
COMPUTER SYNC RETURN
COMPUTER 12.8KC SYNC PULSE
+28 V DC FOR TEMP CONTROLLER
+28 V FOR +28 V DC POWER SUPPLY
0 D VC FOR POWER SUPPLIES
STRUCTURE GROUND
MICROSYN FEEDBACK HI
MICROSYN FEEDBACK LO
3200 CPS 20V (TEMP. CONT.) HI.
3200 CPS 20V (TEMP. CONT.) CT.
3200 CPS 20V (TEMP. CONT.) LO.
COMPUTER 3200 CPS OUT OF PHASE SYNC.
COMPUTER 3200 CPS IN PHASE SYNC.
X1
X2
X3
X11
X12
X13
X21
X22
X23
X28
X31
X32
X33
X34
X35
X36
X37
X38
X39
X41
X43
X44
X45
51
X53
X54
X55
X61
X62
X63
X64
X65
X70
X71
X74
X73
X75
X76
X77
X78
X79
X81
X82
X85
X86
X87
X88
X89
45 A15 J11
A15 J16 EX2
A15 J16 EX4
W5 P1 E70
W5 P1 E71
W2 P2 EL
W2 P2 EK
A15 J16 EX32
A15 J16 EX34
W5 P1 E82
W5 P1 E83
W2 P2 EJ
W2 P2 EH
A15 J16 EX62
A15 J16 EX64
W5 P1 E96
W5 P1 E97
A15 J17 EX2
A15 J17 EX1
W3 P2 Eℓ
A15 J12 EX1
A15 J12 EX2
A15 J16 EX16
A15 J16 EX137
A15 J12 EX17
A15 J12 EX46
W3 P1 EF
A15 J12 EX25
A15 J12 EX26
W2 P1 ER
W2 P1 ES
A15 J12 EX27
W2 P2 EU
W3 P2 Eh
W2 P2 Ea
W2 P2 Ed
W2 P2 Ef
W2 P2 Eg
A15 J12 EX28
W2 P2 EW
W3 P2 E8
W2 P2 Eα
W2 P2 Ez
W2 P2 Eb
W2 P2 Ec
A15 J12 EX29
W2 P2 EC
W2 P2 EV
A15 J12 EX30
W3 P2 Ef
W2 P2 EJ
W2 P2 EH
W3 P1 EX
W3 P1 EY
W1 J6 E37
W5 J1 E37
A15 J15 EX13
A15 J1 XC149B
A15 J12 EX11
A15 J1 XC155A
A15 J12 EX24
A15 J17 EX11
A15 J20 EX[29,30,31,32]
A15 J2 EX[31,32,33,34]
W1 J8 E19
A15 J12 EX57
W1[J1,J2,J3,J4,J5]E41
W2 P1 ET
W2 P1 EU
A15 J17 EX13
A15 J17 EX14
A15 J17 EX15
A15 J1 XC152A
A15 J1 XC151A
W10
W9
W8
W1
W2
W3
W5

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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01484 DATE 6/5/63

1010061

MASTER

ZONE	SYM	REVISIONS DESCRIPTION	DATE	APPROVAL

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

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UNLESS OTHERWISE SPECIFIED
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TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153 DATE
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC
6/5/63
BY DIRECTION MIT
5 June 63

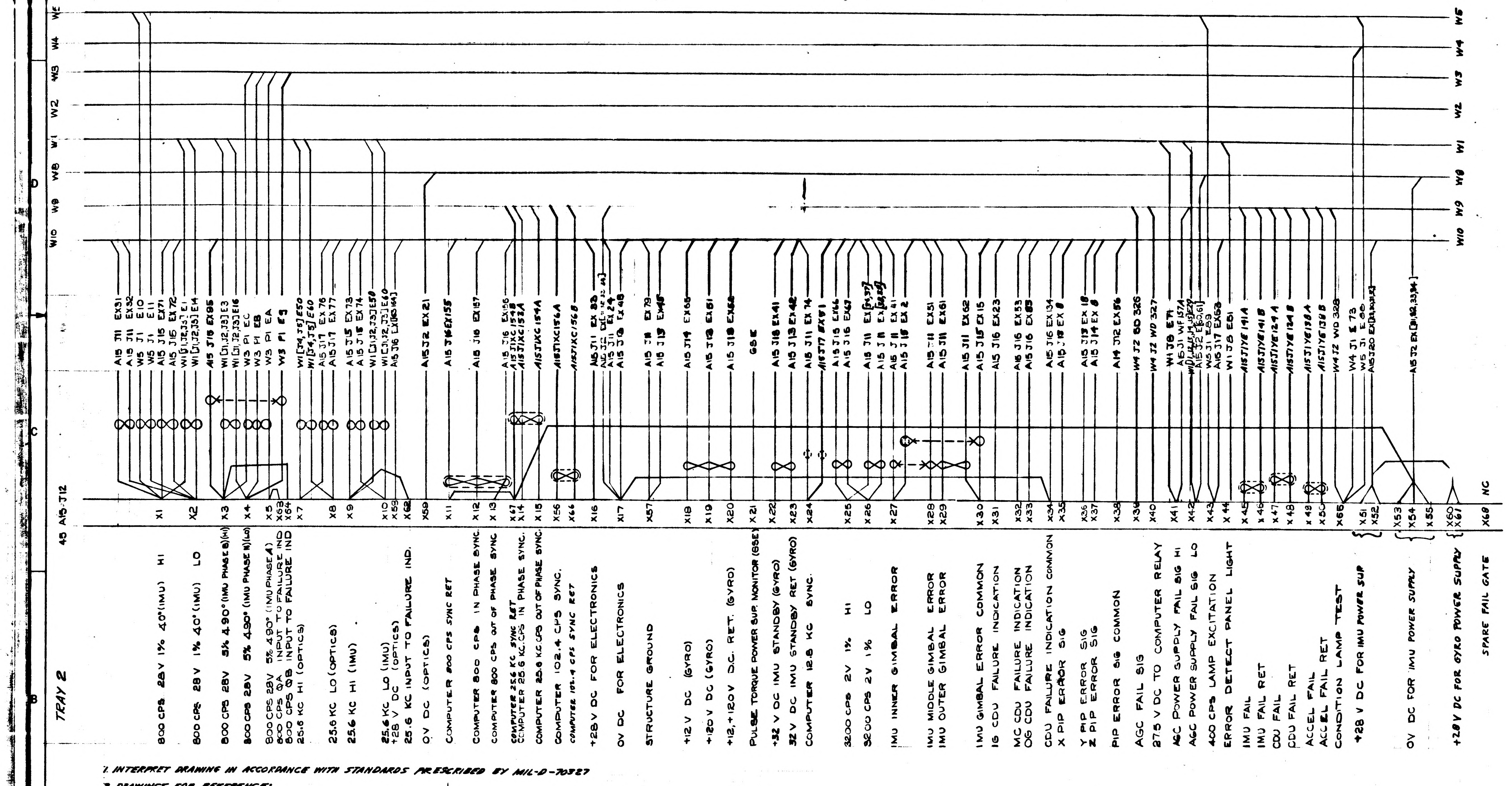
PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 1

SCALE | UNIT WT. | CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
1010061
SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

ZONE	SYM	REVISIONS DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 01764	6-26 63	WK



TRAY 2
45 A15-J12
800 CPS 28V 1% 40°(IMU) HI — X1
800 CPS 28V 1% 40°(IMU) LO — X2
800 CPS 28V 5% 4 90°(IMU PHASE B)(HI) — X3
800 CPS 28V 5% 4 90° (IMU PHASE N)(LO) — X4
800 CPS 28V 5% 4 90° (IMU PHASE A) — X5
800 CPS ΦA INPUT TO FAILURE IND — X63
800 CPS ΦB INPUT TO FAILURE IND — X64
25.6 KC HI (OPTICS) — X7
25.6 KC LO (OPTICS) — X8
25.6 KC HI (IMU) — X9
25.6 KC LO (IMU) — X10
+28 V DC (OPTICS) — X58
25.6 KC INPUT TO FAILURE IND. — X62
OV DC (OPTICS) — X59
COMPUTER 800 CPS SYNC RET — X11
COMPUTER 800 CPS IN PHASE SYNC. — X12
COMPUTER 800 CPS OUT OF PHASE SYNC — X13
COMPUTER 25.6 KC SYNC RET — X67
COMPUTER 25.6 KC.CPS IN PHASE SYNC. — X14
COMPUTER 25.6 KC.CPS OUT OF PHASE SYNC. — X15
COMPUTER 102.4 CPS SYNC. — X56
COMPUTER 102.4 CPS SYNC RET — X66
+28V DC FOR ELECTRONICS — X16
OV DC FOR ELECTRONICS — X17
STRUCTURE GROUND — X57
+12 V DC (GYRO) — X18
+120 V DC (GYRO) — X19
+12,+120V D.C. RET. (GYRO) — X20
PULSE TORQUE POWER SUP. MONITOR (GSE) — X21
+32 V DC IMU STANDBY (GYRO) — X22
32 V DC IMU STANDBY RET (GYRO) — X23
COMPUTER 12.8 KC SYNC. — X24
3200 CPS 2V 1% HI — X25
3200 CPS 2V 1% LO — X26
IMU INNER GIMBAL ERROR — X27
IMU MIDDLE GIMBAL ERROR — X28
IMU OUTER GIMBAL ERROR — X29
IMU GIMBAL ERROR COMMON — X30
IG CDU FAILURE INDICATION — X31
MG CDU FAILURE INDICATION — X32
OG CDU FAILURE INDICATION — X33
CDU FAILURE INDICATION COMMON — X34
X PIP ERROR SIG — X35
Y PIP ERROR SIG — X36
Z PIP ERROR SIG — X37
PIP ERROR SIG COMMON — X38
AGC FAIL SIG — X39
27.5 V DC TO COMPUTER RELAY — X40
AGC POWER SUPPLY FAIL SIG HI — X41
AGC POWER SUPPLY FAIL SIG LO — X42
400 CPS LAMP EXCITATION — X43
ERROR DETECT PANEL LIGHT — X44
IMU FAIL — X45
IMU FAIL RET — X46
CDU FAIL — X47
CDU FAIL RET — X48
ACCEL FAIL — X49
ACCEL FAIL RET — X50
CONDITION LAMP TEST — X65
+28 V DC FOR IMU POWER SUP — X51, X52
OV DC FOR IMU POWER SUPPLY — X53, X54, X55
+28 V DC FOR GYRO POWER SUPPLY — X60, X61
SPARE FAIL GATE — X68 NC
A15 J11 EX31
A15 J11 EX32
W5 J1 E10
W5 J1 E11
A15 J15 EX71
A15 J16 EX72
W1 [J1,J2,J3] E1
W1 [J1,J2,J3] E14
A15 J16 EX95
W1 [J1,J2,J3] E3
W1 [J1,J2,J3] E16
W3 P1 EC
W3 P1 EB
W3 P1 EA
W3 P1 E9
W1 [J4,J5] E50
W1 [J4,J5] E60
A15 J17 EX76
A15 J17 EX77
A15 J15 EX73
A15 J15 EX74
W1 [J1,J2,J3] E50
W1 [J1,J2,J3] E60
A15 J16 EX[163,164]
A15 J2 EX21
A15 J16 EX155
A15 J16 EX157
A15 J16 EX156
A15 J1 XC 154B
A15 J1 XC 153A
A15 J1 XC 154A
A15 J1 XC 156A
A15 J1 XC 156B
A15 J11 EX 83
A15 J2 EX[21,22,23,24]
A15 J11 EX24
A15 J13 EX48
A15 J11 EX79
A15 J13 EX45
A15 J14 EX65
A15 J13 EX61
A15 J18 EX62
GSE
A15 J18 EX41
A15 J13 EX42
A15 J11 EX74
A15 J17 EX81
A15 J15 EX66
A15 J16 EX67
A15 J11 EX[34,37]
A15 J11 EX[38,39]
A15 J11 EX41
A15 J15 EX2
A15 J11 EX51
A15 J11 EX61
A15 J11 EX62
A15 J15 EX15
A15 J16 EX23
A15 J16 EX53
A15 J16 EX83
A15 J16 EX134
A15 J13 EX8
A15 J13 EX18
A15 J14 EX8
A14 J12 EX56
W4 J2 SD 326
W4 J2 WD 327
W1 J8 E71
A15 J1 WF157A
W1 [J1,J2,J3,J4,J5] E29
A15 J2 E[60,61]
W5 J1 E89
A15 J17 EX63
W1 J8 E51
A15 J1 YE 141A
A15 J1 YE 141B
A15 J1 YE 124A
A15 J1 YE 124B
A15 J1 YE 138A
A15 J1 YE 138B
W4 J2 WD 328
W4 J1 E73
W5 J1 E88
A15 J20 EX[29,30,31,32]
A15 J2 EX[31,32,33,34]
W10
W9
W8
W1
W2
W3
W4
W6

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   - 1014523 INTERCONNECTION DIAG, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   - 1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS.
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR.
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (46) WHEN NEEDED.
6. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01434 DATE 6/5/63

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB CONTRACT NAS 9-153 DATE
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC 6/5/63
BY DIRECTION MIT
W K 5 Jun 63

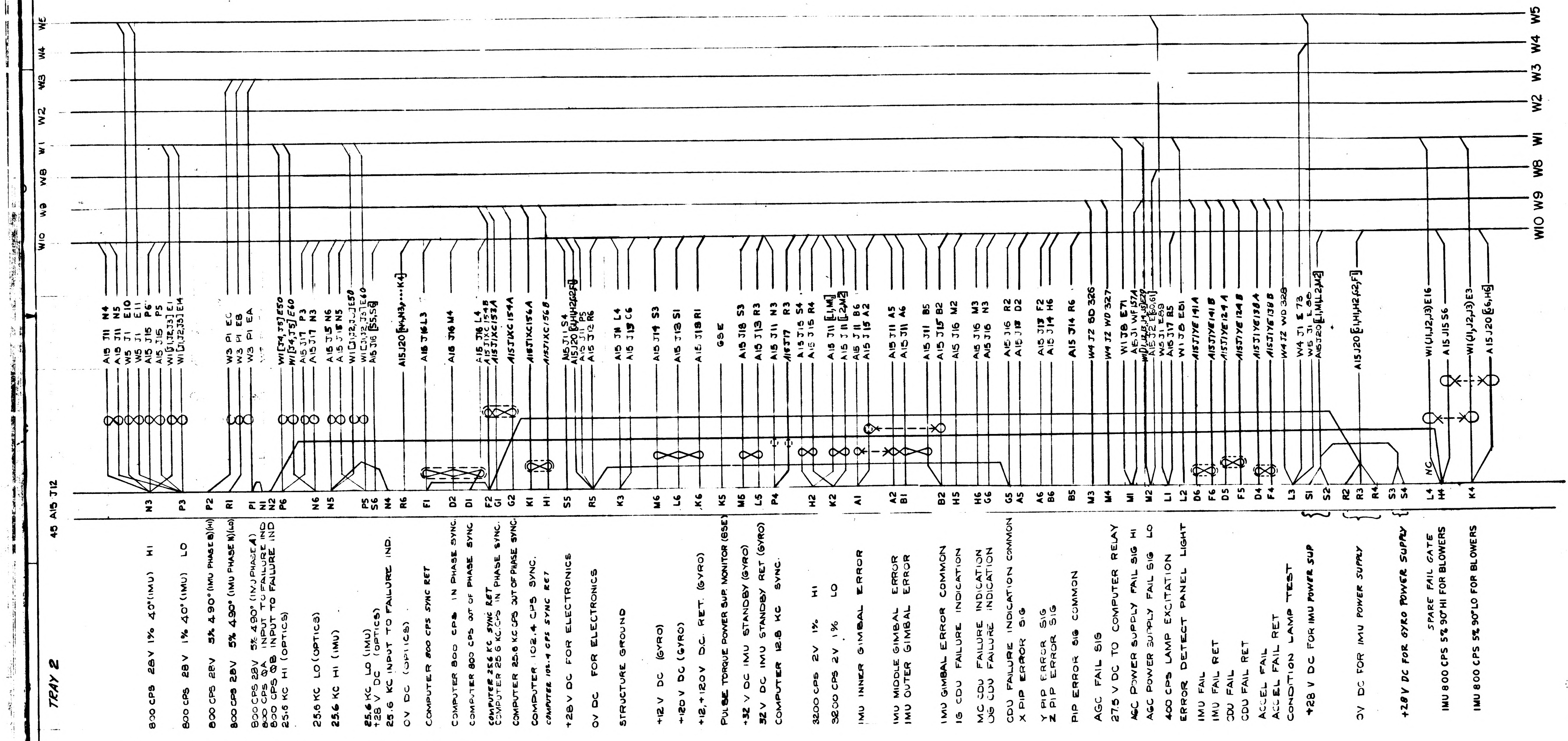
PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 2

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
1010062
SHEET OF

1010062

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 01764	6-26 63	WK
	B	REVISED PER TDRR 02492	7-7-63	wk.


TRAY 2
45 A15 J12
W10 W9 W8 W1 W2 W3 W4 W5
800 CPS 28V 1% 40°(IMU) HI — N3
800 CPS 28V 1% 40°(IMU) LO — P3
800 CPS 28V 5% 4 90° (IMU PHASE B)(HI) — P2
800 CPS 28V 5% 4 90° (IMU PHASE N)(LO) — R1
800 CPS 28V 5% 4 90° (IMU PHASE A) — P1
800 CPS ØA INPUT TO FAILURE IND — N1
800 CPS ØB INPUT TO FAILURE IND — N2
25.6 KC HI (OPTICS) — P6
25.6 KC LO (OPTICS) — N6
25.6 KC HI (IMU) — N5
25.6 KC LO (IMU) — P5
+28 V DC (OPTICS) — S6
25.6 KC INPUT TO FAILURE IND. — N4
OV DC (OPTICS) — R6
COMPUTER 800 CPS SYNC RET — F1
COMPUTER 800 CPS IN PHASE SYNC. — D2
COMPUTER 800 CPS OUT OF PHASE SYNC — D1
COMPUTER 25.6 KC SYNC RET — F2
COMPUTER 25.6 KC CPS IN PHASE SYNC. — G1
COMPUTER 25.6 KC CPS OUT OF PHASE SYNC. — G2
COMPUTER 102.4 CPS SYNC. — K1
COMPUTER 102.4 CPS SYNC RET — H1
+28 V DC FOR ELECTRONICS — S5
OV DC FOR ELECTRONICS — R5
STRUCTURE GROUND — K3
+12 V DC (GYRO) — M6
+120 V DC (GYRO) — L6
+12, +120 V D.C. RET. (GYRO) — K6
PULSE TORQUE POWER SUP. MONITOR (GSE) — K5
+32 V DC IMU STANDBY (GYRO) — M5
32 V DC IMU STANDBY RET (GYRO) — L5
COMPUTER 12.8 KC SYNC. — P4
3200 CPS 2V 1% HI — H2
3200 CPS 2V 1% LO — K2
IMU INNER GIMBAL ERROR — A1
IMU MIDDLE GIMBAL ERROR — A2
IMU OUTER GIMBAL ERROR — B1
IMU GIMBAL ERROR COMMON — B2
IG CDU FAILURE INDICATION — H5
MG CDU FAILURE INDICATION — H6
OG CDU FAILURE INDICATION — G6
CDU FAILURE INDICATION COMMON — G5
X PIP ERROR SIG — A5
Y PIP ERROR SIG — A6
Z PIP ERROR SIG — B6
PIP ERROR SIG COMMON — B5
AGC FAIL SIG — M3
27.5 V DC TO COMPUTER RELAY — M4
AGC POWER SUPPLY FAIL SIG HI — M1
AGC POWER SUPPLY FAIL SIG LO — M2
400 CPS LAMP EXCITATION — L1
ERROR DETECT PANEL LIGHT — L2
IMU FAIL — D6
IMU FAIL RET — F6
CDU FAIL — D5
CDU FAIL RET — F5
ACCEL FAIL — D4
ACCEL FAIL RET — F4
CONDITION LAMP TEST — L3
+28 V DC FOR IMU POWER SUP — S1, S2
OV DC FOR IMU POWER SUPPLY — R2, R3, R4
+28 V DC FOR GYRO POWER SUPPLY — S3, S4
SPARE FAIL GATE — L4 NC
IMU 800 CPS 5% 90° HI FOR BLOWERS — H4
IMU 800 CPS 5% 90° LO FOR BLOWERS — K4
A15 J11 N4
A15 J11 N5
W5 J1 E10
W5 J1 E11
A15 J15 P6
A15 J15 P5
W1 [J1, J2, J3] E1
W1 [J1, J2, J3] E14
W3 P1 EC
W3 P1 EB
W3 P1 EA
W1 [J4, J5] E50
W1 [J4, J5] E60
A15 J17 P3
A15 J17 N3
A15 J15 N6
A15 J15 N5
W1 [J1, J2, J3] E50
W1 [J1, J2, J3] E60
A15 J16 [S5, S6]
A15 J20 [N4, N3, ... K4]
A15 J16 L3
A15 J16 M4
A15 J16 L4
A15 J1 XC 154 B
A15 J1 XC 153 A
A15 J1 XC 154 A
A15 J1 XC 156 A
A15 J1 XC 156 B
A15 J11 S4
A15 J20 [G1, H1, H2, G2, F1]
A15 J11 P5
A15 J12 R6
A15 J11 L4
A15 J13 C6
A15 J14 S3
A15 J13 S1
A15 J18 R1
GSE
A15 J18 S3
A15 J13 R3
A15 J11 N3
A15 J17 R3
A15 J15 S4
A15 J15 R4
A15 J11 [L1, M1]
A15 J11 [L2, M2]
A15 J11 B6
A15 J15 A2
A15 J11 A5
A15 J11 A6
A15 J11 B5
A15 J15 B2
A15 J16 M2
A15 J16 M3
A15 J16 N3
A15 J16 R2
A15 J13 D2
A15 J13 F2
A15 J14 H6
A15 J14 R6
W4 J2 SD 326
W4 J2 WD 327
W1 J8 E71
A15 J1 WF 157A
W1 [J1, J2, J3, J4, J5] E29
A15 J2 E [60, 61]
W5 J1 E89
A15 J17 B5
W1 J8 E81
A15 J1 YE 141 A
A15 J1 YE 141 B
A15 J1 YE 124 A
A15 J1 YE 124 B
A15 J1 YE 138 A
A15 J1 YE 138 B
W4 J2 WD 328
W4 J1 E 73
W5 J1 E 88
A15 J20 [L1, M1, L2, M2]
A15 J20 [G1, H1, H2, G2, F1]
W1 (J1, J2, J3) E16
A15 J15 S6
W1 (J1, J2, J3) E3
A15 J20 [G6, H6]

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01434 DATE 6/5/63

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 INTERCONNECTION DIAG, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS.
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR.
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QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

MASTER

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153 DATE
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC
6/25/63
BY DIRECTION MIT
WKaplan 5 Jun 63

PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 2

SCALE UNIT WT. CODE IDENT.

MIT INSTRUMENTATION LABORATORY
CAMBRIDGE, MASS.
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NASA DRAWING NO. 1010062
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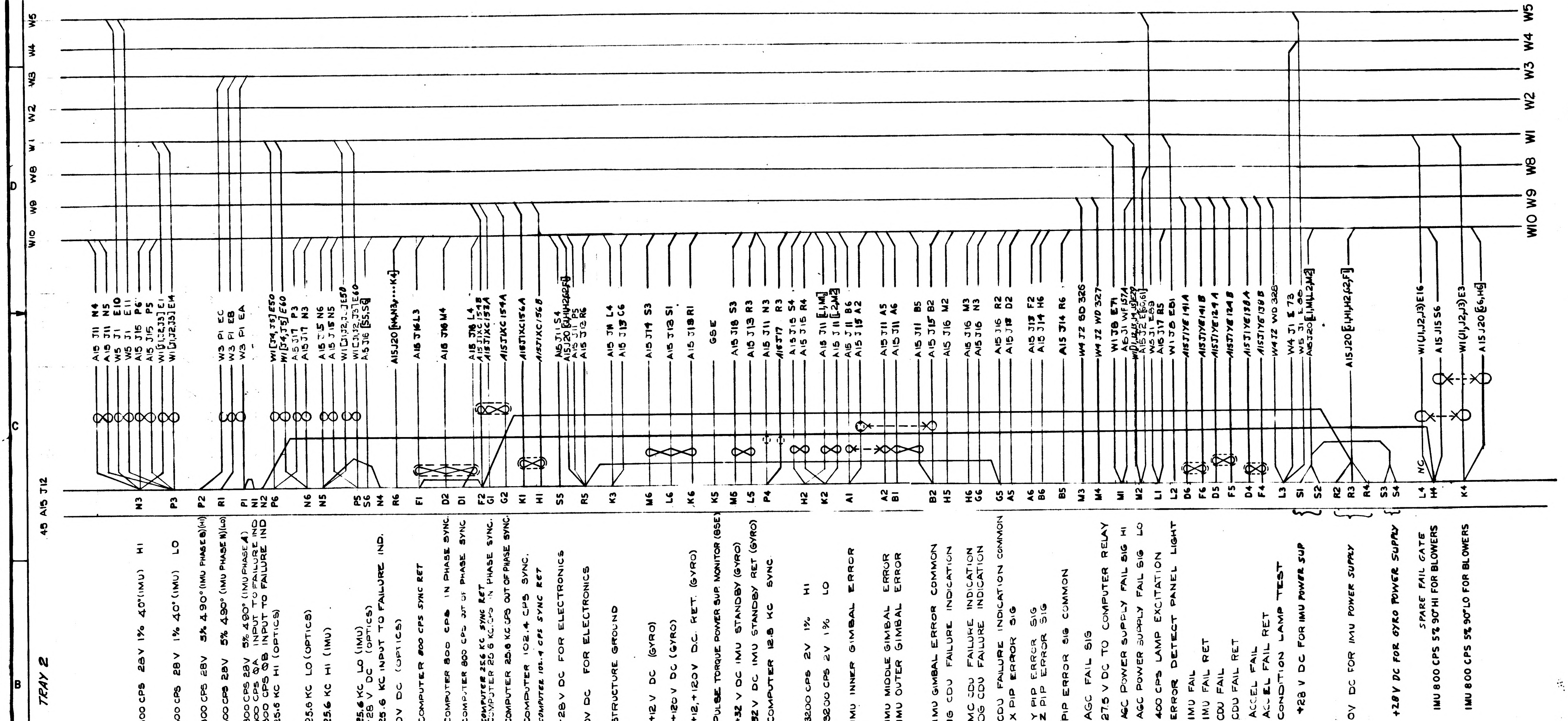
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 01764	6-26 63	WK
	B	REVISED PER TDRR 02492	7-7-63	WK
	C	REVISED PER TDRR 04055	[illegible]	WK



W5
W4
W3
W2
W1
W8
W9
W10
45 A15 J12
800 CPS 28V 1% 40°(IMU) HI
800 CPS 28V 1% 40°(IMU) LO
800 CPS 28V 5% ∠90° (IMU PHASE B)(HI)
800 CPS 28V 5% ∠90° (IMU PHASE B)(LO)
800 CPS 28V 5% ∠90° (IMU PHASE A)
800 CPS ØA INPUT TO FAILURE IND
800 CPS ØB INPUT TO FAILURE IND
25.6 KC HI (OPTICS)
25.6 KC LO (OPTICS)
25.6 KC HI (IMU)
25.6 KC LO (IMU)
+28 V DC (OPTICS)
25.6 KC INPUT TO FAILURE IND.
0V DC (OPTICS)
COMPUTER 800 CPS SYNC RET
COMPUTER 800 CPS IN PHASE SYNC
COMPUTER 800 CPS OUT OF PHASE SYNC
COMPUTER 25.6 KC SYNC RET
COMPUTER 25.6 KC CPS IN PHASE SYNC
COMPUTER 25.6 KC CPS OUT OF PHASE SYNC
COMPUTER 102.4 CPS SYNC
COMPUTER 102.4 CPS SYNC RET
+28 V DC FOR ELECTRONICS
0V DC FOR ELECTRONICS
STRUCTURE GROUND
+12 V DC (GYRO)
+120 V DC (GYRO)
+12, +120V DC RET (GYRO)
PULSE TORQUE POWER SUP MONITOR (BSE)
+32 V DC IMU STANDBY (GYRO)
32 V DC IMU STANDBY RET (GYRO)
COMPUTER 12.8 KC SYNC
3200 CPS 2V 1% HI
3200 CPS 2V 1% LO
IMU INNER GIMBAL ERROR
IMU MIDDLE GIMBAL ERROR
IMU OUTER GIMBAL ERROR
IMU GIMBAL ERROR COMMON
IG CDU FAILURE INDICATION
MG CDU FAILURE INDICATION
OG CDU FAILURE INDICATION
CDU FAILURE INDICATION COMMON
X PIP ERROR SIG
Y PIP ERROR SIG
Z PIP ERROR SIG
PIP ERROR SIG COMMON
AGC FAIL SIG
27.5 V DC TO COMPUTER RELAY
AGC POWER SUPPLY FAIL SIG HI
AGC POWER SUPPLY FAIL SIG LO
400 CPS LAMP EXCITATION
ERROR DETECT PANEL LIGHT
IMU FAIL
IMU FAIL RET
CDU FAIL
CDU FAIL RET
ACCEL FAIL
ACCEL FAIL RET
CONDITION LAMP TEST
+28 V DC FOR IMU POWER SUP
0V DC FOR IMU POWER SUPPLY
+28 V DC FOR GYRO POWER SUPPLY
SPARE FAIL GATE
IMU 800 CPS 5% 90° HI FOR BLOWERS
IMU 800 CPS 5% 90° LO FOR BLOWERS

TRAY 2

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01434 DATE 6/5/63

Ⓒ REPLACED WITH CHANGE BY REV D

MASTER

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LIST OF PARTS AND MATERIALS

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB CONTRACT NAS 9-153
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC 6/5/63
BY DIRECTION MIT
WKupfer 5 June 63

PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 2

SCALE UNIT WT. CODE IDENT.

MIT
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LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
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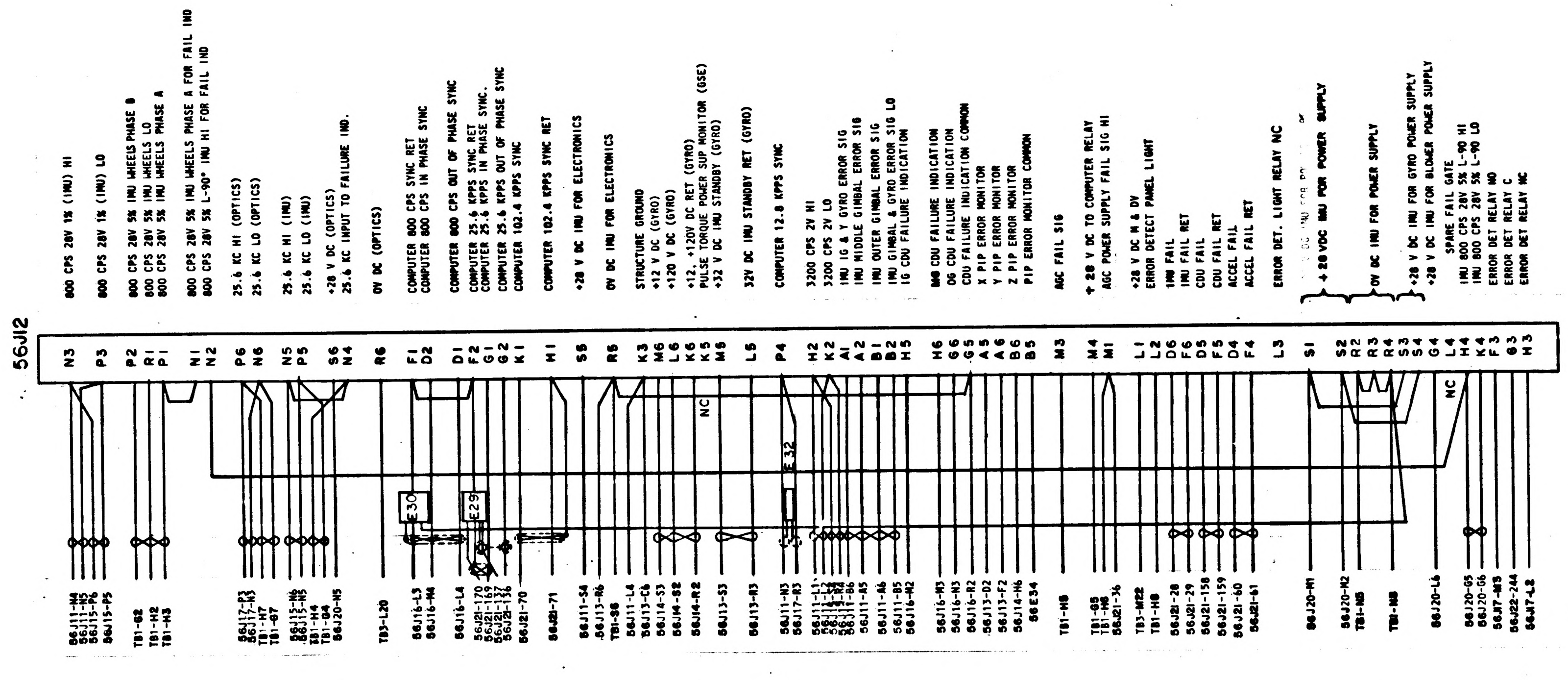
HOUSTON TEXAS
NASA DRAWING NO. 1010062
SHEET OF

1010062

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGES PER TDRR 04055	10/4/63	LK



56J12
N3 800 CPS 28V 1% (IMU) HI
P3 800 CPS 28V 1% (IMU) LO
P2 800 CPS 28V 5% IMU WHEELS PHASE B
R1 800 CPS 28V 5% IMU WHEELS LO
P1 800 CPS 28V 5% IMU WHEELS PHASE A
N1 800 CPS 28V 5% IMU WHEELS PHASE A FOR FAIL IND
N2 800 CPS 28V 5% L-90° IMU HI FOR FAIL IND
P6 25.6 KC HI (OPTICS)
N6 25.6 KC LO (OPTICS)
N5 25.6 KC HI (IMU)
P5 25.6 KC LO (IMU)
S6 +28 V DC (OPTICS)
N4 25.6 KC INPUT TO FAILURE IND.
R6 0V DC (OPTICS)
F1 COMPUTER 800 CPS SYNC RET
D2 COMPUTER 800 CPS IN PHASE SYNC
D1 COMPUTER 800 CPS OUT OF PHASE SYNC
F2 COMPUTER 25.6 KPPS SYNC RET
G1 COMPUTER 25.6 KPPS IN PHASE SYNC.
G2 COMPUTER 25.6 KPPS OUT OF PHASE SYNC
K1 COMPUTER 102.4 KPPS SYNC
H1 COMPUTER 102.4 KPPS SYNC RET
S5 +28 V DC IMU FOR ELECTRONICS
R5 0V DC IMU FOR ELECTRONICS
K3 STRUCTURE GROUND
M6 +12 V DC (GYRO)
L6 +120 V DC (GYRO)
K6 +12, +120V DC RET (GYRO)
K5 PULSE TORQUE POWER SUP MONITOR (GSE)
M5 +32 V DC IMU STANDBY (GYRO)
L5 32V DC IMU STANDBY RET (GYRO)
P4 COMPUTER 12.8 KPPS SYNC
H2 3200 CPS 2V HI
K2 3200 CPS 2V LO
A1 IMU IG & Y GYRO ERROR SIG
A2 IMU MIDDLE GIMBAL ERROR SIG
B1 IMU OUTER GIMBAL ERROR SIG
B2 IMU GIMBAL & GYRO ERROR SIG LO
H5 IG CDU FAILURE INDICATION
H6 MG CDU FAILURE INDICATION
G6 OG CDU FAILURE INDICATION
G5 CDU FAILURE INDICATION COMMON
A5 X PIP ERROR MONITOR
A6 Y PIP ERROR MONITOR
B6 Z PIP ERROR MONITOR
B5 PIP ERROR MONITOR COMMON
M3 AGC FAIL SIG
M4 + 28 V DC TO COMPUTER RELAY
M1 AGC POWER SUPPLY FAIL SIG HI
L1 +28 V DC M & DV
L2 ERROR DETECT PANEL LIGHT
D6 IMU FAIL
F6 IMU FAIL RET
D5 CDU FAIL
F5 CDU FAIL RET
D4 ACCEL FAIL
F4 ACCEL FAIL RET
L3 ERROR DET. LIGHT RELAY NC
S1
+ 28 VDC IMU FOR POWER SUPPLY
S2
R2
R3
R4
0V DC IMU FOR POWER SUPPLY
S3
S4
+28 V DC IMU FOR GYRO POWER SUPPLY
+28 V DC IMU FOR BLOWER POWER SUPPLY
G4 SPARE FAIL GATE
L4 NC
H4 IMU 800 CPS 28V 5% L-90 HI
K4 IMU 800 CPS 28V 5% L-90 LO
F3 ERROR DET RELAY NO
G3 ERROR DET RELAY C
H3 ERROR DET RELAY NC
K5 NC
E30
E29
E32
56J11-N4
56J11-N5
56J15-P6
56J15-P5
TB1-G2
TB1-H2
TB1-H3
56J17-P3
56J17-N3
TB1-H7
TB1-G7
56J15-N6
56J15-N5
TB1-H4
TB1-G4
56J20-N5
TB3-L20
56J16-L3
56J16-M4
56J16-L4
56J21-170
56J21-169
56J21-137
56J21-136
56J21-70
56J21-71
56J11-S4
56J13-R6
TB1-S6
56J11-L4
56J13-C6
56J14-S3
56J14-S2
56J14-R2
56J13-S3
56J13-R3
56J11-N3
56J17-R3
56J11-L1
56J11-L2
56J13-S4
56J13-R4
56J11-B6
56J11-A5
56J11-A6
56J11-B5
56J16-M2
56J16-M3
56J16-N3
56J16-R2
56J13-D2
56J13-F2
56J14-H6
56E34
TB1-H5
TB1-G5
TB1-H6
56J21-36
TB3-M22
TB1-H8
56J21-28
56J21-29
56J21-158
56J21-159
56J21-60
56J21-61
56J20-M1
56J20-M2
TB1-N5
TB1-N8
56J20-L6
56J20-G5
56J20-G6
56J17-M3
56J22-244
56J17-L2

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01434 **DATE** 6/5/63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY.
   1010150-PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINATION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

D REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

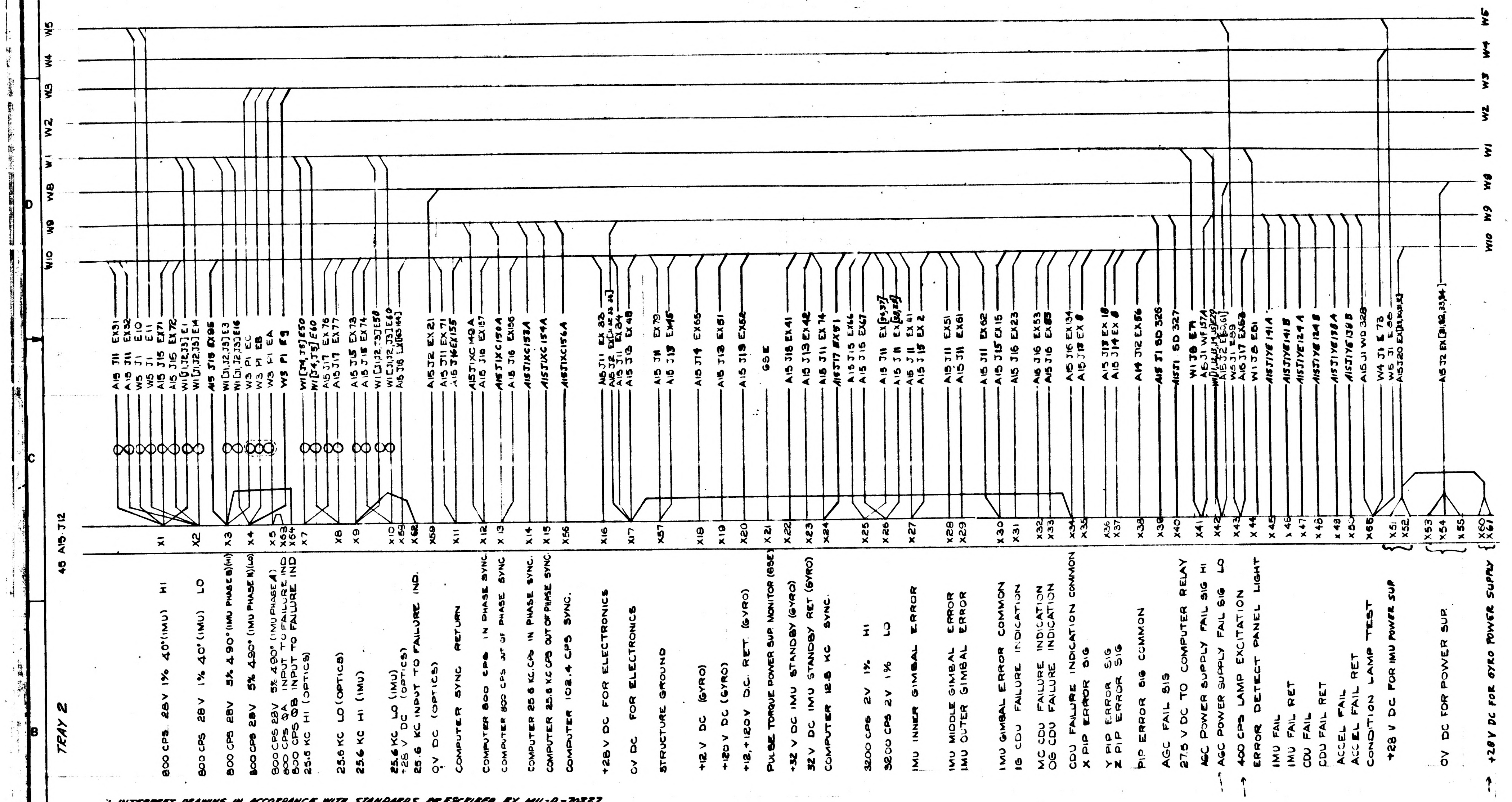
M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO.
CONTRACT
DRAWN A Dagrahi DATE 8/63
CHECKED J Green
APPROVAL J Green
APPROVAL
NASA APPROVAL
MIT APPROVAL 23 Oct 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
TRAY 2

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010062
SCALE #
WT
SHEET 1 OF 1

1010062 D


W5
W4
W3
W2
W1
W8
W9
W10
45 A15 J12
TRAY 2
X1 800 CPS 28V 1% 40°(IMU) HI
X2 800 CPS 28V 1% 40°(IMU) LO
X3 800 CPS 28V 5% 4 90° (IMU PHASE B)(HI)
X4 800 CPS 28V 5% 4 90° (IMU PHASE B)(LO)
X5 800 CPS 28V 5% 4 90° (IMU PHASE A)
X63 800 CPS ØA INPUT TO FAILURE IND
X64 800 CPS ØB INPUT TO FAILURE IND
X7 25.6 KC HI (OPTICS)
X8 25.6 KC LO (OPTICS)
X9 25.6 KC HI (IMU)
X10 25.6 KC LO (IMU)
X58 +28 V DC (OPTICS)
X62 25.6 KC INPUT TO FAILURE IND.
X59 0V DC (OPTICS)
X11 COMPUTER SYNC RETURN
X12 COMPUTER 800 CPS IN PHASE SYNC.
X13 COMPUTER 800 CPS OUT OF PHASE SYNC
X14 COMPUTER 25.6 KC CPS IN PHASE SYNC.
X15 COMPUTER 25.6 KC CPS OUT OF PHASE SYNC.
X56 COMPUTER 102.4 CPS SYNC.
X16 +28 V DC FOR ELECTRONICS
X17 0V DC FOR ELECTRONICS
X57 STRUCTURE GROUND
X18 +12 V DC (GYRO)
X19 +120 V DC (GYRO)
X20 +12, +120 V D.C. RET. (GYRO)
X21 PULSE TORQUE POWER SUP. MONITOR (65E)
X22 +32 V DC IMU STANDBY (GYRO)
X23 32 V DC IMU STANDBY RET (GYRO)
X24 COMPUTER 12.8 KC SYNC.
X25 3200 CPS 2V 1% HI
X26 3200 CPS 2V 1% LO
X27 IMU INNER GIMBAL ERROR
X28 IMU MIDDLE GIMBAL ERROR
X29 IMU OUTER GIMBAL ERROR
X30 IMU GIMBAL ERROR COMMON
X31 IG CDU FAILURE INDICATION
X32 MC CDU FAILURE INDICATION
X33 OG CDU FAILURE INDICATION
X34 CDU FAILURE INDICATION COMMON
X35 X PIP ERROR SIG
X36 Y PIP ERROR SIG
X37 Z PIP ERROR SIG
X38 PIP ERROR SIG COMMON
X39 AGC FAIL SIG
X40 27.5 V DC TO COMPUTER RELAY
X41 AGC POWER SUPPLY FAIL SIG HI
X42 AGC POWER SUPPLY FAIL SIG LO
X43 400 CPS LAMP EXCITATION
X44 ERROR DETECT PANEL LIGHT
X45 IMU FAIL
X46 IMU FAIL RET
X47 CDU FAIL
X48 CDU FAIL RET
X49 ACCEL FAIL
X50 ACCEL FAIL RET
X65 CONDITION LAMP TEST
X51, X52 +28 V DC FOR IMU POWER SUP
X53, X54, X55 0V DC FOR POWER SUP.
X60, X61 +28 V DC FOR GYRO POWER SUPPLY

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 INTERCONNECTION DIAG, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS.
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR.
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED.
6. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01434 DATE 6/5/63

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING
MATERIAL:

MIT INSTRUMENTATION LAB
CONTRACT NAS 9-153
DATE
APPROVED
CHECKED
DRAWN
APPROVED FOR MSC
6/5/63
BY DIRECTION MIT
5 Jun 63

PSA JUNCTION BOX
INTERCONNECTION
WIRING
TRAY 2

SCALE UNIT WT. CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.
DWG. NO.
MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
1010062
SHEET OF

1010062

INCHES
PHOTOGRAPHIC SCALE ONLY

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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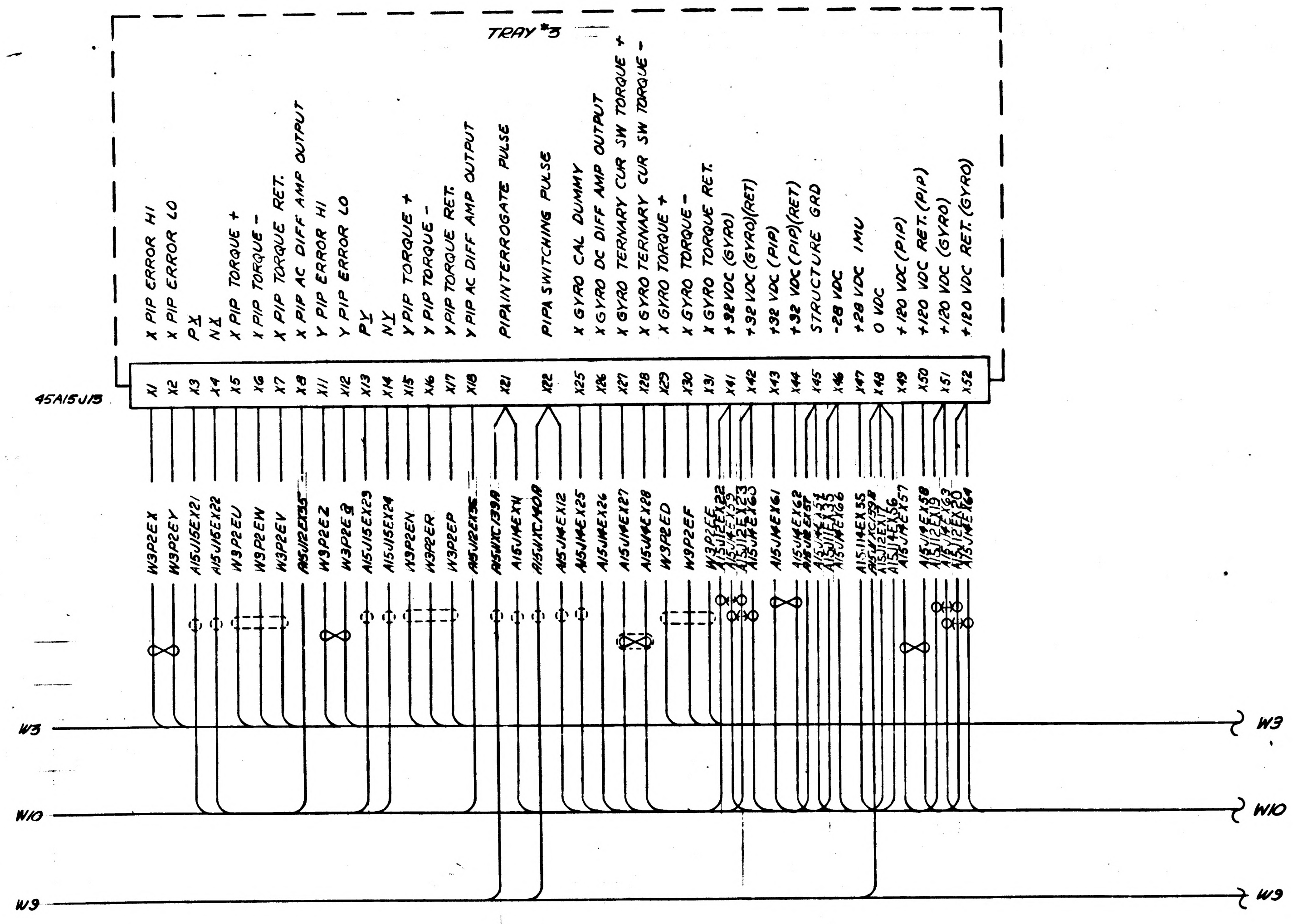
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45A15J13
X1 X PIP ERROR HI W3P2EX
X2 X PIP ERROR LO W3P2EY
X3 PX A15J15EX21
X4 NX A15J15EX22
X5 X PIP TORQUE + W3P2EU
X6 X PIP TORQUE − W9P2EW
X7 X PIP TORQUE RET. W3P2EV
X8 X PIP AC DIFF AMP OUTPUT A15J12EX35
X11 Y PIP ERROR HI W3P2EZ
X12 Y PIP ERROR LO W3P2Ea
X13 PY A15J15EX23
X14 NY A15J15EX24
X15 Y PIP TORQUE + W3P2EN
X16 Y PIP TORQUE − W3P2ER
X17 Y PIP TORQUE RET. W3P2EP
X18 Y PIP AC DIFF AMP OUTPUT A15J12EX36
X21 PIPA INTERROGATE PULSE A15J1XC139A A15J14EX4
X22 PIPA SWITCHING PULSE A15J1XC140A A15J14EX12
X25 X GYRO CAL DUMMY A15J14EX25
X26 X GYRO DC DIFF AMP OUTPUT A15J14EX26
X27 X GYRO TERNARY CUR SW TORQUE + A15J14EX27
X28 X GYRO TERNARY CUR SW TORQUE − A15J14EX28
X29 X GYRO TORQUE + W3P2ED
X30 X GYRO TORQUE − W9P2EF
X31 X GYRO TORQUE RET. W3P2EE
X41 +32 VDC (GYRO) A15J12EX22 A15J14EX59
X42 +32 VDC (GYRO)(RET) A15J12EX23 A15J14EX63
X43 +32 VDC (PIP) A15J14EX61
X44 +32 VDC (PIP)(RET) A15J14EX62 A15J12EX57
X45 STRUCTURE GRD A15J14EX54 A15J11EX35
X46 −28 VDC A15J14EX66
X47 +28 VDC IMU A15J14EX55
X48 0 VDC A15J1XC139B A15J12EX17 A15J14EX56
X49 +120 VDC (PIP) A15J14EX57
X50 +120 VDC RET. (PIP) A15J14EX58
X51 +120 VDC (GYRO) A15J12EX19 A15J14EX63
X52 +120 VDC RET. (GYRO) A15J12EX20 A15J14EX64
W3
W10
W9
W3
W10
W9

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
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6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PRIFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DATE 4-29-63
CHECKED A G Cong 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W J R 5-22-63
MIT APPROVAL 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 3

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010063
SCALE WT SHEET OF

1010063

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
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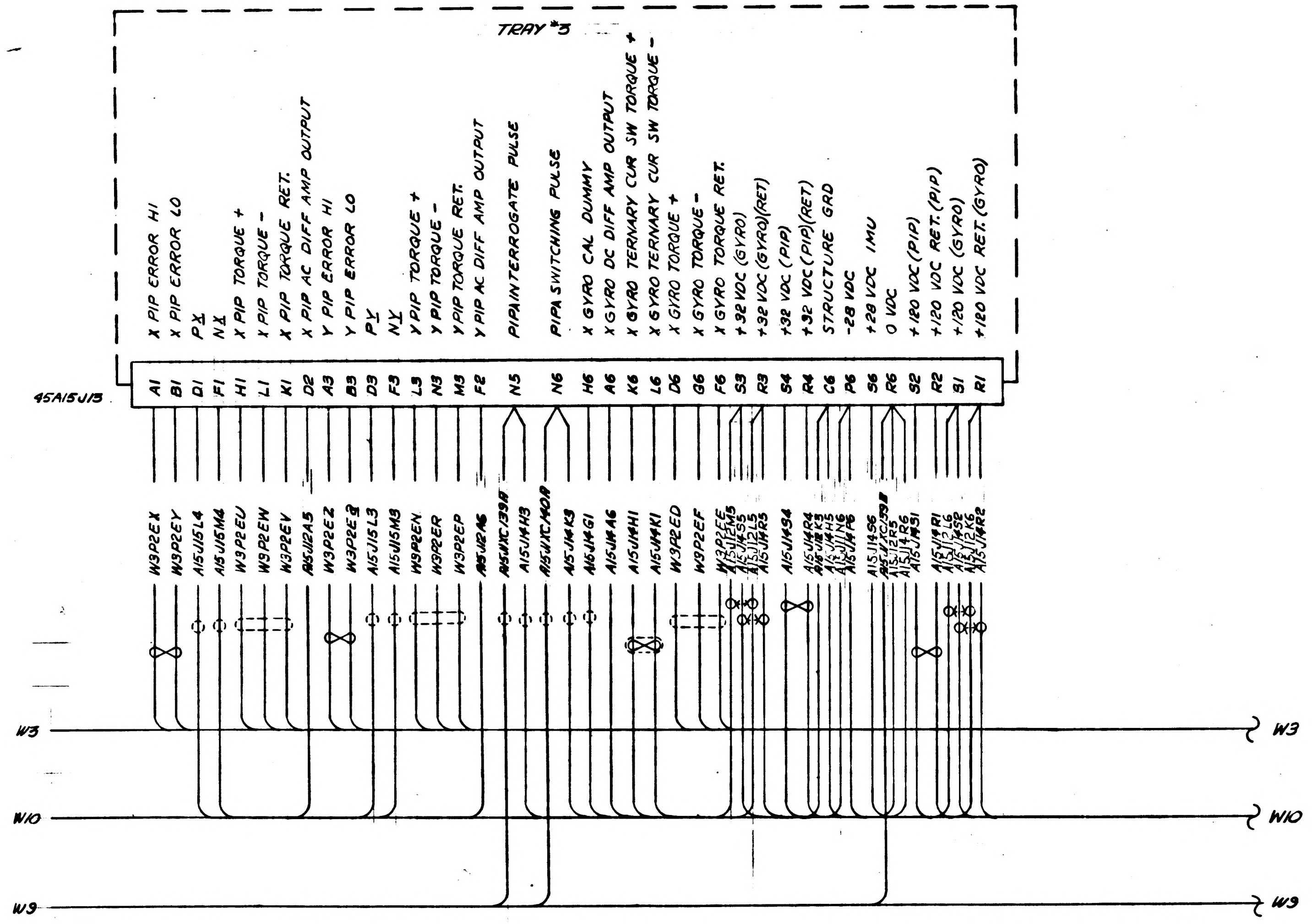
B	REVISED PER TDRR 02493	8 AUG 63	WK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X PIP ERROR LO
PX
NX
X PIP TORQUE +
X PIP TORQUE -
X PIP TORQUE RET.
X PIP AC DIFF AMP OUTPUT
Y PIP ERROR HI
Y PIP ERROR LO
PY
NY
Y PIP TORQUE +
Y PIP TORQUE -
Y PIP TORQUE RET.
Y PIP AC DIFF AMP OUTPUT
PIPA INTERROGATE PULSE
PIPA SWITCHING PULSE
X GYRO CAL DUMMY
X GYRO DC DIFF AMP OUTPUT
X GYRO TERNARY CUR SW TORQUE +
X GYRO TERNARY CUR SW TORQUE -
X GYRO TORQUE +
X GYRO TORQUE -
X GYRO TORQUE RET.
+32 VDC (GYRO)
+32 VDC (GYRO)(RET)
+32 VDC (PIP)
+32 VDC (PIP)(RET)
STRUCTURE GRD
-28 VDC
+28 VDC IMU
0 VDC
+120 VDC (PIP)
+120 VDC RET. (PIP)
+120 VDC (GYRO)
+120 VDC RET. (GYRO)
45A15J13
A1
B1
D1
F1
H1
L1
K1
D2
A3
B3
D3
F3
L3
N3
M3
F2
N5
N6
H6
A6
K6
L6
D6
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S3
R3
S4
R4
C6
P6
S6
R6
S2
R2
S1
R1
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W3P2EY
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A15J15M4
W9P2EU
W9P2EW
W3P2EV
A15J12A5
W3P2EZ
W3P2EQ
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W3P2ER
W3P2EP
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A15J14A6
A15J14H1
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W3P2EE
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A15J14S5
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A15J14R6
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A15J14R1
A15J12L6
A15J14S2
A15J12K6
A15J14R2
W3
W10
W9

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
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4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR

6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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DWG. NO. CONTRACT
DRAWN DATE 4-29-63
CHECKED A G C 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W J 5-22-63
MIT APPROVAL 22 May 63

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PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 3

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010065
SCALE WT SHEET OF

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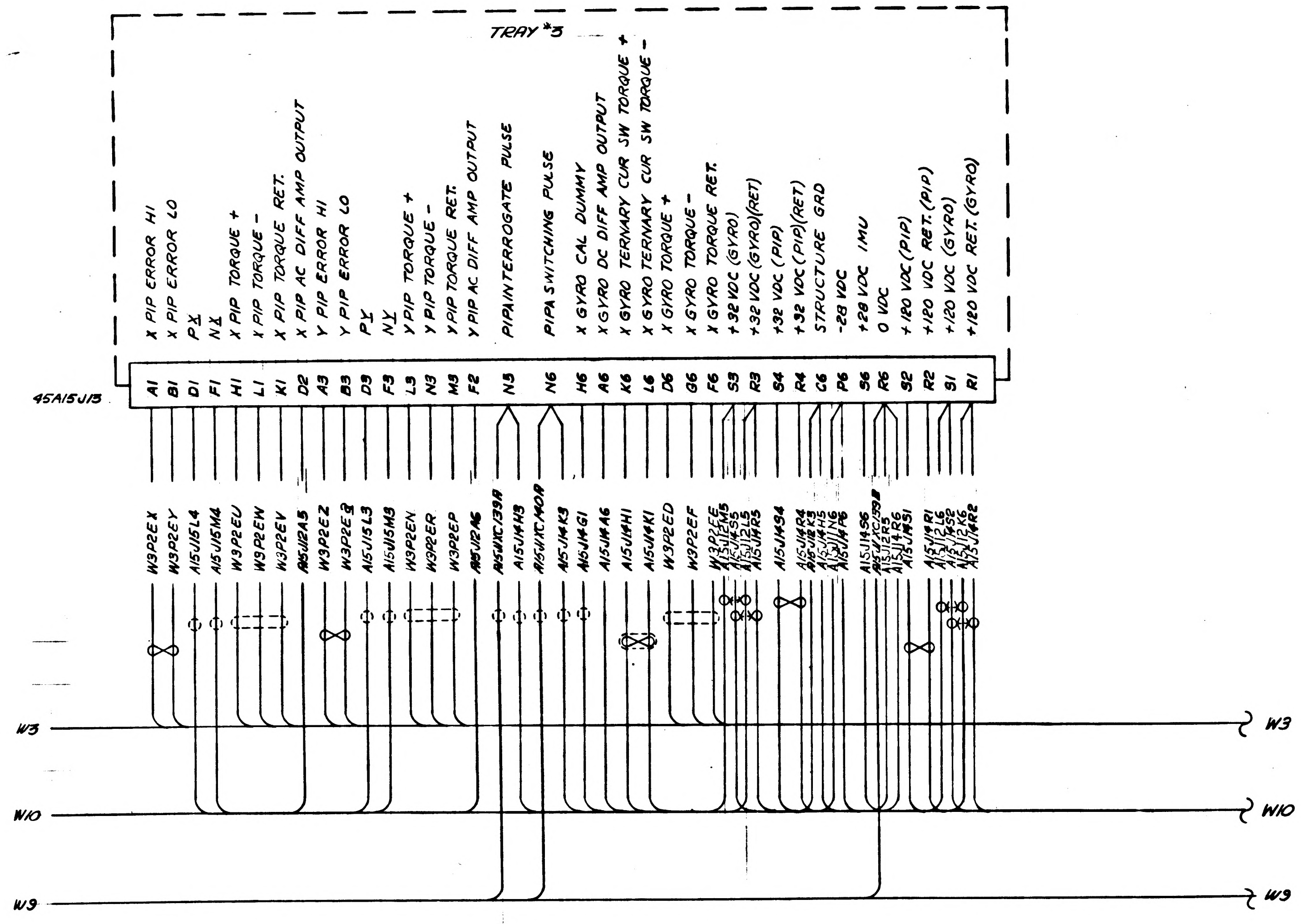
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01839	6-28 63	WK
B	REVISED PER TDRR 02493	8 AUG 63	WK
C	REVISED PER TDRR 0405	[illegible] 63	WK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X PIP ERROR LO
PX
NX
X PIP TORQUE +
X PIP TORQUE -
X PIP TORQUE RET.
X PIP AC DIFF AMP OUTPUT
Y PIP ERROR HI
Y PIP ERROR LO
PY
NY
Y PIP TORQUE +
Y PIP TORQUE -
Y PIP TORQUE RET.
Y PIP AC DIFF AMP OUTPUT
PIPA INTERROGATE PULSE
PIPA SWITCHING PULSE
X GYRO CAL DUMMY
X GYRO DC DIFF AMP OUTPUT
X GYRO TERNARY CUR SW TORQUE +
X GYRO TERNARY CUR SW TORQUE -
X GYRO TORQUE +
X GYRO TORQUE -
X GYRO TORQUE RET.
+32 VDC (GYRO)
+32 VDC (GYRO)(RET)
+32 VDC (PIP)
+32 VDC (PIP)(RET)
STRUCTURE GRD
-28 VDC
+28 VDC IMU
0 VDC
+120 VDC (PIP)
+120 VDC RET. (PIP)
+120 VDC (GYRO)
+120 VDC RET. (GYRO)
A1
B1
D1
F1
H1
L1
K1
D2
A3
B3
D3
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N3
M3
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S3
R3
S4
R4
C6
P6
S6
R6
S2
R2
S1
R1
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A15J12K6
A15J14R2
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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
 1014523 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
 1010152 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR

6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 4-29-63
CHECKED A G Caggiano 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W J Rhine 5-22-63
MIT APPROVAL 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 3

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010063
SCALE WT SHEET OF

1010063 C

INCHES
PHOTOGRAPHIC SCALE ONLY

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REVISIONS			
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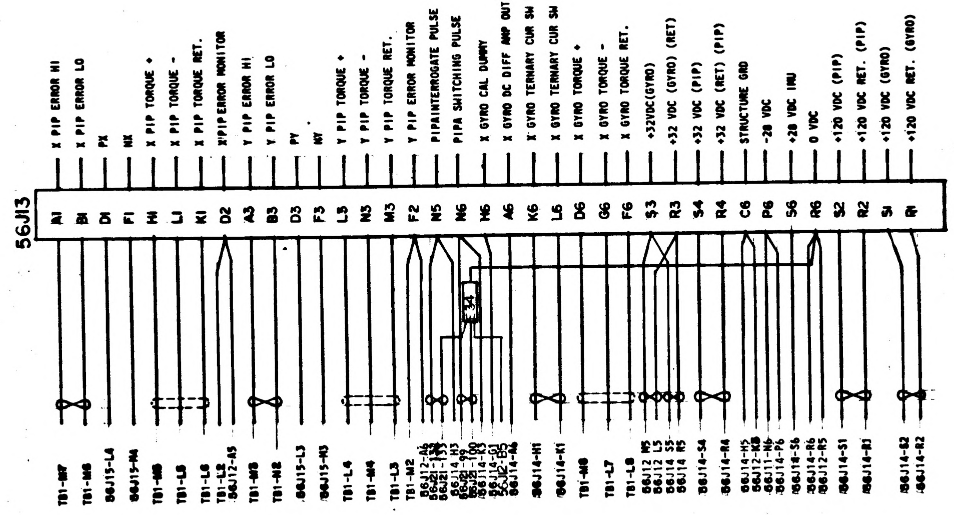
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B1
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N6
M6
A6
K6
L6
D6
G6
F6
S3
R3
S4
R4
C6
P6
S6
R6
S2
R2
S1
R1
X PIP ERROR HI
X PIP ERROR LO
PX
NX
X PIP TORQUE +
X PIP TORQUE -
X PIP TORQUE RET.
X PIP ERROR MONITOR
Y PIP ERROR HI
Y PIP ERROR LO
PY
NY
Y PIP TORQUE +
Y PIP TORQUE -
Y PIP TORQUE RET.
Y PIP ERROR MONITOR
PIPA INTERROGATE PULSE
PIPA SWITCHING PULSE
X GYRO CAL DUMMY
X GYRO DC DIFF AMP OUTPUT
X GYRO TERNARY CUR SW TORQUE +
X GYRO TERNARY CUR SW TORQUE -
X GYRO TORQUE +
X GYRO TORQUE -
X GYRO TORQUE RET.
+32VDC(GYRO)
+32 VDC (GYRO) (RET)
+32 VDC (PIP)
+32 VDC (RET) (PIP)
STRUCTURE GRD
-28 VDC
+28 VDC IMU
0 VDC
+120 VDC (PIP)
+120 VDC RET. (PIP)
+120 VDC (GYRO)
+120 VDC RET. (GYRO)
34
TB1-M7
TB1-M6
56J15-L4
56J15-M4
TB1-M5
TB1-L5
TB1-L6
TB1-L2
56J12-A5
TB1-M3
TB1-M2
56J15-L3
56J15-M3
TB1-L4
TB1-M4
TB1-L3
TB1-M2
56J12-A6
56J21-133
56J21-135
56J14 H3
56J21-99
56J21-100
56J14-K3
56J14-G1
56J12-B5
56J14-A6
56J14-H1
56J14-K1
TB1-M8
TB1-L7
TB1-L8
56J12 M5
56J12 L5
56J14 S5
56J14 R5
56J14-S4
56J14-R4
56J14-H5
56J12-K5
56J11-N6
56J14-P6
56J14-S6
56J14-R6
56J12-R5
56J14-S1
56J14-R1
56J14-S2
56J14-R2

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150-PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTOR GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) AS SHOWN

D REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —#— DECIMALS ± —#— ANGLES ± —#—
DO NOT SCALE THIS DRAWING
MATERIAL —#—
HEAT TREATMENT —#—
FINAL FINISH —#—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 5-27-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 10/28/63
MIT APPROVAL 23 Oct

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA END CONNECTOR
INTERCONN WIRING DIAGRAM
TRAY 3

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010063
SCALE —#—
WT
SHEET 1 OF 1

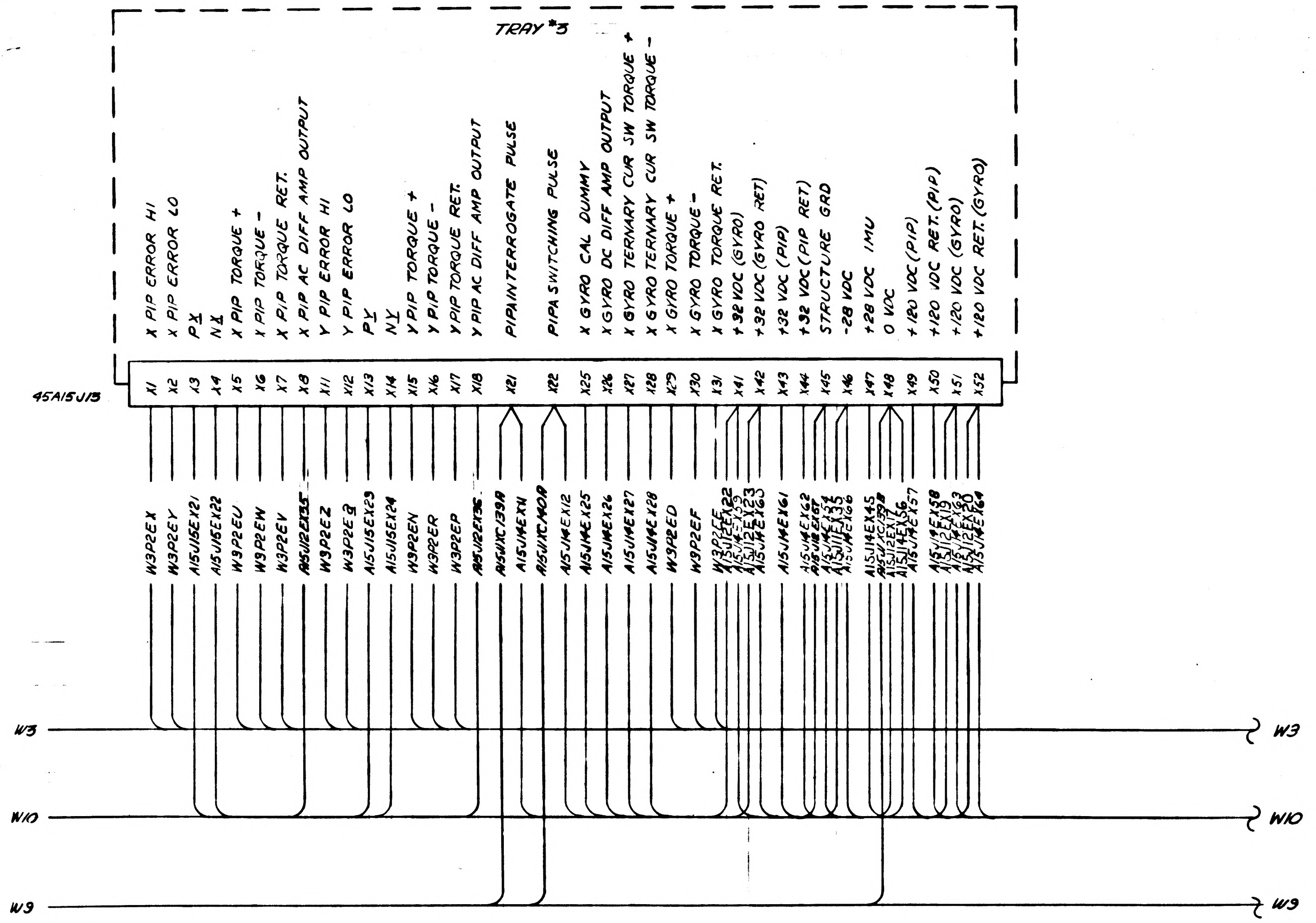
MASTER

1010063 D

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


TRAY *3
45A15J15
X1 X PIP ERROR HI
X2 X PIP ERROR LO
X3 PX
X4 NX
X5 X PIP TORQUE +
X6 X PIP TORQUE −
X7 X PIP TORQUE RET.
X8 X PIP AC DIFF AMP OUTPUT
X11 Y PIP ERROR HI
X12 Y PIP ERROR LO
X13 PY
X14 NY
X15 Y PIP TORQUE +
X16 Y PIP TORQUE −
X17 Y PIP TORQUE RET.
X18 Y PIP AC DIFF AMP OUTPUT
X21 PIPA INTERROGATE PULSE
X22 PIPA SWITCHING PULSE
X25 X GYRO CAL DUMMY
X26 X GYRO DC DIFF AMP OUTPUT
X27 X GYRO TERNARY CUR SW TORQUE +
X28 X GYRO TERNARY CUR SW TORQUE −
X29 X GYRO TORQUE +
X30 X GYRO TORQUE −
X31 X GYRO TORQUE RET.
X41 +32 VDC (GYRO)
X42 +32 VDC (GYRO RET)
X43 +32 VDC (PIP)
X44 +32 VDC (PIP RET)
X45 STRUCTURE GRD
X46 -28 VDC
X47 +28 VDC IMU
X48 0 VDC
X49 +120 VDC (PIP)
X50 +120 VDC RET. (PIP)
X51 +120 VDC (GYRO)
X52 +120 VDC RET. (GYRO)
W3P2EX
W3P2EY
A15J15EX21
A15J15EX22
W9P2EU
W9P2EW
W3P2EV
A15J12EX35
W3P2EZ
W3P2Ea
A15J15EX23
A15J15EX24
W9P2EN
W3P2ER
W3P2EP
A15J12EX36
A15J1XC139A
A15J14EXN
A15J1XCMOA
A15J14EX12
A15J14EX25
A15J14EX26
A15J14EX27
A15J14EX28
W9P2ED
W9P2EF
W3P2EE
A15J12EX22
A15J14EX59
A15J12EX23
A15J14EX60
A15J14EX61
A15J14EX62
A15J18EX67
A15J14EX54
A15J11EX35
A15J14EX66
A15J14EX45
A15J1XC139B
A15J12EX17
A15J14EX56
A15J14EX57
A15J14EX58
A15J12EX19
A15J14EX63
A15J12EX20
A15J14EX64
W3
W10
W9
W3
W10
W9

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
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   1010150 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS
6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PRIFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

1010063

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN P. Rose DATE 4-29-63
CHECKED A G Coggeshall 30 Apr 63
APPROVAL J. S. Rosen
APPROVAL
NASA APPROVAL W J Rhine 5-22-63
MIT APPROVAL W. Coffey 22 May 63

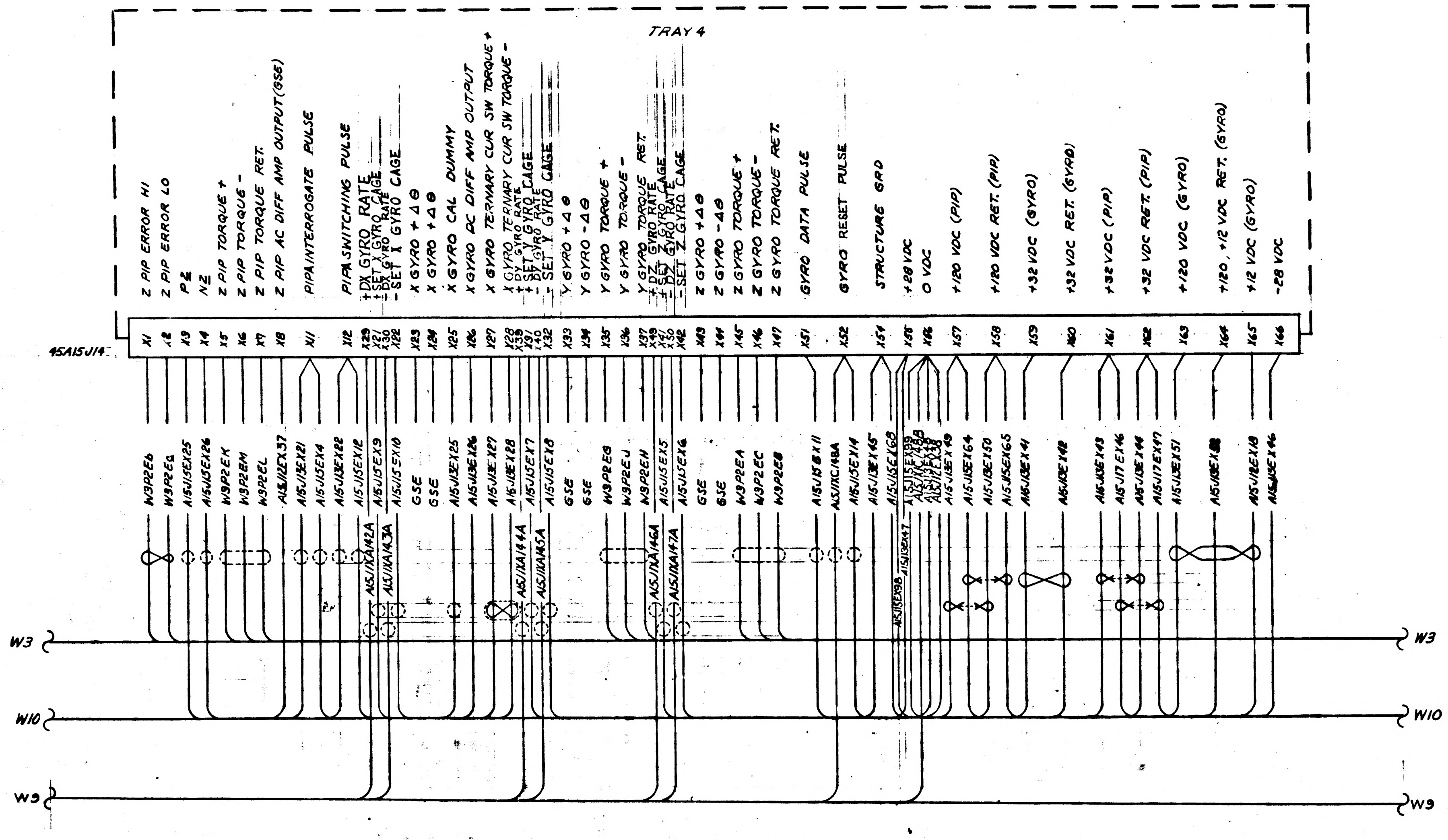
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 3

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010053
SCALE
WT
SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01765	6-24-63	wK



TRAY 4
45A15J14
Z PIP ERROR HI
Z PIP ERROR LO
PZ
NZ
Z PIP TORQUE +
Z PIP TORQUE −
Z PIP TORQUE RET.
Z PIP AC DIFF AMP OUTPUT (GSE)
PIPA INTERROGATE PULSE
PIPA SWITCHING PULSE
+DX GYRO RATE
+SET X GYRO CAGE
−DX GYRO RATE
−SET X GYRO CAGE
X GYRO +Δθ
X GYRO +Δθ
X GYRO CAL DUMMY
X GYRO DC DIFF AMP OUTPUT
X GYRO TERNARY CUR SW TORQUE +
X GYRO TERNARY CUR SW TORQUE −
+DY GYRO RATE
+SET Y GYRO CAGE
−DY GYRO RATE
−SET Y GYRO CAGE
Y GYRO +Δθ
Y GYRO −Δθ
Y GYRO TORQUE +
Y GYRO TORQUE −
Y GYRO TORQUE RET.
+DZ GYRO RATE
+SET Z GYRO CAGE
−DZ GYRO RATE
−SET Z GYRO CAGE
Z GYRO +Δθ
Z GYRO −Δθ
Z GYRO TORQUE +
Z GYRO TORQUE −
Z GYRO TORQUE RET.
GYRO DATA PULSE
GYRO RESET PULSE
STRUCTURE GRD
+28 VDC
0 VDC
+120 VDC (PIP)
+120 VDC RET. (PIP)
+32 VDC (GYRO)
+32 VDC RET. (GYRO)
+32 VDC (PIP)
+32 VDC RET. (PIP)
+120 VDC (GYRO)
+120, +12 VDC RET. (GYRO)
+12 VDC (GYRO)
−28 VDC
GSE
W3
W10
W9

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01346 DATE 22May63

NOTES:
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MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 4-29-63
CHECKED G G Cappane 30Apr63
APPROVAL
APPROVAL
NASA APPROVAL W J 5-22-63
MIT APPROVAL 22May63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 4

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010064
SCALE
WT
SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
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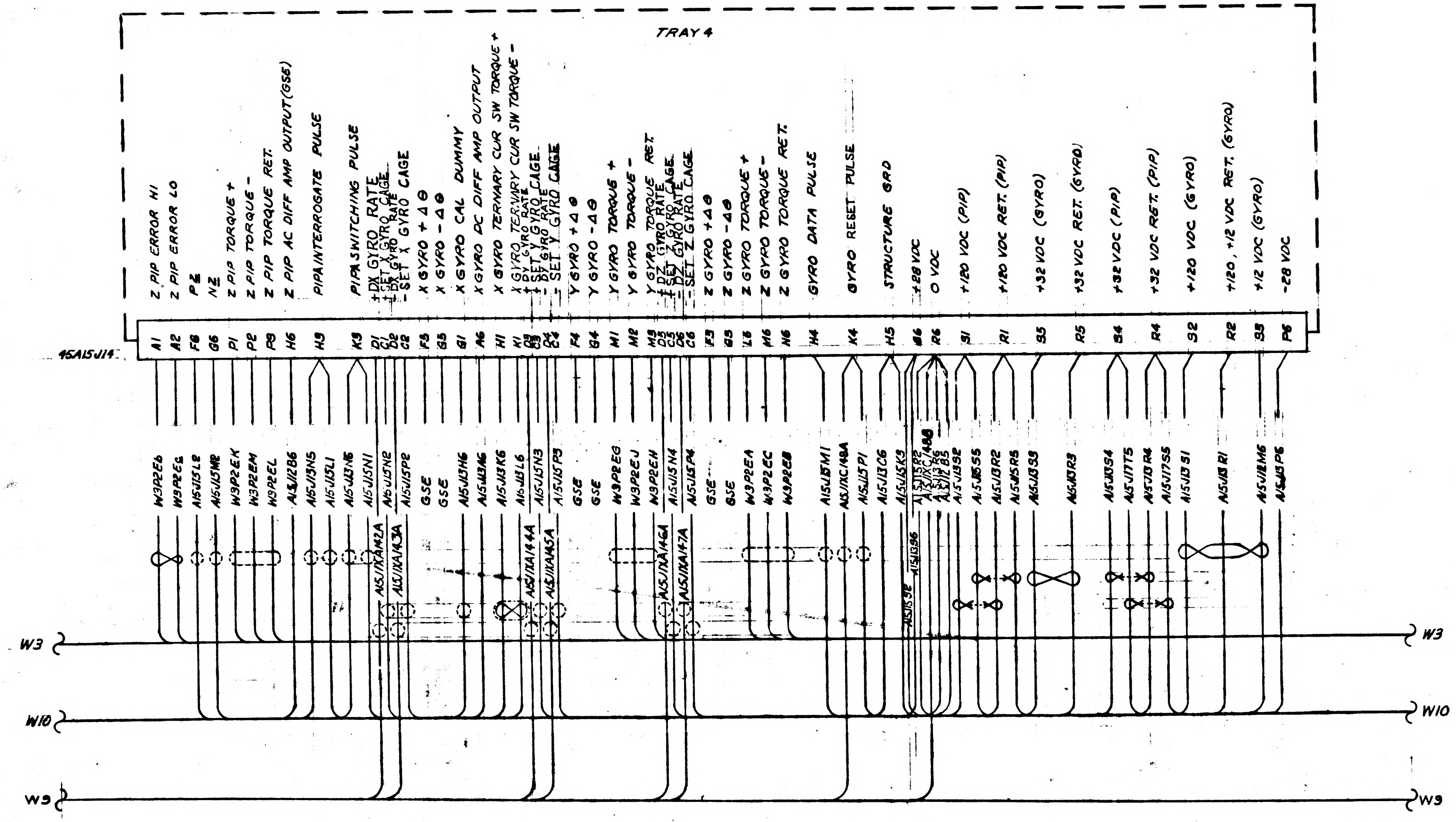
B	REVISED PER TDRR 02494		Wk


TRAY 4
45A15J14
A1 Z PIP ERROR HI
A2 Z PIP ERROR LO
F6 PZ
G6 NZ
P1 Z PIP TORQUE +
P2 Z PIP TORQUE -
P3 Z PIP TORQUE RET.
H6 Z PIP AC DIFF AMP OUTPUT (GSE)
H3 PIPA INTERROGATE PULSE
K3 PIPA SWITCHING PULSE
D1 +DX GYRO RATE
C1 +SET X GYRO CAGE
D2 -DX GYRO RATE
C2 -SET X GYRO CAGE
F5 X GYRO +Δθ
G5 X GYRO -Δθ
G1 X GYRO CAL DUMMY
A6 X GYRO DC DIFF AMP OUTPUT
H1 X GYRO TERNARY CUR SW TORQUE +
K1 X GYRO TERNARY CUR SW TORQUE -
D3 +DY GYRO RATE
C3 +SET Y GYRO CAGE
D4 -DY GYRO RATE
C4 -SET Y GYRO CAGE
F4 Y GYRO +Δθ
G4 Y GYRO -Δθ
M1 Y GYRO TORQUE +
M2 Y GYRO TORQUE -
M3 Y GYRO TORQUE RET.
D5 +DZ GYRO RATE
C5 +SET Z GYRO CAGE
D6 -DZ GYRO RATE
C6 -SET Z GYRO CAGE
F3 Z GYRO +Δθ
G3 Z GYRO -Δθ
L6 Z GYRO TORQUE +
M6 Z GYRO TORQUE -
N6 Z GYRO TORQUE RET.
H4 GYRO DATA PULSE
K4 GYRO RESET PULSE
H5 STRUCTURE GRD
B6 +28 VDC
R6 0 VDC
S1 +120 VDC (PIP)
R1 +120 VDC RET. (PIP)
S5 +32 VDC (GYRO)
R5 +32 VDC RET. (GYRO)
S4 +32 VDC (PIP)
R4 +32 VDC RET. (PIP)
S2 +120 VDC (GYRO)
R2 +120, +12 VDC RET. (GYRO)
S3 +12 VDC (GYRO)
P6 -28 VDC
W3P2E6
W3P2EG
A15J15L2
A15J15M2
W3P2EK
W3P2EM
W3P2EL
A15J12B6
A15J15N5
A15J15L1
A15J13N6
A15J15N1
A15J15N2
A15J1XA142A
A15J1XA143A
A15J15P2
GSE
GSE
A15J13H6
A15J13A6
A15J13K6
A15J13L6
A15J1XA144A
A15J1XA145A
A15J15N3
A15J15P3
GSE
GSE
W3P2EG
W3P2EJ
W3P2EH
A15J1XA146A
A15J1XA147A
A15J15N4
A15J15P4
GSE
GSE
W3P2EA
W3P2EC
W3P2EB
A15J13M1
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A15J15P1
A15J13C6
A15J15K3
A15J15S2
A15J13S6
A15J15R2
A15J1XC148B
A15J13R6
A15J12B5
A15J13S2
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A15J13R2
A15J15R5
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A15J13R3
A15J13S4
A15J17T5
A15J13R4
A15J17S5
A15J13S1
A15J13R1
A15J12M6
A15J13P6
W3
W10
W9

NOTES:

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FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01346 DATE 22 Aug 63.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FED NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 4-29-63
CHECKED A G Cannon 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W J Rhine 5-22-63
MIT APPROVAL 22 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 4

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010064
SCALE
WT
SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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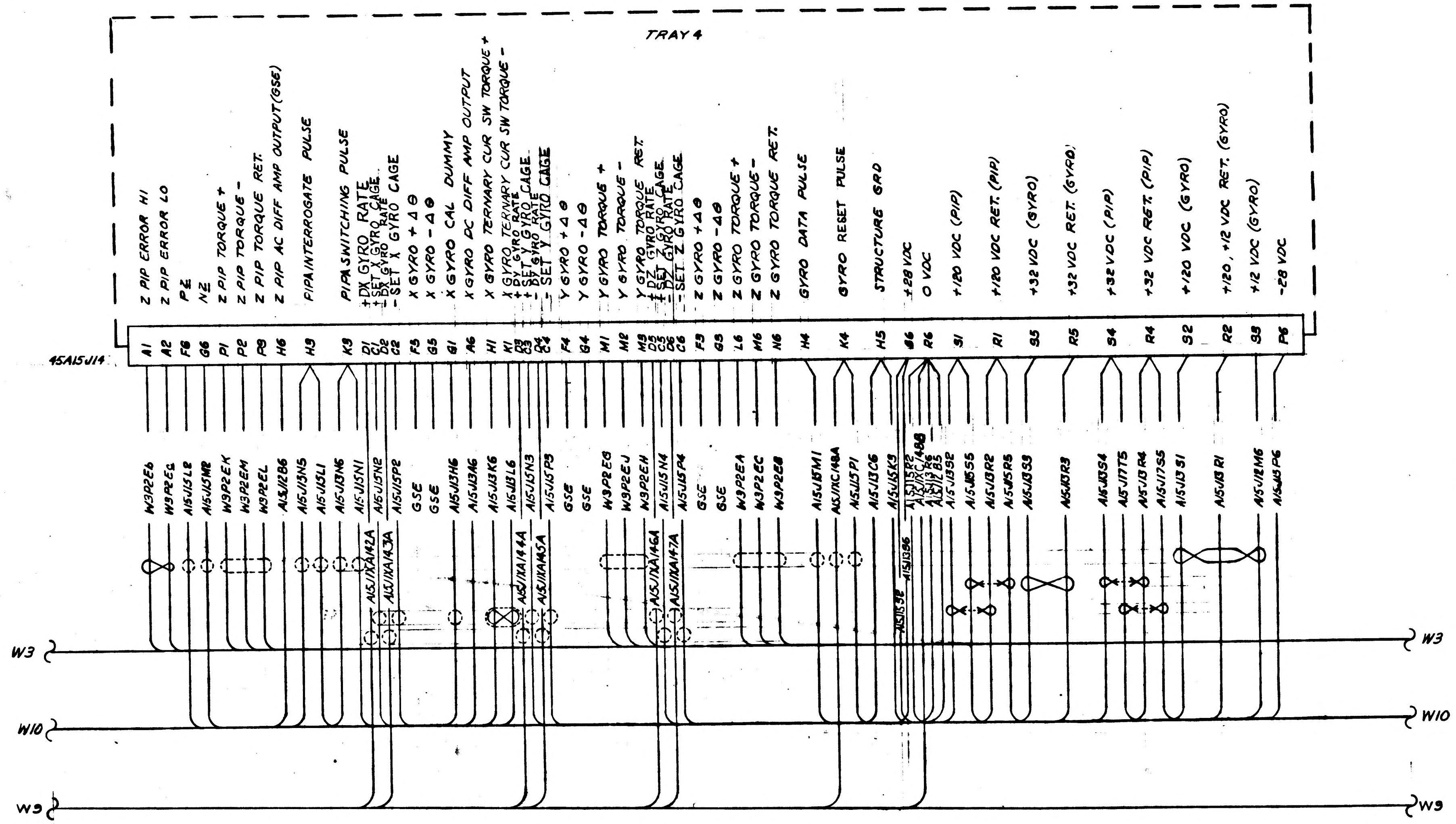
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01765	6-24-63	WK
B	REVISED PER TDRR 02494	28	WK
C	REVISED PER TDRR 04057	[illegible]	WK


TRAY 4
Z PIP ERROR HI
Z PIP ERROR LO
PZ
NZ
Z PIP TORQUE +
Z PIP TORQUE -
Z PIP TORQUE RET.
Z PIP AC DIFF AMP OUTPUT (GSE)
PIPA INTERROGATE PULSE
PIPA SWITCHING PULSE
+DX GYRO RATE
+SET X GYRO CAGE
-DX GYRO RATE
-SET X GYRO CAGE
X GYRO +Δθ
X GYRO -Δθ
X GYRO CAL DUMMY
X GYRO DC DIFF AMP OUTPUT
X GYRO TERNARY CUR SW TORQUE +
X GYRO TERNARY CUR SW TORQUE -
+DY GYRO RATE
+SET Y GYRO CAGE
-DY GYRO RATE
-SET Y GYRO CAGE
Y GYRO +Δθ
Y GYRO -Δθ
Y GYRO TORQUE +
Y GYRO TORQUE -
Y GYRO TORQUE RET.
+DZ GYRO RATE
+SET Z GYRO CAGE
-DZ GYRO RATE
-SET Z GYRO CAGE
Z GYRO +Δθ
Z GYRO -Δθ
Z GYRO TORQUE +
Z GYRO TORQUE -
Z GYRO TORQUE RET.
GYRO DATA PULSE
GYRO RESET PULSE
STRUCTURE GRD
+28 VDC
0 VDC
+120 VDC (PIP)
+120 VDC RET. (PIP)
+32 VDC (GYRO)
+32 VDC RET. (GYRO)
+32 VDC (PIP)
+32 VDC RET. (PIP)
+120 VDC (GYRO)
+120, +12 VDC RET. (GYRO)
+12 VDC (GYRO)
-28 VDC
45A15J14
A1
A2
F6
G6
P1
P2
P3
H6
H3
K3
D1
C1
D2
C2
F5
G5
G1
A6
H1
K1
D3
C3
D4
C4
F4
G4
M1
M2
M3
D5
C5
D6
C6
F3
G3
L6
M6
N6
H4
K4
H5
S6
R6
S1
R1
S5
R5
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R4
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R2
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A15J15M2
W3P2EK
W3P2EM
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A15J13S1
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A15J1XA144A
A15J1XA145A
A15J1XA146A
A15J1XA147A
A15J15S2
A15J13S6
W3
W10
W9
W3
W10
W9

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63.

© REPLACED WITH CHANGE BY REV D

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
1014523 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
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MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN DATE 4-29-63
CHECKED G.G. Cargnano 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W. J. Rhine 5-22-63
MIT APPROVAL 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 4

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010064
SCALE
WT
SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

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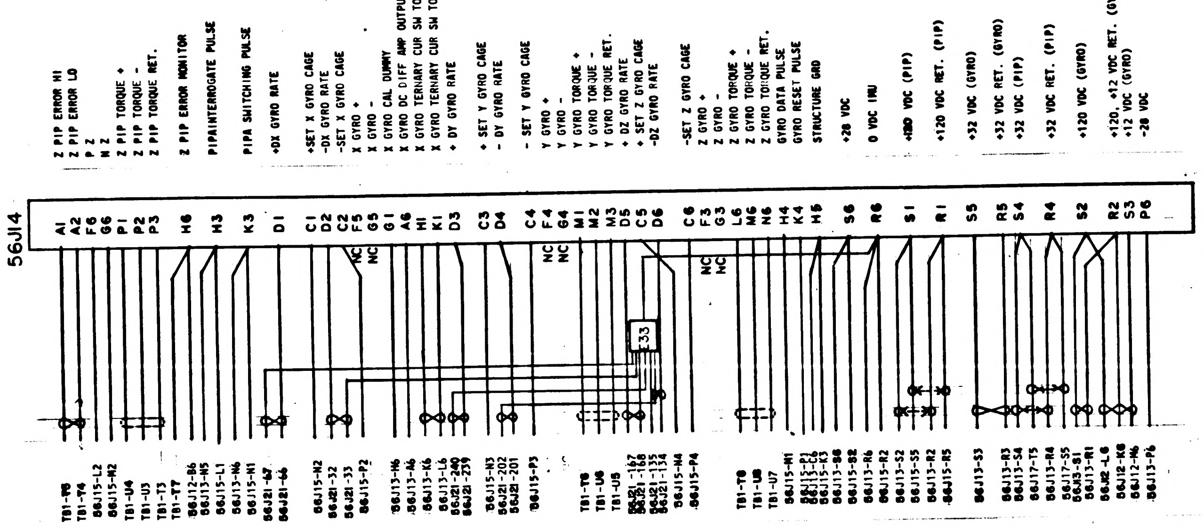
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGES PER TDRR 04057	4/7/63	WK


56J14
Z PIP ERROR HI
Z PIP ERROR LO
P Z
N Z
Z PIP TORQUE +
Z PIP TORQUE -
Z PIP TORQUE RET.
Z PIP ERROR MONITOR
PIPAINTERROGATE PULSE
PIPA SWITCHING PULSE
+DX GYRO RATE
+SET X GYRO CAGE
-DX GYRO RATE
-SET X GYRO CAGE
X GYRO +
X GYRO -
X GYRO CAL DUMMY
X GYRO DC DIFF AMP OUTPUT
X GYRO TERNARY CUR SW TORQUE +
X GYRO TERNARY CUR SW TORQUE -
+ DY GYRO RATE
+ SET Y GYRO CAGE
- DY GYRO RATE
- SET Y GYRO CAGE
Y GYRO +
Y GYRO -
Y GYRO TORQUE +
Y GYRO TORQUE -
Y GYRO TORQUE RET.
+ DZ GYRO RATE
+ SET Z GYRO CAGE
-DZ GYRO RATE
-SET Z GYRO CAGE
Z GYRO +
Z GYRO -
Z GYRO TORQUE +
Z GYRO TORQUE -
Z GYRO TORQUE RET.
GYRO DATA PULSE
GYRO RESET PULSE
STRUCTURE GRD
+28 VDC
0 VDC IMU
+120 VDC (PIP)
+120 VDC RET. (PIP)
+32 VDC (GYRO)
+32 VDC RET. (GYRO)
+32 VDC (PIP)
+32 VDC RET. (PIP)
+120 VDC (GYRO)
+120, +12 VDC RET. (GYRO)
+12 VDC (GYRO)
-28 VDC
A1
A2
F6
G6
P1
P2
P3
H6
H3
K3
D1
C1
D2
C2
F5
G5
G1
A6
H1
K1
D3
C3
D4
C4
F4
G4
M1
M2
M3
D5
C5
D6
C6
F3
G3
L6
M6
N6
H4
K4
H5
S6
R6
S1
R1
S5
R5
S4
R4
S2
R2
S3
P6
NC
NC
NC
NC
NC
NC
E33
TB1-T6
TB1-T4
56J15-L2
56J15-M2
TB1-U4
TB1-U3
TB1-T3
TB1-T7
56J12-B6
56J13-N5
56J15-L1
56J13-N6
56J15-N1
56J21-67
56J21-66
56J15-N2
56J21-32
56J21-33
56J15-P2
56J13-H6
56J13-A6
56J13-K6
56J13-L6
56J21-240
56J21-239
56J15-N3
56J21-202
56J21-201
56J15-P3
TB1-T8
TB1-U6
TB1-U5
56J21-167
56J21-168
56J21-135
56J21-134
56J15-N4
56J15-P4
TB1-T8
TB1-U8
TB1-U7
56J15-M1
56J15-P1
56J13-C6
56J15-K3
56J13-B6
56J13-B2
56J13-R6
56J15-R2
56J13-S2
56J15-S5
56J13-R2
56J15-R5
56J13-S3
56J13-R3
56J13-S4
56J17-T5
56J13-R4
56J17-S5
56J13-S1
56J13-R1
56J12-L6
56J12-K6
56J12-M6
56J13-P6

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 – INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 – PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

D REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN A. Dzugalski DATE 2-2-63
CHECKED J. Green
APPROVAL J. Green
APPROVAL
NASA APPROVAL W. J. Swink 5/23/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA END CONNECTOR INTERCONNECTION WIRING DIAGRAM TRAY 4

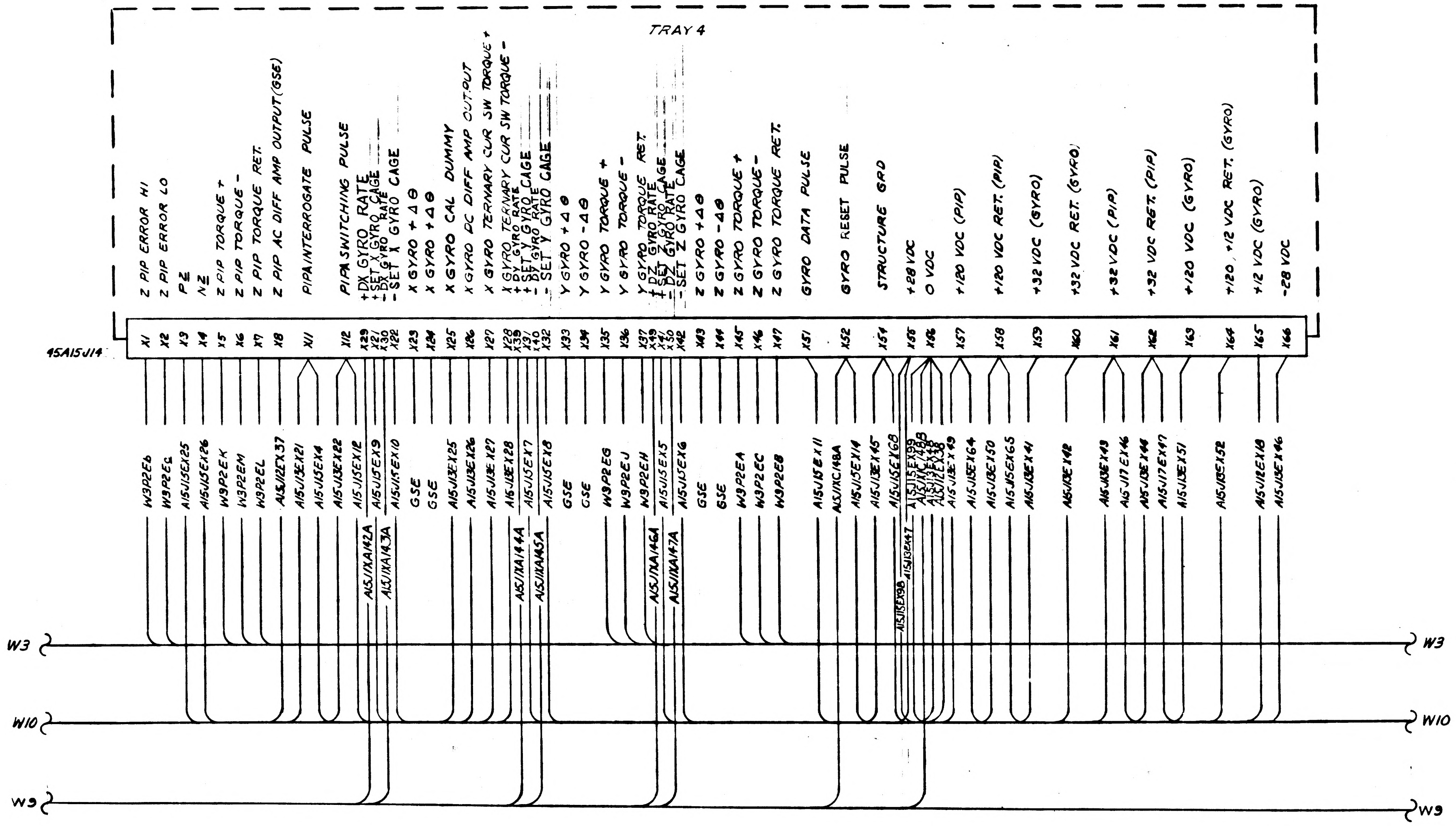
CODE IDENT NO. SIZE E NASA DRAWING NO. 1010064
SCALE — WT SHEET 1 OF 1

1010064 D

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			



TRAY 4
45A15J14
Z PIP ERROR HI
Z PIP ERROR LO
PZ
NZ
Z PIP TORQUE +
Z PIP TORQUE -
Z PIP TORQUE RET.
Z PIP AC DIFF AMP OUTPUT (GSE)
PIPA INTERROGATE PULSE
PIPA SWITCHING PULSE
+DX GYRO RATE
+SET X GYRO CAGE
-DX GYRO RATE
-SET X GYRO CAGE
X GYRO +Δθ
X GYRO +Δθ
X GYRO CAL DUMMY
X GYRO DC DIFF AMP OUTPUT
X GYRO TERNARY CUR SW TORQUE +
X GYRO TERNARY CUR SW TORQUE -
+DY GYRO RATE
+SET Y GYRO CAGE
-DY GYRO RATE
-SET Y GYRO CAGE
Y GYRO +Δθ
Y GYRO -Δθ
Y GYRO TORQUE +
Y GYRO TORQUE -
Y GYRO TORQUE RET.
+DZ GYRO RATE
+SET Z GYRO CAGE
-DZ GYRO RATE
-SET Z GYRO CAGE
Z GYRO +Δθ
Z GYRO -Δθ
Z GYRO TORQUE +
Z GYRO TORQUE -
Z GYRO TORQUE RET.
GYRO DATA PULSE
GYRO RESET PULSE
STRUCTURE GRD
+28 VDC
0 VDC
+120 VDC (PIP)
+120 VDC RET. (PIP)
+32 VDC (GYRO)
+32 VDC RET. (GYRO)
+32 VDC (PIP)
+32 VDC RET. (PIP)
+120 VDC (GYRO)
+120, +12 VDC RET. (GYRO)
+12 VDC (GYRO)
-28 VDC
X1
X2
X3
X4
X5
X6
X7
X8
X11
X12
X29
X21
X30
X22
X23
X24
X25
X26
X27
X28
X39
X31
X40
X32
X33
X34
X35
X36
X37
X49
X41
X50
X42
X43
X44
X45
X46
X47
X51
X52
X54
X55
X56
X57
X58
X59
X60
X61
X62
X63
X64
X65
X66
W3P2EB
W3P2EC
A15J15EX25
A15J15EX26
W3P2EK
W3P2EM
W3P2EL
A15J12EX37
A15J13EX21
A15J15EX4
A15J13EX22
A15J15EX12
A15J15EX9
A15J15EX10
GSE
GSE
A15J13EX25
A15J13EX26
A15J13EX27
A16J13EX28
A15J15EX7
A15J15EX8
GSE
GSE
W3P2EG
W3P2EJ
W3P2EH
A15J15EX5
A15J15EX6
GSE
GSE
W3P2EA
W3P2EC
W3P2EB
A15J15EX11
A15J1XC148A
A15J15EX14
A15J13EX45
A15J15EX68
A15J15EX99
A15J1XC148B
A15J13EX48
A15J12EX38
A15J13EX49
A15J15EX64
A15J13EX50
A15J15EX65
A15J13EX41
A15J13EX42
A15J13EX43
A15J17EX46
A15J13EX44
A15J17EX47
A15J13EX51
A15J13EX52
A15J12EX18
A15J13EX46
A15J1XA142A
A15J1XA143A
A15J1XA144A
A15J1XA145A
A15J1XA146A
A15J1XA147A
A15J15EX98
A15J13EX47
W3
W10
W9

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 **DATE** 22 May 63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS ON CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS
6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATIONS (45) WHEN NEEDED

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 4-29-63
CHECKED A G Cappana 30 Apr
APPROVAL J Grian
APPROVAL
NASA APPROVAL W J Rhine 5-22-63
MIT APPROVAL W Kupffer 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

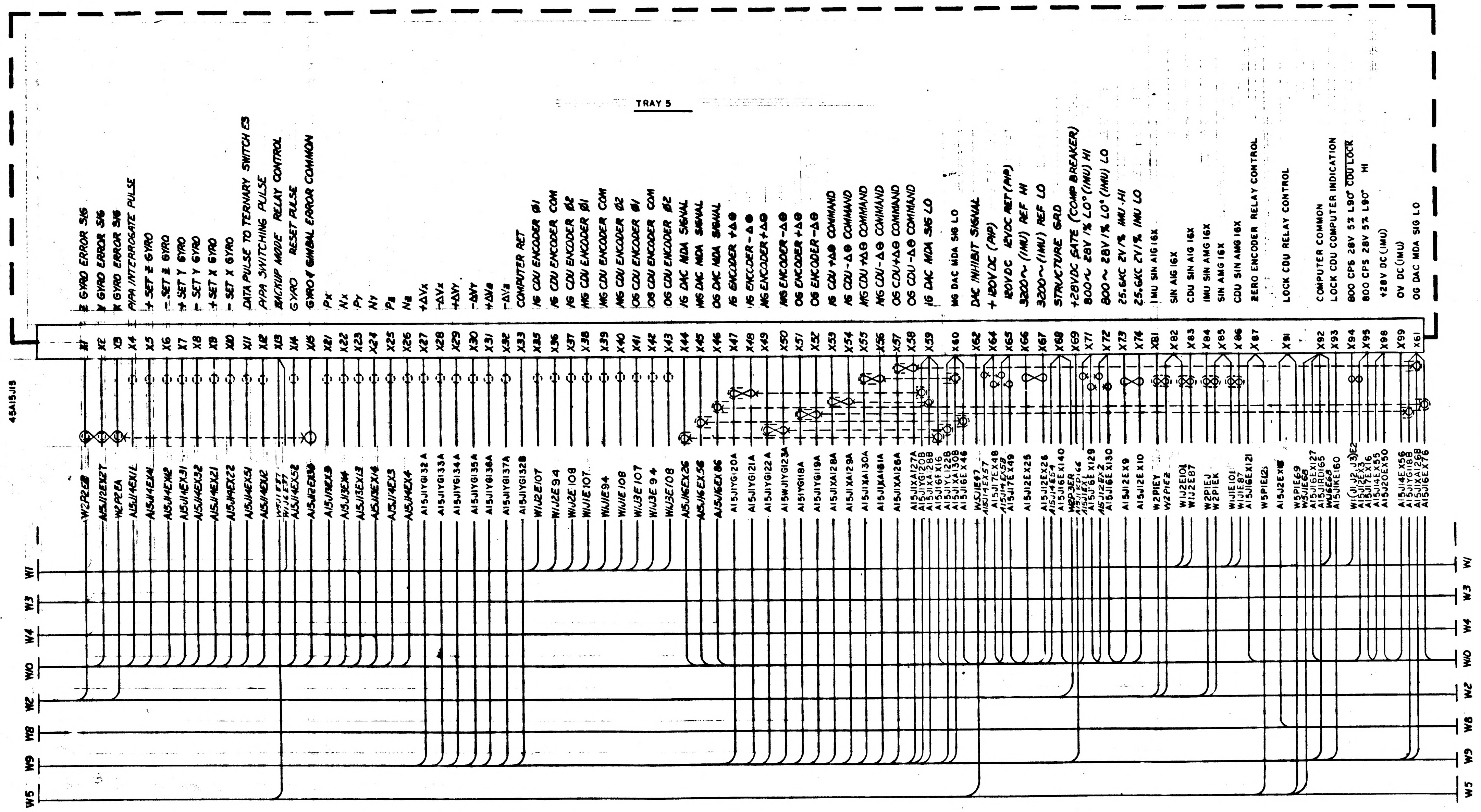
PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 4

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010064
SCALE
WT
SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01989	7-2-63	17 Jly 63 WK

(M)


TRAY 5
45A15J15
X1 Z GYRO ERROR SIG
X2 Y GYRO ERROR SIG
X3 X GYRO ERROR SIG
X4 PIPA INTERROGATE PULSE
X5 + SET Z GYRO
X6 - SET Z GYRO
X7 + SET Y GYRO
X8 - SET Y GYRO
X9 + SET X GYRO
X10 - SET X GYRO
X11 DATA PULSE TO TERNARY SWITCH E3
X12 PIPA SWITCHING PULSE
X13 BACKUP MODE RELAY CONTROL
X14 GYRO RESET PULSE
X15 GYRO & GIMBAL ERROR COMMON
X21 Px
X22 Nx
X23 Py
X24 Ny
X25 Pz
X26 Nz
X27 +ΔVx
X28 -ΔVx
X29 +ΔVy
X30 -ΔVy
X31 +ΔVz
X32 -ΔVz
X33 COMPUTER RET
X35 IG CDU ENCODER Ø1
X36 IG CDU ENCODER COM
X37 IG CDU ENCODER Ø2
X38 MG CDU ENCODER Ø1
X39 MG CDU ENCODER COM
X40 MG CDU ENCODER Ø2
X41 OG CDU ENCODER Ø1
X42 OG CDU ENCODER COM
X43 OG CDU ENCODER Ø2
X44 IG DAC MDA SIGNAL
X45 MG DAC MDA SIGNAL
X46 OG DAC MDA SIGNAL
X47 IG ENCODER +Δθ
X48 IG ENCODER -Δθ
X49 MG ENCODER +Δθ
X50 MG ENCODER -Δθ
X51 OG ENCODER +Δθ
X52 OG ENCODER -Δθ
X53 IG CDU +Δθ COMMAND
X54 IG CDU -Δθ COMMAND
X55 MG CDU +Δθ COMMAND
X56 MG CDU -Δθ COMMAND
X57 OG CDU +Δθ COMMAND
X58 OG CDU -Δθ COMMAND
X59 IG DAC MDA SIG LO
X60 MG DAC MDA SIG LO
X62 DAC INHIBIT SIGNAL
X64 + 120V DC (PIP)
X65 120VDC 12VDC RET (PIP)
X66 3200~ (IMU) REF HI
X67 3200~ (IMU) REF LO
X68 STRUCTURE GRD
X69 +28VDC GATE (COMP BREAKER)
X71 800~ 28V 1% LO° (IMU) HI
X72 800~ 28V 1% LO° (IMU) LO
X73 25.6KC 2V 1% IMU HI
X74 25.6KC 2V 1% IMU LO
X81 IMU SIN AIG 16X
X82 SIN AIG 16X
X83 CDU SIN AIG 16X
X84 IMU SIN AMG 16X
X85 SIN AMG 16X
X86 CDU SIN AMG 16X
X87 ZERO ENCODER RELAY CONTROL
X91 LOCK CDU RELAY CONTROL
X92 COMPUTER COMMON
X93 LOCK CDU COMPUTER INDICATION
X94 800 CPS 28V 5% L90° CDU LOCK
X95 800 CPS 28V 5% L90° HI
X98 +28V DC (IMU)
X99 0V DC (IMU)
X61 OG DAC MDA SIG LO
W2P2EB
A15J12EX27
W2P2EA
A15J14EX1L
A15J14EX41
A15J14EX42
A15J14EX31
A15J14EX32
A15J14EX21
A15J14EX22
A15J14EX51
A15J14EX12
W5J1E77
W1J6E77
A15J14EX52
A15J12EX36
A15J13EX3
A15J13EX4
A15J13EX13
A15J13EX14
A15J14EX3
A15J14EX4
A15J1YG132 A
A15J1YG133A
A15J1YG134A
A15J1YG135A
A15J1YG136A
A15J1YG137A
A15J1YG132B
W1J2E107
W1J2E94
W1J2E108
W1J1E107
W1J1E94
W1J1E108
W1J3E107
W1J3E94
W1J3E108
A15J16EX26
A15J16EX56
A15J16EX86
A15J1YG120A
A15J1YG121A
A15J1YG122A
A15WJ1YG123A
A15J1YG118A
A15J1YG119A
A15J1XA128A
A15J1XA129A
A15J1XA130A
A15J1XA131A
A15J1XA126A
A15J1XA127A
A15J1YG120B
A15J1XA128B
A15J16EX16
A15J1YC122B
A15J1XA130B
A15J16EX46
W5J1E47
A15J14EX57
A15J17EX48
A15J14EX58
A15J17EX49
A15J12EX25
A15J12EX26
A15J14E54
A15J16EX140
W2P3ER
A15J1RD166
A15J1EX1L
A15J16EX129
A15J12EX2
A15J16EX130
A15J12EX9
A15J12EX10
W2P1EY
W2P1EZ
W1J2E101
W1J2E87
W2P1EJ
W2P1EK
W1J1E101
W1J1E87
A15J16EX121
W5P1E(2)
A15J2EX16
W5P1E69
W5J1E68
A15J16EX127
A15J1RD165
W1J6E68
A15J1KE160
W1(J1,J2,J3)E2
A15J12EX3
A15J17EX16
A15J14EX55
A15J20EX50
A15J14EX56
A15J1YG118B
A15J1XA126B
A15J16EX76
W1
W3
W4
W10
W2
W8
W9
W5

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE: 1014523 INTERCONNECTION DRAWING, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWING AND DEFINITIONS OF REFFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X... ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN J.J. McConnell DATE 23 Apr 63
CHECKED A.G. Cuzzino 30 Apr 63
APPROVAL J. Green
APPROVAL
NASA APPROVAL W. J. Rhine 5-22-63
MIT APPROVAL W. Kupfer 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

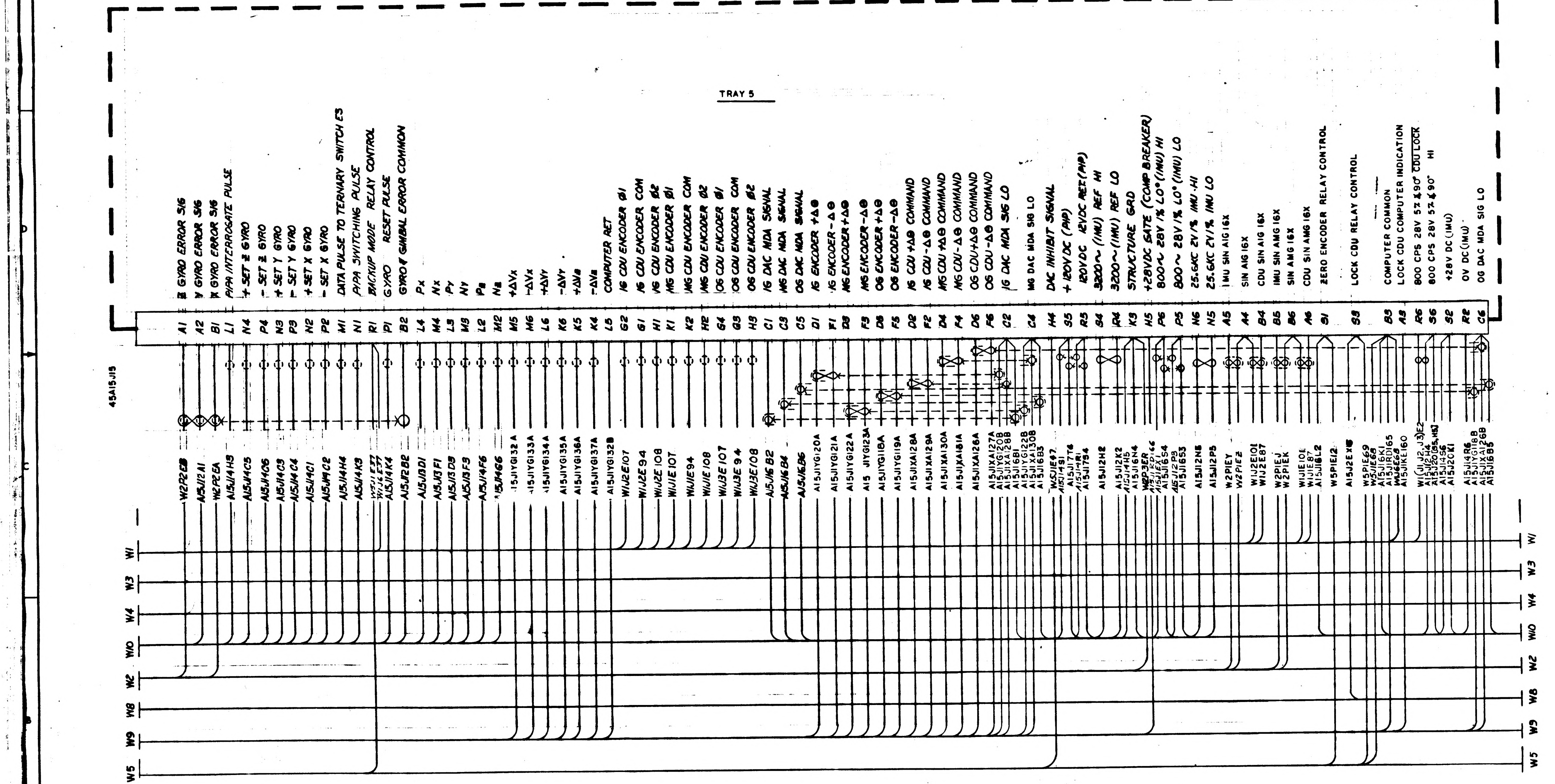
PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 5

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010065
SCALE
WT
SHEET OF

1010065

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01989	7-2-63	17 Jly 63 WK
B	REVISED PER TDRR 02495	2 AUG 63	WK


TRAY 5
45A15J15
A1 Z GYRO ERROR SIG
A2 Y GYRO ERROR SIG
B1 X GYRO ERROR SIG
L1 PIPA INTERROGATE PULSE
N4 + SET Z GYRO
P4 - SET Z GYRO
N3 + SET Y GYRO
P3 - SET Y GYRO
N2 + SET X GYRO
P2 - SET X GYRO
M1 DATA PULSE TO TERNARY SWITCH ES
N1 PIPA SWITCHING PULSE
R1 BACKUP MODE RELAY CONTROL
P1 GYRO RESET PULSE
B2 GYRO & GIMBAL ERROR COMMON
L4 Px
M4 Nx
L3 Py
M3 Ny
L2 Pz
M2 Nz
M5 +ΔVx
M6 -ΔVx
L6 +ΔVy
K6 -ΔVy
K5 +ΔVz
K4 -ΔVz
L5 COMPUTER RET
G2 IG CDU ENCODER Ø1
G1 IG CDU ENCODER COM
H1 IG CDU ENCODER Ø2
K1 MG CDU ENCODER Ø1
K2 MG CDU ENCODER COM
H2 MG CDU ENCODER Ø2
G4 OG CDU ENCODER Ø1
G3 OG CDU ENCODER COM
H3 OG CDU ENCODER Ø2
C1 IG DAC MDA SIGNAL
C3 MG DAC MDA SIGNAL
C5 OG DAC MDA SIGNAL
D1 IG ENCODER +Δθ
F1 IG ENCODER -Δθ
D3 MG ENCODER +Δθ
F3 MG ENCODER -Δθ
D5 OG ENCODER +Δθ
F5 OG ENCODER -Δθ
D2 IG CDU +Δθ COMMAND
F2 IG CDU -Δθ COMMAND
D4 MG CDU +Δθ COMMAND
F4 MG CDU -Δθ COMMAND
D6 OG CDU +Δθ COMMAND
F6 OG CDU -Δθ COMMAND
C2 IG DAC MDA SIG LO
C4 MG DAC MDA SIG LO
H4 DAC INHIBIT SIGNAL
S5 + 120V DC (PIP)
R5 120VDC 12VDC RET (PIP)
S4 3200~ (IMU) REF HI
R4 3200~ (IMU) REF LO
K3 STRUCTURE GRD
H5 +28VDC GATE (COMP BREAKER)
P6 800~ 28V 1% LO° (IMU) HI
P5 800~ 28V 1% LO° (IMU) LO
N6 25.6KC 2V/1% IMU HI
N5 25.6KC 2V/1% IMU LO
A5 IMU SIN AIG 16X
A4 SIN AIG 16X
B4 CDU SIN AIG 16X
B5 IMU SIN AMG 16X
B6 SIN AMG 16X
A6 CDU SIN AMG 16X
S1 ZERO ENCODER RELAY CONTROL
S3 LOCK CDU RELAY CONTROL
B3 COMPUTER COMMON
A3 LOCK CDU COMPUTER INDICATION
R6 800 CPS 28V 5% ∠90° CDU LOCK
S6 800 CPS 28V 5% ∠90° HI
S2 +28V DC (IMU)
R2 0V DC (IMU)
C6 OG DAC MDA SIG LO
W2P2EB
A15J12A1
W2P2EA
A15J14H3
A15J14C5
A15J14C6
A15J14C3
A15J14C4
A15J14C1
A15J14C2
A15J14H4
A15J14K3
W5J1E37
W1J6E37
A15J14K4
A15J12B2
A15J13D1
A15J13F1
A15J13D3
A15J13F3
A15J14F6
A15J14G6
A15J1YG132A
A15J1YG133A
A15J1YG134A
A15J1YG135A
A15J1YG136A
A15J1YG137A
A15J1YG132B
W1J2E107
W1J2E94
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W1J1E107
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W1J1E108
W1J3E107
W1J3E94
W1J3E108
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A15J1YG122A
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A15J1YG118A
A15J1YG119A
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A15J1XA130A
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A15J16B1
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A15J16S4
A15J12P3
A15J16S3
A15J12N5
A15J12P5
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W5P1E12
A15J2EX15
W5P1E69
W5J1E68
A15J16K1
A15J1RD165
W1J6E68
A15J1KE160
W1(J1,J2,J3)E2
A15J12H4
A15J20(G5,H5)
A15J14S6
A15J2CK1
A15J14R6
A15J1YG118B
A15J1XA126B
A15J16B5
W1
W3
W4
W10
W2
W8
W9
W5

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE: 1014523 INTERCONNECTION DRAWING, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWING AND DEFINITIONS OF REFFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X... ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN J.L. McDowell DATE 29 APR 63
CHECKED A.G. Cuzzino 30 Apr 63
APPROVAL J. Evans
APPROVAL
NASA APPROVAL W.J. Rhine 5-22-63
MIT APPROVAL W. Kupfer 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 5

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010065
SCALE
WT
SHEET OF

1010065 B

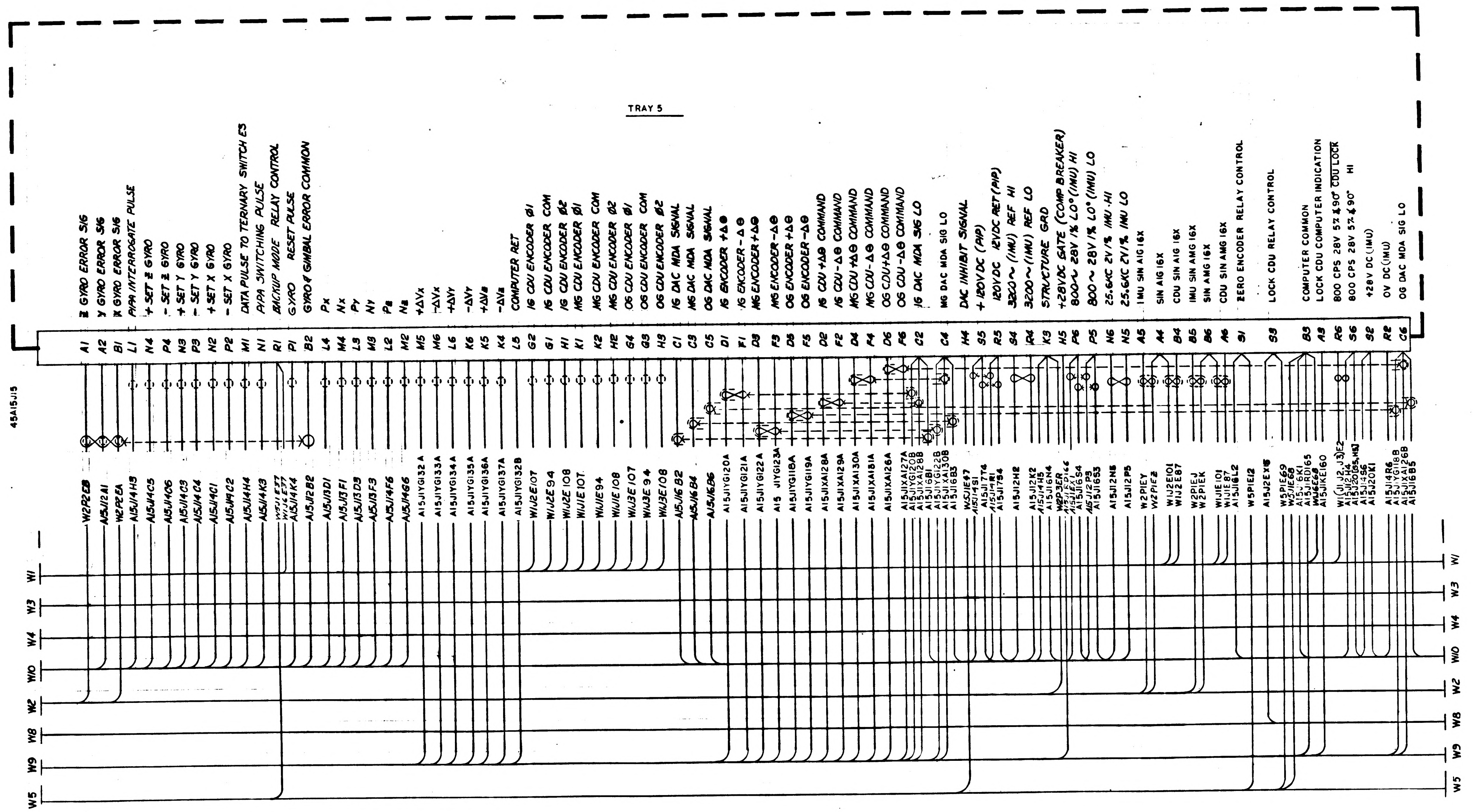
MASTER

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

(M)

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
(M) A	REVISED TDRR 01989	7-2-63	17 July 63 WK
(M) B	REVISED PER TDRR 02495	2 AUG 63	WK
C	REVISED PER TDRR 04058	23 Oct 63	WK


TRAY 5
45A15J5
Z GYRO ERROR SIG
Y GYRO ERROR SIG
X GYRO ERROR SIG
PIPA INTERROGATE PULSE
+ SET Z GYRO
- SET Z GYRO
+ SET Y GYRO
- SET Y GYRO
+ SET X GYRO
- SET X GYRO
DATA PULSE TO TERNARY SWITCH ES
PIPA SWITCHING PULSE
BACKUP MODE RELAY CONTROL
GYRO RESET PULSE
GYRO & GIMBAL ERROR COMMON
Px
Nx
Py
Ny
Pz
Nz
+ΔVx
-ΔVx
+ΔVy
-ΔVy
+ΔVz
-ΔVz
COMPUTER RET
IG CDU ENCODER Ø1
IG CDU ENCODER COM
IG CDU ENCODER Ø2
MG CDU ENCODER Ø1
MG CDU ENCODER COM
MG CDU ENCODER Ø2
OG CDU ENCODER Ø1
OG CDU ENCODER COM
OG CDU ENCODER Ø2
IG DAC MDA SIGNAL
MG DAC MDA SIGNAL
OG DAC MDA SIGNAL
IG ENCODER +Δθ
IG ENCODER -Δθ
MG ENCODER +Δθ
MG ENCODER -Δθ
OG ENCODER +Δθ
OG ENCODER -Δθ
IG CDU +Δθ COMMAND
IG CDU -Δθ COMMAND
MG CDU +Δθ COMMAND
MG CDU -Δθ COMMAND
OG CDU +Δθ COMMAND
OG CDU -Δθ COMMAND
IG DAC MDA SIG LO
MG DAC MDA SIG LO
DAC INHIBIT SIGNAL
+ 120VDC (PIP)
120VDC 12VDC RET (PIP)
3200~ (IMU) REF HI
3200~ (IMU) REF LO
STRUCTURE GRD
+28VDC GATE (COMP BREAKER)
800~ 28V 1% LO° (IMU) HI
800~ 28V 1% LO° (IMU) LO
25.6KC 2V 1% IMU HI
25.6KC 2V 1% IMU LO
IMU SIN AIG 16X
SIN AIG 16X
CDU SIN AIG 16X
IMU SIN AMG 16X
SIN AMG 16X
CDU SIN AMG 16X
ZERO ENCODER RELAY CONTROL
LOCK CDU RELAY CONTROL
COMPUTER COMMON
LOCK CDU COMPUTER INDICATION
800 CPS 28V 5% ∠90° CDU LOCK
800 CPS 28V 5% ∠90° HI
+28V DC (IMU)
0V DC (IMU)
OG DAC MDA SIG LO
A1
A2
B1
L1
N4
P4
N3
P3
N2
P2
M1
N1
R1
P1
B2
L4
M4
L3
M3
L2
M2
M5
M6
L6
K6
K5
K4
L5
G2
G1
H1
K1
K2
H2
G4
G3
H3
C1
C3
C5
D1
F1
D3
F3
D5
F5
D2
F2
D4
F4
D6
F6
C2
C4
H4
S5
R5
S4
R4
K3
H5
P6
P5
N6
N5
A5
A4
B4
B5
B6
A6
S1
S3
B3
A3
R6
S6
S2
R2
C6
W2P2EB
A15J12A1
W2P2EA
A15J14H3
A15J14C5
A15J14C6
A15J14C3
A15J14C4
A15J14C1
A15J14C2
A15J14H4
A15J14K3
W5J1E37
W1J6E37
A15J14K4
A15J12B2
A15J13D1
A15J13F1
A15J13D3
A15J13F3
A15J14F6
A15J14G6
A15J1YG132A
A15J1YG133A
A15J1YG134A
A15J1YG135A
A15J1YG136A
A15J1YG137A
A15J1YG132B
W1J2E107
W1J2E94
W1J2E108
W1J1E107
W1J1E94
W1J1E108
W1J3E107
W1J3E94
W1J3E108
A15J16B2
A15J16B4
A15J16B6
A15J1YG120A
A15J1YG121A
A15J1YG122A
A15 J1YG123A
A15J1YG118A
A15J1YG119A
A15J1XA128A
A15J1XA129A
A15J1XA130A
A15J1XA131A
A15J1XA126A
A15J1XA127A
A15J1YG120B
A15J1XA128B
A15J16B1
A15J1YG122B
A15J1XA130B
A15J16B3
W5J1E47
A15J14S1
A15J17T4
A15J14R1
A15J17S4
A15J12H2
A15J12K2
A15J14H5
A15J16N4
W2P3ER
A15J1RD166
A15J1EX1
A15J16S4
A15J12P3
A15J16S3
A15J12N5
A15J12P5
W2P1EY
W2P1EZ
W1J2E101
W1J2E87
W2P1EJ
W2P1EK
W1J1E101
W1J1E87
A15J16L2
W5P1E12
A15J2EX16
W5P1E69
W5J1E68
A15J16K1
A15J1RD165
W1J6E68
A15J1KE160
W1(J1, J2, J3)E2
A15J12H4
A15J20[G5,H5]
A15J14S6
A15J20K1
A15J14R6
A15J1YG118B
A15J1XA126B
A15J16B5
W1
W3
W4
W10
W2
W8
W9
W5

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE: 1014523 INTERCONNECTION DRAWING, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWING AND DEFINITIONS OF REFFERENCE NUMBERS
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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

Ⓒ REPLACED WITH CHANGE BY REV D

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN J.L. McDowell DATE 25 APR 63
CHECKED A.G. Cuggino 30 Apr 63
APPROVAL J. Green
APPROVAL
NASA APPROVAL W.J. Rhine 5-22-63
MIT APPROVAL W Kupfer 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 5

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010065
SCALE
WT
SHEET OF

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
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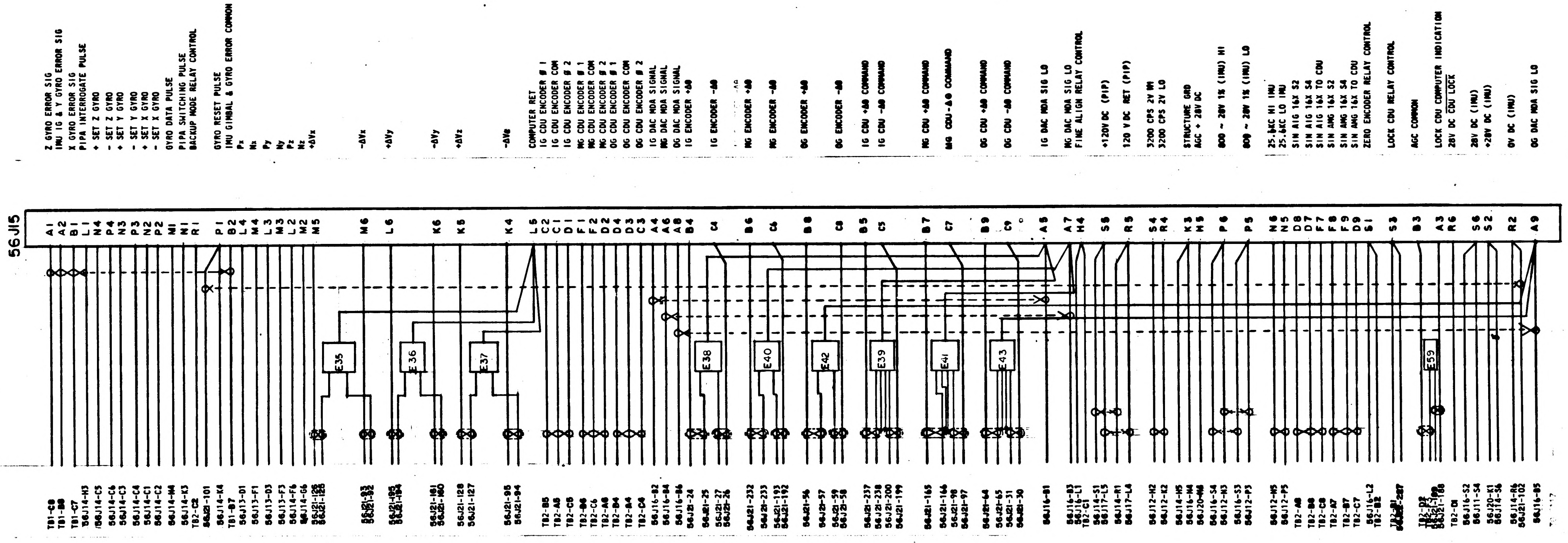
56J15
Z GYRO ERROR SIG
IMU IG & Y GYRO ERROR SIG
X GYRO ERROR SIG
PIPA INTERROGATE PULSE
+ SET Z GYRO
- SET Z GYRO
+ SET Y GYRO
- SET Y GYRO
+ SET X GYRO
- SET X GYRO
GYRO DATA PULSE
PIPA SWITCHING PULSE
BACKUP MODE RELAY CONTROL
GYRO RESET PULSE
IMU GIMBAL & GYRO ERROR COMMON
Px
Nx
Py
Ny
Pz
Nz
+ΔVx
-ΔVx
+ΔVy
-ΔVy
+ΔVz
-ΔVz
COMPUTER RET
IG CDU ENCODER # 1
IG CDU ENCODER COM
IG CDU ENCODER # 2
MG CDU ENCODER # 1
MG CDU ENCODER COM
MG CDU ENCODER # 2
OG CDU ENCODER # 1
OG CDU ENCODER COM
OG CDU ENCODER # 2
IG DAC MDA SIGNAL
MG DAC MDA SIGNAL
OG DAC MDA SIGNAL
IG ENCODER +Δθ
IG ENCODER -Δθ
MG ENCODER +Δθ
MG ENCODER -Δθ
OG ENCODER +Δθ
OG ENCODER -Δθ
IG CDU +Δθ COMMAND
IG CDU -Δθ COMMAND
MG CDU +Δθ COMMAND
MG CDU -Δθ COMMAND
OG CDU +Δθ COMMAND
OG CDU -Δθ COMMAND
IG DAC MDA SIG LO
MG DAC MDA SIG LO
FINE ALIGN RELAY CONTROL
+120V DC (PIP)
120 V DC RET (PIP)
3200 CPS 2V HI
3200 CPS 2V LO
STRUCTURE GRD
AGC + 28V DC
800 ~ 28V 1% (IMU) HI
800 ~ 28V 1% (IMU) LO
25.6KC HI IMU
25.6KC LO IMU
SIN AIG 16X S2
SIN AIG 16X S4
SIN AIG 16X TO CDU
SIN AMG 16X S2
SIN AMG 16X S4
SIN AMG 16X TO CDU
ZERO ENCODER RELAY CONTROL
LOCK CDU RELAY CONTROL
AGC COMMON
LOCK CDU COMPUTER INDICATION
28V DC CDU LOCK
28V DC (IMU)
+28V DC (IMU)
0V DC (IMU)
OG DAC MDA SIG LO
A1
A2
B1
L1
N4
P4
N3
P3
N2
P2
M1
N1
R1
P1
B2
L4
M4
L3
M3
L2
M2
M5
M6
L6
K6
K5
K4
L5
C2
C1
D1
F1
F2
D2
D4
D3
C3
A4
A6
A8
B4
C4
B6
C6
B8
C8
B5
C5
B7
C7
B9
C9
A5
A7
H4
S5
R5
S4
R4
K3
H5
P6
P5
N6
N5
D8
D7
F7
F8
F9
D9
S1
S3
B3
A3
R6
S6
S2
R2
A9
E35
E36
E37
E38
E40
E42
E39
E41
E43
E59
TB1-C8
TB1-B8
TB1-C7
56J14-H3
56J14-C5
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56J14-C1
56J14-C2
56J14-H4
56J14-K3
TB2-C2
56J21-101
56J14-K4
TB1-B7
56J13-D1
56J13-F1
56J13-D3
56J13-F3
56J14-F6
56J14-G6
56J21-126
56J21-125
56J21-93
56J21-92
56J21-195
56J21-194
56J21-161
56J21-160
56J21-128
56J21-127
56J21-95
56J21-94
TB2-B5
TB2-A5
TB2-C5
TB2-B6
TB2-C6
TB2-A6
TB2-B4
TB2-A4
TB2-C4
56J16-B2
56J16-B4
56J16-B6
56J21-24
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56J21-27
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56J21-233
56J21-193
56J21-192
56J21-56
56J21-57
56J21-59
56J21-58
56J21-237
56J21-238
56J21-200
56J21-199
56J21-165
56J21-166
56J21-98
56J21-97
56J21-64
56J21-65
56J21-31
56J21-30
56J16-B1
56J16-B3
56J16-L1
TB2-C1
56J14-S1
56J17-L5
56J14-R1
56J17-L4
56J12-H2
56J12-K2
56J14-H5
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56J20-M4
56J16-S4
56J12-N3
56J16-S3
56J12-P3
56J12-N5
56J12-P5
TB2-A8
TB2-B8
TB2-C8
TB2-A7
TB2-B7
TB2-C7
56J16-L2
TB2-B2
TB2-B1
56J21-287
TB2-D2
TB2-F3
56J21-189
56J21-188
TB2-D1
56J16-S2
56J11-S4
56J20-K1
56J14-S6
56J14-R6
56J21-102
56J16-B5

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 **DATE** 22 May 63

1010065 D

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 — INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 — PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

D REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
10/23/63
MIT APPROVAL 23 Oct 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
TRAY 5

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010065
SCALE —
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

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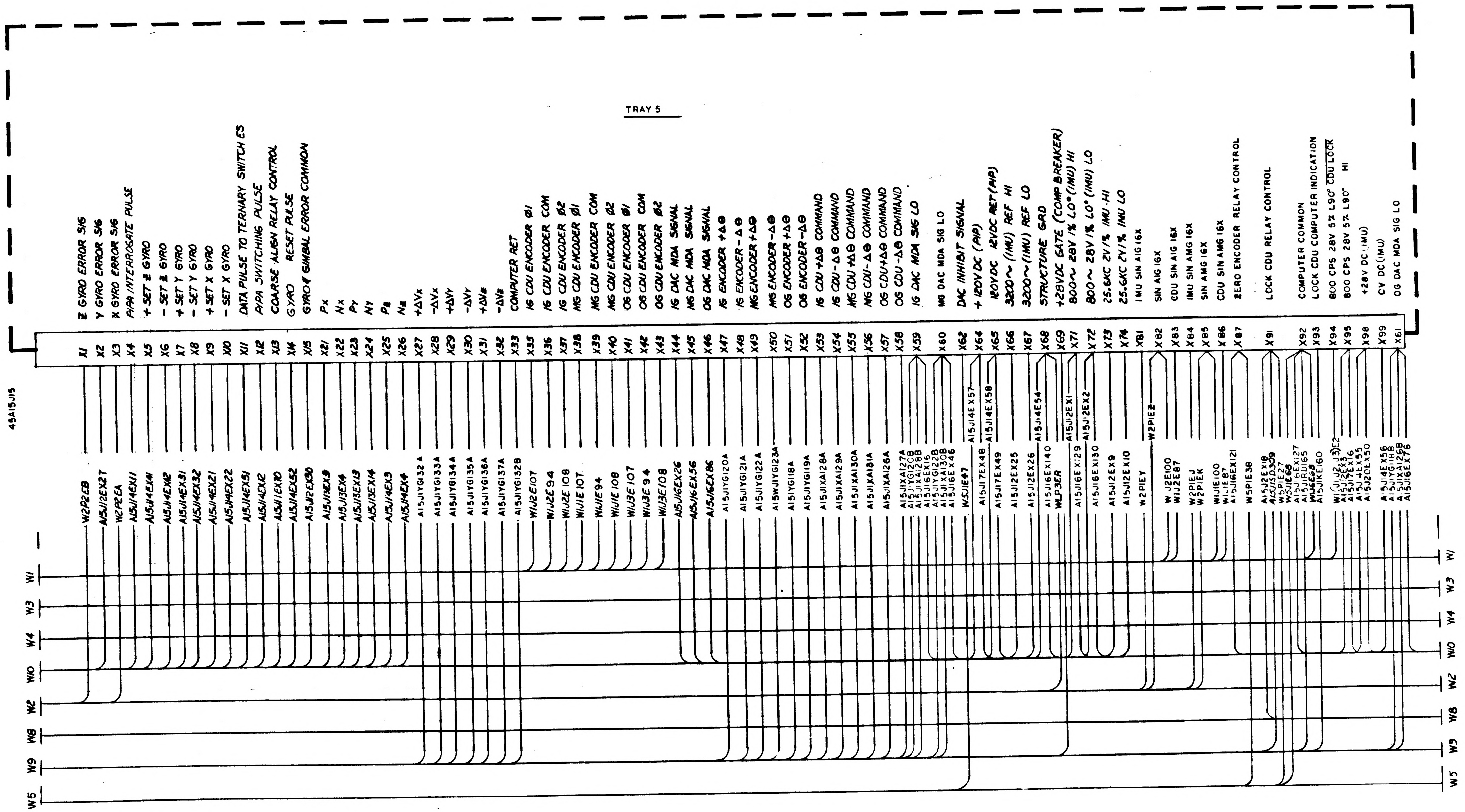
SYM	DESCRIPTION	DATE	APPROVAL


TRAY 5
45A15J15
X1 Z GYRO ERROR SIG
X2 Y GYRO ERROR SIG
X3 X GYRO ERROR SIG
X4 PIPA INTERROGATE PULSE
X5 + SET Z GYRO
X6 - SET Z GYRO
X7 + SET Y GYRO
X8 - SET Y GYRO
X9 + SET X GYRO
X10 - SET X GYRO
X11 DATA PULSE TO TERNARY SWITCH ES
X12 PIPA SWITCHING PULSE
X13 COARSE ALIGN RELAY CONTROL
X14 GYRO RESET PULSE
X15 GYRO & GIMBAL ERROR COMMON
X21 Px
X22 Nx
X23 Py
X24 Ny
X25 Pz
X26 Nz
X27 +ΔVx
X28 -ΔVx
X29 +ΔVy
X30 -ΔVy
X31 +ΔVz
X32 -ΔVz
X33 COMPUTER RET
X35 IG CDU ENCODER Ø1
X36 IG CDU ENCODER COM
X37 IG CDU ENCODER Ø2
X38 MG CDU ENCODER Ø1
X39 MG CDU ENCODER COM
X40 MG CDU ENCODER Ø2
X41 OG CDU ENCODER Ø1
X42 OG CDU ENCODER COM
X43 OG CDU ENCODER Ø2
X44 IG DAC MDA SIGNAL
X45 MG DAC MDA SIGNAL
X46 OG DAC MDA SIGNAL
X47 IG ENCODER +Δθ
X48 IG ENCODER -Δθ
X49 MG ENCODER +Δθ
X50 MG ENCODER -Δθ
X51 OG ENCODER +Δθ
X52 OG ENCODER -Δθ
X53 IG CDU +Δθ COMMAND
X54 IG CDU -Δθ COMMAND
X55 MG CDU +Δθ COMMAND
X56 MG CDU -Δθ COMMAND
X57 OG CDU +Δθ COMMAND
X58 OG CDU -Δθ COMMAND
X59 IG DAC MDA SIG LO
X60 MG DAC MDA SIG LO
X62 DAC INHIBIT SIGNAL
X64 +120VDC (PIP)
X65 120VDC RET (PIP)
X66 3200~ (IMU) REF HI
X67 3200~ (IMU) REF LO
X68 STRUCTURE GND
X69 +28VDC GATE (COMP BREAKER)
X71 800~ 28V 1% L0° (IMU) HI
X72 800~ 28V 1% L0° (IMU) LO
X73 25.6KC 2V 1% IMU HI
X74 25.6KC 2V 1% IMU LO
X81 IMU SIN AIG 16X
X82 SIN AIG 16X
X83 CDU SIN AIG 16X
X84 IMU SIN AMG 16X
X85 SIN AMG 16X
X86 CDU SIN AMG 16X
X87 ZERO ENCODER RELAY CONTROL
X91 LOCK CDU RELAY CONTROL
X92 COMPUTER COMMON
X93 LOCK CDU COMPUTER INDICATION
X94 800 CPS 28V 5% L90° CDU LOCK
X95 800 CPS 28V 5% L90° HI
X98 +28V DC (IMU)
X99 CV DC (IMU)
X61 OG DAC MDA SIG LO
W2P2EB
A15J12EX27
W2P2EA
A15J14EX11
A15J14EX41
A15J14EX42
A15J14EX31
A15J14EX32
A15J14EX21
A15J14EX22
A15J14EX51
A15J14EX12
A15J11EX10
A15J14EX52
A15J12EX30
A15J13EX3
A15J13EX4
A15J13EX13
A15J13EX14
A15J14EX3
A15J14EX4
A15J1YG132A
A15J1YG133A
A15J1YG134A
A15J1YG135A
A15J1YG136A
A15J1YG137A
A15J1YG132B
W1J2E107
W1J2E94
W1J2E108
W1J1E107
W1J1E94
W1J1E108
W1J3E107
W1J3E94
W1J3E108
A15J16EX26
A15J16EX56
A15J16EX86
A15J1YG120A
A15J1YG121A
A15J1YG122A
A15WJ1YG123A
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A15J16EX16
A15J1YG122B
A15J1XA130B
A15J16EX46
W5J1E47
A15J14EX57
A15J17EX48
A15J14EX58
A15J17EX49
A15J12EX25
A15J12EX26
A15J14E54
A15J16EX140
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A15J12EX9
A15J12EX10
W2P1EZ
W2P1EY
W1J2E100
W1J2E87
W2P1EJ
W2P1EK
W1J1E100
W1J1E87
A15J16EX121
W5P1E38
A15J2EX18
A15J15D309
W5P1E27
W5J1E68
A15J16EX127
A15J1RD165
W1J6E68
A15J1KE160
W1(J1,J2,J3)E2
A15J12EX3
A15J17EX16
A15J14EX55
A15J20EX50
A15J14EX56
A15J1YG118B
A15J1XA126B
A15J16EX76
W1
W3
W4
W10
W2
W8
W9
W5

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE: 1014523 INTERCONNECTION DRAWING, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWING AND DEFINITIONS OF REFFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X... ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN J. L. McConnell DATE 29 Apr 63
CHECKED A. G. Cappiano 30 Apr 63
APPROVAL J. Green
APPROVAL
NASA APPROVAL W. G. Rhine 5-22-63
MIT APPROVAL W. Kupfer 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 5

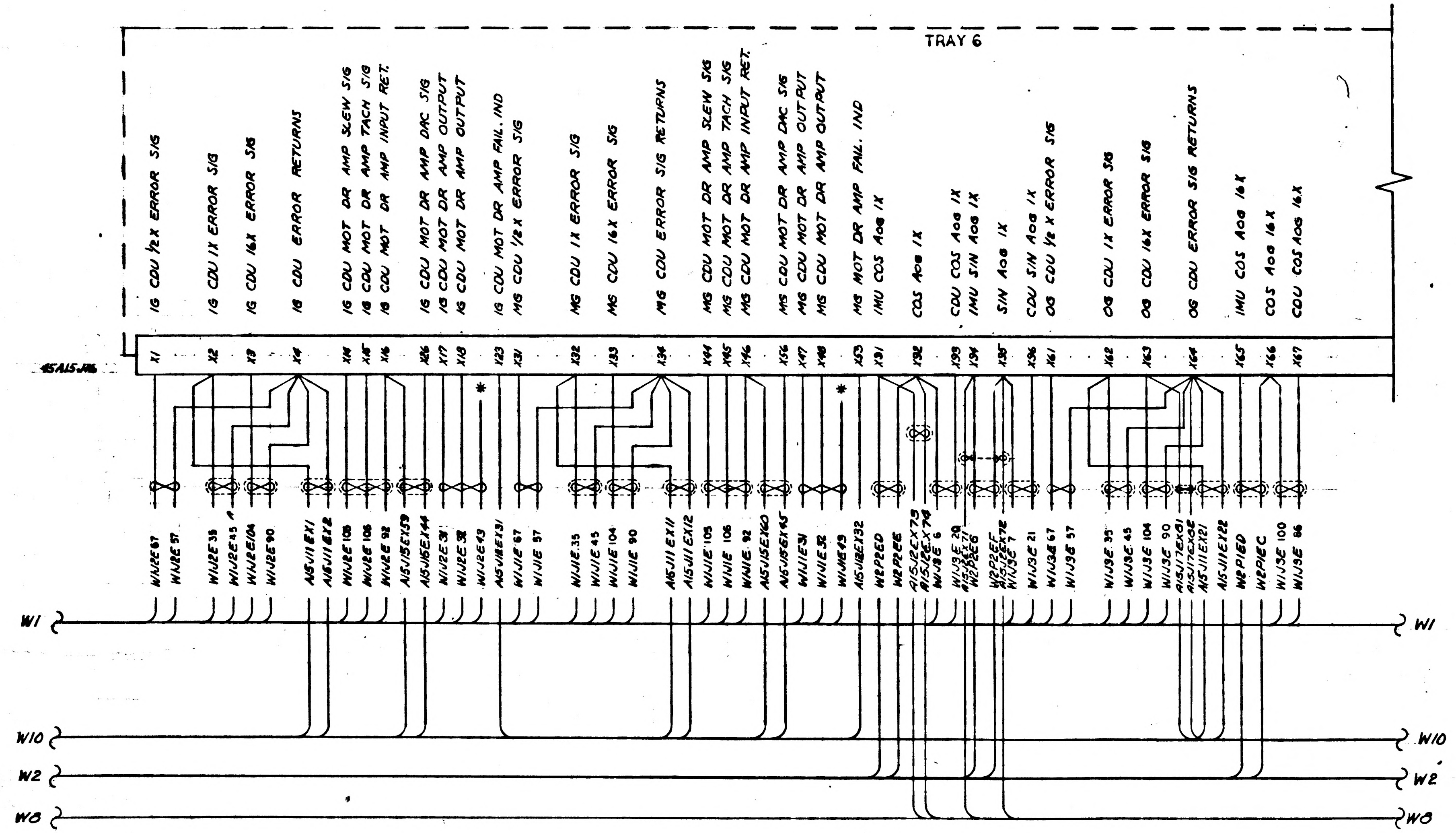
CODE IDENT NO. SIZE E NASA DRAWING NO 1010065
SCALE WT SHEET OF

1010065

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01390		


TRAY 6
IG CDU ½X ERROR SIG
IG CDU 1X ERROR SIG
IG CDU 16X ERROR SIG
IG CDU ERROR RETURNS
IG CDU MOT DR AMP SLEW SIG
IG CDU MOT DR AMP TACH SIG
IG CDU MOT DR AMP INPUT RET.
IG CDU MOT DR AMP DAC SIG
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP FAIL. IND
MG CDU ½X ERROR SIG
MG CDU 1X ERROR SIG
MG CDU 16X ERROR SIG
MG CDU ERROR SIG RETURNS
MG CDU MOT DR AMP SLEW SIG
MG CDU MOT DR AMP TACH SIG
MG CDU MOT DR AMP INPUT RET.
MG CDU MOT DR AMP DAC SIG
MG CDU MOT DR AMP OUTPUT
MG CDU MOT DR AMP OUTPUT
MG MOT DR AMP FAIL. IND
IMU COS AOG 1X
COS AOG 1X
CDU COS AOG 1X
IMU SIN AOG 1X
SIN AOG 1X
CDU SIN AOG 1X
OG CDU ½X ERROR SIG
OG CDU 1X ERROR SIG
OG CDU 16X ERROR SIG
OG CDU ERROR SIG RETURNS
IMU COS AOG 16X
COS AOG 16X
CDU COS AOG 16X
45A15J16
X1 X2 X3 X4 X14 X15 X16 X26 X17 X18 X23 X31 X32 X33 X34 X44 X45 X46 X56 X47 X48 X53 X91 X92 X93 X94 X95 X96 X61 X62 X63 X64 X65 X66 X67
*
W1J2E 67
W1J2E 57
W1J2E 35
W1J2E 45
W1J2E 104
W1J2E 90
A15J11EX1
A15J11EX2
W1J2E 105
W1J2E 106
W1J2E 92
A15J15EX59
A15J15EX44
W1J2E 31
W1J2E 32
W1J2E 43
A15J18EX31
W1J1E 67
W1J1E 57
W1J1E 35
W1J1E 45
W1J1E 104
W1J1E 90
A15J11EX11
A15J11EX12
W1J1E 105
W1J1E 106
W1J1E 92
A15J15EX60
A15J15EX45
W1J1E 31
W1J1E 32
W1J1E 43
A15J18EX32
W2P2ED
W2P2EE
A15J2EX73
A15J2EX74
W1J3E 6
W1J3E 20
A15J2EX71
W2P2EG
W2P2EF
A15J2EX72
W1J3E 7
W1J3E 21
W1J3E 67
W1J3E 57
W1J3E 35
W1J3E 45
W1J3E 104
W1J3E 90
A15J17EX81
A15J17EX82
A15J11EX21
A15J11EX22
W2P1ED
W2P1EC
W1J3E 100
W1J3E 86
W1
W10
W2
W8

NOTES:

1. INTERPRET DRAWING INACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 -PSA FAMILY TREE
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* CONNECT LEAD TO A15J16EX138

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CLASS B RELEASE TDR No. 01387 DATE 5/29/63

MASTER

1010066 A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE 4-30-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 29 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX INTERCONNECTING WIRING TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE
WT
SHEET 1 OF 2

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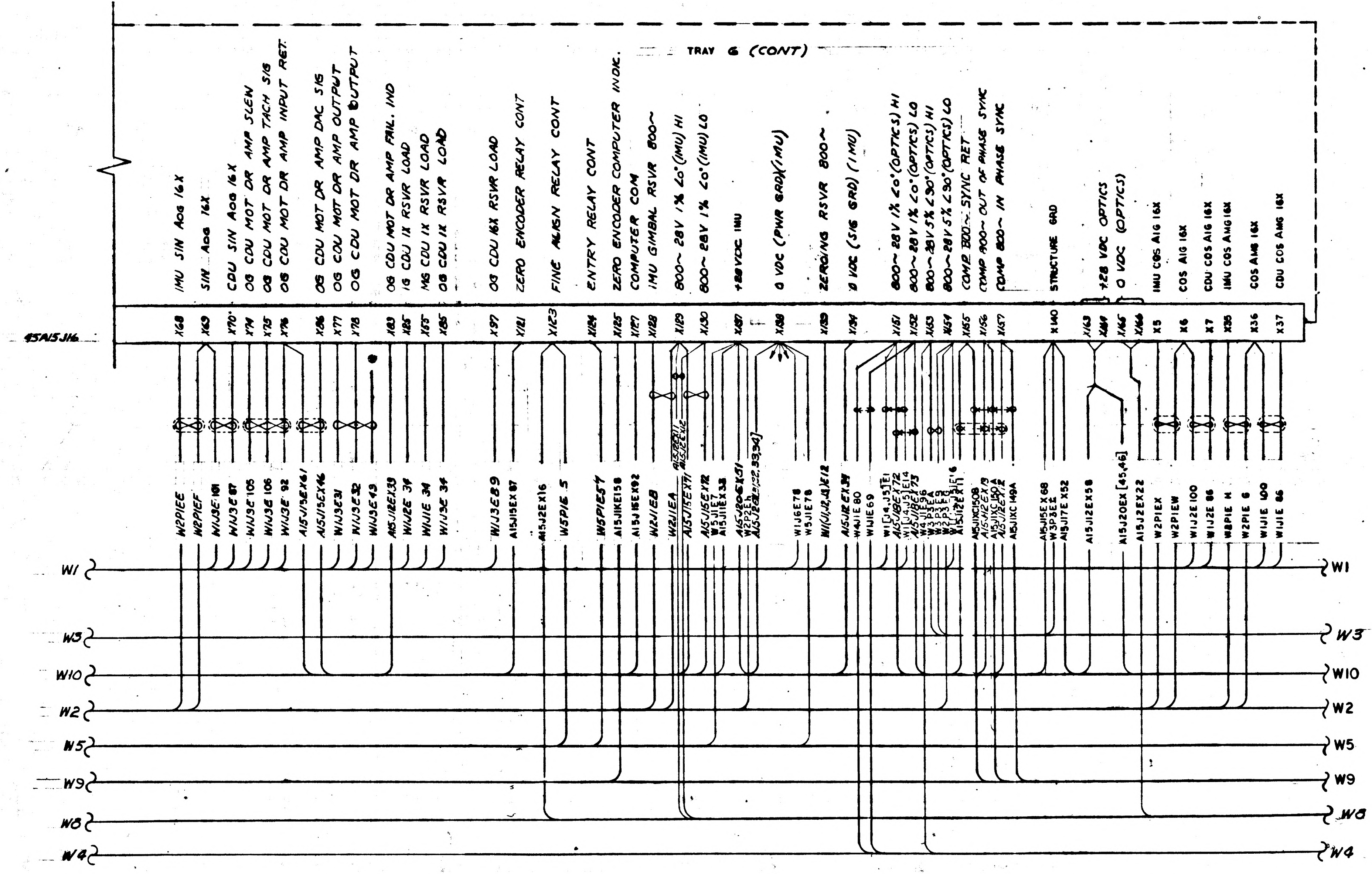
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01990	17 Jly 63	WK


TRAY 6 (CONT)
45A15J16
IMU SIN AOG 16X
SIN AOG 16X
CDU SIN AOG 16X
OG CDU MOT DR AMP SLEW
OG CDU MOT DR AMP TACH SIG
OG CDU MOT DR AMP INPUT RET.
OG CDU MOT DR AMP DAC SIG
OG CDU MOT DR AMP OUTPUT
OG CDU MOT DR AMP OUTPUT
OG CDU MOT DR AMP FAIL. IND
IG CDU 1X RSVR LOAD
MG CDU 1X RSVR LOAD
OG CDU 1X RSVR LOAD
OG CDU 16X RSVR LOAD
ZERO ENCODER RELAY CONT
FINE ALIGN RELAY CONT
ENTRY RELAY CONT
ZERO ENCODER COMPUTER INDIC.
COMPUTER COM
IMU GIMBAL RSVR 800~
800~ 28V 1% ∠0° (IMU) HI
800~ 28V 1% ∠0° (IMU) LO
+28VDC IMU
0 VDC (PWR GRD) (IMU)
ZEROING RSVR 800~
0 VDC (SIG GRD) (IMU)
800~ 28V 1% ∠0° (OPTICS) HI
800~ 28V 1% ∠0° (OPTICS) LO
800~ 28V 5% ∠90° (OPTICS) HI
800~ 28V 5% ∠90° (OPTICS) LO
COMP 800~ SYNC RET
COMP 800~ OUT OF PHASE SYNC
COMP 800~ IN PHASE SYNC
STRUCTURE GRD
+28 VDC OPTICS
0 VDC (OPTICS)
IMU COS AIG 16X
COS AIG 16X
CDU COS AIG 16X
IMU COS AMG 16X
COS AMG 16X
CDU COS AMG 16X
X68
X69
X70
X74
X75
X76
X86
X77
X78
X83
X85
X55
X85
X97
X121
X123
X124
X125
X127
X128
X129
X130
X137
X138
X139
X134
X151
X152
X153
X154
X155
X156
X157
X140
X163
X164
X165
X166
X5
X6
X7
X35
X36
X37
W2P1EE
W2P1EF
W1J3E 101
W1J3E 87
W1J3E 105
W1J3E 106
W1J3E 92
A15J15EX61
A15J15EX46
W1J3E31
W1J3E32
W1J3E43
A15J12EX39
W1J2E 34
W1J1E 34
W1J3E 34
W1J3E89
A15J15EX87
A15J2EX16
W5P1E 5
W5P1E57
A15J1KE158
A15J15EX92
W2J1EB
W2J1EA
A15J2EX11
A15J2EX12
A15J15EX71
A15J15EX72
W5J1E7
A15J11EX33
A15J20EX51
W2P2Eh
A15J20EX[31,32,33,34]
W1J6E78
W5J1E78
W1(J1,J2,J3)E12
A15J12EX34
W4J1E 80
W1J1E 69
W1[J4,J5]E1
A15J18EX72
W1[J4,J5]E14
A15J18EX73
W4J1E96
W3P3EA
W3P3E9
W2P3EG
W1[J4,J5]E6
A15J12EX11
A15J1XC150B
A15J12EX13
A15J1XC150A
A15J12EX12
A15J1XC149A
A15J15EX68
W3P3EE
A15J17EX52
A15J12EX58
A15J20EX[45,46]
A15J2EX22
W2P1EX
W2P1EW
W1J2E100
W1J2E 86
W8P1E H
W2P1E 6
W1J1E 100
W1J1E 86
W1
W3
W10
W2
W5
W9
W8
W4

* CONNECT LEAD TO - A15J16EX138

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01387 DATE 5/29/63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT

DRAWN DATE 4-29-63
CHECKED R.G. Caggiano 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 29 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE
WT
SHEET 2 OF 2

1010066 A

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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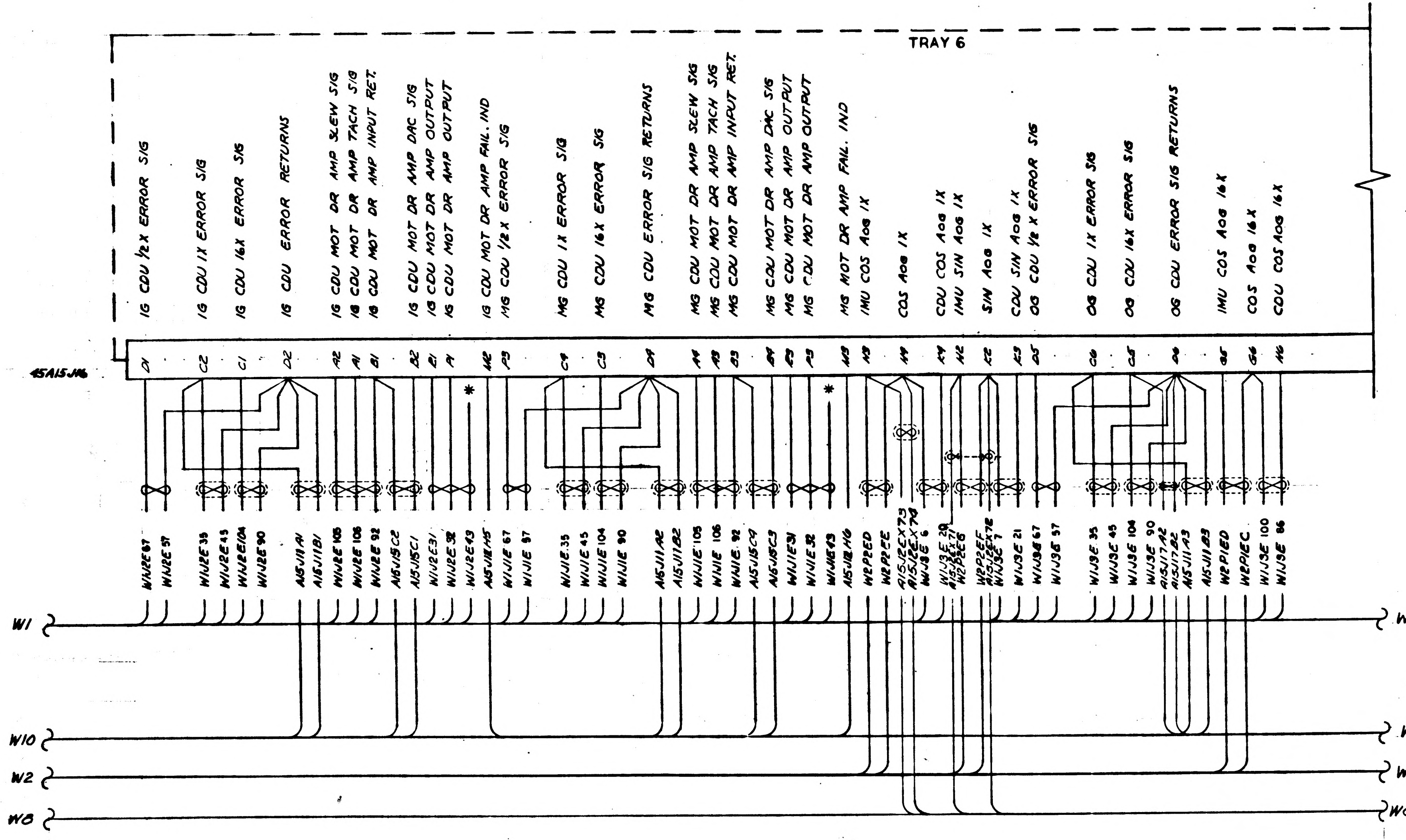
B	REVISED PER TDRR 02436	9/[illegible]/63	WR


TRAY 6
45A15J16
IG CDU ½X ERROR SIG
IG CDU 1X ERROR SIG
IG CDU 16X ERROR SIG
IG CDU ERROR RETURNS
IG CDU MOT DR AMP SLEW SIG
IG CDU MOT DR AMP TACH SIG
IG CDU MOT DR AMP INPUT RET.
IG CDU MOT DR AMP DAC SIG
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP FAIL. IND
MG CDU ½X ERROR SIG
MG CDU 1X ERROR SIG
MG CDU 16X ERROR SIG
MG CDU ERROR SIG RETURNS
MG CDU MOT DR AMP SLEW SIG
MG CDU MOT DR AMP TACH SIG
MG CDU MOT DR AMP INPUT RET.
MG CDU MOT DR AMP DAC SIG
MG CDU MOT DR AMP OUTPUT
MG CDU MOT DR AMP OUTPUT
MG MOT DR AMP FAIL. IND
IMU COS Aog 1X
COS Aog 1X
CDU COS Aog 1X
IMU SIN Aog 1X
SIN Aog 1X
CDU SIN Aog 1X
OG CDU ½X ERROR SIG
OG CDU 1X ERROR SIG
OG CDU 16X ERROR SIG
OG CDU ERROR SIG RETURNS
IMU COS Aog 16X
COS Aog 16X
CDU COS Aog 16X
D1
C2
C1
D2
A2
A1
B1
B2
E1
P1
M2
P3
C4
C3
D4
A4
A3
B3
B4
E3
P3
M3
N3
N4
K4
M2
K2
K3
D5
C6
C5
D6
G5
G6
M6
W1J2E67
W1J2E57
W1J2E35
W1J2E45
W1J2E104
W1J2E90
A15J11A1
A15J11B1
W1J2E105
W1J2E106
W1J2E92
A15J15C2
A15J15C1
W1J2E31
W1J2E32
W1J2E43
A15J12H5
W1J1E67
W1J1E57
W1J1E35
W1J1E45
W1J1E104
W1J1E90
A15J11A2
A15J11B2
W1J1E105
W1J1E106
W1J1E92
A15J15C4
A15J15C3
W1J1E31
W1J1E32
W1J1E43
A15J12H6
W2P2ED
W2P2EE
A15J2EX73
A15J2EX74
W1J3E6
W1J3E20
A15J2EX71
W2P2EG
W2P2EF
A15J2EX72
W1J3E7
W1J3E21
W1J3E67
W1J3E57
W1J3E35
W1J3E45
W1J3E104
W1J3E90
A15J17A2
A15J17B2
A15J11A3
A15J11B3
W2P1ED
W2P1EC
W1J3E100
W1J3E86
*
*
W1
W10
W2
W8
W1
W10
W2
W8

* CONNECT LEAD TO A15J16P2

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X___ ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01387 DATE 5/29/63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN [illegible] DATE 4-30-63
CHECKED [illegible] 4-30-63
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 29 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE
WT
SHEET 1 OF 2

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
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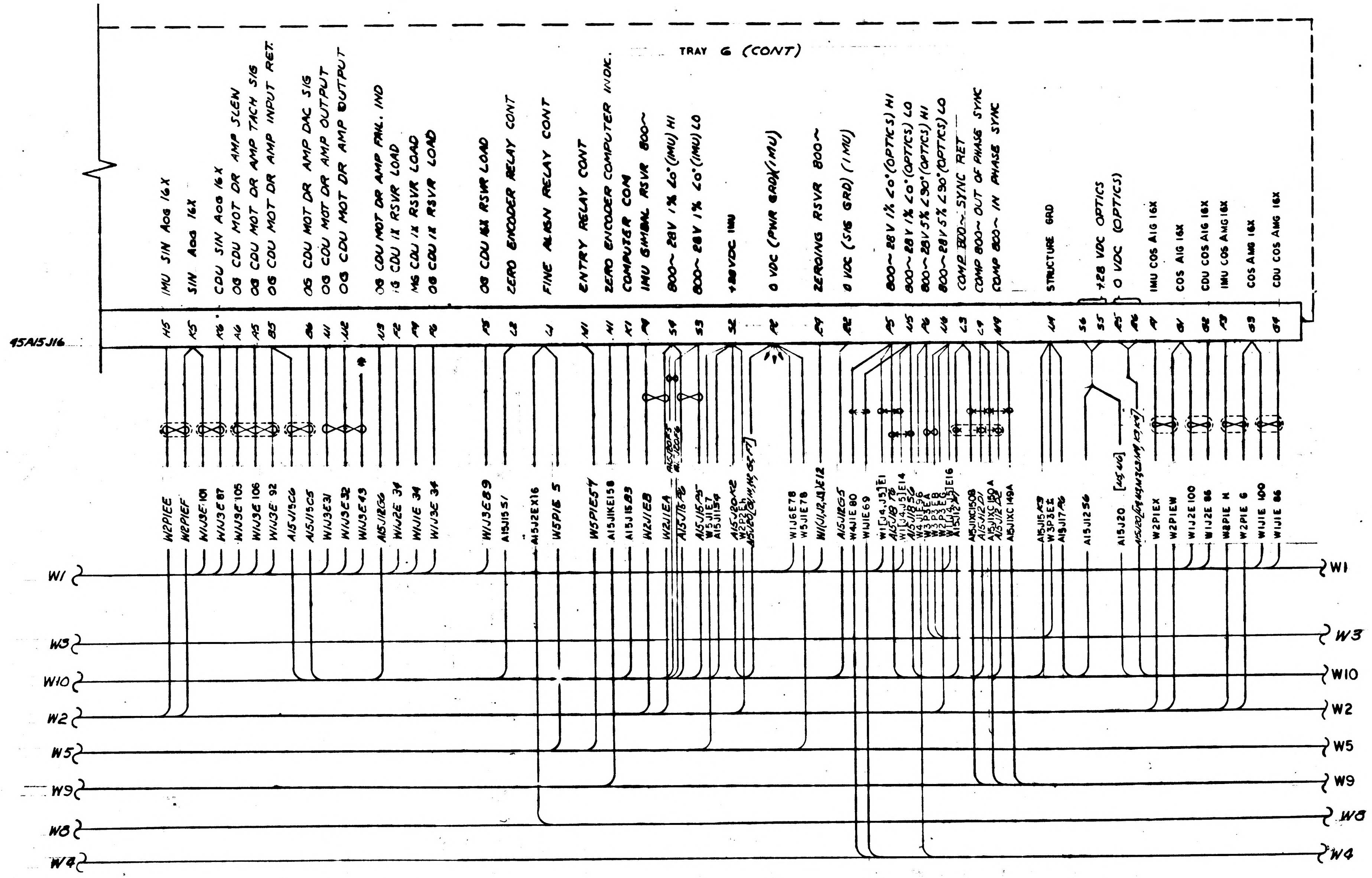
B	REVISED PER TDRR 02496	9-7-63	WK


TRAY 6 (CONT)
45A15J16
IMU SIN A0G 16X
SIN A0G 16X
CDU SIN A0G 16X
OG CDU MOT DR AMP SLEW
OG CDU MOT DR AMP TACH SIG
OG CDU MOT DR AMP INPUT RET.
OG CDU MOT DR AMP DAC SIG
OG CDU MOT DR AMP OUTPUT
OG CDU MOT DR AMP OUTPUT
OG CDU MOT DR AMP FAIL. IND
IG CDU 1X RSVR LOAD
MG CDU 1X RSVR LOAD
OG CDU 1X RSVR LOAD
OG CDU 16X RSVR LOAD
ZERO ENCODER RELAY CONT
FINE ALIGN RELAY CONT
ENTRY RELAY CONT
ZERO ENCODER COMPUTER INDK.
COMPUTER COM
IMU GIMBAL RSVR 800~
800~ 28V 1% ∠0°(IMU) HI
800~ 28V 1% ∠0°(IMU) LO
+28VDC IMU
0 VDC (PWR GRD)(IMU)
ZEROING RSVR 800~
0 VDC (SIG GRD) (IMU)
800~ 28V 1% ∠0°(OPTICS) HI
800~ 28V 1% ∠0°(OPTICS) LO
800~ 28V 5% ∠90°(OPTICS) HI
800~ 28V 5% ∠90°(OPTICS) LO
COMP 800~ SYNC RET
COMP 800~ OUT OF PHASE SYNC
COMP 800~ IN PHASE SYNC
STRUCTURE GRD
+28 VDC OPTICS
0 VDC (OPTICS)
IMU COS AIG 16X
COS AIG 16X
CDU COS AIG 16X
IMU COS AMG 16X
COS AMG 16X
CDU COS AMG 16X
H5
K5
K6
A6
A5
B5
B6
M1
M2
M3
F2
F4
F6
F5
L2
L1
N1
H1
K1
F8
S4
S3
S2
R2
F9
E2
P5
N5
P6
N6
L3
L4
M4
U4
S6
S5
P5
R6
F7
G1
G2
F3
G3
G4
W2P1EE
W2P1EF
W1J3E101
W1J3E87
W1J3E105
W1J3E106
W1J3E92
A15J15C6
A15J15C5
W1J3E31
W1J3E32
W1J3E43
A15J12G6
W1J2E34
W1J1E34
W1J3E34
W1J3E89
A15J15 51
A15J2EX16
W5P1E 5
W5P1E57
A15J1KE158
A15J15B3
W2J1EB
W2J1EA
A15J6P5
W.J6CF6
A15J16F6
A15J16F5
W5J1E7
A15J1154
A15J20K2
W2P2Eh
W1J6E78
W5J1E78
W1(J1,J2,J3)E12
A15J12G5
W4J1E80
W1J1E69
W1[J4,J5]E1
A15J18 76
W1[J4,J5]E14
A15J18 56
W4J1E96
W3P3EA
W3P3EB
W2P3EG
W1[J4,J5]E16
A15J12 F7
A15J1XC150B
A15J12D1
A15J1XC150A
A15J12 D2
A15J1XC 149A
A15J15 K3
W3P3EE
A15J17 R6
A15J12 56
A15J20
[U5 U6]
W2P1EX
W2P1EW
W1J2E100
W1J2E86
W8P1E K
W2P1E 6
W1J1E 100
W1J1E 86
W1
W3
W10
W2
W5
W9
W8
W4

* CONNECT LEAD TO A15J16EX138

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01387 DATE 5/24/63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 4-8-63
CHECKED R. G. Cazzaniga 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 29 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 6

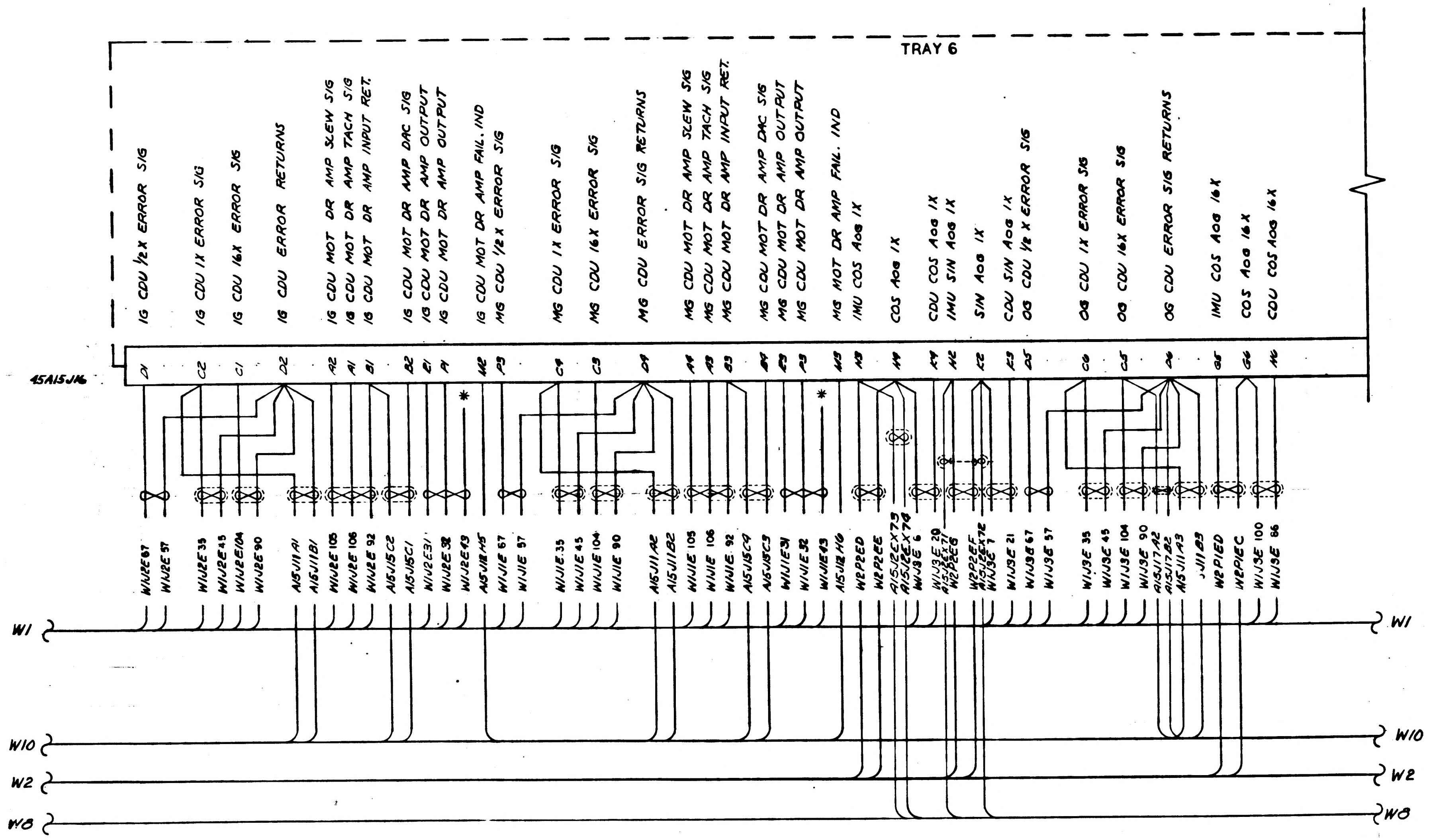
CODE IDENT NO. SIZE E NASA DRAWING NO. 1010066
SCALE WT SHEET 2 OF 2

1010066 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

[illegible]

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01390	17 [illegible]	WR
B	REVISED PER TDRR 02496	4-1-63	WR
C	REVISED PER TDRR 04059	[illegible] 63	WR


TRAY 6
45A15J16
IG CDU 1/2X ERROR SIG
IG CDU 1X ERROR SIG
IG CDU 16X ERROR SIG
IG CDU ERROR RETURNS
IG CDU MOT DR AMP SLEW SIG
IG CDU MOT DR AMP TACH SIG
IG CDU MOT DR AMP INPUT RET.
IG CDU MOT DR AMP DAC SIG
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP FAIL. IND
MG CDU 1/2X ERROR SIG
MG CDU 1X ERROR SIG
MG CDU 16X ERROR SIG
MG CDU ERROR SIG RETURNS
MG CDU MOT DR AMP SLEW SIG
MG CDU MOT DR AMP TACH SIG
MG CDU MOT DR AMP INPUT RET.
MG CDU MOT DR AMP DAC SIG
MG CDU MOT DR AMP OUTPUT
MG CDU MOT DR AMP OUTPUT
MG MOT DR AMP FAIL. IND
IMU COS AOG 1X
COS AOG 1X
CDU COS AOG 1X
IMU SIN AOG 1X
SIN AOG 1X
CDU SIN AOG 1X
OG CDU 1/2 X ERROR SIG
OG CDU 1X ERROR SIG
OG CDU 16X ERROR SIG
OG CDU ERROR SIG RETURNS
IMU COS AOG 16X
COS AOG 16X
CDU COS AOG 16X
D1
C2
C1
D2
A2
A1
B1
B2
E1
A1
M2
P3
C4
C5
D4
A4
A3
B3
B4
E3
P3
M3
K3
M4
K4
H2
K2
E3
D5
C6
C5
D6
G5
G6
H6
*
*
W1J2E67
W1J2E57
W1J2E35
W1J2E45
W1J2E104
W1J2E90
A15J11A1
A15J11B1
W1J2E105
W1J2E106
W1J2E92
A15J15C2
A15J15C1
W1J2E31
W1J2E32
W1J2E43
A15J12H5
W1J1E67
W1J1E57
W1J1E35
W1J1E45
W1J1E104
W1J1E90
A15J11A2
A15J11B2
W1J1E105
W1J1E106
W1J1E92
A15J15C4
A15J15C3
W1J1E31
W1J1E32
W1J1E43
A15J12H6
W2P2ED
W2P2EE
A15J2EX73
A15J2EX74
W1J3E6
W1J3E20
A15J2EX71
W2P2EG
W2P2EF
A15J2EX72
W1J3E7
W1J3E21
W1J3E67
W1J3E57
W1J3E35
W1J3E45
W1J3E104
W1J3E90
A15J17A2
A15J17B2
A15J11A3
J11B3
W2P1ED
W2P1EC
W1J3E100
W1J3E86
W1
W10
W2
W8

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01387 DATE 5/29/63

© REPLACED WITH CHANGE BY REV D

* CONNECT LEAD TO A15J16P2

NOTES:

1. INTERPRET DRAWING INACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150-PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X___ ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN [illegible] DATE 4-30-63
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible]
MIT APPROVAL [illegible] 29 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

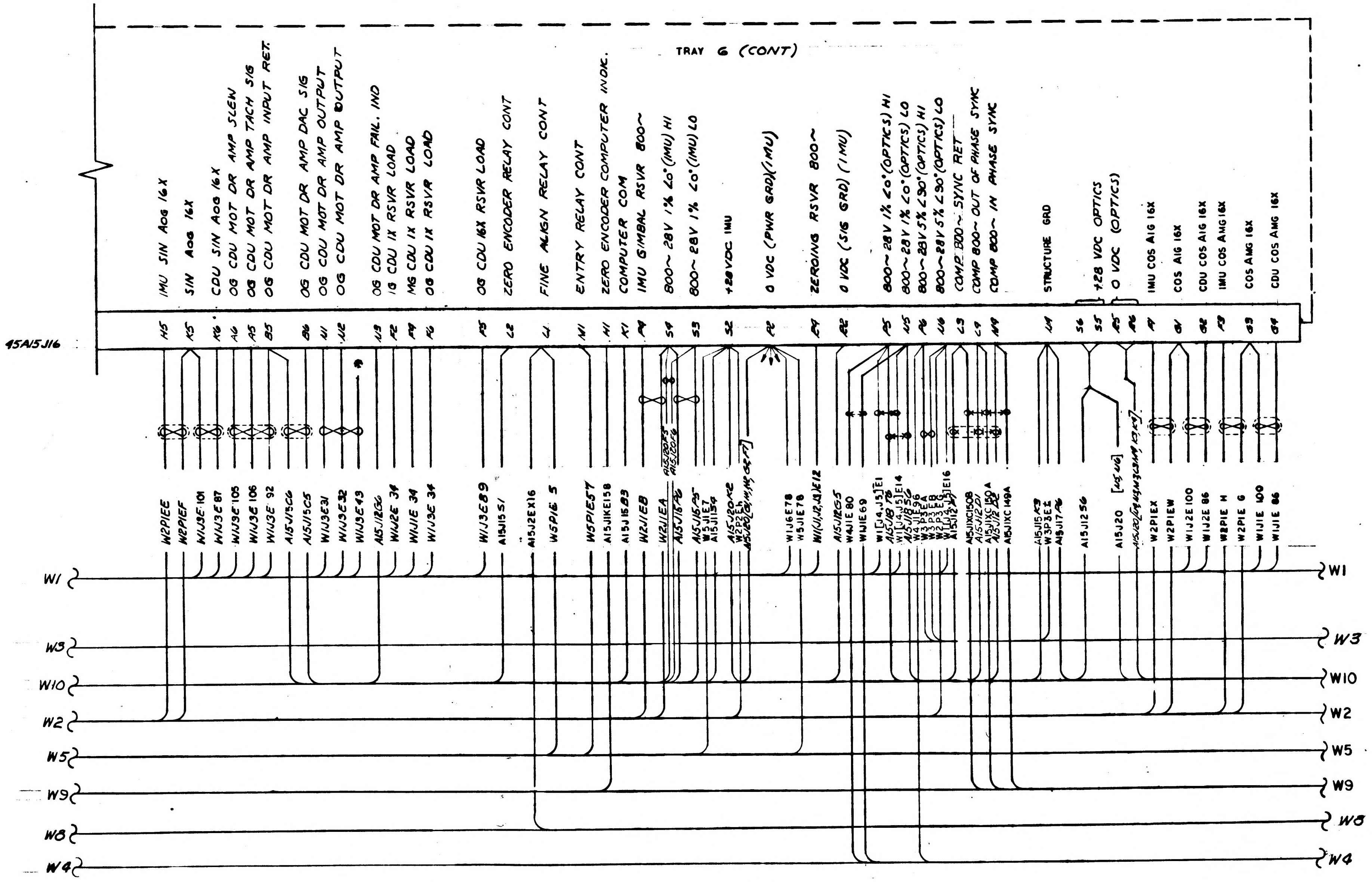
PSA JUNCTION BOX INTERCONNECTING WIRING TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE
WT
SHEET 1 OF 2

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 01990	17 Jul 63	WK
B	REVISED PER TDRR 02496	9-7-63	WK
C	REVISED PER TDRR 04059	[illegible]	[illegible]



TRAY 6 (CONT)
45A15J16
H5 IMU SIN AOG 16X
K5 SIN AOG 16X
K6 CDU SIN AOG 16X
A6 OG CDU MOT DR AMP SLEW
A5 OG CDU MOT DR AMP TACH SIG
B5 OG CDU MOT DR AMP INPUT RET.
B6 OG CDU MOT DR AMP DAC SIG
N1 OG CDU MOT DR AMP OUTPUT
N2 OG CDU MOT DR AMP OUTPUT
N3 OG CDU MOT DR AMP FAIL. IND
F2 IG CDU 1X RSVR LOAD
F4 MG CDU 1X RSVR LOAD
F6 OG CDU 1X RSVR LOAD
F5 OG CDU 16X RSVR LOAD
L2 ZERO ENCODER RELAY CONT
L1 FINE ALIGN RELAY CONT
M1 ENTRY RELAY CONT
H1 ZERO ENCODER COMPUTER INDIC.
K1 COMPUTER COM
P4 IMU GIMBAL RSVR 800~
S4 800~ 28V 1% ∠0° (IMU) HI
S3 800~ 28V 1% ∠0° (IMU) LO
S2 +28VDC IMU
P2 0 VDC (PWR GRD)(IMU)
E4 ZEROING RSVR 800~
E2 0 VDC (SIG GRD) (IMU)
P5 800~ 28V 1% ∠0° (OPTICS) HI
N5 800~ 28V 1% ∠0° (OPTICS) LO
P6 800~ 28V 5% ∠90° (OPTICS) HI
N6 800~ 28V 5% ∠90° (OPTICS) LO
L3 COMP 800~ SYNC RET
L9 COMP 800~ OUT OF PHASE SYNC
M4 COMP 800~ IN PHASE SYNC
M4 STRUCTURE GRD
S6
S5 +28 VDC OPTICS
R5 0 VDC (OPTICS)
R6
R7 IMU COS AIG 16X
G1 COS AIG 16X
G2 CDU COS AIG 16X
F3 IMU COS AMG 16X
G3 COS AMG 16X
G4 CDU COS AMG 16X
W2P1EE
W2P1EF
W1J3E 101
W1J3E 87
W1J3E 105
W1J3E 106
W1J3E 92
A15J15C6
A15J15C5
W1J3E31
W1J3E32
W1J3E43
A15J12G6
W1J2E 34
W1J1E 34
W1J3E 34
W1J3E89
A15J15 51
A15J2EX16
W5P1E 5
W5P1E57
A15J1KE158
A15J15B3
W2J1EB
W2J1EA
A15J20F5
A15J20F6
A15J16P6
A15J15P5
W5J1E7
A15J1159
A15J20K2
W2P2Eh
A15J20[B,H,M,G&F1]
W1J6E78
W5J1E78
W1(J1,J2,J3)E12
A15J12G5
W4J1E 80
W1J1E 69
W1[J4,J5]E1
A15J18 76
W1[J4,J5]E14
A15J18 5G
W4J1E96
W3P3EA
W3P3EB
W2P3EG
W1[J4,J5]E16
A15J12
A15J1XC150B
A15J12D1
A15J1XC150A
A15J12
A15J1XC 149A
A15J15K3
W3P3EE
A15J17P6
A15J12 56
A15J20 [N5,N6]
A15J20[G&N5N3CSAM,K3,K4]
W2P1EX
W2P1EW
W1J2E 100
W1J2E 86
W2P1E H
W2P1E G
W1J1E 100
W1J1E 86
W1
W3
W10
W2
W5
W9
W8
W4

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01387 **DATE** 5/28/63

© REPLACED WITH CHANGE BY REV D

* CONNECT LEAD TO A15J16EX138

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN Ross DATE 4-29-63
CHECKED R.G. Cazzgano 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL W Kupfer 29 May 63

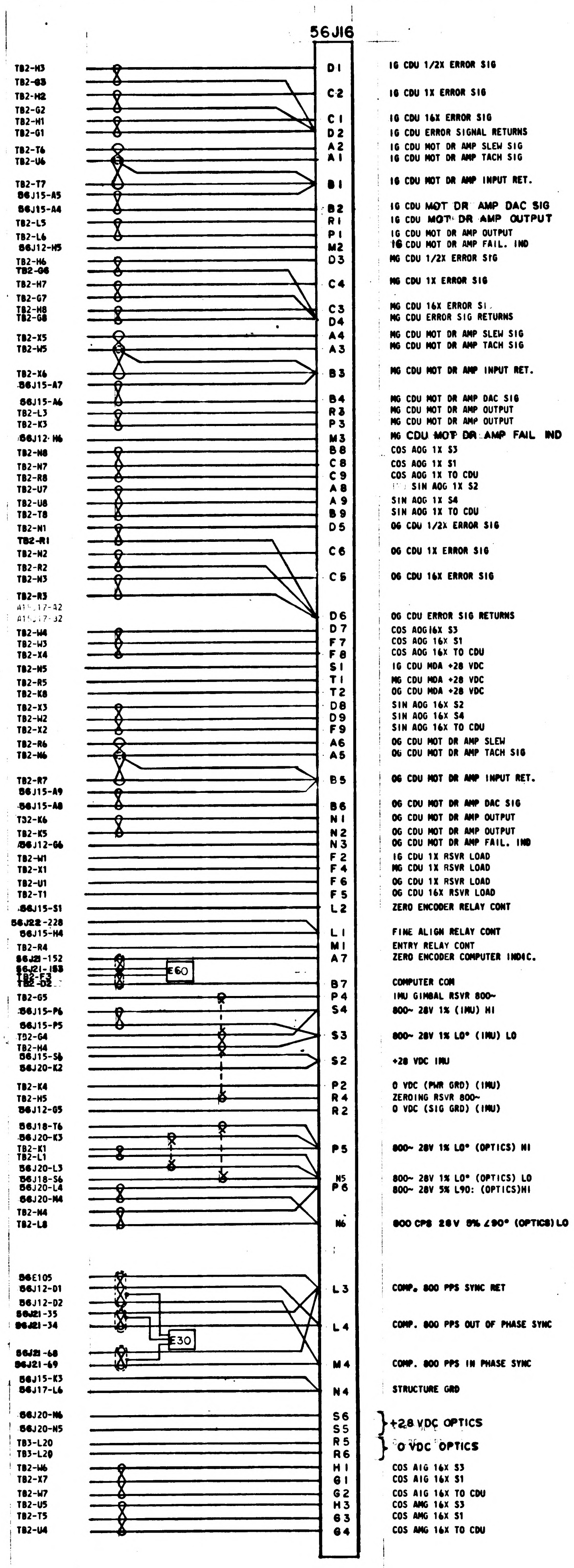
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX INTERCONNECTING WIRING TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE
WT
SHEET 2 OF 2

1010066 C

INCHES
PHOTOGRAPHIC SCALE ONLY


56J16
TB2-H3 — D1 — IG CDU 1/2X ERROR SIG
TB2-G3, TB2-H2 — C2 — IG CDU 1X ERROR SIG
TB2-G2 — C1 — IG CDU 16X ERROR SIG
TB2-H1, TB2-G1 — D2 — IG CDU ERROR SIGNAL RETURNS
TB2-T6 — A2 — IG CDU MOT DR AMP SLEW SIG
TB2-U6 — A1 — IG CDU MOT DR AMP TACH SIG
TB2-T7, 56J15-A5 — B1 — IG CDU MOT DR AMP INPUT RET.
56J15-A4 — B2 — IG CDU MOT DR AMP DAC SIG
TB2-L5 — R1 — IG CDU MOT DR AMP OUTPUT
TB2-L6 — P1 — IG CDU MOT DR AMP OUTPUT
56J12-H5 — M2 — IG CDU MOT DR AMP FAIL. IND
TB2-H6 — D3 — MG CDU 1/2X ERROR SIG
TB2-G6, TB2-H7 — C4 — MG CDU 1X ERROR SIG
TB2-G7 — C3 — MG CDU 16X ERROR SI
TB2-H8, TB2-G8 — D4 — MG CDU ERROR SIG RETURNS
TB2-X5 — A4 — MG CDU MOT DR AMP SLEW SIG
TB2-W5 — A3 — MG CDU MOT DR AMP TACH SIG
TB2-X6, 56J15-A7 — B3 — MG CDU MOT DR AMP INPUT RET.
56J15-A6 — B4 — MG CDU MOT DR AMP DAC SIG
TB2-L3 — R3 — MG CDU MOT DR AMP OUTPUT
TB2-K3 — P3 — MG CDU MOT DR AMP OUTPUT
56J12-H6 — M3 — MG CDU MOT DR AMP FAIL IND
TB2-N8 — B8 — COS AOG 1X S3
TB2-N7 — C8 — COS AOG 1X S1
TB2-R8 — C9 — COS AOG 1X TO CDU
TB2-U7 — A8 — SIN AOG 1X S2
TB2-U8 — A9 — SIN AOG 1X S4
TB2-T8 — B9 — SIN AOG 1X TO CDU
TB2-N1 — D5 — OG CDU 1/2X ERROR SIG
TB2-R1, TB2-N2 — C6 — OG CDU 1X ERROR SIG
TB2-R2, TB2-N3 — C5 — OG CDU 16X ERROR SIG
TB2-R3 — D6 — OG CDU ERROR SIG RETURNS
A15J17-A2
A15J17-B2
TB2-W4 — D7 — COS AOG 16X S3
TB2-W3 — F7 — COS AOG 16X S1
TB2-X4 — F8 — COS AOG 16X TO CDU
TB2-N5 — S1 — IG CDU MDA +28 VDC
TB2-R5 — T1 — MG CDU MDA +28 VDC
TB2-K8 — T2 — OG CDU MDA +28 VDC
TB2-X3 — D8 — SIN AOG 16X S2
TB2-W2 — D9 — SIN AOG 16X S4
TB2-X2 — F9 — SIN AOG 16X TO CDU
TB2-R6 — A6 — OG CDU MOT DR AMP SLEW
TB2-N6 — A5 — OG CDU MOT DR AMP TACH SIG
TB2-R7, 56J15-A9 — B5 — OG CDU MOT DR AMP INPUT RET.
56J15-A8 — B6 — OG CDU MOT DR AMP DAC SIG
TB2-K6 — N1 — OG CDU MOT DR AMP OUTPUT
TB2-K5 — N2 — OG CDU MOT DR AMP OUTPUT
56J12-G6 — N3 — OG CDU MOT DR AMP FAIL. IND
TB2-W1 — F2 — IG CDU 1X RSVR LOAD
TB2-X1 — F4 — MG CDU 1X RSVR LOAD
TB2-U1 — F6 — OG CDU 1X RSVR LOAD
TB2-T1 — F5 — OG CDU 16X RSVR LOAD
56J15-S1 — L2 — ZERO ENCODER RELAY CONT
56J22-228, 56J15-H4 — L1 — FINE ALIGN RELAY CONT
TB2-R4 — M1 — ENTRY RELAY CONT
56J21-152 — A7 — ZERO ENCODER COMPUTER INDIC.
56J21-153
TB2-F3
TB2-D2 — B7 — COMPUTER COM
E60
TB2-G5 — P4 — IMU GIMBAL RSVR 800~
56J15-P6 — S4 — 800~ 28V 1% (IMU) HI
56J15-P5, TB2-G4, TB2-H4 — S3 — 800~ 28V 1% LO° (IMU) LO
56J15-S6, 56J20-K2 — S2 — +28 VDC IMU
TB2-K4 — P2 — 0 VDC (PWR GRD) (IMU)
TB2-H5 — R4 — ZEROING RSVR 800~
56J12-G5 — R2 — 0 VDC (SIG GRD) (IMU)
56J18-T6, 56J20-K3, TB2-K1 — P5 — 800~ 28V 1% LO° (OPTICS) HI
TB2-L1, 56J20-L3, 56J18-S6 — N5 — 800~ 28V 1% LO° (OPTICS) LO
56J20-L4, 56J20-M4 — P6 — 800~ 28V 5% L90: (OPTICS)HI
TB2-N4, TB2-L8 — N6 — 800 CPS 28 V 5% ∠90° (OPTICS) LO
56E105, 56J12-D1 — L3 — COMP. 800 PPS SYNC RET
56J12-D2, 56J21-35, 56J21-34 — L4 — COMP. 800 PPS OUT OF PHASE SYNC
E30
56J21-68, 56J21-69 — M4 — COMP. 800 PPS IN PHASE SYNC
56J15-K3, 56J17-L6 — N4 — STRUCTURE GRD
56J20-N6 — S6 — +28 VDC OPTICS
56J20-N5 — S5 — +28 VDC OPTICS
TB3-L20 — R5 — 0 VDC OPTICS
TB3-L20 — R6 — 0 VDC OPTICS
TB2-W6 — H1 — COS AIG 16X S3
TB2-X7 — G1 — COS AIG 16X S1
TB2-W7 — G2 — COS AIG 16X TO CDU
TB2-U5 — H3 — COS AMG 16X S3
TB2-T5 — G3 — COS AMG 16X S1
TB2-U4 — G4 — COS AMG 16X TO CDU

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150-PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGES PER TDRR 01059	11/3/63	LWK

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01389 DATE 5/29/63

D REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE
CHECKED J. Green
APPROVAL J. Green
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

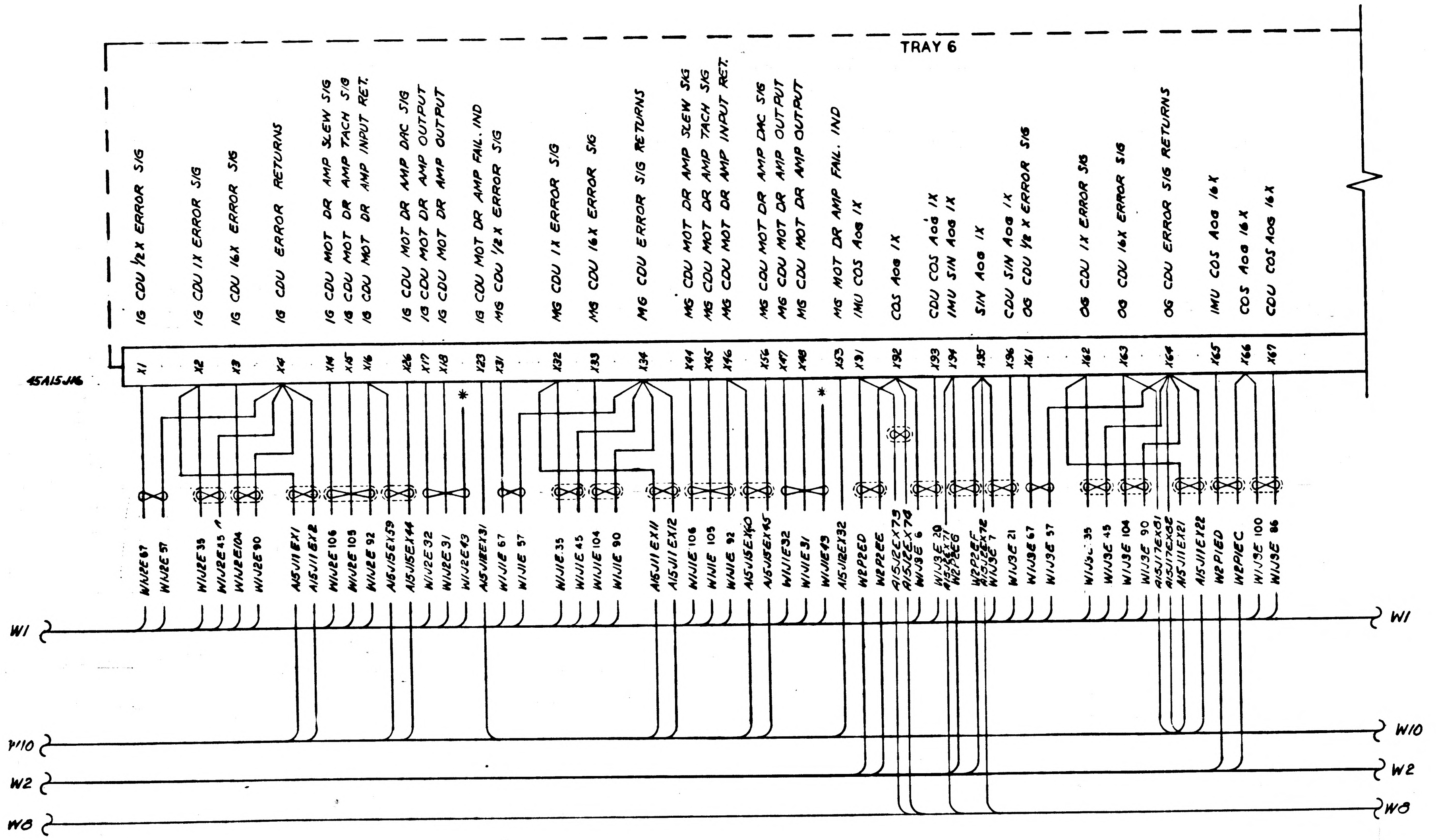
PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE —
WT
SHEET 1 OF 1

1010066 D

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY


TRAY 6
45A15J16
IG CDU ½X ERROR SIG
IG CDU IX ERROR SIG
IG CDU 16X ERROR SIG
IG CDU ERROR RETURNS
IG CDU MOT DR AMP SLEW SIG
IG CDU MOT DR AMP TACH SIG
IG CDU MOT DR AMP INPUT RET.
IG CDU MOT DR AMP DAC SIG
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP OUTPUT
IG CDU MOT DR AMP FAIL. IND
MG CDU ½X ERROR SIG
MG CDU IX ERROR SIG
MG CDU 16X ERROR SIG
MG CDU ERROR SIG RETURNS
MG CDU MOT DR AMP SLEW SIG
MG CDU MOT DR AMP TACH SIG
MG CDU MOT DR AMP INPUT RET.
MG CDU MOT DR AMP DAC SIG
MG CDU MOT DR AMP OUTPUT
MG CDU MOT DR AMP OUTPUT
MG MOT DR AMP FAIL. IND
IMU COS AOG IX
COS AOG IX
CDU COS AOG IX
IMU SIN AOG IX
SIN AOG IX
CDU SIN AOG IX
OG CDU ½X ERROR SIG
OG CDU IX ERROR SIG
OG CDU 16X ERROR SIG
OG CDU ERROR SIG RETURNS
IMU COS AOG 16X
COS AOG 16X
CDU COS AOG 16X
X1
X2
X3
X4
X14
X15
X16
X26
X17
X18
X23
X31
X32
X33
X34
X44
X45
X46
X56
X47
X48
X53
X91
X92
X93
X94
X95
X96
X61
X62
X63
X64
X65
X66
X67
*
*
W1J2E67
W1J2E57
W1J2E35
W1J2E45
W1J2E104
W1J2E90
A15J11EX1
A15J11EX2
W1J2E106
W1J2E105
W1J2E92
A15J15EX59
A15J15EX44
W1J2E32
W1J2E31
W1J2E43
A15J12EX31
W1J1E67
W1J1E57
W1J1E35
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A15J11EX12
W1J1E106
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W1J1E43
A15J12EX32
W2P2ED
W2P2EE
A15J2EX73
A15J2EX74
W1J3E6
W1J3E20
A15J2EX71
W2P2EG
W2P2EF
A15J2EX72
W1J3E7
W1J3E21
W1J3E67
W1J3E57
W1J3E35
W1J3E45
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A15J17EX82
A15J11EX21
A15J11EX22
W2P1ED
W2P1EC
W1J3E100
W1J3E86
W1
W1
W10
W10
W2
W2
W8
W8

* CONNECT LEAD TO A15J16EX138

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X___ ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01387 DATE 5/29/63

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS
APPLICATION		MATERIAL	DRAWN DATE 4-30-63 CHECKED APPROVAL J Grim APPROVAL
		HEAT TREATMENT	NASA APPROVAL
		FINAL FINISH	MIT APPROVAL 29 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

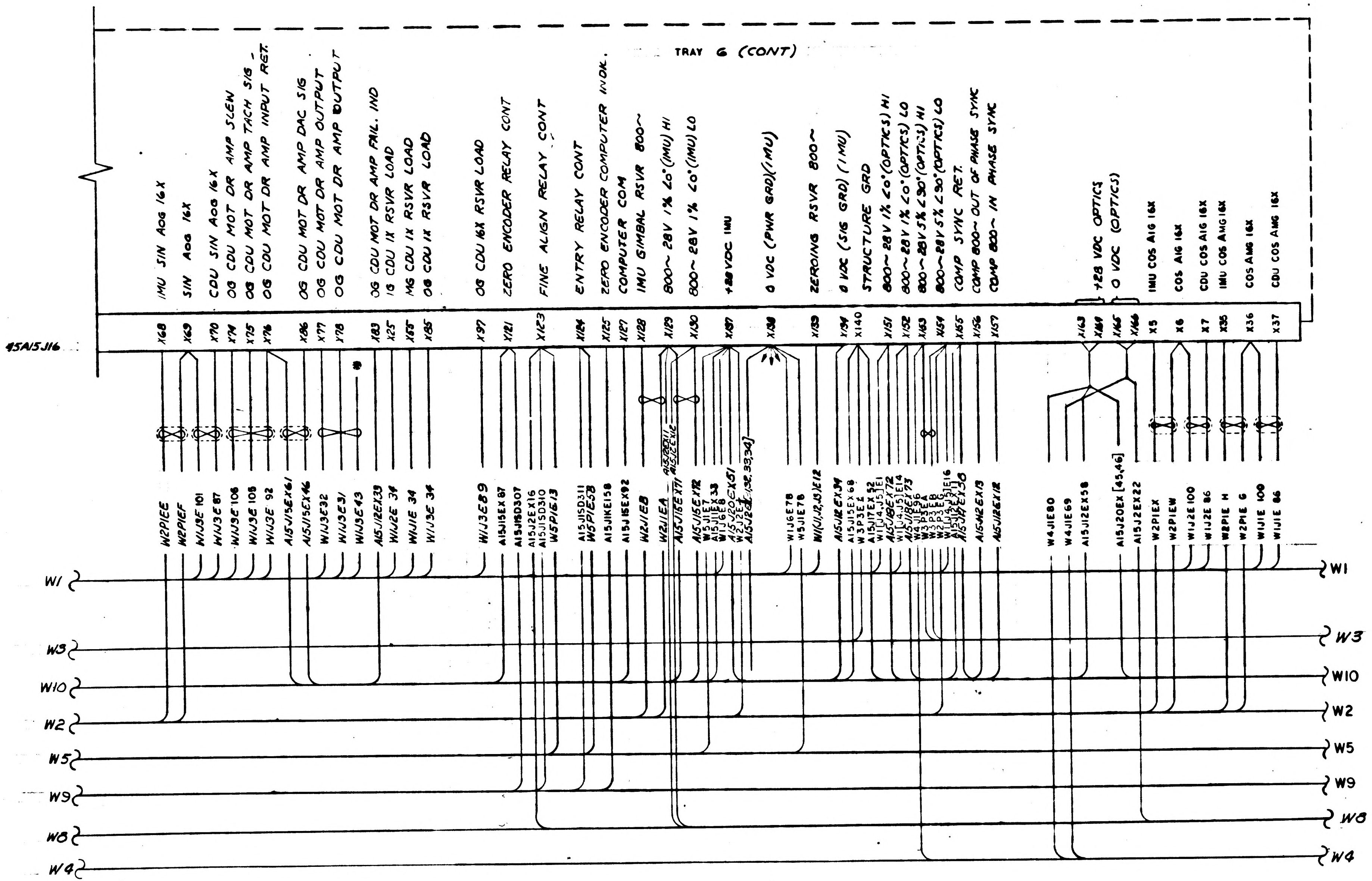
PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE
WT
SHEET 1 OF 2

1010066

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY


TRAY 6 (CONT)
45A15J16
IMU SIN AOG 16X
SIN AOG 16X
CDU SIN AOG 16X
OG CDU MOT DR AMP SLEW
OG CDU MOT DR AMP TACH SIG
OG CDU MOT DR AMP INPUT RET.
OG CDU MOT DR AMP DAC SIG
OG CDU MOT DR AMP OUTPUT
OG CDU MOT DR AMP OUTPUT
OG CDU MOT DR AMP FAIL. IND
IG CDU 1X RSVR LOAD
MG CDU 1X RSVR LOAD
OG CDU 1X RSVR LOAD
OG CDU 16X RSVR LOAD
ZERO ENCODER RELAY CONT
FINE ALIGN RELAY CONT
ENTRY RELAY CONT
ZERO ENCODER COMPUTER INOK.
COMPUTER COM
IMU GIMBAL RSVR 800~
800~ 28V 1% ∠0° (IMU) HI
800~ 28V 1% ∠0° (IMU) LO
+28 VDC IMU
0 VDC (PWR GRD)(IMU)
ZEROING RSVR 800~
0 VDC (SIG GRD) (IMU)
STRUCTURE GRD
800~ 28V 1% ∠0° (OPTICS) HI
800~ 28V 1% ∠0° (OPTICS) LO
800~ 28V 5% ∠90° (OPTICS) HI
800~ 28V 5% ∠90° (OPTICS) LO
COMP SYNC RET.
COMP 800~ OUT OF PHASE SYNC
COMP 800~ IN PHASE SYNC
+28 VDC OPTICS
0 VDC (OPTICS)
IMU COS AIG 16X
COS AIG 16X
CDU COS AIG 16X
IMU COS AMG 16X
COS AMG 16X
CDU COS AMG 16X
X68
X69
X70
X74
X75
X76
X86
X77
X78
X83
X25
X55
X85
X97
X121
X123
X124
X125
X127
X128
X129
X130
X137
X138
X139
X134
X140
X151
X152
X153
X154
X155
X156
X157
X163
X164
X165
X166
X5
X6
X7
X35
X36
X37
*
W2P1EE
W2P1EF
W1J3E101
W1J3E87
W1J3E106
W1J3E105
W1J3E92
A15J15EX61
A15J15EX46
W1J3E32
W1J3E31
W1J3E43
A15J12EX39
W1J2E34
W1J1E34
W1J3E34
W1J3E89
A15J15EX87
A15J15D307
A15J2EX16
A15J15D310
W5P1E13
A15J15D311
W5P1E58
A15J1KE158
A15J15EX92
W2J1EB
W2J1EA
A15J12EX11
A15J12EX12
A15J16EX71
A15J15EX72
W5J1E7
A15J11EX33
W1J6E8
A15J20EX51
W2J2E1
A15J2E[31,32,33,34]
W1J6E78
W5J1E78
W1(J1,J2,J3)E12
A15J12EX34
A15J15EX68
W3P3E£
A15J17EX52
W1[J4,J5]E1
A15J18EX72
W1[J4,J5]E14
A15J18EX73
W4J1E96
W3P3EA
W3P3EB
W2P3EG
W1[J4,J5]E16
A15J12EX11
A15J17EX50
A15J12EX13
A15J12EX12
W4J1E80
W4J1E69
A15J12EX58
A15J20EX[45,46]
A15J2EX22
W2P1EX
W2P1EW
W1J2E100
W1J2E86
W2P1EH
W2P1EG
W1J1E100
W1J1E86
W1
W3
W10
W2
W5
W9
W8
W4

* CONNECT LEAD TO A15J16EX138

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01387 DATE 5/29/63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN DATE 4-29-63
CHECKED 30Apr63
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 29May63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

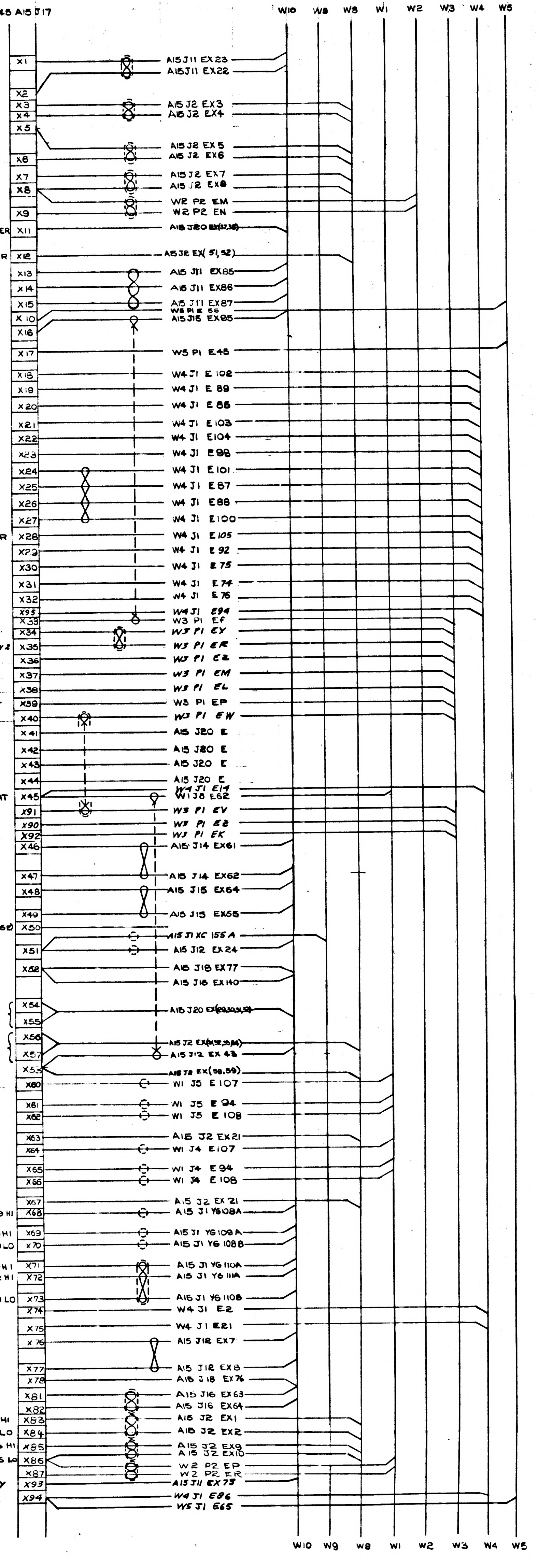
PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010066
SCALE
WT
SHEET 2 OF 2

1010066

INCHES
PHOTOGRAPHIC SCALE ONLY

TRAY 7



Signal	Pin	Destination
OG CDU ATTIT. STEERING ERROR HI	X1	A15 J11 EX23
OG CDU ATTIT. STEERING ERROR LO	X2	A15 J11 EX22
ROLL ERROR BODY AXIS HI	X3	A15 J2 EX3
ROLL ERROR BODY AXIS LO	X4	A15 J2 EX4
YAW ERROR BODY AXIS HI	X5	A15 J2 EX5
YAW ERROR BODY AXIS LO	X6	A15 J2 EX6
YAW ERROR BODY, OFFSET AXIS HI	X7	A15 J2 EX7
YAW ERROR BODY OFFSET AXIS LO	X8	A15 J2 EX8 W2 P2 EM
PITCH-YAW RESOLVER S3	X9	W2 P2 EN
+28 V DC FOR TEMPERATURE CONTROLLER	X11	A15 J20 EX(37,38)
O V DC FOR TEMPERATURE CONTROLLER	X12	A15 J2 EX(51,52)
3200 CPS 20 V (TEMP CONT) HI	X13	A15 J11 EX85
3200 CPS 20 V (TEMP CONT) CT	X14	A15 J11 EX86
3200 CPS 20 V (TEMP CONT) LO	X15	A15 J11 EX87
IMU TD RELAY NO	X10	W5 P1 E55
800 CPS 28V 5% ∠90° (IMU) HI.	X16	A15 J16 EX95
IMU TD RELAY C	X17	W5 P1 E45
IMU TEMP. CONTROL -5° GAIN CHECK	X18	W4 J1 E 102
IRIG ZERO DEVIATION CHECK	X19	W4 J1 E 89
IRIG TEMP BRIDGE AMP PIN 6	X20	W4 J1 E 85
IMU TEMP. CONTROL +5° GAIN CHECK	X21	W4 J1 E103
ACCEL ZERO DEVIATION CHECK	X22	W4 J1 E104
ACCEL BRIDGE AMP PIN 6	X23	W4 J1 E98
IMU TEMP CONTROL K1 PIN 3	X24	W4 J1 E101
IMU TEMP CONTROL AMP PIN 5	X25	W4 J1 E87
IMU TEMP CONTROL K2 PIN 5	X26	W4 J1 E88
IMU HEATER CURRENT AMP PIN 5	X27	W4 J1 E100
IMU TEMP ALARM AMP BIAS RESISTOR	X28	W4 J1 E105
IMU TEMP ALARM AMP PIN 5	X29	W4 J1 E 92
IMU TEMP ALARM AMP PIN 14.	X30	W4 J1 E 75
IMU TEMP ALARM. AMP PIN 15	X31	W4 J1 E 74
IMU TEMP CONTROL K2 PIN 6	X32	W4 J1 E 76
OVDC (STANDBY) (TEMP CONTROL)	X95	W4 J1 E94
IMU BLOWER HI	X33	W3 P1 EF
IMU EMERGENCY HEATER HI	X34	W3 P1 EY
IMU EMERGENCY HEATER CONT MODULE PIN 2	X35	W3 P1 ER
IRIG TEMP INDICATING SENSOR RET	X36	W3 P1 EZ
IRIG TEMP CONTROL SENSOR HI	X37	W3 P1 EM
IRIG TEMP CONTROL SENSOR RET	X38	W3 P1 EL
ACCEL TEMP INDICATING SENSOR RET	X39	W3 P1 EP
IMU CONTROL HEATERS	X40	W3 P1 EW
BLOWER CURRENT SENSOR (TELEM.)	X41	A15 J20 E
ACCEL TEMP. (TELEMETRY)	X42	A15 J20 E
IRIG TEMP. (TELEMETRY)	X43	A15 J20 E
HEATER CURRENT (TELEMETRY)	X44	A15 J20 E
IMU TEMP CONTROLLER FAILURE LIGHT	X45	W4 J1 E14 W1 J8 E62
+28 VDC FOR IMU CONTROL HEATERS	X91	W3 P1 EV
IRIG TEMP INDICATING SENSOR HI	X90	W3 P1 EZ
IMU TEMP SENSOR COMMON	X92	W3 P1 EK
+32 V DC IMU STANDBY (PIP)	X46	A15 J14 EX61
32V DC IMU STANDBY RET (PIP)	X47	A15 J14 EX62
+120V DC	X48	A15 J15 EX64
120V DC RET	X49	A15 J15 EX65
PULSE TORQUE POWER SUP MON. (GSE)	X50	
COMPUTER 12.8 KC SYNC	X51	A15 J1 XC 155 A A15 J12 EX 24
STRUCTURE GROUND	X52	A15 J18 EX77 A15 J16 EX 140
+28 V DC FOR POWER SUPPLIES	X54 X55	A15 J20 EX(29,30,31,32)
OV DC FOR POWER SUPPLIES	X56 X57	A15 J2 EX(51,52,53,54) A15 J12 EX 43
6V 400 CPS HI	X53	A15 J2 EX(58,59)
TRUNNION CDU ENCODER ø1	X60	W1 J5 E 107
TRUNNION CDU ENCODER COM	X61	W1 J5 E 94
TRUNNION CDU ENCODER ø2	X62	W1 J5 E 108
TRUNNION CDU ENCODER O V DC	X63	A15 J2 EX21
SHAFT CDU ENCODER ø1	X64	W1 J4 E107
SHAFT CDU ENCODER COM	X65	W1 J4 E 94
SHAFT CDU ENCODER ø2	X66	W1 J4 E 108
SHAFT CDU ENCODER O V DC	X67	A15 J2 EX 21
TRUNNION CDU READOUT AMP +Δθ HI	X68	A15 J1 YG108A
TRUNNION CDU READOUT AMP - Δθ HI	X69	A15 J1 YG 109 A
TRUNNION CDU READOUT AMP ± Δθ LO	X70	A15 J1 YG 108 B
SHAFT CDU READOUT AMP +Δθ HI	X71	A15 J1 YG 110A
SHAFT CDU READOUT AMP -Δθ HI	X72	A15 J1 YG 111A
SHAFT CDU READOUT AMP ±Δθ LO	X73	A15 J1 YG 110B
SEXTANT POWER INDICATION TO TRUNNION DECODER E3	X74	W4 J1 E2
" " " E4	X75	W4 J1 E21
25.6 KC (OPTICS) HI	X76	A15 J12 EX7
25.6 KC (OPTICS) LO	X77	A15 J12 EX8
+28V DC (OPTICS)	X78	A15 J18 EX76
OG CDU 16 X ERROR SIG HI	X81	A15 J16 EX63
OG CDU 16 X ERROR SIG LO	X82	A15 J16 EX64
ROLL ERROR BODY OFFSET AXIS HI	X83	A15 J2 EX1
ROLL ERROR BODY OFFSET AXIS LO	X84	A15 J2 EX2
PITCH ERROR BODY & BODY OFFSET AXIS HI	X85	A15 J2 EX9
PITCH ERROR BODY & BODY OFFSET AXIS LO	X86	A15 J2 EX10 W2 P2 EP
PITCH-YAW RESOLVER S4	X87	W2 P2 ER
+28V DC FOR 3200 CPS POWER SUPPLY	X93	A15 J11 EX 73
IRIG TEMP GAIN SWITCH NC	X94	W4 J1 E86 W5 J1 E65

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE
   - 1014523 INTERCONNECTION DIAG., APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   - 1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2. FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS.

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01346 DATE 22 May 63

REVISIONS
A REVISED TDRR 01840 6-25-63

MASTER

LIST OF PARTS AND MATERIALS

M I T INSTRUMENTATION LABORATORY CAMBRIDGE, MASS.
PSA JUNCTION BOX
INTERCONNECTION WIRING
TRAY 7
MANNED SPACECRAFT CENTER HOUSTON TEXAS
APPLICATION

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE
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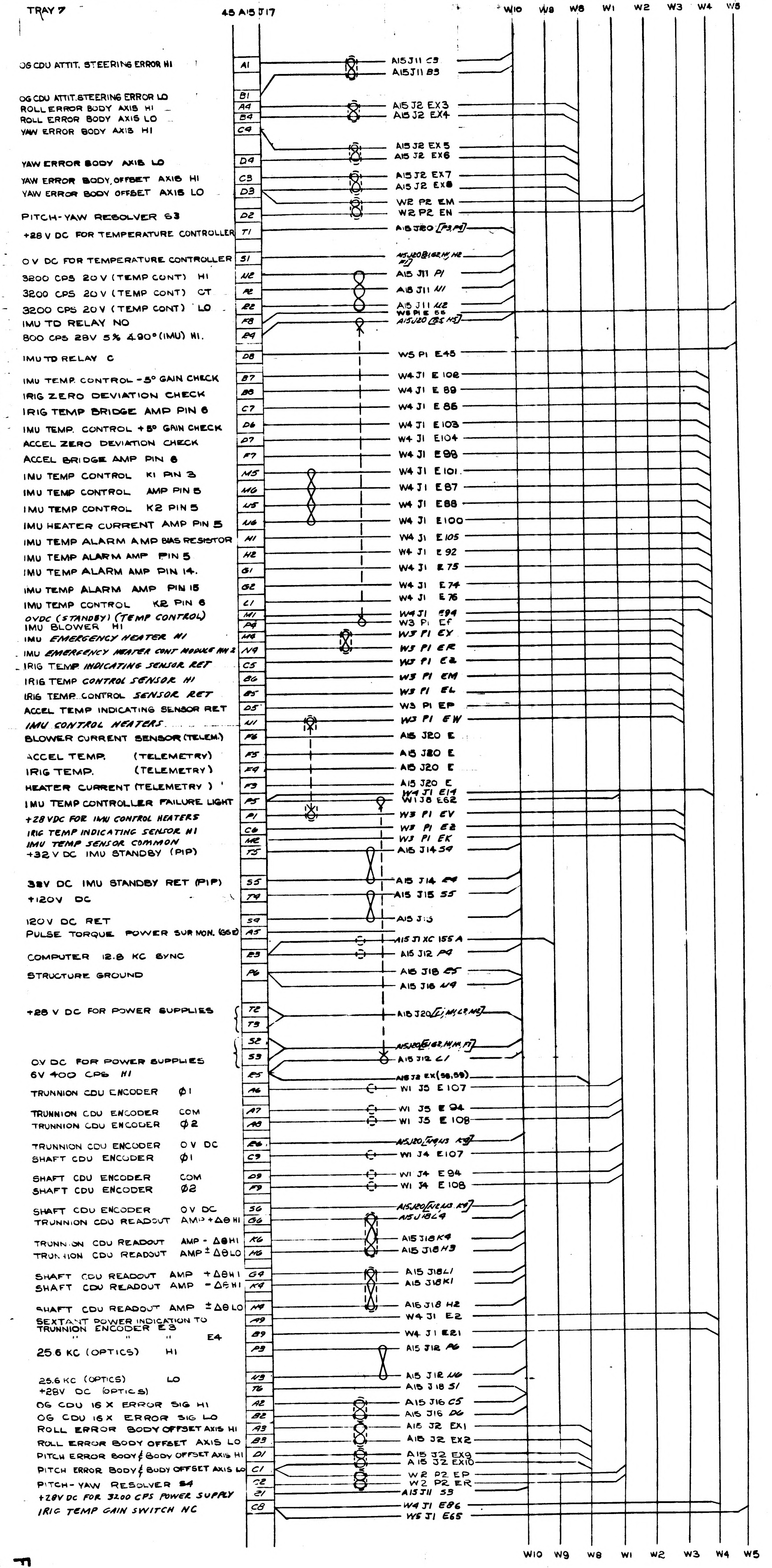
TRAY 7
45 A15 J17
W10 W9 W8 W1 W2 W3 W4 W5
OG CDU ATTIT. STEERING ERROR HI A1
OG CDU ATTIT. STEERING ERROR LO B1
ROLL ERROR BODY AXIS HI A4
ROLL ERROR BODY AXIS LO B4
YAW ERROR BODY AXIS HI C4
YAW ERROR BODY AXIS LO D4
YAW ERROR BODY, OFFSET AXIS HI C3
YAW ERROR BODY OFFSET AXIS LO D3
PITCH-YAW RESOLVER S3 D2
+28 V DC FOR TEMPERATURE CONTROLLER T1
0 V DC FOR TEMPERATURE CONTROLLER S1
3200 CPS 20 V (TEMP CONT) HI N2
3200 CPS 20 V (TEMP CONT) CT P2
3200 CPS 20 V (TEMP CONT) LO R2
IMU TD RELAY NO F8
800 CPS 28V 5% ∠90° (IMU) HI. R4
IMU TD RELAY C D8
IMU TEMP. CONTROL -5° GAIN CHECK B7
IRIG ZERO DEVIATION CHECK B8
IRIG TEMP BRIDGE AMP PIN 6 C7
IMU TEMP. CONTROL +5° GAIN CHECK D6
ACCEL ZERO DEVIATION CHECK D7
ACCEL BRIDGE AMP PIN 6 F7
IMU TEMP CONTROL K1 PIN 3 M5
IMU TEMP CONTROL AMP PIN 5 M6
IMU TEMP CONTROL K2 PIN 5 N5
IMU HEATER CURRENT AMP PIN 5 N6
IMU TEMP ALARM AMP BIAS RESISTOR H1
IMU TEMP ALARM AMP PIN 5 H2
IMU TEMP ALARM AMP PIN 14. G1
IMU TEMP ALARM AMP PIN 15 G2
IMU TEMP CONTROL K2 PIN 6 L1
0VDC (STANDBY) (TEMP CONTROL) M1
IMU BLOWER HI P4
IMU EMERGENCY HEATER H1 M4
IMU EMERGENCY HEATER CONT MODULE HN 2 N4
IRIG TEMP INDICATING SENSOR RET C5
IRIG TEMP CONTROL SENSOR HI B6
IRIG TEMP CONTROL SENSOR RET B5
ACCEL TEMP INDICATING SENSOR RET D5
IMU CONTROL HEATERS N1
BLOWER CURRENT SENSOR (TELEM.) F6
ACCEL TEMP. (TELEMETRY) F5
IRIG TEMP. (TELEMETRY) F4
HEATER CURRENT (TELEMETRY) F3
IMU TEMP CONTROLLER FAILURE LIGHT P5
+28 VDC FOR IMU CONTROL HEATERS P1
IRIG TEMP INDICATING SENSOR HI C6
IMU TEMP SENSOR COMMON M2
+32 V DC IMU STANDBY (PIP) T5
32V DC IMU STANDBY RET (PIP) S5
+120V DC T4
120V DC RET S4
PULSE TORQUE POWER SUP MON. (GSE) A5
COMPUTER 12.8 KC SYNC R3
STRUCTURE GROUND P6
+28 V DC FOR POWER SUPPLIES T2 T3
0 V DC FOR POWER SUPPLIES S2 S3
6V 400 CPS HI R5
TRUNNION CDU ENCODER φ1 A6
TRUNNION CDU ENCODER COM A7
TRUNNION CDU ENCODER φ2 A8
TRUNNION CDU ENCODER 0 V DC R6
SHAFT CDU ENCODER φ1 C9
SHAFT CDU ENCODER COM D9
SHAFT CDU ENCODER φ2 F9
SHAFT CDU ENCODER 0 V DC S6
TRUNNION CDU READOUT AMP +Δθ HI G6
TRUNNION CDU READOUT AMP -Δθ HI K6
TRUNNION CDU READOUT AMP ±Δθ LO H6
SHAFT CDU READOUT AMP +Δθ HI G4
SHAFT CDU READOUT AMP -Δθ HI K4
SHAFT CDU READOUT AMP ±Δθ LO M9
SEXTANT POWER INDICATION TO TRUNNION ENCODER E3 A9
" " " E4 B9
25.6 KC (OPTICS) HI P3
25.6 KC (OPTICS) LO N3
+28V DC (OPTICS) T6
OG CDU 16 X ERROR SIG HI A2
OG CDU 16 X ERROR SIG LO B2
ROLL ERROR BODY OFFSET AXIS HI A3
ROLL ERROR BODY OFFSET AXIS LO B3
PITCH ERROR BODY & BODY OFFSET AXIS HI D1
PITCH ERROR BODY & BODY OFFSET AXIS LO C1
PITCH-YAW RESOLVER S4 C2
+28V DC FOR 3200 CPS POWER SUPPLY R1
IRIG TEMP GAIN SWITCH NC C8
A15J11 C3
A15J11 B3
A15 J2 EX3
A15 J2 EX4
A15 J2 EX5
A15 J2 EX6
A15 J2 EX7
A15 J2 EX8
W2 P2 EM
W2 P2 EN
A15 J20 [P3, P4]
A15 J20 [B1, G2, H1, H2, F1]
A15 J11 P1
A15 J11 N1
A15 J11 N2
W5 P1 E 55
A15 J20 [E5, H5]
W5 P1 E45
W4 J1 E 102
W4 J1 E 89
W4 J1 E 86
W4 J1 E 103
W4 J1 E104
W4 J1 E98
W4 J1 E101
W4 J1 E87
W4 J1 E88
W4 J1 E100
W4 J1 E 105
W4 J1 E 92
W4 J1 E 75
W4 J1 E 74
W4 J1 E 76
W4 J1 E94
W3 P1 EF
W3 P1 EY
W3 P1 ER
W3 P1 EZ
W3 P1 EM
W3 P1 EL
W3 P1 EP
W3 P1 EW
A15 J20 E
A15 J20 E
A15 J20 E
A15 J20 E
W4 J1 E14
W1 J8 E62
W3 P1 EV
W3 P1 E2
W3 P1 EK
A15 J14 S4
A15 J14 R4
A15 J15 S5
A15 J15
A15 J1 XC 155 A
A15 J12 P4
A15 J18 E5
A15 J16 N9
A15 J20 [L1, M1, L2, M2]
A15 J20 [B1, G2, H1, H2, F1]
A15 J12 L1
A15 J2 EX(58,59)
W1 J5 E 107
W1 J5 E 94
W1 J5 E 108
A15 J20 [N2, N3, K9]
W1 J4 E107
W1 J4 E 94
W1 J4 E 108
A15 J20 [N2, N3, K9]
A15 J18 L4
A15 J18 K4
A15 J18 H3
A15 J18 L1
A15 J18 K1
A15 J18 H2
W4 J1 E2
W4 J1 E21
A15 J12 P6
A15 J12 N6
A15 J18 S1
A15 J16 C5
A15 J16 D6
A15 J2 EX1
A15 J2 EX2
A15 J2 EX9
A15 J2 EX10
W2 P2 EP
W2 P2 ER
A15 J11 S3
W4 J1 E86
W5 J1 E65
W10 W9 W8 W1 W2 W3 W4 W5

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01346 DATE 22 May 63

MASTER

REVISIONS				
ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 01840	6-28-63	WH
	B	REVISED PER TDRR 02497	6-6-63	WH

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.
LIST OF PARTS AND MATERIALS					

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES DO NOT SCALE THIS DRAWING MATERIAL:	M I T INSTRUMENTATION LAB CONTRACT NAS 9-153 DATE APPROVED E. G. Gran 7/1/6 CHECKED DRAWN APPROVED FOR MSC W. J. Rhine 5-2263 BY DIRECTION MIT/IL W/A 22 May 63	PSA JUNCTION BOX INTERCONECTION WIRING TRAY 7 SCALE UNIT WT. CODE IDENT.
APPLICATION				MIT INSTRUMENTATION LABORATORY CAMBRIDGE, MASS. DWG. NO. MANNED SPACECRAFT CENTER HOUSTON TEXAS NASA DRAWING NO. 1010067 SHEET OF

ZONE	SYM	DESCRIPTION	DATE	APPROVAL
	A	REVISED TDRR 01840	-28-63	WH
	B	REVISED PER TDRR 02497	4-63	WH
	C	REVISED PER TDRR 04060		

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE
   - 1014523 INTERCONNECTION DIAG., APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
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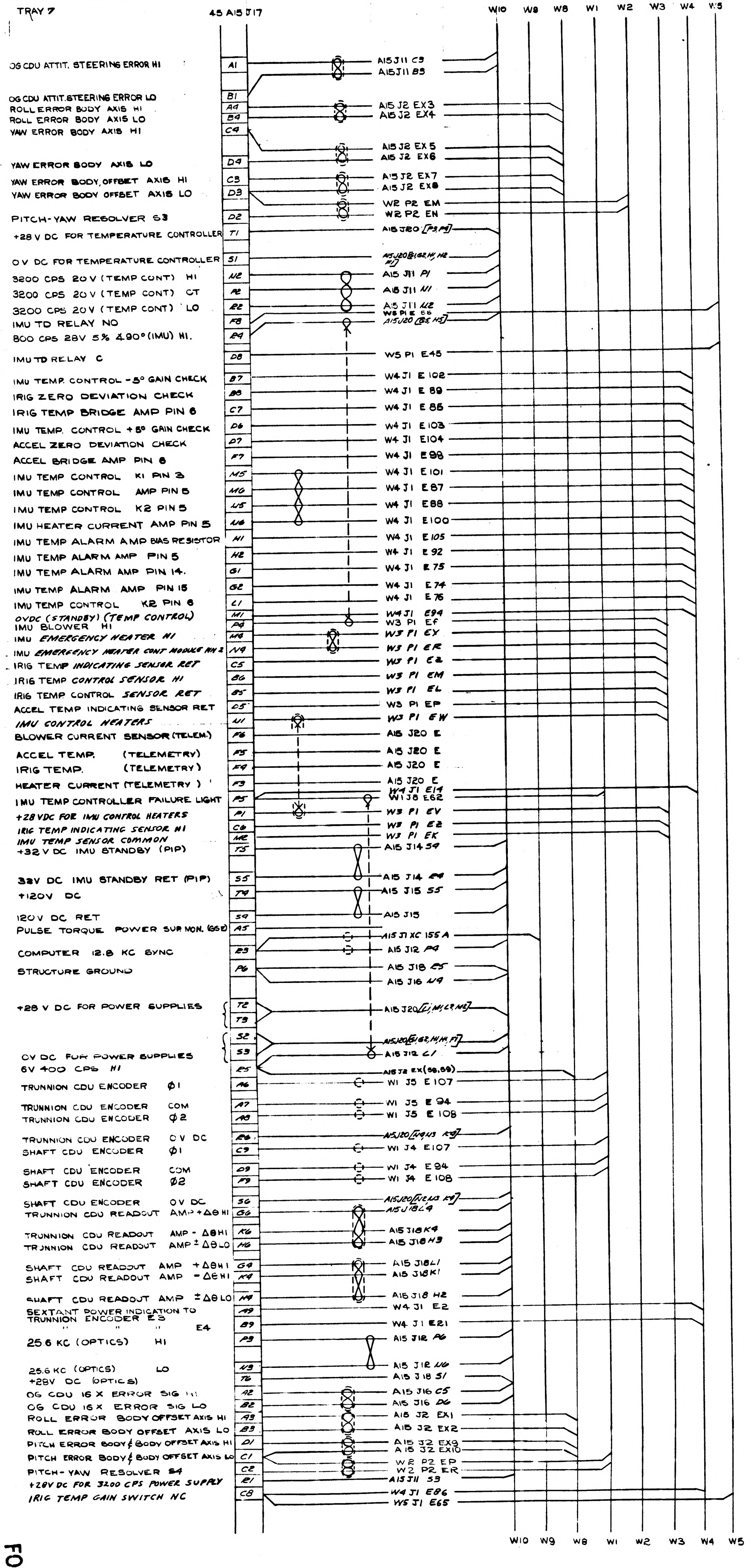

TRAY 7
45 A15 J17
W10 W9 W8 W1 W2 W3 W4 W5
OG CDU ATTIT. STEERING ERROR HI — A1
OG CDU ATTIT. STEERING ERROR LO — B1
ROLL ERROR BODY AXIS HI — A4
ROLL ERROR BODY AXIS LO — B4
YAW ERROR BODY AXIS HI — C4
YAW ERROR BODY AXIS LO — D4
YAW ERROR BODY, OFFSET AXIS HI — C3
YAW ERROR BODY OFFSET AXIS LO — D3
PITCH-YAW RESOLVER S3 — D2
+28 V DC FOR TEMPERATURE CONTROLLER — T1
O V DC FOR TEMPERATURE CONTROLLER — S1
3200 CPS 20 V (TEMP CONT) HI — N2
3200 CPS 20 V (TEMP CONT) CT — P2
3200 CPS 20 V (TEMP CONT) LO — R2
IMU TD RELAY NO — F8
800 CPS 28V 5% ∠90° (IMU) HI. — P4
IMU TD RELAY C — D8
IMU TEMP. CONTROL -5° GAIN CHECK — B7
IRIG ZERO DEVIATION CHECK — B8
IRIG TEMP BRIDGE AMP PIN 6 — C7
IMU TEMP. CONTROL +5° GAIN CHECK — D6
ACCEL ZERO DEVIATION CHECK — D7
ACCEL BRIDGE AMP PIN 6 — F7
IMU TEMP CONTROL K1 PIN 3 — M5
IMU TEMP CONTROL AMP PIN 5 — M6
IMU TEMP CONTROL K2 PIN 5 — N5
IMU HEATER CURRENT AMP PIN 5 — N6
IMU TEMP ALARM AMP BIAS RESISTOR — H1
IMU TEMP ALARM AMP PIN 5 — H2
IMU TEMP ALARM AMP PIN 14. — G1
IMU TEMP ALARM AMP PIN 15 — G2
IMU TEMP CONTROL K2 PIN 6 — L1
OVDC (STANDBY) (TEMP CONTROL) — M1
IMU BLOWER HI — P4
IMU EMERGENCY HEATER HI — M4
IMU EMERGENCY HEATER CONT MODULE PIN 2 — N4
IRIG TEMP INDICATING SENSOR RET — C5
IRIG TEMP CONTROL SENSOR HI — B6
IRIG TEMP CONTROL SENSOR RET — B5
ACCEL TEMP INDICATING SENSOR RET — D5
IMU CONTROL HEATERS — N1
BLOWER CURRENT SENSOR (TELEM.) — F6
ACCEL TEMP. (TELEMETRY) — F5
IRIG TEMP. (TELEMETRY) — F4
HEATER CURRENT (TELEMETRY) — F3
IMU TEMP CONTROLLER FAILURE LIGHT — P5
+28 VDC FOR IMU CONTROL HEATERS — P1
IRIG TEMP INDICATING SENSOR HI — C6
IMU TEMP SENSOR COMMON — M2
+32 V DC IMU STANDBY (PIP) — T5
32V DC IMU STANDBY RET (PIP) — S5
+120V DC — T4
120 V DC RET — S4
PULSE TORQUE POWER SUP MON. (GSE) — A5
COMPUTER 12.8 KC SYNC — E3
STRUCTURE GROUND — P6
+28 V DC FOR POWER SUPPLIES — T2, T3
OV DC FOR POWER SUPPLIES — S2, S3
6V 400 CPS HI — E5
TRUNNION CDU ENCODER ϕ1 — A6
TRUNNION CDU ENCODER COM — A7
TRUNNION CDU ENCODER ϕ2 — A8
TRUNNION CDU ENCODER O V DC — E6
SHAFT CDU ENCODER ϕ1 — C9
SHAFT CDU ENCODER COM — D9
SHAFT CDU ENCODER ϕ2 — F9
SHAFT CDU ENCODER O V DC — S6
TRUNNION CDU READOUT AMP +Δθ HI — G6
TRUNNION CDU READOUT AMP -Δθ HI — K6
TRUNNION CDU READOUT AMP ±Δθ LO — H6
SHAFT CDU READOUT AMP +Δθ HI — G4
SHAFT CDU READOUT AMP -Δθ HI — K4
SHAFT CDU READOUT AMP ±Δθ LO — H4
SEXTANT POWER INDICATION TO TRUNNION ENCODER E3 — A9
" " " E4 — B9
25.6 KC (OPTICS) HI — P3
25.6 KC (OPTICS) LO — N3
+28V DC (OPTICS) — T6
OG CDU 16 X ERROR SIG HI — A2
OG CDU 16 X ERROR SIG LO — B2
ROLL ERROR BODY OFFSET AXIS HI — A3
ROLL ERROR BODY OFFSET AXIS LO — B3
PITCH ERROR BODY & BODY OFFSET AXIS HI — D1
PITCH ERROR BODY & BODY OFFSET AXIS LO — C1
PITCH-YAW RESOLVER S4 — C2
+28V DC FOR 3200 CPS POWER SUPPLY — R1
IRIG TEMP GAIN SWITCH NC — C8
A15 J11 C3
A15 J11 B3
A15 J2 EX3
A15 J2 EX4
A15 J2 EX5
A15 J2 EX6
A15 J2 EX7
A15 J2 EX8
W2 P2 EM
W2 P2 EN
A15 J20 [P3,P4]
A15 J20 [E1,E2,H1,H2,F1]
A15 J11 P1
A15 J11 N1
A15 J11 N2
W5 P1 E 55
A15 J20 [G5,H5]
W5 P1 E45
W4 J1 E 102
W4 J1 E 89
W4 J1 E 85
W4 J1 E 103
W4 J1 E104
W4 J1 E98
W4 J1 E101
W4 J1 E87
W4 J1 E88
W4 J1 E100
W4 J1 E105
W4 J1 E 92
W4 J1 E 75
W4 J1 E 74
W4 J1 E 76
W4 J1 E94
W3 P1 EF
W3 P1 EY
W3 P1 ER
W3 P1 E2
W3 P1 EM
W3 P1 EL
W3 P1 EP
W3 P1 EW
A15 J20 E
A15 J20 E
A15 J20 E
A15 J20 E
W4 J1 E14
W1 J8 E62
W3 P1 EV
W3 P1 EZ
W3 P1 EK
A15 J14 S4
A15 J14 P4
A15 J15 S5
A15 J15
A15 J1 XC 155 A
A15 J12 P4
A15 J18 E5
A15 J16 N4
A15 J20 [L1,M1,L2,M2]
A15 J20 [E1,E2,H1,H2,F1]
A15 J12 L1
A15 J2 EX(58,59)
W1 J5 E 107
W1 J5 E 94
W1 J5 E 108
A15 J20 [N4,N3 K5]
W1 J4 E107
W1 J4 E 94
W1 J4 E 108
A15 J20 [N2,N3 K5]
A15 J18 L4
A15 J18 K4
A15 J18 H3
A15 J18 L1
A15 J18 K1
A15 J18 H2
W4 J1 E2
W4 J1 E21
A15 J12 P6
A15 J12 N6
A15 J18 S1
A15 J16 C5
A15 J16 D6
A15 J2 EX1
A15 J2 EX2
A15 J2 EX9
A15 J2 EX10
W2 P2 EP
W2 P2 ER
A15 J11 S3
W4 J1 E86
W5 J1 E65
W10 W9 W8 W1 W2 W3 W4 W5

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01346 DATE 22 May 63

ⒸREPLACED WITH CHANGE BY REV D

MASTER

QTY. REQD.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES

DO NOT SCALE THIS DRAWING

MATERIAL:

MIT
INSTRUMENTATION LAB
CONTRACT
NAS 9-153
DATE

APPROVED
CHECKED
DRAWN
APPROVED FOR MSC
W.J. Rhine 5-2263
BY DIRECTION MIT/IL
W.W.H. 5-22 May 63

PSA JUNCTION BOX
INTERCONECTION WIRING
TRAY 7

SCALE
UNIT WT.
CODE IDENT.

MIT
INSTRUMENTATION
LABORATORY
CAMBRIDGE, MASS.

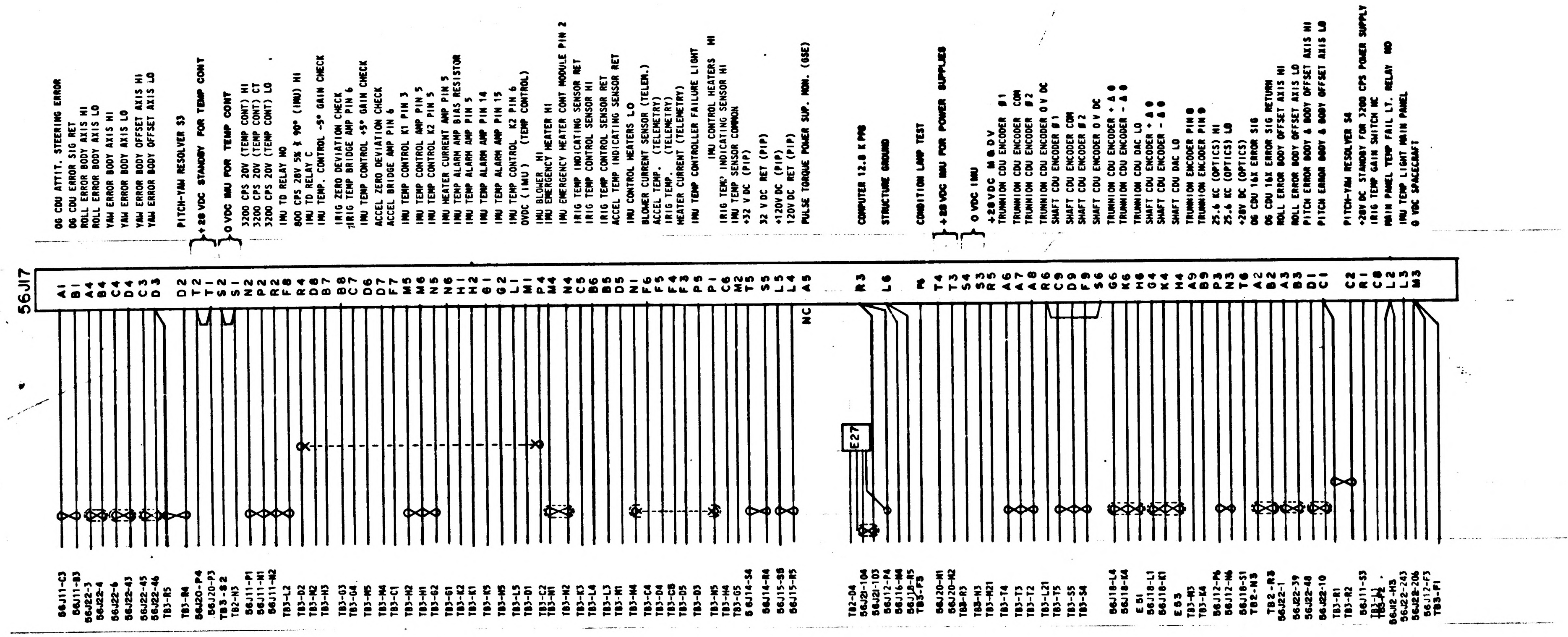
DWG. NO.

MANNED
SPACECRAFT CENTER
HOUSTON TEXAS
NASA DRAWING NO.
1010067

SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGES PER TDRR 0V0C0	1/21/63	WH



FOR INFORMATION ONLY

CLASS B RELEASE TDR No. C1346 DATE 22 May 63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150-PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

D REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN Q. Dauphin DATE 7-26-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 10-23-63
MIT APPROVAL 23 Oct 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

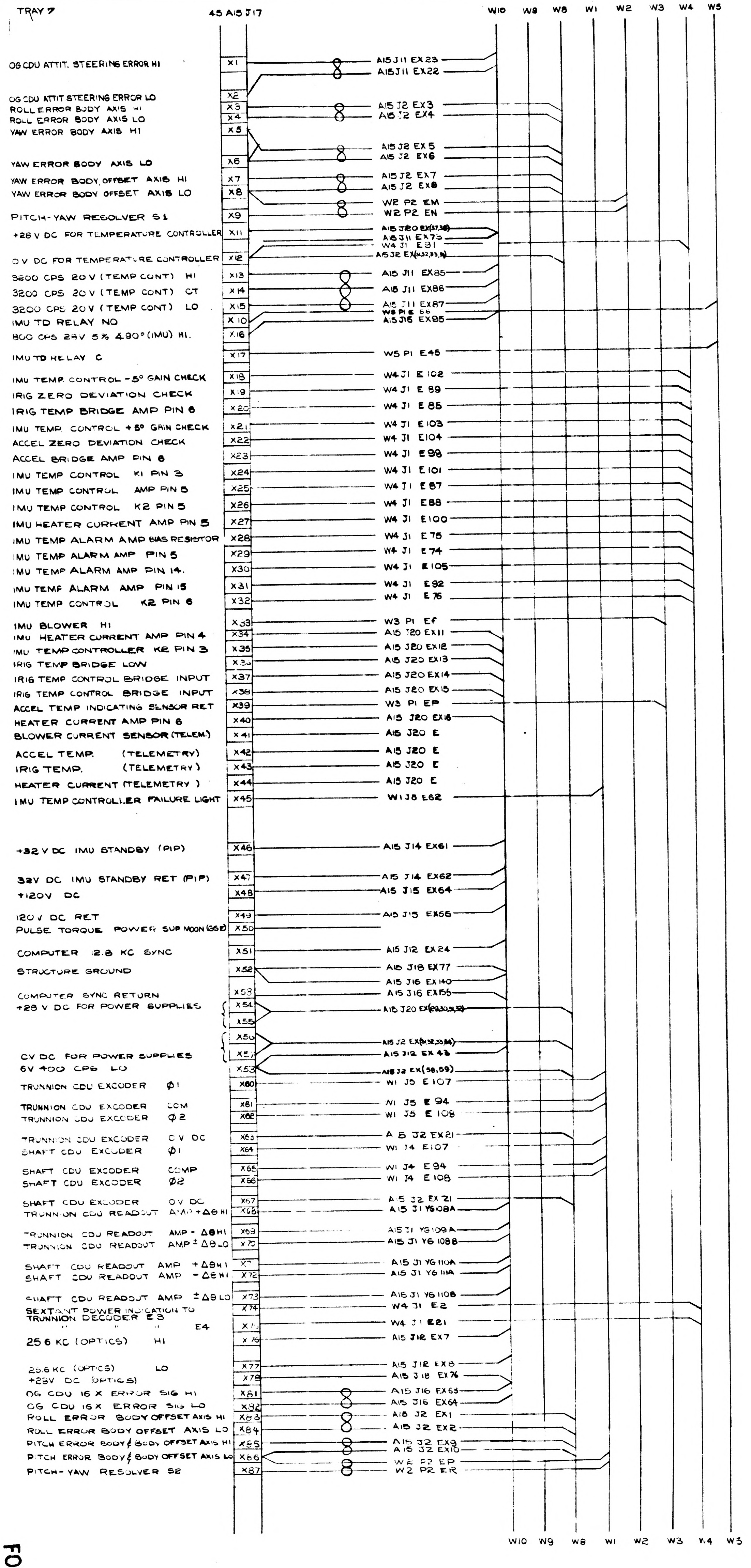
PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
TRAY 7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010067
SCALE —
WT
SHEET 1 OF 1

MASTER

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL~D-70327
2. DRAWINGS FOR REFERENCE
   IC 1523 INTERCONNECTION DIAG., APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2. FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS.


TRAY 7
45 A15 J17
W10 W9 W8 W1 W2 W3 W4 W5
OG CDU ATTIT. STEERING ERROR HI X1 A15 J11 EX 23
OG CDU ATTIT STEERING ERROR LO X2 A15 J11 EX22
ROLL ERROR BODY AXIS HI X3 A15 J2 EX3
ROLL ERROR BODY AXIS LO X4 A15 J2 EX4
YAW ERROR BODY AXIS HI X5 A15 J2 EX 5
YAW ERROR BODY AXIS LO X6 A15 J2 EX6
YAW ERROR BODY OFFSET AXIS HI X7 A15 J2 EX7
YAW ERROR BODY OFFSET AXIS LO X8 A15 J2 EX8
W2 P2 EM
PITCH-YAW RESOLVER S1 X9 W2 P2 EN
+28 V DC FOR TEMPERATURE CONTROLLER X11 A15 J20 EX(37,38)
A15 J11 EX73
W4 J1 E91
0 V DC FOR TEMPERATURE CONTROLLER X12 A15 J2 EX(31,32,33,34)
3200 CPS 20 V (TEMP CONT) HI X13 A15 J11 EX85
3200 CPS 20 V (TEMP CONT) CT X14 A15 J11 EX86
3200 CPS 20 V (TEMP CONT) LO X15 A15 J11 EX87
W5 P1 E 66
IMU TD RELAY NO X10 A15 J16 EX95
800 CPS 28V 5% 4 90° (IMU) HI. X16
IMU TD RELAY C X17 W5 P1 E45
IMU TEMP. CONTROL -5° GAIN CHECK X18 W4 J1 E 102
IRIG ZERO DEVIATION CHECK X19 W4 J1 E 89
IRIG TEMP BRIDGE AMP PIN 6 X20 W4 J1 E 85
IMU TEMP. CONTROL +5° GAIN CHECK X21 W4 J1 E 103
ACCEL ZERO DEVIATION CHECK X22 W4 J1 E104
ACCEL BRIDGE AMP PIN 6 X23 W4 J1 E 98
IMU TEMP CONTROL K1 PIN 3 X24 W4 J1 E 101
IMU TEMP CONTROL AMP PIN 5 X25 W4 J1 E 87
IMU TEMP CONTROL K2 PIN 5 X26 W4 J1 E 88
IMU HEATER CURRENT AMP PIN 5 X27 W4 J1 E 100
IMU TEMP ALARM AMP BIAS RESISTOR X28 W4 J1 E 75
IMU TEMP ALARM AMP PIN 5 X29 W4 J1 E 74
IMU TEMP ALARM AMP PIN 14. X30 W4 J1 E 105
IMU TEMP ALARM AMP PIN 15 X31 W4 J1 E 92
IMU TEMP CONTROL K2 PIN 6 X32 W4 J1 E 76
IMU BLOWER HI X33 W3 P1 EF
IMU HEATER CURRENT AMP PIN 4 X34 A15 J20 EX11
IMU TEMP CONTROLLER K2 PIN 3 X35 A15 J20 EX12
IRIG TEMP BRIDGE LOW X36 A15 J20 EX13
IRIG TEMP CONTROL BRIDGE INPUT X37 A15 J20 EX14
IRIG TEMP CONTROL BRIDGE INPUT X38 A15 J20 EX15
ACCEL TEMP INDICATING SENSOR RET X39 W3 P1 EP
HEATER CURRENT AMP PIN 6 X40 A15 J20 EX16
BLOWER CURRENT SENSOR (TELEM.) X41 A15 J20 E
ACCEL TEMP. (TELEMETRY) X42 A15 J20 E
IRIG TEMP. (TELEMETRY) X43 A15 J20 E
HEATER CURRENT (TELEMETRY) X44 A15 J20 E
IMU TEMP CONTROLLER FAILURE LIGHT X45 W1 J8 E62
+32 V DC IMU STANDBY (PIP) X46 A15 J14 EX61
32V DC IMU STANDBY RET (PIP) X47 A15 J14 EX62
+120V DC X48 A15 J15 EX64
120 V DC RET X49 A15 J15 EX65
PULSE TORQUE POWER SUP MOON (GSE) X50
COMPUTER 12.8 KC SYNC X51 A15 J12 EX 24
STRUCTURE GROUND X52 A15 J18 EX77
A15 J16 EX 140
COMPUTER SYNC RETURN X53 A15 J16 EX155
+28 V DC FOR POWER SUPPLIES X54 X55 A15 J20 EX(29,30,31,32)
X56 A15 J2 EX(51,52,53,54)
0 V DC FOR POWER SUPPLIES X57 A15 J12 EX 43
6V 400 CPS LO X53 A15 J2 EX(58,59)
TRUNNION CDU EXCODER Ø1 X60 W1 J5 E 107
TRUNNION CDU EXCODER COM X61 W1 J5 E 94
TRUNNION CDU EXCODER Ø2 X62 W1 J5 E 108
TRUNNION CDU EXCODER 0 V DC X63 A15 J2 EX21
SHAFT CDU EXCODER Ø1 X64 W1 J4 E107
SHAFT CDU EXCODER COMP X65 W1 J4 E 94
SHAFT CDU EXCODER Ø2 X66 W1 J4 E 108
SHAFT CDU EXCODER 0 V DC X67 A15 J2 EX 21
TRUNNION CDU READOUT AMP +Δθ HI X68 A15 J1 Y6 108A
TRUNNION CDU READOUT AMP -Δθ HI X69 A15 J1 Y6 109A
TRUNNION CDU READOUT AMP ±Δθ LO X70 A15 J1 Y6 108B
SHAFT CDU READOUT AMP +Δθ HI X71 A15 J1 Y6 110A
SHAFT CDU READOUT AMP -Δθ HI X72 A15 J1 Y6 111A
SHAFT CDU READOUT AMP ±Δθ LO X73 A15 J1 Y6 110B
SEXTANT POWER INDICATION TO TRUNNION DECODER E3 X74 W4 J1 E2
" " " E4 X75 W4 J1 E21
25.6 KC (OPTICS) HI X76 A15 J12 EX7
25.6 KC (OPTICS) LO X77 A15 J12 EX8
+28V DC (OPTICS) X78 A15 J18 EX76
OG CDU 16 X ERROR SIG HI X81 A15 J16 EX63
OG CDU 16 X ERROR SIG LO X82 A15 J16 EX64
ROLL ERROR BODY OFFSET AXIS HI X83 A15 J2 EX1
ROLL ERROR BODY OFFSET AXIS LO X84 A15 J2 EX2
PITCH ERROR BODY & BODY OFFSET AXIS HI X85 A15 J2 EX9
PITCH ERROR BODY & BODY OFFSET AXIS LO X86 A15 J2 EX10
W2 P2 EP
PITCH-YAW RESOLVER S8 X87 W2 P2 ER
W10 W9 W8 W1 W2 W3 W4 W5

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. C1346 DATE 22 May 63

QTY REQD	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	SPECIFICATION	MATERIAL OR NOTES	FIND NO.

LIST OF PARTS AND MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
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APPLICATION

MIT INSTRUMENTATION LAB CONTRACT NAS 9-153
APPROVED FOR MSC 5-22-63
BY DIRECTION MIT/IL
22 May 63

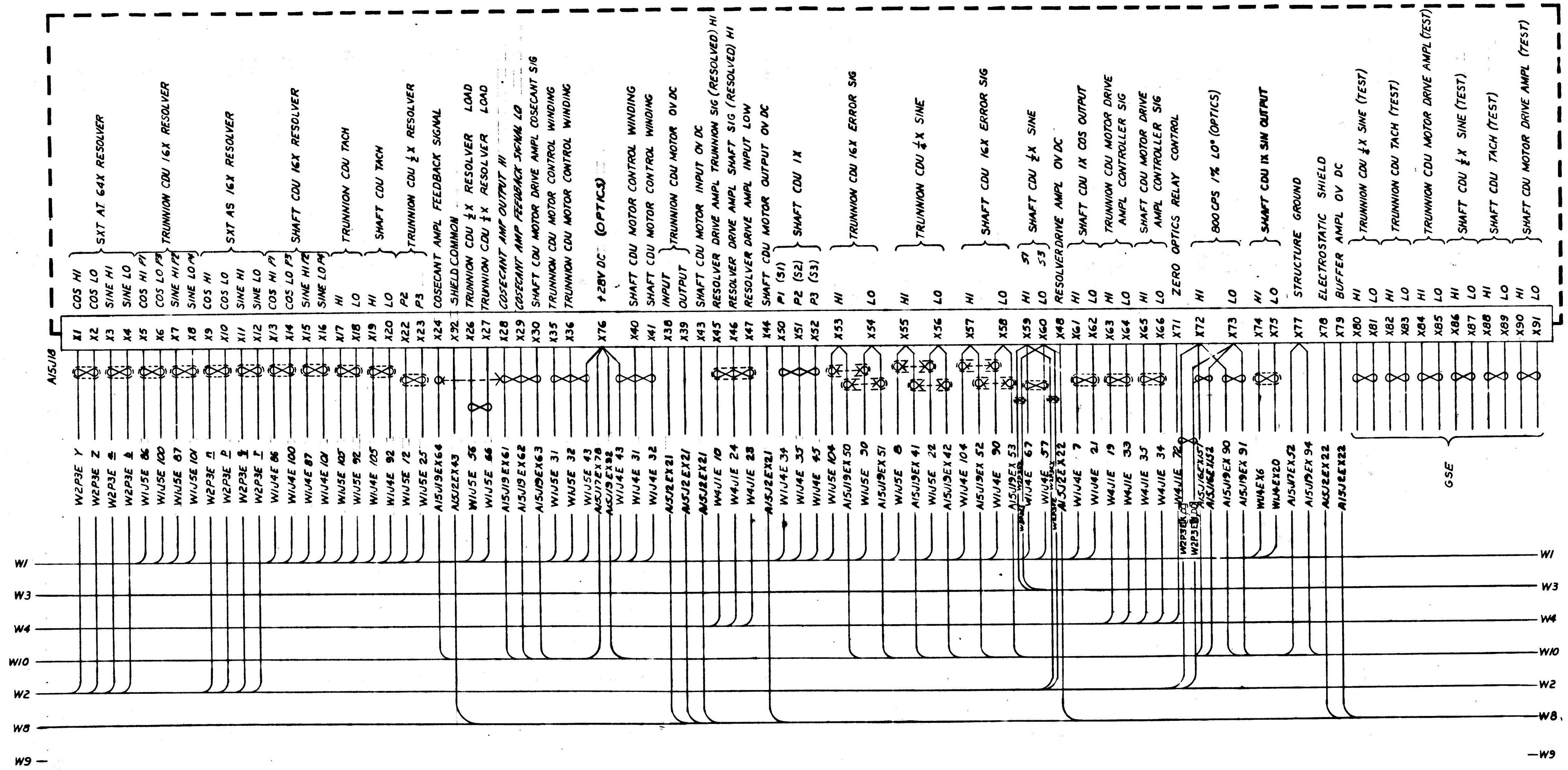
PSA JUNCTION BOX
INTERCONECTION WIRING
TRAY 7

SCALE
UNIT WT.
CODE IDENT

MIT INSTRUMENTATION LABORATORY CAMBRIDGE, MASS.
MANNED SPACECRAFT CENTER HOUSTON TEXAS
NASA DRAWING NO. [illegible]67
SHEET OF

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01991	7-2-63	17 July 63 WH

TRAY 8


A15J18
X1 COS HI
X2 COS LO
X3 SINE HI
X4 SINE LO
SXT AT 64X RESOLVER
X5 COS HI P1
X6 COS LO P3
X7 SINE HI P2
X8 SINE LO P4
TRUNNION CDU 16X RESOLVER
X9 COS HI
X10 COS LO
X11 SINE HI
X12 SINE LO
SXT AS 16X RESOLVER
X13 COS HI P1
X14 COS LO P3
X15 SINE HI P2
X16 SINE LO P4
SHAFT CDU 16X RESOLVER
X17 HI
X18 LO
TRUNNION CDU TACH
X19 HI
X20 LO
SHAFT CDU TACH
X22 P2
X23 P3
TRUNNION CDU 1/2X RESOLVER
X24 COSECANT AMPL FEEDBACK SIGNAL
X92 SHIELD COMMON
X26 TRUNNION CDU 1/2X RESOLVER LOAD
X27 TRUNNION CDU 1/4X RESOLVER LOAD
X28 COSECANT AMP OUTPUT HI
X29 COSECANT AMP FEEDBACK SIGNAL LO
X30 SHAFT CDU MOTOR DRIVE AMPL COSECANT SIG
X35 TRUNNION CDU MOTOR CONTROL WINDING
X36 TRUNNION CDU MOTOR CONTROL WINDING
X76 +28V DC (OPTICS)
X40 SHAFT CDU MOTOR CONTROL WINDING
X41 SHAFT CDU MOTOR CONTROL WINDING
X38 INPUT
X39 OUTPUT
TRUNNION CDU MOTOR 0V DC
X43 SHAFT CDU MOTOR INPUT 0V DC
X45 RESOLVER DRIVE AMPL TRUNNION SIG (RESOLVED) HI
X46 RESOLVER DRIVE AMPL SHAFT SIG (RESOLVED) HI
X47 RESOLVER DRIVE AMPL INPUT LOW
X44 SHAFT CDU MOTOR OUTPUT 0V DC
X50 P1 (S1)
X51 P2 (S2)
X52 P3 (S3)
SHAFT CDU 1X
X53 HI
X54 LO
TRUNNION CDU 16X ERROR SIG
X55 HI
X56 LO
TRUNNION CDU 1/4X SINE
X57 HI
X58 LO
SHAFT CDU 16X ERROR SIG
X59 HI S1
X60 LO S3
SHAFT CDU 1/4X SINE
X48 RESOLVER DRIVE AMPL 0V DC
X61 HI
X62 LO
SHAFT CDU 1X COS OUTPUT
X63 HI
X64 LO
TRUNNION CDU MOTOR DRIVE AMPL CONTROLLER SIG
X65 HI
X66 LO
SHAFT CDU MOTOR DRIVE AMPL CONTROLLER SIG
X71 ZERO OPTICS RELAY CONTROL
X72 HI
X73 LO
800 CPS 1% LO° (OPTICS)
X74 HI
X75 LO
SHAFT CDU 1X SIN OUTPUT
X77 STRUCTURE GROUND
X78 ELECTROSTATIC SHIELD
X79 BUFFER AMPL 0V DC
X80 HI
X81 LO
TRUNNION CDU 1/4X SINE (TEST)
X82 HI
X83 LO
TRUNNION CDU TACH (TEST)
X84 HI
X85 LO
TRUNNION CDU MOTOR DRIVE AMPL (TEST)
X86 HI
X87 LO
SHAFT CDU 1/4X SINE (TEST)
X88 HI
X89 LO
SHAFT CDU TACH (TEST)
X90 HI
X91 LO
SHAFT CDU MOTOR DRIVE AMPL (TEST)
W2P3E Y
W2P3E Z
W2P3E a
W2P3E b
W1J5E 86
W1J5E 100
W1J5E 87
W1J5E 101
W2P3E n
W2P3E p
W2P3E q
W2P3E r
W1J4E 86
W1J4E 100
W1J4E 87
W1J4E 101
W1J5E 105
W1J5E 92
W1J4E 105
W1J4E 92
W1J5E 12
W1J5E 25
A15J19EX64
A15J2EX43
W1J5E 56
W1J5E 66
A15J19EX61
A15J19EX62
A15J19EX63
W1J5E 31
W1J5E 32
W1J5E 43
A15J17EX78
A15J19EX92
W1J4E 43
W1J4E 31
W1J4E 32
A15J2EX21
A15J2EX21
A15J2EX21
W4J1E 10
W4J1E 24
W4J1E 23
A15J2EX21
W1J4E 34
W1J4E 35
W1J4E 45
W1J5E 104
A15J19EX 50
W1J5E 50
A15J19EX 51
W1J5E 8
A15J19EX 41
W1J5E 22
A15J19EX 42
W1J4E 104
A15J19EX 52
W1J4E 90
A15J19EX 53
W2P3E
W1J4E 67
W1J4E 57
W2P3E
A15J2EX22
W1J4E 7
W1J4E 21
W4J1E 19
W4J1E 33
W4J1E 35
W4J1E 34
W4J1E 72
W2P3E K
W2P3E D
A15J16EX157
A15J16EX152
A15J19EX 90
A15J19EX 91
W1J4EX6
W1J4EX20
A15J17EX52
A15J19EX 94
A15J2EX22
A15J2EX22
GSE
W1
W3
W4
W10
W2
W8
W9

NOTES:

1. INTERPRET DRAWINGS IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE: 1014523 INTERCONNECTION DRAWING, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWING LISTED IN NOTE 2 FOR LISTINGS OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X... ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 **DATE** 22 May 63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL

HEAT TREATMENT

FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN Rosa DATE 4-30-63
CHECKED R.G. Cazzina 30 Apr 63
APPROVAL
APPROVAL

NASA APPROVAL W J Rhine 5-28-63
MIT APPROVAL W Kupfer 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 8

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010068
SCALE
WT
SHEET OF

MASTER

1010068

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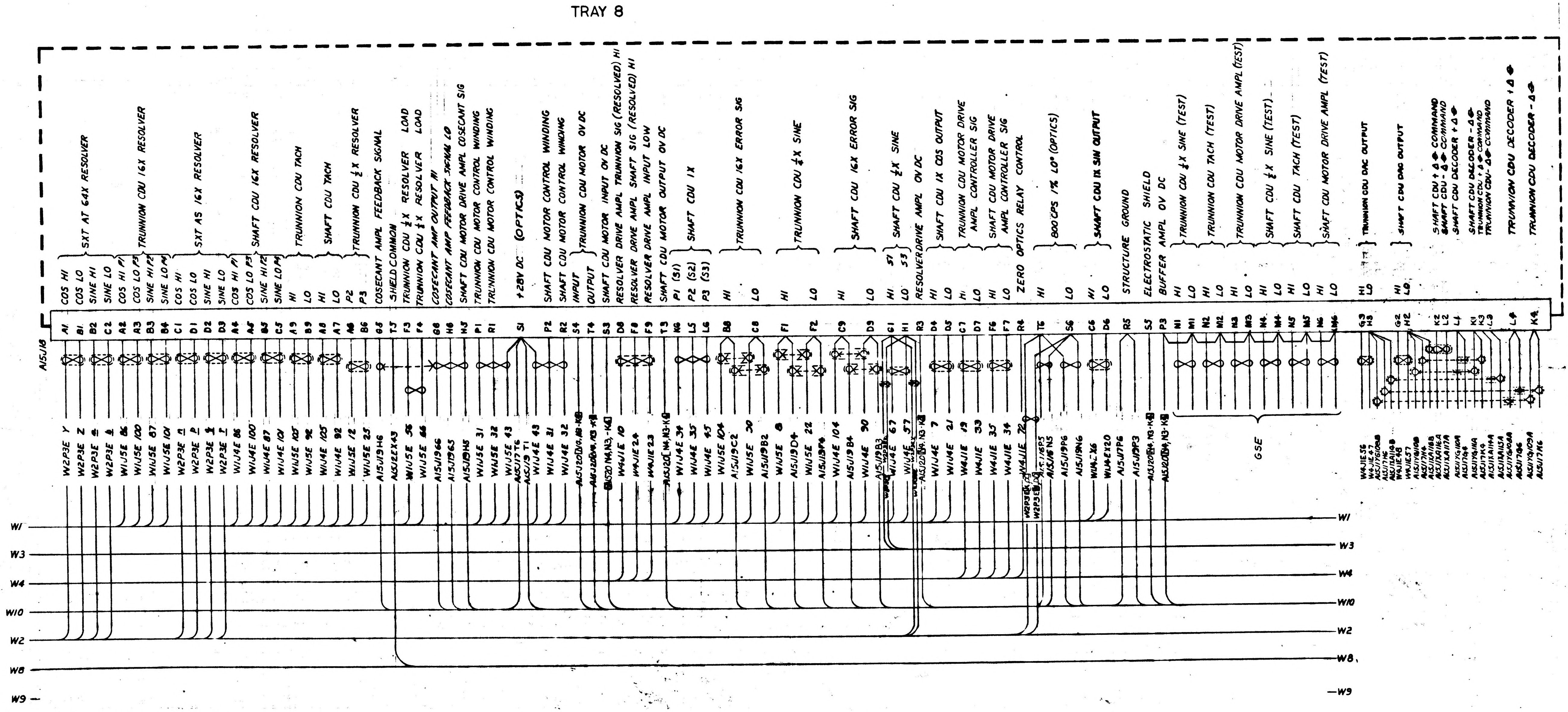
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01991	7-2-63	17 Jly 63 WK
B	REVISED PER TDRR 02498	8-7-63	WK


TRAY 8
A15J18
SXT AT 64X RESOLVER
TRUNNION CDU 16X RESOLVER
SXT AS 16X RESOLVER
SHAFT CDU 16X RESOLVER
TRUNNION CDU TACH
SHAFT CDU TACH
TRUNNION CDU ½X RESOLVER
COSECANT AMPL FEEDBACK SIGNAL
SHIELD COMMON
TRUNNION CDU ½X RESOLVER LOAD
TRUNNION CDU ½X RESOLVER LOAD
COSECANT AMP OUTPUT HI
COSECANT AMP FEEDBACK SIGNAL LO
SHAFT CDU MOTOR DRIVE AMPL COSECANT SIG
TRUNNION CDU MOTOR CONTROL WINDING
TRUNNION CDU MOTOR CONTROL WINDING
+28V DC (OPTICS)
SHAFT CDU MOTOR CONTROL WINDING
SHAFT CDU MOTOR CONTROL WINDING
TRUNNION CDU MOTOR OV DC
SHAFT CDU MOTOR INPUT OV DC
RESOLVER DRIVE AMPL TRUNNION SIG (RESOLVED) HI
RESOLVER DRIVE AMPL SHAFT SIG (RESOLVED) HI
RESOLVER DRIVE AMPL INPUT LOW
SHAFT CDU MOTOR OUTPUT OV DC
SHAFT CDU 1X
TRUNNION CDU 16X ERROR SIG
TRUNNION CDU ½X SINE
SHAFT CDU 16X ERROR SIG
SHAFT CDU ½X SINE
RESOLVER DRIVE AMPL OV DC
SHAFT CDU 1X COS OUTPUT
TRUNNION CDU MOTOR DRIVE AMPL CONTROLLER SIG
SHAFT CDU MOTOR DRIVE AMPL CONTROLLER SIG
ZERO OPTICS RELAY CONTROL
800 CPS 1% 0° (OPTICS)
SHAFT CDU 1X SIN OUTPUT
STRUCTURE GROUND
ELECTROSTATIC SHIELD
BUFFER AMPL OV DC
TRUNNION CDU ½X SINE (TEST)
TRUNNION CDU TACH (TEST)
TRUNNION CDU MOTOR DRIVE AMPL (TEST)
SHAFT CDU ½X SINE (TEST)
SHAFT CDU TACH (TEST)
SHAFT CDU MOTOR DRIVE AMPL (TEST)
TRUNNION CDU DAC OUTPUT
SHAFT CDU DAC OUTPUT
SHAFT CDU + Δθ COMMAND
SHAFT CDU - Δθ COMMAND
SHAFT CDU DECODER + Δθ
SHAFT CDU DECODER - Δθ
TRUNNION CDU + Δθ COMMAND
TRUNNION CDU - Δθ COMMAND
TRUNNION CDU DECODER + Δθ
TRUNNION CDU DECODER - Δθ
GSE
W1
W3
W4
W10
W2
W8
W9

NOTES:

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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 Aug 63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 4-30-63
CHECKED R.G. Cassius 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W J 8-22-63
MIT APPROVAL W Kupfer 22 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 8

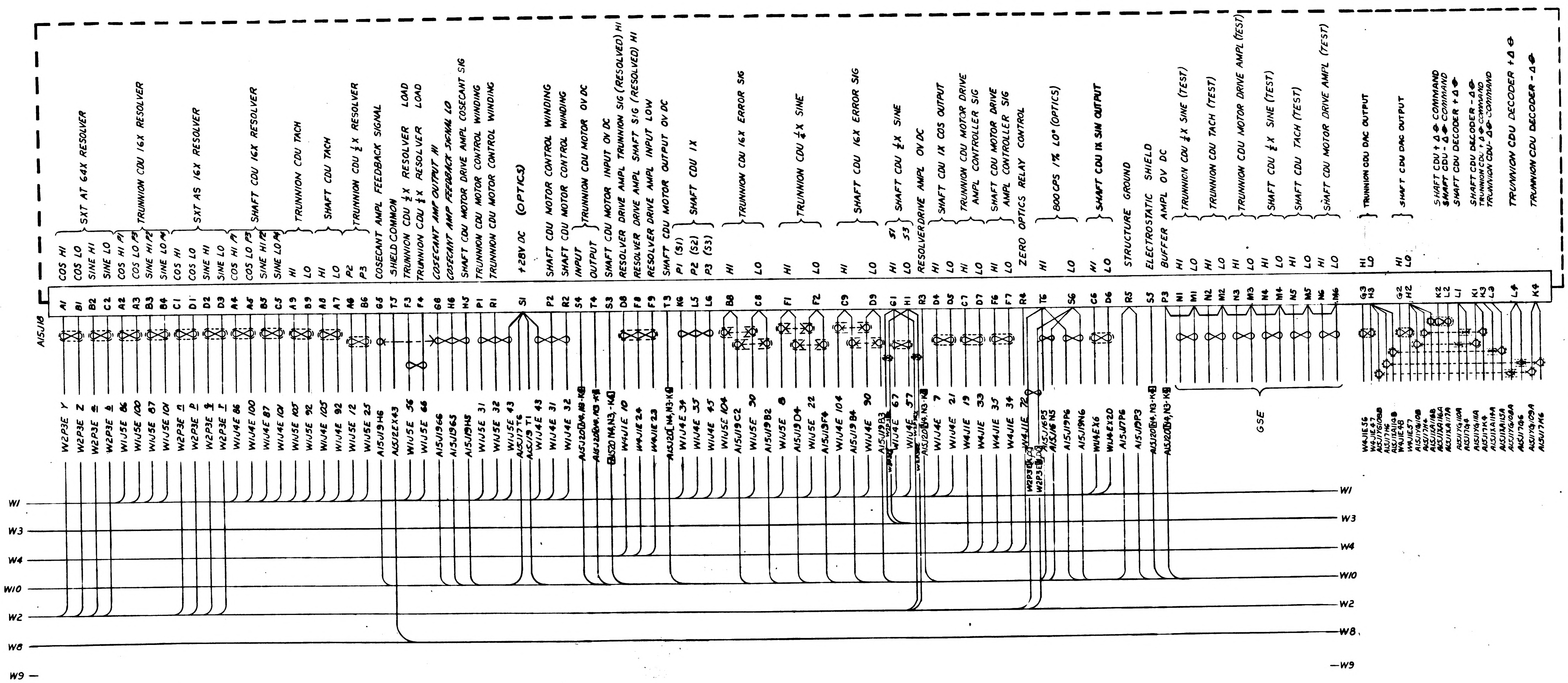
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010068
SCALE
WT
SHEET OF

1010068

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01991	7-8-63	17 July 63 WK
B	REVISED PER TDRR 02498	8-7-63	WK
C	REVISED PER TDRR 04061	30 Aug 63	WK

TRAY 8



A15J18
SXT AT 64X RESOLVER
TRUNNION CDU 16X RESOLVER
SXT AS 16X RESOLVER
SHAFT CDU 16X RESOLVER
TRUNNION CDU TACH
SHAFT CDU TACH
TRUNNION CDU ½X RESOLVER
COSECANT AMPL FEEDBACK SIGNAL
SHIELD COMMON
TRUNNION CDU ½X RESOLVER LOAD
TRUNNION CDU ½X RESOLVER LOAD
COSECANT AMP OUTPUT HI
COSECANT AMP FEEDBACK SIGNAL LO
SHAFT CDU MOTOR DRIVE AMPL COSECANT SIG
TRUNNION CDU MOTOR CONTROL WINDING
TRUNNION CDU MOTOR CONTROL WINDING
+28V DC (OPTICS)
SHAFT CDU MOTOR CONTROL WINDING
SHAFT CDU MOTOR CONTROL WINDING
INPUT
OUTPUT
TRUNNION CDU MOTOR OV DC
SHAFT CDU MOTOR INPUT OV DC
RESOLVER DRIVE AMPL TRUNNION SIG (RESOLVED) HI
RESOLVER DRIVE AMPL SHAFT SIG (RESOLVED) HI
RESOLVER DRIVE AMPL INPUT LOW
SHAFT CDU MOTOR OUTPUT OV DC
SHAFT CDU 1X
TRUNNION CDU 16X ERROR SIG
TRUNNION CDU ½X SINE
SHAFT CDU 16X ERROR SIG
SHAFT CDU ½X SINE
RESOLVER DRIVE AMPL OV DC
SHAFT CDU 1X COS OUTPUT
TRUNNION CDU MOTOR DRIVE AMPL CONTROLLER SIG
SHAFT CDU MOTOR DRIVE AMPL CONTROLLER SIG
ZERO OPTICS RELAY CONTROL
800 CPS 1% 0° (OPTICS)
SHAFT CDU 1X SIN OUTPUT
STRUCTURE GROUND
ELECTROSTATIC SHIELD
BUFFER AMPL OV DC
TRUNNION CDU ½X SINE (TEST)
TRUNNION CDU TACH (TEST)
TRUNNION CDU MOTOR DRIVE AMPL (TEST)
SHAFT CDU ½X SINE (TEST)
SHAFT CDU TACH (TEST)
SHAFT CDU MOTOR DRIVE AMPL (TEST)
TRUNNION CDU DAC OUTPUT
SHAFT CDU DAC OUTPUT
SHAFT CDU + Δθ COMMAND
SHAFT CDU - Δθ COMMAND
SHAFT CDU DECODER + Δθ
SHAFT CDU DECODER - Δθ
TRUNNION CDU + Δθ COMMAND
TRUNNION CDU - Δθ COMMAND
TRUNNION CDU DECODER + Δθ
TRUNNION CDU DECODER - Δθ
GSE
W1
W3
W4
W10
W2
W8
W9

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE: 1014523 INTERCONNECTION DRAWING, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWING LISTED IN NOTE 2 FOR LISTINGS OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWING AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED
6. PIN NUMBERS LISTED AS X... ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

Ⓒ REPLACED WITH CHANGE BY REV D

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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INSTRUMENTATION LAB
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DWG NO. CONTRACT
DRAWN DATE 4-30-63
CHECKED 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL 5-22-63
MIT APPROVAL 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 8

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010068
SCALE | WT | SHEET OF

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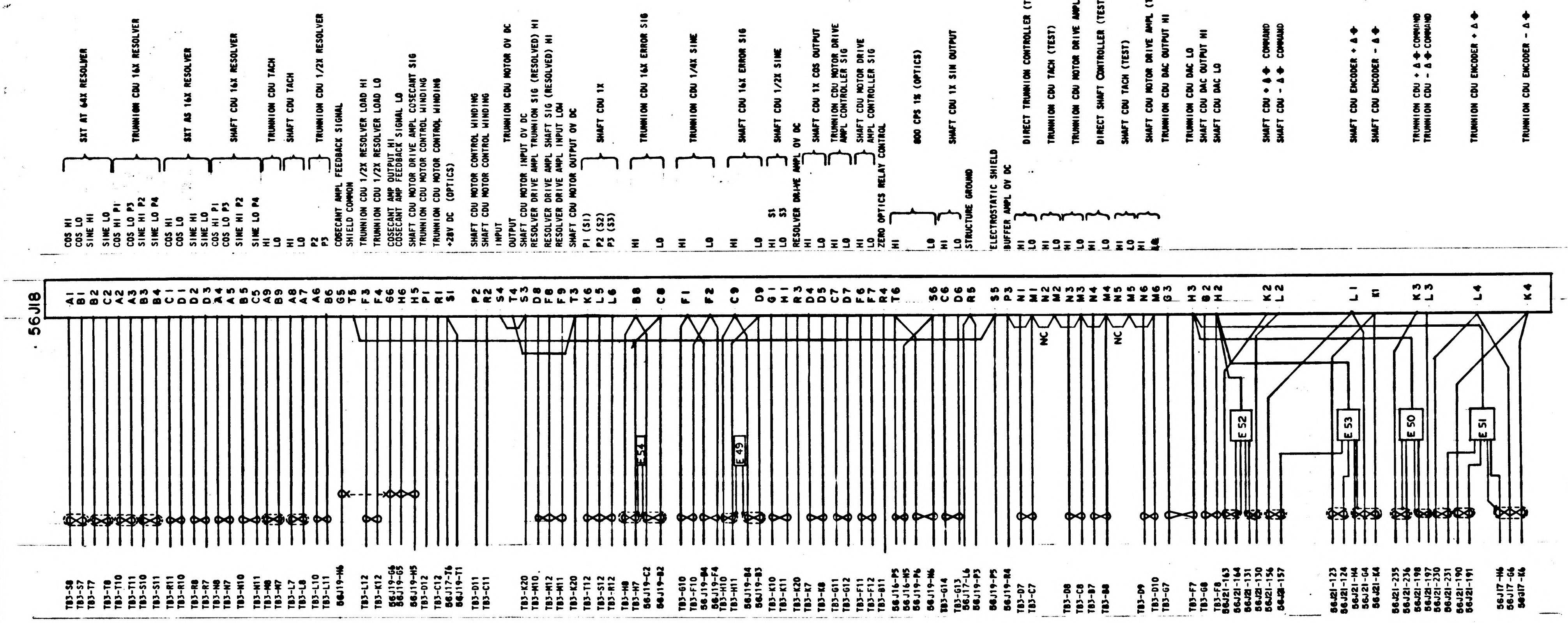
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGES PER TDRR 04061	5/28/63	WK


56J18
COS HI
COS LO
SINE HI
SINE LO
COS HI P1
COS LO P3
SINE HI P2
SINE LO P4
SXT AT 64X RESOLVER
TRUNNION CDU 16X RESOLVER
COS HI
COS LO
SINE HI
SINE LO
COS HI P1
COS LO P3
SINE HI P2
SINE LO P4
SXT AS 16X RESOLVER
SHAFT CDU 16X RESOLVER
HI
LO
TRUNNION CDU TACH
HI
LO
SHAFT CDU TACH
P2
P3
TRUNNION CDU 1/2X RESOLVER
COSECANT AMPL FEEDBACK SIGNAL
SHIELD COMMON
TRUNNION CDU 1/2X RESOLVER LOAD HI
TRUNNION CDU 1/2X RESOLVER LOAD LO
COSECANT AMP OUTPUT HI
COSECANT AMP FEEDBACK SIGNAL LO
SHAFT CDU MOTOR DRIVE AMPL COSECANT SIG
TRUNNION CDU MOTOR CONTROL WINDING
TRUNNION CDU MOTOR CONTROL WINDING
+28V DC (OPTICS)
SHAFT CDU MOTOR CONTROL WINDING
SHAFT CDU MOTOR CONTROL WINDING
INPUT
OUTPUT
TRUNNION CDU MOTOR OV DC
SHAFT CDU MOTOR INPUT OV DC
RESOLVER DRIVE AMPL TRUNNION SIG (RESOLVED) HI
RESOLVER DRIVE AMPL SHAFT SIG (RESOLVED) HI
RESOLVER DRIVE AMPL INPUT LOW
SHAFT CDU MOTOR OUTPUT OV DC
P1 (S1)
P2 (S2)
P3 (S3)
SHAFT CDU 1X
HI
LO
TRUNNION CDU 16X ERROR SIG
HI
LO
TRUNNION CDU 1/4X SINE
HI
LO
SHAFT CDU 16X ERROR SIG
HI S1
LO S3
SHAFT CDU 1/2X SINE
RESOLVER DRIVE AMPL OV DC
HI
LO
SHAFT CDU 1X COS OUTPUT
HI
LO
TRUNNION CDU MOTOR DRIVE AMPL CONTROLLER SIG
HI
LO
SHAFT CDU MOTOR DRIVE AMPL CONTROLLER SIG
ZERO OPTICS RELAY CONTROL
HI
LO
800 CPS 1% (OPTICS)
HI
LO
SHAFT CDU 1X SIN OUTPUT
STRUCTURE GROUND
ELECTROSTATIC SHIELD
BUFFER AMPL OV DC
HI
LO
DIRECT TRUNNION CONTROLLER (TEST)
HI
LO
TRUNNION CDU TACH (TEST)
HI
LO
TRUNNION CDU MOTOR DRIVE AMPL. (TEST)
HI
LO
DIRECT SHAFT CONTROLLER (TEST)
HI
LO
SHAFT CDU TACH (TEST)
HI
LO
SHAFT CDU MOTOR DRIVE AMPL (TEST)
TRUNNION CDU DAC OUTPUT HI
TRUNNION CDU DAC LO
SHAFT CDU DAC OUTPUT HI
SHAFT CDU DAC LO
SHAFT CDU + Δ ϕ COMMAND
SHAFT CDU - Δ ϕ COMMAND
SHAFT CDU ENCODER + Δ ϕ
SHAFT CDU ENCODER - Δ ϕ
TRUNNION CDU + Δ ϕ COMMAND
TRUNNION CDU - Δ ϕ COMMAND
TRUNNION CDU ENCODER + Δ ϕ
TRUNNION CDU ENCODER - Δ ϕ
A1 B1 B2 C2 A2 A3 B3 B4 C1 D1 D2 D3 A4 A5 B5 C5 A9 B9 A8 A7 A6 B6 G5 T5 F3 F4 G6 H6 H5 P1 R1 S1
P2 R2 S4 T4 S3 D8 F8 F9 T3 K6 L5 L6 B8 C8 F1 F2 C9 D9 G1 H1 R3 D4 D5 C7 D7 F6 F7 R4 T6
S6 C6 D6 R5 S5 P3 N1 M1 N2 M2 N3 M3 N4 M4 N5 M5 N6 M6 G3 H3 B2 H2 K2 L2 L1 K1 K3 L3 L4 K4
NC
NC
E54
E49
E52
E53
E50
E51

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CLASS B RELEASE TDR No. 01346 DATE 22 May 63

Ⓓ REPLACES REV C WITH CHANGE

1010068 D

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 – INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 – PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINITION OF PIN NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

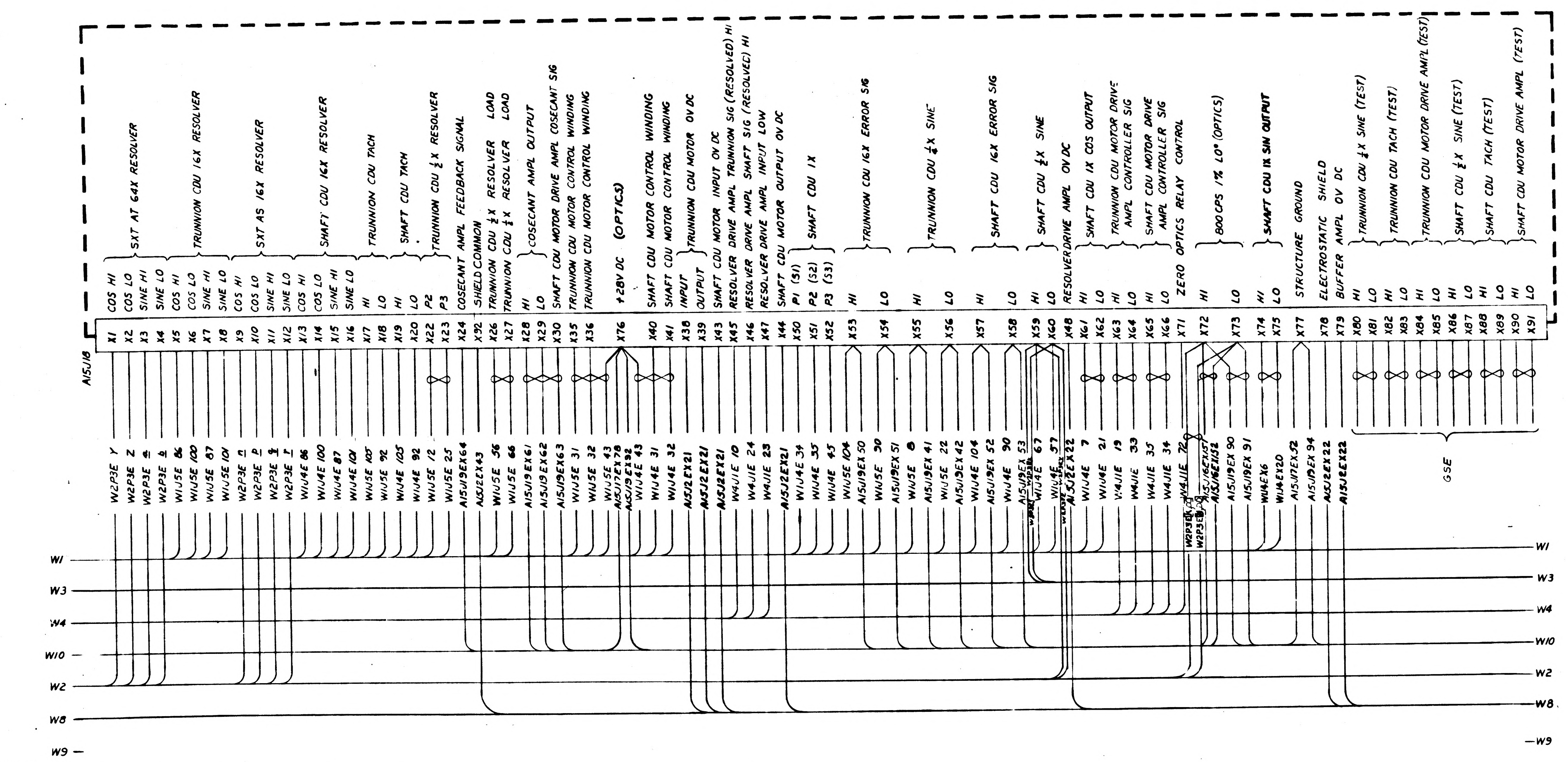
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN J. Burgess DATE 5/24/63
CHECKED J. Green
APPROVAL J. Green
APPROVAL
NASA APPROVAL 6/25/63
MIT APPROVAL 23 Apr 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
TRAY 8

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010068
SCALE — WT SHEET 1 OF 1

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL



TRAY 8
A15J18
X1 COS HI
X2 COS LO
X3 SINE HI
X4 SINE LO
SXT AT 64X RESOLVER
X5 COS HI
X6 COS LO
X7 SINE HI
X8 SINE LO
TRUNNION CDU 16X RESOLVER
X9 COS HI
X10 COS LO
X11 SINE HI
X12 SINE LO
SXT AS 16X RESOLVER
X13 COS HI
X14 COS LO
X15 SINE HI
X16 SINE LO
SHAFT CDU 16X RESOLVER
X17 HI
X18 LO
TRUNNION CDU TACH
X19 HI
X20 LO
SHAFT CDU TACH
X22 P2
X23 P3
TRUNNION CDU ½X RESOLVER
X24 COSECANT AMPL FEEDBACK SIGNAL
X92 SHIELD COMMON
X26 TRUNNION CDU ½X RESOLVER LOAD
X27 TRUNNION CDU ½X RESOLVER LOAD
X28 HI
X29 LO
COSECANT AMPL OUTPUT
X30 SHAFT CDU MOTOR DRIVE AMPL COSECANT SIG
X35 TRUNNION CDU MOTOR CONTROL WINDING
X36 TRUNNION CDU MOTOR CONTROL WINDING
X76 +28V DC (OPTICS)
X40 SHAFT CDU MOTOR CONTROL WINDING
X41 SHAFT CDU MOTOR CONTROL WINDING
X38 INPUT
X39 OUTPUT
TRUNNION CDU MOTOR OV DC
X43 SHAFT CDU MOTOR INPUT OV DC
X45 RESOLVER DRIVE AMPL TRUNNION SIG (RESOLVED) HI
X46 RESOLVER DRIVE AMPL SHAFT SIG (RESOLVED) HI
X47 RESOLVER DRIVE AMPL INPUT LOW
X44 SHAFT CDU MOTOR OUTPUT OV DC
X50 P1 (51)
X51 P2 (52)
X52 P3 (53)
SHAFT CDU 1X
X53 HI
X54 LO
TRUNNION CDU 16X ERROR SIG
X55 HI
X56 LO
TRUNNION CDU ½X SINE
X57 HI
X58 LO
SHAFT CDU 16X ERROR SIG
X59 HI
X60 LO
SHAFT CDU ½X SINE
X48 RESOLVER DRIVE AMPL OV DC
X61 HI
X62 LO
SHAFT CDU 1X COS OUTPUT
X63 HI
X64 LO
TRUNNION CDU MOTOR DRIVE AMPL CONTROLLER SIG
X65 HI
X66 LO
SHAFT CDU MOTOR DRIVE AMPL CONTROLLER SIG
X71 ZERO OPTICS RELAY CONTROL
X72 HI
X73 LO
800 CPS 1% LO° (OPTICS)
X74 HI
X75 LO
SHAFT CDU 1X SIN OUTPUT
X77 STRUCTURE GROUND
X78 ELECTROSTATIC SHIELD
X79 BUFFER AMPL OV DC
X80 HI
X81 LO
TRUNNION CDU ½X SINE (TEST)
X82 HI
X83 LO
TRUNNION CDU TACH (TEST)
X84 HI
X85 LO
TRUNNION CDU MOTOR DRIVE AMPL (TEST)
X86 HI
X87 LO
SHAFT CDU ½X SINE (TEST)
X88 HI
X89 LO
SHAFT CDU TACH (TEST)
X90 HI
X91 LO
SHAFT CDU MOTOR DRIVE AMPL (TEST)
GSE
W2P3E Y
W2P3E Z
W2P3E a
W2P3E b
W1U5E 86
W1U5E 100
W1U5E 87
W1U5E 101
W2P3E n
W2P3E p
W2P3E r
W2P3E t
W1U4E 86
W1U4E 100
W1U4E 87
W1U4E 101
W1U5E 105
W1U5E 92
W1U4E 105
W1U4E 92
W1U5E 12
W1U5E 25
A15J19EX64
A15J2EX43
W1U5E 56
W1U5E 66
A15J19EX61
A15J19EX62
A15J19EX63
W1U5E 31
W1U5E 32
W1U5E 43
A15J17EX78
W1U4E 43
W1U4E 31
W1U4E 32
A15J2EX21
W4J1E 10
W4J1E 24
W4J1E 23
W1U4E 34
W1U4E 35
W1U4E 45
W1U4E 104
A15J19EX50
W1U5E 30
W1U5E 35
W1U5E 104
A15J19EX51
W1U5E 41
W1U5E 22
A15J19EX42
W1U4E 104
A15J19EX52
W1U4E 90
A15J19EX53
W1U4E 67
W1U4E 57
A15J2EX22
W1U4E 7
W1U4E 21
W4J1E 19
W4J1E 33
W4J1E 35
W4J1E 34
W4J1E 72
W2P3E
A15J19EX90
A15J19EX91
W1U4EX2D
A15J17EX32
A15J19EX94
A15J2EX22
W1
W3
W4
W10
W2
W8
W9

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE: 1014523 INTERCONNECTION DRAWING, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 PSA FAMILY TREE
3. REFER TO DRAWING LISTED IN NOTE 2 FOR LISTINGS OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (4S) WHEN NEEDED
6. PIN NUMBERS LISTED AS X... ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 **DATE** 22 May 63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

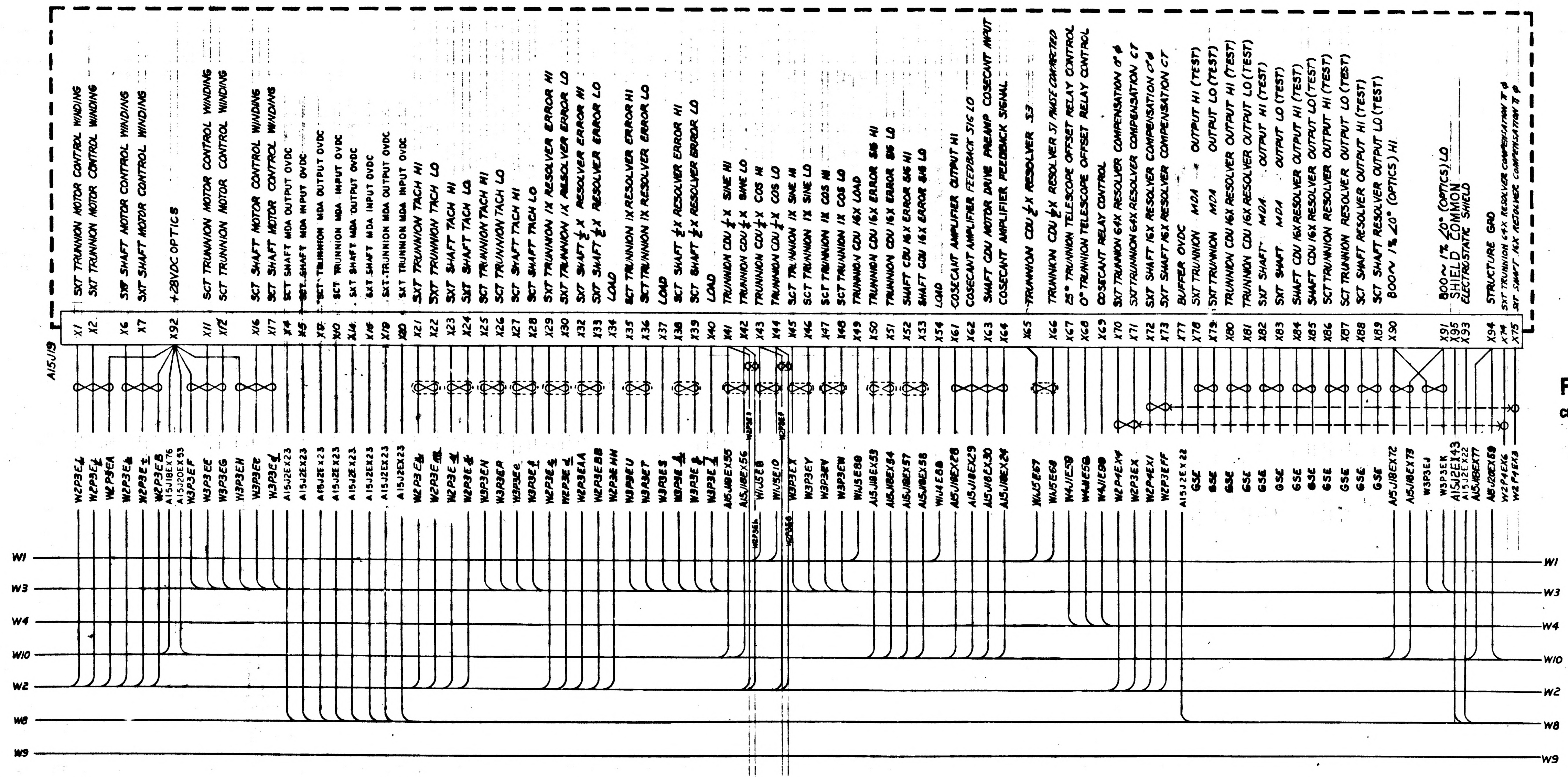
NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE MASS DWG NO CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		MATERIAL	DRAWN DATE 4-30-63 CHECKED APPROVAL APPROVAL	PSA JUNCTION BOY INTERCONNECTING WIRING TRAY 8
		HEAT TREATMENT	NASA APPROVAL 5-22-63	CODE IDENT NO. SIZE E NASA DRAWING NO. 1010068
		FINAL FINISH	MIT APPROVAL 22 May 62	SCALE WT SHEET OF

1010068

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01392	7-2-63	

TRAY 9



A15J19
X1 SXT TRUNNION MOTOR CONTROL WINDING
X2 SXT TRUNNION MOTOR CONTROL WINDING
X6 SXT SHAFT MOTOR CONTROL WINDING
X7 SXT SHAFT MOTOR CONTROL WINDING
X92 +28VDC OPTICS
X11 SCT TRUNNION MOTOR CONTROL WINDING
X12 SCT TRUNNION MOTOR CONTROL WINDING
X16 SCT SHAFT MOTOR CONTROL WINDING
X17 SCT SHAFT MOTOR CONTROL WINDING
X4 SCT SHAFT MDA OUTPUT OVDC
X5 SCT SHAFT MDA INPUT OVDC
X8 SCT TRUNNION MDA OUTPUT OVDC
X10 SCT TRUNNION MDA INPUT OVDC
X14 SXT SHAFT MDA OUTPUT OVDC
X15 SXT SHAFT MDA INPUT OVDC
X19 SXT TRUNNION MDA OUTPUT OVDC
X20 SXT TRUNNION MDA INPUT OVDC
X21 SXT TRUNNION TACH HI
X22 SXT TRUNNION TACH LO
X23 SXT SHAFT TACH HI
X24 SXT SHAFT TACH LO
X25 SCT TRUNNION TACH HI
X26 SCT TRUNNION TACH LO
X27 SCT SHAFT TACH HI
X28 SCT SHAFT TACH LO
X29 SXT TRUNNION 1X RESOLVER ERROR HI
X30 SXT TRUNNION 1X RESOLVER ERROR LO
X32 SXT SHAFT ½X RESOLVER ERROR HI
X33 SXT SHAFT ½X RESOLVER ERROR LO
X34 LOAD
X35 SCT TRUNNION 1X RESOLVER ERROR HI
X36 SCT TRUNNION 1X RESOLVER ERROR LO
X37 LOAD
X38 SCT SHAFT ½X RESOLVER ERROR HI
X39 SCT SHAFT ½X RESOLVER ERROR LO
X40 LOAD
X41 TRUNNION CDU ½X SINE HI
X42 TRUNNION CDU ½X SINE LO
X43 TRUNNION CDU ½X COS HI
X44 TRUNNION CDU ½X COS LO
X45 SCT TRUNNION 1X SINE HI
X46 SCT TRUNNION 1X SINE LO
X47 SCT TRUNNION 1X COS HI
X48 SCT TRUNNION 1X COS LO
X49 TRUNNION CDU 16X LOAD
X50 TRUNNION CDU 16X ERROR SIG HI
X51 TRUNNION CDU 16X ERROR SIG LO
X52 SHAFT CDU 16X ERROR SIG HI
X53 SHAFT CDU 16X ERROR SIG LO
X54 LOAD
X61 COSECANT AMPLIFIER OUTPUT HI
X62 COSECANT AMPLIFIER FEEDBACK SIG LO
X63 SHAFT CDU MOTOR DRIVE PREAMP COSECANT INPUT
X64 COSECANT AMPLIFIER FEEDBACK SIGNAL
X65 TRUNNION CDU ½X RESOLVER S3
X66 TRUNNION CDU ½X RESOLVER S1 PHASE CORRECTED
X67 25° TRUNNION TELESCOPE OFFSET RELAY CONTROL
X68 0° TRUNNION TELESCOPE OFFSET RELAY CONTROL
X69 COSECANT RELAY CONTROL
X70 SXT TRUNNION 64X RESOLVER COMPENSATION 0° φ
X71 SXT TRUNNION 64X RESOLVER COMPENSATION CT
X72 SXT SHAFT 16X RESOLVER COMPENSATION 0° φ
X73 SXT SHAFT 16X RESOLVER COMPENSATION CT
X77 BUFFER OVDC
X78 SXT TRUNNION MDA OUTPUT HI (TEST)
X79 SXT TRUNNION MDA OUTPUT LO (TEST)
X80 TRUNNION CDU 16X RESOLVER OUTPUT HI (TEST)
X81 TRUNNION CDU 16X RESOLVER OUTPUT LO (TEST)
X82 SXT SHAFT MDA OUTPUT HI (TEST)
X83 SXT SHAFT MDA OUTPUT LO (TEST)
X84 SHAFT CDU 16X RESOLVER OUTPUT HI (TEST)
X85 SHAFT CDU 16X RESOLVER OUTPUT LO (TEST)
X86 SCT TRUNNION RESOLVER OUTPUT HI (TEST)
X87 SCT TRUNNION RESOLVER OUTPUT LO (TEST)
X88 SCT SHAFT RESOLVER OUTPUT HI (TEST)
X89 SCT SHAFT RESOLVER OUTPUT LO (TEST)
X90 800~ 1% ∠0° (OPTICS) HI
X91 800~ 1% ∠0° (OPTICS) LO
X95 SHIELD COMMON
X93 ELECTROSTATIC SHIELD
X94 STRUCTURE GRD
X74 SXT TRUNNION 64X RESOLVER COMPENSATION π φ
X75 SXT SHAFT 16X RESOLVER COMPENSATION π φ
W2P3EL
W2P3EK
W2P3EA
W2P3Eb
W2P3Et
W2P3EB
A15J18EX76
A15J20EX53
W3P3EF
W3P3EE
W3P3EG
W3P3EH
W3P3Ee
W3P3Ed
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W2P3EBB
W2P3EHH
W3P3EU
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W3P3EV
W3P3EW
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A15J18EX58
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A15J18EX28
A15J18EX29
A15J18EX30
A15J18EX24
W1J5E67
W1J5E68
W4J1E58
W4J1E58
W4J1E98
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W2P3EX
W2P4EX1
W2P3EFF
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A15J2EX43
A15J2EX22
A15J18EX77
A15J20EX59
W2P4EX6
W2P4EX3
W2P3E1
W2P3EL
W2P3E4
W2P3E6
W1
W3
W4
W10
W2
W8
W9

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523- INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150- PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS
6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN DATE 29 Apr 63
CHECKED 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL 5-22-63
MIT APPROVAL 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

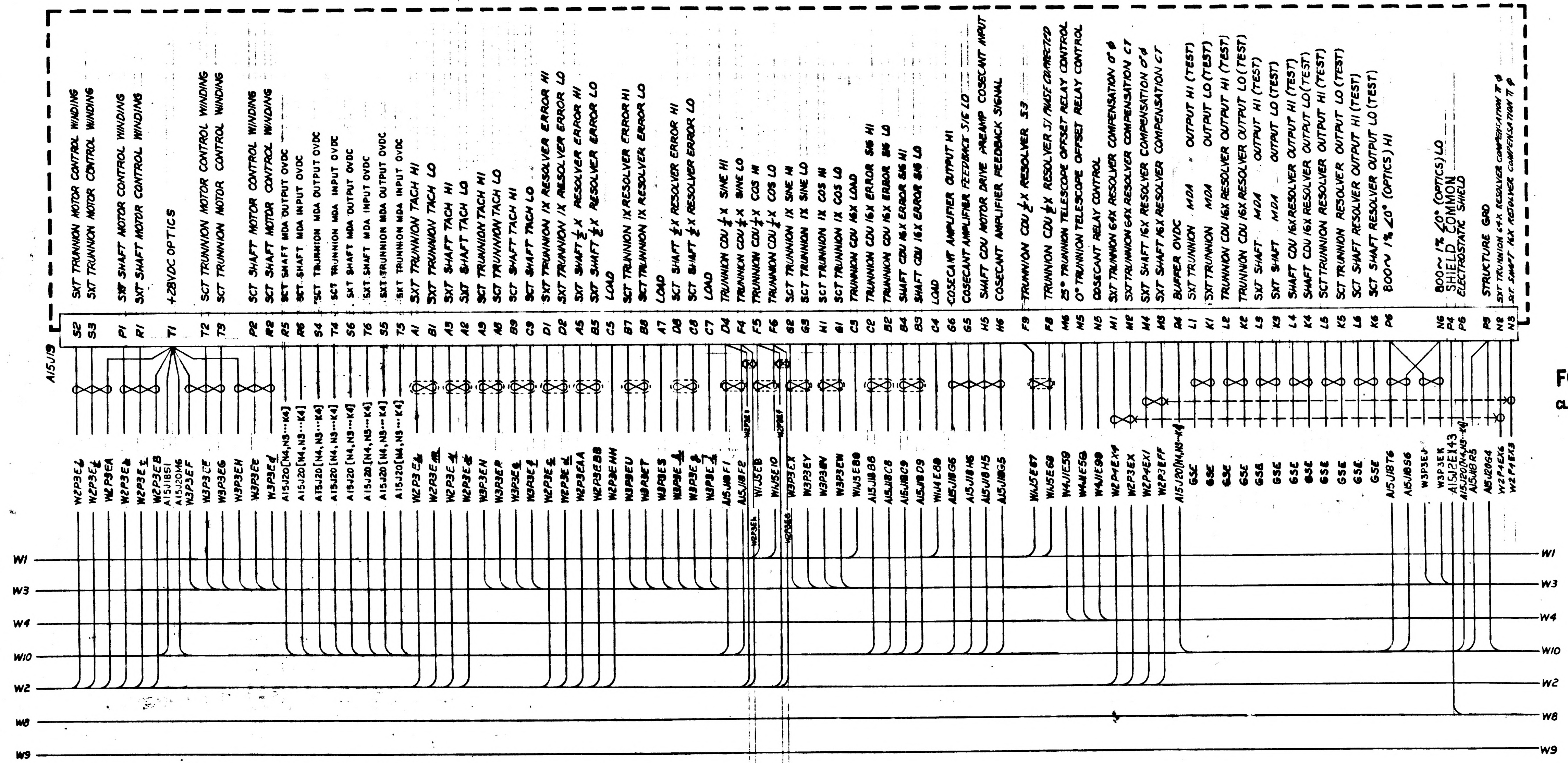
PSA JUNCTION BOX INTERCONNECTING WIRING TRAY 9

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010069
SCALE
WT
SHEET OF

1010069

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01992	7-2-63	
B	REVISED PER TDRR 02499	6 AUG 63	WK

TRAY 9


A15J19
S2 SXT TRUNNION MOTOR CONTROL WINDING
S3 SXT TRUNNION MOTOR CONTROL WINDING
P1 SXT SHAFT MOTOR CONTROL WINDING
R1 SXT SHAFT MOTOR CONTROL WINDING
T1 +28VDC OPTICS
T2 SCT TRUNNION MOTOR CONTROL WINDING
T3 SCT TRUNNION MOTOR CONTROL WINDING
P2 SCT SHAFT MOTOR CONTROL WINDING
R2 SCT SHAFT MOTOR CONTROL WINDING
R5 SCT SHAFT MDA OUTPUT OVDC
R6 SCT SHAFT MDA INPUT OVDC
S4 SCT TRUNNION MDA OUTPUT OVDC
T4 SCT TRUNNION MDA INPUT OVDC
S6 SXT SHAFT MDA OUTPUT OVDC
T6 SXT SHAFT MDA INPUT OVDC
S5 SXT TRUNNION MDA OUTPUT OVDC
T5 SXT TRUNNION MDA INPUT OVDC
A1 SXT TRUNNION TACH HI
B1 SXT TRUNNION TACH LO
A3 SXT SHAFT TACH HI
A2 SXT SHAFT TACH LO
A9 SCT TRUNNION TACH HI
A8 SCT TRUNNION TACH LO
B9 SCT SHAFT TACH HI
C9 SCT SHAFT TACH LO
D1 SXT TRUNNION 1X RESOLVER ERROR HI
D2 SXT TRUNNION 1X RESOLVER ERROR LO
A5 SXT SHAFT ½X RESOLVER ERROR HI
B5 SXT SHAFT ½X RESOLVER ERROR LO
C5 LOAD
B7 SCT TRUNNION 1X RESOLVER ERROR HI
B8 SCT TRUNNION 1X RESOLVER ERROR LO
A7 LOAD
D8 SCT SHAFT ½X RESOLVER ERROR HI
C8 SCT SHAFT ½X RESOLVER ERROR LO
C7 LOAD
D4 TRUNNION CDU ½X SINE HI
F4 TRUNNION CDU ½X SINE LO
F5 TRUNNION CDU ½X COS HI
F6 TRUNNION CDU ½X COS LO
G2 SCT TRUNNION 1X SINE HI
G3 SCT TRUNNION 1X SINE LO
H1 SCT TRUNNION 1X COS HI
G1 SCT TRUNNION 1X COS LO
C3 TRUNNION CDU 16X LOAD
C2 TRUNNION CDU 16X ERROR SIG HI
B2 TRUNNION CDU 16X ERROR SIG LO
B4 SHAFT CDU 16X ERROR SIG HI
B3 SHAFT CDU 16X ERROR SIG LO
C4 LOAD
G6 COSECANT AMPLIFIER OUTPUT HI
G5 COSECANT AMPLIFIER FEEDBACK SIG LO
H5 SHAFT CDU MOTOR DRIVE PREAMP COSECANT INPUT
H6 COSECANT AMPLIFIER FEEDBACK SIGNAL
F9 TRUNNION CDU ½X RESOLVER S3
F8 TRUNNION CDU ½X RESOLVER S1 PHASE CORRECTED
M6 25° TRUNNION TELESCOPE OFFSET RELAY CONTROL
M5 0° TRUNNION TELESCOPE OFFSET RELAY CONTROL
N5 COSECANT RELAY CONTROL
M1 SXT TRUNNION 64X RESOLVER COMPENSATION 0°φ
M2 SXT TRUNNION 64X RESOLVER COMPENSATION CT
M4 SXT SHAFT 16X RESOLVER COMPENSATION 0°φ
M3 SXT SHAFT 16X RESOLVER COMPENSATION CT
R4 BUFFER OVDC
L1 SXT TRUNNION MDA OUTPUT HI (TEST)
K1 SXT TRUNNION MDA OUTPUT LO (TEST)
L2 TRUNNION CDU 16X RESOLVER OUTPUT HI (TEST)
K2 TRUNNION CDU 16X RESOLVER OUTPUT LO (TEST)
L3 SXT SHAFT MDA OUTPUT HI (TEST)
K3 SXT SHAFT MDA OUTPUT LO (TEST)
L4 SHAFT CDU 16X RESOLVER OUTPUT HI (TEST)
K4 SHAFT CDU 16X RESOLVER OUTPUT LO (TEST)
L5 SCT TRUNNION RESOLVER OUTPUT HI (TEST)
K5 SCT TRUNNION RESOLVER OUTPUT LO (TEST)
L6 SCT SHAFT RESOLVER OUTPUT HI (TEST)
K6 SCT SHAFT RESOLVER OUTPUT LO (TEST)
P6 800~ 1% ∠0° (OPTICS) HI
N6 800~ 1% ∠0° (OPTICS) LO
P4 SHIELD COMMON
P5 ELECTROSTATIC SHIELD
P3 STRUCTURE GRD
N2 SXT TRUNNION 64X RESOLVER COMPENSATION π φ
N3 SXT SHAFT 16X RESOLVER COMPENSATION π φ
W2P3EA
W2P3EB
A15J18S1
A15J20M6
W3P3EF
W3P3EG
W3P3EH
A15J20[N4,N3···K4]
W2P3EAA
W2P3EBB
W2P3EHH
W3P3EU
W3P3ET
W3P3ES
A15J18F1
A15J18F2
W1J5EB
W1J5E10
W2P3EB
W2P3EF
W2P3Eh
W2P3EG
W3P3EX
W3P3EY
W3P3EV
W3P3EW
W1J5E80
A15J18B8
A15J18C8
A15J18C9
A15J18D9
W1J4E80
A15J18G6
A15J18H6
A15J18H5
A15J18G5
W1J5E67
W1J5E68
W4J1E59
W4J1E58
W4J1E90
W2P4EX4
W2P3EX
W2P4EX1
W2P3EFF
GSE
A15J18T6
A15J18S6
W3P3EJ
W3P3EK
A15J2EX43
A15J18R5
A15J20G4
W2P4EX6
W2P4EX3
W1
W3
W4
W10
W2
W8
W9

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
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   1010150- PSA FAMILY TREE
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MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN J. F. McConnell DATE 29 APR 63
CHECKED 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL 5-22-63
MIT APPROVAL 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 9

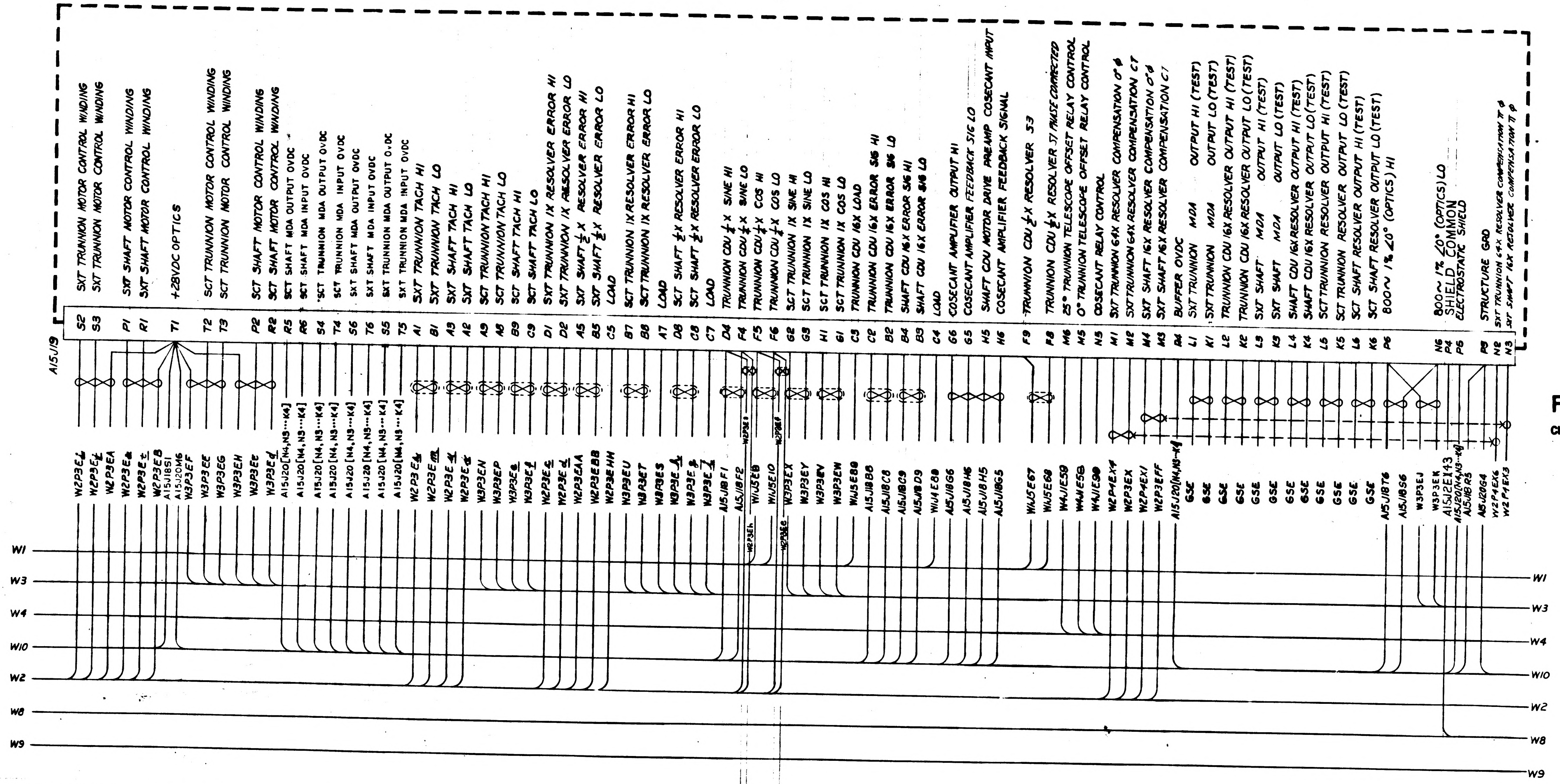
CODE IDENT NO. SIZE E NASA DRAWING NO. 1010069
SCALE WT SHEET OF

1010069 B

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED TDRR 01992	7-2-63	
B	REVISED PER TDRR 02499	6 AUG 63	WR.
C	REVISED PER TDRR 04062		WR.

TRAY 9



A15J19
S2 SXT TRUNNION MOTOR CONTROL WINDING
S3 SXT TRUNNION MOTOR CONTROL WINDING
P1 SXT SHAFT MOTOR CONTROL WINDING
R1 SXT SHAFT MOTOR CONTROL WINDING
T1 +28VDC OPTICS
T2 SCT TRUNNION MOTOR CONTROL WINDING
T3 SCT TRUNNION MOTOR CONTROL WINDING
P2 SCT SHAFT MOTOR CONTROL WINDING
R2 SCT SHAFT MOTOR CONTROL WINDING
R5 SCT SHAFT MDA OUTPUT OVDC
R6 SCT SHAFT MDA INPUT OVDC
S4 SCT TRUNNION MDA OUTPUT OVDC
T4 SCT TRUNNION MDA INPUT OVDC
S6 SXT SHAFT MDA OUTPUT OVDC
T6 SXT SHAFT MDA INPUT OVDC
S5 SXT TRUNNION MDA OUTPUT O.VDC
T5 SXT TRUNNION MDA INPUT OVDC
A1 SXT TRUNNION TACH HI
B1 SXT TRUNNION TACH LO
A3 SXT SHAFT TACH HI
A2 SXT SHAFT TACH LO
A9 SCT TRUNNION TACH HI
A8 SCT TRUNNION TACH LO
B9 SCT SHAFT TACH HI
C9 SCT SHAFT TACH LO
D1 SXT TRUNNION 1X RESOLVER ERROR HI
D2 SXT TRUNNION 1X RESOLVER ERROR LO
A5 SXT SHAFT ½X RESOLVER ERROR HI
B5 SXT SHAFT ½X RESOLVER ERROR LO
C5 LOAD
B7 SCT TRUNNION 1X RESOLVER ERROR HI
B8 SCT TRUNNION 1X RESOLVER ERROR LO
A7 LOAD
D8 SCT SHAFT ½X RESOLVER ERROR HI
C8 SCT SHAFT ½X RESOLVER ERROR LO
C7 LOAD
D4 TRUNNION CDU ½X SINE HI
F4 TRUNNION CDU ½X SINE LO
F5 TRUNNION CDU ½X COS HI
F6 TRUNNION CDU ½X COS LO
G2 SCT TRUNNION 1X SINE HI
G3 SCT TRUNNION 1X SINE LO
H1 SCT TRUNNION 1X COS HI
G1 SCT TRUNNION 1X COS LO
C3 TRUNNION CDU 16X LOAD
C2 TRUNNION CDU 16X ERROR SIG HI
B2 TRUNNION CDU 16X ERROR SIG LO
B4 SHAFT CDU 16X ERROR SIG HI
B3 SHAFT CDU 16X ERROR SIG LO
C4 LOAD
G6 COSECANT AMPLIFIER OUTPUT HI
G5 COSECANT AMPLIFIER FEEDBACK SIG LO
H5 SHAFT CDU MOTOR DRIVE PREAMP COSECANT INPUT
H6 COSECANT AMPLIFIER FEEDBACK SIGNAL
F9 TRUNNION CDU ½X RESOLVER S3
F8 TRUNNION CDU ½X RESOLVER S1 PHASE CORRECTED
M6 25° TRUNNION TELESCOPE OFFSET RELAY CONTROL
M5 0° TRUNNION TELESCOPE OFFSET RELAY CONTROL
N5 COSECANT RELAY CONTROL
M1 SXT TRUNNION 64X RESOLVER COMPENSATION C φ
M2 SXT TRUNNION 64X RESOLVER COMPENSATION CT
M4 SXT SHAFT 16X RESOLVER COMPENSATION C φ
M3 SXT SHAFT 16X RESOLVER COMPENSATION CT
R4 BUFFER OVDC
L1 SXT TRUNNION MDA OUTPUT HI (TEST)
K1 SXT TRUNNION MDA OUTPUT LO (TEST)
L2 TRUNNION CDU 16X RESOLVER OUTPUT HI (TEST)
K2 TRUNNION CDU 16X RESOLVER OUTPUT LO (TEST)
L3 SXT SHAFT MDA OUTPUT HI (TEST)
K3 SXT SHAFT MDA OUTPUT LO (TEST)
L4 SHAFT CDU 16X RESOLVER OUTPUT HI (TEST)
K4 SHAFT CDU 16X RESOLVER OUTPUT LO (TEST)
L5 SCT TRUNNION RESOLVER OUTPUT HI (TEST)
K5 SCT TRUNNION RESOLVER OUTPUT LO (TEST)
L6 SCT SHAFT RESOLVER OUTPUT HI (TEST)
K6 SCT SHAFT RESOLVER OUTPUT LO (TEST)
P6 800~ 1% ∠0° (OPTICS) HI
N6 800~ 1% ∠0° (OPTICS) LO
P4 SHIELD COMMON
P5 ELECTROSTATIC SHIELD
P3 STRUCTURE GRD
N2 SXT TRUNNION 64X RESOLVER COMPENSATION T φ
N3 SXT SHAFT 16X RESOLVER COMPENSATION T φ
W2P3EL
W2P3EK
W2P3EA
W2P3Ea
W2P3Et
W2P3EB
A15J18S1
A15J20M6
W3P3EF
W3P3EE
W3P3EG
W3P3EH
W3P3Ee
W3P3Ed
A15J20[N4,N3···K4]
A15J20[N4,N3···K4]
A15J20[N4,N3···K4]
A15J20[N4,N3···K4]
A15J20[N4,N3···K4]
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W2P3Ek
W2P3Em
W2P3En
W2P3Er
W3P3EN
W3P3EP
W3P3Eb
W3P3Ef
W2P3Eg
W2P3Ed
W2P3EAA
W2P3EBB
W2P3EHH
W3P3EU
W3P3ET
W3P3ES
W3P3Eh
W3P3Eg
W3P3Ej
A15J18F1
A15J18F2
W2P3Ei
W1J5EB
W2P3Eh
W1J5E10
W2P3Ef
W2P3Ee
W3P3EX
W3P3EY
W3P3EV
W3P3EW
W1J5E80
A15J18B8
A15J18C8
A15J18C9
A15J18D9
W1J4E80
A15J18G6
A15J18H6
A15J18H5
A15J18G5
W1J5E67
W1J5E68
W4J1E59
W4J1E58
W4J1E90
W2P4EX4
W2P3EX
W2P4EX1
W2P3EFF
A15J20[N4,N3···K4]
GSE
GSE
GSE
GSE
GSE
GSE
GSE
GSE
GSE
GSE
GSE
GSE
A15J18T6
A15J18S6
W3P3EJ
W3P3EK
A15J2EX43
A15J20[N4,N3···K4]
A15J18R5
A15J20G4
W2P4EX6
W2P4EX3
W1
W3
W4
W10
W2
W8
W9

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523- INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
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3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR

6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

Ⓒ REPLACED WITH CHANGE BY REV D

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT
DRAWN J. McDowell DATE 29 APR 63
CHECKED J. G. Cappone 30 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W. J. [illegible] 5-22-63
MIT APPROVAL W. Kupfer 22 May 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

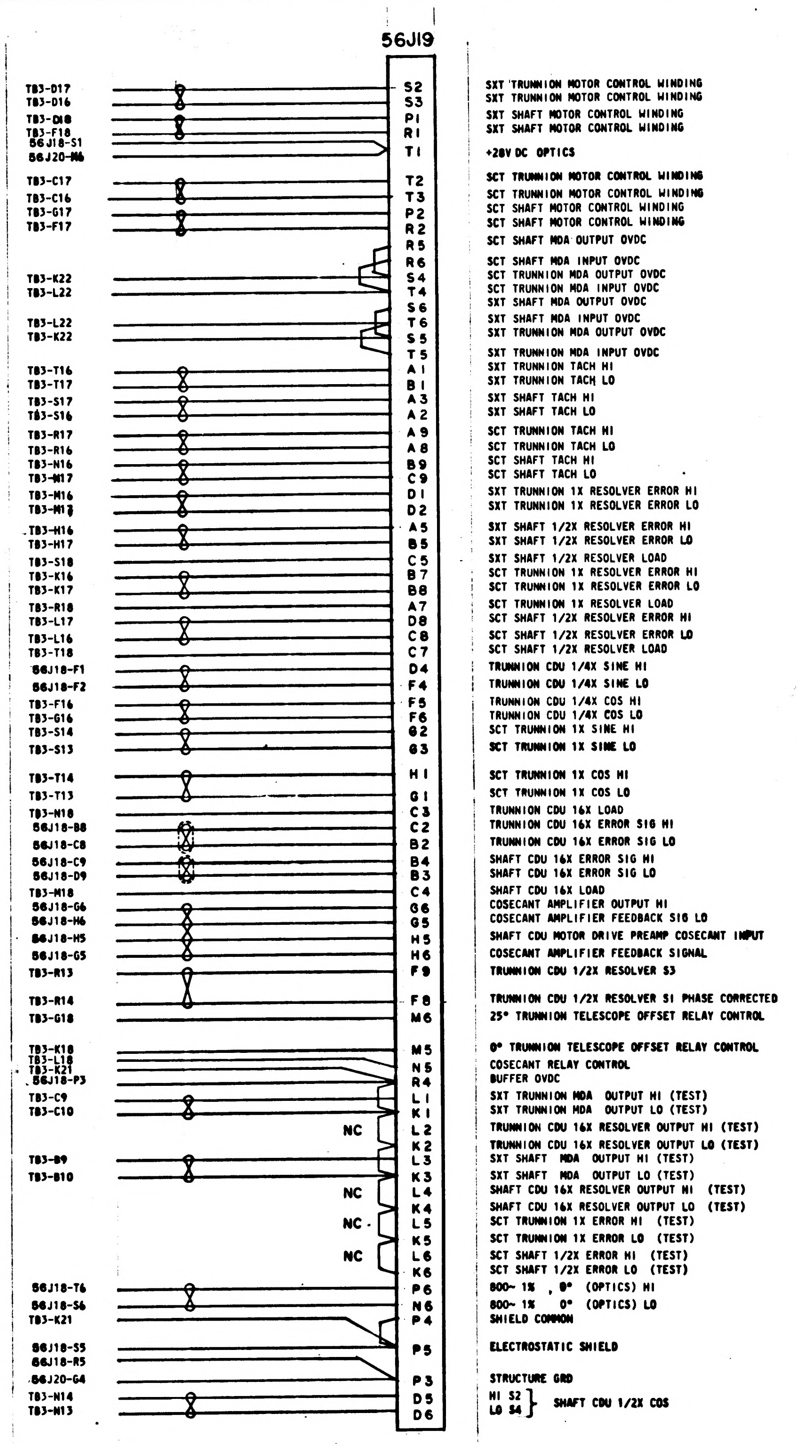
PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 9

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010069
SCALE WT SHEET OF

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
D	REPLACES REV C WITH CHANGES PER ovo6c		LW


56J19
TB3-D17 — S2 — SXT TRUNNION MOTOR CONTROL WINDING
TB3-D16 — S3 — SXT TRUNNION MOTOR CONTROL WINDING
TB3-D18 — P1 — SXT SHAFT MOTOR CONTROL WINDING
TB3-F18 — R1 — SXT SHAFT MOTOR CONTROL WINDING
56J18-S1
56J20-M6 — T1 — +28V DC OPTICS
TB3-C17 — T2 — SCT TRUNNION MOTOR CONTROL WINDING
TB3-C16 — T3 — SCT TRUNNION MOTOR CONTROL WINDING
TB3-G17 — P2 — SCT SHAFT MOTOR CONTROL WINDING
TB3-F17 — R2 — SCT SHAFT MOTOR CONTROL WINDING
R5 — SCT SHAFT MDA OUTPUT OVDC
R6 — SCT SHAFT MDA INPUT OVDC
TB3-K22 — S4 — SCT TRUNNION MDA OUTPUT OVDC
TB3-L22 — T4 — SCT TRUNNION MDA INPUT OVDC
S6 — SXT SHAFT MDA OUTPUT OVDC
TB3-L22 — T6 — SXT SHAFT MDA INPUT OVDC
TB3-K22 — S5 — SXT TRUNNION MDA OUTPUT OVDC
T5 — SXT TRUNNION MDA INPUT OVDC
TB3-T16 — A1 — SXT TRUNNION TACH HI
TB3-T17 — B1 — SXT TRUNNION TACH LO
TB3-S17 — A3 — SXT SHAFT TACH HI
TB3-S16 — A2 — SXT SHAFT TACH LO
TB3-R17 — A9 — SCT TRUNNION TACH HI
TB3-R16 — A8 — SCT TRUNNION TACH LO
TB3-N16 — B9 — SCT SHAFT TACH HI
TB3-M17 — C9 — SCT SHAFT TACH LO
TB3-M16 — D1 — SXT TRUNNION 1X RESOLVER ERROR HI
TB3-M17 — D2 — SXT TRUNNION 1X RESOLVER ERROR LO
TB3-H16 — A5 — SXT SHAFT 1/2X RESOLVER ERROR HI
TB3-H17 — B5 — SXT SHAFT 1/2X RESOLVER ERROR LO
TB3-S18 — C5 — SXT SHAFT 1/2X RESOLVER LOAD
TB3-K16 — B7 — SCT TRUNNION 1X RESOLVER ERROR HI
TB3-K17 — B8 — SCT TRUNNION 1X RESOLVER ERROR LO
TB3-R18 — A7 — SCT TRUNNION 1X RESOLVER LOAD
TB3-L17 — D8 — SCT SHAFT 1/2X RESOLVER ERROR HI
TB3-L16 — C8 — SCT SHAFT 1/2X RESOLVER ERROR LO
TB3-T18 — C7 — SCT SHAFT 1/2X RESOLVER LOAD
56J18-F1 — D4 — TRUNNION CDU 1/4X SINE HI
56J18-F2 — F4 — TRUNNION CDU 1/4X SINE LO
TB3-F16 — F5 — TRUNNION CDU 1/4X COS HI
TB3-G16 — F6 — TRUNNION CDU 1/4X COS LO
TB3-S14 — G2 — SCT TRUNNION 1X SINE HI
TB3-S13 — G3 — SCT TRUNNION 1X SINE LO
TB3-T14 — H1 — SCT TRUNNION 1X COS HI
TB3-T13 — G1 — SCT TRUNNION 1X COS LO
TB3-N18 — C3 — TRUNNION CDU 16X LOAD
56J18-B8 — C2 — TRUNNION CDU 16X ERROR SIG HI
56J18-C8 — B2 — TRUNNION CDU 16X ERROR SIG LO
56J18-C9 — B4 — SHAFT CDU 16X ERROR SIG HI
56J18-D9 — B3 — SHAFT CDU 16X ERROR SIG LO
TB3-M18 — C4 — SHAFT CDU 16X LOAD
56J18-G6 — G6 — COSECANT AMPLIFIER OUTPUT HI
56J18-H6 — G5 — COSECANT AMPLIFIER FEEDBACK SIG LO
56J18-H5 — H5 — SHAFT CDU MOTOR DRIVE PREAMP COSECANT INPUT
56J18-G5 — H6 — COSECANT AMPLIFIER FEEDBACK SIGNAL
TB3-R13 — F9 — TRUNNION CDU 1/2X RESOLVER S3
TB3-R14 — F8 — TRUNNION CDU 1/2X RESOLVER S1 PHASE CORRECTED
TB3-G18 — M6 — 25° TRUNNION TELESCOPE OFFSET RELAY CONTROL
TB3-K18 — M5 — 0° TRUNNION TELESCOPE OFFSET RELAY CONTROL
TB3-L18
TB3-K21 — N5 — COSECANT RELAY CONTROL
56J18-P3 — R4 — BUFFER OVDC
TB3-C9 — L1 — SXT TRUNNION MDA OUTPUT HI (TEST)
TB3-C10 — K1 — SXT TRUNNION MDA OUTPUT LO (TEST)
NC — L2 — TRUNNION CDU 16X RESOLVER OUTPUT HI (TEST)
K2 — TRUNNION CDU 16X RESOLVER OUTPUT LO (TEST)
TB3-B9 — L3 — SXT SHAFT MDA OUTPUT HI (TEST)
TB3-B10 — K3 — SXT SHAFT MDA OUTPUT LO (TEST)
NC — L4 — SHAFT CDU 16X RESOLVER OUTPUT HI (TEST)
K4 — SHAFT CDU 16X RESOLVER OUTPUT LO (TEST)
NC — L5 — SCT TRUNNION 1X ERROR HI (TEST)
K5 — SCT TRUNNION 1X ERROR LO (TEST)
NC — L6 — SCT SHAFT 1/2X ERROR HI (TEST)
K6 — SCT SHAFT 1/2X ERROR LO (TEST)
56J18-T6 — P6 — 800~ 1% , 0° (OPTICS) HI
56J18-S6 — N6 — 800~ 1% 0° (OPTICS) LO
TB3-K21 — P4 — SHIELD COMMON
56J18-S5 — P5 — ELECTROSTATIC SHIELD
56J18-R5
56J20-G4 — P3 — STRUCTURE GRD
TB3-N14 — D5
TB3-N13 — D6
HI S2 } SHAFT CDU 1/2X COS
LO S4

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
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FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01346 DATE 22 May 63

D REPLACES REV C WITH CHANGES

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

NEXT ASSY	USED ON

APPLICATION

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

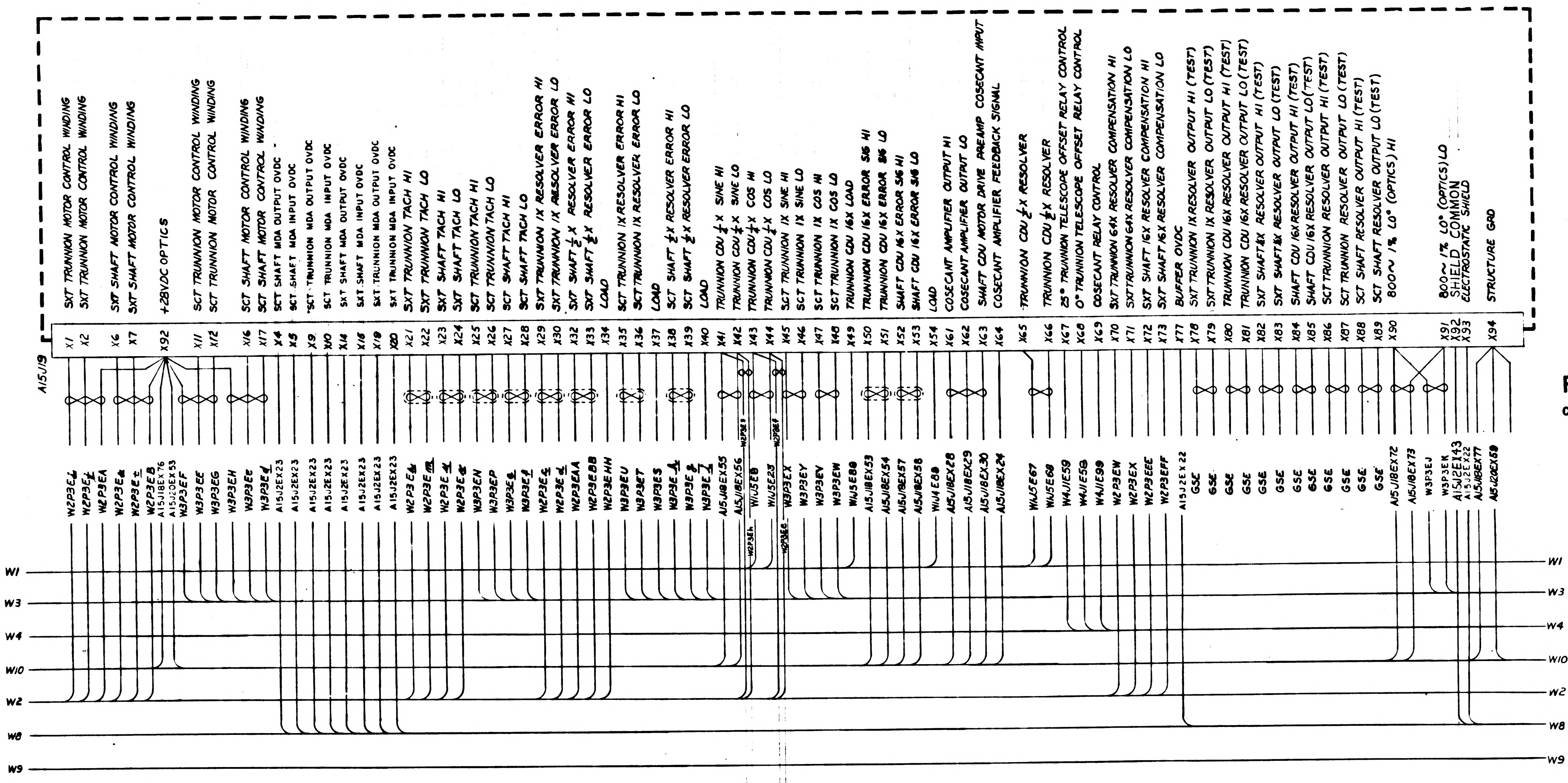
PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
TRAY 9

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010069

SCALE — WT SHEET 1 OF 1

1010069 D

TRAY 9


A15J19
X1 SXT TRUNNION MOTOR CONTROL WINDING
X2 SXT TRUNNION MOTOR CONTROL WINDING
X6 SXT SHAFT MOTOR CONTROL WINDING
X7 SXT SHAFT MOTOR CONTROL WINDING
X92 +28VDC OPTICS
X11 SCT TRUNNION MOTOR CONTROL WINDING
X12 SCT TRUNNION MOTOR CONTROL WINDING
X16 SCT SHAFT MOTOR CONTROL WINDING
X17 SCT SHAFT MOTOR CONTROL WINDING
X4 SCT SHAFT MDA OUTPUT OVDC
X5 SCT SHAFT MDA INPUT OVDC
X9 SCT TRUNNION MDA OUTPUT OVDC
X10 SCT TRUNNION MDA INPUT OVDC
X14 SXT SHAFT MDA OUTPUT OVDC
X16 SXT SHAFT MDA INPUT OVDC
X19 SXT TRUNNION MDA OUTPUT OVDC
X20 SXT TRUNNION MDA INPUT OVDC
X21 SXT TRUNNION TACH HI
X22 SXT TRUNNION TACH LO
X23 SXT SHAFT TACH HI
X24 SXT SHAFT TACH LO
X25 SCT TRUNNION TACH HI
X26 SCT TRUNNION TACH LO
X27 SCT SHAFT TACH HI
X28 SCT SHAFT TACH LO
X29 SXT TRUNNION 1X RESOLVER ERROR HI
X30 SXT TRUNNION 1X RESOLVER ERROR LO
X32 SXT SHAFT 1/2X RESOLVER ERROR HI
X33 SXT SHAFT 1/2X RESOLVER ERROR LO
X34 LOAD
X35 SCT TRUNNION 1X RESOLVER ERROR HI
X36 SCT TRUNNION 1X RESOLVER ERROR LO
X37 LOAD
X38 SCT SHAFT 1/2X RESOLVER ERROR HI
X39 SCT SHAFT 1/2X RESOLVER ERROR LO
X40 LOAD
X41 TRUNNION CDU 1/2X SINE HI
X42 TRUNNION CDU 1/2X SINE LO
X43 TRUNNION CDU 1/2X COS HI
X44 TRUNNION CDU 1/2X COS LO
X45 SCT TRUNNION 1X SINE HI
X46 SCT TRUNNION 1X SINE LO
X47 SCT TRUNNION 1X COS HI
X48 SCT TRUNNION 1X COS LO
X49 TRUNNION CDU 16X LOAD
X50 TRUNNION CDU 16X ERROR SIG HI
X51 TRUNNION CDU 16X ERROR SIG LO
X52 SHAFT CDU 16X ERROR SIG HI
X53 SHAFT CDU 16X ERROR SIG LO
X54 LOAD
X61 COSECANT AMPLIFIER OUTPUT HI
X62 COSECANT AMPLIFIER OUTPUT LO
X63 SHAFT CDU MOTOR DRIVE PREAMP COSECANT INPUT
X64 COSECANT AMPLIFIER FEEDBACK SIGNAL
X65 TRUNNION CDU 1/2X RESOLVER
X66 TRUNNION CDU 1/2X RESOLVER
X67 25° TRUNNION TELESCOPE OFFSET RELAY CONTROL
X68 0° TRUNNION TELESCOPE OFFSET RELAY CONTROL
X69 COSECANT RELAY CONTROL
X70 SXT TRUNNION 64X RESOLVER COMPENSATION HI
X71 SXT TRUNNION 64X RESOLVER COMPENSATION LO
X72 SXT SHAFT 16X RESOLVER COMPENSATION HI
X73 SXT SHAFT 16X RESOLVER COMPENSATION LO
X77 BUFFER OVDC
X78 SXT TRUNNION 1X RESOLVER OUTPUT HI (TEST)
X79 SXT TRUNNION 1X RESOLVER OUTPUT LO (TEST)
X80 TRUNNION CDU 16X RESOLVER OUTPUT HI (TEST)
X81 TRUNNION CDU 16X RESOLVER OUTPUT LO (TEST)
X82 SXT SHAFT 1X RESOLVER OUTPUT HI (TEST)
X83 SXT SHAFT 1X RESOLVER OUTPUT LO (TEST)
X84 SHAFT CDU 16X RESOLVER OUTPUT HI (TEST)
X85 SHAFT CDU 16X RESOLVER OUTPUT LO (TEST)
X86 SCT TRUNNION RESOLVER OUTPUT HI (TEST)
X87 SCT TRUNNION RESOLVER OUTPUT LO (TEST)
X88 SCT SHAFT RESOLVER OUTPUT HI (TEST)
X89 SCT SHAFT RESOLVER OUTPUT LO (TEST)
X90 800~ 1% LO° (OPTICS) HI
X91 800~ 1% LO° (OPTICS) LO
X92 SHIELD COMMON
X93 ELECTROSTATIC SHIELD
X94 STRUCTURE GND
W2P3E
W2P3EA
W2P3EB
A15J1BEX76
A15J2EX53
W3P3EF
W3P3EE
W3P3EG
W3P3EH
A15J2EX23
W3P3EN
W3P3EP
W2P3EAA
W2P3EBB
W2P3EHH
W3P3EU
W3P3ES
A15J1BEX55
A15J1BEX56
W1J5E8
W1J5E23
W3P3EX
W3P3EY
W3P3EV
W3P3EW
W1J5E80
A15J1BEX53
A15J1BEX54
A15J1BEX57
A15J1BEX58
W1J4E28
A15J1BEX29
A15J1BEX30
A15J1BEX24
W1J5E67
W1J5E68
W4J1E59
W4J1E58
W2P3EW
W2P3EX
W2P3EE
W2P3EFF
A15J2EX22
GSE
A15J1BEX72
A15J1BEX73
W3P3EK
W3P3EJ
A15J2EX43
A15J2EX22
A15J1BEX77
A15J2BEX59
W1
W3
W4
W10
W2
W8
W9

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 01346 DATE 22 May 63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523- INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150- PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PIN NUMBERS LISTED AS X--- ARE "DUMMY" PIN NUMBERS USED TO IDENTIFY CONNECTOR PINS PENDING FINAL ASSIGNMENT OF SIGNALS TO THE CONNECTOR PINS
6. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN J. F. McDowell DATE 29 Apr 63
CHECKED B. G. Cappone 29 Apr 63
APPROVAL
APPROVAL
NASA APPROVAL W. J. Rhine 5-22-63
MIT APPROVAL W Kupfer 22 May 63

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HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONNECTING WIRING
TRAY 9

CODE IDENT NO | SIZE E | NASA DRAWING NO 1010069
SCALE | WT | SHEET OF

1010069

INCHES
PHOTOGRAPHIC SCALE ONLY

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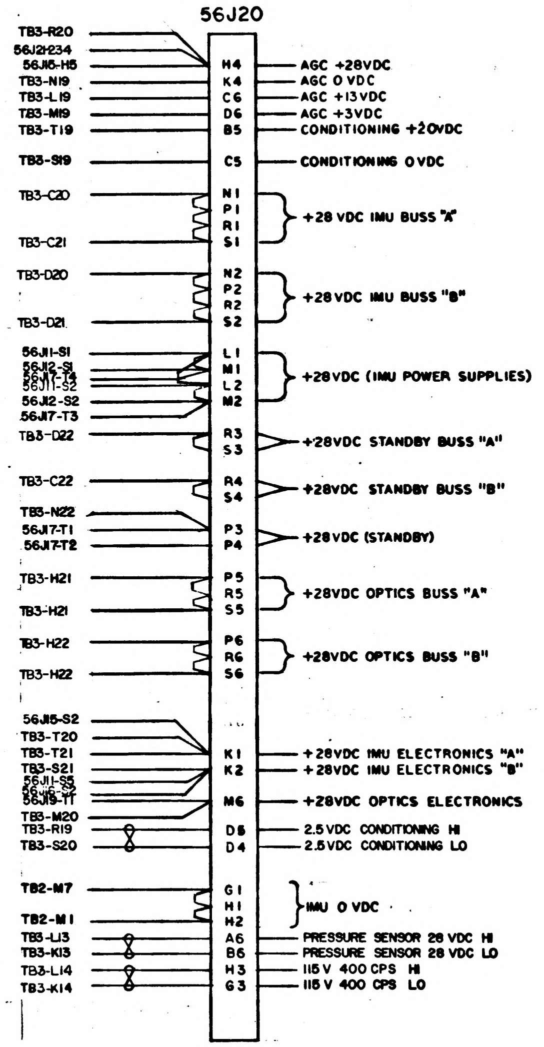
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL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TB3-R20
56J21-234
56J16-H5
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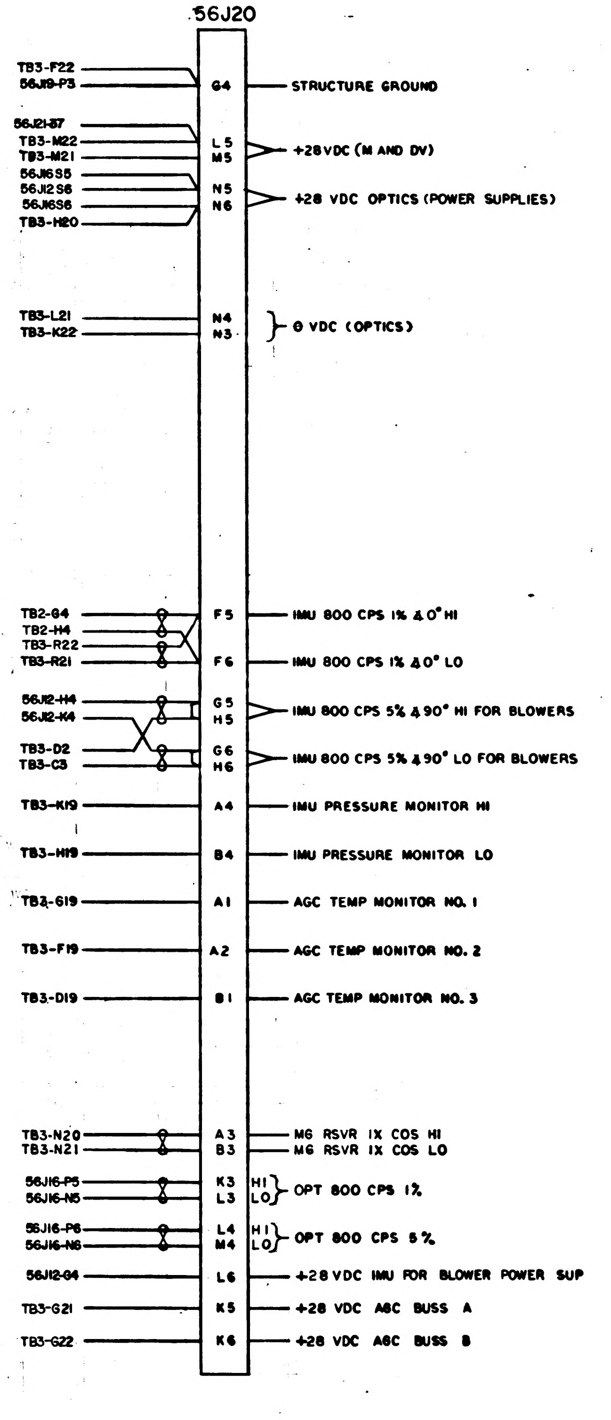
TB3-L19
TB3-M19
TB3-T19
TB3-S19
TB3-C20
TB3-C21
TB3-D20
TB3-D21
56J11-S1
56J12-S1
56J17-T4
56J11-S2
56J12-S2
56J17-T3
TB3-D22
TB3-C22
TB3-N22
56J17-T1
56J17-T2
TB3-H21
TB3-H21
TB3-H22
TB3-H22
56J15-S2
TB3-T20
TB3-T21
TB3-S21
56J11-S5
56J16-S2
56J19-T1
TB3-M20
TB3-R19
TB3-S20
TB2-M7
TB2-M1
TB3-L13
TB3-K13
TB3-L14
TB3-K14
H4
K4
C6
D6
B5
C5
N1
P1
R1
S1
N2
P2
R2
S2
L1
M1
L2
M2
R3
S3
R4
S4
P3
P4
P5
R5
S5
P6
R6
S6
K1
K2
M6
D5
D4
G1
H1
H2
A6
B6
H3
G3
AGC +28VDC
AGC 0 VDC
AGC +13VDC
AGC +3VDC
CONDITIONING +20VDC
CONDITIONING 0VDC
+28 VDC IMU BUSS "A"
+28 VDC IMU BUSS "B"
+28VDC (IMU POWER SUPPLIES)
+28VDC STANDBY BUSS "A"
+28VDC STANDBY BUSS "B"
+28VDC (STANDBY)
+28VDC OPTICS BUSS "A"
+28VDC OPTICS BUSS "B"
+28VDC IMU ELECTRONICS "A"
+28VDC IMU ELECTRONICS "B"
+28VDC OPTICS ELECTRONICS
2.5VDC CONDITIONING HI
2.5VDC CONDITIONING LO
IMU 0 VDC
PRESSURE SENSOR 28 VDC HI
PRESSURE SENSOR 28 VDC LO
115 V 400 CPS HI
115 V 400 CPS LO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TB3-F22
56J19-P3
56J21-37
TB3-M22
TB3-M21
56J16S5
56J12S6
56J16S6
TB3-H20
TB3-L21
TB3-K22
TB2-G4
TB2-H4
TB3-R22
TB3-R21
56J12-H4
56J12-K4
TB3-D2
TB3-C3
TB3-K19
TB3-H19
TB3-G19
TB3-F19
TB3-D19
TB3-N20
TB3-N21
56J16-P5
56J16-N5
56J16-P6
56J16-N6
56J12-G4
TB3-G21
TB3-G22
G4
L5
M5
N5
N6
N4
N3
F5
F6
G5
H5
G6
H6
A4
B4
A1
A2
B1
A3
B3
K3
L3
L4
M4
L6
K5
K6
HI
LO
HI
LO
STRUCTURE GROUND
+28VDC (M AND DV)
+28 VDC OPTICS (POWER SUPPLIES)
0 VDC (OPTICS)
IMU 800 CPS 1% ∡ 0° HI
IMU 800 CPS 1% ∡ 0° LO
IMU 800 CPS 5% ∡ 90° HI FOR BLOWERS
IMU 800 CPS 5% ∡ 90° LO FOR BLOWERS
IMU PRESSURE MONITOR HI
IMU PRESSURE MONITOR LO
AGC TEMP MONITOR NO. 1
AGC TEMP MONITOR NO. 2
AGC TEMP MONITOR NO. 3
M6 RSVR 1X COS HI
M6 RSVR 1X COS LO
OPT 800 CPS 1%
OPT 800 CPS 5%
+28 VDC IMU FOR BLOWER POWER SUP
+28 VDC AGC BUSS A
+28 VDC AGC BUSS B

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   - 1014523 INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   - 1010150 PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR LISTING OF OTHER PSA JUNCTION BOX INTERCONNECTION WIRING DRAWINGS AND DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

FOR INFORMATION ONLY
CLASS B RELEASE TDR No. 04063 DATE 23 Oct 63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
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FRACTIONS ± —//— DECIMALS ± —//— ANGLES ± —//—
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MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

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APPROVAL
NASA APPROVAL W. J. Sw 10/23/63
MIT APPROVAL 23 Oct 63

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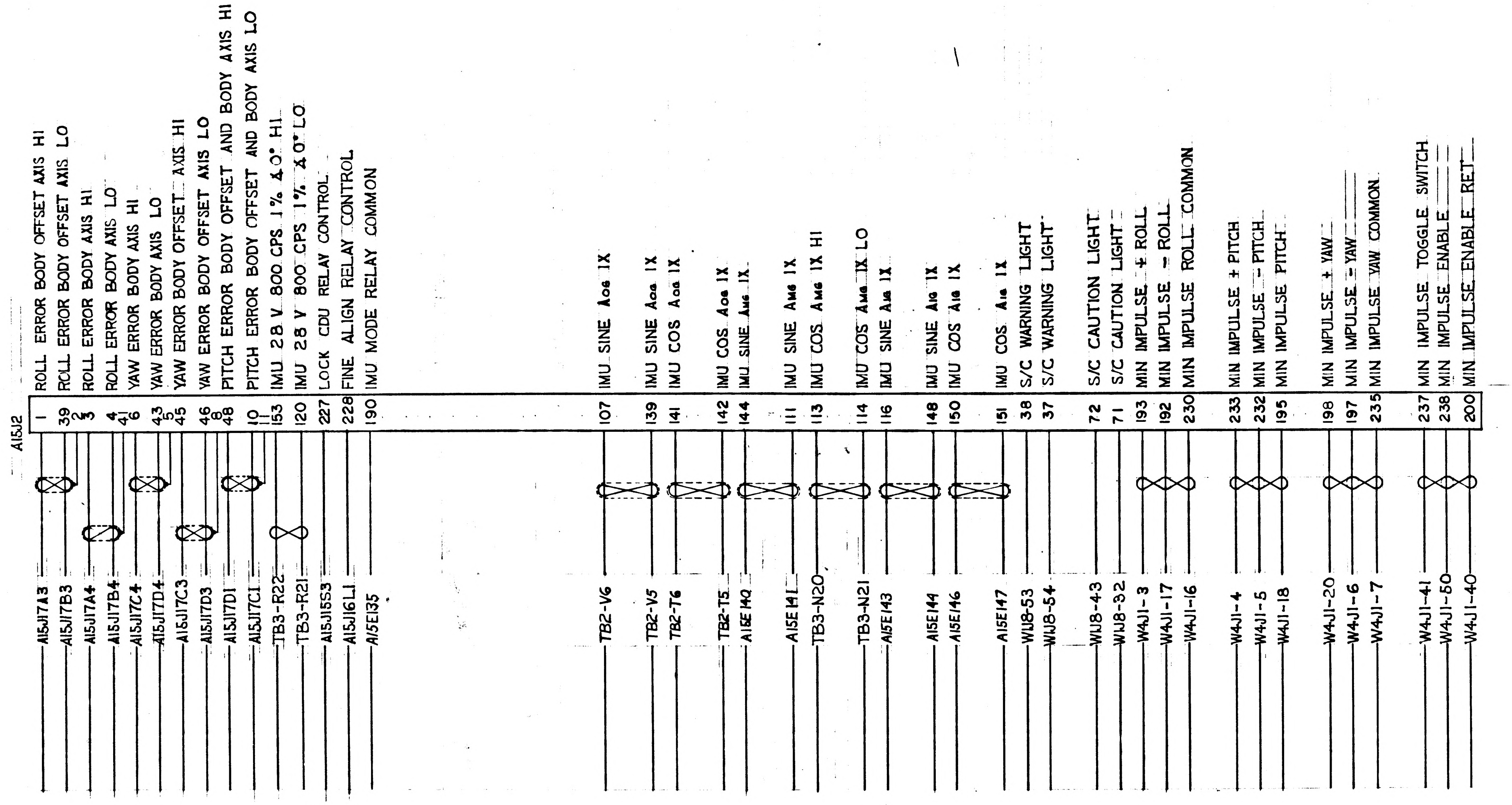
PSA END CONNECTOR INTERCONNECTION WIRING TRAY 10

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010070
SCALE —//— WT SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



A15J2
1 ROLL ERROR BODY OFFSET AXIS HI — A15J17A3
39 ROLL ERROR BODY OFFSET AXIS LO — A15J17B3
2
3 ROLL ERROR BODY AXIS HI — A15J17A4
4 ROLL ERROR BODY AXIS LO — A15J17B4
41
6 YAW ERROR BODY AXIS HI — A15J17C4
43 YAW ERROR BODY AXIS LO — A15J17D4
5
45 YAW ERROR BODY OFFSET AXIS HI — A15J17C3
46 YAW ERROR BODY OFFSET AXIS LO — A15J17D3
8
48 PITCH ERROR BODY OFFSET AND BODY AXIS HI — A15J17D1
10 PITCH ERROR BODY OFFSET AND BODY AXIS LO — A15J17C1
11
153 IMU 28 V 800 CPS 1% ∡0° HI — TB3-R22
120 IMU 28 V 800 CPS 1% ∡0° LO — TB3-R21
227 LOCK CDU RELAY CONTROL — A15J15S3
228 FINE ALIGN RELAY CONTROL — A15J16L1
190 IMU MODE RELAY COMMON — A15E135
107 IMU SINE AOG 1X — TB2-V6
139 IMU SINE AOG 1X — TB2-V5
141 IMU COS AOG 1X — TB2-T6
142 IMU COS AOG 1X — TB2-T5
144 IMU SINE AMG 1X — A15E140
111 IMU SINE AMG 1X — A15E141
113 IMU COS AMG 1X HI — TB3-N20
114 IMU COS AMG 1X LO — TB3-N21
116 IMU SINE AIG 1X — A15E143
148 IMU SINE AIG 1X — A15E144
150 IMU COS AIG 1X — A15E146
151 IMU COS AIG 1X — A15E147
38 S/C WARNING LIGHT — W1J8-53
37 S/C WARNING LIGHT — W1J8-54
72 S/C CAUTION LIGHT — W1J8-43
71 S/C CAUTION LIGHT — W1J8-32
193 MIN IMPULSE + ROLL — W4J1-3
192 MIN IMPULSE − ROLL — W4J1-17
230 MIN IMPULSE ROLL COMMON — W4J1-16
233 MIN IMPULSE + PITCH — W4J1-4
232 MIN IMPULSE − PITCH — W4J1-5
195 MIN IMPULSE PITCH — W4J1-18
198 MIN IMPULSE + YAW — W4J1-20
197 MIN IMPULSE − YAW — W4J1-6
235 MIN IMPULSE YAW COMMON — W4J1-7
237 MIN IMPULSE TOGGLE SWITCH — W4J1-41
238 MIN IMPULSE ENABLE — W4J1-50
200 MIN IMPULSE ENABLE RET — W4J1-40

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CLASS B RELEASE TDR No. 02703 DATE 8/28/63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR EXPLANATION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOW. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
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DRAWN A. Dzepeki DATE 8-2-63
CHECKED J. Green
APPROVAL L. Stamis 20 Aug 63
APPROVAL
NASA APPROVAL 8/28/63
MIT APPROVAL L. E. Larson Jr.

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HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONN. WIRING DIAGRAM
SPACECRAFT CONNECTOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010071
SCALE | WT | SHEET 1 OF 1

1010071

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
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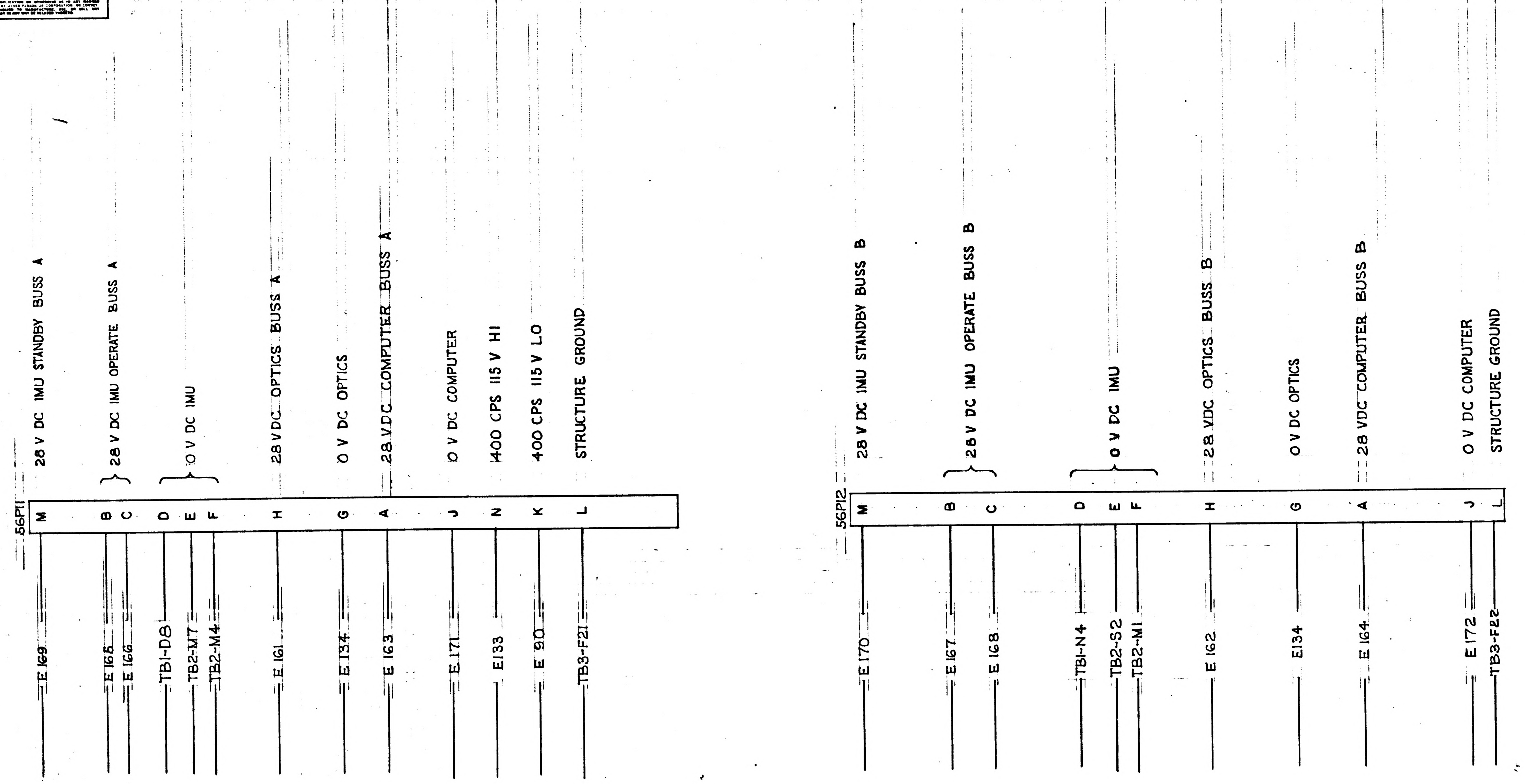
28 V DC IMU STANDBY BUSS A
28 V DC IMU OPERATE BUSS A
O V DC IMU
28 VDC OPTICS BUSS A
O V DC OPTICS
28 VDC COMPUTER BUSS A
O V DC COMPUTER
400 CPS 115 V HI
400 CPS 115 V LO
STRUCTURE GROUND
56P11
M
B
C
D
E
F
H
G
A
J
N
K
L
E 169
E 165
E 166
TB1-D8
TB2-M7
TB2-M4
E 161
E 134
E 163
E 171
E 133
E 90
TB3-F21
28 V DC IMU STANDBY BUSS B
28 V DC IMU OPERATE BUSS B
O V DC IMU
28 VDC OPTICS BUSS B
O V DC OPTICS
28 VDC COMPUTER BUSS B
O V DC COMPUTER
STRUCTURE GROUND
56P12
M
B
C
D
E
F
H
G
A
J
L
E 170
E 167
E 168
TB1-N4
TB2-S2
TB2-M1
E 162
E134
E 164
E 172
TB3-F22

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02783 DATE 8/28/63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014528 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR EXPLANATION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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CHECKED J. Green
APPROVAL Stameris 28 Aug 63
APPROVAL
NASA APPROVAL 9/4/63
MIT APPROVAL

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HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONN WIRING DIAGRAM
POWER CONNECTOR

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010072
SCALE
WT
SHEET 1 OF 1

J. Green

INCHES
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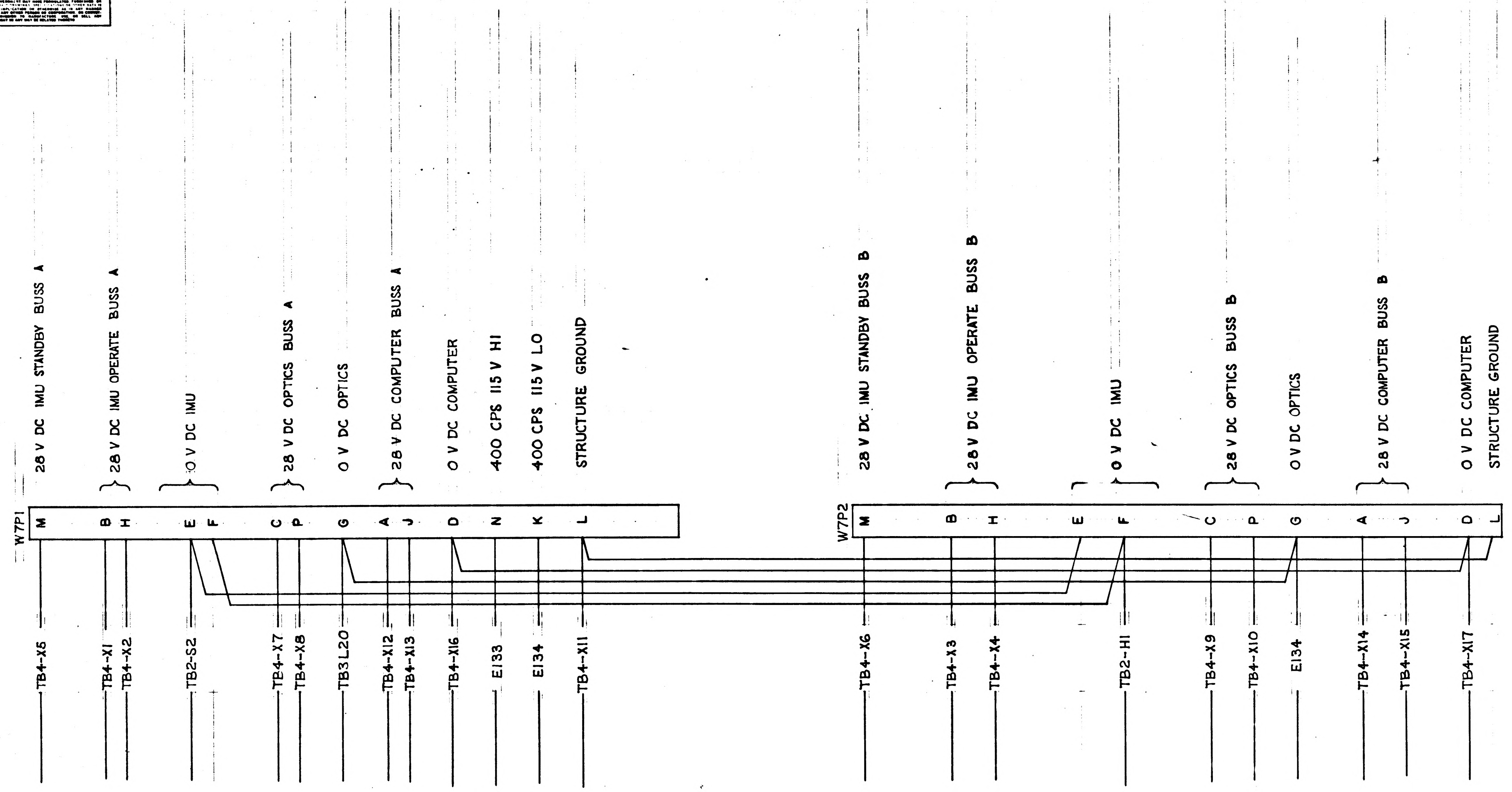
28 V DC IMU STANDBY BUSS A
28 V DC IMU OPERATE BUSS A
O V DC IMU
28 V DC OPTICS BUSS A
O V DC OPTICS
28 V DC COMPUTER BUSS A
O V DC COMPUTER
400 CPS 115 V HI
400 CPS 115 V LO
STRUCTURE GROUND
W7P1
M B H E F C P G A J D N K L
TB4-X5
TB4-X1
TB4-X2
TB2-S2
TB4-X7
TB4-X8
TB3L20
TB4-X12
TB4-X13
TB4-X16
E133
E134
TB4-X11
28 V DC IMU STANDBY BUSS B
28 V DC IMU OPERATE BUSS B
O V DC IMU
28 V DC OPTICS BUSS B
O V DC OPTICS
28 V DC COMPUTER BUSS B
O V DC COMPUTER
STRUCTURE GROUND
W7P2
M B H E F C P G A J D L
TB4-X6
TB4-X3
TB4-X4
TB2-H1
TB4-X9
TB4-X10
E134
TB4-X14
TB4-X15
TB4-X17

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02783 DATE 8/28/63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014528 - INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150 - PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR EXPLANATION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA SYSTEM DESIGNATION (45) WHEN NEEDED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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CHECKED J. Green
APPROVAL Hamerie 28 Aug 63
APPROVAL
NASA APPROVAL 8/28/63
MIT APPROVAL

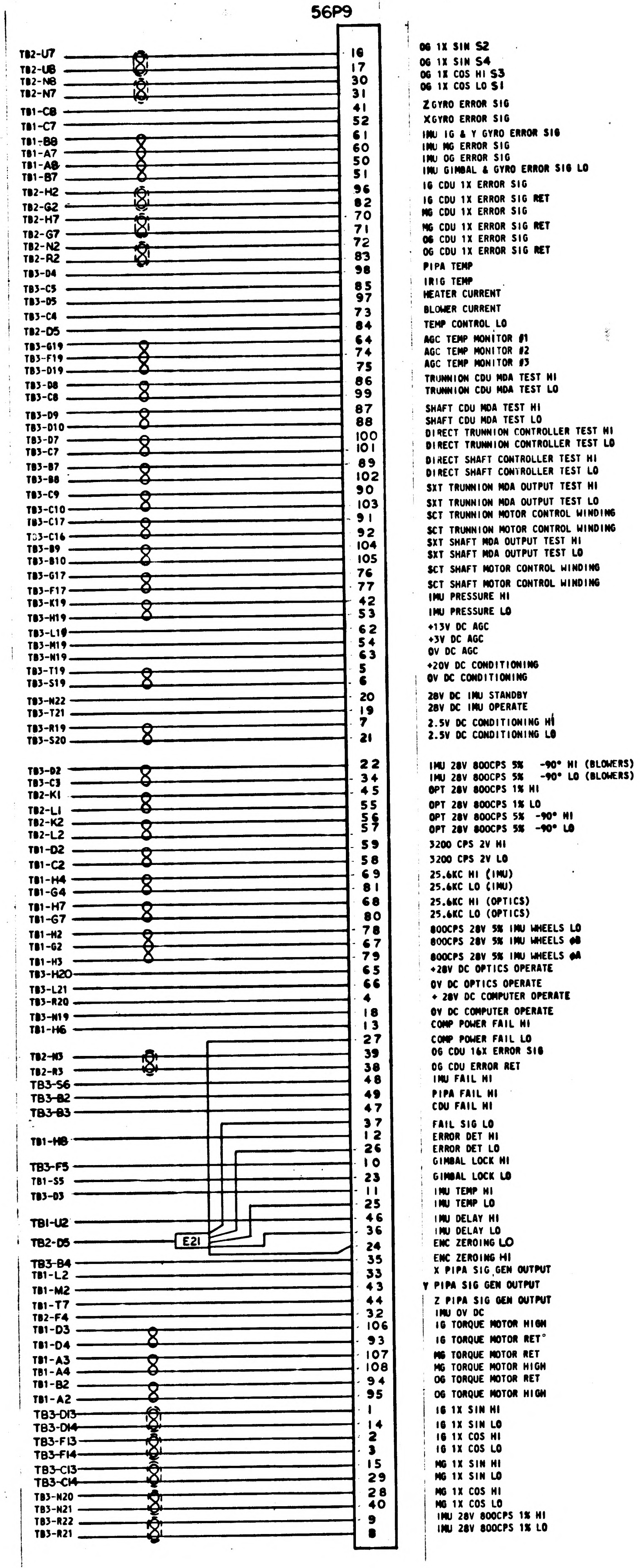
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA JUNCTION BOX
INTERCONN WIRING DIAGRAM
POWER CONNECTOR

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010072
SCALE | WT | SHEET 1 OF

1010072

INCHES
PHOTOGRAPHIC SCALE ONLY



TB2-U7	16	OG 1X SIN S2
TB2-U8	17	OG 1X SIN S4
TB2-N8	30	OG 1X COS HI S3
TB2-N7	31	OG 1X COS LO S1
TB1-C8	41	Z GYRO ERROR SIG
TB1-C7	52	X GYRO ERROR SIG
TB1-B8	61	IMU IG & Y GYRO ERROR SIG
TB1-A7	60	IMU MG ERROR SIG
TB1-A8	50	IMU OG ERROR SIG
TB1-B7	51	IMU GIMBAL & GYRO ERROR SIG LO
TB2-H2	96	IG CDU 1X ERROR SIG
TB2-G2	82	IG CDU 1X ERROR SIG RET
TB2-H7	70	MG CDU 1X ERROR SIG
TB2-G7	71	MG CDU 1X ERROR SIG RET
TB2-N2	72	OG CDU 1X ERROR SIG
TB2-R2	83	OG CDU 1X ERROR SIG RET
TB3-D4	98	PIPA TEMP
TB3-C5	85	IRIG TEMP
TB3-D5	97	HEATER CURRENT
TB3-C4	73	BLOWER CURRENT
TB2-D5	84	TEMP CONTROL LO
TB3-G19	64	AGC TEMP MONITOR #1
TB3-F19	74	AGC TEMP MONITOR #2
TB3-D19	75	AGC TEMP MONITOR #3
TB3-D8	86	TRUNNION CDU MDA TEST HI
TB3-C8	99	TRUNNION CDU MDA TEST LO
TB3-D9	87	SHAFT CDU MDA TEST HI
TB3-D10	88	SHAFT CDU MDA TEST LO
TB3-D7	100	DIRECT TRUNNION CONTROLLER TEST HI
TB3-C7	101	DIRECT TRUNNION CONTROLLER TEST LO
TB3-B7	89	DIRECT SHAFT CONTROLLER TEST HI
TB3-B8	102	DIRECT SHAFT CONTROLLER TEST LO
TB3-C9	90	SXT TRUNNION MDA OUTPUT TEST HI
TB3-C10	103	SXT TRUNNION MDA OUTPUT TEST LO
TB3-C17	91	SCT TRUNNION MOTOR CONTROL WINDING
TB3-C16	92	SCT TRUNNION MOTOR CONTROL WINDING
TB3-B9	104	SXT SHAFT MDA OUTPUT TEST HI
TB3-B10	105	SXT SHAFT MDA OUTPUT TEST LO
TB3-G17	76	SCT SHAFT MOTOR CONTROL WINDING
TB3-F17	77	SCT SHAFT MOTOR CONTROL WINDING
TB3-K19	42	IMU PRESSURE HI
TB3-H19	53	IMU PRESSURE LO
TB3-L19	62	+13V DC AGC
TB3-M19	54	+3V DC AGC
TB3-N19	63	0V DC AGC
TB3-T19	5	+20V DC CONDITIONING
TB3-S19	6	0V DC CONDITIONING
TB3-N22	20	28V DC IMU STANDBY
TB3-T21	19	28V DC IMU OPERATE
TB3-R19	7	2.5V DC CONDITIONING HI
TB3-S20	21	2.5V DC CONDITIONING LO
TB3-D2	22	IMU 28V 800CPS 5% -90° HI (BLOWERS)
TB3-C3	34	IMU 28V 800CPS 5% -90° LO (BLOWERS)
TB2-K1	45	OPT 28V 800CPS 1% HI
TB2-L1	55	OPT 28V 800CPS 1% LO
TB2-K2	56	OPT 28V 800CPS 5% -90° HI
TB2-L2	57	OPT 28V 800CPS 5% -90° LO
TB1-D2	59	3200 CPS 2V HI
TB1-C2	58	3200 CPS 2V LO
TB1-H4	69	25.6KC HI (IMU)
TB1-G4	81	25.6KC LO (IMU)
TB1-H7	68	25.6KC HI (OPTICS)
TB1-G7	80	25.6KC LO (OPTICS)
TB1-H2	78	800CPS 28V 5% IMU WHEELS LO
TB1-G2	67	800CPS 28V 5% IMU WHEELS φB
TB1-H3	79	800CPS 28V 5% IMU WHEELS φA
TB3-H20	65	+28V DC OPTICS OPERATE
TB3-L21	66	0V DC OPTICS OPERATE
TB3-R20	4	+ 28V DC COMPUTER OPERATE
TB3-N19	18	0V DC COMPUTER OPERATE
TB1-H6	13	COMP POWER FAIL HI
	27	COMP POWER FAIL LO
TB2-N3	39	OG CDU 16X ERROR SIG
TB2-R3	38	OG CDU ERROR RET
TB3-S6	48	IMU FAIL HI
TB3-B2	49	PIPA FAIL HI
TB3-B3	47	CDU FAIL HI
	37	FAIL SIG LO
TB1-H8	12	ERROR DET HI
	26	ERROR DET LO
TB3-F5	10	GIMBAL LOCK HI
TB1-S5	23	GIMBAL LOCK LO
TB3-D3	11	IMU TEMP HI
	25	IMU TEMP LO
TB1-U2	46	IMU DELAY HI
	36	IMU DELAY LO
TB2-D5	24	ENC ZEROING LO
TB3-B4	35	ENC ZEROING HI
TB1-L2	33	X PIPA SIG GEN OUTPUT
TB1-M2	43	Y PIPA SIG GEN OUTPUT
TB1-T7	44	Z PIPA SIG GEN OUTPUT
TB2-F4	32	IMU 0V DC
TB1-D3	106	IG TORQUE MOTOR HIGH
TB1-D4	93	IG TORQUE MOTOR RET
TB1-A3	107	MG TORQUE MOTOR RET
TB1-A4	108	MG TORQUE MOTOR HIGH
TB1-B2	94	OG TORQUE MOTOR RET
TB1-A2	95	OG TORQUE MOTOR HIGH
TB3-D13	1	IG 1X SIN HI
TB3-D14	14	IG 1X SIN LO
TB3-F13	2	IG 1X COS HI
TB3-F14	3	IG 1X COS LO
TB3-C13	15	MG 1X SIN HI
TB3-C14	29	MG 1X SIN LO
TB3-N20	28	MG 1X COS HI
TB3-N21	40	MG 1X COS LO
TB3-R22	9	IMU 28V 800CPS 1% HI
TB3-R21	8	IMU 28V 800CPS 1% LO

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. DRAWINGS FOR REFERENCE:
   1014523-INTERCONNECTION DIAGRAM, APOLLO GUIDANCE EQUIPMENT, LOWER EQUIPMENT BAY
   1010150-PSA FAMILY TREE
3. REFER TO DRAWINGS LISTED IN NOTE 2 FOR DEFINITION OF REFERENCE NUMBERS
4. NUMBERS IN CONDUCTORS GIVE DESTINATION OF THAT CONDUCTOR
5. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THEM WITH PSA END CONNECTOR DESIGNATION (56) WHEN NEEDED

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 04410 DATE 11/5/63

MASTER

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO — CONTRACT
DRAWN — DATE 9-20-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL — 11-5-63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

PSA END CONNECTOR
INTERCONNECTION WIRING DIAGRAM
SYSTEM MONITOR CONNECTOR

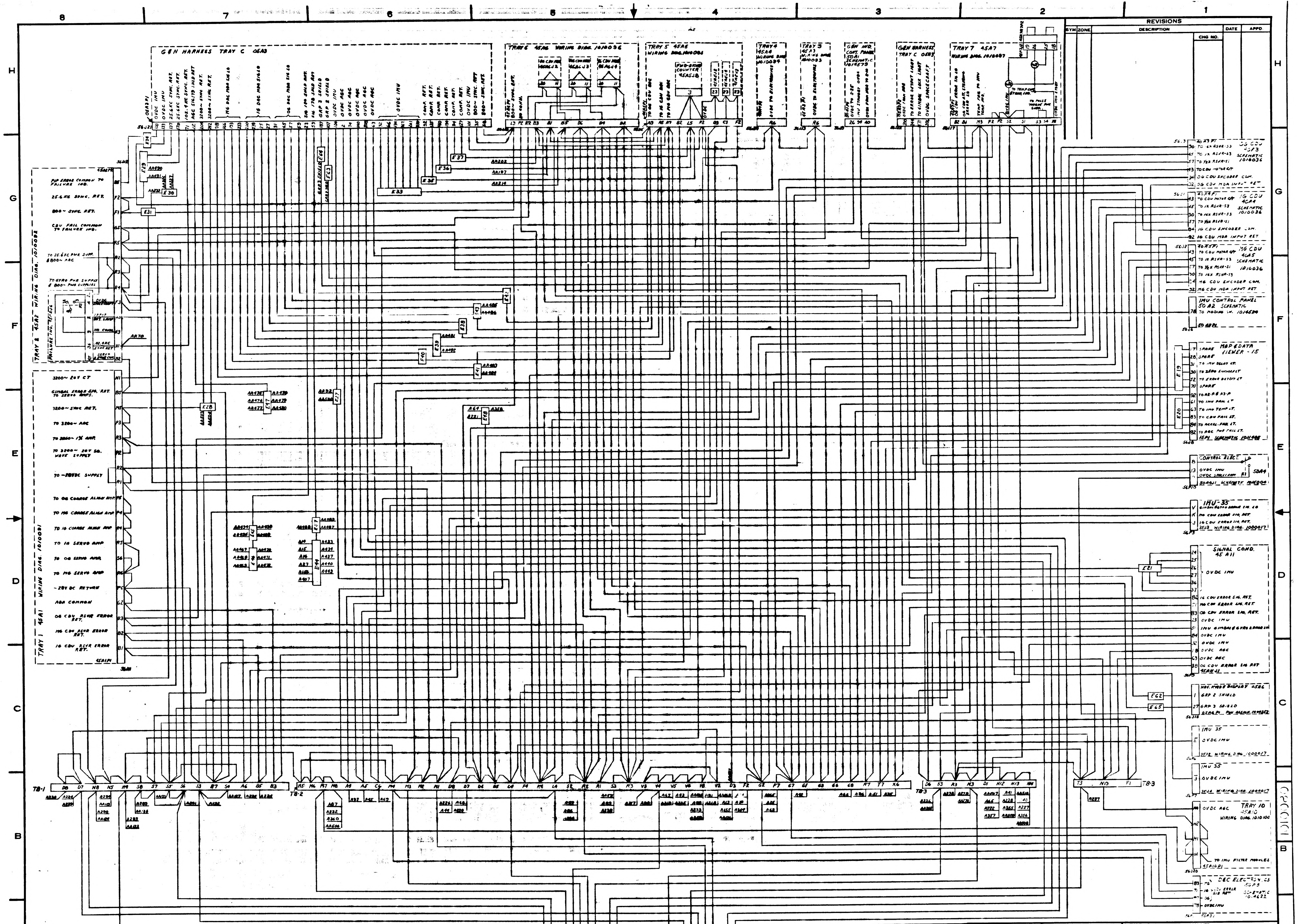
CODE IDENT NO. — SIZE E — NASA DRAWING NO. 1010073
SCALE — WT — SHEET 1 OF 1

1010073

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD


GEN HARNESS TRAY C 05A3
05A3P1
56J21
0VDC IMU
25.6KC SYNC. RET.
102.4KC SYNC. RET.
AGC SIG.179 SHLD RET
3200~ SYNC RET.
MG DAC MDA SIG LO
IG DAC MDA SIG LO
OG DAC MDA SIG LO
SIG 180 SHLD RET.
SIG 178 SHLD RET
GRP 3 SHIELD
GRP 2 SHIELD
0VDC AGC
COMP. RET.
800~ SYNC. RET.
TRAY 6 45A6 WIRING DIAG. 1010096
OG CDU MDA 45A6J2
MG CDU MDA 45A6J3
IG CDU MDA 45A6J4
TRAY 5 45A5 WIRING DIAG. 1010095
FWD-BKWD COUNTER 45A5J8
TRAY 4 45A4 WIRING DIAG. 1010094
TRAY 3 45A3 WIRING DIAG. 1010093
0VDC TO ELECTRONICS
GEN IND. CONT. PANEL 50A1 SCHEMATIC 1014579
GEN HARNESS TRAY C 05A3
TO ERROR DETECT LIGHT
TO GIMBAL LOCK LIGHT
0VDC SPACECRAFT
TRAY 7 45A7 WIRING DIAG. 1010097
TO TEMP CONT. ERROR IND.
TO PULSE TORQUE PWR SUPP.
OG CDU 40A3 SCHEMATIC 1010036
TO 16X RSVR-S3
TO 1X RSVR-S3
TO ½X RSVR-S1
TO CDU MOTOR C/T
OG CDU ENCODER COM.
OG CDU MDA INPUT RET.
IG CDU 40A4 SCHEMATIC 1010036
IG CDU ENCODER COM.
IG CDU MDA INPUT RET
MG CDU 40A5 SCHEMATIC 1010036
MG CDU ENCODER COM.
MG CDU MDA INPUT RET
IMU CONTROL PANEL 50A2 SCHEMATIC
TO MODING SW. 1014580
MAP & DATA VIEWER - 15
SPARE
TO IMU DELAY LT.
TO ZERO ENCODER LT
TO ERROR DETECT LT
TO IMU FAIL LT
TO IMU TEMP LT.
TO CDU FAIL LT.
TO ACCEL. FAIL LT.
TO AGC PWR FAIL LT.
15P1 SCHEMATIC 1011408
CONTROL ELECT.
0VDC IMU
0VDC SPACECRAFT
K1
50A4
50A4J1 SCHEMATIC 1015004
IMU-35
GIMBAL & GYRO ERROR SIG. LO
MG CDU ERROR SIG. RET.
IG CDU ERROR SIG. RET.
35J3 WIRING DIAG. 1000017
SIGNAL COND. 45A11
0VDC IMU
IG CDU ERROR SIG. RET.
MG CDU ERROR SIG. RET.
OG CDU ERROR SIG. RET.
IMU GIMBAL & GYRO ERROR LO
0VDC AGC
NAV. BASE DISPLAY 05A6
GRP 2 SHIELD
GRP 3 SHIELD
TRAY 10 45A10 WIRING DIAG. 1010100
0VDC AGC
TO IMU FILTER MODULES
D&C ELECTRONICS 50P3 SCHEMATIC 1014622
TRAY 1 45A1 WIRING DIAG. 1010081
3200~ 26V CT
GIMBAL ERROR SIG. RET. TO SERVO AMPS.
3200~ SYNC RET.
TO 3200~ AGC
TO 3200~ 1% AMP.
TO 3200~ 28V SQ. WAVE SUPPLY
TO -28VDC SUPPLY
TO OG COARSE ALIGN AMP
TO MG COARSE ALIGN AMP
TO IG COARSE ALIGN AMP
TO IG SERVO AMP
TO OG SERVO AMP
TO MG SERVO AMP
-28V DC RETURN
AGC COMMON
OG CDU RSVR ERROR RET.
MG CDU RSVR ERROR RET.
IG CDU RSVR ERROR RET.
TRAY 2 45A2 WIRING DIAG. 1010082
PWR ERROR COMMON TO FAILURE IND.
25.6KC SYNC. RET.
800~ SYNC. RET.
CDU FAIL COMMON TO FAILURE IND.
TO 25.6KC PWR SUPP. & 800~ AGC
TO GYRO PWR SUPPLY & 800~ PWR SUPPLIES
FAILURE IND. CIRCUIT
TB-1
TB-2
TB-3
56P11
56P12
0VDC IMU
0VDC AGC

NOTES:

1. NUMBERS WITH PREFIX "A" OR "AA", ARE USED TO DESIGNATE THE SHIELD TERMINATION POINTS OF THAT CONDUCTOR NUMBER. SHIELDS ARE CONNECTED DIRECTLY TO THE "E" POINTS OR TERMINALS SHOWN. REFERENCE DWG. # 1014607 FOR CONDUCTOR NOS. & POINT TO POINT INTERCONNECTIONS.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 06372 **DATE** 2/18/64

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+	+
−	−	−

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN

ACSP PN

DRAWN C. KORSAN DATE 2-18-64
CHECKED 2-18-64
APPROVAL J. Wachholz
APPROVAL W. Stameroski 2/18/64
NASA APPROVAL W J Rhine 2-18-64
MIT APPROVAL W Kupfer 18 Feb 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

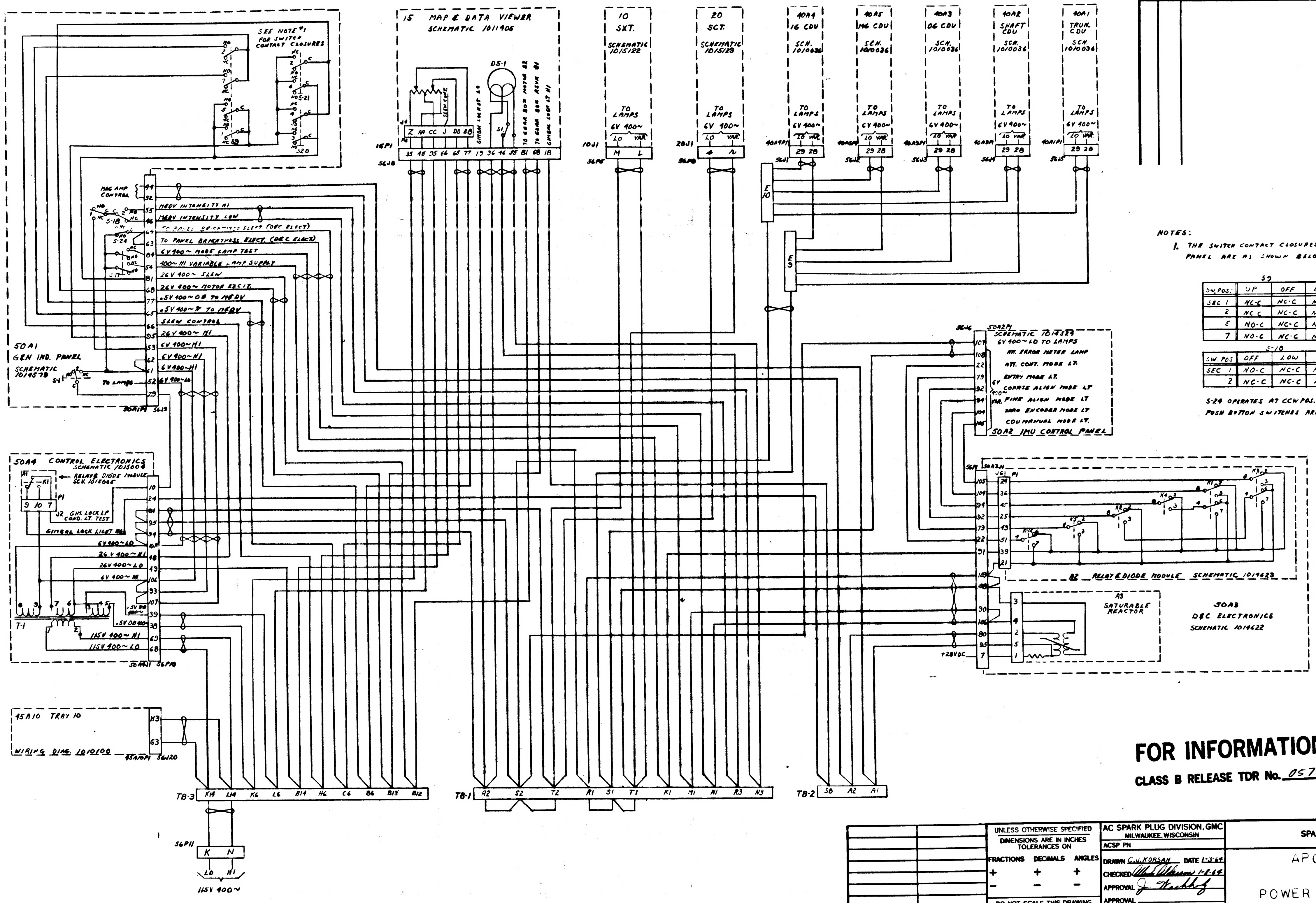
APOLLO INERTIAL SUBSYSTEM
0VDC
POWER DISTRIBUTION

CODE IDENT NO.	SIZE	
	E	1010080
SCALE		SHEET

1010080

ML 10776-P

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


SEE NOTE #1 FOR SWITCH CONTACT CLOSURES
S9
S20
S-21
15 MAP & DATA VIEWER SCHEMATIC 1011405
DS-1
S1
SLEW CONT.
GIMBAL LOCK LT LO
TO GEAR BOX MOTOR 82
TO GEAR BOX RSVR 81
GIMBAL LOCK LT HI
J4
Z AA CC J DD BB
P4
15P1
56J8
35 45 95 66 65 77 19 36 46 55 81 68 18
10 SXT. SCHEMATIC 1015122
20 SCT. SCHEMATIC 1015129
TO LAMPS 6V 400~
LO VAR.
10J1
56P5
M L
20J1
56P8
40A4 IG CDU SCH. 1010036
40A5 MG CDU SCH. 1010036
40A3 OG CDU SCH. 1010036
40A2 SHAFT CDU SCH. 1010036
40A1 TRUN. CDU SCH. 1010036
40A4P1
40A5P1
40A3P1
40A2P1
40A1P1
29 28
56J1
56J2
56J3
56J4
56J5
E10
E5
MAG AMP CONTROL
MEDV INTENSITY HI
MEDV INTENSITY LOW
TO PANEL BRIGHTNESS ELECT (DEC ELECT)
TO PANEL BRIGHTNESS ELECT. (DEC ELECT)
6V400~ MODE LAMP TEST
400~ HI VARIABLE LAMP SUPPLY
26V 400~ SLEW
26V 400~ MOTOR EXCIT.
.5V 400~ OB TO MEDV
.5V 400~ IB TO MEDV
SLEW CONTROL
26V 400~ HI
6V 400~ HI
6V400~ HI
6V400~ HI
6V 400~ LO
S-18
S-24
S-17
S-1
TO LAMPS
50A1 GEN IND. PANEL SCHEMATIC 1014578
30A1P1
56J9
50A4 CONTROL ELECTRONICS SCHEMATIC 1015004
RELAY & DIODE MODULE SCH. 1015005
A1
K1
P1
9 10 7
J2 GIM. LOCK LP COND. LT. TEST
GIMBAL LOCK LIGHT HI
6V400~LO
26V 400~ HI
26V 400~ LO
6V 400~ HI
.5V IB 400~
.5V OB 400~
115V 400~ HI
115V 400~ LO
T-1
50A4J1
56P10
45A10 TRAY 10
WIRING DIAG. 1010100
H3
G3
45A10P1
56J20
TB-3
K14 L14 K6 L6 B14 H6 C6 B6 B13 B12
56P11
K N
LO HI
115V 400~
TB-1
R2 S2 T2 R1 S1 T1 K1 M1 N1 R3 H3
TB-2
S8 A2 A1
56J6
50A2P1 SCHEMATIC 1014524
6V 400~ LO TO LAMPS
ATT. ERROR METER LAMP
ATT. CONT. MODE LT.
ENTRY MODE LT.
6V 400~ VAR.
COARSE ALIGN MODE LT
FINE ALIGN MODE LT
ZERO ENCODER MODE LT
CDU MANUAL MODE LT.
50A2 IMU CONTROL PANEL
56P7
50A3J1
J61
P1
K1
K2
K3
K4
A2 RELAY & DIODE MODULE SCHEMATIC 1014623
A3 SATURABLE REACTOR
50A3 DEC ELECTRONICS SCHEMATIC 1014622
+28VDC

NOTES:

1. THE SWITCH CONTACT CLOSURES IN THE GEN IND. CONTROL PANEL ARE AS SHOWN BELOW

S9

SW. POS.	UP	OFF	DOWN
SEC 1	NC-C	NC-C	NO-C
2	NC-C	NC-C	NO-C
5	NO-C	NC-C	NC-C
7	NO-C	NC-C	NC-C

S-18

SW. POS	OFF	LOW	HI
SEC 1	NO-C	NC-C	NC-C
2	NC-C	NC-C	NO-C

S-24 OPERATES AT CCW POS. OF R-1

PUSH BOTTON SWITCHES ARE DESIGNATED ⊥

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 05752 **DATE** 1/14/64

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN C.J. KORSAN DATE 1-3-64
CHECKED 1-8-64
APPROVAL J. Wachholz
APPROVAL
NASA APPROVAL W. J. Rhine 1-14-64
MIT APPROVAL 14 Jan 64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO G&N
400 CPS
POWER DISTRIBUTION

CODE IDENT NO.
SIZE D
1010081
SCALE
SHEET

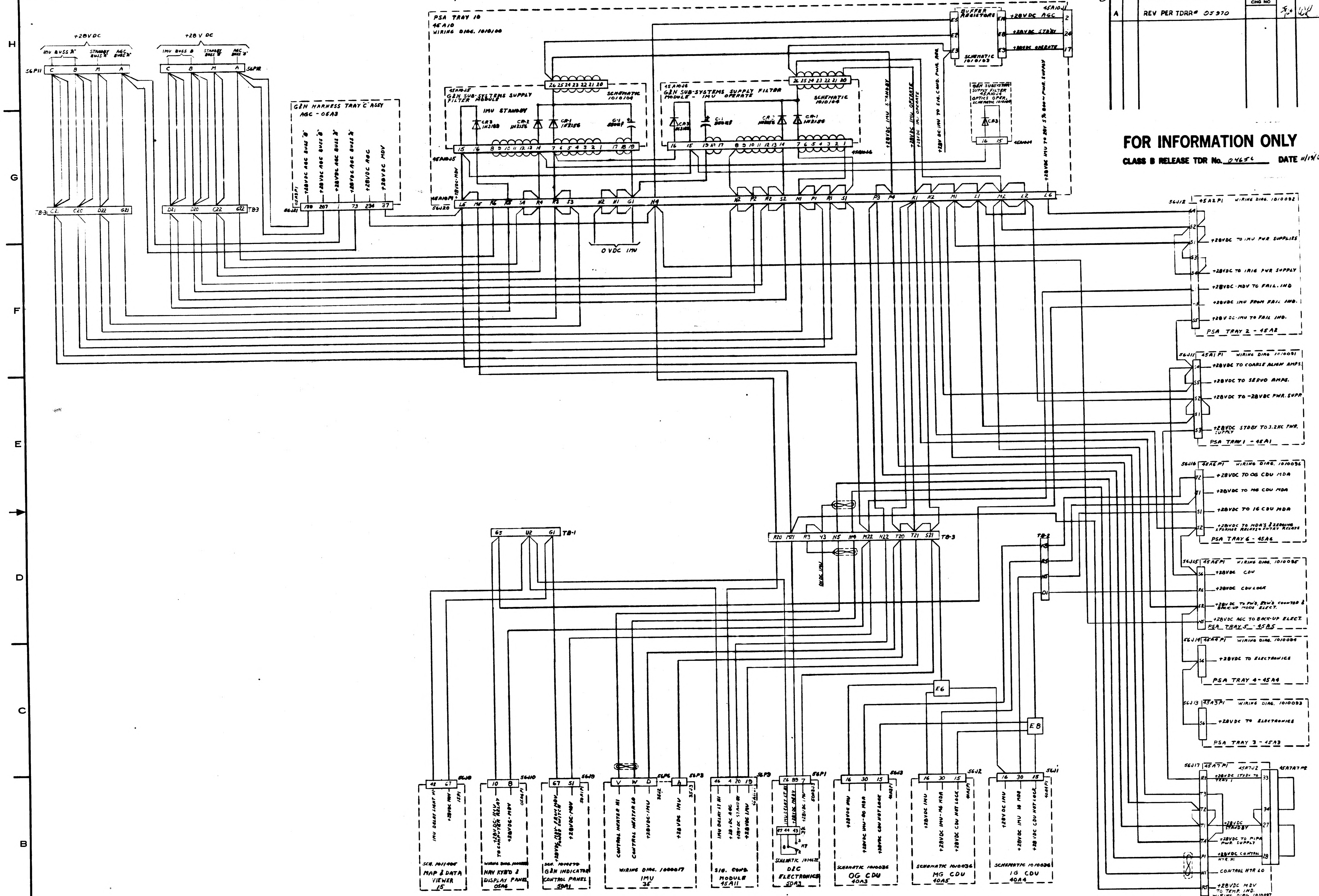
MIL 1077D—P

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD.
A		REV PER TDRR# 05970		5/64	WK

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 04656 **DATE** 11/19/65



+28VDC
IMU BUSS "A"
STANDBY BUSS "A"
AGC BUSS "A"
56P11
C B M A
+28 V DC
IMU BUSS B
STANDBY BUSS "B"
AGC BUSS "B"
56P12
TB-3 C21 C20 D22 G21
D21 D20 C22 G22 TB-3
G&N HARNESS TRAY "C" ASSY
AGC - 05A3
+28VDC AGC BUSS "B"
+28VDC AGC BUSS "B"
+28VDC AGC BUSS "A"
+28VDC AGC BUSS "A"
+28VDC AGC
+28VDC MDV
05A3P1
56J21
139 207 1 73 234 37
PSA TRAY 10
45A10
WIRING DIAG. 1010100
45A10J5
G&N SUB-SYSTEMS SUPPLY FILTER MODULE
IMU STANDBY
CR3 1N3189
CR-2 1N2156
CR-1 1N2156
C-1 850μf
SCHEMATIC 1010104
26 25 24 23 22 21 20
15 16 8 9 10 11 12 13 14 7 6 5 4 3 2 1 17 18 19
45A10J6
G&N SUB-SYSTEMS SUPPLY FILTER MODULE - IMU OPERATE
SCHEMATIC 1010104
16 15 19 18 17 8 9 10 11 12 13 14 7 6 5 4 3 2 1
G&N SUBSYSTEM SUPPLY FILTER 45A10J4 OPTICS OPER. SCHEMATIC 1010104
CR3
16 15
45A10J4
BUFFER RESISTORS
SCHEMATIC 1010103
45A10J1
+28VDC AGC
+28VDC STDBY
+28VDC OPERATE
E5 E2 E3 E4 E6 E5
2 24 17
+28VDC IMU STANDBY
+28VDC IMU OPERATE
+28VDC IMU OPERATE
+28V DC IMU TO SIG. COND. PWR. REG.
+28VDC IMU TO 28V 5% 800~ PWR. SUPPLY
+28VDC-MDV
45A10P1
56J20
L6 M5 R6 R5 S4 R4 R3 S3 N2 N1 G1 H4 N2 P2 R2 S2 M1 P1 R1 S1 P3 P4 K1 K2 M1 L1 M2 L2 L6
0 VDC IMU
56J12 45A2P1 WIRING DIAG. 1010092
+28VDC TO IMU PWR SUPPLIES
+28VDC TO IRIG PWR SUPPLY
+28VDC-MDV TO FAIL. IND
+28VDC IMU FROM FAIL IND.
+28V DC-IMU TO FAIL IND.
PSA TRAY 2 - 45A2
56J11 45A1P1 WIRING DIAG 1010091
+28VDC TO COARSE ALIGN AMPS.
+28VDC TO SERVO AMPS.
+28VDC TO -28VDC PWR. SUPP.
+28VDC STDBY TO 3.2KC PWR. SUPPLY
PSA TRAY 1 - 45A1
56J16 45A6P1 WIRING DIAG. 1010096
+28VDC TO OG CDU MDA
+28VDC TO MG CDU MDA
+28VDC TO IG CDU MDA
+28VDC TO MDA'S & ZEROING XFORMER RELAYS & ENTRY RELAYS
PSA TRAY 6 - 45A6
56J15 45A5P1 WIRING DIAG. 1010095
+28VDC CDU
+28VDC CDU LOCK
+28V DC TO FW'D, BKW'D COUNTER & BACK-UP MODE ELECT.
+28VDC AGC TO BACK-UP ELECT.
PSA TRAY 5 - 45A5
56J14 45A4P1 WIRING DIAG. 1010094
+28VDC TO ELECTRONICS
PSA TRAY 4 - 45A4
56J13 45A3P1 WIRING DIAG. 1010093
+28VDC TO ELECTRONICS
PSA TRAY 3 - 45A3
56J17 45A7P1 45A7J2 45A7A7P2
+28VDC STDBY TO TRAY 1
+28VDC STANDBY
+28VDC TO PIPA PWR. SUPPLY
+28VDC CONTROL HTR. HI
CONTROL HTR LO
+28VDC MDV TO TEMP. IND.
WIRING DIAG 1010097
PSA TRAY 7 - 45A7
TB-1 G3 U2 G1
TB-3 R20 M21 R3 Y3 N5 N9 M22 N22 T20 T21 S21
TB-2
E6
E8
IMU DELAY LIGHT HI
+28VDC MDV
15P1
56J8
SCH. 1011405
MAP & DATA VIEWER
15
56J10
+28VDC-IMU TO COMPUTER RELAY
+28VDC-MDV
05A6P1
NAV KYB'D & DISPLAY PANEL
05A6
56J9
+28VDC-MDV FROM MDV POWER SWITCH
+28VDC-MDV
50A1P1
G&N INDICATOR CONTROL PANEL
50A1
56P6 56P3
V W D h
CONTROL HEATER HI
CONTROL HEATER LO
+28VDC-IMU
+28VDC IMU
35J2 35J3
WIRING DIAG. 1000017
IMU
35
56P9
46 4 20 19
IMU DELAY LT HI
+28VDC AGC
+28VDC STANDBY
+28VDC IMU
SIG. COND. MODULE
45A11
56P1
26 89 7
IMU DELAY LT HI
+28VDC MDV
+28VDC IMU
50A3J3
47 44 43
K7
SCHEMATIC 1014622
D&C ELECTRONICS
50A3
56J3
16 30 15
+28VDC IMU
+28VDC IMU-OG MDA
+28VDC CDU NOT LOCK
40A3P1
SCHEMATIC 1010036
OG CDU
40A3
56J2
16 30 15
+28VDC IMU
+28VDC IMU-MG MDA
+28VDC CDU NOT LOCK
40A5P1
SCHEMATIC 1010036
MG CDU
40A5
56J1
16 30 15
+28V DC IMU
+28VDC IMU IG MDA
+28VDC CDU NOT LOCK
40A4P1
SCHEMATIC 1010036
IG CDU
40A4

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN G.KORSAN DATE 10-21-63
CHECKED Albert Alderson 11-14-63
APPROVAL J. Woelfel 11-19-63
APPROVAL
NASA APPROVAL 11/19/63
MIT APPROVAL 11/19/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

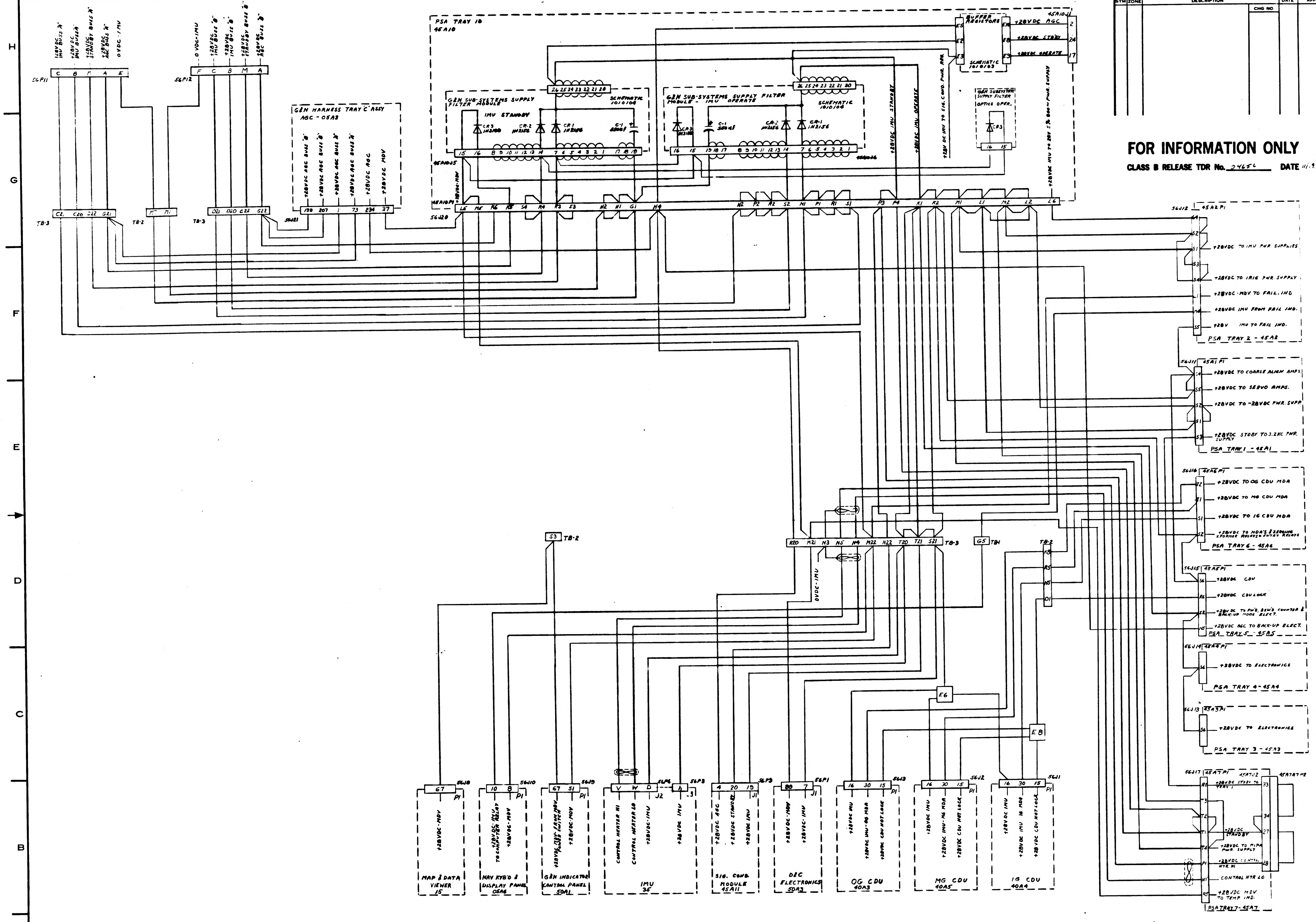
APOLLO INERTIAL SUBSYSTE
+28VDC
POWER DISTRIBUTION

CODE IDENT NO.
SIZE E
1010082
SCALE
SHEET

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 24656 DATE 11/19/63



8
7
6
5
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3
2
1
H
G
F
E
D
C
B
A
+28VDC IMU BUSS "A"
+28V DC IMU BUSS A
+28VDC STANDBY BUSS "A"
+28VDC AGC BUSS "A"
0VDC - IMU
C B M A E
56P11
0 VDC-IMU
+28VDC IMU BUSS "B"
+28VDC IMU BUSS "B"
+28VDC STANDBY BUSS "B"
+28VDC AGC BUSS "B"
F C B M A
56P12
G&N HARNESS TRAY "C" ASSY
AGC - 05A3
+28VDC AGC BUSS "B"
+28VDC AGC BUSS "B"
+28VDC AGC BUSS "A"
+28VDC AGC BUSS "A"
+28VDC AGC
+28VDC MDV
139 207 1 73 234 37
56J21
C21 C20 C22 G21
TB-3
M7 M1
TB-2
D21 D20 C22 G22
TB-3
PSA TRAY 10
45A10
G&N SUB-SYSTEMS SUPPLY FILTER MODULE
IMU STANDBY
SCHEMATIC 1010104
CR3 1N3188
CR-2 1N2156
CR-1 1N2156
C-1 250µf
15 16 8 9 10 11 12 13 14 7 6 5 4 3 2 1 17 18 19
26 25 24 23 22 21 20
45A10J5
+28VDC-MDV
45A10P1
L6 M5 R6 R5 S4 R4 R3 S3 N2 N1 G1 H4
56J20
G&N SUB-SYSTEMS SUPPLY FILTER MODULE - IMU OPERATE
SCHEMATIC 1010104
CR3 1N3188
C-1 250µf
CR-2 1N2156
CR-1 1N2156
16 15 19 18 17 8 9 10 11 12 13 14 7 6 5 4 3 2 1
26 25 24 23 22 21 20
45A10J6
N2 P2 R2 S2 N1 P1 R1 S1 P3 P4 K1 K2 M1 L1 M2 L2 L6
+28VDC IMU STANDBY
+28VDC IMU OPERATE
+28V DC IMU TO SIG. COND. PWR. REG.
+28VDC IMU TO 28V 5% 800~ PWR. SUPPLY
BUFFER RESISTORS
E5 E2 E3
E10 E8 E9
SCHEMATIC 1010103
+28VDC AGC
+28VDC STD'BY
+28VDC OPERATE
45A10J1
2 24 17
G&N SUBSYSTEM SUPPLY FILTER
OPTICS OPER.
CR3
16 15
56J12 45A2P1
S4 S2 S1 S3 S4 L1 M4 S5
+28VDC TO IMU PWR. SUPPLIES
+28VDC TO IRIG PWR. SUPPLY
+28VDC-MDV TO FAIL. IND
+28VDC IMU FROM FAIL IND.
+28V IMU TO FAIL IND.
PSA TRAY 2 - 45A2
56J11 45A1 P1
S4 S5 S2 S1 S3
+28VDC TO COARSE ALIGN AMPS.
+28VDC TO SERVO AMPS.
+28VDC TO -28VDC PWR. SUPP.
+28VDC STDBY TO 3.2KC PWR. SUPPLY
PSA TRAY 1 - 45A1
56J16 45A6 P1
T2 T1 S1 S2
+28VDC TO OG CDU MDA
+28VDC TO MG CDU MDA
+28VDC TO IG CDU MDA
+28VDC TO MDA'S & ZEROING XFORMER RELAYS & ENTRY RELAYS
PSA TRAY 6 - 45A6
56J15 45A5 P1
S6 R6 S2 M5
+28VDC CDU
+28VDC CDU LOCK
+28V DC TO FW'D, BKW'D COUNTER & BACK-UP MODE ELECT.
+28VDC AGC TO BACK-UP ELECT.
PSA TRAY 5 - 45A5
56J14 45A4 P1
S6
+28VDC TO ELECTRONICS
PSA TRAY 4 - 45A4
56J13 45A3 P1
S6
+28VDC TO ELECTRONICS
PSA TRAY 3 - 45A3
56J17 45A7 P1
45A7J2
45A7A7P2
R1 T3 T2 T1 T4 P1 N1 R5
+28VDC STDBY TO TRAY 1
+28VDC STANDBY
+28VDC TO PIPA PWR. SUPPLY
+28VDC CONTROL HTR. HI
CONTROL HTR LO
+28VDC MDV TO TEMP. IND.
33 34 27 28
PSA TRAY 7 - 45A7
S3 TB-2
R20 M21 N3 N5 N4 M22 N22 T20 T21 S21 TB-3
0VDC-IMU
G5 TB1
TB-2
K8 R5 N5 D1
E6
E8
67 P1 56J8
+28VDC-MDV
MAP & DATA VIEWER 15
10 8 P1 56J10
+28VDC-IMU TO COMPUTER RELAY
+28VDC-MDV
NAV KYB'D & DISPLAY PANEL 05A6
67 51 P1 56J9
+28VDC MDV FROM MDV POWER SWITCH
+28VDC-MDV
G&N INDICATOR CONTROL PANEL 50A1
V W D J2 56P6
h J3 56P3
CONTROL HEATER HI
CONTROL HEATER LO
+28VDC-IMU
+28VDC IMU
IMU 35
4 20 19 J1 56P9
+28VDC AGC
+28VDC STANDBY
+28VDC IMU
SIG. COND. MODULE 45A11
89 7 J1 56P1
+28VDC-MDV
+28VDC-IMU
D&C ELECTRONICS 50A3
16 30 15 P1 56J3
+28VDC IMU
+28VDC IMU-OG MDA
+28VDC CDU NOT LOCK
OG CDU 40A3
16 30 15 P1 56J2
+28VDC IMU
+28VDC IMU-MG MDA
+28VDC CDU NOT LOCK
MG CDU 40A5
16 30 15 P1 56J1
+28VDC IMU
+28VDC IMU IG MDA
+28VDC CDU NOT LOCK
IG CDU 40A4

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
		FRACTIONS DECIMALS ANGLES + + + − − −	ACSP PN			
			DRAWN C. KORSAN DATE 10-21-63	APOLLO INERTIAL SUBSYSTEM +28VDC POWER DISTRIBUTION		
			CHECKED 11-19-63			
			APPROVAL 11-19-63			
		DO NOT SCALE THIS DRAWING	APPROVAL			
		MATERIAL	NASA APPROVAL 11/15/63	CODE IDENT NO.	SIZE E	1010082
NEXT ASSY	USED ON		MIT APPROVAL			
APPLICATION		CONTRACT		SCALE		SHEET

INCHES
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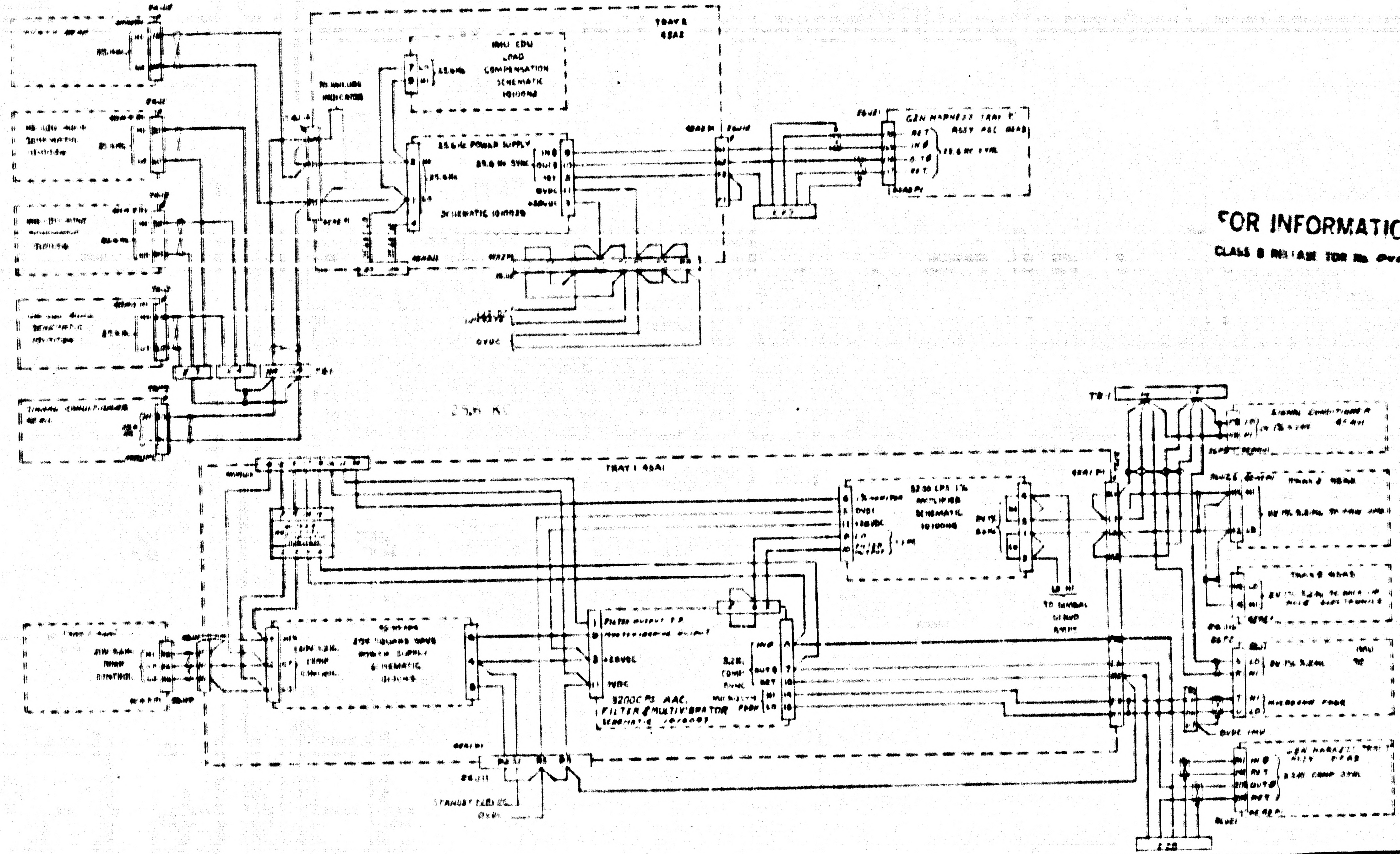
PHOTOGRAPHIC SCALE ONLY


TRAY 2
IMU CDU LOAD COMPENSATION SCHEMATIC
25.6KC POWER SUPPLY
SCHEMATIC 1010020
GEN HARNESS TRAY 2
25.6 KC
TRAY 1 45A1
3200 CPS 1% AMPLIFIER SCHEMATIC
TO GIMBAL SERVO AMPS
28VDC
3200CPS AAC. FILTER & MULTIVIBRATOR SCHEMATIC
SIGNAL CONDITIONER
TB-1
STANDBY CABLE
3200CPS

FOR INFORMATION ONLY

CLASS II RELEASE

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ + +
- - -
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

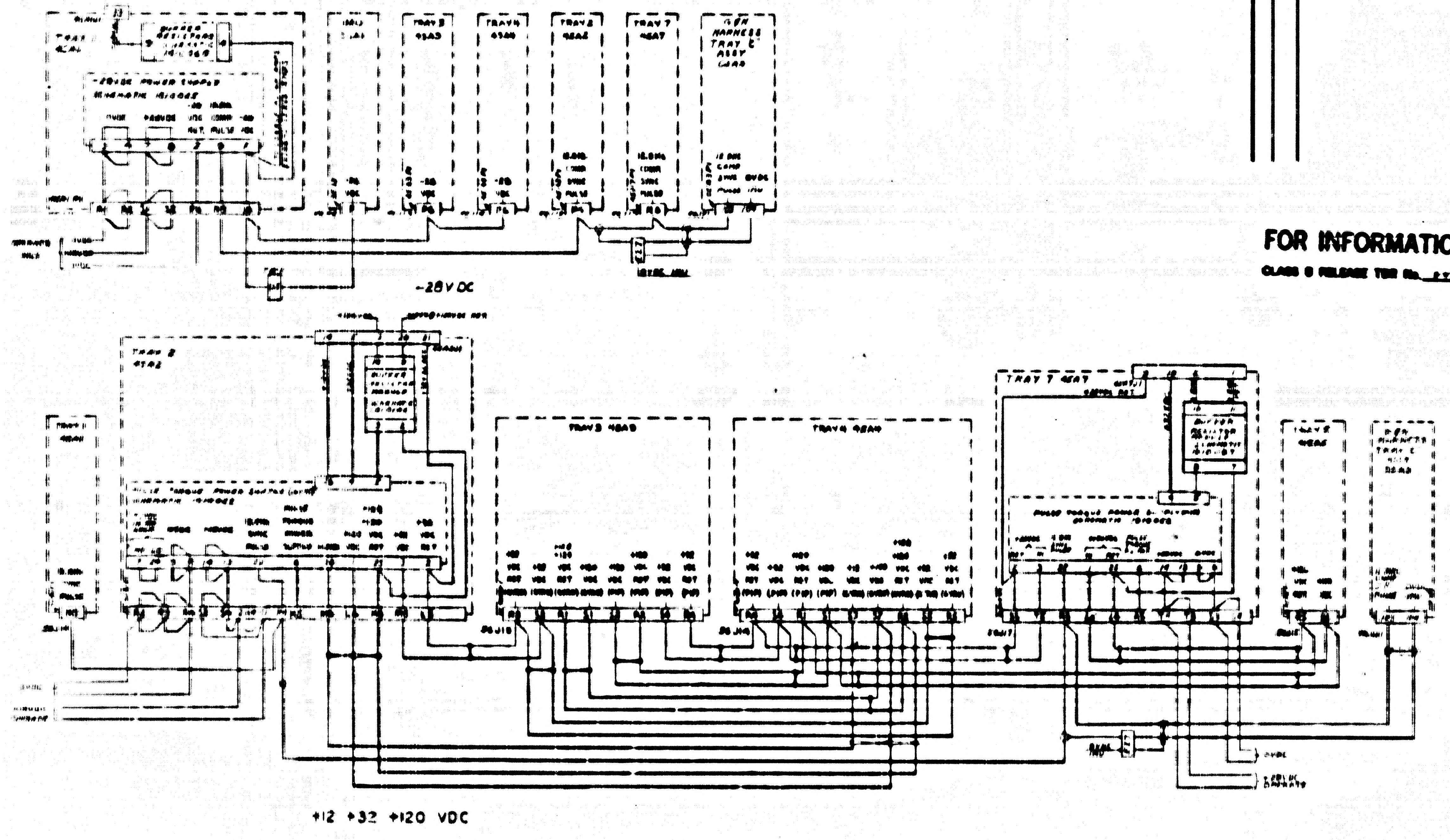
AC SPARK PLUG DIVISION GMC
MILWAUKEE, WISCONSIN

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO INERTIAL SUBSYSTEM
3200CPS, 25.6KC
POWER DISTRIBUTION

1010083

INCHES
PHOTOGRAPHIC SCALE ONLY



-28VDC
TRAY 2 4SA2
TRAY 3 4SA3
TRAY 4 4SA4
TRAY 7 4SA7
+12 +32 +120 VDC

REVISIONS

FOR INFORMATION ONLY

CLASS 0 RELEASE TDR No. 2762 DATE 4/19/67

NEXT ASSY	USED ON
APPLICATION	

DO NOT SCALE THIS DRAWING

CONTRACT

AC SPARK PLUG DIVISION GMC
MILWAUKEE, WISCONSIN

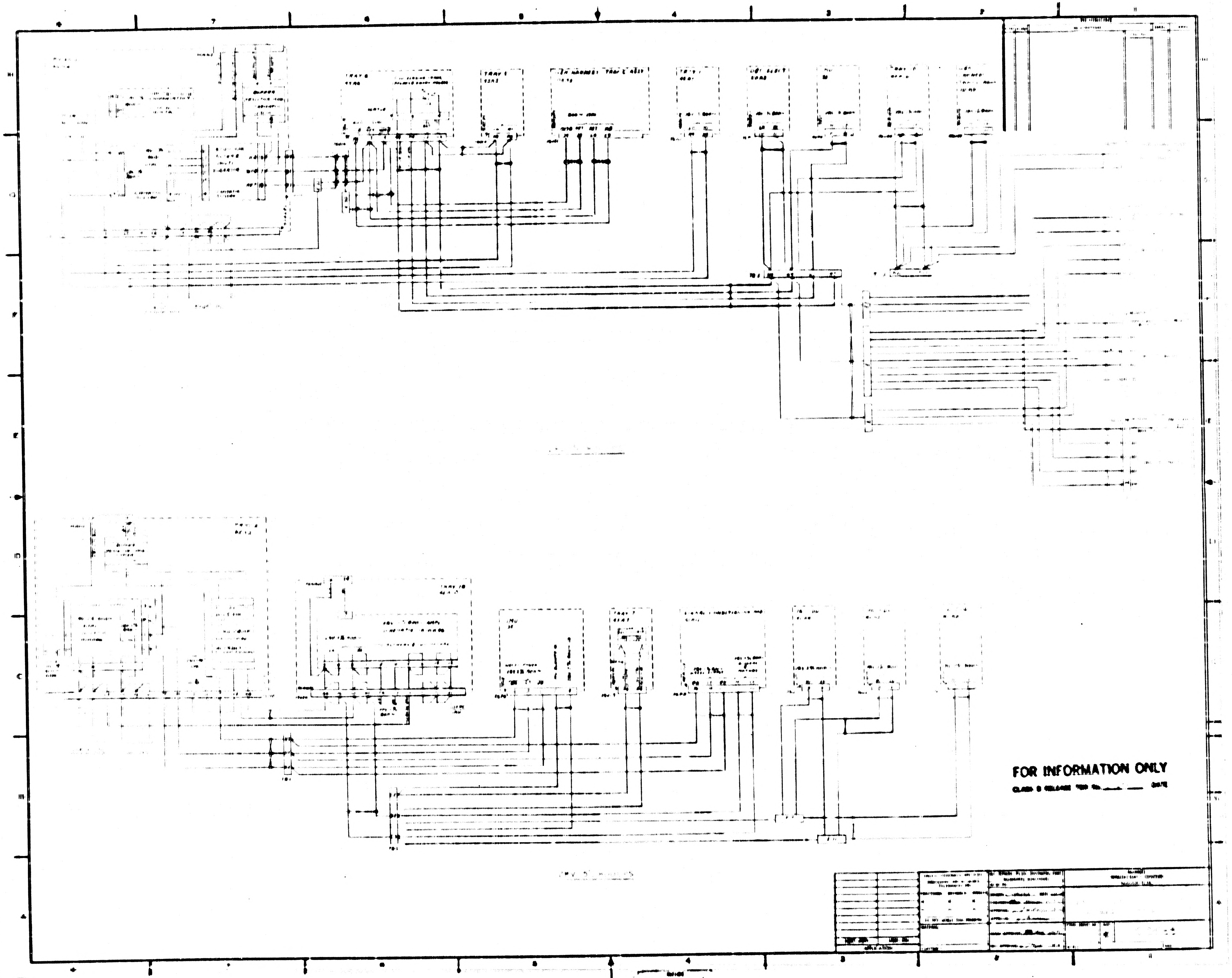
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

APOLLO INERTIAL SUBSYSTEM
-28 +12 +32 +120 VDC
POWER DISTRIBUTION

D 1010084

SCALE SHEET

INCHES
PHOTOGRAPHIC SCALE ONLY



FOR INFORMATION ONLY

CLASS B RELEASE TDP No.______ DATE

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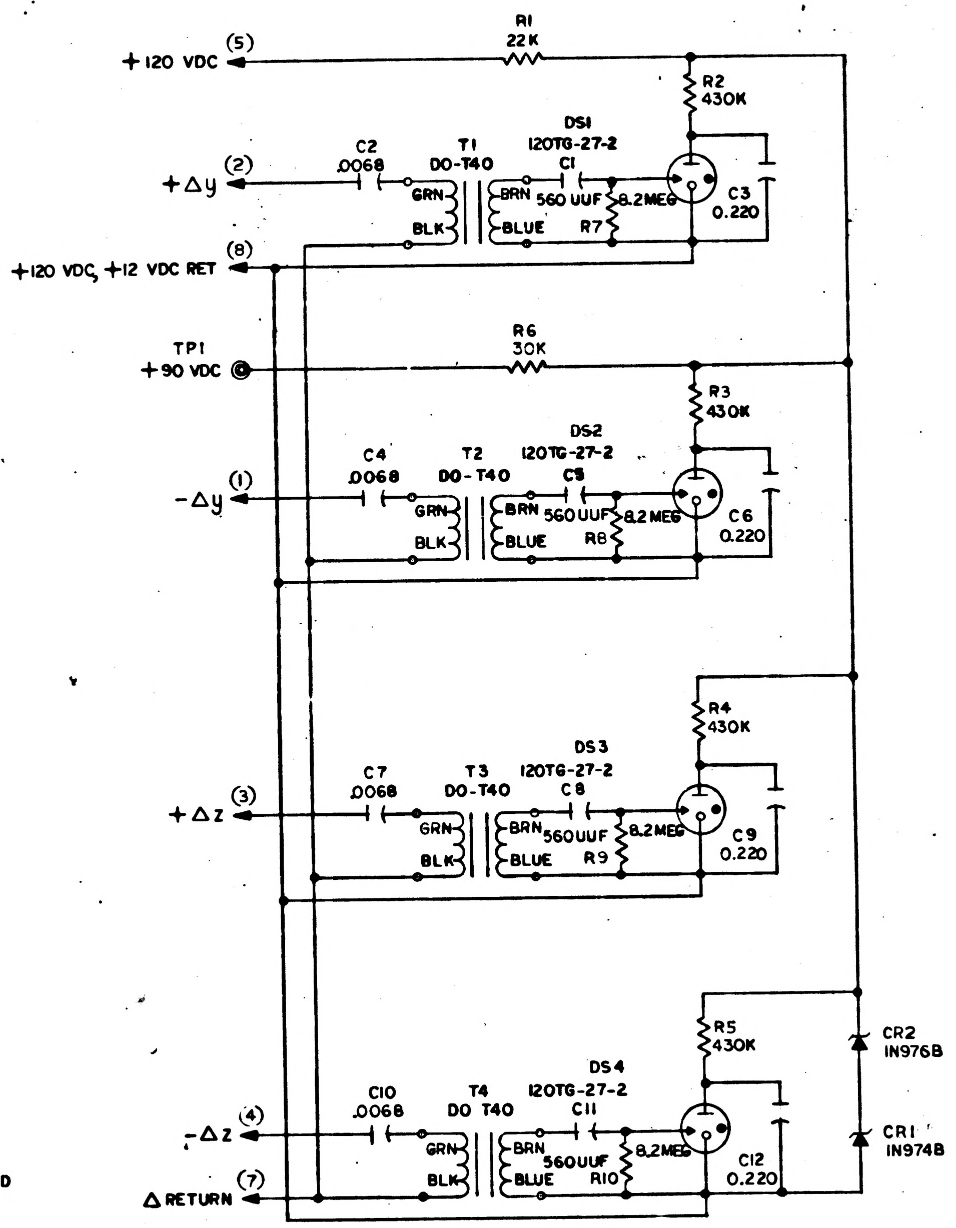
REVISIONS TM01954

SYM	DESCRIPTION	DATE	APPROVAL


(5)
+120 VDC
R1
22K
R2
430K
DS1
120TG-27-2
C2
.0068
T1
DO-T40
C1
(2)
+Δy
GRN
BLK
BRN
BLUE
560 UUF
8.2MEG
R7
C3
0.220
(8)
+120 VDC, +12 VDC RET
TP1
+90 VDC
R6
30K
R3
430K
DS2
120TG-27-2
C4
.0068
T2
DO-T40
C5
(1)
-Δy
GRN
BLK
BRN
BLUE
560UUF
8.2 MEG
R8
C6
0.220
R4
430K
DS3
120TG-27-2
C7
.0068
T3
DO-T40
C8
(3)
+Δz
GRN
BLK
BRN
BLUE
560UUF
8.2MEG
R9
C9
0.220
R5
430K
CR2
IN976B
DS4
120TG-27-2
C10
.0068
T4
DO T40
C11
(4)
-Δz
GRN
BLK
BRN
BLUE
560UUF
8.2MEG
R10
C12
0.220
CR1
IN974B
(7)
Δ RETURN

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTORS ARE $\frac{1}{4}$W ± 2%
3. UNLESS OTHERWISE SPECIFIED CAPACITORS ARE IN MICROFARADS
4. UNLESS OTHERWISE SPECIFIED RESISTORS ARE IN OHMS

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO.
CONTRACT
DRAWN J. Cowley DATE 6-27-63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
LAMPS BACK UP MODE
ELECTRONICS PIPA-GYRO

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010086
SCALE
WT
SHEET 1 OF 2

1010086

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS - TDR# 31957

SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R 1	1006750-64	RESISTOR	22 K	2 %	1/4 W
R 2	1010369-96	↓	430 K	5 %	1/8 W
R 3	↓	↓	↓	↓	↓
R 4	↓	↓	↓	↓	↓
R 5	↓	↓	↓	↓	↓
R 6	1006750-67	↓	30 K	2 %	1/4 W
R 7	1010369-127	↓	8.2 K	5 %	1/8 W
R 8	↓	↓	↓	↓	↓
R 9	↓	↓	↓	↓	↓
R 10	↓	↓	↓	↓	↓
C 1	1010359-14	CAPACITOR	560 UUF	± 20 %	200 V
C 2	1006777-30	↓	.0068	± 10 %	100 V DC
C 3	1010264-29	↓	.220	± 5 %	200 V
C 4	1006777-30	↓	.0068	± 10 %	100 V
C 5	1010359-14	↓	560 UUF	± 20 %	200 V
C 6	1010264-29	↓	.220	± 5 %	200 V
C 7	1006777-30	↓	.0068	± 10 %	100 V
C 8	1010359-14	↓	560 UUF	± 20 %	200 V
C 9	1010264-29	↓	.220	± 5 %	200 V
C 10	1006777-30	↓	.0068	± 10 %	100 V
C 11	1010359-14	↓	560 UUF	± 20 %	200 V
C 12	1010264-29	↓	220	± 5 %	200 V DC
CR1	1010286-18	DIODE			
CR2	1010286-20	DIODE			
T 1	1010315	TRANSFORMER			
T 2	↓	↓			
T 3	↓	↓			
T 4	↓	↓			
DS1	1010465	LAMP			
DS2	↓	↓			
DS3	↓	↓			
DS4	↓	↓			

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±# DECIMALS ±# ANGLES ±#
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN J.F. Walsh DATE 7/1/63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL M.B. Trageser 7/19/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC,
LAMPS BACK-UP MODE ELECTRONICS PIPA-GYRO

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010086
SCALE #
WT
SHEET 2 OF 2

1010086

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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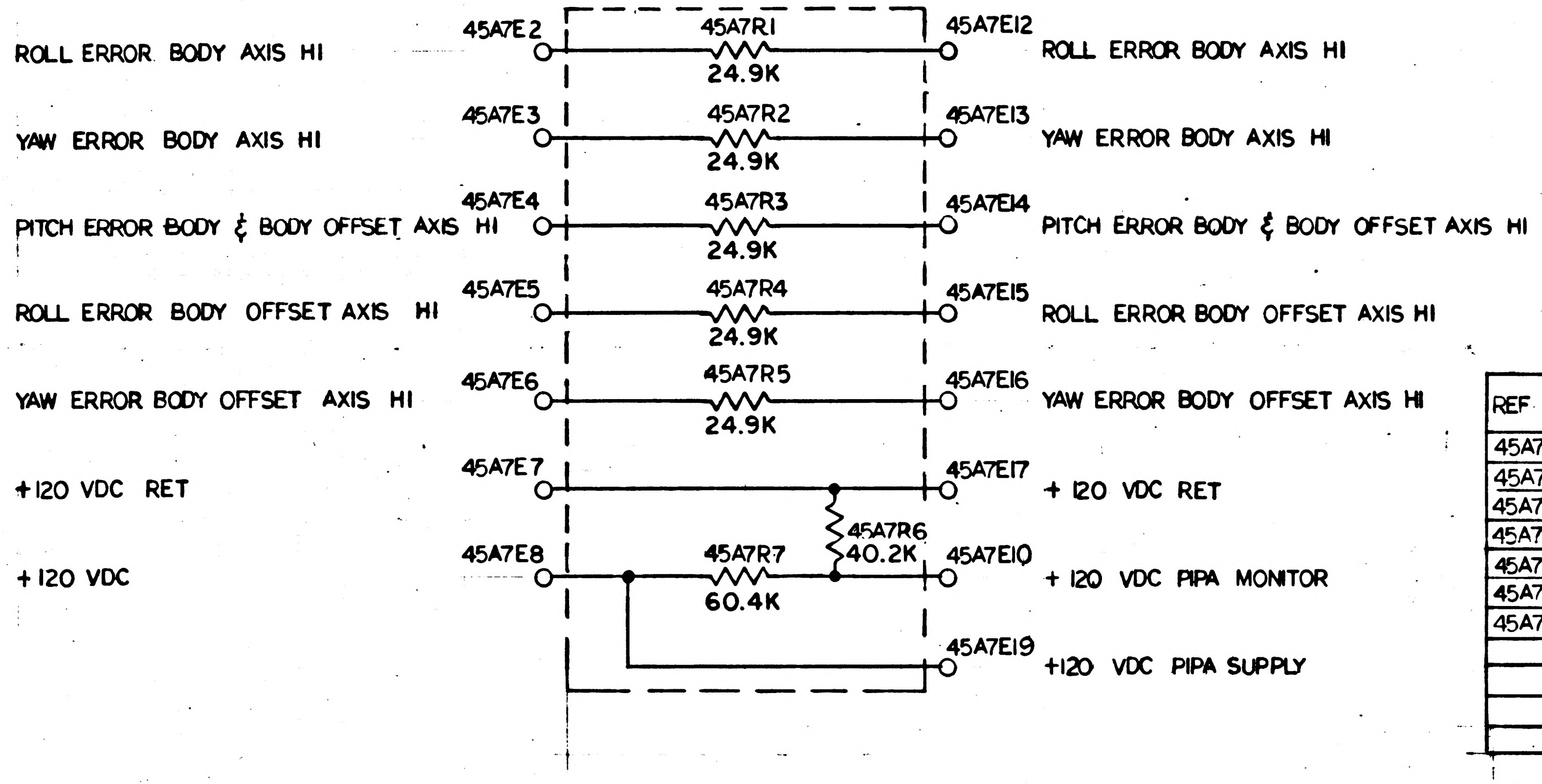
A 6800101 (M)

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02538	8-14-63	JJM WK


45A7E2
45A7R1
24.9K
45A7E12
ROLL ERROR BODY AXIS HI
ROLL ERROR BODY AXIS HI
45A7E3
45A7R2
24.9K
45A7E13
YAW ERROR BODY AXIS HI
YAW ERROR BODY AXIS HI
45A7E4
45A7R3
24.9K
45A7E14
PITCH ERROR BODY & BODY OFFSET AXIS HI
PITCH ERROR BODY & BODY OFFSET AXIS HI
45A7E5
45A7R4
24.9K
45A7E15
ROLL ERROR BODY OFFSET AXIS HI
ROLL ERROR BODY OFFSET AXIS HI
45A7E6
45A7R5
24.9K
45A7E16
YAW ERROR BODY OFFSET AXIS HI
YAW ERROR BODY OFFSET AXIS HI
45A7E7
45A7E17
+120 VDC RET
+120 VDC RET
45A7R6
40.2K
45A7E8
45A7R7
60.4K
45A7E10
+120 VDC
+120 VDC PIPA MONITOR
45A7E19
+120 VDC PIPA SUPPLY

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 DATE 8-7-63

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
45A7R1	1010364-519	RESISTOR	24.9K	±1%	1/8W
45A7R2	-519		24.9K		
45A7R3	-519		24.9K		
45A7R4	-519		24.9K		
45A7R5	-519		24.9K		
45A7R6	-559		40.2K		
45A7R7	↓ -593	↓	60.4K	↓	↓

NOTES:—

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Louis A Lowe DATE 24-July-63
CHECKED
APPROVAL D. A. [illegible] 8-6-63
APPROVAL
NASA APPROVAL [illegible] 8/7/63
MIT APPROVAL W Kupfer 7 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY #7

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010089
SCALE — WT SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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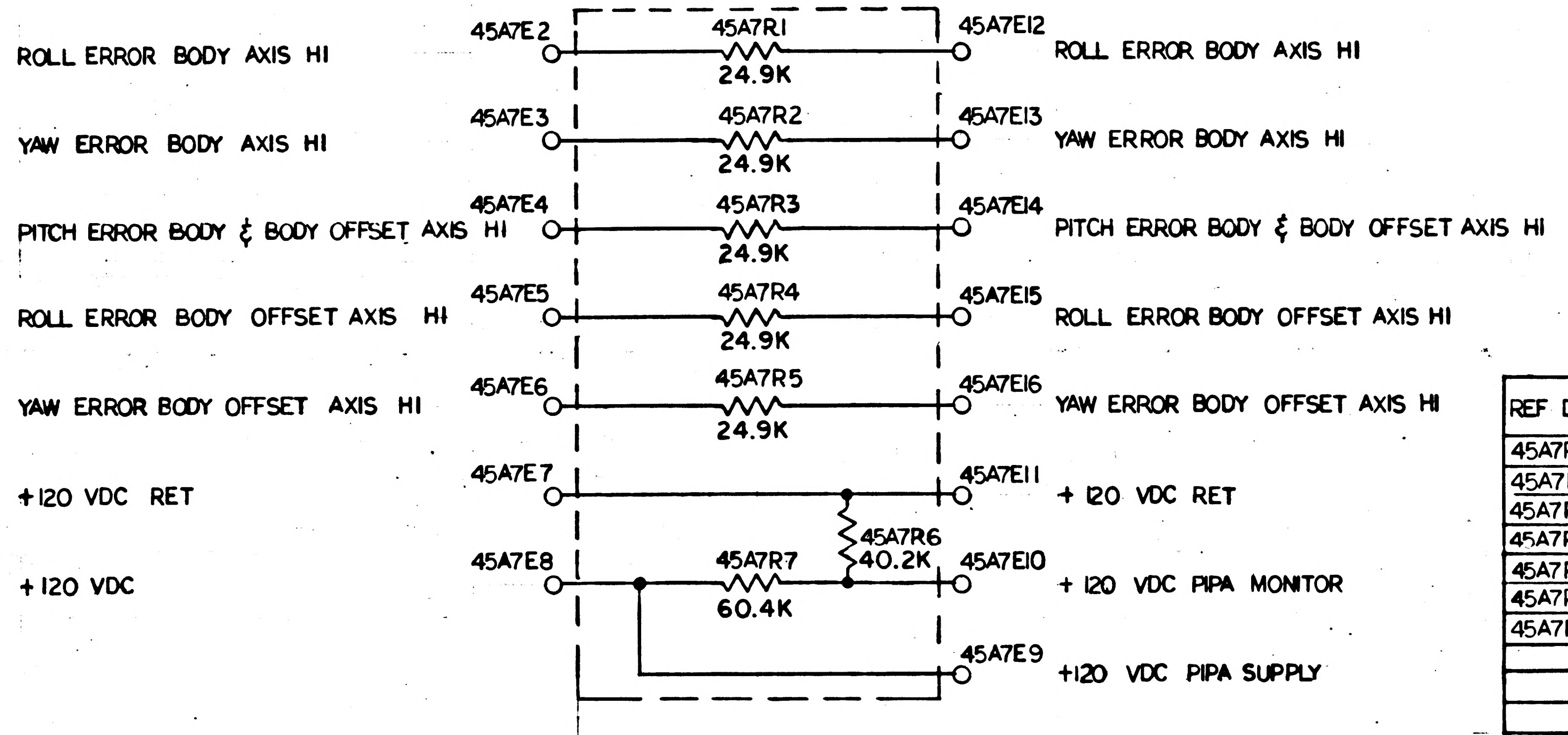
B 6800101

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02538	8-14-63	J.J.M. WK.
B	REVISED PER TDRR 02709	8-21-63	J.J.M.



ROLL ERROR BODY AXIS HI
45A7E2
45A7R1
24.9K
45A7E12
ROLL ERROR BODY AXIS HI
YAW ERROR BODY AXIS HI
45A7E3
45A7R2
24.9K
45A7E13
YAW ERROR BODY AXIS HI
PITCH ERROR BODY & BODY OFFSET AXIS HI
45A7E4
45A7R3
24.9K
45A7E14
PITCH ERROR BODY & BODY OFFSET AXIS HI
ROLL ERROR BODY OFFSET AXIS HI
45A7E5
45A7R4
24.9K
45A7E15
ROLL ERROR BODY OFFSET AXIS HI
YAW ERROR BODY OFFSET AXIS HI
45A7E6
45A7R5
24.9K
45A7E16
YAW ERROR BODY OFFSET AXIS HI
+120 VDC RET
45A7E7
45A7E11
+120 VDC RET
45A7R6
40.2K
+120 VDC
45A7E8
45A7R7
60.4K
45A7E10
+120 VDC PIPA MONITOR
45A7E9
+120 VDC PIPA SUPPLY

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 DATE 8-9-63

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
45A7R1	1010364-519	RESISTOR	24.9K	±1%	1/8 W
45A7R2	-519		24.9K		
45A7R3	-519		24.9K		
45A7R4	-519		24.9K		
45A7R5	-519		24.9K		
45A7R6	-559		40.2K		
45A7R7	↓ -593	↓	60.4K	↓	↓

NOTES:—
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIDED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN Louis A Lowe DATE 24-July-63
CHECKED
APPROVAL D. A. ... 8-6-63
APPROVAL
NASA APPROVAL 8/7/63
MIT APPROVAL 7 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY #7

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1010089
SCALE — | WT | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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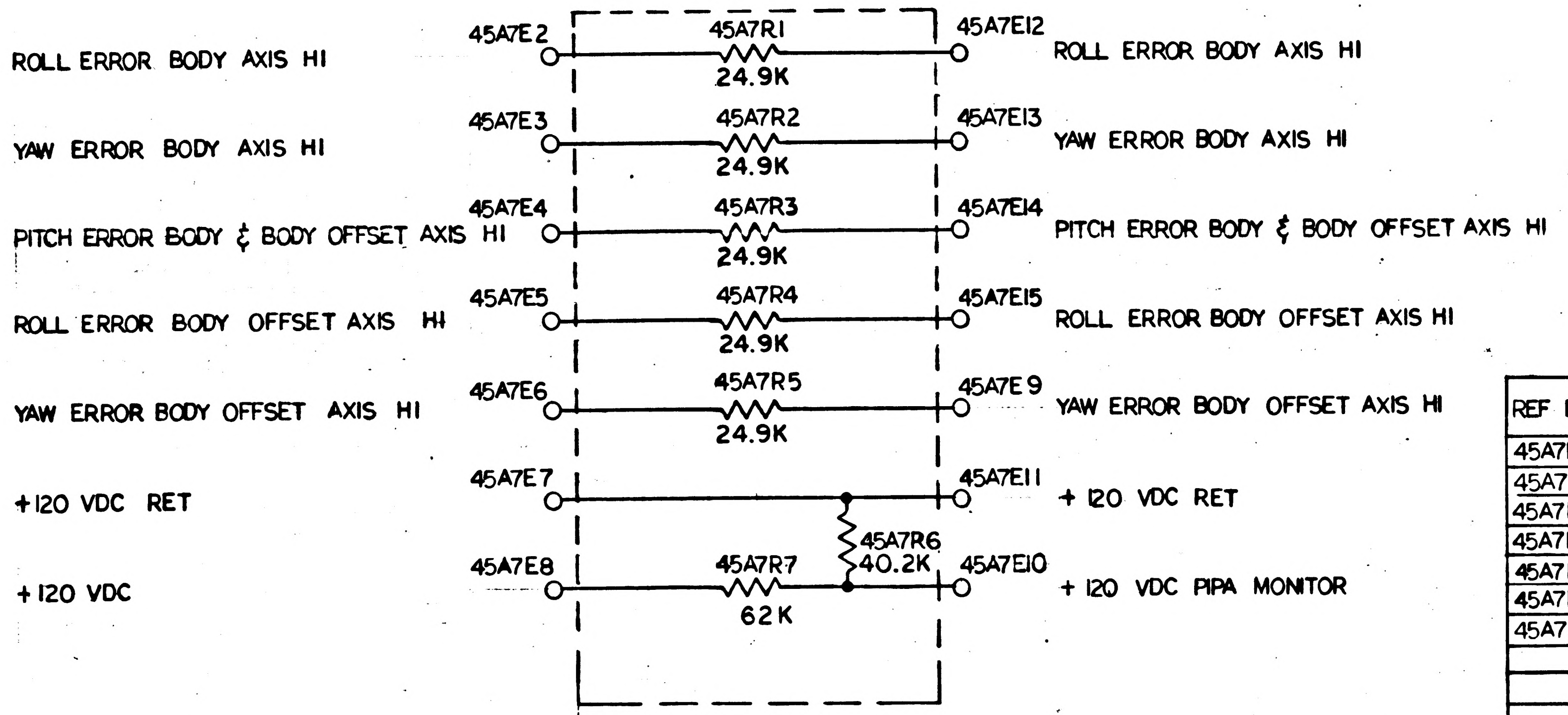
B 6800101

REVISIONS Class B - 02437

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02538	8-14-63	JJM WK
B	REVISED PER TDRR 02709	8-21-63	JJM WK
C	REVISED PER TDRR 03089	9/12/63	JJM WK



ROLL ERROR BODY AXIS HI
45A7E2
45A7R1
24.9K
45A7E12
ROLL ERROR BODY AXIS HI
YAW ERROR BODY AXIS HI
45A7E3
45A7R2
24.9K
45A7E13
YAW ERROR BODY AXIS HI
PITCH ERROR BODY & BODY OFFSET AXIS HI
45A7E4
45A7R3
24.9K
45A7E14
PITCH ERROR BODY & BODY OFFSET AXIS HI
ROLL ERROR BODY OFFSET AXIS HI
45A7E5
45A7R4
24.9K
45A7E15
ROLL ERROR BODY OFFSET AXIS HI
YAW ERROR BODY OFFSET AXIS HI
45A7E6
45A7R5
24.9K
45A7E9
YAW ERROR BODY OFFSET AXIS HI
+120 VDC RET
45A7E7
45A7E11
+120 VDC RET
45A7R6
40.2K
+120 VDC
45A7E8
45A7R7
62K
45A7E10
+120 VDC PIPA MONITOR

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
45A7R1	1010364-519	RESISTOR	24.9K	±1%	1/8W
45A7R2	-519		24.9K		
45A7R3	-519		24.9K		
45A7R4	-519		24.9K		
45A7R5	-519		24.9K		
45A7R6	-559		40.2K		
45A7R7	1006750-75		62 K	2%	1/4 W

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIDED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Louis Alcove DATE 4 July 63
CHECKED
APPROVAL D. A. [illegible] 8-6-63
APPROVAL
NASA APPROVAL [illegible] 8/7/63
MIT APPROVAL W Kupfer 7 Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY #7

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010089
SCALE — WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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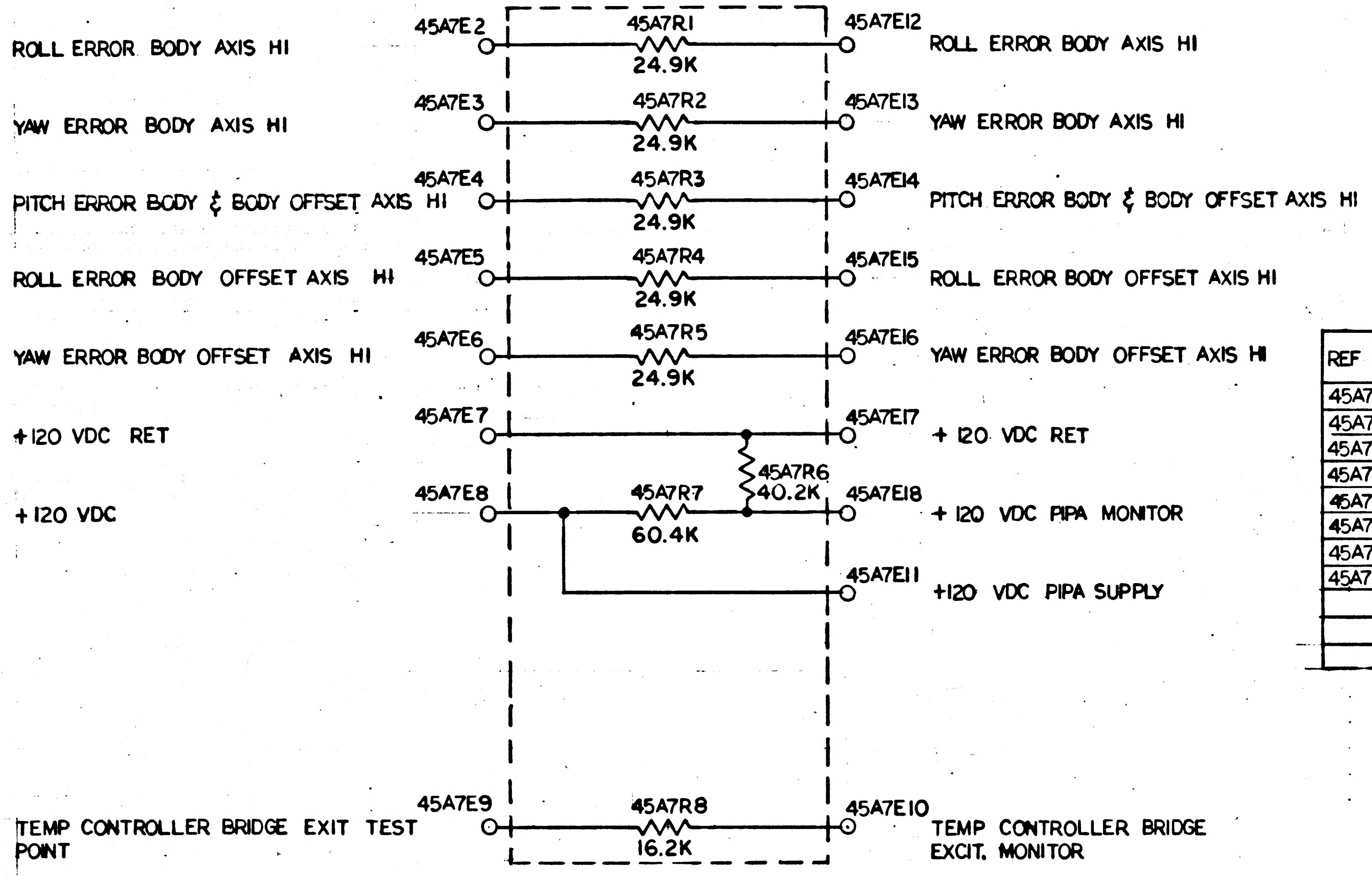
6800101

SYM	REVISIONS DESCRIPTION	DATE	APPROVAL



45A7E2
ROLL ERROR BODY AXIS HI
45A7R1
24.9K
45A7E12
ROLL ERROR BODY AXIS HI
45A7E3
YAW ERROR BODY AXIS HI
45A7R2
24.9K
45A7E13
YAW ERROR BODY AXIS HI
45A7E4
PITCH ERROR BODY & BODY OFFSET AXIS HI
45A7R3
24.9K
45A7E14
PITCH ERROR BODY & BODY OFFSET AXIS HI
45A7E5
ROLL ERROR BODY OFFSET AXIS HI
45A7R4
24.9K
45A7E15
ROLL ERROR BODY OFFSET AXIS HI
45A7E6
YAW ERROR BODY OFFSET AXIS HI
45A7R5
24.9K
45A7E16
YAW ERROR BODY OFFSET AXIS HI
45A7E7
+120 VDC RET
45A7E17
+ 120 VDC RET
45A7R6
40.2K
45A7E8
+120 VDC
45A7R7
60.4K
45A7E18
+ 120 VDC PIPA MONITOR
45A7E11
+120 VDC PIPA SUPPLY
45A7E9
TEMP CONTROLLER BRIDGE EXIT TEST POINT
45A7R8
16.2K
45A7E10
TEMP CONTROLLER BRIDGE EXCIT. MONITOR

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 **DATE** 8-7-63

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
45A7R1	1010364-519	RESISTOR	24.9K	± 1%	1/8 W
45A7R2	-519		24.9K		
45A7R3	-519		24.9K		
45A7R4	-519		24.9K		
45A7R5	-519		24.9K		
45A7R6	-559		40.2K		
45A7R7	-593		60.4K		
45A7R8	↓ -483	↓	16.2K	↓	↓

NOTES:—
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIDED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Louis A Lowe DATE 24 July 63
CHECKED
APPROVAL D. R. [illegible] 8-6-63
APPROVAL
NASA APPROVAL [illegible] 8/7/63
MIT APPROVAL W [illegible] 7 Aug 63

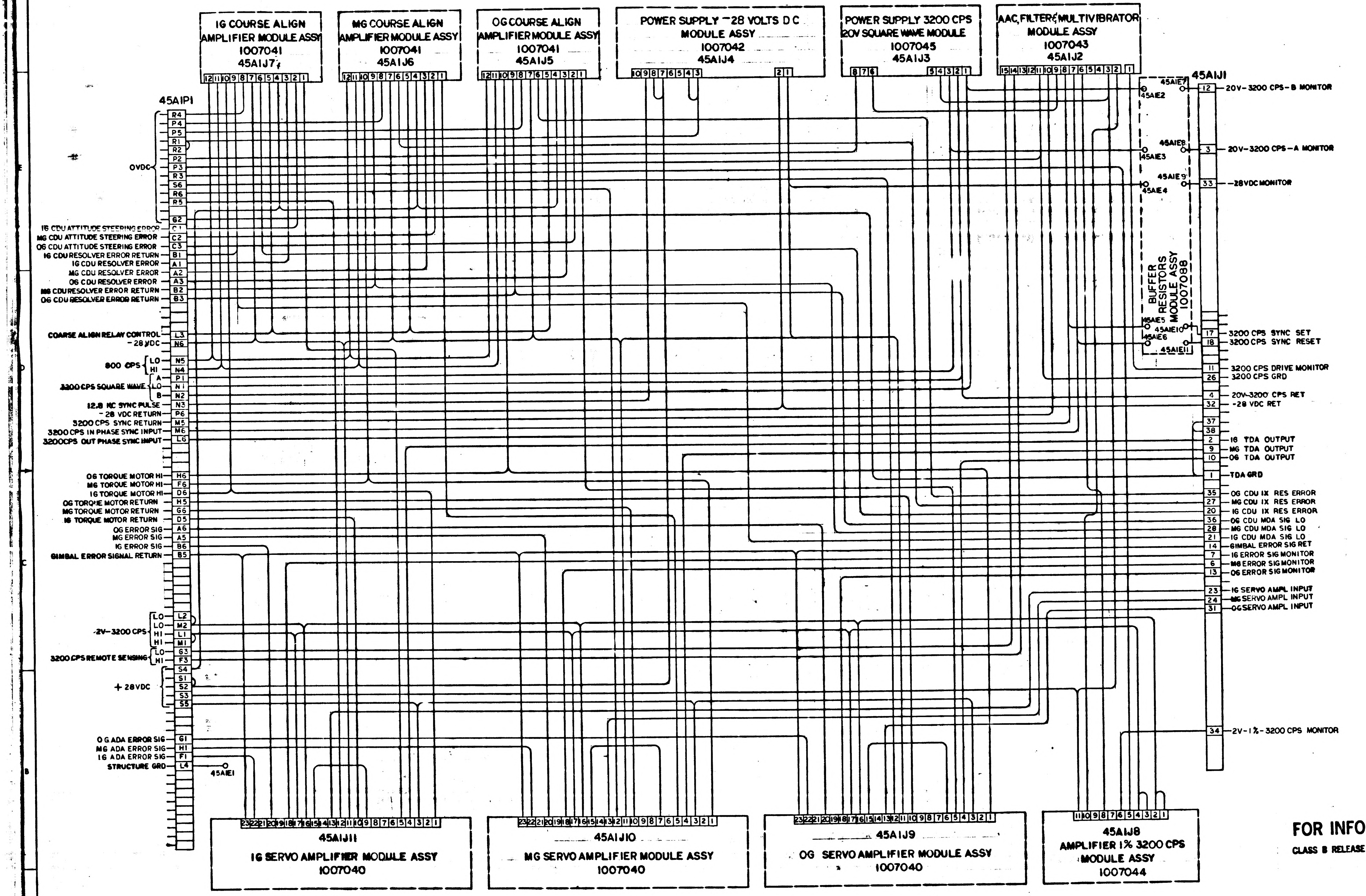
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY #7

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010089
SCALE —
WT
SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDR 02715		



IG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J7
MG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J6
OG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J5
POWER SUPPLY -28 VOLTS D C MODULE ASSY 1007042 45A1J4
POWER SUPPLY 3200 CPS 20V SQUARE WAVE MODULE 1007045 45A1J3
AAC, FILTER & MULTIVIBRATOR MODULE ASSY 1007043 45A1J2
45A1P1
45A1J1
BUFFER RESISTORS MODULE ASSY 1007088
45A1E1
45A1E2
45A1E3
45A1E4
45A1E5
45A1E6
45A1E7
45A1E8
45A1E9
45A1E10
45A1E11
0VDC
IG CDU ATTITUDE STEERING ERROR
MG CDU ATTITUDE STEERING ERROR
OG CDU ATTITUDE STEERING ERROR
IG CDU RESOLVER ERROR RETURN
IG CDU RESOLVER ERROR
MG CDU RESOLVER ERROR
OG CDU RESOLVER ERROR
MG CDU RESOLVER ERROR RETURN
OG CDU RESOLVER ERROR RETURN
COARSE ALIGN RELAY CONTROL
-28 VDC
800 CPS LO HI
3200 CPS SQUARE WAVE A LO B HI
12.8 KC SYNC PULSE
-28 VDC RETURN
3200 CPS SYNC RETURN
3200 CPS IN PHASE SYNC INPUT
3200 CPS OUT PHASE SYNC INPUT
OG TORQUE MOTOR HI
MG TORQUE MOTOR HI
IG TORQUE MOTOR HI
OG TORQUE MOTOR RETURN
MG TORQUE MOTOR RETURN
IG TORQUE MOTOR RETURN
OG ERROR SIG
MG ERROR SIG
IG ERROR SIG
GIMBAL ERROR SIGNAL RETURN
-2V-3200 CPS LO LO HI HI
3200 CPS REMOTE SENSING LO HI
+28VDC
OG ADA ERROR SIG
MG ADA ERROR SIG
IG ADA ERROR SIG
STRUCTURE GRD
R4 P4 P5 R1 R2 P2 P3 R3 S6 R6 R5 G2 C1 C2 C3 B1 A1 A2 A3 B2 B3 L3 N6 N5 N4 P1 N1 N2 N3 P6 M5 M6 L6 H6 F6 D6 H5 G6 D5 A6 A5 B6 B5 L2 M2 L1 M1 G3 F3 S4 S1 S2 S3 S5 G1 H1 F1 L4
12 20V-3200 CPS-B MONITOR
3 20V-3200 CPS-A MONITOR
33 -28VDC MONITOR
17 3200 CPS SYNC SET
18 3200 CPS SYNC RESET
11 3200 CPS DRIVE MONITOR
26 3200 CPS GRD
4 20V-3200 CPS RET
32 -28 VDC RET
37
38
2 IG TDA OUTPUT
9 MG TDA OUTPUT
10 OG TDA OUTPUT
1 TDA GRD
35 OG CDU IX RES ERROR
27 MG CDU IX RES ERROR
20 IG CDU IX RES ERROR
36 OG CDU MDA SIG LO
28 MG CDU MDA SIG LO
21 IG CDU MDA SIG LO
14 GIMBAL ERROR SIG RET
7 IG ERROR SIG MONITOR
6 MG ERROR SIG MONITOR
13 OG ERROR SIG MONITOR
23 IG SERVO AMPL INPUT
24 MG SERVO AMPL INPUT
31 OG SERVO AMPL INPUT
34 2V-1%-3200 CPS MONITOR
45A1J11 IG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J10 MG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J9 OG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J8 AMPLIFIER 1% 3200 CPS MODULE ASSY 1007044

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02000 DATE 7-17-63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:
GIMBAL SERVO AMPLIFIER — 1010024
GIMBAL COARSE ALIGN AMLIFIER — 1010023
3200 CPS AAC, FILTER & MULTIVIBRATOR — 1010047
POWER SUPPLY — 28VDC — 1010025
POWER SUPPLY 3200 CPS 20 V SQUARE WAVE — 1010046
AMPLIFIER 3200 CPS 1% — 1010048
BUFFER RESISTORS — 1010060

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN W.F. Troy DATE 6/25/63
CHECKED
APPROVAL 7-17-63
APPROVAL 7-17-63
NASA APPROVAL 7/17/63
MIT APPROVAL 17 Jul 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #1

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010091
SCALE —
WT
SHEET 1 OF 1

1010091 A

MASTER

INCHES
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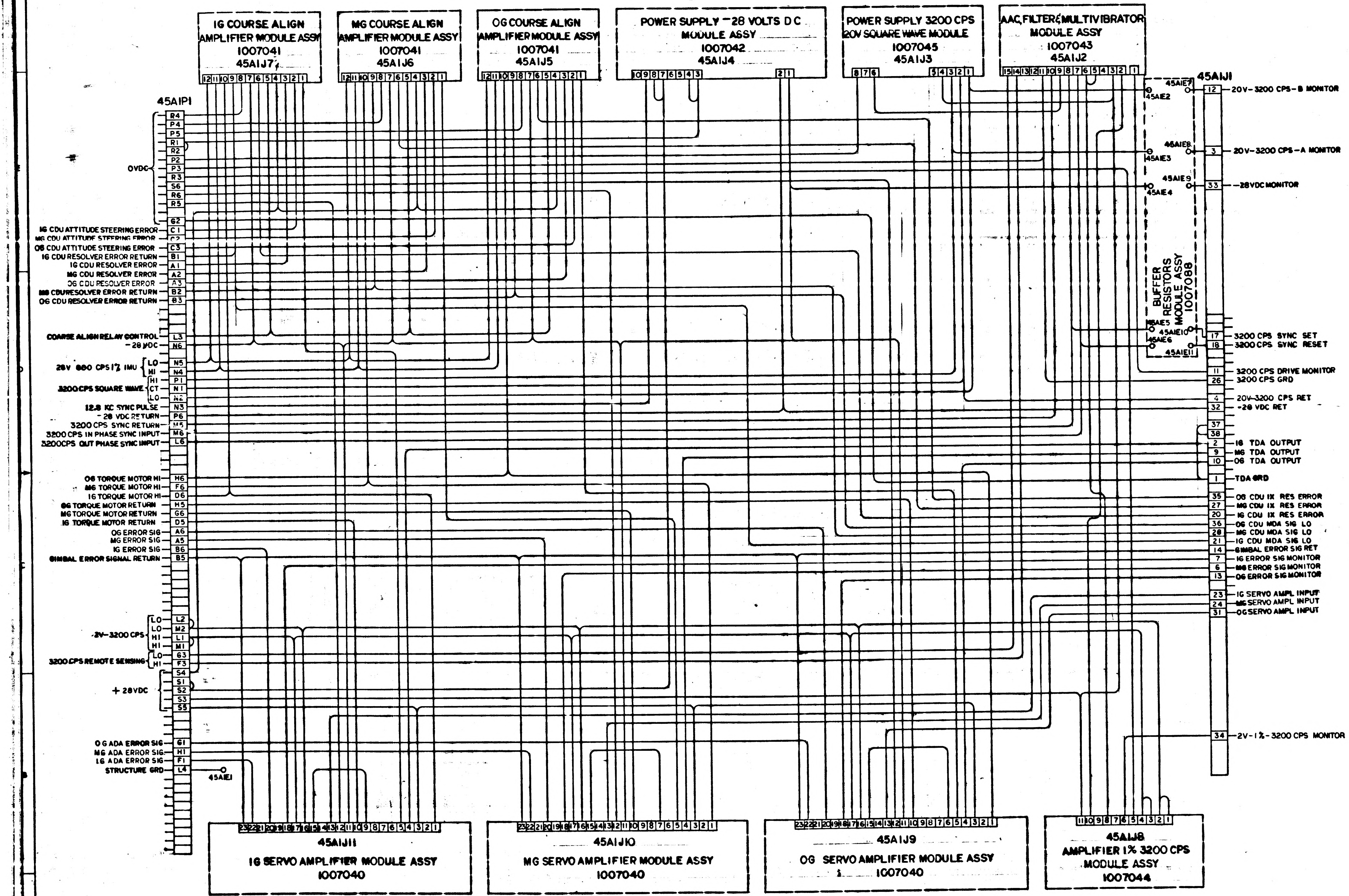
REVISIONS CLASS B TDRR 02

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02715	8-21-63	[illegible]
B	REVISED PER TDRR 03288	9-9-63	[illegible]


IG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J7
MG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J6
OG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J5
POWER SUPPLY -28 VOLTS DC MODULE ASSY 1007042 45A1J4
POWER SUPPLY 3200 CPS 20V SQUARE WAVE MODULE 1007045 45A1J3
AAC, FILTER & MULTIVIBRATOR MODULE ASSY 1007043 45A1J2
BUFFER RESISTORS MODULE ASSY 1007088
45A1P1
45A1J1
OVDC
R4
P4
P5
R1
R2
P2
P3
R3
S6
R6
R5
G2
IG CDU ATTITUDE STEERING ERROR C1
MG CDU ATTITUDE STEERING ERROR C2
OG CDU ATTITUDE STEERING ERROR C3
IG CDU RESOLVER ERROR RETURN B1
IG CDU RESOLVER ERROR A1
MG CDU RESOLVER ERROR A2
OG CDU RESOLVER ERROR A3
MG CDU RESOLVER ERROR RETURN B2
OG CDU RESOLVER ERROR RETURN B3
COARSE ALIGN RELAY CONTROL L3
-28 VDC N6
28V 800 CPS 1% IMU LO N5
HI N4
3200 CPS SQUARE WAVE HI P1
CT N1
LO N2
12.8 KC SYNC PULSE N3
-28 VDC RETURN P6
3200 CPS SYNC RETURN M5
3200 CPS IN PHASE SYNC INPUT M6
3200 CPS OUT PHASE SYNC INPUT L6
OG TORQUE MOTOR HI H6
MG TORQUE MOTOR HI F6
IG TORQUE MOTOR HI D6
OG TORQUE MOTOR RETURN H5
MG TORQUE MOTOR RETURN G6
IG TORQUE MOTOR RETURN D5
OG ERROR SIG A6
MG ERROR SIG A5
IG ERROR SIG B6
GIMBAL ERROR SIGNAL RETURN B5
2V-3200 CPS LO L2
LO M2
HI L1
HI M1
3200 CPS REMOTE SENSING LO G3
HI F3
+28VDC S4
S1
S2
S3
S5
OG ADA ERROR SIG G1
MG ADA ERROR SIG H1
IG ADA ERROR SIG F1
STRUCTURE GRD L4
45A1E1
45A1E2
45A1E3
45A1E4
45A1E5
45A1E6
45A1E7
45A1E8
45A1E9
45A1E10
45A1E11
12 20V-3200 CPS-B MONITOR
3 20V-3200 CPS-A MONITOR
33 -28VDC MONITOR
17 3200 CPS SYNC SET
18 3200 CPS SYNC RESET
11 3200 CPS DRIVE MONITOR
26 3200 CPS GRD
4 20V-3200 CPS RET
32 -28 VDC RET
37
38
2 IG TDA OUTPUT
9 MG TDA OUTPUT
10 OG TDA OUTPUT
1 TDA GRD
35 OG CDU 1X RES ERROR
27 MG CDU 1X RES ERROR
20 IG CDU 1X RES ERROR
36 OG CDU MDA SIG LO
28 MG CDU MDA SIG LO
21 IG CDU MDA SIG LO
14 GIMBAL ERROR SIG RET
7 IG ERROR SIG MONITOR
6 MG ERROR SIG MONITOR
13 OG ERROR SIG MONITOR
23 IG SERVO AMPL INPUT
24 MG SERVO AMPL INPUT
31 OG SERVO AMPL INPUT
34 2V-1%-3200 CPS MONITOR
45A1J11 IG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J10 MG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J9 OG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J8 AMPLIFIER 1% 3200 CPS MODULE ASSY 1007044

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:
GIMBAL SERVO AMPLIFIER—1010024
GIMBAL COARSE ALIGN AMLIFIER—1010023
3200 CPS AAC, FILTER & MULTIVIBRATOR—1010047
POWER SUPPLY—28VDC—1010025
POWER SUPPLY 3200 CPS 20V SQUARE WAVE—1010046
AMPLIFIER 3200 CPS 1%—1010048
BUFFER RESISTORS—1010060

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE 6/25/63
CHECKED
APPROVAL 7-1-63
APPROVAL 7-1-63
NASA APPROVAL 7/17/63
MIT APPROVAL 7/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 9

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010091
SCALE —
WT
SHEET 1 OF 1

1010091 B

INCHES
0 1 2
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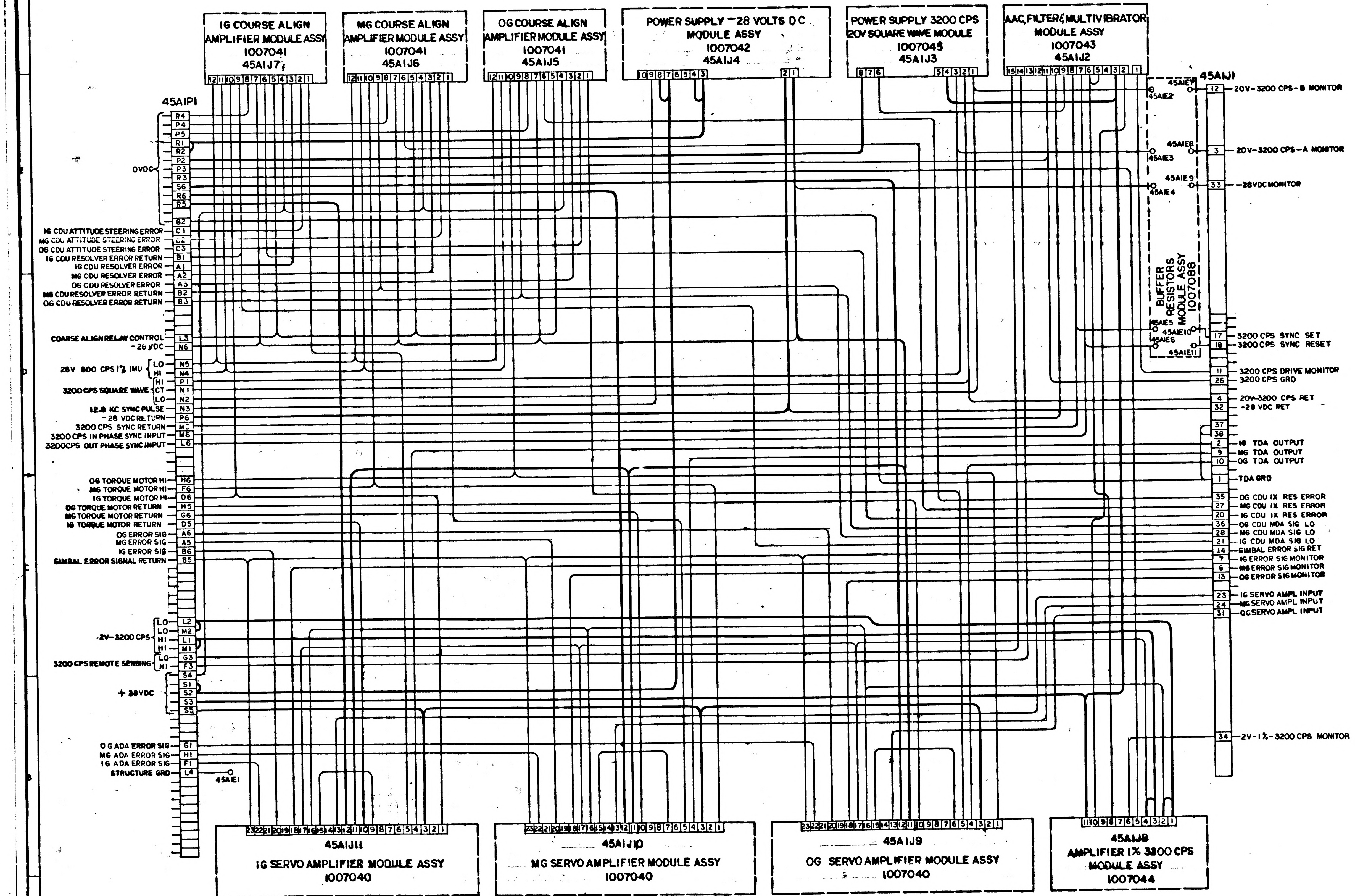
REVISIONS CLASS B TDRR 02

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02715	8-21-63	
B	REVISED PER TDRR 03284	7-19-63	
C	REVISED PER TDRR 04109	10-28-63	



1G COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J7
MG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J6
OG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J5
POWER SUPPLY -28 VOLTS D C MODULE ASSY 1007042 45A1J4
POWER SUPPLY 3200 CPS 20V SQUARE WAVE MODULE 1007045 45A1J3
AAC, FILTER & MULTIVIBRATOR MODULE ASSY 1007043 45A1J2
45A1P1
0VDC
R4
P4
P5
R1
R2
P2
P3
R3
S6
R6
R5
G2
IG CDU ATTITUDE STEERING ERROR — C1
MG CDU ATTITUDE STEERING ERROR — C2
OG CDU ATTITUDE STEERING ERROR — C3
IG CDU RESOLVER ERROR RETURN — B1
IG CDU RESOLVER ERROR — A1
MG CDU RESOLVER ERROR — A2
OG CDU RESOLVER ERROR — A3
MG CDU RESOLVER ERROR RETURN — B2
OG CDU RESOLVER ERROR RETURN — B3
COARSE ALIGN RELAY CONTROL — L3
-28 VDC — N6
28V 800 CPS 1% IMU LO — N5
HI — N4
HI — P1
3200 CPS SQUARE WAVE CT — N1
LO — N2
12.8 KC SYNC PULSE — N3
-28 VDC RETURN — P6
3200 CPS SYNC RETURN — M5
3200 CPS IN PHASE SYNC INPUT — M6
3200CPS OUT PHASE SYNC INPUT — L6
OG TORQUE MOTOR HI — H6
MG TORQUE MOTOR HI — F6
IG TORQUE MOTOR HI — D6
OG TORQUE MOTOR RETURN — H5
MG TORQUE MOTOR RETURN — G6
IG TORQUE MOTOR RETURN — D5
OG ERROR SIG — A6
MG ERROR SIG — A5
IG ERROR SIG — B6
GIMBAL ERROR SIGNAL RETURN — B5
-2V-3200 CPS LO — L2
LO — M2
HI — L1
HI — M1
3200 CPS REMOTE SENSING LO — G3
HI — F3
+28VDC S4
S1
S2
S3
S5
O G ADA ERROR SIG — G1
MG ADA ERROR SIG — H1
IG ADA ERROR SIG — F1
STRUCTURE GRD — L4
45A1E1
45A1J1
45A1E7
45A1E2
45A1E8
45A1E3
45A1E9
45A1E4
45A1E5
45A1E10
45A1E6
45A1E11
BUFFER RESISTORS MODULE ASSY 1007088
12 — 20V-3200 CPS-B MONITOR
3 — 20V-3200 CPS-A MONITOR
33 — -28VDC MONITOR
17 — 3200 CPS SYNC SET
18 — 3200 CPS SYNC RESET
11 — 3200 CPS DRIVE MONITOR
26 — 3200 CPS GRD
4 — 20V-3200 CPS RET
32 — -28 VDC RET
37
38
2 — IG TDA OUTPUT
9 — MG TDA OUTPUT
10 — OG TDA OUTPUT
1 — TDA GRD
35 — OG CDU 1X RES ERROR
27 — MG CDU 1X RES ERROR
20 — IG CDU 1X RES ERROR
36 — OG CDU MDA SIG LO
28 — MG CDU MDA SIG LO
21 — IG CDU MDA SIG LO
14 — GIMBAL ERROR SIG RET
7 — IG ERROR SIG MONITOR
6 — MG ERROR SIG MONITOR
13 — OG ERROR SIG MONITOR
23 — IG SERVO AMPL INPUT
24 — MG SERVO AMPL INPUT
31 — OG SERVO AMPL INPUT
34 — 2V-1%-3200 CPS MONITOR
45A1J11 IG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J10 MG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J9 OG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J8 AMPLIFIER 1% 3200 CPS MODULE ASSY 1007044

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. —— INDICATES #24 GA WIRE PER 1010639-2
3. ━━ INDICATES #20 GA WIRE PER 1010639-4

SCHEMATIC REF:
GIMBAL SERVO AMPLIFIER — 1010024
GIMBAL COARSE ALIGN AMLIFIER — 1010023
3200 CPS AAC, FILTER & MULTIVIBRATOR — 1010047
POWER SUPPLY — 28VDC — 1010025
POWER SUPPLY 3200 CPS 20 V SQUARE WAVE — 1010049
AMPLIFIER 3200 CPS 1% — 1010048
BUFFER RESISTORS — 1010060

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN DATE 6/25/63
CHECKED
APPROVAL 7-12-63
APPROVAL 7-12-63
NASA APPROVAL 7-17-63
MIT APPROVAL 17 July 63

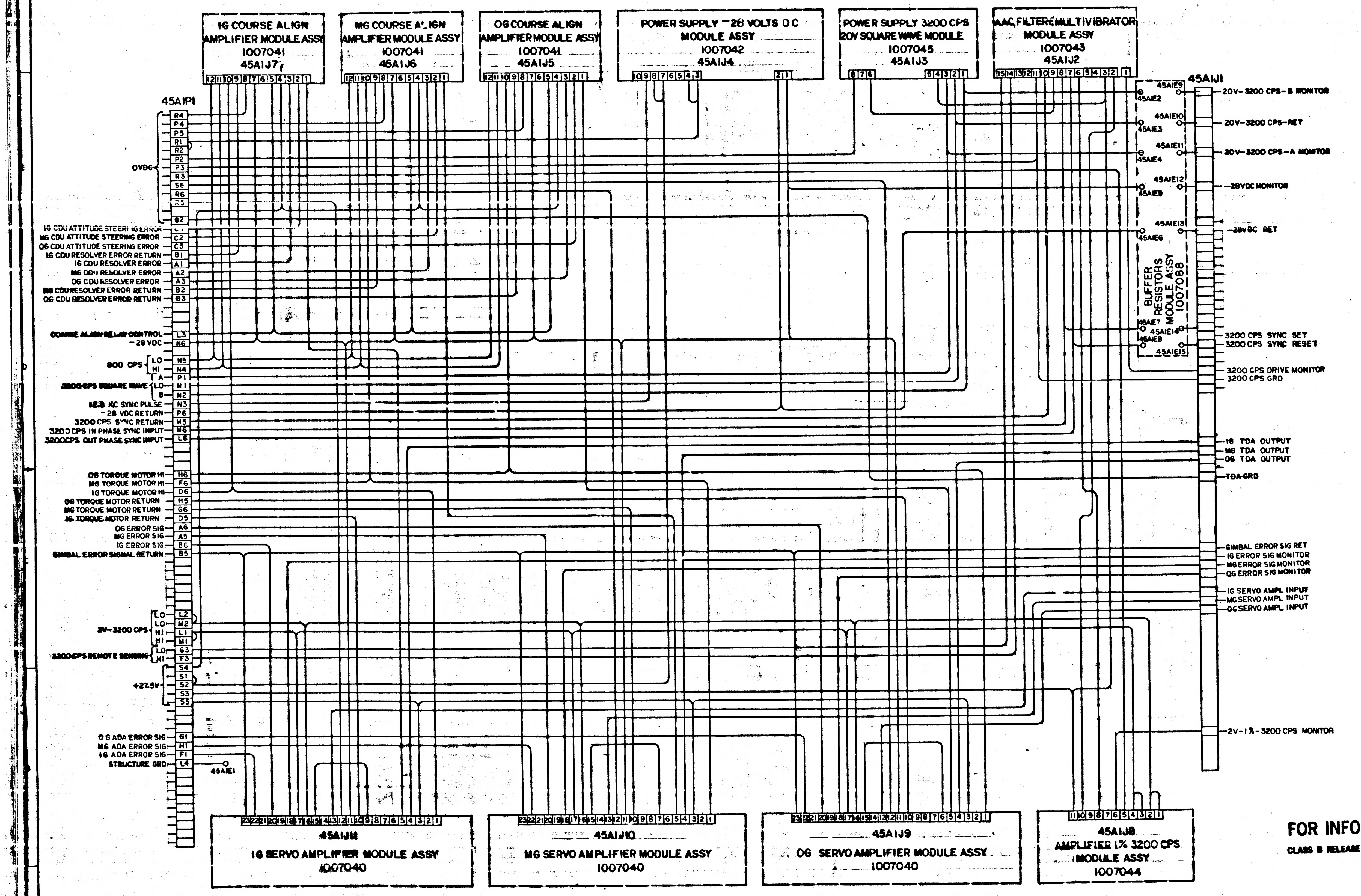
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 1

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010091
SCALE — | WT | SHEET 1 OF 1

MASTER

1010091



IG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J7
MG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J6
OG COURSE ALIGN AMPLIFIER MODULE ASSY 1007041 45A1J5
POWER SUPPLY -28 VOLTS DC MODULE ASSY 1007042 45A1J4
POWER SUPPLY 3200 CPS 20V SQUARE WAVE MODULE 1007045 45A1J3
AAC, FILTER & MULTIVIBRATOR MODULE ASSY 1007043 45A1J2
45A1P1
OVDG
R4
P4
P5
R1
R2
P2
P3
R3
S6
R6
R5
G2
IG CDU ATTITUDE STEERING ERROR C1
MG CDU ATTITUDE STEERING ERROR C2
OG CDU ATTITUDE STEERING ERROR C3
IG CDU RESOLVER ERROR RETURN B1
IG CDU RESOLVER ERROR A1
MG CDU RESOLVER ERROR A2
OG CDU RESOLVER ERROR A3
MG CDU RESOLVER ERROR RETURN B2
OG CDU RESOLVER ERROR RETURN B3
COARSE ALIGN RELAY CONTROL L3
-28 VDC N6
800 CPS LO N5
HI N4
A P1
3200 CPS SQUARE WAVE LO N1
B N2
12.8 KC SYNC PULSE N3
-28 VDC RETURN P6
3200 CPS SYNC RETURN M5
3200 CPS IN PHASE SYNC INPUT M6
3200 CPS OUT PHASE SYNC INPUT L6
OG TORQUE MOTOR HI H6
MG TORQUE MOTOR HI F6
IG TORQUE MOTOR HI D6
OG TORQUE MOTOR RETURN H5
MG TORQUE MOTOR RETURN G6
IG TORQUE MOTOR RETURN D5
OG ERROR SIG A6
MG ERROR SIG A5
IG ERROR SIG B6
GIMBAL ERROR SIGNAL RETURN B5
2V-3200 CPS LO L2
LO M2
HI L1
HI M1
3200 CPS REMOTE SENSING LO G3
HI F3
+27.5V S4
S1
S2
S3
S5
OG ADA ERROR SIG G1
MG ADA ERROR SIG H1
IG ADA ERROR SIG F1
STRUCTURE GRD L4
45A1E1
45A1J1
45A1E9
45A1E2
45A1E10
45A1E3
45A1E11
45A1E4
45A1E12
45A1E5
45A1E13
45A1E6
BUFFER RESISTORS MODULE ASSY 1007088
45A1E7
45A1E14
45A1E8
45A1E15
20V-3200 CPS-B MONITOR
20V-3200 CPS-RET
20V-3200 CPS-A MONITOR
-28VDC MONITOR
-28VDC RET
3200 CPS SYNC SET
3200 CPS SYNC RESET
3200 CPS DRIVE MONITOR
3200 CPS GRD
IG TDA OUTPUT
MG TDA OUTPUT
OG TDA OUTPUT
TDA GRD
GIMBAL ERROR SIG RET
IG ERROR SIG MONITOR
MG ERROR SIG MONITOR
OG ERROR SIG MONITOR
IG SERVO AMPL INPUT
MG SERVO AMPL INPUT
OG SERVO AMPL INPUT
2V-1%-3200 CPS MONITOR
45A1J11 IG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J10 MG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J9 OG SERVO AMPLIFIER MODULE ASSY 1007040
45A1J8 AMPLIFIER 1% 3200 CPS MODULE ASSY 1007044

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02000 DATE 7-17-63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:
GIMBAL SERVO AMPLIFIER—1010024
GIMBAL COARSE ALIGN AMLIFIER—1010023
3200 CPS AAC, FILTER & MULTIVIBRATOR—1010047
POWER SUPPLY—28VDC—1010025
POWER SUPPLY 3200 CPS 20 V SQUARE WAVE—[illegible]
AMPLIFIER 3200 CPS 1% —1010048
BUFFER RESISTORS—1010060

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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HEAT TREATMENT —//—
FINAL FINISH —//—

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CAMBRIDGE, MASS
DWG. NO.
CONTRACT

DRAWN W. F. Troy DATE 6/25/63
CHECKED
APPROVAL [illegible] 7-17-63
APPROVAL [illegible] 7-17-63
NASA APPROVAL [illegible] 7/17/63
MIT APPROVAL [illegible] 17 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 9

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010091
SCALE —
WT
SHEET 1 OF 1

1010091

MASTER

INCHES
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SYM	DESCRIPTION	DATE	APPROVAL
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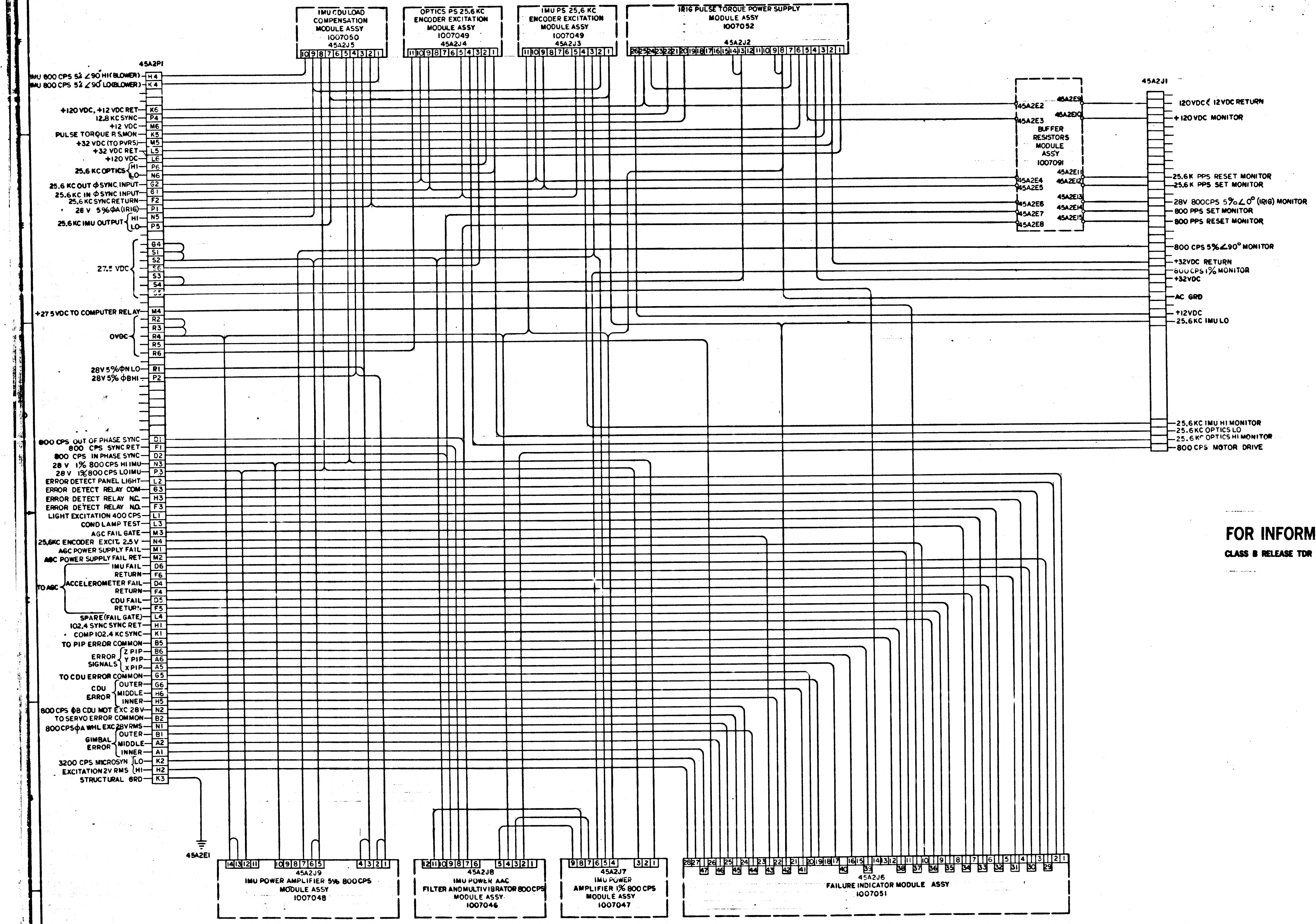

IMU CDU LOAD COMPENSATION MODULE ASSY 1007050 45A2J5
OPTICS PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J4
IMU PS 25,6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J3
IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY 1007052 45A2J2
45A2P1
IMU 800 CPS 5% ∠90° HI (BLOWER) H4
IMU 800 CPS 5% ∠90° LO (BLOWER) K4
+120 VDC, +12 VDC RET K6
12.8 KC SYNC P4
+12 VDC M6
PULSE TORQUE P.S. MON K5
+32 VDC (TO PVRS) M5
+32 VDC RET L5
+120 VDC L6
25.6 KC OPTICS HI P6
LO N6
25.6 KC OUT ϕ SYNC INPUT G2
25.6 KC IN ϕ SYNC INPUT G1
25.6 KC SYNC RETURN F2
28 V 5% ϕA (IRIG) P1
25.6 KC IMU OUTPUT HI N5
LO P5
27.5 VDC G4 S1 S2 S6 S3 S4 S5
+27.5 VDC TO COMPUTER RELAY M4
OVDC R2 R3 R4 R5 R6
28V 5% ϕN LO R1
28V 5% ϕB HI P2
800 CPS OUT OF PHASE SYNC D1
800 CPS SYNC RET F1
800 CPS IN PHASE SYNC D2
28 V 1% 800 CPS HI IMU N3
28 V 1% 800 CPS LO IMU P3
ERROR DETECT PANEL LIGHT L2
ERROR DETECT RELAY COM G3
ERROR DETECT RELAY N.C. H3
ERROR DETECT RELAY N.O. F3
LIGHT EXCITATION 400 CPS L1
COND LAMP TEST L3
AGC FAIL GATE M3
25.6KC ENCODER EXCIT. 2.5 V N4
AGC POWER SUPPLY FAIL M1
AGC POWER SUPPLY FAIL RET M2
TO AGC
IMU FAIL D6
RETURN F6
ACCELEROMETER FAIL D4
RETURN F4
CDU FAIL D5
RETURN F5
SPARE (FAIL GATE) L4
102.4 SYNC SYNC RET H1
COMP 102.4 KC SYNC K1
TO PIP ERROR COMMON B5
ERROR SIGNALS Z PIP B6
Y PIP A6
X PIP A5
TO CDU ERROR COMMON G5
CDU ERROR OUTER G6
MIDDLE H6
INNER H5
800 CPS ϕB CDU MOT EXC 28V N2
TO SERVO ERROR COMMON B2
800 CPS ϕA WHL EXC 28V RMS N1
GIMBAL ERROR OUTER B1
MIDDLE A2
INNER A1
3200 CPS MICROSYN EXCITATION 2V RMS LO K2
HI H2
STRUCTURAL GRD K3
45A2E1
BUFFER RESISTORS MODULE ASSY 1007091
45A2E2 45A2E3 45A2E4 45A2E5 45A2E6 45A2E7 45A2E8
45A2E9 45A2E10 45A2E11 45A2E12 45A2E13 45A2E14 45A2E15
45A2J1
120VDC & 12VDC RETURN
+120 VDC MONITOR
25.6K PPS RESET MONITOR
25.6K PPS SET MONITOR
28V 800CPS 5% ∠0° (IRIG) MONITOR
800 PPS SET MONITOR
800 PPS RESET MONITOR
800 CPS 5% ∠90° MONITOR
+32VDC RETURN
800 CPS 1% MONITOR
+32VDC
AC GRD
+12VDC
25.6KC IMU LO
25.6KC IMU HI MONITOR
25.6KC OPTICS LO
25.6KC OPTICS HI MONITOR
800 CPS MOTOR DRIVE
45A2J9 IMU POWER AMPLIFIER 5% 800CPS MODULE ASSY 1007048
45A2J8 IMU POWER AAC FILTER AND MULTIVIBRATOR 800CPS MODULE ASSY 1007046
45A2J7 IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007047
45A2J6 FAILURE INDICATOR MODULE ASSY 1007051

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 **DATE** 6-7-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:

IMU CDU LOAD COMPENSATION	1010042
POWER SUPPLY 25.6KC	1010029
POWER SUPPLY PULSE TORQUE	1010052
AMPLIFIER 5% 800 CPS	1010046
AAC FILTER AND MULTIVIBRATOR	1010044
AMPLIFIER 1% 800 CPS	1010045
FAILURE INDICATOR	1010033
BUFFER RESISTORS	1010102

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

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TOLERANCES ON
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MATERIAL —
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MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN H. F. Troy DATE 7/26/63
CHECKED
APPROVAL D. A. Test 8-6-63
APPROVAL
NASA APPROVAL E. S. S. 8/7/63
MIT APPROVAL W. Kupfer Vaughn

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #2

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010092
SCALE | WT | SHEET 1 OF 1

1010012 1

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REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
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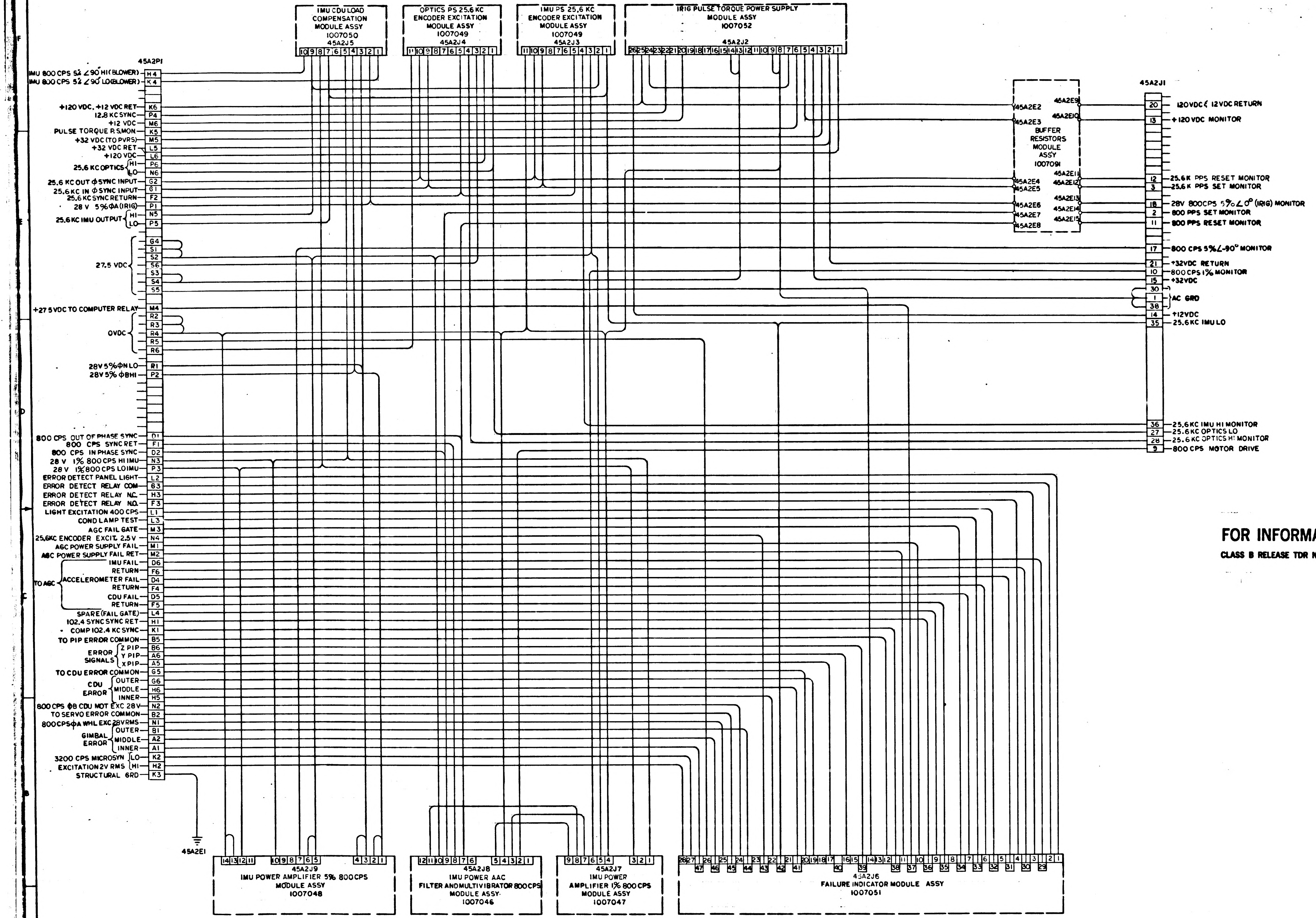
B	REVISED PER TDRR 02714	[illegible]-63	J.T.


IMU CDU LOAD COMPENSATION MODULE ASSY 1007050 45A2J5
OPTICS PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J4
IMU PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J3
IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY 1007052 45A2J2
45A2P1
IMU 800 CPS 5% ∠90° HI (BLOWER) H4
IMU 800 CPS 5% ∠90° LO (BLOWER) K4
+120 VDC, +12 VDC RET K6
12.8 KC SYNC P4
+12 VDC M6
PULSE TORQUE P.S. MON K5
+32 VDC (TO PVRS) M5
+32 VDC RET L5
+120 VDC L6
25.6 KC OPTICS HI P6
LO N6
25.6 KC OUT Φ SYNC INPUT G2
25.6 KC IN Φ SYNC INPUT G1
25.6 KC SYNC RETURN F2
28 V 5% ΦA (IRIG) P1
25.6 KC IMU OUTPUT HI N5
LO P5
27.5 VDC G4 S1 S2 S6 S3 S4 S5
+27.5 VDC TO COMPUTER RELAY M4
OVDC R2 R3 R4 R5 R6
28V 5% ΦN LO R1
28V 5% ΦB HI P2
800 CPS OUT OF PHASE SYNC D1
800 CPS SYNC RET F1
800 CPS IN PHASE SYNC D2
28 V 1% 800 CPS HI IMU N3
28 V 1% 800 CPS LO IMU P3
ERROR DETECT PANEL LIGHT L2
ERROR DETECT RELAY COM G3
ERROR DETECT RELAY N.C. H3
ERROR DETECT RELAY N.O. F3
LIGHT EXCITATION 400 CPS L1
COND LAMP TEST L3
AGC FAIL GATE M3
25.6KC ENCODER EXCIT. 2.5V N4
AGC POWER SUPPLY FAIL M1
AGC POWER SUPPLY FAIL RET M2
TO AGC
IMU FAIL D6
RETURN F6
ACCELEROMETER FAIL D4
RETURN F4
CDU FAIL D5
RETURN F5
SPARE (FAIL GATE) L4
102.4 SYNC SYNC RET H1
COMP 102.4 KC SYNC K1
TO PIP ERROR COMMON B5
ERROR SIGNALS Z PIP B6
Y PIP A6
X PIP A5
TO CDU ERROR COMMON G5
CDU ERROR OUTER G6
MIDDLE H6
INNER H5
800 CPS ΦB CDU MOT EXC 28V N2
TO SERVO ERROR COMMON B2
800 CPS ΦA WHL EXC 28V RMS N1
GIMBAL ERROR OUTER B1
MIDDLE A2
INNER A1
3200 CPS MICROSYN EXCITATION 2V RMS LO K2
HI H2
STRUCTURAL GRD K3
45A2E1
45A2E2
45A2E3
BUFFER RESISTORS MODULE ASSY 1007091
45A2E4
45A2E5
45A2E6
45A2E7
45A2E8
45A2E9
45A2E10
45A2E11
45A2E12
45A2E13
45A2E14
45A2E15
45A2J1
20 120VDC & 12VDC RETURN
13 +120 VDC MONITOR
12 25.6K PPS RESET MONITOR
3 25.6K PPS SET MONITOR
18 28V 800CPS 5% ∠0° (IRIG) MONITOR
2 800 PPS SET MONITOR
11 800 PPS RESET MONITOR
17 800 CPS 5% ∠-90° MONITOR
21 +32VDC RETURN
10 800 CPS 1% MONITOR
15 +32VDC
30 1 38 AC GRD
14 +12VDC
35 25.6KC IMU LO
36 25.6KC IMU HI MONITOR
27 25.6KC OPTICS LO
28 25.6KC OPTICS HI MONITOR
9 800 CPS MOTOR DRIVE
45A2J9 IMU POWER AMPLIFIER 5% 800CPS MODULE ASSY 1007048
45A2J8 IMU POWER AAC FILTER AND MULTIVIBRATOR 800CPS MODULE ASSY 1007046
45A2J7 IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007047
45A2J6 FAILURE INDICATOR MODULE ASSY 1007051

FOR INFORMATION CNLY

CLASS B RELEASE TDR No. 02437 **DATE** 8-7-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:

IMU CDU LOAD COMPENSATION	1010042
POWER SUPPLY 25.6KC	1010029
POWER SUPPLY PULSE TORQUE	1010052
AMPLIFIER 5% 800 CPS	1010046
AAC FILTER AND MULTIVIBRATOR	1010044
AMPLIFIER 1% 800 CPS	1010045
FAILURE INDICATOR	1010033
BUFFER RESISTORS	1010102

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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HEAT TREATMENT —
FINAL FINISH —

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DWG. NO. CONTRACT
DRAWN N. F. Troy DATE 7/26/63
CHECKED
APPROVAL 8-6-63
APPROVAL
NASA APPROVAL 8/7/63
MIT APPROVAL

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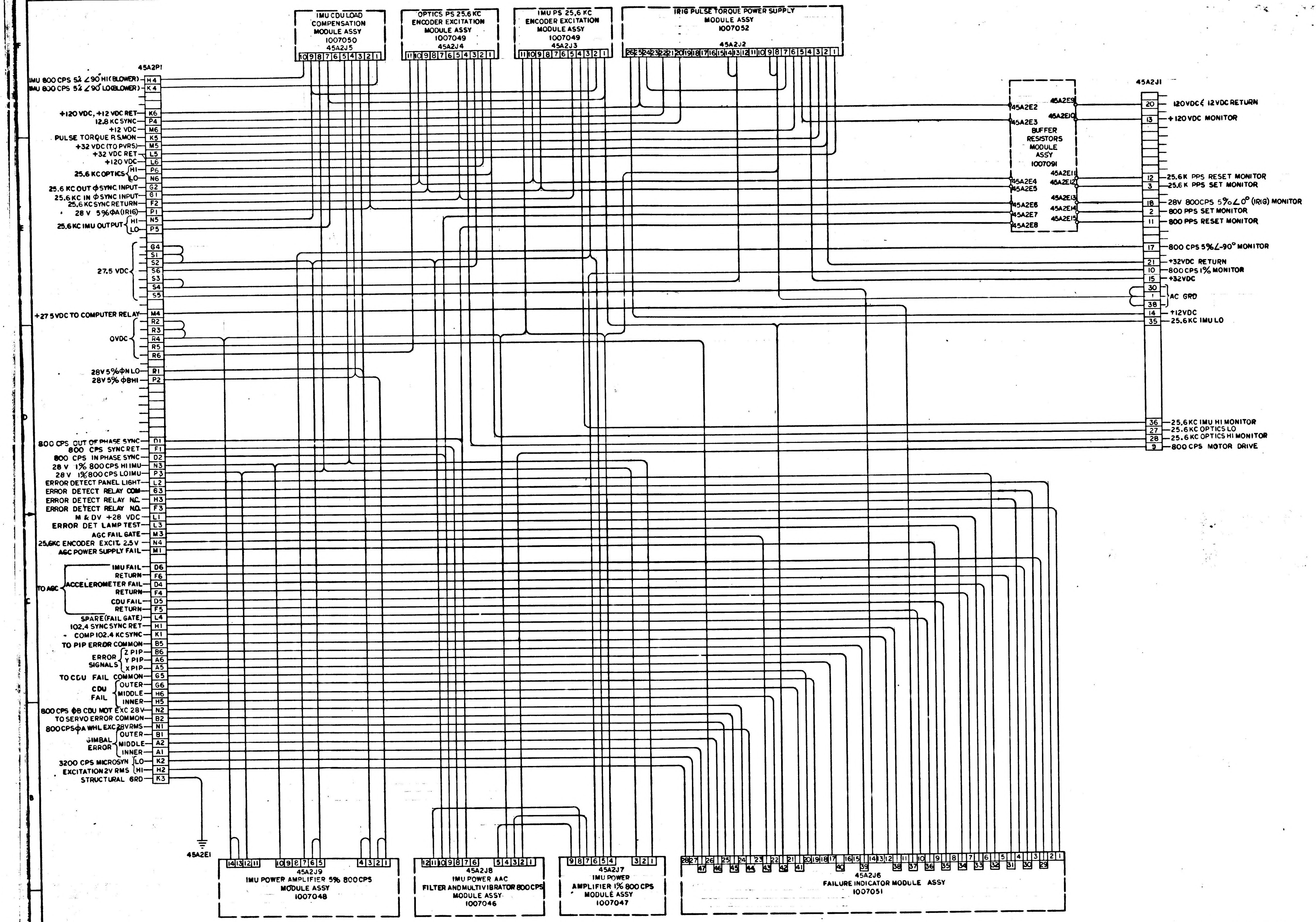
WIRING DIAGRAM
TRAY #2

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010092
SCALE
WT
SHEET 1 OF 1

MASTER

1010092-1

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02532	6-10-63	J.J.A.
B	REVISED PER TDRR 02714	8-21-63	A.T.
C	REVISED PER TDRR 03285	9-19-63	


IMU CDU LOAD COMPENSATION MODULE ASSY 1007050 45A2J5
OPTICS PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J4
IMU PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J3
IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY 1007052 45A2J2
45A2P1
IMU 800 CPS 5% ∠90° HI (BLOWER) H4
IMU 800 CPS 5% ∠90° LO (BLOWER) K4
+120 VDC, +12 VDC RET K6
12.8 KC SYNC P4
+12 VDC M6
PULSE TORQUE R.S. MON K5
+32 VDC (TO PVRS) M5
+32 VDC RET L5
+120 VDC L6
25.6 KC OPTICS HI P6
LO N6
25.6 KC OUT ΦSYNC INPUT G2
25.6 KC IN ΦSYNC INPUT G1
25.6 KC SYNC RETURN F2
28 V 5% ΦA (IRIG) P1
25.6 KC IMU OUTPUT HI N5
LO P5
27.5 VDC G4 S1 S2 S6 S3 S4 S5
+27.5 VDC TO COMPUTER RELAY M4
OVDC R2 R3 R4 R5 R6
28V 5% ΦN LO R1
28V 5% ΦB HI P2
800 CPS OUT OF PHASE SYNC D1
800 CPS SYNC RET F1
800 CPS IN PHASE SYNC D2
28 V 1% 800 CPS HI IMU N3
28 V 1% 800 CPS LO IMU P3
ERROR DETECT PANEL LIGHT L2
ERROR DETECT RELAY COM G3
ERROR DETECT RELAY N.C. H3
ERROR DETECT RELAY N.O. F3
M & DV +28 VDC L1
ERROR DET LAMP TEST L3
AGC FAIL GATE M3
25.6KC ENCODER EXCIT. 2.5V N4
AGC POWER SUPPLY FAIL M1
TO AGC
IMU FAIL D6
RETURN F6
ACCELEROMETER FAIL D4
RETURN F4
CDU FAIL D5
RETURN F5
SPARE (FAIL GATE) L4
102.4 SYNC SYNC RET H1
COMP 102.4 KC SYNC K1
TO PIP ERROR COMMON B5
ERROR SIGNALS Z PIP B6
Y PIP A6
X PIP A5
TO CDU FAIL COMMON G5
CDU FAIL OUTER G6
MIDDLE H6
INNER H5
800 CPS ΦB CDU MOT EXC 28V N2
TO SERVO ERROR COMMON B2
800 CPS ΦA WHL EXC 28V RMS N1
GIMBAL ERROR OUTER B1
MIDDLE A2
INNER A1
3200 CPS MICROSYN EXCITATION 2V RMS LO K2
HI H2
STRUCTURAL GRD K3
45A2E1
BUFFER RESISTORS MODULE ASSY 1007091
45A2E2 45A2E3 45A2E4 45A2E5 45A2E6 45A2E7 45A2E8
45A2E9 45A2E10 45A2E11 45A2E12 45A2E13 45A2E14 45A2E15
45A2J1
20 120VDC & 12VDC RETURN
13 +120 VDC MONITOR
12 25.6K PPS RESET MONITOR
3 25.6K PPS SET MONITOR
18 28V 800CPS 5% ∠0° (IRIG) MONITOR
2 800 PPS SET MONITOR
11 800 PPS RESET MONITOR
17 800 CPS 5% ∠-90° MONITOR
21 +32VDC RETURN
10 800 CPS 1% MONITOR
15 +32VDC
30 1 38 AC GRD
14 +12VDC
35 25.6KC IMU LO
36 25.6KC IMU HI MONITOR
27 25.6KC OPTICS LO
28 25.6KC OPTICS HI MONITOR
9 800 CPS MOTOR DRIVE
45A2J9 IMU POWER AMPLIFIER 5% 800 CPS MODULE ASSY 1007048
45A2J8 IMU POWER AAC FILTER AND MULTIVIBRATOR 800 CPS MODULE ASSY 1007046
45A2J7 IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007047
45A2J6 FAILURE INDICATOR MODULE ASSY 1007051

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:

IMU CDU LOAD COMPENSATION	1010042
POWER SUPPLY 25.6KC	1010029
POWER SUPPLY PULSE TORQUE	1010052
AMPLIFIER 5% 800 CPS	1010046
AAC FILTER AND MULTIVIBRATOR	1010044
AMPLIFIER 1% 800 CPS	1010045
FAILURE INDICATOR	1010033
BUFFER RESISTORS	1010102

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN N. F. Gray DATE 7/26/63
CHECKED
APPROVAL B. B. Test 8-6-63
APPROVAL
NASA APPROVAL 8/7/63
MIT APPROVAL

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WIRING DIAGRAM
TRAY #2

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010092
SCALE | WT | SHEET 1 OF 1

INCHES
0 1 2
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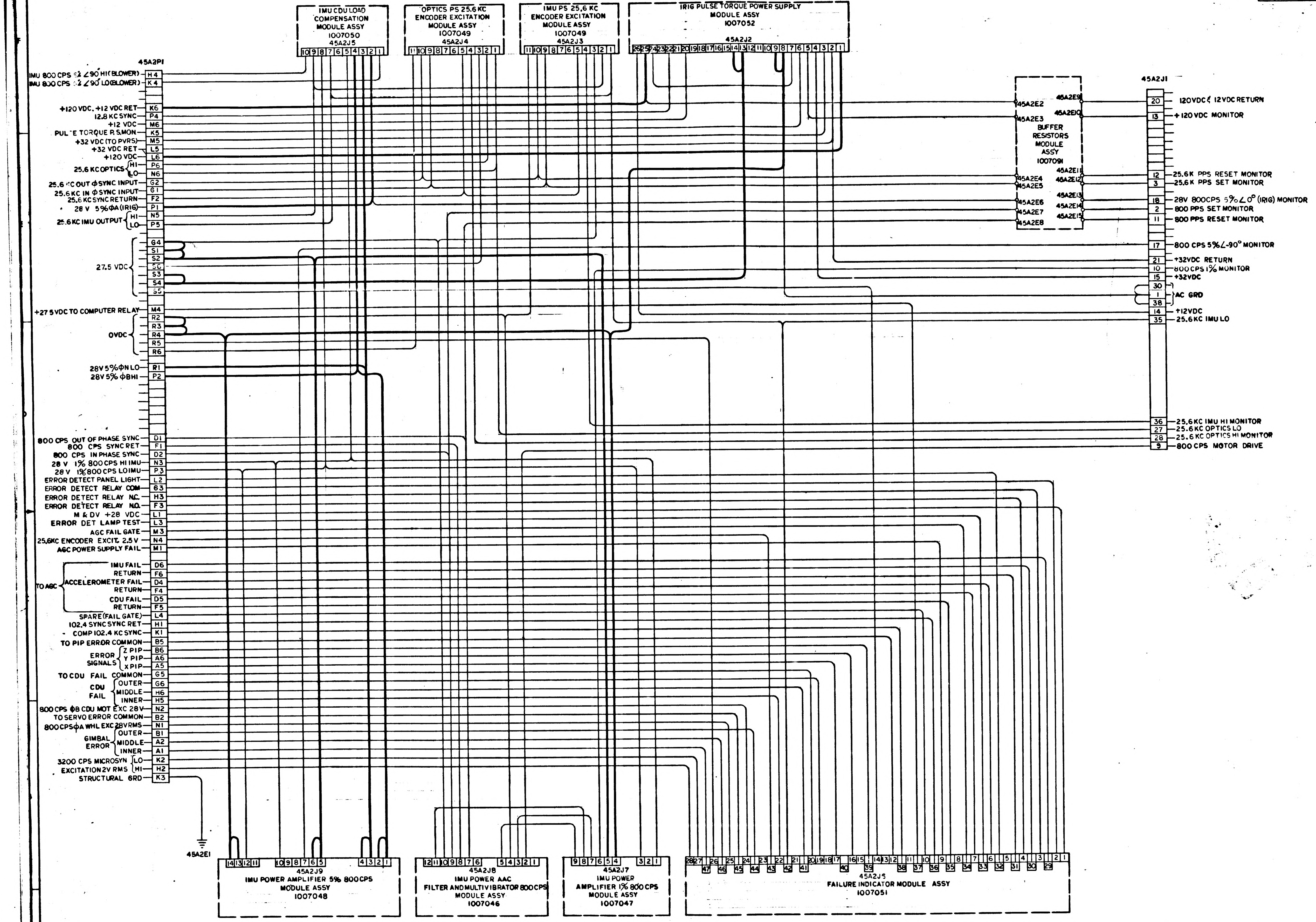
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02532	[illegible]	J.J. WK
B	REVISED PER TDRR 02714	8-21-63	A.T. [illegible]
C	REVISED PER TDRR 03285	9-19-63	[illegible] WK
D	REVISED PER TDRR 4191	10-29-63	[illegible] WK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OPTICS PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J4
IMU PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J3
IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY 1007052 45A2J2
45A2P1
IMU 800 CPS 5% ∠90° HI (BLOWER) H4
IMU 800 CPS 5% ∠90° LO (BLOWER) K4
+120 VDC, +12 VDC RET K6
12.8 KC SYNC P4
+12 VDC M6
PULSE TORQUE P.S. MON K5
+32 VDC (TO PVRS) M5
+32 VDC RET L5
+120 VDC L6
25.6 KC OPTICS HI P6
LO N6
25.6 KC OUT Φ SYNC INPUT G2
25.6 KC IN Φ SYNC INPUT G1
25.6 KC SYNC RETURN F2
28 V 5% ΦA (IRIG) P1
25.6 KC IMU OUTPUT HI N5
LO P5
27.5 VDC G4 S1 S2 S6 S3 S4 S5
+27.5 VDC TO COMPUTER RELAY M4
0VDC R2 R3 R4 R5 R6
28V 5% ΦN LO R1
28V 5% ΦB HI P2
800 CPS OUT OF PHASE SYNC D1
800 CPS SYNC RET F1
800 CPS IN PHASE SYNC D2
28 V 1% 800 CPS HI IMU N3
28 V 1% 800 CPS LO IMU P3
ERROR DETECT PANEL LIGHT L2
ERROR DETECT RELAY COM G3
ERROR DETECT RELAY N.C. H3
ERROR DETECT RELAY N.O. F3
M & DV +28 VDC L1
ERROR DET LAMP TEST L3
AGC FAIL GATE M3
25.6KC ENCODER EXCIT. 2.5 V N4
AGC POWER SUPPLY FAIL M1
TO AGC
IMU FAIL D6
RETURN F6
ACCELEROMETER FAIL D4
RETURN F4
CDU FAIL D5
RETURN F5
SPARE (FAIL GATE) L4
102.4 SYNC SYNC RET H1
COMP 102.4 KC SYNC K1
TO PIP ERROR COMMON B5
ERROR SIGNALS Z PIP B6
Y PIP A6
X PIP A5
TO CDU FAIL COMMON G5
CDU FAIL OUTER G6
MIDDLE H6
INNER H5
800 CPS ΦB CDU MOT EXC 28V N2
TO SERVO ERROR COMMON B2
800 CPS ΦA WHL EXC 28 VRMS N1
GIMBAL ERROR OUTER B1
MIDDLE A2
INNER A1
3200 CPS MICROSYN EXCITATION 2V RMS LO K2
HI H2
STRUCTURAL GRD K3
45A2E1
45A2E2
45A2E3
BUFFER RESISTORS MODULE ASSY 1007091
45A2E4
45A2E5
45A2E6
45A2E7
45A2E8
45A2E9
45A2E10
45A2E11
45A2E12
45A2E13
45A2E14
45A2E15
45A2J1
20 120VDC & 12VDC RETURN
13 +120 VDC MONITOR
12 25.6K PPS RESET MONITOR
3 25.6K PPS SET MONITOR
18 28V 800CPS 5% ∠0° (IRIG) MONITOR
2 800 PPS SET MONITOR
11 800 PPS RESET MONITOR
17 800 CPS 5% ∠-90° MONITOR
21 +32VDC RETURN
10 800CPS 1% MONITOR
15 +32VDC
30 1 38 AC GRD
14 +12VDC
35 25.6KC IMU LO
36 25.6KC IMU HI MONITOR
27 25.6KC OPTICS LO
28 25.6KC OPTICS HI MONITOR
9 800 CPS MOTOR DRIVE
45A2J9 IMU POWER AMPLIFIER 5% 800CPS MODULE ASSY 1007048
45A2J8 IMU POWER AAC FILTER AND MULTIVIBRATOR 800CPS MODULE ASSY 1007046
45A2J7 IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007047
45A2J5 FAILURE INDICATOR MODULE ASSY 1007051

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. —— INDICATES NO. 24 GAGE WIRE PER 1010639-2
3. —— INDICATES NO. 20 GAGE WIRE PER 1010639-4

SCHEMATIC REF:

IMU CDU LOAD COMPENSATION	1010042
POWER SUPPLY 25.6KC	1010029
POWER SUPPLY PULSE TORQUE	1010052
AMPLIFIER 5% 800 CPS	1010046
AAC FILTER AND MULTIVIBRATOR	1010044
AMPLIFIER 1% 800 CPS	1010045
FAILURE INDICATOR	1010033
BUFFER RESISTORS	1010102

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
MATERIAL #
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M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN W. F. Troy DATE 7/26/63
CHECKED
APPROVAL R. A. Tat 8-6-63
APPROVAL
NASA APPROVAL 8/7/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #2

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010092
SCALE WT SHEET 1 OF 1

INCHES 0 1 2
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1010092 D

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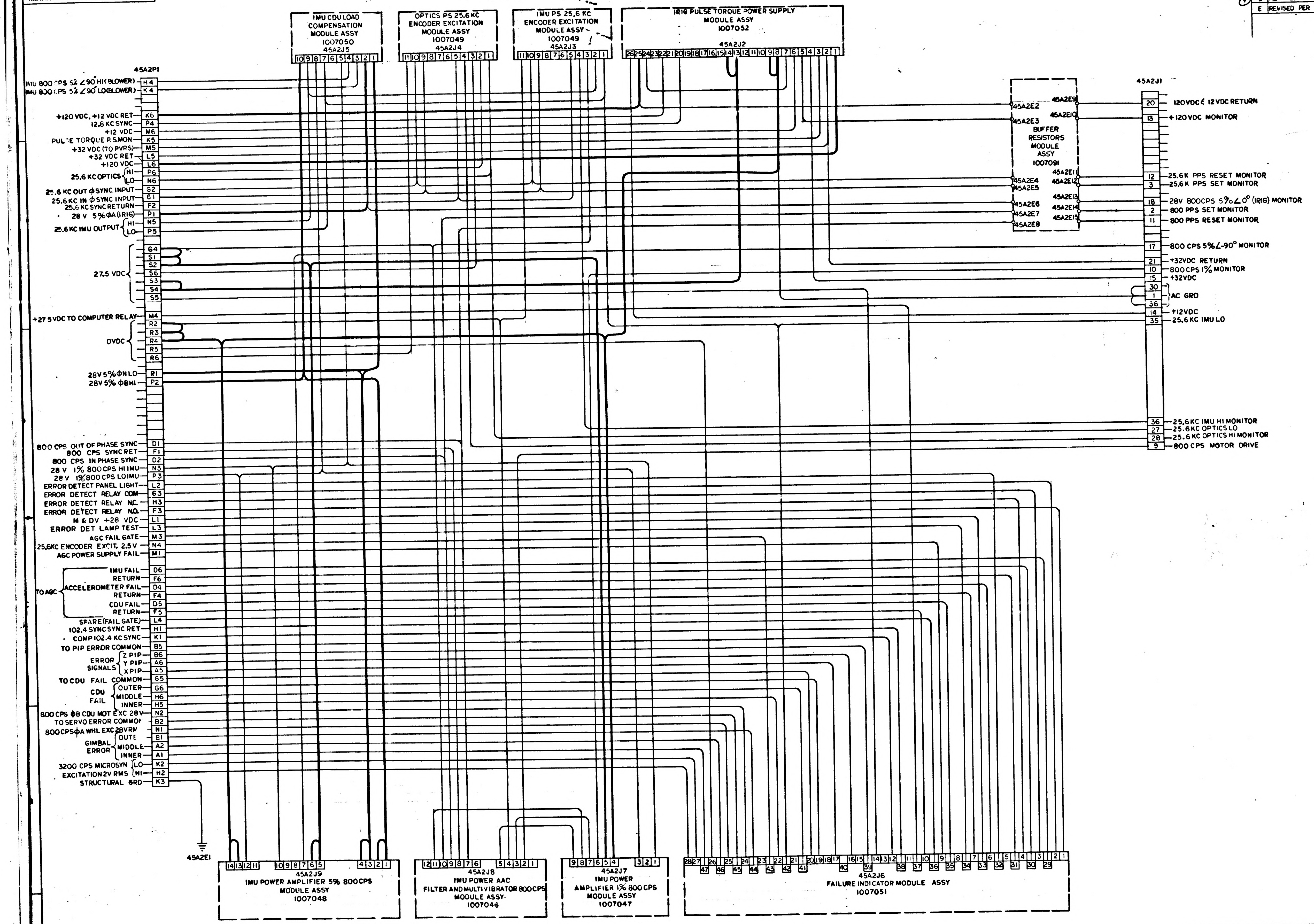
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02532	4-10-63	J.J.A. WK
B	REVISED PER TDRR 02714	8-21-63	A.T.
C	REVISED PER TDRR 03245	9-19-63	WK
D	REVISED PER TDRR 4191	10-29-63	WK
E	REVISED PER TDRR 04673	Nov -3	Dec 12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OPTICS PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J4
IMU PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J3
IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY 1007052 45A2J2
45A2P1
IMU 800 CPS 5% ∠90° HI (BLOWER) H4
IMU 800 CPS 5% ∠90° LO (BLOWER) K4
+120 VDC, +12 VDC RET K6
12.8 KC SYNC P4
+12 VDC M6
PULSE TORQUE P.S. MON K5
+32 VDC (TO PVRS) M5
+32 VDC RET L5
+120 VDC L6
25.6 KC OPTICS HI P6
LO N6
25.6 KC OUT Φ SYNC INPUT G2
25.6 KC IN Φ SYNC INPUT G1
25.6 KC SYNC RETURN F2
28 V 5% ΦA (IRIG) P1
25.6 KC IMU OUTPUT HI N5
LO P5
27.5 VDC G4 S1 S2 S6 S3 S4 S5
+27.5 VDC TO COMPUTER RELAY M4
OVDC R2 R3 R4 R5 R6
28V 5% ΦN LO R1
28V 5% ΦB HI P2
800 CPS OUT OF PHASE SYNC D1
800 CPS SYNC RET F1
800 CPS IN PHASE SYNC D2
28 V 1% 800 CPS HI IMU N3
28 V 1% 800 CPS LO IMU P3
ERROR DETECT PANEL LIGHT L2
ERROR DETECT RELAY COM G3
ERROR DETECT RELAY N.C. H3
ERROR DETECT RELAY N.O. F3
M & DV +28 VDC L1
ERROR DET LAMP TEST L3
AGC FAIL GATE M3
25.6KC ENCODER EXCIT. 2.5 V N4
AGC POWER SUPPLY FAIL M1
TO AGC
IMU FAIL D6
RETURN F6
ACCELEROMETER FAIL D4
RETURN F4
CDU FAIL D5
RETURN F5
SPARE (FAIL GATE) L4
102.4 SYNC SYNC RET H1
COMP 102.4 KC SYNC K1
TO PIP ERROR COMMON B5
ERROR SIGNALS Z PIP B6
Y PIP A6
X PIP A5
TO CDU FAIL COMMON G5
CDU FAIL OUTER G6
MIDDLE H6
INNER H5
800 CPS ΦB CDU MOT EXC 28V N2
TO SERVO ERROR COMMON B2
800 CPS ΦA WHL EXC 28VRM N1
GIMBAL ERROR OUTER B1
MIDDLE A2
INNER A1
3200 CPS MICROSYN EXCITATION 2V RMS LO K2
HI H2
STRUCTURAL GRD K3
45A2E1
BUFFER RESISTORS MODULE ASSY 1007091
45A2E2
45A2E3
45A2E4
45A2E5
45A2E6
45A2E7
45A2E8
45A2E9
45A2E10
45A2E11
45A2E12
45A2E13
45A2E14
45A2E15
45A2J1
20 120VDC & 12VDC RETURN
13 +120 VDC MONITOR
12 25.6K PPS RESET MONITOR
3 25.6K PPS SET MONITOR
18 28V 800CPS 5% ∠0° (IRIG) MONITOR
2 800 PPS SET MONITOR
11 800 PPS RESET MONITOR
17 800 CPS 5% ∠-90° MONITOR
21 +32VDC RETURN
10 800 CPS 1% MONITOR
15 +32VDC
30 1 36 AC GRD
14 +12VDC
35 25.6KC IMU LO
36 25.6KC IMU HI MONITOR
27 25.6KC OPTICS LO
28 25.6KC OPTICS HI MONITOR
9 800 CPS MOTOR DRIVE
45A2J9 IMU POWER AMPLIFIER 5% 800CPS MODULE ASSY 1007048
45A2J8 IMU POWER AAC FILTER AND MULTIVIBRATOR 800CPS MODULE ASSY 1007046
45A2J7 IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007047
45A2J6 FAILURE INDICATOR MODULE ASSY 1007051

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. ── INDICATES NO.24 GAGE WIRE PER 1010639-2
3. ━━ INDICATES NO.20 GAGE WIRE PER 1010639-4

SCHEMATIC REF:

IMU CDU LOAD COMPENSATION	1010042
POWER SUPPLY 25.6KC	1010029
POWER SUPPLY PULSE TORQUE	1010052
AMPLIFIER 5% 800 CPS	1010046
AAC FILTER AND MULTIVIBRATOR	1010044
AMPLIFIER 1% 800 CPS	1010045
FAILURE INDICATOR	1010033
BUFFER RESISTORS	1010102

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
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APPROVAL
NASA APPROVAL 8/7/63
MIT APPROVAL

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HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #2

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010092
SCALE
WT
SHEET 1 OF 1

MASTER

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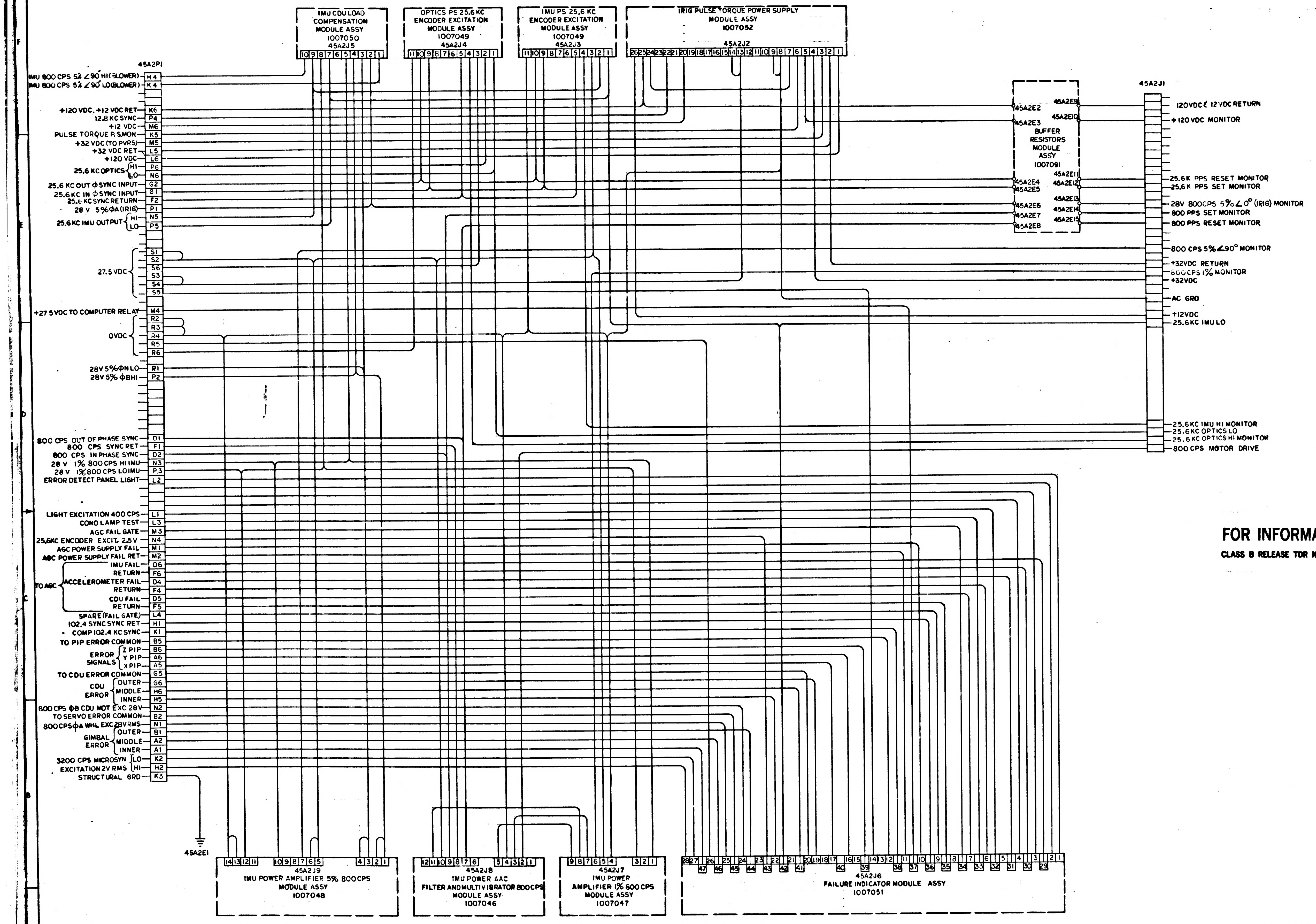
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


IMU CDU LOAD COMPENSATION MODULE ASSY 1007050 45A2J5
OPTICS PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J4
IMU PS 25.6 KC ENCODER EXCITATION MODULE ASSY 1007049 45A2J3
IRIG PULSE TORQUE POWER SUPPLY MODULE ASSY 1007052 45A2J2
45A2P1
IMU 800 CPS 5% ∠90° HI (BLOWER) — H4
IMU 800 CPS 5% ∠90° LO (BLOWER) — K4
+120 VDC, +12 VDC RET — K6
12.8 KC SYNC — P4
+12 VDC — M6
PULSE TORQUE P.S. MON — K5
+32 VDC (TO PVRS) — M5
+32 VDC RET — L5
+120 VDC — L6
25.6 KC OPTICS HI — P6
LO — N6
25.6 KC OUT Φ SYNC INPUT — G2
25.6 KC IN Φ SYNC INPUT — G1
25.6 KC SYNC RETURN — F2
28 V 5% ΦA (IRIG) — P1
25.6 KC IMU OUTPUT HI — N5
LO — P5
27.5 VDC — S1 S2 S6 S3 S4 S5
+27.5 VDC TO COMPUTER RELAY — M4
0VDC — R2 R3 R4 R5 R6
28V 5% ΦN LO — R1
28V 5% ΦB HI — P2
800 CPS OUT OF PHASE SYNC — D1
800 CPS SYNC RET — F1
800 CPS IN PHASE SYNC — D2
28 V 1% 800 CPS HI IMU — N3
28 V 1% 800 CPS LO IMU — P3
ERROR DETECT PANEL LIGHT — L2
LIGHT EXCITATION 400 CPS — L1
COND LAMP TEST — L3
AGC FAIL GATE — M3
25.6KC ENCODER EXCIT. 2.5V — N4
AGC POWER SUPPLY FAIL — M1
AGC POWER SUPPLY FAIL RET — M2
TO AGC
IMU FAIL — D6
RETURN — F6
ACCELEROMETER FAIL — D4
RETURN — F4
CDU FAIL — D5
RETURN — F5
SPARE (FAIL GATE) — L4
102.4 SYNC SYNC RET — H1
COMP 102.4 KC SYNC — K1
TO PIP ERROR COMMON — B5
ERROR SIGNALS Z PIP — B6
Y PIP — A6
X PIP — A5
TO CDU ERROR COMMON — G5
CDU ERROR OUTER — G6
MIDDLE — H6
INNER — H5
800 CPS ΦB CDU MOT EXC 28V — N2
TO SERVO ERROR COMMON — B2
800CPS ΦA WHL EXC 28VRMS — N1
GIMBAL ERROR OUTER — B1
MIDDLE — A2
INNER — A1
3200 CPS MICROSYN EXCITATION 2V RMS LO — K2
HI — H2
STRUCTURAL GRD — K3
45A2E1
BUFFER RESISTORS MODULE ASSY 1007091
45A2E2 45A2E3 45A2E4 45A2E5 45A2E6 45A2E7 45A2E8
45A2E9 45A2E10 45A2E11 45A2E12 45A2E13 45A2E14 45A2E15
45A2J1
120VDC & 12VDC RETURN
+120VDC MONITOR
25.6K PPS RESET MONITOR
25.6K PPS SET MONITOR
28V 800CPS 5% ∠0° (IRIG) MONITOR
800 PPS SET MONITOR
800 PPS RESET MONITOR
800 CPS 5% ∠90° MONITOR
+32VDC RETURN
800CPS 1% MONITOR
+32VDC
AC GRD
+12VDC
25.6KC IMU LO
25.6KC IMU HI MONITOR
25.6KC OPTICS LO
25.6KC OPTICS HI MONITOR
800 CPS MOTOR DRIVE
45A2J9 IMU POWER AMPLIFIER 5% 800CPS MODULE ASSY 1007048
45A2J8 IMU POWER AAC FILTER AND MULTIVIBRATOR 800CPS MODULE ASSY 1007046
45A2J7 IMU POWER AMPLIFIER 1% 800 CPS MODULE ASSY 1007047
45A2J6 FAILURE INDICATOR MODULE ASSY 1007051

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 DATE 8-7-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:

IMU CDU LOAD COMPENSATION	1010042
POWER SUPPLY 25.6KC	1010029
POWER SUPPLY PULSE TORQUE	1010052
AMPLIFIER 5% 800 CPS	1010046
AAC FILTER AND MULTIVIBRATOR	1010044
AMPLIFIER 1% 800CPS	1010045
FAILURE INDICATOR	1010033
BUFFER RESISTORS	1010102

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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MATERIAL —
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN W. F. Tracy DATE 7/26/63
CHECKED
APPROVAL R. A. Scott 8-6-63
APPROVAL
NASA APPROVAL E. S. Swift 8/7/63
MIT APPROVAL W. Kupfer 8/7/63

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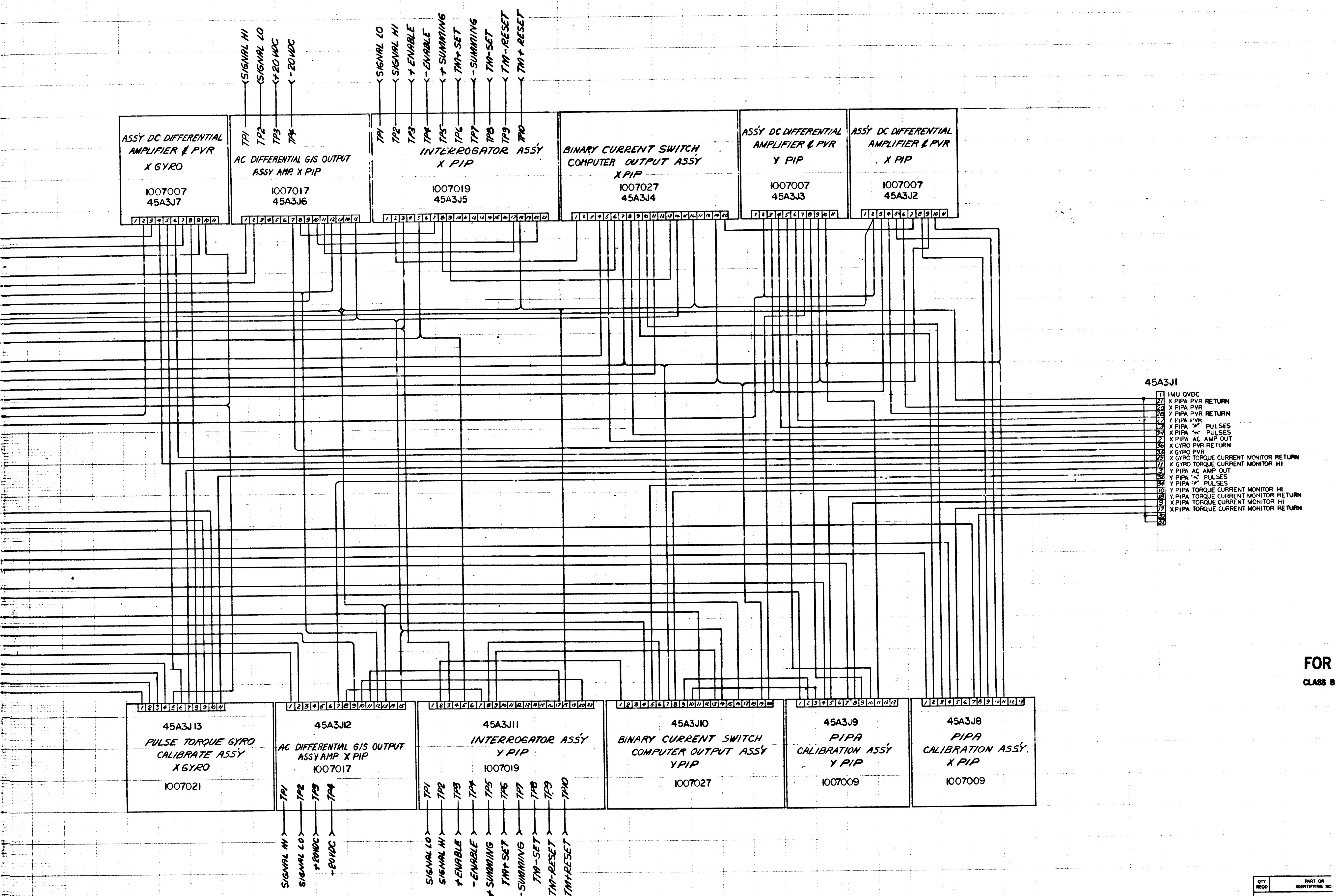
WIRING DIAGRAM
TRAY #2

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010092
SCALE | WT | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010121


SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL LO
SIGNAL HI
+ ENABLE
- ENABLE
+ SUMMING
TM+ SET
- SUMMING
TM- SET
TM- RESET
TM+ RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO
1007007
45A3J7
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP
1007017
45A3J6
INTERROGATOR ASSY X PIP
1007019
45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP
1007027
45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP
1007007
45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP
1007007
45A3J2
45A3J1
1 IMU OVDC
21 X PIPA PVR RETURN
20 X PIPA PVR
28 Y PIPA PVR RETURN
27 Y PIPA PVR
33 X PIPA "P" PULSES
34 X PIPA "N" PULSES
2 X PIPA AC AMP OUT
36 X GYRO PVR RETURN
35 X GYRO PVR
19 X GYRO TORQUE CURRENT MONITOR RETURN
11 X GYRO TORQUE CURRENT MONITOR HI
3 Y PIPA AC AMP OUT
32 Y PIPA "N" PULSES
31 Y PIPA "P" PULSES
10 Y PIPA TORQUE CURRENT MONITOR HI
18 Y PIPA TORQUE CURRENT MONITOR RETURN
9 X PIPA TORQUE CURRENT MONITOR HI
17 XPIPA TORQUE CURRENT MONITOR RETURN
30
37
45A3J13
PULSE TORQUE GYRO CALIBRATE ASSY X GYRO
1007021
45A3J12
AC DIFFERENTIAL G/S OUTPUT ASSY AMP X PIP
1007017
45A3J11
INTERROGATOR ASSY Y PIP
1007019
45A3J10
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP
1007027
45A3J9
PIPA CALIBRATION ASSY Y PIP
1007009
45A3J8
PIPA CALIBRATION ASSY. X PIP
1007009
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET

1010093 A

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02435 DATE 1-7-63

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO CONTRACT
DRAWN R. Koury DATE 7-9-63
CHECKED
APPROVAL D. R. Test 7-10-63
APPROVAL
NASA APPROVAL 4/7/65
MIT APPROVAL

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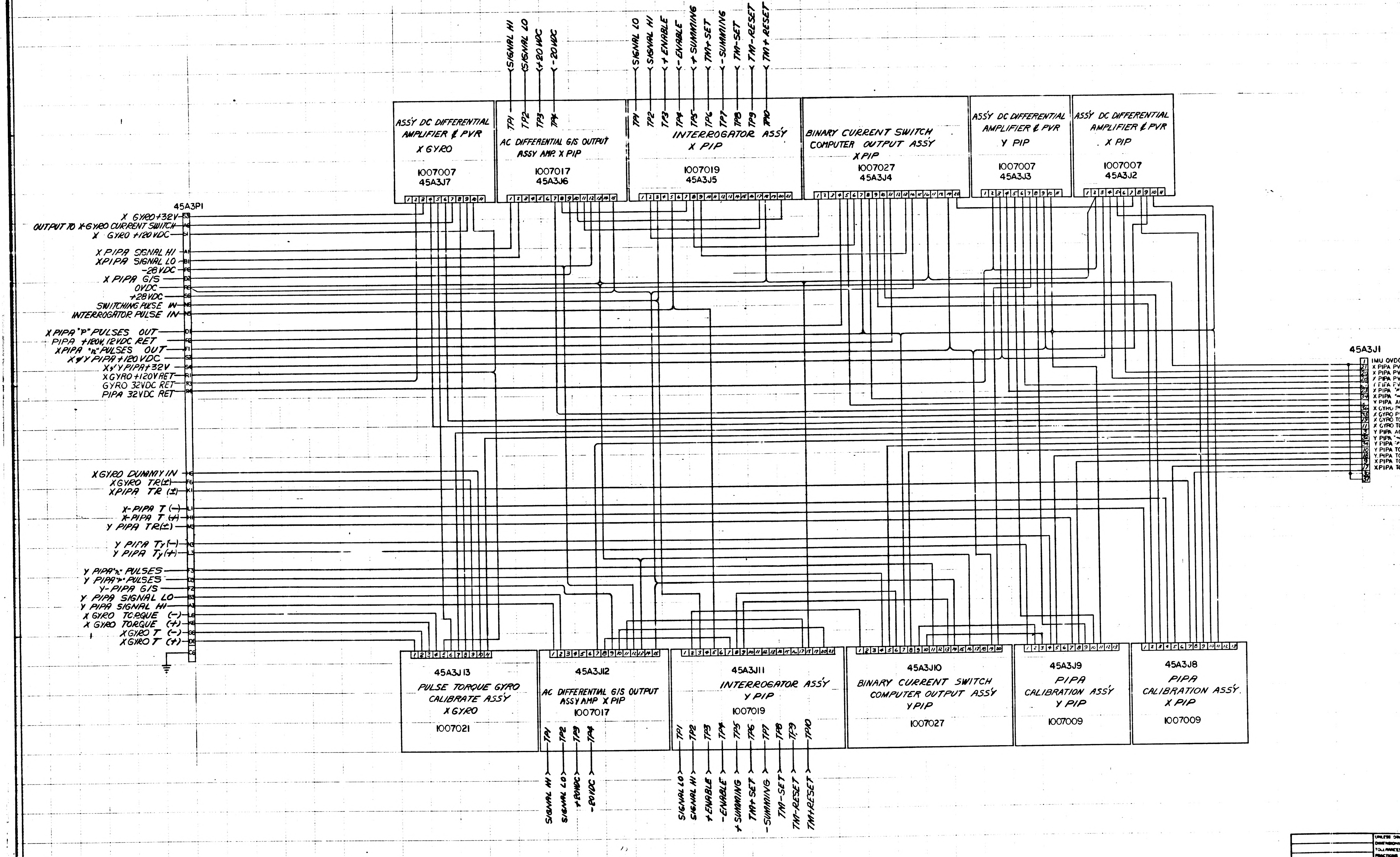
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 3

CODE IDENT NO. SIZE J NASA DRAWING NO. 1010093
SCALE — WT SHEET OF

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

F2 1010093



SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J7
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP 1007017 45A3J6
INTERROGATOR ASSY X PIP 1007019 45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP 1007027 45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP 1007007 45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP 1007007 45A3J2
45A3P1
X GYRO +32V
OUTPUT TO X-GYRO CURRENT SWITCH
X GYRO +120 VDC
X PIPA SIGNAL HI
XPIPA SIGNAL LO
-28 VDC
X PIPA G/S
0VDC
+28 VDC
SWITCHING PULSE IN
INTERROGATOR PULSE IN
X PIPA "P" PULSES OUT
PIPA +120V, 12VDC RET
XPIPA "n" PULSES OUT
X & Y PIPA +120 VDC
X & Y PIPA +32V
X GYRO +120V RET
GYRO 32VDC RET
PIPA 32VDC RET
X GYRO DUMMY IN
X GYRO TR(±)
XPIPA TR (±)
X-PIPA T (−)
X-PIPA T (+)
Y PIPA TR(±)
Y PIPA Ty(−)
Y PIPA Ty(+)
Y PIPA "n" PULSES
Y PIPA "p" PULSES
Y-PIPA G/S
Y PIPA SIGNAL LO
Y PIPA SIGNAL HI
X GYRO TORQUE (−)
X GYRO TORQUE (+)
X GYRO T (−)
X GYRO T (+)
S3
A6
S1
A1
B1
P6
D2
R6
S6
N6
N5
D1
R2
F1
S2
S4
R1
R3
R4
H6
F6
K1
L1
H1
M3
N3
L3
F3
D3
F2
B3
A3
L6
K6
G6
D6
C6
45A3J1
IMU OVDC
X PIPA PV
X PIPA PV
Y PIPA PV
Y PIPA PV
X PIPA
X PIPA
Y PIPA A
X GYRO P
X GYRO P
X GYRO TO
X GYRO TO
Y PIPA AC
Y PIPA
Y PIPA
Y PIPA TO
Y PIPA TO
X PIPA TO
XPIPA TO
1
21
20
28
23
34
36
35
19
11
3
32
34
10
18
9
17
30
37
45A3J13 PULSE TORQUE GYRO CALIBRATE ASSY X GYRO 1007021
45A3J12 AC DIFFERENTIAL G/S OUTPUT ASSY AMP X PIP 1007017
45A3J11 INTERROGATOR ASSY Y PIP 1007019
45A3J10 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP 1007027
45A3J9 PIPA CALIBRATION ASSY Y PIP 1007009
45A3J8 PIPA CALIBRATION ASSY. X PIP 1007009
TP1
TP2
TP3
TP4
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET

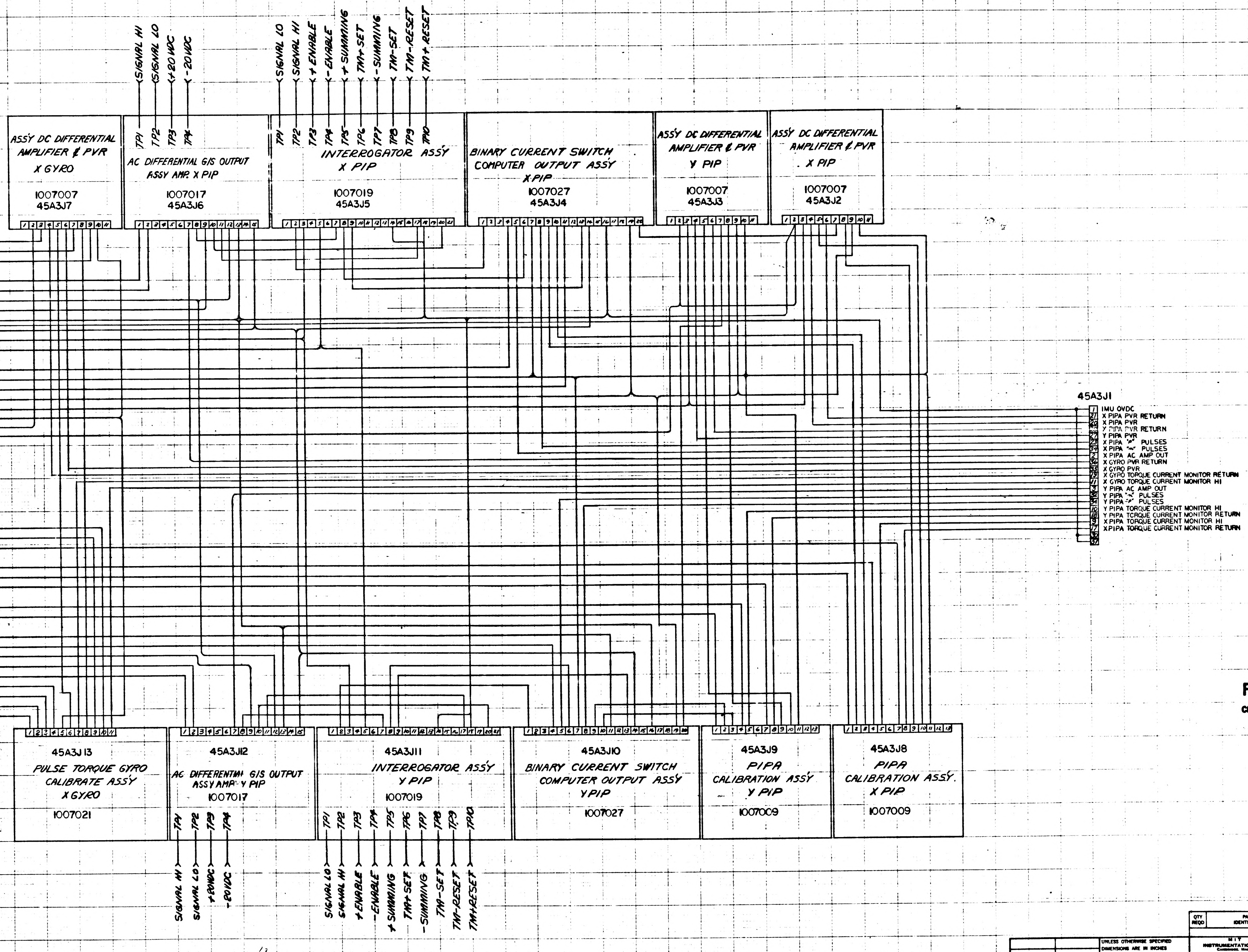
NEXT ASSY USED ON
APPLICATION

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

F-1

1010093

A	REL. 300 PER TDAR			
B	REVISED PER TDRR 03096			


SIGNAL HI
SIGNAL LO
+20 VDC
-20VDC
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO
1007007
45A3J7
TP1 TP2 TP3 TP4
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP
1007017
45A3J6
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
INTERROGATOR ASSY X PIP
1007019
45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP
1007027
45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP
1007007
45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP
1007007
45A3J2
45A3J1
1 IMU OVDC
21 X PIPA PVR RETURN
20 X PIPA PVR
Y PIPA PVR RETURN
27 Y PIPA PVR
23 X PIPA "P" PULSES
34 X PIPA "N" PULSES
2 X PIPA AC AMP OUT
36 X GYRO PVR RETURN
35 X GYRO PVR
19 X GYRO TORQUE CURRENT MONITOR RETURN
11 X GYRO TORQUE CURRENT MONITOR HI
3 Y PIPA AC AMP OUT
32 Y PIPA "N" PULSES
31 Y PIPA "P" PULSES
10 Y PIPA TORQUE CURRENT MONITOR HI
18 Y PIPA TORQUE CURRENT MONITOR RETURN
9 X PIPA TORQUE CURRENT MONITOR HI
17 XPIPA TORQUE CURRENT MONITOR RETURN
30
37
45A3J13
PULSE TORQUE GYRO CALIBRATE ASSY X GYRO
1007021
45A3J12
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. Y PIP
1007017
TP1 TP2 TP3 TP4
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
45A3J11
INTERROGATOR ASSY Y PIP
1007019
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
45A3J10
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP
1007027
45A3J9
PIPA CALIBRATION ASSY Y PIP
1007009
45A3J8
PIPA CALIBRATION ASSY. X PIP
1007009

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02435 DATE 1-9-63

1010093 B

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R Rosey DATE 2-9-63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL

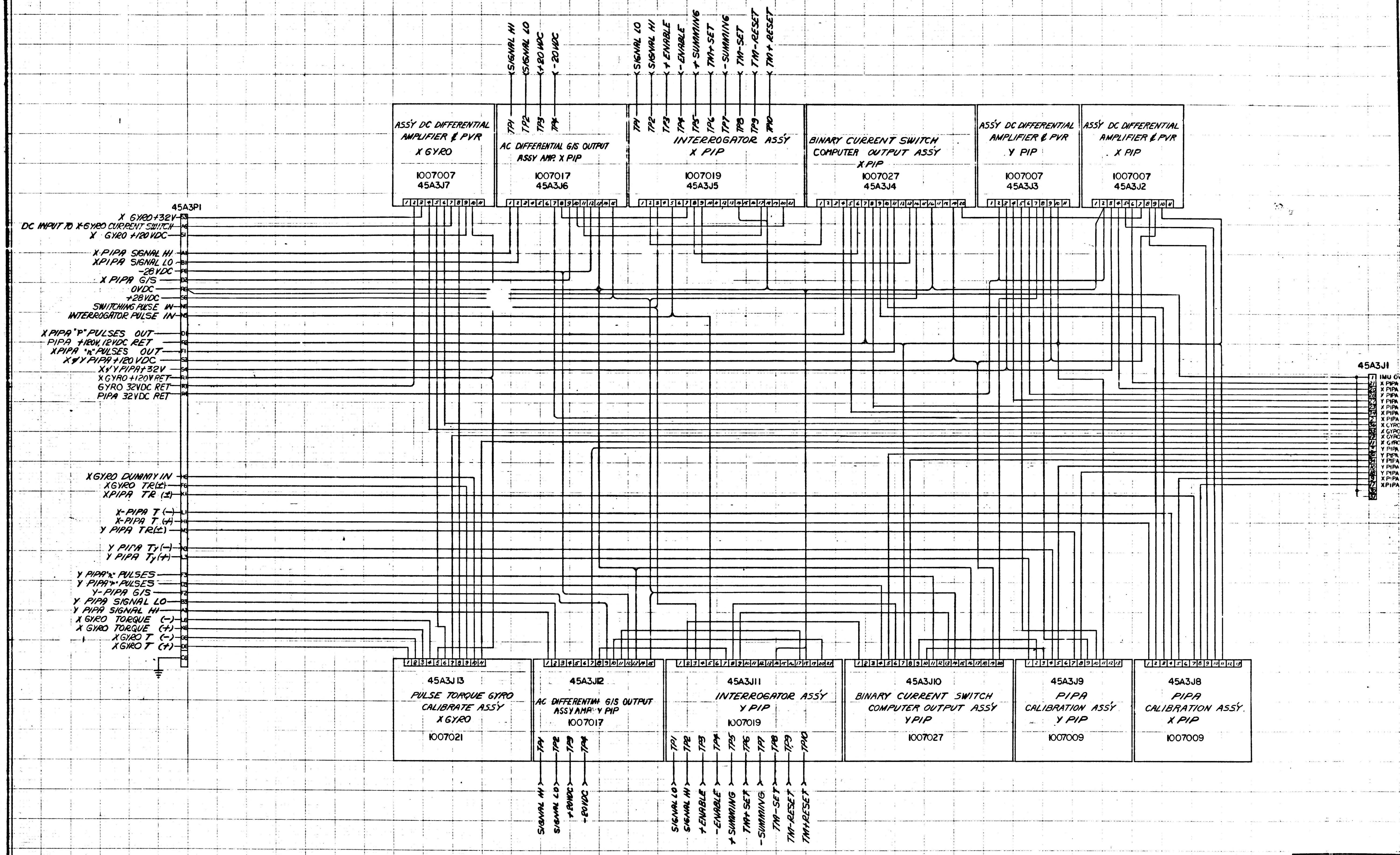
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 3

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1010093
SCALE | WT | SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

F2 1010093


45A3P1
X GYRO +32V S3
DC INPUT TO X-GYRO CURRENT SWITCH A6
X GYRO +120 VDC S1
X PIPA SIGNAL HI A1
XPIPA SIGNAL LO B1
-28VDC P6
X PIPA G/S D2
OVDC R6
+28VDC S6
SWITCHING PULSE IN N6
INTERROGATOR PULSE IN N6
X PIPA "P" PULSES OUT D1
PIPA +120V, 12VDC RET R2
XPIPA "n" PULSES OUT F1
X & Y PIPA +120 VDC S2
X & Y PIPA +32V S4
X GYRO +120V RET R1
GYRO 32VDC RET R3
PIPA 32VDC RET R4
XGYRO DUMMY IN H6
XGYRO TR(±) F6
XPIPA TR (±) K1
X-PIPA T (−) L1
X-PIPA T (+) H1
Y PIPA TR(±) M3
Y PIPA Ty(−) N3
Y PIPA Ty(+) L3
Y PIPA "n" PULSES F3
Y PIPA "P" PULSES D3
Y-PIPA G/S F2
Y PIPA SIGNAL LO B3
Y PIPA SIGNAL HI A3
X GYRO TORQUE (−) L6
X GYRO TORQUE (+) K6
XGYRO T (−) G6
XGYRO T (+) D6
C6
SIGNAL HI
SIGNAL LO
+20 VDC
-20VDC
TP1 TP2 TP3 TP4
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
ASSY DC DIFFERENTIAL AMPLIFIER & PVR
X GYRO
1007007
45A3J7
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP
1007017
45A3J6
INTERROGATOR ASSY
X PIP
1007019
45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY
X PIP
1007027
45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR
Y PIP
1007007
45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR
X PIP
1007007
45A3J2
45A3J1
1 IMU OV
21 X PIPA
20 X PIPA
26 Y PIPA
27 Y PIPA
23 X PIPA
34 X PIPA
2 X PIPA
36 X GYRO
35 X GYRO
12 X GYRO
11 X GYRO
4 Y PIPA
32 Y PIPA
31 Y PIPA
10 Y PIPA
18 Y PIPA
9 X PIPA
17 XPIPA
36
37
45A3J13
PULSE TORQUE GYRO CALIBRATE ASSY
X GYRO
1007021
45A3J12
AC DIFFERENTIAL G/S OUTPUT ASSY AMP Y PIP
1007017
TP1 TP2 TP3 TP4
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
45A3J11
INTERROGATOR ASSY
Y PIP
1007019
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
45A3J10
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY
Y PIP
1007027
45A3J9
PIPA CALIBRATION ASSY
Y PIP
1007009
45A3J8
PIPA CALIBRATION ASSY.
X PIP
1007009

NEXT ASSY | USED ON

APPLICATION

INCHES
0 2
PHOTOGRAPHIC SCALE ONLY

F-1

1010093

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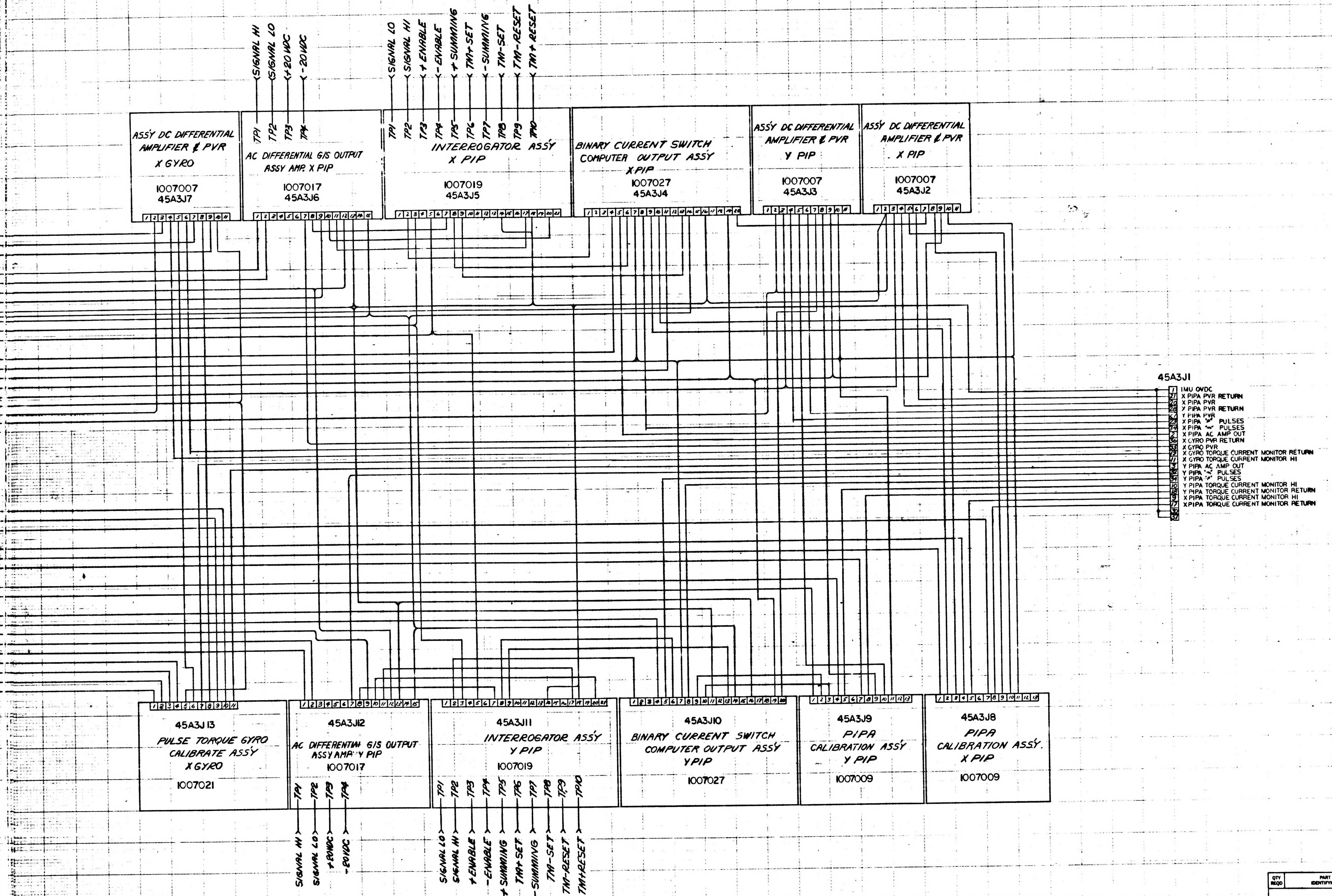
C	REVISED PER TDRR 03291	9-19-63	



SIGNAL HI
SIGNAL LO
+20 VDC
-20VDC
SIGNAL LO
SIGNAL HI
+ ENABLE
- ENABLE
+ SUMMING
TM+ SET
- SUMMING
TM-SET
TM-RESET
TM+ RESET
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J7
TP1 TP2 TP3 TP4
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP 1007017 45A3J6
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
INTERROGATOR ASSY X PIP 1007019 45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP 1007027 45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP 1007007 45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP 1007007 45A3J2
45A3J1
1 IMU OVDC
21 X PIPA PVR RETURN
20 X PIPA PVR
26 Y PIPA PVR RETURN
27 Y PIPA PVR
23 X PIPA "+" PULSES
34 X PIPA "-" PULSES
2 X PIPA AC AMP OUT
36 X GYRO PVR RETURN
35 X GYRO PVR
19 X GYRO TORQUE CURRENT MONITOR RETURN
11 X GYRO TORQUE CURRENT MONITOR HI
3 Y PIPA AC AMP OUT
32 Y PIPA "-" PULSES
31 Y PIPA "+" PULSES
10 Y PIPA TORQUE CURRENT MONITOR HI
18 Y PIPA TORQUE CURRENT MONITOR RETURN
9 X PIPA TORQUE CURRENT MONITOR HI
17 XPIPA TORQUE CURRENT MONITOR RETURN
30
37
45A3J13 PULSE TORQUE GYRO CALIBRATE ASSY X GYRO 1007021
45A3J12 AC DIFFERENTIAL G/S OUTPUT ASSY AMP Y PIP 1007017
TP1 TP2 TP3 TP4
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
45A3J11 INTERROGATOR ASSY Y PIP 1007019
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+ SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
45A3J10 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP 1007027
45A3J9 PIPA CALIBRATION ASSY Y PIP 1007009
45A3J8 PIPA CALIBRATION ASSY. X PIP 1007009

1010093 C

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN R. Rousey DATE 7-9-63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL 9/17/63
MIT APPROVAL

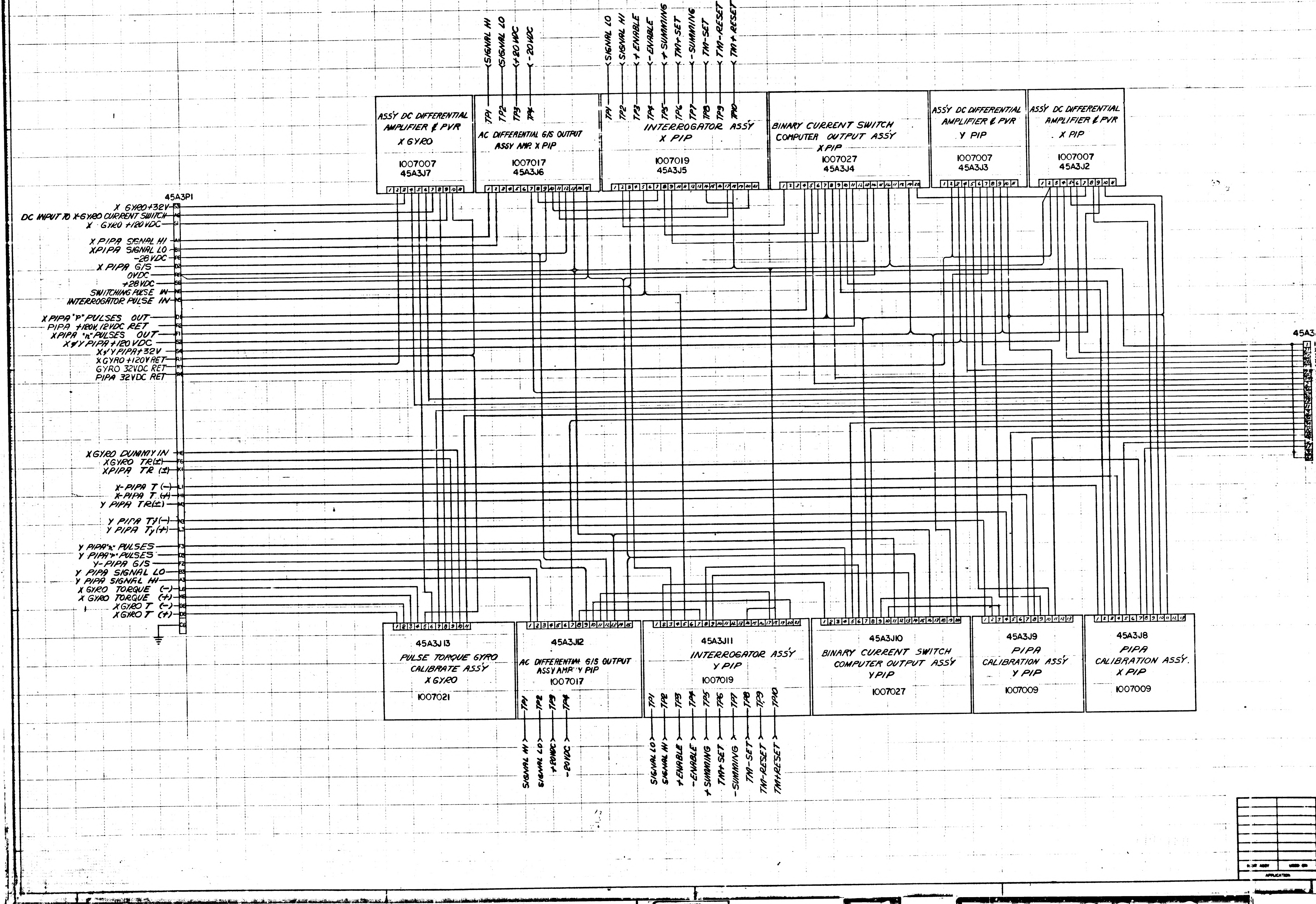
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 3

CODE IDENT NO. SIZE J NASA DRAWING NO. 1010093
SCALE WT SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

F2 1010093


45A3P1
X GYRO +32V
DC INPUT TO X-GYRO CURRENT SWITCH
X GYRO +120 VDC
X PIPA SIGNAL HI
XPIPA SIGNAL LO
-28 VDC
X PIPA G/S
0VDC
+28 VDC
SWITCHING PULSE IN
INTERROGATOR PULSE IN
X PIPA "P" PULSES OUT
PIPA +120V, 12VDC RET
XPIPA "n" PULSES OUT
X & Y PIPA +120 VDC
X & Y PIPA +32V
X GYRO +120V RET
GYRO 32VDC RET
PIPA 32VDC RET
XGYRO DUMMY IN
XGYRO TR(±)
XPIPA TR (±)
X-PIPA T (−)
X-PIPA T (+)
Y PIPA TR(±)
Y PIPA Ty(−)
Y PIPA Ty(+)
Y PIPA "n" PULSES
Y PIPA "p" PULSES
Y-PIPA G/S
Y PIPA SIGNAL LO
Y PIPA SIGNAL HI
X GYRO TORQUE (−)
X GYRO TORQUE (+)
XGYRO T (−)
XGYRO T (+)
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO
1007007
45A3J7
SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
TP1
TP2
TP3
TP4
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP
1007017
45A3J6
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
INTERROGATOR ASSY X PIP
1007019
45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP
1007027
45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP
1007007
45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP
1007007
45A3J2
45A3
45A3J13
PULSE TORQUE GYRO CALIBRATE ASSY X GYRO
1007021
45A3J12
AC DIFFERENTIAL G/S OUTPUT ASSY AMP Y PIP
1007017
TP1
TP2
TP3
TP4
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
45A3J11
INTERROGATOR ASSY Y PIP
1007019
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
45A3J10
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP
1007027
45A3J9
PIPA CALIBRATION ASSY Y PIP
1007009
45A3J8
PIPA CALIBRATION ASSY. X PIP
1007009
NEXT ASSY
USED ON
APPLICATION

INCHES
PHOTOGRAPHIC SCALE ONLY

E1

1010093

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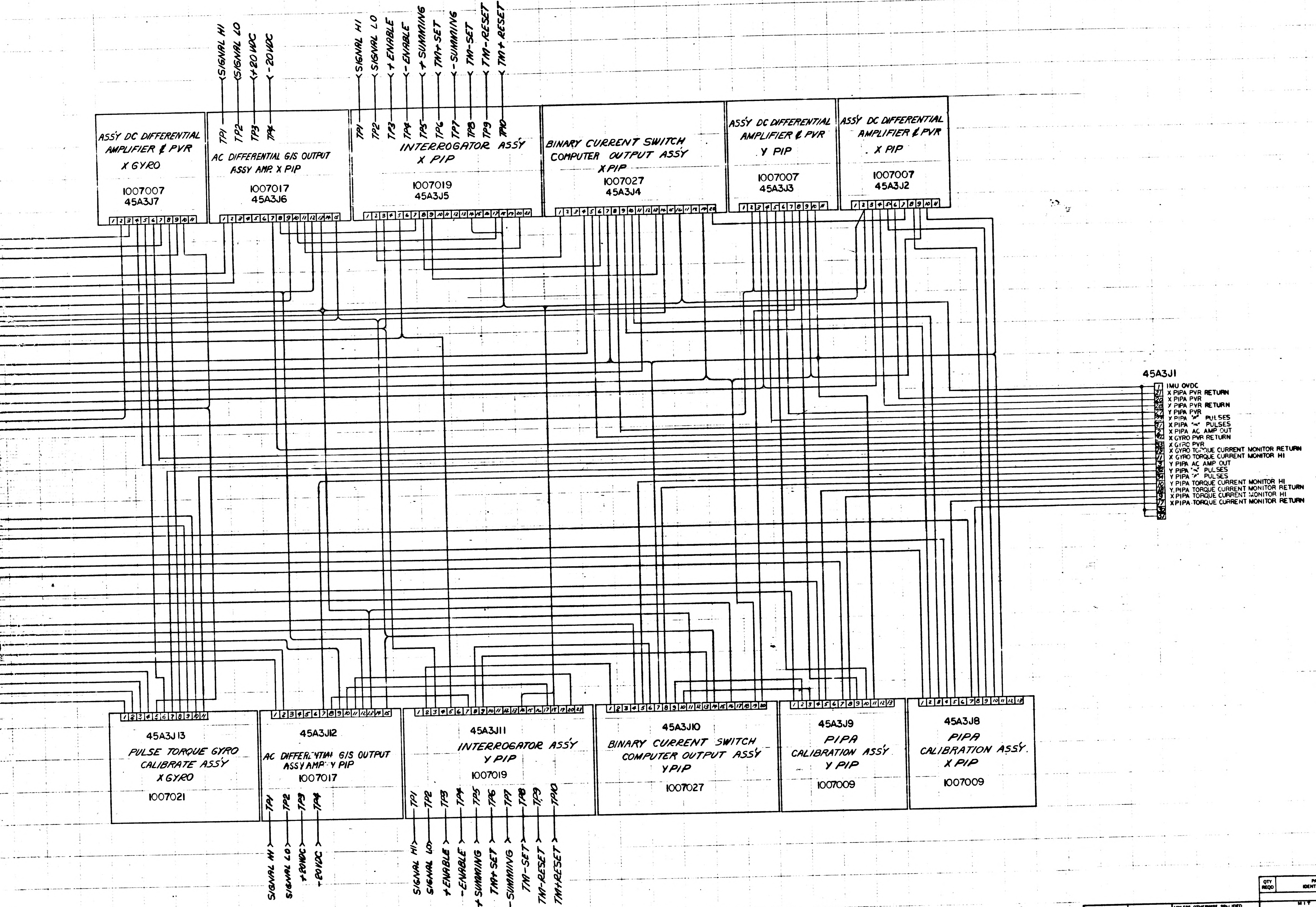
D	REVISED PER TDRR 04111	23	WK
E	REVISED PER TDRR 04113	23	WK


SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL HI
SIGNAL LO
+ ENABLE
- ENABLE
+ SUMMING
TM-SET
- SUMMING
TM-SET
TM-RESET
TM+ RESET
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO
1007007
45A3J7
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP
1007017
45A3J6
INTERROGATOR ASSY X PIP
1007019
45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP
1007027
45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP
1007007
45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP
1007007
45A3J2
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
45A3J1
1 IMU OVDC
21 X PIPA PVR RETURN
20 X PIPA PVR
28 Y PIPA PVR RETURN
27 Y PIPA PVR
23 X PIPA "+" PULSES
31 X PIPA "-" PULSES
2 X PIPA AC AMP OUT
36 X GYRO PVR RETURN
35 X GYRO PVR
19 X GYRO TORQUE CURRENT MONITOR RETURN
11 X GYRO TORQUE CURRENT MONITOR HI
3 Y PIPA AC AMP OUT
32 Y PIPA "-" PULSES
34 Y PIPA "+" PULSES
10 Y PIPA TORQUE CURRENT MONITOR HI
18 Y PIPA TORQUE CURRENT MONITOR RETURN
9 X PIPA TORQUE CURRENT MONITOR HI
17 XPIPA TORQUE CURRENT MONITOR RETURN
30
37
45A3J13
PULSE TORQUE GYRO CALIBRATE ASSY X GYRO
1007021
45A3J12
AC DIFFERENTIAL G/S OUTPUT ASSY AMP Y PIP
1007017
45A3J11
INTERROGATOR ASSY Y PIP
1007019
45A3J10
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP
1007027
45A3J9
PIPA CALIBRATION ASSY Y PIP
1007009
45A3J8
PIPA CALIBRATION ASSY. X PIP
1007009
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
SIGNAL HI
SIGNAL LO
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY | USED ON
APPLICATION

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN R. Rouse DATE 7-9-63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 3

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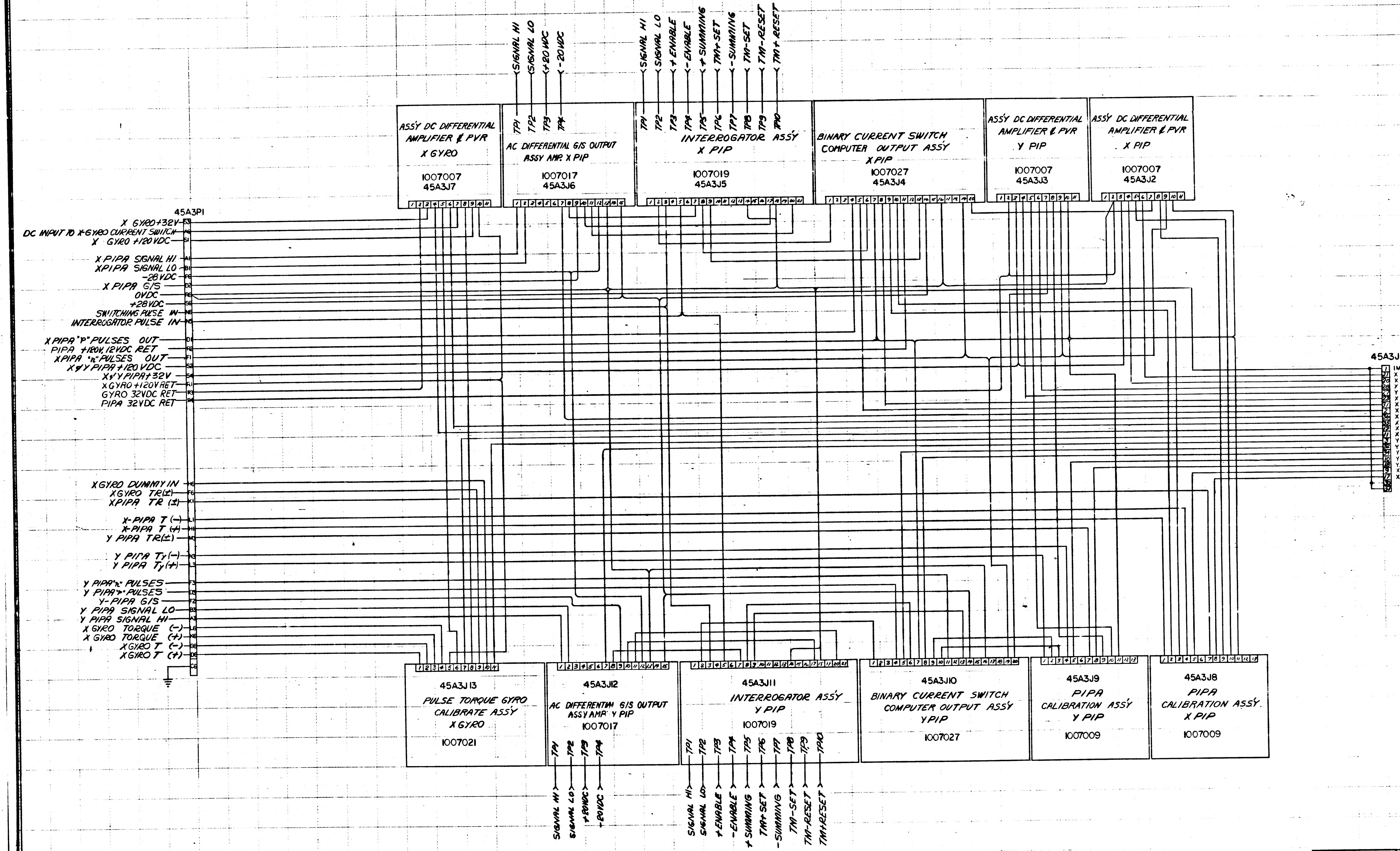
SCALE | WT | SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY

E2

1010093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X GYRO+32V S3
DC INPUT TO X-GYRO CURRENT SWITCH
X GYRO +120VDC S1
X PIPA SIGNAL HI A1
XPIPA SIGNAL LO B1
-28VDC
X PIPA G/S D2
0VDC
+28VDC
SWITCHING PULSE IN
INTERROGATOR PULSE IN
X PIPA "P" PULSES OUT D1
PIPA +120V, 12VDC RET
XPIPA "n" PULSES OUT F1
X & Y PIPA +120VDC S2
X & Y PIPA +32V S4
X GYRO +120V RET R1
GYRO 32VDC RET R3
PIPA 32VDC RET R4
X GYRO DUMMY IN
X GYRO TR(±) F6
XPIPA TR (±) K1
X-PIPA T (−) L1
X-PIPA T (+) H1
Y PIPA TR(±)
Y PIPA Ty(−)
Y PIPA Ty(+) L3
Y PIPA "n" PULSES F3
Y PIPA "p" PULSES D3
Y-PIPA G/S F2
Y PIPA SIGNAL LO B3
Y PIPA SIGNAL HI A3
X GYRO TORQUE (−) L6
X GYRO TORQUE (+) K6
X GYRO T (−) G6
X GYRO T (+) D6
C6
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
SIGNAL HI
SIGNAL LO
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J7
AC DIFFERENTIAL G/S OUTPUT ASSY AMP. X PIP 1007017 45A3J6
INTERROGATOR ASSY X PIP 1007019 45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP 1007027 45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP 1007007 45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP 1007007 45A3J2
45A3J13 PULSE TORQUE GYRO CALIBRATE ASSY X GYRO 1007021
45A3J12 AC DIFFERENTIAL G/S OUTPUT ASSY AMP Y PIP 1007017
45A3J11 INTERROGATOR ASSY Y PIP 1007019
45A3J10 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY YPIP 1007027
45A3J9 PIPA CALIBRATION ASSY Y PIP 1007009
45A3J8 PIPA CALIBRATION ASSY. X PIP 1007009
45A3J1
1 IMU 0VDC
21 X PIPA PVR RETUR
20 X PIPA PVR
28 Y PIPA PVR RETUR
27 Y PIPA PVR
23 X PIPA "p" PULSE
31 X PIPA "n" PULSE
2 X PIPA AC AMP O
36 X GYRO PVR RETUR
35 X GYRO PVR
19 X GYRO TORQUE CU
11 X GYRO TORQUE CU
3 Y PIPA AC AMP O
32 Y PIPA "n" PULSE
34 Y PIPA "p" PULSE
10 Y PIPA TORQUE CU
18 Y PIPA TORQUE CU
9 X PIPA TORQUE CU
17 X PIPA TORQUE C
33
37

UNLESS OTHERWISE SPECI
DIMENSIONS ARE IN INCHE
TOLERANCES ON
FRACTIONS DECIMALS
±
DO NOT SCALE THIS DRAW
MATERIAL
HEAT TREATMENT
FINAL FINISH

NEXT ASSY	USED ON
APPLICATION	

INCHES
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PHOTOGRAPHIC SCALE ONLY

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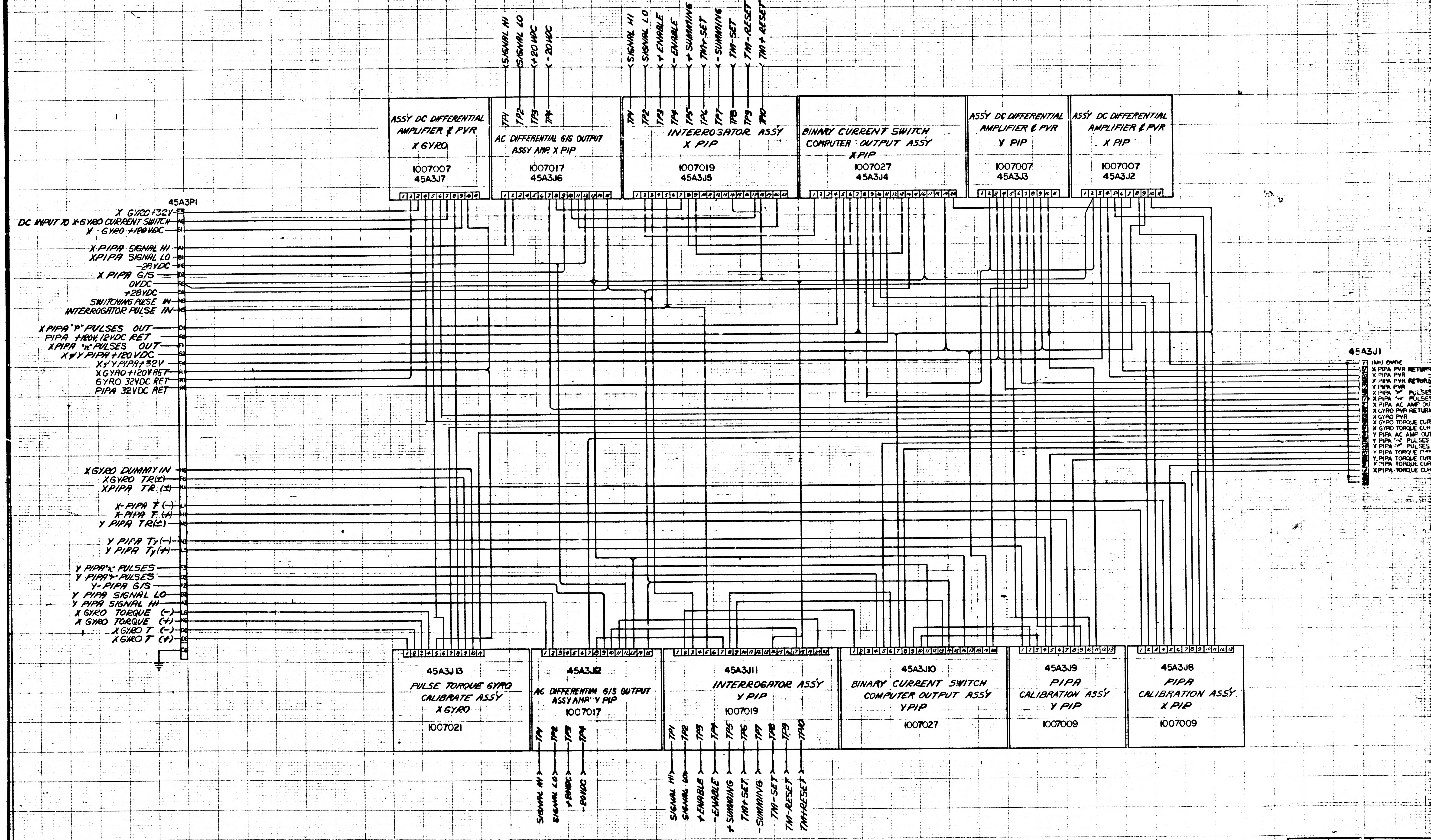
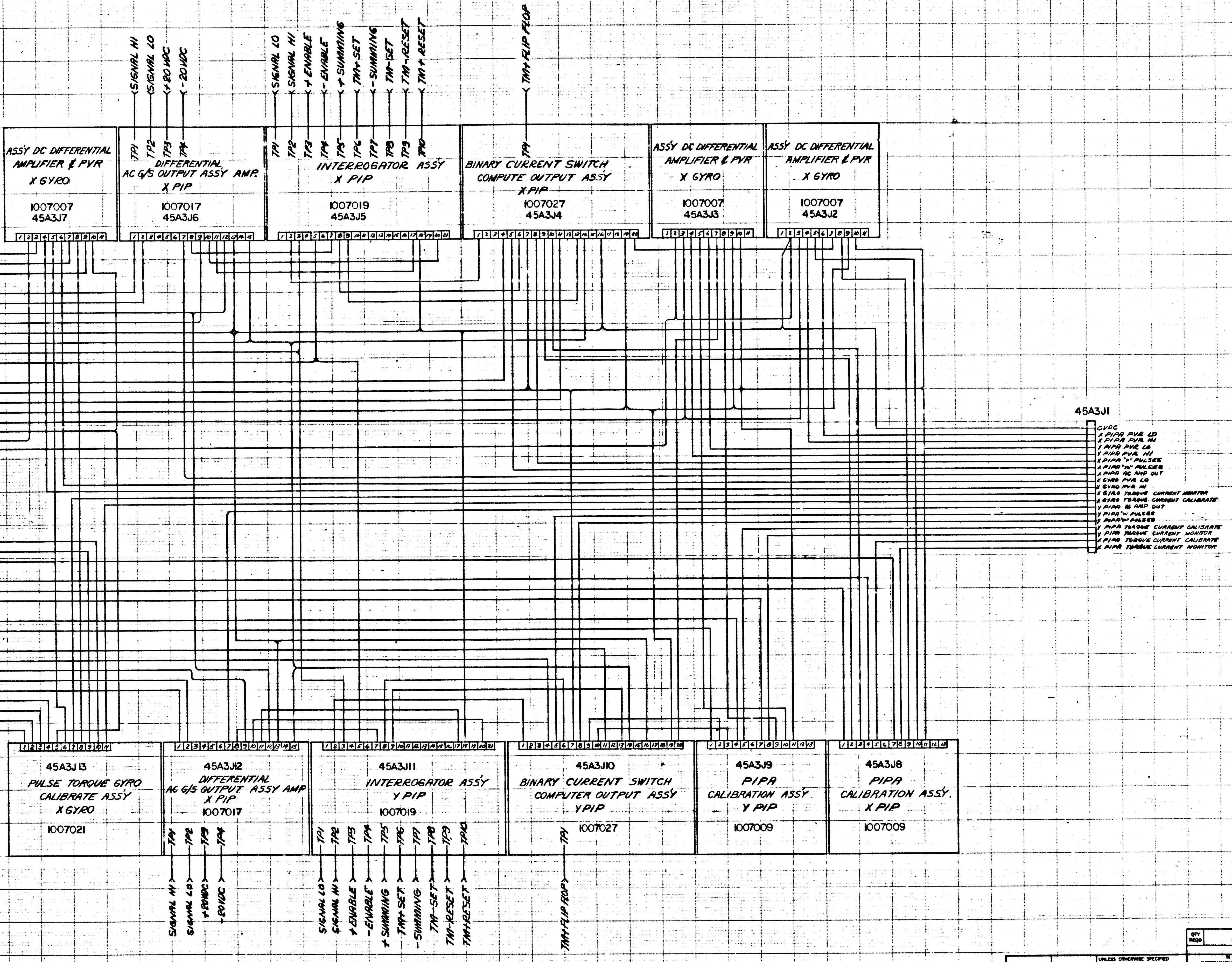


45A3P1
X GYRO +32V
DC INPUT TO X-GYRO CURRENT SWITCH
X GYRO +120 VDC
X PIPA SIGNAL HI
XPIPA SIGNAL LO
-28VDC
X PIPA G/S
0VDC
+28VDC
SWITCHING PULSE IN
INTERROGATOR PULSE IN
X PIPA "P" PULSES OUT
PIPA +120V, 12VDC RET
XPIPA "n" PULSES OUT
X & Y PIPA +120 VDC
X & Y PIPA +32V
X GYRO +120V RET
GYRO 32VDC RET
PIPA 32VDC RET
XGYRO DUMMY IN
XGYRO TR(±)
XPIPA TR (±)
X-PIPA T (−)
X-PIPA T (+)
Y PIPA TR(±)
Y PIPA Ty(−)
Y PIPA Ty(+)
Y PIPA "n" PULSES
Y PIPA "P" PULSES
Y-PIPA G/S
Y PIPA SIGNAL LO
Y PIPA SIGNAL HI
X GYRO TORQUE (−)
X GYRO TORQUE (+)
XGYRO T (−)
XGYRO T (+)
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO
1007007
45A3J7
SIGNAL HI
SIGNAL LO
+20 VDC
−20VDC
TP1
TP2
TP3
TP4
AC DIFFERENTIAL G/S OUTPUT ASSY AMP X PIP
1007017
45A3J6
SIGNAL HI
SIGNAL LO
+ENABLE
−ENABLE
+SUMMING
TM+SET
−SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
INTERROGATOR ASSY X PIP
1007019
45A3J5
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY X PIP
1007027
45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y PIP
1007007
45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X PIP
1007007
45A3J2
45A3J1
IMU 0VDC
X PIPA PVR RETURN
X PIPA PVR
Y PIPA PVR RETURN
Y PIPA PVR
X PIPA "P" PULSES
X PIPA "n" PULSES
X PIPA AC AMP OUT
X GYRO PVR RETURN
X GYRO PVR
X GYRO TORQUE CUR
X GYRO TORQUE CUR
Y PIPA AC AMP OUT
Y PIPA "n" PULSES
Y PIPA "P" PULSES
Y PIPA TORQUE CUR
Y PIPA TORQUE CUR
X PIPA TORQUE CUR
XPIPA TORQUE CUR
45A3J13
PULSE TORQUE GYRO CALIBRATE ASSY X GYRO
1007021
45A3J12
AC DIFFERENTIAL G/S OUTPUT ASSY AMP Y PIP
1007017
TP1
TP2
TP3
TP4
SIGNAL HI
SIGNAL LO
+20VDC
−20VDC
45A3J11
INTERROGATOR ASSY Y PIP
1007019
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
SIGNAL HI
SIGNAL LO
+ENABLE
−ENABLE
+SUMMING
TM+SET
−SUMMING
TM−SET
TM−RESET
TM+RESET
45A3J10
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP
1007027
45A3J9
PIPA CALIBRATION ASSY Y PIP
1007009
45A3J8
PIPA CALIBRATION ASSY. X PIP
1007009

NEXT ASSY
USED ON
APPLICATION

1010093


SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL LO
SIGNAL HI
+ ENABLE
- ENABLE
+ SUMMING
TM+SET
- SUMMING
TM-SET
TM-RESET
TM+RESET
TM+FLIP FLOP
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J7
TP1 TP2 TP3 TP4
DIFFERENTIAL AC G/S OUTPUT ASSY AMP. X PIP 1007017 45A3J6
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
INTERROGATOR ASSY X PIP 1007019 45A3J5
TP1
BINARY CURRENT SWITCH COMPUTE OUTPUT ASSY X PIP 1007027 45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J2
45A3J1
OVDC
X PIPA PVR LO
X PIPA PVR HI
Y PIPA PVR LO
Y PIPA PVR HI
X PIPA "P" PULSES
X PIPA "N" PULSES
X PIPA AC AMP OUT
X GYRO PVR LO
X GYRO PVR HI
X GYRO TORQUE CURRENT MONITOR
X GYRO TORQUE CURRENT CALIBRATE
Y PIPA AC AMP OUT
Y PIPA "N" PULSES
Y PIPA "P" PULSES
Y PIPA TORQUE CURRENT CALIBRATE
Y PIPA TORQUE CURRENT MONITOR
X PIPA TORQUE CURRENT CALIBRATE
X PIPA TORQUE CURRENT MONITOR
45A3J13 PULSE TORQUE GYRO CALIBRATE ASSY X GYRO 1007021
45A3J12 DIFFERENTIAL AC G/S OUTPUT ASSY AMP X PIP 1007017
TP1 TP2 TP3 TP4
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
45A3J11 INTERROGATOR ASSY Y PIP 1007019
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
45A3J10 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP 1007027
TP1
TM+FLIP FLOP
45A3J9 PIPA CALIBRATION ASSY Y PIP 1007009
45A3J8 PIPA CALIBRATION ASSY. X PIP 1007009

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02435 DATE 1-7-63

1010093

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN R. Rousy DATE 7-9-63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL 4/17/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 3

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1010093
SCALE | WT | SHEET OF

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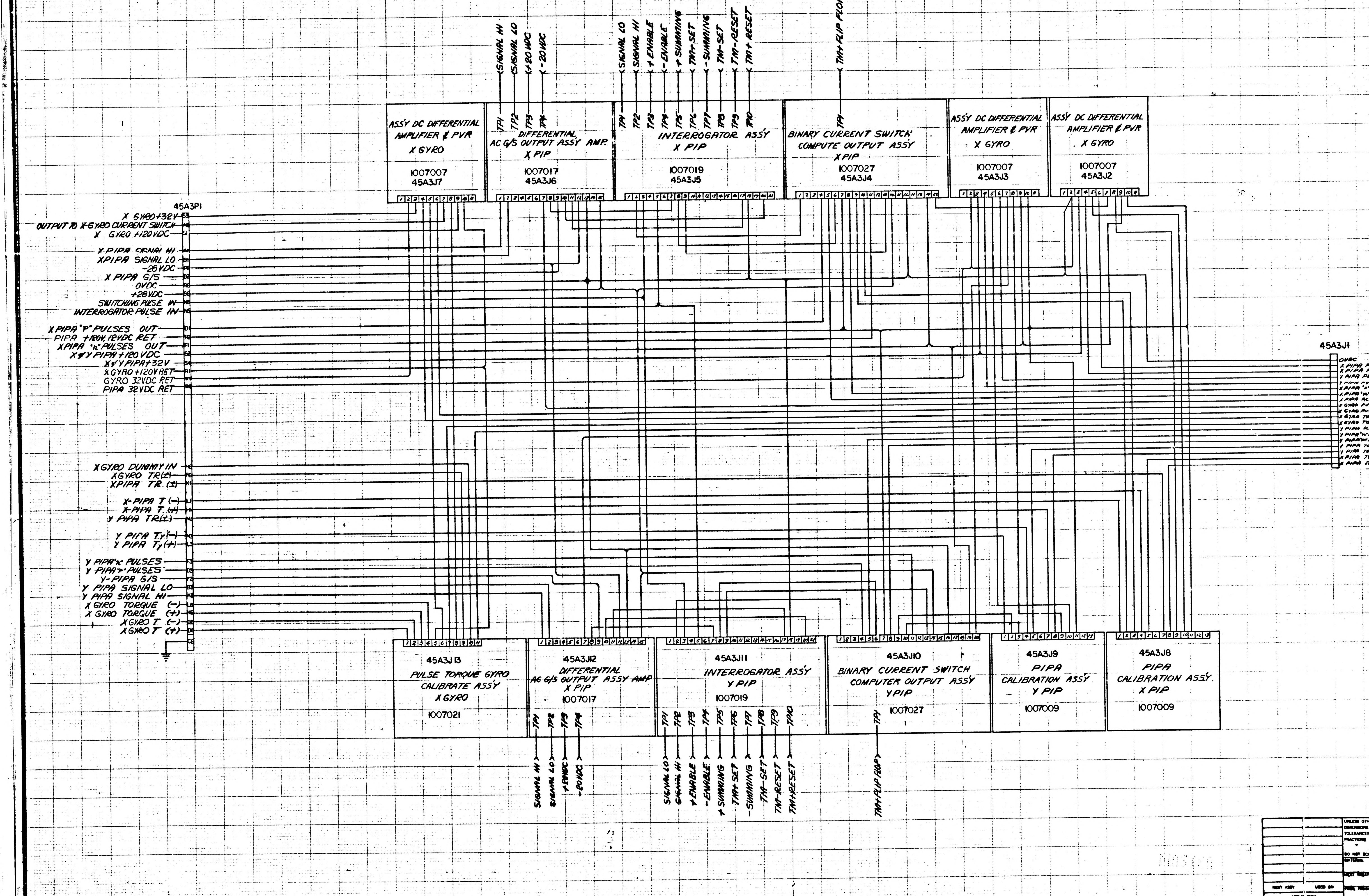
PHOTOGRAPHIC SCALE ONLY

E2

1010093


SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL LO
SIGNAL HI
+ ENABLE
- ENABLE
+ SUMMING
TM-SET
- SUMMING
TM-SET
TM-RESET
TM+RESET
TM+FLIP FLOP
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J7
TP1 TP2 TP3 TP4
DIFFERENTIAL AC G/S OUTPUT ASSY AMP. X PIP 1007017 45A3J6
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
INTERROGATOR ASSY X PIP 1007019 45A3J5
TP1
BINARY CURRENT SWITCH COMPUTE OUTPUT ASSY X PIP 1007027 45A3J4
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR X GYRO 1007007 45A3J2
45A3P1
X GYRO +32V
OUTPUT TO X-GYRO CURRENT SWITCH
X GYRO +120 VDC
X PIPA SIGNAL HI
XPIPA SIGNAL LO.
-28 VDC
X PIPA G/S
OVDC
+28 VDC
SWITCHING PULSE IN
INTERROGATOR PULSE IN
X PIPA "P" PULSES OUT
PIPA +120V, 12VDC RET
XPIPA "n" PULSES OUT
X & Y PIPA +120 VDC
X & Y PIPA +32V
X GYRO +120V RET
GYRO 32VDC RET
PIPA 32VDC RET
X GYRO DUMMY IN
X GYRO TR(±)
XPIPA TR. (±)
X-PIPA T (-)
X-PIPA T. (+)
Y PIPA TR(±)
Y PIPA Ty (-)
Y PIPA Ty (+)
Y PIPA "n" PULSES
Y PIPA "P" PULSES
Y-PIPA G/S
Y PIPA SIGNAL LO
Y PIPA SIGNAL HI
X GYRO TORQUE (-)
X GYRO TORQUE (+)
X GYRO T (-)
X GYRO T (+)
45A3J1
OVDC
X PIPA P
X PIPA P
Y PIPA PU
Y PIPA PU
X PIPA "P"
X PIPA "n"
X PIPA AC
X GYRO PV
X GYRO PV
X GYRO TO
X GYRO TO
Y PIPA AC
Y PIPA "n"
Y PIPA "P"
Y PIPA TO
Y PIPA TO
X PIPA T
X PIPA T
45A3J13 PULSE TORQUE GYRO CALIBRATE ASSY X GYRO 1007021
45A3J12 DIFFERENTIAL AC G/S OUTPUT ASSY AMP X PIP 1007017
TP1 TP2 TP3 TP4
SIGNAL HI
SIGNAL LO
+20VDC
-20VDC
45A3J11 INTERROGATOR ASSY Y PIP 1007019
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
SIGNAL LO
SIGNAL HI
+ ENABLE
- ENABLE
+ SUMMING
TM+SET
- SUMMING
TM-SET
TM-RESET
TM+RESET
45A3J10 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y PIP 1007027
TP1
TM+FLIP FLOP
45A3J9 PIPA CALIBRATION ASSY Y PIP 1007009
45A3J8 PIPA CALIBRATION ASSY. X PIP 1007009

INCHES
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PHOTOGRAPHIC SCALE ONLY

F1

1010093

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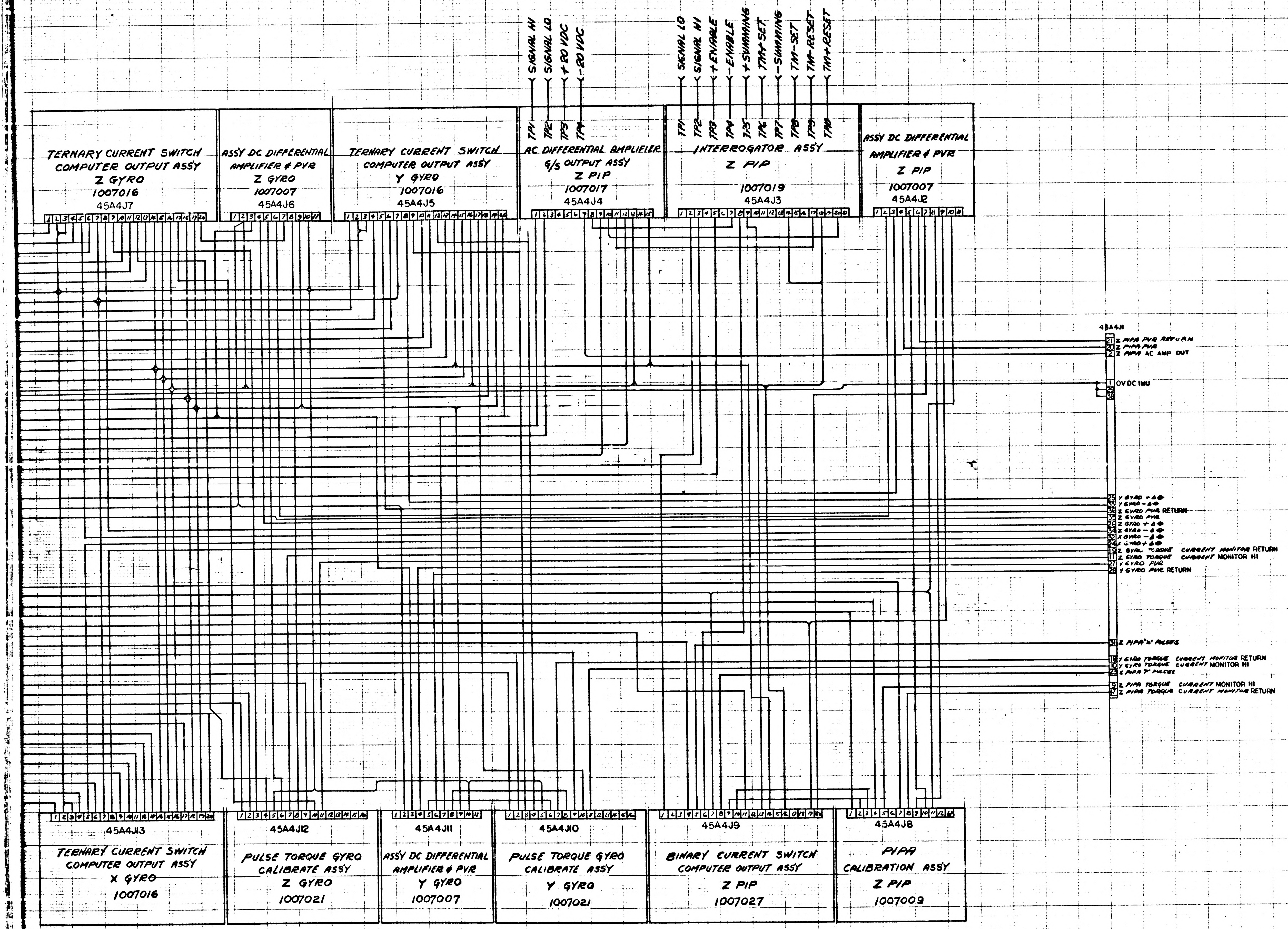
SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016 45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016 45A4J5
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017 45A4J4
INTERROGATOR ASSY Z PIP 1007019 45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007 45A4J2
45A4J1
21 Z PIPA PVR RETURN
20 Z PIPA PVR
2 Z PIPA AC AMP OUT
1 OV DC IMU
29
38
25 Y GYRO +Δθ
33 Y GYRO -Δθ
36 Z GYRO PVR RETURN
35 Z GYRO PVR
26 Z GYRO +Δθ
34 Z GYRO -Δθ
32 X GYRO -Δθ
24 X GYRO +Δθ
19 Z GYRO TORQUE CURRENT MONITOR RETURN
11 Z GYRO TORQUE CURRENT MONITOR HI
27 Y GYRO PVR
28 Y GYRO PVR RETURN
31 Z PIPA "X" PULSES
18 Y GYRO TORQUE CURRENT MONITOR RETURN
10 Y GYRO TORQUE CURRENT MONITOR HI
23 Z PIPA "Y" PULSES
9 Z PIPA TORQUE CURRENT MONITOR HI
17 Z PIPA TORQUE CURRENT MONITOR RETURN
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11 ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
45A4J8 PIPA CALIBRATION ASSY Z PIP 1007009

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CLASS B RELEASE TDR No. 02435 DATE 8-7-63

1010094 A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
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M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
NAS 9-4065 CONTRACT (REG. NO. 109705)

DRAWN R SULLIVAN DATE 5/12/63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL 4/1/64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

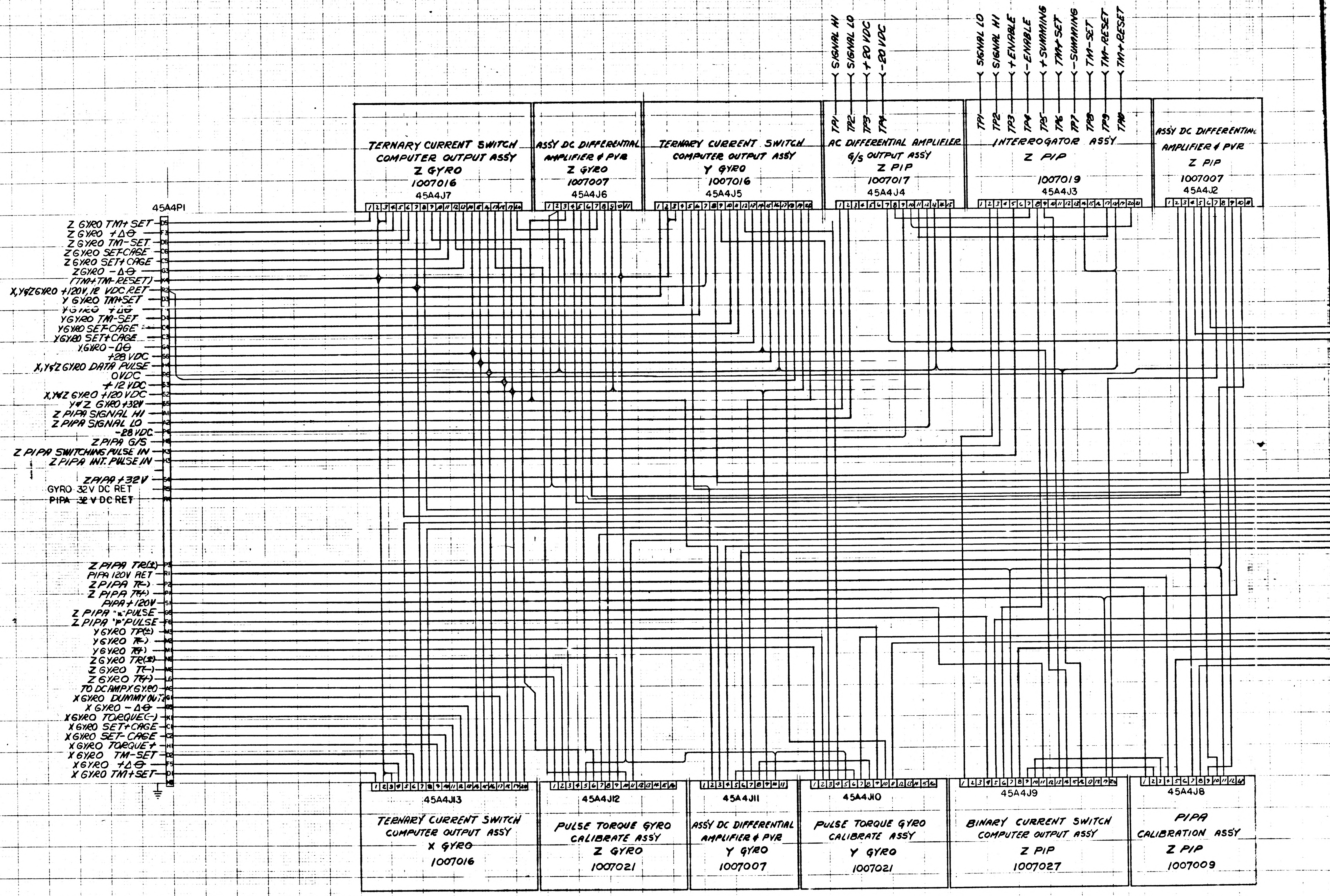
WIRING DIAGRAM
TRAY 4

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010094
SCALE —
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

F2

1010094


45A4P1
Z GYRO TM+ SET — D5
Z GYRO +ΔΘ — F3
Z GYRO TM-SET — D6
Z GYRO SET-CAGE — C6
Z GYRO SET+ CAGE — C5
ZGYRO -ΔΘ — G3
(TM+TM-RESET) — K4
X,Y&Z GYRO +120V, 12 VDC RET — R2
Y GYRO TM+SET — D3
Y GYRO +ΔΘ
YGYRO TM-SET — D4
YGYRO SET-CAGE — C4
YGYRO SET+CAGE — C3
Y GYRO -ΔΘ — G4
+28 VDC — S6
X,Y&Z GYRO DATA PULSE — H4
0VDC — R6
+12 VDC — S3
X,Y&Z GYRO +120 VDC — S2
Y&Z GYRO +32V — S5
Z PIPA SIGNAL HI — A1
Z PIPA SIGNAL LO — A2
-28 VDC — P6
Z PIPA G/S — H6
Z PIPA SWITCHING PULSE IN — K3
Z PIPA INT. PULSE IN — H3
Z PIPA +32V — S4
GYRO 32V DC RET — R5
PIPA 32 V DC RET — R4
Z PIPA TR(±) — P3
PIPA 120V RET — R1
Z PIPA T(-) — P2
Z PIPA T(+) — P1
PIPA +120V — S1
Z PIPA "n" PULSE — G6
Z PIPA "P" PULSE — F6
Y GYRO TR(±) — M3
Y GYRO T(-) — M2
Y GYRO T(+) — M1
Z GYRO TR(±) — N6
Z GYRO T(-) — M6
Z GYRO T(+) — L6
TO DC AMP X GYRO — A6
X GYRO DUMMY OUT — G1
X GYRO -ΔΘ — G2
X GYRO TORQUE(-) — K1
X GYRO SET+CAGE — C1
X GYRO SET-CAGE — C2
X GYRO TORQUE+ — H1
X GYRO TM-SET — D2
X GYRO +ΔΘ — F5
X GYRO TM+SET — D1
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016 45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016 45A4J5
SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
TP1 TP2 TP3 TP4
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017 45A4J4
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
INTERROGATOR ASSY Z PIP 1007019 45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007 45A4J2
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11 ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
45A4J8 PIPA CALIBRATION ASSY Z PIP 1007009

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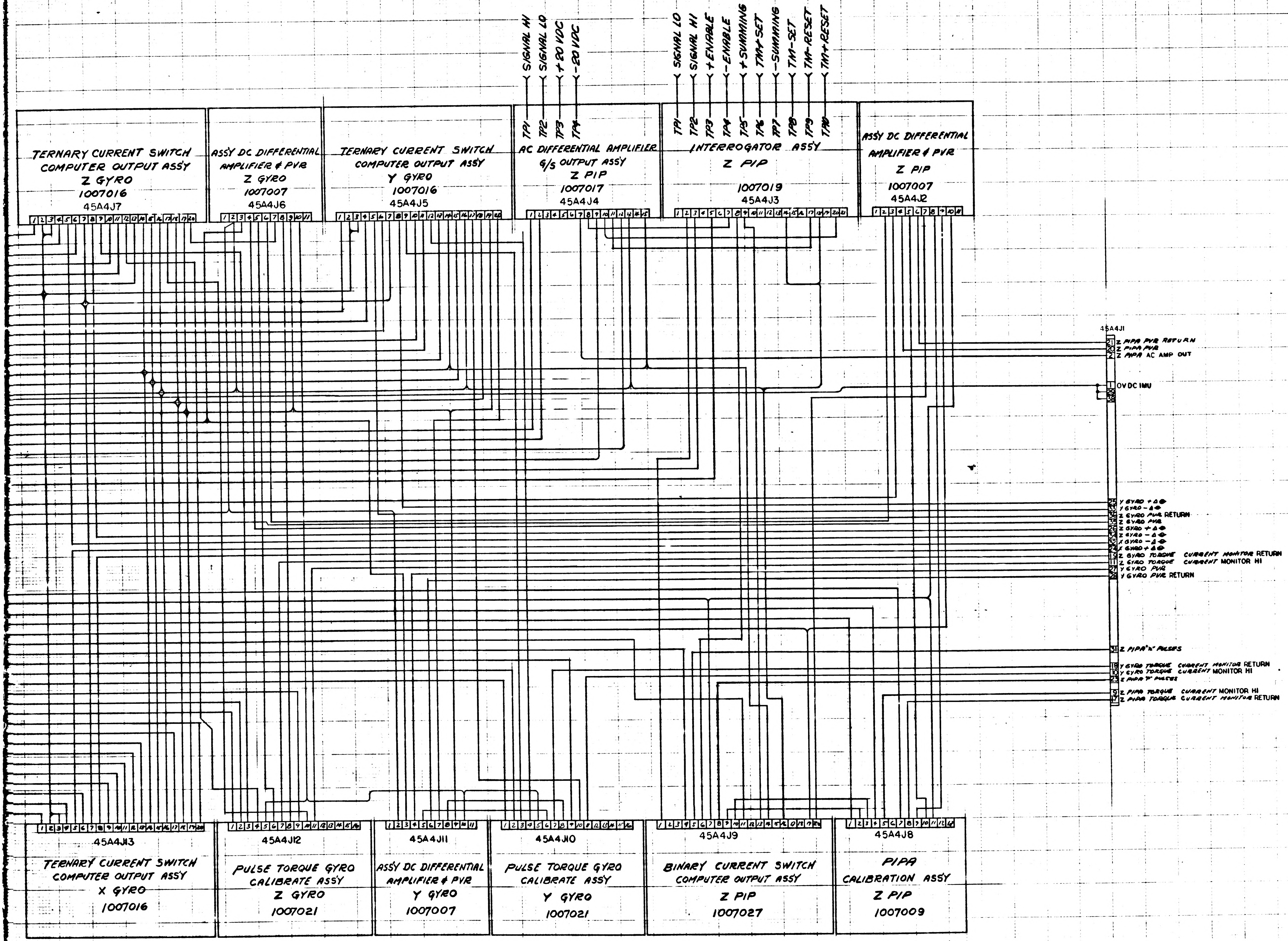
PHOTOGRAPHIC SCALE ONLY

	B	REVISED PER IDRR 03097		


SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY
Z GYRO
1007016
45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR
Z GYRO
1007007
45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY
Y GYRO
1007016
45A4J5
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY
Z PIP
1007017
45A4J4
INTERROGATOR ASSY
Z PIP
1007019
45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR
Z PIP
1007007
45A4J2
45A4J1
21 Z PIPA PVR RETURN
20 Z PIPA PVR
2 Z PIPA AC AMP OUT
1 OVDC IMU
29
38
25 Y GYRO +Δθ
33 Y GYRO -Δθ
36 Z GYRO PVR RETURN
35 Z GYRO PVR
26 Z GYRO +Δθ
34 Z GYRO -Δθ
32 X GYRO -Δθ
24 X GYRO +Δθ
19 Z GYRO TORQUE CURRENT MONITOR RETURN
11 Z GYRO TORQUE CURRENT MONITOR HI
27 Y GYRO PVR
28 Y GYRO PVR RETURN
31 Z PIPA "N" PULSES
18 Y GYRO TORQUE CURRENT MONITOR RETURN
10 Y GYRO TORQUE CURRENT MONITOR HI
23 Z PIPA "P" PULSES
9 Z PIPA TORQUE CURRENT MONITOR HI
17 Z PIPA TORQUE CURRENT MONITOR RETURN
45A4J13
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY
X GYRO
1007016
45A4J12
PULSE TORQUE GYRO CALIBRATE ASSY
Z GYRO
1007021
45A4J11
ASSY DC DIFFERENTIAL AMPLIFIER & PVR
Y GYRO
1007007
45A4J10
PULSE TORQUE GYRO CALIBRATE ASSY
Y GYRO
1007021
45A4J9
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY
Z PIP
1007027
45A4J8
PIPA CALIBRATION ASSY
Z PIP
1007009

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CLASS B RELEASE TDR No. 03435 DATE 8-7-63

1010094	B

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LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
DO NOT SCALE THIS DRAWING
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HEAT TREATMENT #
FINAL FINISH #

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO 109705 CONTRACT
DRAWN R SULLIVAN DATE 5/2/63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL 8/7/63
MIT APPROVAL

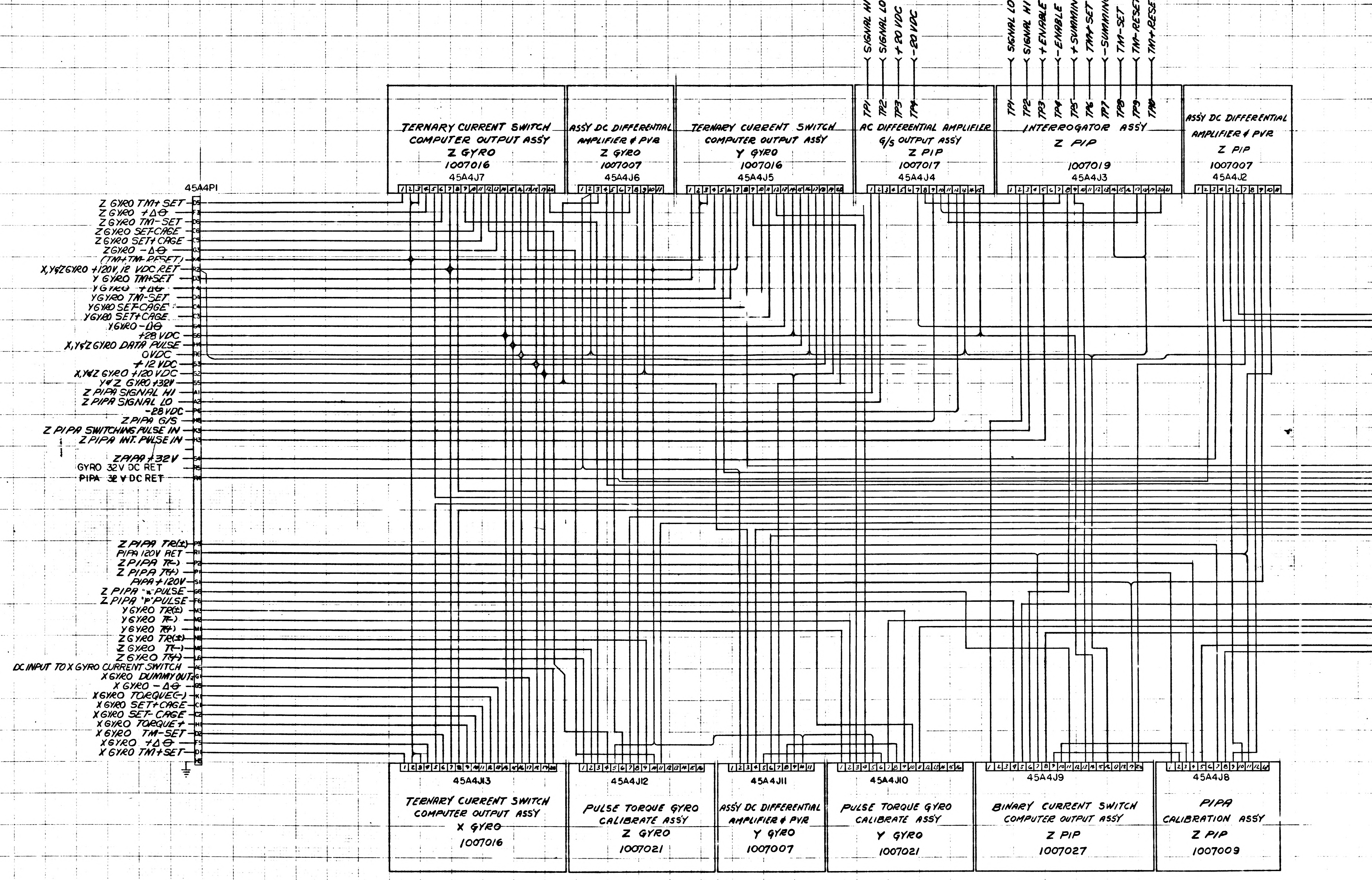
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 4

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010094
SCALE #
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

F2 1010094


45A4P1
Z GYRO TM+ SET D5
Z GYRO +Δθ F3
Z GYRO TM-SET D6
Z GYRO SET-CAGE C6
Z GYRO SET+ CAGE C5
Z GYRO -Δθ G3
(TM+TM-RESET) K4
X,Y&Z GYRO +120V, 12 VDC RET R2
Y GYRO TM+SET D3
Y GYRO +Δθ F4
Y GYRO TM-SET D4
Y GYRO SET-CAGE C4
Y GYRO SET+CAGE C3
Y GYRO -Δθ G4
+28 VDC S6
X,Y&Z GYRO DATA PULSE H4
0 VDC R6
+12 VDC S3
X,Y&Z GYRO +120 VDC S2
Y&Z GYRO +32V S5
Z PIPA SIGNAL HI A1
Z PIPA SIGNAL LO A2
-28 VDC P6
Z PIPA G/S H6
Z PIPA SWITCHING PULSE IN K3
Z PIPA INT. PULSE IN H3
Z PIPA +32V S4
GYRO 32V DC RET R5
PIPA 32 V DC RET R4
Z PIPA TR(±) P3
PIPA 120V RET R1
Z PIPA T(-) P2
Z PIPA T(+) P1
PIPA +120V S1
Z PIPA "n" PULSE G6
Z PIPA "P" PULSE F6
Y GYRO TR(±) M3
Y GYRO T(-) M2
Y GYRO T(+) M1
Z GYRO TR(±) N6
Z GYRO T(-) M6
Z GYRO T(+) L6
DC INPUT TO X GYRO CURRENT SWITCH A6
X GYRO DUMMY OUT* G1
X GYRO -Δθ G5
X GYRO TORQUE(-) K1
X GYRO SET+CAGE C1
X GYRO SET-CAGE C2
X GYRO TORQUE+ H1
X GYRO TM-SET D2
X GYRO +Δθ F5
X GYRO TM+SET D1
H5
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016 45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016 45A4J5
SIGNAL HI TP1
SIGNAL LO TP2
+20 VDC TP3
-20 VDC TP4
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017 45A4J4
SIGNAL LO TP1
SIGNAL HI TP2
+ENABLE TP3
-ENABLE TP4
+SUMMING TP5
TM+SET TP6
-SUMMING TP7
TM-SET TP8
TM-RESET TP9
TM+RESET TP10
INTERROGATOR ASSY Z PIP 1007019 45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007 45A4J2
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11 ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
45A4J8 PIPA CALIBRATION ASSY Z PIP 1007009

INCHES
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PHOTOGRAPHIC SCALE ONLY

F-1

1010094

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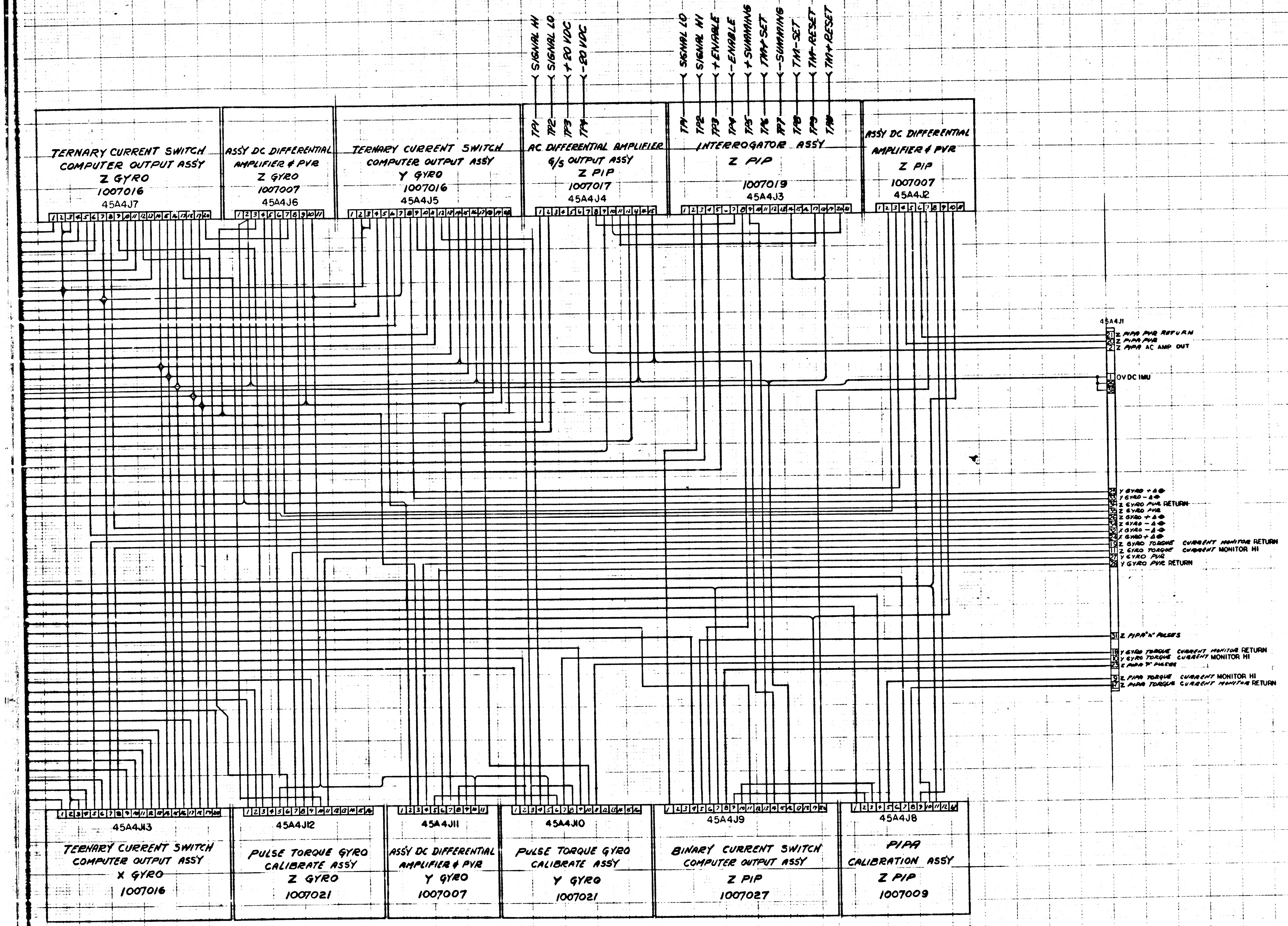
C	REVISED PER TDRR 03291		


SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016 45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016 45A4J5
TP1 TP2 TP3 TP4
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017 45A4J4
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
INTERROGATOR ASSY Z PIP 1007019 45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007 45A4J2
45A4J1
21 Z PIPA PVR RETURN
20 Z PIPA PVR
2 Z PIPA AC AMP OUT
1 OV DC IMU
29
38
25 Y GYRO +Δ◆
33 Y GYRO -Δ◆
36 Z GYRO PVR RETURN
35 Z GYRO PVR
26 Z GYRO +Δ◆
34 Z GYRO -Δ◆
32 X GYRO -Δ◆
24 X GYRO +Δ◆
19 Z GYRO TORQUE CURRENT MONITOR RETURN
11 Z GYRO TORQUE CURRENT MONITOR HI
27 Y GYRO PVR
28 Y GYRO PVR RETURN
31 Z PIPA "N" PULSES
18 Y GYRO TORQUE CURRENT MONITOR RETURN
10 Y GYRO TORQUE CURRENT MONITOR HI
23 Z PIPA "P" PULSES
9 Z PIPA TORQUE CURRENT MONITOR HI
17 Z PIPA TORQUE CURRENT MONITOR RETURN
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11 ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
45A4J8 PIPA CALIBRATION ASSY Z PIP 1007009

1010094 C

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± # DECIMALS ± # ANGLES ± #
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MATERIAL #
HEAT TREATMENT #
FINAL FINISH #

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
109705
DRAWN R SULLIVAN DATE
CHECKED
APPROVAL 7-10-62
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 4

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1010094
SCALE # | WT | SHEET 1 OF 1

MASTER

INCHES
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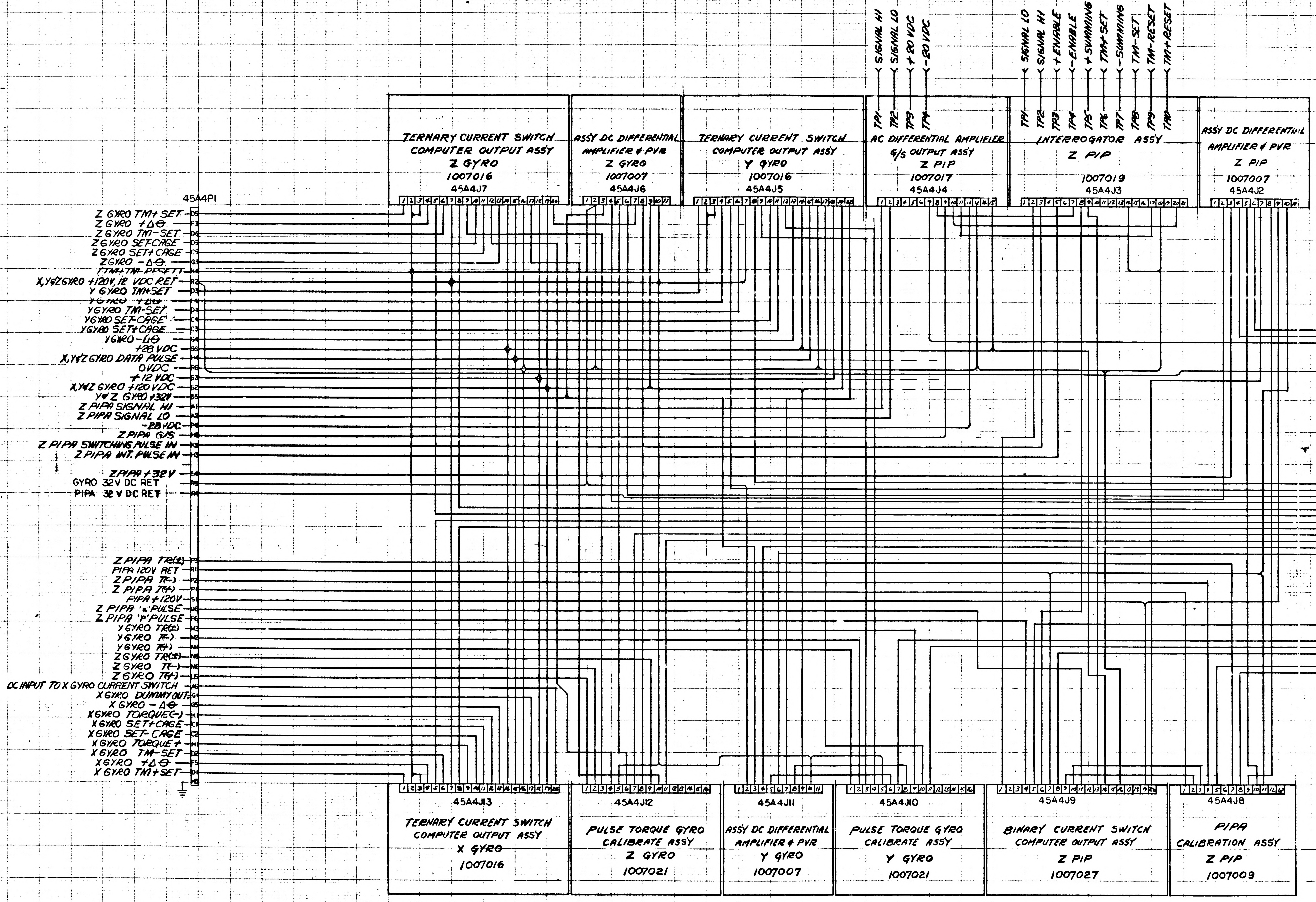
F2

1010094


45A4P1
Z GYRO TM+ SET
Z GYRO +ΔΘ
Z GYRO TM−SET
Z GYRO SET-CAGE
Z GYRO SET+ CAGE
Z GYRO −ΔΘ
(TM+TM− RESET)
X,Y&Z GYRO +120V, 12 VDC RET
Y GYRO TM+SET
Y GYRO +ΔΘ
Y GYRO TM-SET
Y GYRO SET-CAGE
Y GYRO SET+CAGE
Y GYRO −ΔΘ
+28 VDC
X,Y&Z GYRO DATA PULSE
0VDC
+12 VDC
X,Y&Z GYRO +120 VDC
Y&Z GYRO +32V
Z PIPA SIGNAL HI
Z PIPA SIGNAL LO
−28 VDC
Z PIPA G/S
Z PIPA SWITCHING PULSE IN
Z PIPA INT. PULSE IN
Z PIPA +32V
GYRO 32V DC RET
PIPA 32 V DC RET
Z PIPA TR(±)
PIPA 120V RET
Z PIPA T(−)
Z PIPA T(+)
PIPA +120V
Z PIPA "n" PULSE
Z PIPA "P" PULSE
Y GYRO TR(±)
Y GYRO T(−)
Y GYRO T(+)
Z GYRO TR(±)
Z GYRO T(−)
Z GYRO T(+)
DC INPUT TO X GYRO CURRENT SWITCH
X GYRO DUMMY OUT
X GYRO −ΔΘ
X GYRO TORQUE(−)
X GYRO SET+CAGE
X GYRO SET- CAGE
X GYRO TORQUE+
X GYRO TM−SET
X GYRO +ΔΘ
X GYRO TM+SET
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016 45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016 45A4J5
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017 45A4J4
TP1 TP2 TP3 TP4
SIGNAL HI
SIGNAL LO
+20 VDC
−20 VDC
INTERROGATOR ASSY Z PIP 1007019 45A4J3
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
SIGNAL LO
SIGNAL HI
+ENABLE
−ENABLE
+SUMMING
TM+SET
−SUMMING
TM−SET
TM−RESET
TM+RESET
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007 45A4J2
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11 ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
45A4J8 PIPA CALIBRATION ASSY Z PIP 1007009

INCHES
PHOTOGRAPHIC SCALE ONLY

E1

K0-1-0094

A	REVISED PER TDRR 02722		
B	REVISED PER TDRR 03097		
C	REVISED PER TDRR 03291		
D	REVISED PER TDRR 04113		

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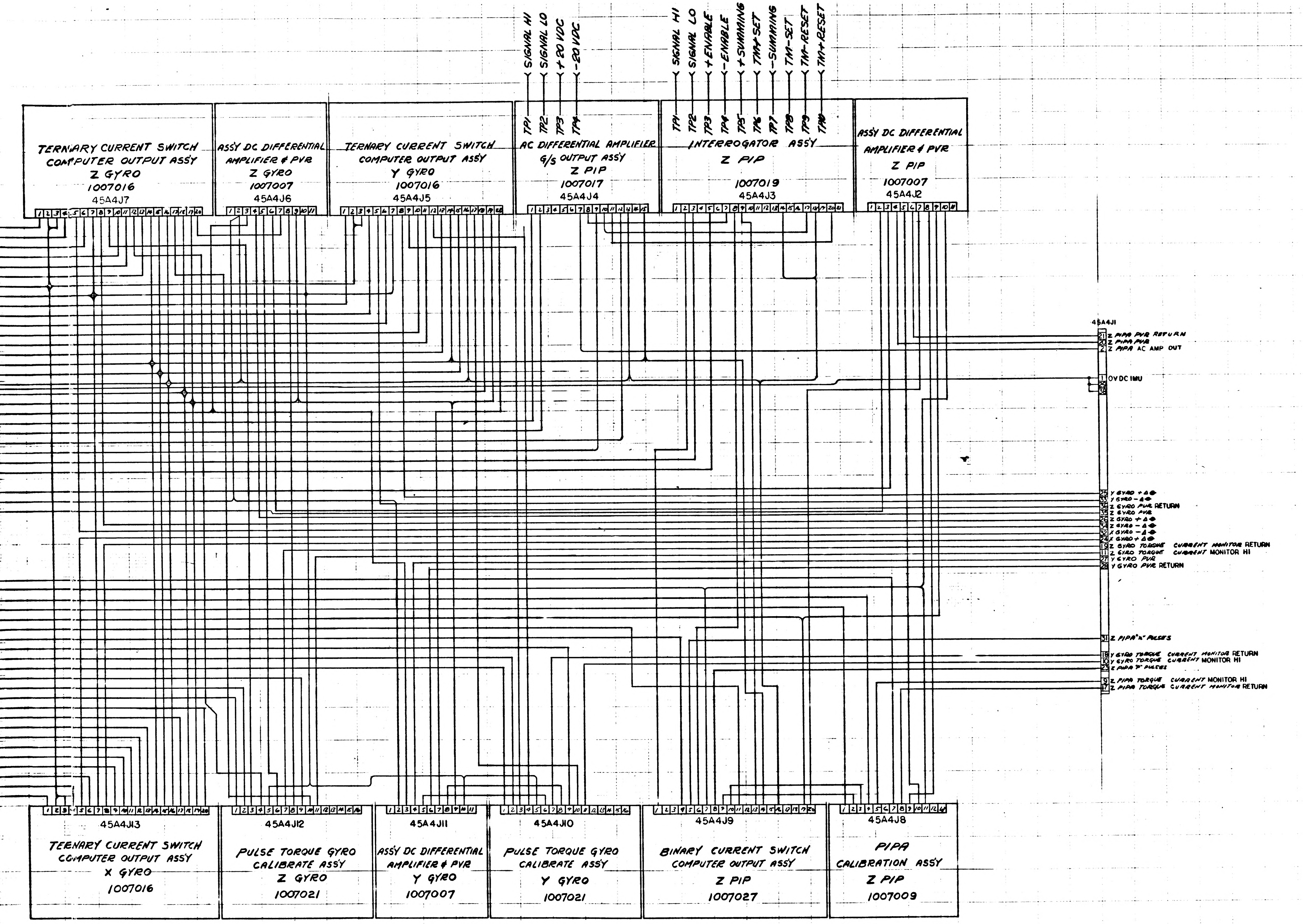
SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
SIGNAL HI
SIGNAL LO
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016 45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016 45A4J5
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017 45A4J4
INTERROGATOR ASSY Z PIP 1007019 45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007 45A4J2
45A4J1
21 Z PIPA PVR RETURN
20 Z PIPA PVR
2 Z PIPA AC AMP OUT
1 OV DC IMU
29
38
25 Y GYRO +Δθ
33 Y GYRO -Δθ
36 Z GYRO PVR RETURN
35 Z GYRO PVR
26 Z GYRO +Δθ
34 Z GYRO -Δθ
32 X GYRO -Δθ
24 X GYRO +Δθ
19 Z GYRO TORQUE CURRENT MONITOR RETURN
11 Z GYRO TORQUE CURRENT MONITOR HI
27 Y GYRO PVR
28 Y GYRO PVR RETURN
31 Z PIPA "N" PULSES
18 Y GYRO TORQUE CURRENT MONITOR RETURN
10 Y GYRO TORQUE CURRENT MONITOR HI
23 Z PIPA "P" PULSES
9 Z PIPA TORQUE CURRENT MONITOR HI
17 Z PIPA TORQUE CURRENT MONITOR RETURN
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11 ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
45A4J8 PIPA CALIBRATION ASSY Z PIP 1007009

1010094 D

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. 109705 CONTRACT
DRAWN R SULLIVAN DATE 5/2/63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL 8/1/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

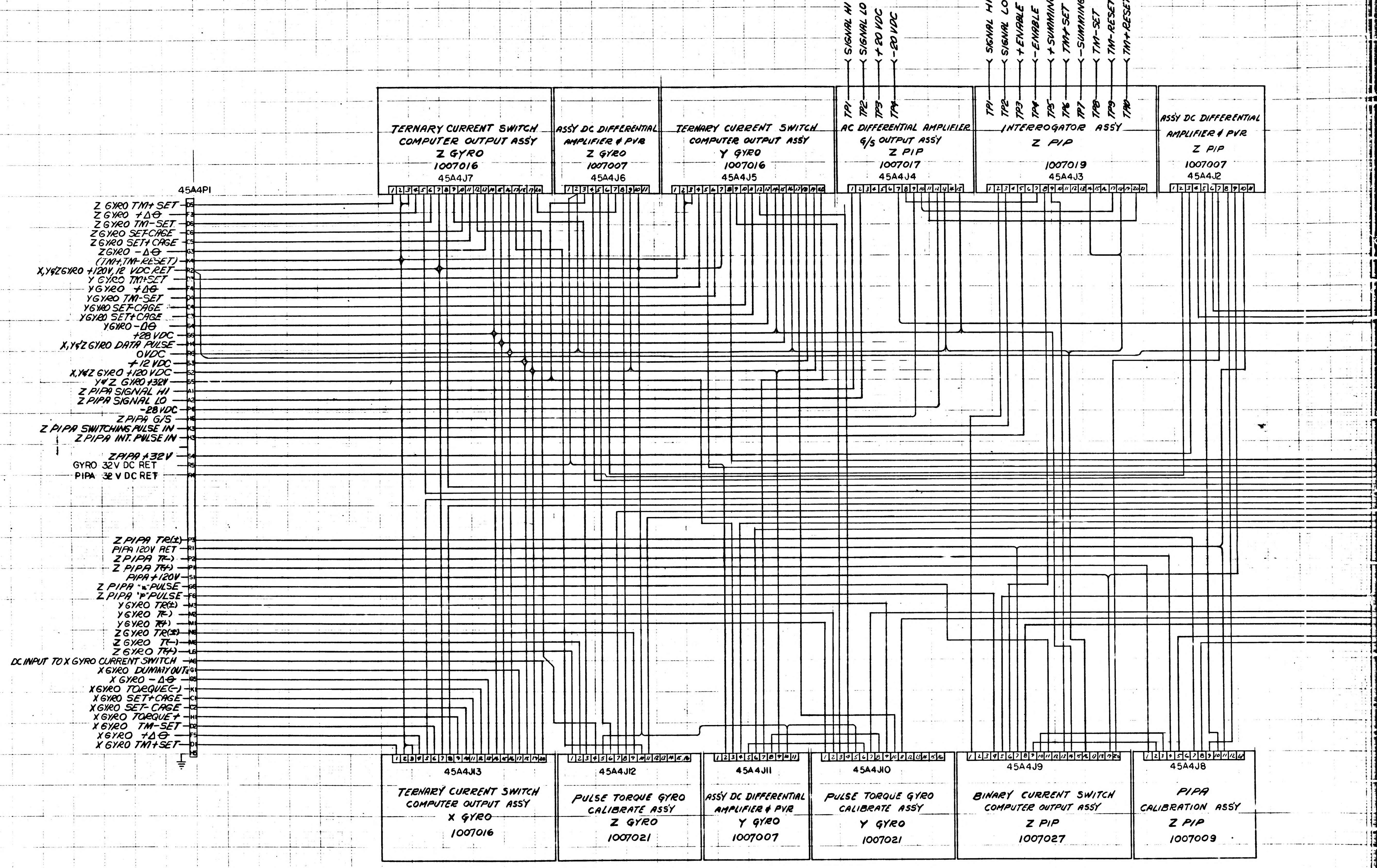
WIRING DIAGRAM
TRAY 4

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010094
SCALE — WT SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY

F-2

1010094


45A4P1
Z GYRO TM+ SET D5
Z GYRO +Δθ F3
Z GYRO TM-SET D6
Z GYRO SET-CAGE C6
Z GYRO SET+ CAGE C5
Z GYRO -Δθ G3
(TM+,TM-RESET) K4
X,Y&Z GYRO +120V, 12 VDC RET R2
Y GYRO TM+SET
Y GYRO +Δθ F4
Y GYRO TM-SET D4
Y GYRO SET-CAGE C4
Y GYRO SET+CAGE C3
Y GYRO -Δθ G4
+28 VDC S6
X,Y&Z GYRO DATA PULSE H4
0 VDC R6
+12 VDC S3
X,Y&Z GYRO +120 VDC S2
Y&Z GYRO +32V S5
Z PIPA SIGNAL HI A1
Z PIPA SIGNAL LO A2
-28 VDC P6
Z PIPA G/S H6
Z PIPA SWITCHING PULSE IN K3
Z PIPA INT. PULSE IN H3
Z PIPA +32V S4
GYRO 32V DC RET R5
PIPA 32 V DC RET R4
Z PIPA TR(±) P3
PIPA 120V RET R1
Z PIPA T(-) P2
Z PIPA T(+) P1
PIPA +120V S1
Z PIPA "n" PULSE G6
Z PIPA "P" PULSE F6
Y GYRO TR(±) M3
Y GYRO T(-) M2
Y GYRO T(+) M1
Z GYRO TR(±) N6
Z GYRO T(-) M6
Z GYRO T(+) L6
DC INPUT TO X GYRO CURRENT SWITCH A6
X GYRO DUMMY OUT G1
X GYRO -Δθ G5
X GYRO TORQUE(-) K1
X GYRO SET+CAGE C1
X GYRO SET-CAGE C2
X GYRO TORQUE+ H1
X GYRO TM-SET D2
X GYRO +Δθ F5
X GYRO TM+SET D1
H5
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016 45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007 45A4J6
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016 45A4J5
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017 45A4J4
TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 +20 VDC
TP4 -20 VDC
INTERROGATOR ASSY Z PIP 1007019 45A4J3
TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 +ENABLE
TP4 -ENABLE
TP5 +SUMMING
TP6 TM+SET
TP7 -SUMMING
TP8 TM-SET
TP9 TM-RESET
TP10 TM+RESET
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007 45A4J2
45A4J13 TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
45A4J12 PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11 ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10 PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9 BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
45A4J8 PIPA CALIBRATION ASSY Z PIP 1007009

INCHES
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PHOTOGRAPHIC SCALE ONLY

F-1

E 8800101

SYM	DESCRIPTION	DATE	APPROVAL
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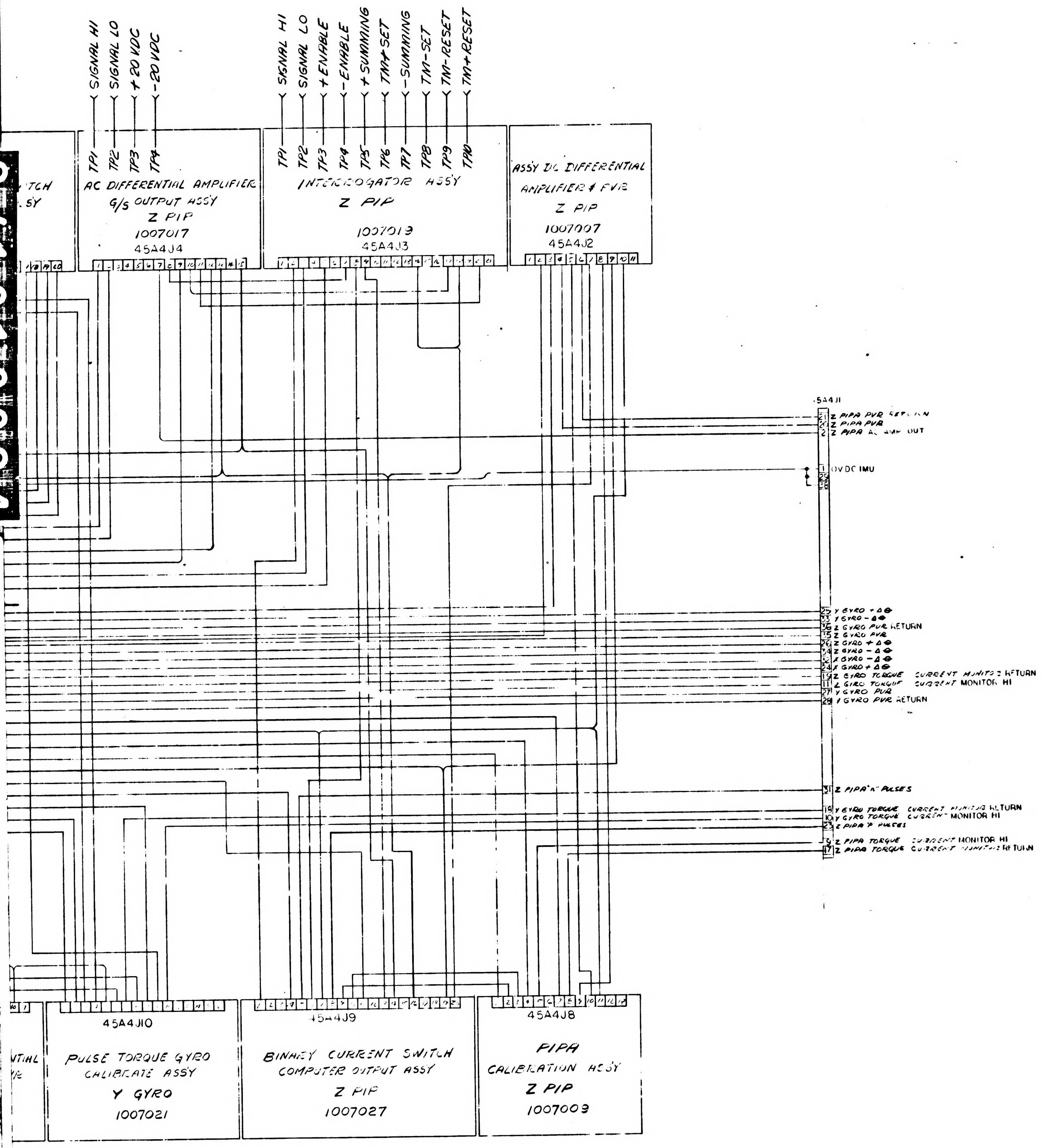
B	REVISED PER TDRR 03097	12 sep 63	RVV WK
C	REVISED PER TDRR 03291	7/19 63	WK
D	REVISED PER TDRR 04113		PPK WK
E	REVISED PER TDRR 12755	28 SEP 64	R.EL



SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
TP1
TP2
TP3
TP4
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY
Z PIP
1007017
45A4J4
SIGNAL HI
SIGNAL LO
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
INTERROGATOR ASSY
Z PIP
1007013
45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR
Z PIP
1007007
45A4J2
TCH
SY
45A4J1
21 Z PIPA PVR RETURN
20 Z PIPA PVR
2 Z PIPA AC AMP OUT
1 0VDC IMU
29
28
25 Y GYRO +Δθ
33 Y GYRO -Δθ
36 Z GYRO PVR RETURN
35 Z GYRO PVR
26 Z GYRO +Δθ
34 Z GYRO -Δθ
32 X GYRO -Δθ
24 X GYRO +Δθ
19 Z GYRO TORQUE CURRENT MONITOR RETURN
11 Z GYRO TORQUE CURRENT MONITOR HI
27 Y GYRO PVR
28 Y GYRO PVR RETURN
31 Z PIPA "n" PULSES
18 Y GYRO TORQUE CURRENT MONITOR RETURN
10 Y GYRO TORQUE CURRENT MONITOR HI
23 Z PIPA "P" PULSES
9 Z PIPA TORQUE CURRENT MONITOR HI
17 Z PIPA TORQUE CURRENT MONITOR RETURN
45A4J10
PULSE TORQUE GYRO CALIBRATE ASSY
Y GYRO
1007021
45A4J9
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY
Z PIP
1007027
45A4J8
PIPA
CALIBRATION ASSY
Z PIP
1007009

1010094 E

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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INSTRUMENTATION LAB
CAMBRIDGE MASS
DOC NO 109705 CONTRACT
DRAWN R SULLIVAN DATE 5/2/63
CHECKED
APPROVAL 7-10-63
APPROVAL
NASA APPROVAL 9/7/6?
MIT APPROVAL

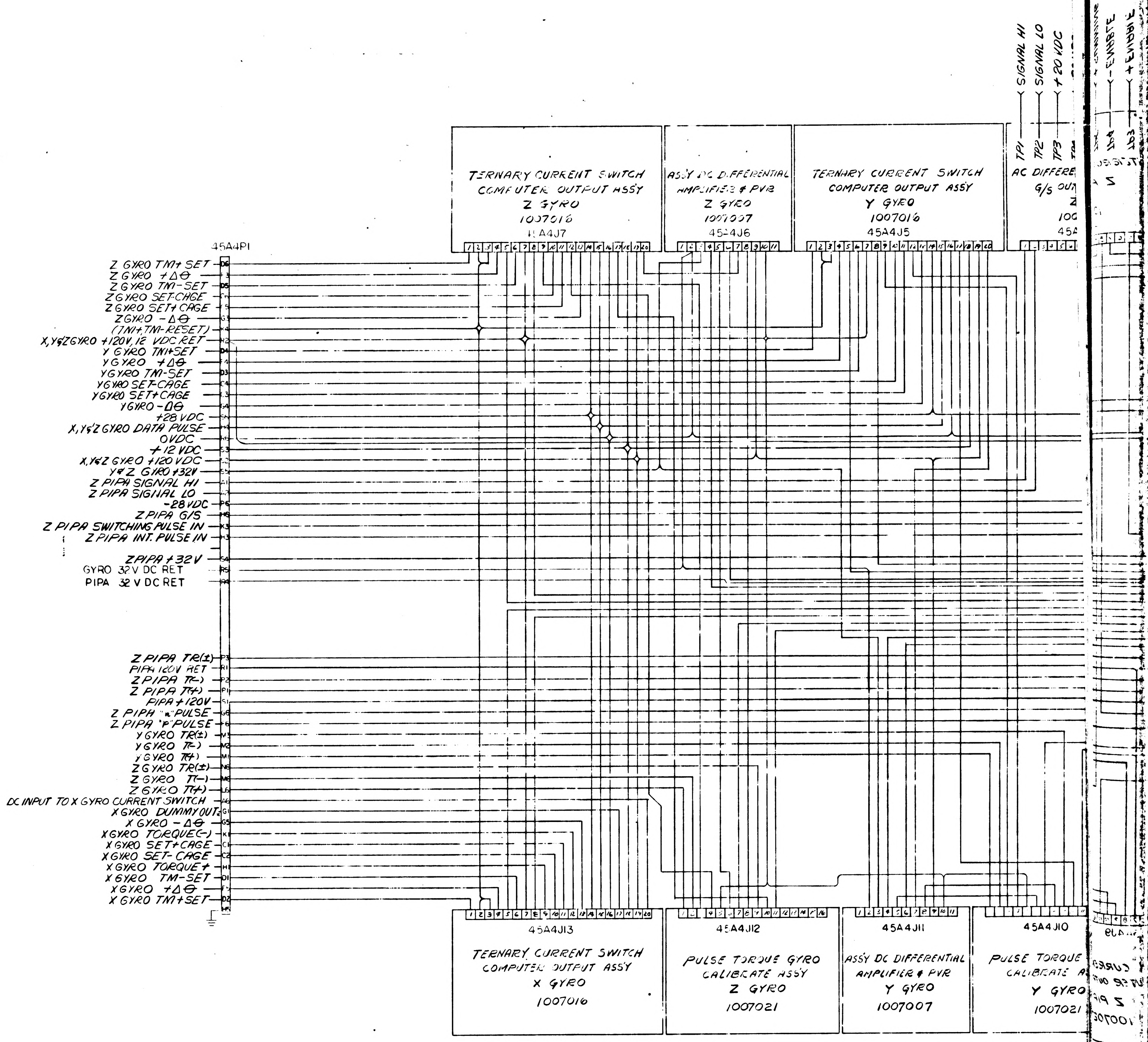
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

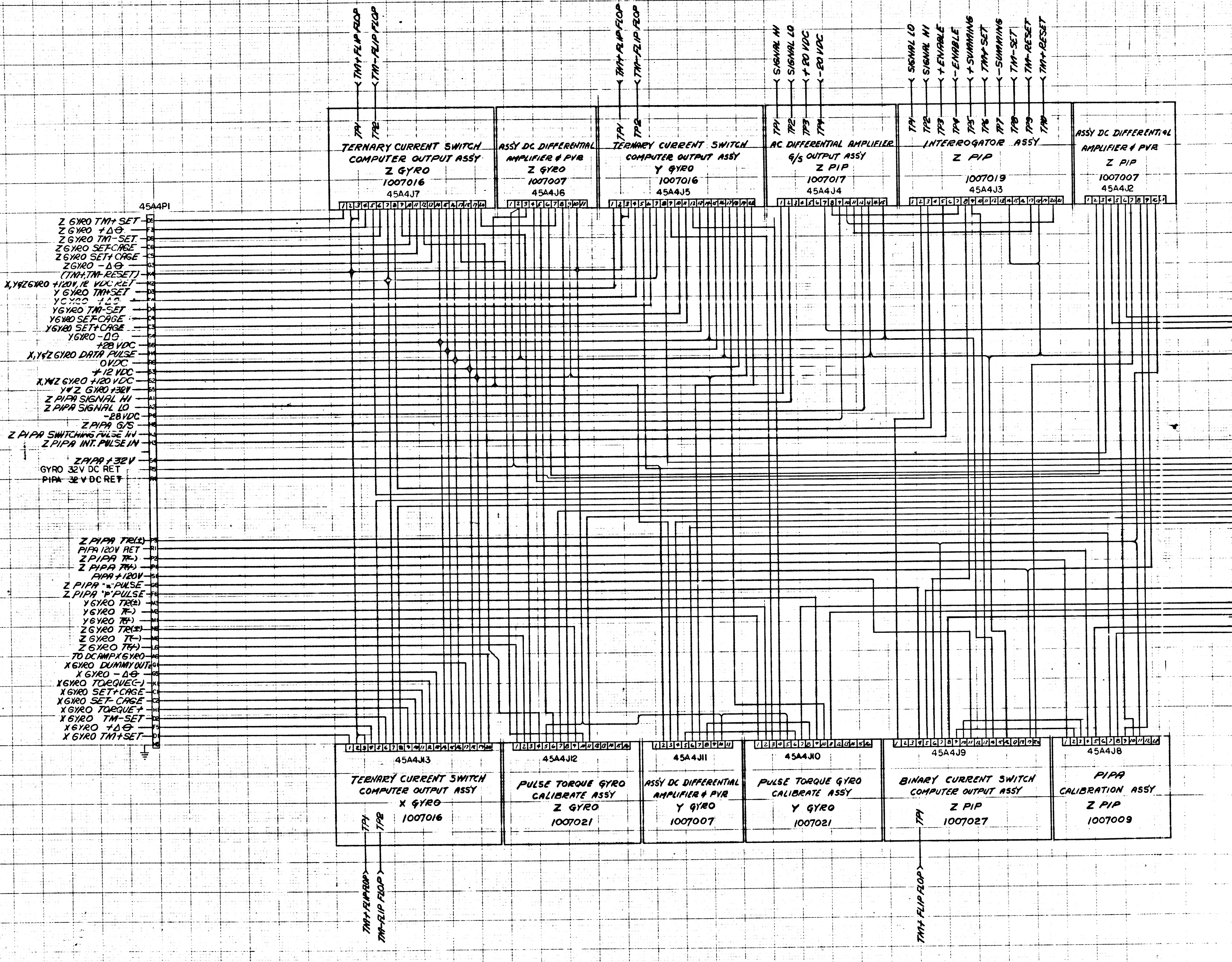
WIRING DIAGRAM
TRAY 4

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010094
SCALE —
WT
SHEET 1 OF 1

2/1010094

1/1010094


TERNARY CURRENT SWITCH
COMPUTER OUTPUT ASSY
Z GYRO
1007016
45A4J7
ASSY DC DIFFERENTIAL
AMPLIFIER & PVR
Z GYRO
1007007
45A4J6
TERNARY CURRENT SWITCH
COMPUTER OUTPUT ASSY
Y GYRO
1007016
45A4J5
AC DIFFERE
G/S OUT
Z
100
45A
TP1 SIGNAL HI
TP2 SIGNAL LO
TP3 +20 VDC
TP4 -ENABLE
TP3 +ENABLE
45A4P1
Z GYRO TM+ SET
Z GYRO +ΔΘ
Z GYRO TM-SET
Z GYRO SET-CAGE
Z GYRO SET+ CAGE
Z GYRO -ΔΘ
(TM+,TM-RESET)
X,Y&Z GYRO +120V, 12 VDC RET
Y GYRO TM+SET
Y GYRO +ΔΘ
Y GYRO TM-SET
Y GYRO SET-CAGE
Y GYRO SET+CAGE
Y GYRO -ΔΘ
+28 VDC
X,Y&Z GYRO DATA PULSE
0 VDC
+12 VDC
X,Y&Z GYRO +120 VDC
Y&Z GYRO +32V
Z PIPA SIGNAL HI
Z PIPA SIGNAL LO
-28 VDC
Z PIPA G/S
Z PIPA SWITCHING PULSE IN
Z PIPA INT. PULSE IN
Z PIPA +32V
GYRO 32V DC RET
PIPA 32 V DC RET
Z PIPA TR(±)
PIPA 120V RET
Z PIPA T(-)
Z PIPA T(+)
PIPA +120V
Z PIPA "n" PULSE
Z PIPA "p" PULSE
Y GYRO TR(±)
Y GYRO T(-)
Y GYRO T(+)
Z GYRO TR(±)
Z GYRO T(-)
Z GYRO T(+)
DC INPUT TO X GYRO CURRENT SWITCH
X GYRO DUMMY OUT
X GYRO -ΔΘ
X GYRO TORQUE(-)
X GYRO SET+CAGE
X GYRO SET-CAGE
X GYRO TORQUE+
X GYRO TM-SET
X GYRO +ΔΘ
X GYRO TM+SET
45A4J13
TERNARY CURRENT SWITCH
COMPUTER OUTPUT ASSY
X GYRO
1007016
45A4J12
PULSE TORQUE GYRO
CALIBRATE ASSY
Z GYRO
1007021
45A4J11
ASSY DC DIFFERENTIAL
AMPLIFIER & PVR
Y GYRO
1007007
45A4J10
PULSE TORQUE
CALIBRATE A
Y GYRO
1007021
45A4J9
CURRE
TER OUT
Z PIP
10070


45A4P1
Z GYRO TM+ SET
Z GYRO +ΔΘ
Z GYRO TM-SET
Z GYRO SET-CAGE
Z GYRO SET+CAGE
Z GYRO -ΔΘ
(TM+,TM-RESET)
X,Y&Z GYRO +120V, 12 VDC RET
Y GYRO TM+SET
Y GYRO +ΔΘ
Y GYRO TM-SET
Y GYRO SET-CAGE
Y GYRO SET+CAGE
Y GYRO -ΔΘ
+28 VDC
X,Y&Z GYRO DATA PULSE
0 VDC
+12 VDC
X,Y&Z GYRO +120 VDC
Y&Z GYRO +32V
Z PIPA SIGNAL HI
Z PIPA SIGNAL LO
-28 VDC
Z PIPA G/S
Z PIPA SWITCHING PULSE IN
Z PIPA INT. PULSE IN
Z PIPA +32V
GYRO 32V DC RET
PIPA 32V DC RET
Z PIPA TR(±)
PIPA 120V RET
Z PIPA T(-)
Z PIPA T(+)
PIPA +120V
Z PIPA "n" PULSE
Z PIPA "P" PULSE
Y GYRO TR(±)
Y GYRO T(-)
Y GYRO T(+)
Z GYRO TR(±)
Z GYRO T(-)
Z GYRO T(+)
TO DC AMP X GYRO
X GYRO DUMMY OUT
X GYRO -ΔΘ
X GYRO TORQUE(-)
X GYRO SET+CAGE
X GYRO SET-CAGE
X GYRO TORQUE+
X GYRO TM-SET
X GYRO +ΔΘ
X GYRO TM+SET
TM+ FLIP FLOP
TM- FLIP FLOP
TP1
TP2
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z GYRO 1007016
45A4J7
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z GYRO 1007007
45A4J6
TM+ FLIP FLOP
TM- FLIP FLOP
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY Y GYRO 1007016
45A4J5
SIGNAL HI
SIGNAL LO
+20 VDC
-20 VDC
TP1 TP2 TP3 TP4
AC DIFFERENTIAL AMPLIFIER G/S OUTPUT ASSY Z PIP 1007017
45A4J4
SIGNAL LO
SIGNAL HI
+ENABLE
-ENABLE
+SUMMING
TM+SET
-SUMMING
TM-SET
TM-RESET
TM+RESET
TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10
INTERROGATOR ASSY Z PIP 1007019
45A4J3
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Z PIP 1007007
45A4J2
45A4J13
TERNARY CURRENT SWITCH COMPUTER OUTPUT ASSY X GYRO 1007016
TP1 TP2
TM+ FLIP FLOP
TM- FLIP FLOP
45A4J12
PULSE TORQUE GYRO CALIBRATE ASSY Z GYRO 1007021
45A4J11
ASSY DC DIFFERENTIAL AMPLIFIER & PVR Y GYRO 1007007
45A4J10
PULSE TORQUE GYRO CALIBRATE ASSY Y GYRO 1007021
45A4J9
BINARY CURRENT SWITCH COMPUTER OUTPUT ASSY Z PIP 1007027
TP1
TM+ FLIP FLOP
45A4J8
PIPA CALIBRATION ASSY Z PIP 1007009

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
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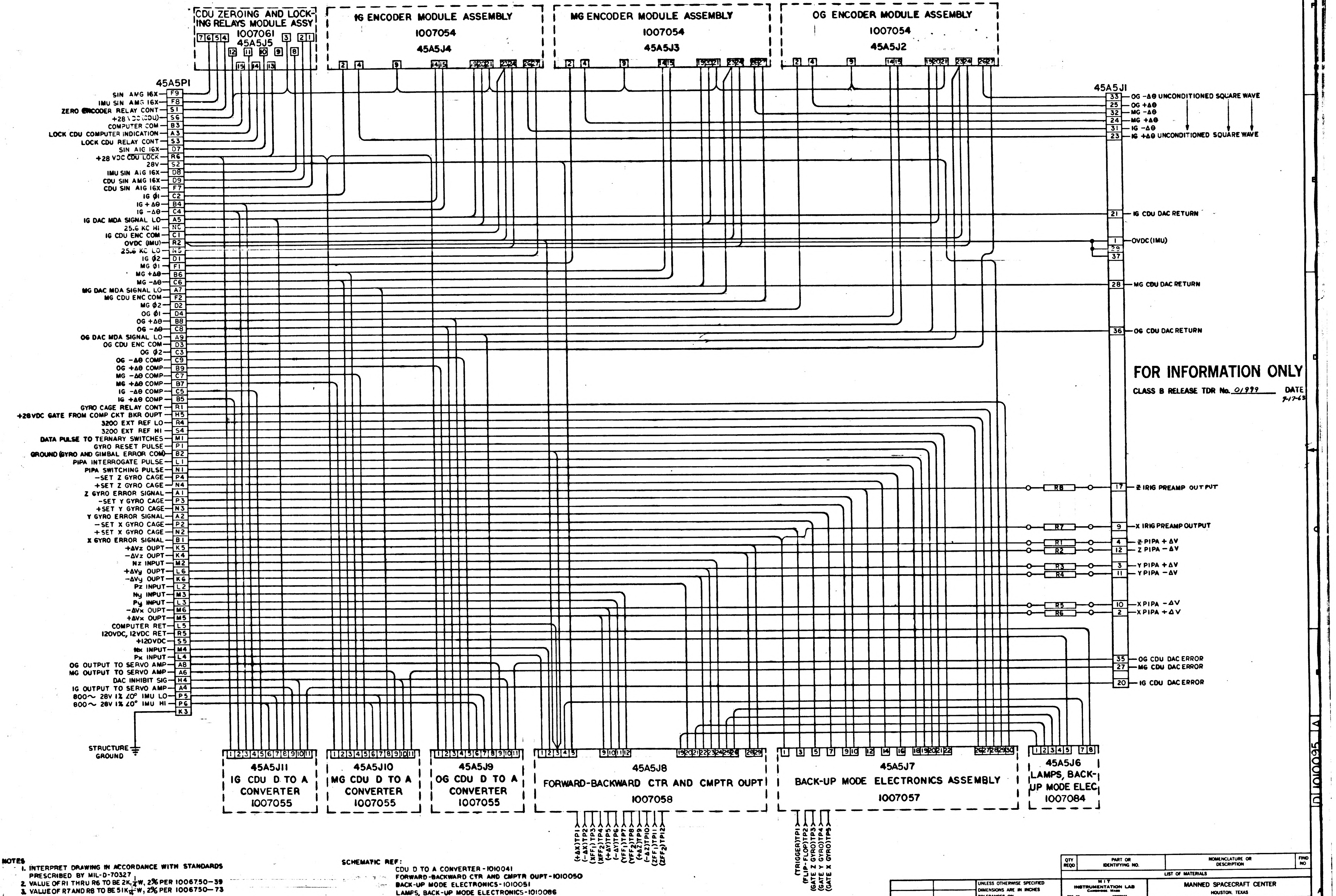

CDU ZEROING AND LOCKING RELAYS MODULE ASSY
1007061
45A5J5
IG ENCODER MODULE ASSEMBLY
1007054
45A5J4
MG ENCODER MODULE ASSEMBLY
1007054
45A5J3
OG ENCODER MODULE ASSEMBLY
1007054
45A5J2
45A5P1
SIN AMG 16X — F9
IMU SIN AMG 16X — F8
ZERO ENCODER RELAY CONT — S1
+28 VDC (CDU) — S6
COMPUTER COM — B3
LOCK CDU COMPUTER INDICATION — A3
LOCK CDU RELAY CONT — S3
SIN AIG 16X — D7
+28 VDC CDU LOCK — R6
28V — S2
IMU SIN AIG 16X — D8
CDU SIN AMG 16X — D9
CDU SIN AIG 16X — F7
IG ϕ1 — C2
IG +Δθ — B4
IG −Δθ — C4
IG DAC MDA SIGNAL LO — A5
25.6 KC HI — NC
IG CDU ENC COM — C1
OVDC (IMU) — R2
25.6 KC LO — N5
IG ϕ2 — D1
MG ϕ1 — F1
MG +Δθ — B6
MG −Δθ — C6
MG DAC MDA SIGNAL LO — A7
MG CDU ENC COM — F2
MG ϕ2 — D2
OG ϕ1 — D4
OG +Δθ — B8
OG −Δθ — C8
OG DAC MDA SIGNAL LO — A9
OG CDU ENC COM — D3
OG ϕ2 — C3
OG −Δθ COMP — C9
OG +Δθ COMP — B9
MG −Δθ COMP — C7
MG +Δθ COMP — B7
IG −Δθ COMP — C5
IG +Δθ COMP — B5
GYRO CAGE RELAY CONT — R1
+28VDC GATE FROM COMP CKT BKR OUPT — H5
3200 EXT REF LO — R4
3200 EXT REF HI — S4
DATA PULSE TO TERNARY SWITCHES — M1
GYRO RESET PULSE — P1
GROUND (GYRO AND GIMBAL ERROR COM) — B2
PIPA INTERROGATE PULSE — L1
PIPA SWITCHING PULSE — N1
−SET Z GYRO CAGE — P4
+SET Z GYRO CAGE — N4
Z GYRO ERROR SIGNAL — A1
−SET Y GYRO CAGE — P3
+SET Y GYRO CAGE — N3
Y GYRO ERROR SIGNAL — A2
−SET X GYRO CAGE — P2
+SET X GYRO CAGE — N2
X GYRO ERROR SIGNAL — B1
+ΔVz OUPT — K5
−ΔVz OUPT — K4
Nz INPUT — M2
+ΔVy OUPT — L6
−ΔVy OUPT — K6
Pz INPUT — L2
Ny INPUT — M3
Py INPUT — L3
−ΔVx OUPT — M6
+ΔVx OUPT — M5
COMPUTER RET — L5
120VDC, 12VDC RET — R5
+120VDC — S5
Nx INPUT — M4
Px INPUT — L4
OG OUTPUT TO SERVO AMP — A8
MG OUTPUT TO SERVO AMP — A6
DAC INHIBIT SIG — H4
IG OUTPUT TO SERVO AMP — A4
800~ 28V 1% ∠0° IMU LO — P5
800~ 28V 1% ∠0° IMU HI — P6
K3
STRUCTURE GROUND
45A5J1
33 — OG −Δθ UNCONDITIONED SQUARE WAVE
25 — OG +Δθ
32 — MG −Δθ
24 — MG +Δθ
31 — IG −Δθ
23 — IG +Δθ UNCONDITIONED SQUARE WAVE
21 — IG CDU DAC RETURN
1 — OVDC (IMU)
29
37
28 — MG CDU DAC RETURN
36 — OG CDU DAC RETURN
R8 — 17 — Z IRIG PREAMP OUTPUT
R7 — 9 — X IRIG PREAMP OUTPUT
R1 — 4 — Z PIPA +ΔV
R2 — 12 — Z PIPA −ΔV
R3 — 3 — Y PIPA +ΔV
R4 — 11 — Y PIPA −ΔV
R5 — 10 — X PIPA −ΔV
R6 — 2 — X PIPA +ΔV
35 — OG CDU DAC ERROR
27 — MG CDU DAC ERROR
20 — IG CDU DAC ERROR
45A5J11
IG CDU D TO A CONVERTER
1007055
45A5J10
MG CDU D TO A CONVERTER
1007055
45A5J9
OG CDU D TO A CONVERTER
1007055
45A5J8
FORWARD-BACKWARD CTR AND CMPTR OUPT
1007058
(+ΔX)TP1
(−ΔX)TP2
(XFF1)TP3
(XFF2)TP4
(+ΔY)TP5
(−ΔY)TP6
(YFF1)TP7
(YFF2)TP8
(+ΔZ)TP9
(−ΔZ)TP10
(ZFF1)TP11
(ZFF2)TP12
45A5J7
BACK-UP MODE ELECTRONICS ASSEMBLY
1007057
(TRIGGER)TP1
(FLIP-FLOP)TP2
(GATE Z GYRO)TP3
(GATE Y GYRO)TP4
(GATE X GYRO)TP5
45A5J6
LAMPS, BACK-UP MODE ELEC
1007084

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01999 DATE 7-17-63

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. VALUE OF R1 THRU R6 TO BE 2K, 1/4 W, 2% PER 1006750–39
3. VALUE OF R7 AND R8 TO BE 51K 1/4 W, 2% PER 1006750–73

SCHEMATIC REF:
CDU D TO A CONVERTER - 1010041
FORWARD-BACKWARD CTR AND CMPTR OUPT - 1010050
BACK-UP MODE ELECTRONICS - 1010051
LAMPS, BACK-UP MODE ELECTRONICS - 1010086
CDU ZEROING AND LOCK RELAYS - 1010054
ENCODER - 1010034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 63
CHECKED
APPROVAL 7-17-63
APPROVAL
NASA APPROVAL 7/17/63
MIT APPROVAL 17 Jul 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY NO. 5

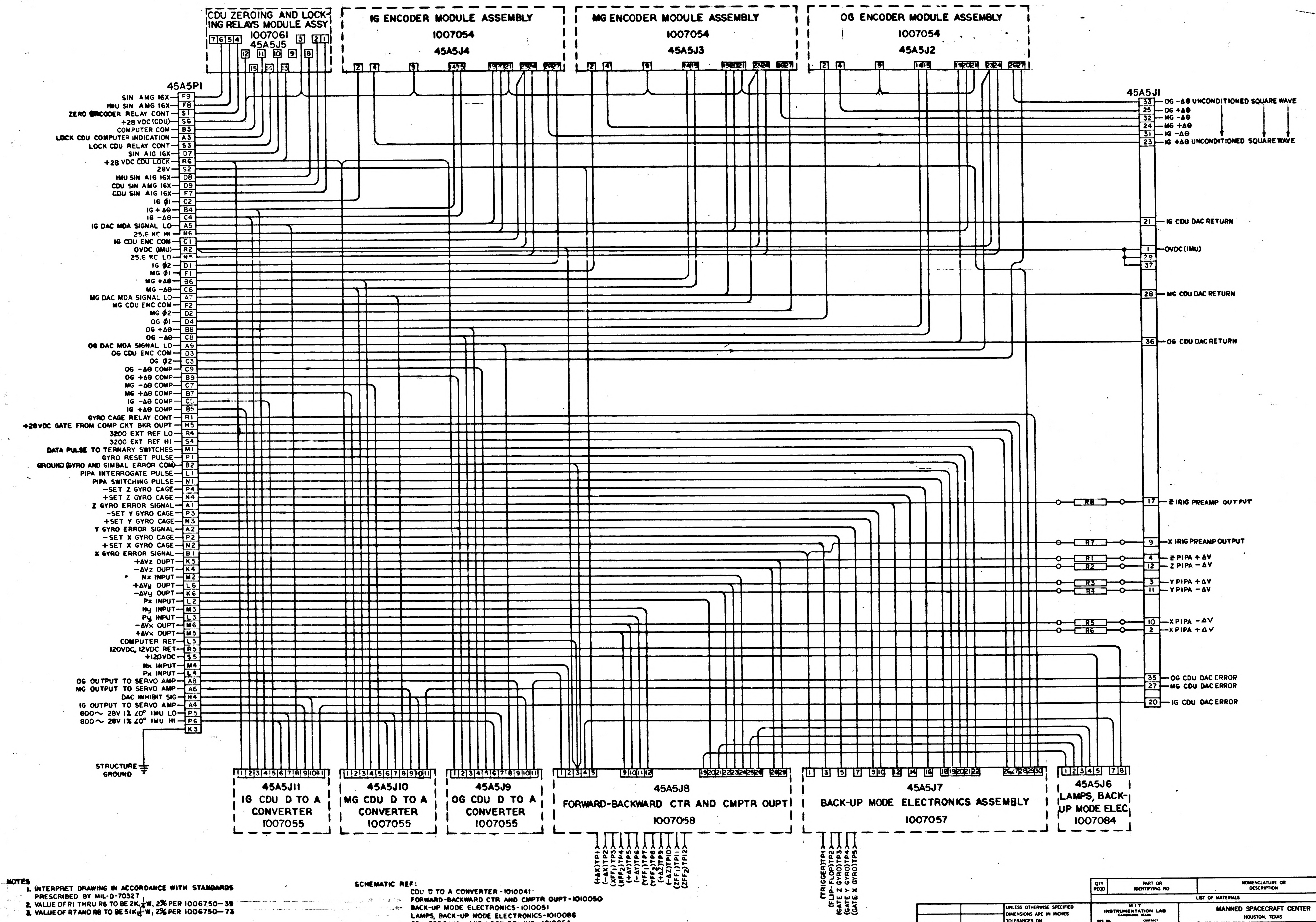
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010095
SCALE —
WT
SHEET 1 OF 1

1010095 A

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS CLASS B TDRR C1999		
A	REVISED PER TDRR 02725	9-2-63	UT.
B	REVISED PER TDRR 03291	9-19-63	


CDU ZEROING AND LOCKING RELAYS MODULE ASSY
1007061
45A5J5
7 6 5 4 3 2 1
12 11 10 9 8
15 14 13
IG ENCODER MODULE ASSEMBLY
1007054
45A5J4
MG ENCODER MODULE ASSEMBLY
1007054
45A5J3
OG ENCODER MODULE ASSEMBLY
1007054
45A5J2
2 4 9 14 15 19 20 21 23 24 26 27
45A5P1
SIN AMG 16X F9
IMU SIN AMG 16X F8
ZERO ENCODER RELAY CONT S1
+28 VDC (CDU) S6
COMPUTER COM B3
LOCK CDU COMPUTER INDICATION A3
LOCK CDU RELAY CONT S3
SIN AIG 16X D7
+28 VDC CDU LOCK R6
28V S2
IMU SIN AIG 16X D8
CDU SIN AMG 16X D9
CDU SIN AIG 16X F7
IG ϕ1 C2
IG +Δθ B4
IG −Δθ C4
IG DAC MDA SIGNAL LO A5
25.6 KC HI N6
IG CDU ENC COM C1
OVDC (IMU) R2
25.6 KC LO N5
IG ϕ2 D1
MG ϕ1 F1
MG +Δθ B6
MG −Δθ C6
MG DAC MDA SIGNAL LO A7
MG CDU ENC COM F2
MG ϕ2 D2
OG ϕ1 D4
OG +Δθ B8
OG −Δθ C8
OG DAC MDA SIGNAL LO A9
OG CDU ENC COM D3
OG ϕ2 C3
OG −Δθ COMP C9
OG +Δθ COMP B9
MG −Δθ COMP C7
MG +Δθ COMP B7
IG −Δθ COMP C5
IG +Δθ COMP B5
GYRO CAGE RELAY CONT R1
+28VDC GATE FROM COMP CKT BKR OUPT H5
3200 EXT REF LO R4
3200 EXT REF HI S4
DATA PULSE TO TERNARY SWITCHES M1
GYRO RESET PULSE P1
GROUND (GYRO AND GIMBAL ERROR COM) B2
PIPA INTERROGATE PULSE L1
PIPA SWITCHING PULSE N1
−SET Z GYRO CAGE P4
+SET Z GYRO CAGE N4
Z GYRO ERROR SIGNAL A1
−SET Y GYRO CAGE P3
+SET Y GYRO CAGE N3
Y GYRO ERROR SIGNAL A2
−SET X GYRO CAGE P2
+SET X GYRO CAGE N2
X GYRO ERROR SIGNAL B1
+ΔVz OUPT K5
−ΔVz OUPT K4
Nz INPUT M2
+ΔVy OUPT L6
−ΔVy OUPT K6
Pz INPUT L2
Ny INPUT M3
Py INPUT L3
−ΔVx OUPT M6
+ΔVx OUPT M5
COMPUTER RET L5
120VDC, 12VDC RET R5
+120VDC S5
Nx INPUT M4
Px INPUT L4
OG OUTPUT TO SERVO AMP A8
MG OUTPUT TO SERVO AMP A6
DAC INHIBIT SIG H4
IG OUTPUT TO SERVO AMP A4
800~ 28V 1% ∠0° IMU LO P5
800~ 28V 1% ∠0° IMU HI P6
K3
STRUCTURE GROUND
45A5J1
33 OG −Δθ UNCONDITIONED SQUARE WAVE
25 OG +Δθ
32 MG −Δθ
24 MG +Δθ
31 IG −Δθ
23 IG +Δθ UNCONDITIONED SQUARE WAVE
21 IG CDU DAC RETURN
1 OVDC (IMU)
29
37
28 MG CDU DAC RETURN
36 OG CDU DAC RETURN
R8
17 Z IRIG PREAMP OUTPUT
R7
9 X IRIG PREAMP OUTPUT
R1
4 Z PIPA +ΔV
R2
12 Z PIPA −ΔV
R3
3 Y PIPA +ΔV
R4
11 Y PIPA −ΔV
R5
10 X PIPA −ΔV
R6
2 X PIPA +ΔV
35 OG CDU DAC ERROR
27 MG CDU DAC ERROR
20 IG CDU DAC ERROR
1 2 3 4 5 6 7 8 9 10 11
45A5J11
IG CDU D TO A CONVERTER
1007055
45A5J10
MG CDU D TO A CONVERTER
1007055
45A5J9
OG CDU D TO A CONVERTER
1007055
1 2 3 4 5 9 10 11 12 19 20 21 22 23 24 25 26 28 29
45A5J8
FORWARD-BACKWARD CTR AND CMPTR OUPT
1007058
1 3 5 7 9 10 12 14 16 18 19 20 21 22 26 27 28 29 30
45A5J7
BACK-UP MODE ELECTRONICS ASSEMBLY
1007057
1 2 3 4 5 7 8
45A5J6
LAMPS, BACK-UP MODE ELEC
1007084
(+ΔX)TP1
(−ΔX)TP2
(XFF1)TP3
(XFF2)TP4
(+ΔY)TP5
(−ΔY)TP6
(YFF1)TP7
(YFF2)TP8
(+ΔZ)TP9
(−ΔZ)TP10
(ZFF1)TP11
(ZFF2)TP12
(TRIGGER)TP1
(FLIP-FLOP)TP2
(GATE Z GYRO)TP3
(GATE Y GYRO)TP4
(GATE X GYRO)TP5

NOTES
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. VALUE OF R1 THRU R6 TO BE 2K, $\frac{1}{4}$W, 2% PER 1006750-39
3. VALUE OF R7 AND R8 TO BE 51K $\frac{1}{4}$W, 2% PER 1006750-73

SCHEMATIC REF:
CDU D TO A CONVERTER - 1010041
FORWARD-BACKWARD CTR AND CMPTR OUPT - 1010050
BACK-UP MODE ELECTRONICS - 1010051
LAMPS, BACK-UP MODE ELECTRONICS - 1010086
CDU ZEROING AND LOCK RELAYS - 1010054
ENCODER - 1010034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN — DATE — 63
CHECKED
APPROVAL Joe Martin 2-7-63
APPROVAL
NASA APPROVAL 2/17/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY NO. 5

CODE IDENT NO.	SIZE	NASA DRAWING NO.
	E	1010095
SCALE —	WT	SHEET 1 OF 1

D 1010095 B

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

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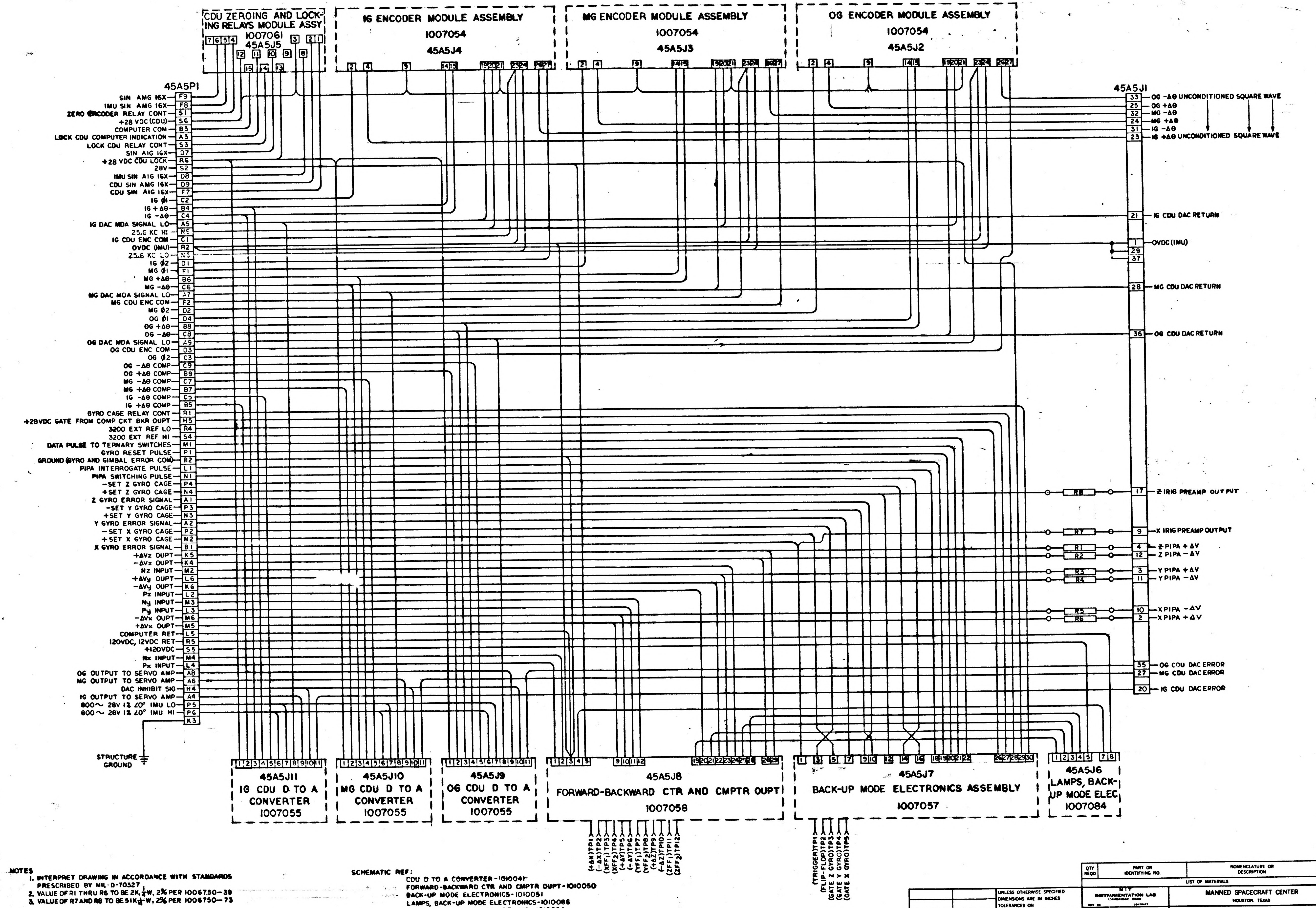
REVISIONS CLASS B TDRR 01999

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02726	9-21-63	U.T.
B	REVISED PER TDRR 03291	9-19-63	JJM
C	REVISED PEP TDRR 04448	5-1-63	WK



6
5
4
3
2
1
CDU ZEROING AND LOCKING RELAYS MODULE ASSY
1007061
45A5J5
IG ENCODER MODULE ASSEMBLY
1007054
45A5J4
MG ENCODER MODULE ASSEMBLY
1007054
45A5J3
OG ENCODER MODULE ASSEMBLY
1007054
45A5J2
45A5P1
SIN AMG 16X F9
IMU SIN AMG 16X F8
ZERO ENCODER RELAY CONT S1
+28 VDC (CDU) S6
COMPUTER COM B3
LOCK CDU COMPUTER INDICATION A3
LOCK CDU RELAY CONT S3
SIN AIG 16X D7
+28 VDC CDU LOCK R6
28V S2
IMU SIN AIG 16X D8
CDU SIN AMG 16X D9
CDU SIN AIG 16X F7
IG φ1 C2
IG +Δθ B4
IG −Δθ C4
IG DAC MDA SIGNAL LO A5
25.6 KC HI N5
IG CDU ENC COM C1
OVDC (IMU) R2
25.6 KC LO N3
IG φ2 D1
MG φ1 F1
MG +Δθ B6
MG −Δθ C6
MG DAC MDA SIGNAL LO A7
MG CDU ENC COM F2
MG φ2 D2
OG φ1 D4
OG +Δθ B8
OG −Δθ C8
OG DAC MDA SIGNAL LO A9
OG CDU ENC COM D3
OG φ2 C3
OG −Δθ COMP C9
OG +Δθ COMP B9
MG −Δθ COMP C7
MG +Δθ COMP B7
IG −Δθ COMP C5
IG +Δθ COMP B5
GYRO CAGE RELAY CONT R1
+28VDC GATE FROM COMP CKT BKR OUPT H5
3200 EXT REF LO R4
3200 EXT REF HI S4
DATA PULSE TO TERNARY SWITCHES M1
GYRO RESET PULSE P1
GROUND (GYRO AND GIMBAL ERROR COM) B2
PIPA INTERROGATE PULSE L1
PIPA SWITCHING PULSE N1
−SET Z GYRO CAGE P4
+SET Z GYRO CAGE N4
Z GYRO ERROR SIGNAL A1
−SET Y GYRO CAGE P3
+SET Y GYRO CAGE N3
Y GYRO ERROR SIGNAL A2
−SET X GYRO CAGE P2
+SET X GYRO CAGE N2
X GYRO ERROR SIGNAL B1
+ΔVz OUPT K5
−ΔVz OUPT K4
Nz INPUT M2
+ΔVy OUPT L6
−ΔVy OUPT K6
Pz INPUT L2
Ny INPUT M3
Py INPUT L3
−ΔVx OUPT M6
+ΔVx OUPT M5
COMPUTER RET L5
120VDC, 12VDC RET R5
+120VDC S5
Nx INPUT M4
Px INPUT L4
OG OUTPUT TO SERVO AMP A8
MG OUTPUT TO SERVO AMP A6
DAC INHIBIT SIG H4
IG OUTPUT TO SERVO AMP A4
800~ 28V 1% ∠0° IMU LO P5
800~ 28V 1% ∠0° IMU HI P6
K3
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33 OG −Δθ UNCONDITIONED SQUARE WAVE
25 OG +Δθ
32 MG −Δθ
24 MG +Δθ
31 IG −Δθ
23 IG +Δθ UNCONDITIONED SQUARE WAVE
21 IG CDU DAC RETURN
1 OVDC (IMU)
29
37
28 MG CDU DAC RETURN
36 OG CDU DAC RETURN
R8
17 Z IRIG PREAMP OUTPUT
R7
9 X IRIG PREAMP OUTPUT
R1
4 Z PIPA +ΔV
R2
12 Z PIPA −ΔV
R3
3 Y PIPA +ΔV
R4
11 Y PIPA −ΔV
R5
10 X PIPA −ΔV
R6
2 X PIPA +ΔV
35 OG CDU DAC ERROR
27 MG CDU DAC ERROR
20 IG CDU DAC ERROR
45A5J11
IG CDU D TO A CONVERTER
1007055
45A5J10
MG CDU D TO A CONVERTER
1007055
45A5J9
OG CDU D TO A CONVERTER
1007055
45A5J8
FORWARD-BACKWARD CTR AND CMPTR OUPT
1007058
45A5J7
BACK-UP MODE ELECTRONICS ASSEMBLY
1007057
45A5J6
LAMPS, BACK-UP MODE ELEC
1007084
(+ΔX)TP1
(−ΔX)TP2
(XFF1)TP3
(XFF2)TP4
(+ΔY)TP5
(−ΔY)TP6
(YFF1)TP7
(YFF2)TP8
(+ΔZ)TP9
(−ΔZ)TP10
(ZFF1)TP11
(ZFF2)TP12
(TRIGGER)TP1
(FLIP-FLOP)TP2
(GATE Z GYRO)TP3
(GATE Y GYRO)TP4
(GATE X GYRO)TP5
D 1010095 C

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. VALUE OF R1 THRU R6 TO BE 2K, $\frac{1}{4}$W, 2% PER 1006750-39
3. VALUE OF R7 AND R8 TO BE 51K $\frac{1}{4}$W, 2% PER 1006750-73

SCHEMATIC REF:
CDU D TO A CONVERTER - 1010041
FORWARD-BACKWARD CTR AND CMPTR OUPT - 1010050
BACK-UP MODE ELECTRONICS - 1010051
LAMPS, BACK-UP MODE ELECTRONICS - 1010086
CDU ZEROING AND LOCK RELAYS - 1010054
ENCODER - 1010034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//— DECIMALS ± —//— ANGLES ± —//—
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO
CONTRACT
DRAWN J. Palazzo DATE 10 July 63
CHECKED
APPROVAL Joe Martin 9-2-63
APPROVAL D. Bell 9-2-63
NASA APPROVAL 2/17/63
MIT APPROVAL 11 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY NO. 5

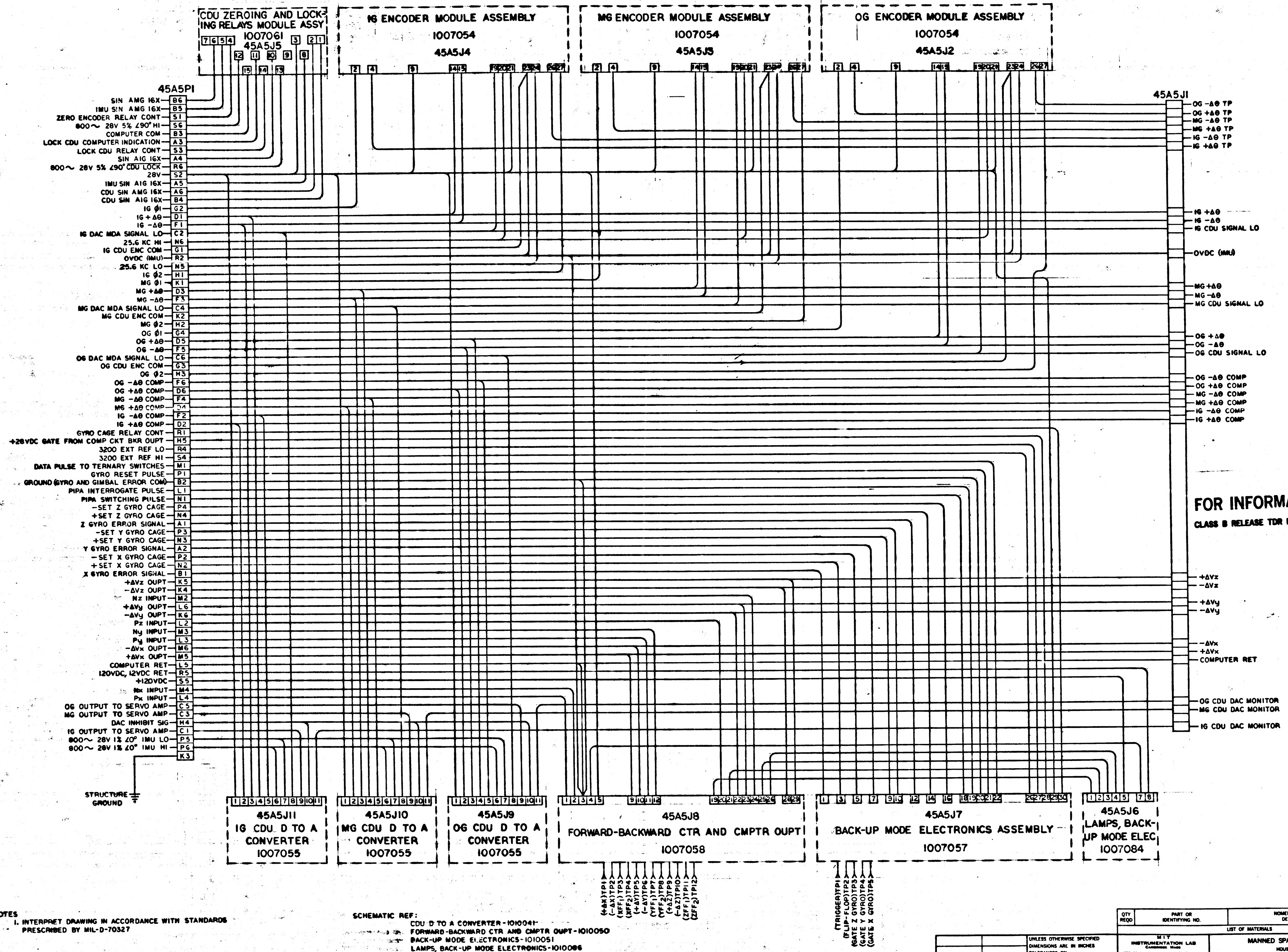
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010095
SCALE —//—
WT
SHEET 1 OF 1

MASTER

INCHES
PHOTOGRAPHIC SCALE ONLY

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS


CDU ZEROING AND LOCKING RELAYS MODULE ASSY
1007061
45A5J5
7 6 5 4 3 2 1
12 11 10 9 8
15 14 13
IG ENCODER MODULE ASSEMBLY
1007054
45A5J4
MG ENCODER MODULE ASSEMBLY
1007054
45A5J3
OG ENCODER MODULE ASSEMBLY
1007054
45A5J2
2 4 9 14 15 19 20 21 23 24 26 27
45A5P1
SIN AMG 16X — B6
IMU SIN AMG 16X — B5
ZERO ENCODER RELAY CONT — S1
800~ 28V 5% ∠90° HI — S6
COMPUTER COM — B3
LOCK CDU COMPUTER INDICATION — A3
LOCK CDU RELAY CONT — S3
SIN AIG 16X — A4
800~ 28V 5% ∠90° CDU LOCK — R6
28V — S2
IMU SIN AIG 16X — A5
CDU SIN AMG 16X — A6
CDU SIN AIG 16X — B4
IG ϕ1 — G2
IG +Δθ — D1
IG −Δθ — F1
IG DAC MDA SIGNAL LO — C2
25.6 KC HI — N6
IG CDU ENC COM — G1
OVDC (IMU) — R2
25.6 KC LO — N5
IG ϕ2 — H1
MG ϕ1 — K1
MG +Δθ — D3
MG −Δθ — F3
MG DAC MDA SIGNAL LO — C4
MG CDU ENC COM — K2
MG ϕ2 — H2
OG ϕ1 — G4
OG +Δθ — D5
OG −Δθ — F5
OG DAC MDA SIGNAL LO — C6
OG CDU ENC COM — G3
OG ϕ2 — H3
OG −Δθ COMP — F6
OG +Δθ COMP — D6
MG −Δθ COMP — F4
MG +Δθ COMP — D4
IG −Δθ COMP — F2
IG +Δθ COMP — D2
GYRO CAGE RELAY CONT — R1
+28VDC GATE FROM COMP CKT BKR OUPT — H5
3200 EXT REF LO — R4
3200 EXT REF HI — S4
DATA PULSE TO TERNARY SWITCHES — M1
GYRO RESET PULSE — P1
GROUND (GYRO AND GIMBAL ERROR COM) — B2
PIPA INTERROGATE PULSE — L1
PIPA SWITCHING PULSE — N1
−SET Z GYRO CAGE — P4
+SET Z GYRO CAGE — N4
Z GYRO ERROR SIGNAL — A1
−SET Y GYRO CAGE — P3
+SET Y GYRO CAGE — N3
Y GYRO ERROR SIGNAL — A2
−SET X GYRO CAGE — P2
+SET X GYRO CAGE — N2
X GYRO ERROR SIGNAL — B1
+ΔVz OUPT — K5
−ΔVz OUPT — K4
Nz INPUT — M2
+ΔVy OUPT — L6
−ΔVy OUPT — K6
Pz INPUT — L2
Ny INPUT — M3
Py INPUT — L3
−ΔVx OUPT — M6
+ΔVx OUPT — M5
COMPUTER RET — L5
120VDC, 12VDC RET — R5
+120VDC — S5
Nx INPUT — M4
Px INPUT — L4
OG OUTPUT TO SERVO AMP — C5
MG OUTPUT TO SERVO AMP — C3
DAC INHIBIT SIG — H4
IG OUTPUT TO SERVO AMP — C1
800~ 28V 1% ∠0° IMU LO — P5
800~ 28V 1% ∠0° IMU HI — P6
K3
STRUCTURE GROUND
45A5J1
OG −Δθ TP
OG +Δθ TP
MG −Δθ TP
MG +Δθ TP
IG −Δθ TP
IG +Δθ TP
IG +Δθ
IG −Δθ
IG CDU SIGNAL LO
OVDC (IMU)
MG +Δθ
MG −Δθ
MG CDU SIGNAL LO
OG +Δθ
OG −Δθ
OG CDU SIGNAL LO
OG −Δθ COMP
OG +Δθ COMP
MG −Δθ COMP
MG +Δθ COMP
IG −Δθ COMP
IG +Δθ COMP
+ΔVz
−ΔVz
+ΔVy
−ΔVy
−ΔVx
+ΔVx
COMPUTER RET
OG CDU DAC MONITOR
MG CDU DAC MONITOR
IG CDU DAC MONITOR
1 2 3 4 5 6 7 8 9 10 11
45A5J11
IG CDU D TO A CONVERTER
1007055
45A5J10
MG CDU D TO A CONVERTER
1007055
45A5J9
OG CDU D TO A CONVERTER
1007055
1 2 3 4 5 9 10 11 12 19 20 21 22 23 24 25 26 28 29
45A5J8
FORWARD-BACKWARD CTR AND CMPTR OUPT
1007058
1 3 5 7 9 10 12 14 16 18 19 20 21 22 26 27 28 29 30
45A5J7
BACK-UP MODE ELECTRONICS ASSEMBLY
1007057
1 2 3 4 5 7 8
45A5J6
LAMPS, BACK-UP MODE ELEC
1007084
(+ΔX)TP1
(−ΔX)TP2
(XFF1)TP3
(XFF2)TP4
(+ΔY)TP5
(−ΔY)TP6
(YFF1)TP7
(YFF2)TP8
(+ΔZ)TP9
(−ΔZ)TP10
(ZFF1)TP11
(ZFF2)TP12
(TRIGGER)TP1
(FLIP-FLOP)TP2
(GATE Z GYRO)TP3
(GATE Y GYRO)TP4
(GATE X GYRO)TP5

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 0999 DATE 9-12-63

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:
CDU D TO A CONVERTER - 1010041
FORWARD-BACKWARD CTR AND CMPTR OUPT - 1010050
BACK-UP MODE ELECTRONICS - 1010051
LAMPS, BACK-UP MODE ELECTRONICS - 1010086
CDU ZEROEING AND LOCK RELAYS - 1010054
ENCODER - 1010034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± —//— DECIMALS ± —//— ANGLES ± —//—
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE 7-24-63
CHECKED
APPROVAL 7-17-63
APPROVAL
NASA APPROVAL 7/17/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY NO. 5

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010095
SCALE —//— | WT | SHEET 1 OF 1

D 1010095

MASTER

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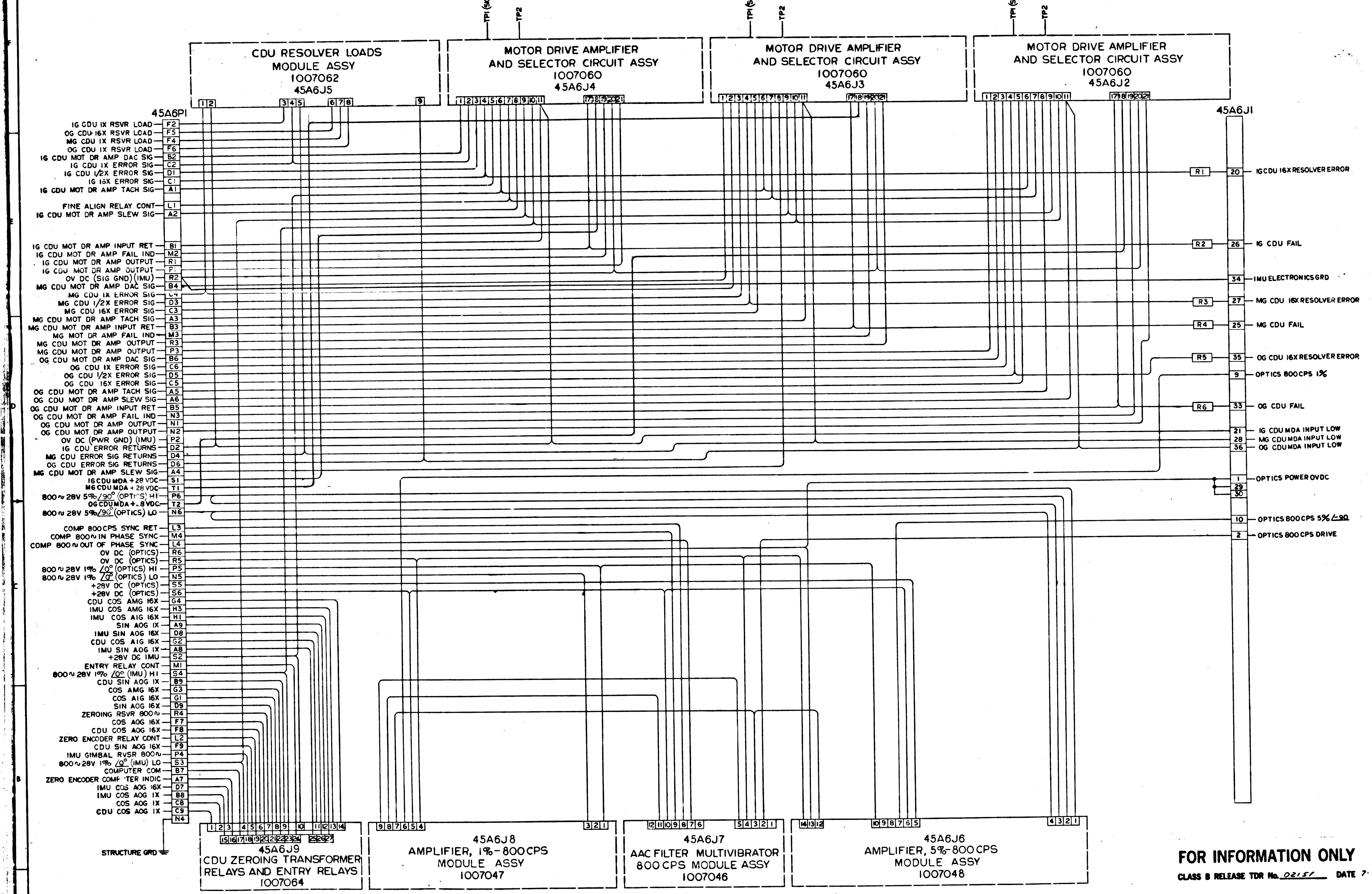
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02721	2/19/63	RVO


TP1 (SIGNAL GND)
TP2
CDU RESOLVER LOADS MODULE ASSY 1007062 45A6J5
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J4
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J3
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J2
45A6P1
IG CDU 1X RSVR LOAD — F2
OG CDU 16X RSVR LOAD — F5
MG CDU 1X RSVR LOAD — F4
OG CDU 1X RSVR LOAD — F6
IG CDU MOT DR AMP DAC SIG — B2
IG CDU 1X ERROR SIG — C2
IG CDU 1/2X ERROR SIG — D1
IG 16X ERROR SIG — C1
IG CDU MOT DR AMP TACH SIG — A1
FINE ALIGN RELAY CONT — L1
IG CDU MOT DR AMP SLEW SIG — A2
IG CDU MOT DR AMP INPUT RET — B1
IG CDU MOT DR AMP FAIL IND — M2
IG CDU MOT DR AMP OUTPUT — R1
IG CDU MOT DR AMP OUTPUT — P1
OV DC (SIG GND) (IMU) — R2
MG CDU MOT DR AMP DAC SIG — B4
MG CDU 1X ERROR SIG — C4
MG CDU 1/2X ERROR SIG — D3
MG CDU 16X ERROR SIG — C3
MG CDU MOT DR AMP TACH SIG — A3
MG CDU MOT DR AMP INPUT RET — B3
MG MOT DR AMP FAIL IND — M3
MG CDU MOT DR AMP OUTPUT — R3
MG CDU MOT DR AMP OUTPUT — P3
OG CDU MOT DR AMP DAC SIG — B6
OG CDU 1X ERROR SIG — C6
OG CDU 1/2X ERROR SIG — D5
OG CDU 16X ERROR SIG — C5
OG CDU MOT DR AMP TACH SIG — A5
OG CDU MOT DR AMP SLEW SIG — A6
OG CDU MOT DR AMP INPUT RET — B5
OG CDU MOT DR AMP FAIL IND — N3
OG CDU MOT DR AMP OUTPUT — N1
OG CDU MOT DR AMP OUTPUT — N2
OV DC (PWR GND) (IMU) — P2
IG CDU ERROR RETURNS — D2
MG CDU ERROR SIG RETURNS — D4
OG CDU ERROR SIG RETURNS — D6
MG CDU MOT DR AMP SLEW SIG — A4
IG CDU MDA +28 VDC — S1
MG CDU MDA +28 VDC — T1
800 ~ 28V 5% /90° (OPTICS) HI — P6
OG CDU MDA +28 VDC — T2
800 ~ 28V 5% /90° (OPTICS) LO — N6
COMP 800 CPS SYNC RET — L3
COMP 800 ~ IN PHASE SYNC — M4
COMP 800 ~ OUT OF PHASE SYNC — L4
OV DC (OPTICS) — R6
OV DC (OPTICS) — R5
800 ~ 28V 1% /0° (OPTICS) HI — P5
800 ~ 28V 1% /0° (OPTICS) LO — N5
+28V DC (OPTICS) — S5
+28V DC (OPTICS) — S6
CDU COS AMG 16X — G4
IMU COS AMG 16X — H3
IMU COS AIG 16X — H1
SIN AOG 1X — A9
IMU SIN AOG 16X — D8
CDU COS AIG 16X — G2
IMU SIN AOG 1X — A8
+28V DC IMU — S2
ENTRY RELAY CONT — M1
800 ~ 28V 1% /0° (IMU) HI — S4
CDU SIN AOG 1X — B9
COS AMG 16X — G3
COS AIG 16X — G1
SIN AOG 16X — D9
ZEROING RSVR 800 ~ — R4
COS AOG 16X — F7
CDU COS AOG 16X — F8
ZERO ENCODER RELAY CONT — L2
CDU SIN AOG 16X — F9
IMU GIMBAL RVSR 800 ~ — P4
800 ~ 28V 1% /0° (IMU) LO — S3
COMPUTER COM — B7
ZERO ENCODER COMPUTER INDIC — A7
IMU COS AOG 16X — D7
IMU COS AOG 1X — B8
COS AOG 1X — C8
CDU COS AOG 1X — C9
N4
STRUCTURE GRD
45A6J1
R1 — 20 — IG CDU 16X RESOLVER ERROR
R2 — 26 — IG CDU FAIL
34 — IMU ELECTRONICS GRD
R3 — 27 — MG CDU 16X RESOLVER ERROR
R4 — 25 — MG CDU FAIL
R5 — 35 — OG CDU 16X RESOLVER ERROR
9 — OPTICS 800 CPS 1%
R6 — 33 — OG CDU FAIL
21 — IG CDU MDA INPUT LOW
28 — MG CDU MDA INPUT LOW
36 — OG CDU MDA INPUT LOW
1 — OPTICS POWER OVDC
29
30
10 — OPTICS 800 CPS 5% /-90
2 — OPTICS 800 CPS DRIVE
45A6J9 CDU ZEROING TRANSFORMER RELAYS AND ENTRY RELAYS 1007064
45A6J8 AMPLIFIER, 1%-800 CPS MODULE ASSY 1007047
45A6J7 AAC FILTER MULTIVIBRATOR 800 CPS MODULE ASSY 1007046
45A6J6 AMPLIFIER, 5%-800 CPS MODULE ASSY 1007048

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. VALUE OF R2 R4 AND R6 TO BE 15K, 1/4 W, 2% PER 1006750—60
3. VALUE OF R1 R3 AND R5 TO BE 10K, 1/4 W, 2% PER 1006750—56

SCHEMATIC REF:

RESOLVER LOADS—1010055
CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY—1010035
CDU ZEROING TRANSFORMER, RELAYS & ENTRY RELAYS—1010056
800 CPS 1% AMPLIFIER—1010045
AAC, FILTER & MULTIVIBRATOR—1010044
800 CPS 5% AMPLIFIER—1010046

MATRIX RES R1
MATRIX RES R2
MATRIX RES R3
MATRIX RES R4
MATRIX RES R5
MATRIX RES R6

MASTER

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02151 DATE 7-20-63

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN E. Murdock DATE 7/15/63
CHECKED
APPROVAL 7-20-63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #6

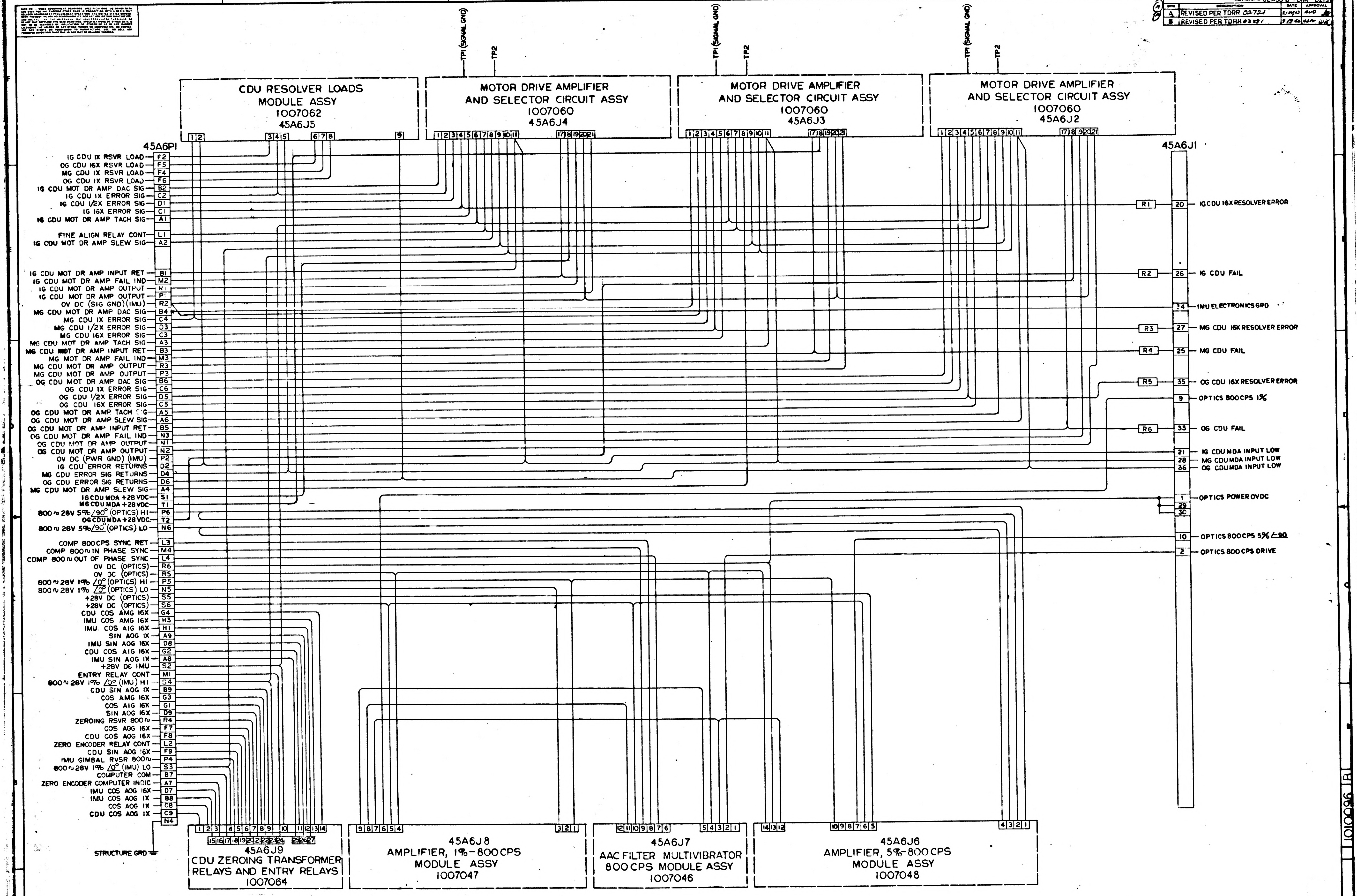
CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010096
SCALE — WT SHEET 1 OF 1

1010096 A

INCHES
0 1
PHOTOGRAPHIC SCALE ONLY

NOTICE — [illegible]

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS CLASS B TDRR 02151			
A	REVISED PER TDRR 02721	2/14/63	AVD
B	REVISED PER TDRR 03291	9/17/63	WK


6
5
4
3
2
1
TP1 (SIGNAL GND)
TP2
TP1 (SIGNAL GND)
TP2
TP1 (SIGNAL GND)
TP2
CDU RESOLVER LOADS MODULE ASSY 1007062 45A6J5
1 2 3 4 5 6 7 8 9
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J4
1 2 3 4 5 6 7 8 9 10 11 17 18 19 20 21
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J3
1 2 3 4 5 6 7 8 9 10 11 17 18 19 20 21
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J2
1 2 3 4 5 6 7 8 9 10 11 17 18 19 20 21
45A6P1
IG CDU 1X RSVR LOAD — F2
OG CDU 16X RSVR LOAD — F5
MG CDU 1X RSVR LOAD — F4
OG CDU 1X RSVR LOAD — F6
IG CDU MOT DR AMP DAC SIG — B2
IG CDU 1X ERROR SIG — C2
IG CDU 1/2X ERROR SIG — D1
IG 16X ERROR SIG — C1
IG CDU MOT DR AMP TACH SIG — A1
FINE ALIGN RELAY CONT — L1
IG CDU MOT DR AMP SLEW SIG — A2
IG CDU MOT DR AMP INPUT RET — B1
IG CDU MOT DR AMP FAIL IND — M2
IG CDU MOT DR AMP OUTPUT — R1
IG CDU MOT DR AMP OUTPUT — P1
0V DC (SIG GND) (IMU) — R2
MG CDU MOT DR AMP DAC SIG — B4
MG CDU 1X ERROR SIG — C4
MG CDU 1/2X ERROR SIG — D3
MG CDU 16X ERROR SIG — C3
MG CDU MOT DR AMP TACH SIG — A3
MG CDU MOT DR AMP INPUT RET — B3
MG MOT DR AMP FAIL IND — M3
MG CDU MOT DR AMP OUTPUT — R3
MG CDU MOT DR AMP OUTPUT — P3
OG CDU MOT DR AMP DAC SIG — B6
OG CDU 1X ERROR SIG — C6
OG CDU 1/2X ERROR SIG — D5
OG CDU 16X ERROR SIG — C5
OG CDU MOT DR AMP TACH SIG — A5
OG CDU MOT DR AMP SLEW SIG — A6
OG CDU MOT DR AMP INPUT RET — B5
OG CDU MOT DR AMP FAIL IND — N3
OG CDU MOT DR AMP OUTPUT — N1
OG CDU MOT DR AMP OUTPUT — N2
0V DC (PWR GND) (IMU) — P2
IG CDU ERROR RETURNS — D2
MG CDU ERROR SIG RETURNS — D4
OG CDU ERROR SIG RETURNS — D6
MG CDU MOT DR AMP SLEW SIG — A4
IG CDU MDA +28 VDC — S1
MG CDU MDA +28 VDC — T1
800 ~ 28V 5% /90° (OPTICS) HI — P6
OG CDU MDA +28 VDC — T2
800 ~ 28V 5% /90° (OPTICS) LO — N6
COMP 800 CPS SYNC RET — L3
COMP 800 ~ IN PHASE SYNC — M4
COMP 800 ~ OUT OF PHASE SYNC — L4
0V DC (OPTICS) — R6
0V DC (OPTICS) — R5
800 ~ 28V 1% /0° (OPTICS) HI — P5
800 ~ 28V 1% /0° (OPTICS) LO — N5
+28V DC (OPTICS) — S5
+28V DC (OPTICS) — S6
CDU COS AMG 16X — G4
IMU COS AMG 16X — H3
IMU COS AIG 16X — H1
SIN AOG 1X — A9
IMU SIN AOG 16X — D8
CDU COS AIG 16X — G2
IMU SIN AOG 1X — A8
+28V DC IMU — S2
ENTRY RELAY CONT — M1
800 ~ 28V 1% /0° (IMU) HI — S4
CDU SIN AOG 1X — B9
COS AMG 16X — G3
COS AIG 16X — G1
SIN AOG 16X — D9
ZEROING RSVR 800 ~ — R4
COS AOG 16X — F7
CDU COS AOG 16X — F8
ZERO ENCODER RELAY CONT — L2
CDU SIN AOG 16X — F9
IMU GIMBAL RVSR 800 ~ — P4
800 ~ 28V 1% /0° (IMU) LO — S3
COMPUTER COM — B7
ZERO ENCODER COMPUTER INDIC — A7
IMU COS AOG 16X — D7
IMU COS AOG 1X — B8
COS AOG 1X — C8
CDU COS AOG 1X — C9
N4
STRUCTURE GRD
45A6J1
R1 — 20 — IG CDU 16X RESOLVER ERROR
R2 — 26 — IG CDU FAIL
34 — IMU ELECTRONICS GRD
R3 — 27 — MG CDU 16X RESOLVER ERROR
R4 — 25 — MG CDU FAIL
R5 — 35 — OG CDU 16X RESOLVER ERROR
9 — OPTICS 800 CPS 1%
R6 — 33 — OG CDU FAIL
21 — IG CDU MDA INPUT LOW
28 — MG CDU MDA INPUT LOW
36 — OG CDU MDA INPUT LOW
1 — OPTICS POWER 0VDC
29
30
10 — OPTICS 800 CPS 5% /-90
2 — OPTICS 800 CPS DRIVE
1 2 3 4 5 6 7 8 9 10 11 12 13 14
15 16 17 18 19 20 21 22 23 24 25 26 27
45A6J9 CDU ZEROING TRANSFORMER RELAYS AND ENTRY RELAYS 1007064
9 8 7 6 5 4 3 2 1
45A6J8 AMPLIFIER, 1% - 800 CPS MODULE ASSY 1007047
12 11 10 9 8 7 6 5 4 3 2 1
45A6J7 AAC FILTER MULTIVIBRATOR 800 CPS MODULE ASSY 1007046
14 13 12 10 9 8 7 6 5 4 3 2 1
45A6J6 AMPLIFIER, 5% - 800 CPS MODULE ASSY 1007048
1010096 B

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. VALUE OF R2 R4 AND R6 TO BE 15K, $\frac{1}{4}$ W, 2% PER 1006750—60
3. VALUE OF R1 R3 AND R5 TO BE 10K, $\frac{1}{4}$ W, 2% PER 1006750—56

SCHEMATIC REF:

RESOLVER LOADS—1010055
CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY—1010035
CDU ZEROING TRANSFORMER, RELAYS & ENTRY RELAYS—1010056
800 CPS 1% AMPLIFIER—1010045
AAC, FILTER & MULTIVIBRATOR—1010044
800 CPS 5% AMPLIFIER—1010046

MATRIX RES R1
MATRIX RES R2
MATRIX RES R3
MATRIX RES R4
MATRIX RES R5
MATRIX RES R6

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

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CAMBRIDGE, MASS
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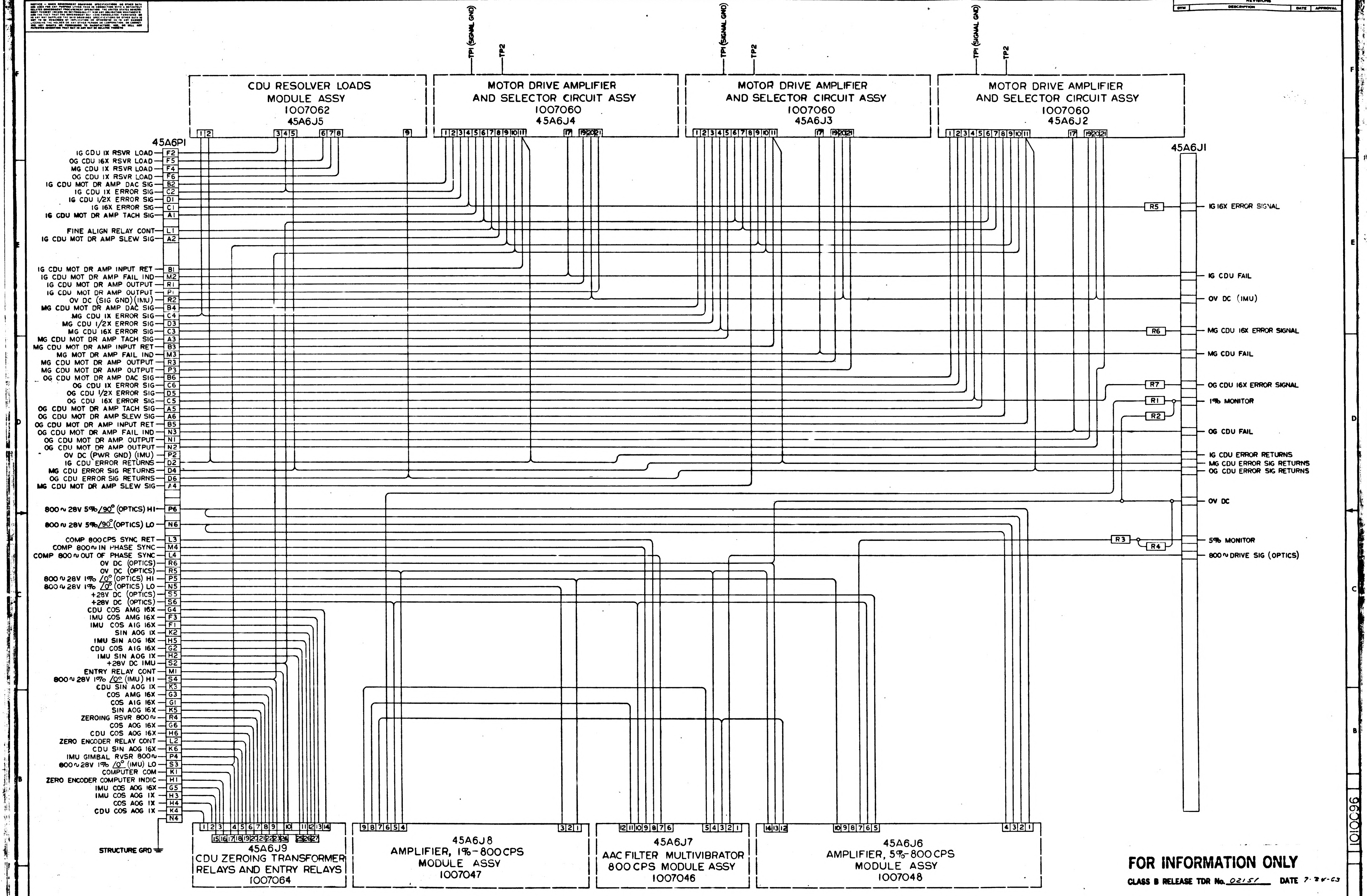
DRAWN E. Neudeck DATE 7/15/63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010096
SCALE
WT
SHEET 1 OF 1

INCHES
PHOTOGRAPHIC SCALE ONLY



CDU RESOLVER LOADS MODULE ASSY 1007062 45A6J5
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J4
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J3
MOTOR DRIVE AMPLIFIER AND SELECTOR CIRCUIT ASSY 1007060 45A6J2
TP1 (SIGNAL GND)
TP2
45A6P1
45A6J1
IG CDU IX RSVR LOAD F2
OG CDU 16X RSVR LOAD F5
MG CDU IX RSVR LOAD F4
OG CDU IX RSVR LOAD F6
IG CDU MOT DR AMP DAC SIG B2
IG CDU IX ERROR SIG C2
IG CDU 1/2X ERROR SIG D1
IG 16X ERROR SIG C1
IG CDU MOT DR AMP TACH SIG A1
FINE ALIGN RELAY CONT L1
IG CDU MOT DR AMP SLEW SIG A2
IG CDU MOT DR AMP INPUT RET B1
IG CDU MOT DR AMP FAIL IND M2
IG CDU MOT DR AMP OUTPUT R1
IG CDU MOT DR AMP OUTPUT P1
OV DC (SIG GND) (IMU) R2
MG CDU MOT DR AMP DAC SIG B4
MG CDU IX ERROR SIG C4
MG CDU 1/2X ERROR SIG D3
MG CDU 16X ERROR SIG C3
MG CDU MOT DR AMP TACH SIG A3
MG CDU MOT DR AMP INPUT RET B3
MG MOT DR AMP FAIL IND M3
MG CDU MOT DR AMP OUTPUT R3
MG CDU MOT DR AMP OUTPUT P3
OG CDU MOT DR AMP DAC SIG B6
OG CDU IX ERROR SIG C6
OG CDU 1/2X ERROR SIG D5
OG CDU 16X ERROR SIG C5
OG CDU MOT DR AMP TACH SIG A5
OG CDU MOT DR AMP SLEW SIG A6
OG CDU MOT DR AMP INPUT RET B5
OG CDU MOT DR AMP FAIL IND N3
OG CDU MOT DR AMP OUTPUT N1
OG CDU MOT DR AMP OUTPUT N2
OV DC (PWR GND) (IMU) P2
IG CDU ERROR RETURNS D2
MG CDU ERROR SIG RETURNS D4
OG CDU ERROR SIG RETURNS D6
MG CDU MOT DR AMP SLEW SIG A4
800 ~ 28V 5% /90° (OPTICS) HI P6
800 ~ 28V 5% /90° (OPTICS) LO N6
COMP 800CPS SYNC RET L3
COMP 800 ~ IN PHASE SYNC M4
COMP 800 ~ OUT OF PHASE SYNC L4
OV DC (OPTICS) R6
OV DC (OPTICS) R5
800 ~ 28V 1% /0° (OPTICS) HI P5
800 ~ 28V 1% /0° (OPTICS) LO N5
+28V DC (OPTICS) S5
+28V DC (OPTICS) S6
CDU COS AMG 16X G4
IMU COS AMG 16X F3
IMU COS AIG 16X F1
SIN AOG IX K2
IMU SIN AOG 16X H5
CDU COS AIG 16X G2
IMU SIN AOG IX H2
+28V DC IMU S2
ENTRY RELAY CONT M1
800 ~ 28V 1% /0° (IMU) HI S4
CDU SIN AOG IX K3
COS AMG 16X G3
COS AIG 16X G1
SIN AOG 16X K5
ZEROING RSVR 800 ~ R4
COS AOG 16X G6
CDU COS AOG 16X H6
ZERO ENCODER RELAY CONT L2
CDU SIN AOG 16X K6
IMU GIMBAL RVSR 800 ~ P4
800 ~ 28V 1% /0° (IMU) LO S3
COMPUTER COM K1
ZERO ENCODER COMPUTER INDIC H1
IMU COS AOG 16X G5
IMU COS AOG IX H3
COS AOG IX H4
CDU COS AOG IX K4
N4
STRUCTURE GRD
R5 IG 16X ERROR SIGNAL
IG CDU FAIL
OV DC (IMU)
R6 MG CDU 16X ERROR SIGNAL
MG CDU FAIL
R7 OG CDU 16X ERROR SIGNAL
R1 1% MONITOR
R2
OG CDU FAIL
IG CDU ERROR RETURNS
MG CDU ERROR SIG RETURNS
OG CDU ERROR SIG RETURNS
OV DC
R3 5% MONITOR
R4 800 ~ DRIVE SIG (OPTICS)
45A6J9 CDU ZEROING TRANSFORMER RELAYS AND ENTRY RELAYS 1007064
45A6J8 AMPLIFIER, 1%-800CPS MODULE ASSY 1007047
45A6J7 AAC FILTER MULTIVIBRATOR 800 CPS MODULE ASSY 1007046
45A6J6 AMPLIFIER, 5%-800CPS MODULE ASSY 1007048

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02151 DATE 7-24-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:

RESOLVER LOADS—1010055
CDU MOTOR DRIVE AMPL, SELECTOR CIRCUIT & FINE ALIGN RELAY—1010035
CDU ZEROING TRANSFORMER, RELAYS & ENTRY RELAYS—1010056
800CPS 1% AMPLIFIER—1010045
AAC, FILTER & MULTIVIBRATOR—1010044
800 CPS 5% AMPLIFIER—1010046

MATRIX RES R1
MATRIX RES R2
MATRIX RES R3
MATRIX RES R4
MATRIX RES R5
MATRIX RES R6
MATRIX RES R7

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL —//—
HEAT TREATMENT —//—
FINAL FINISH —//—

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DRAWN E. Murdock DATE 7/16/63
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APPROVAL 7-24-63
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NASA APPROVAL
MIT APPROVAL 24 Jul 63

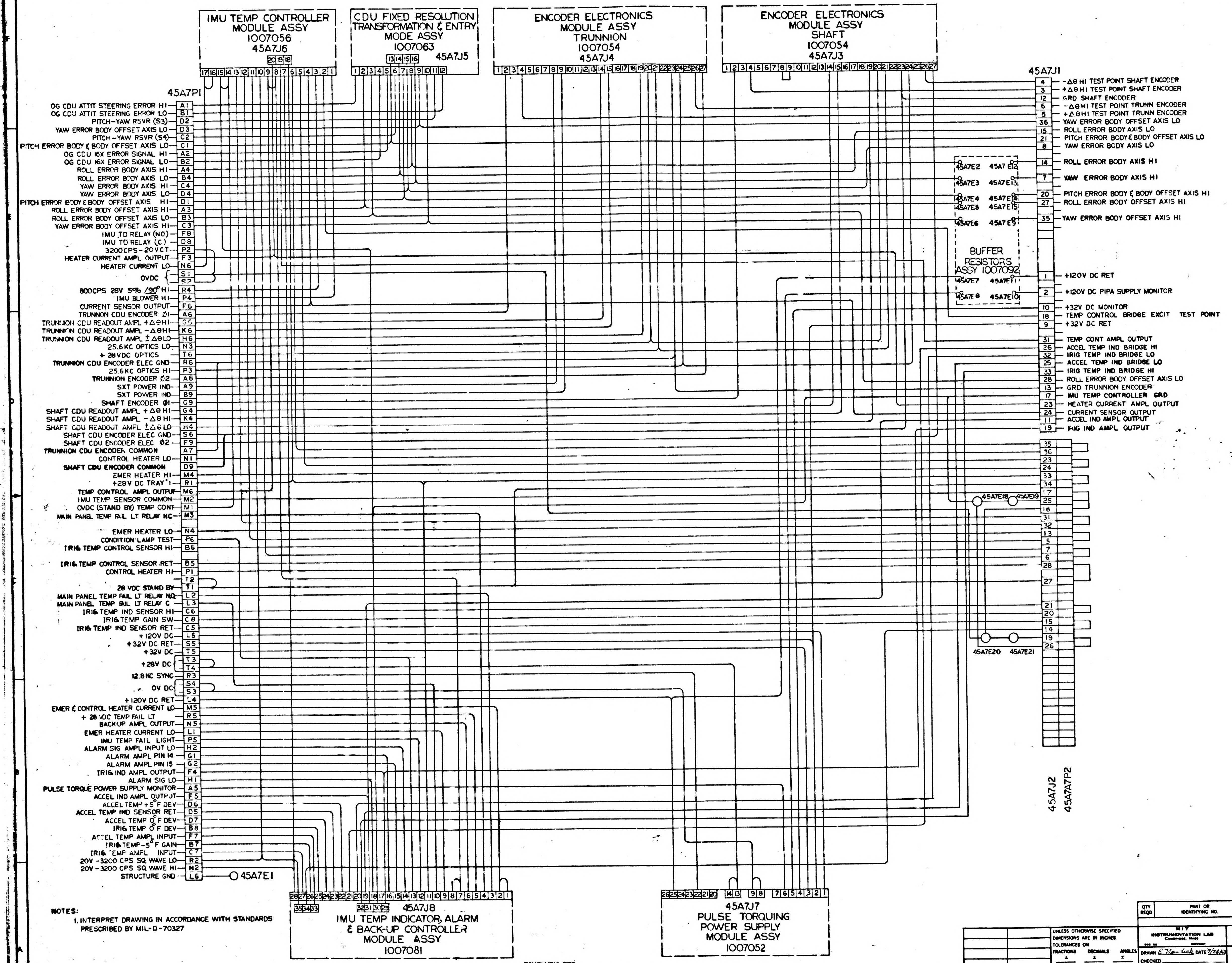
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #6

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010096
SCALE —
WT
SHEET 1 OF 1

1010096

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS CLASS B TDRR 02437		
A	REVISED PER TDRR 02533	9-10-63	WK
B	REVISED PER TDRR 02712	9-20-63	
C	REVISED PER TDRR 03286	9-17-63	WK



IMU TEMP CONTROLLER MODULE ASSY 1007056 45A7J6
CDU FIXED RESOLUTION TRANSFORMATION & ENTRY MODE ASSY 1007063 45A7J5
ENCODER ELECTRONICS MODULE ASSY TRUNNION 1007054 45A7J4
ENCODER ELECTRONICS MODULE ASSY SHAFT 1007054 45A7J3
45A7P1
OG CDU ATTIT STEERING ERROR HI — A1
OG CDU ATTIT STEERING ERROR LO — B1
PITCH-YAW RSVR (S3) — D2
YAW ERROR BODY OFFSET AXIS LO — D3
PITCH-YAW RSVR (S4) — C2
PITCH ERROR BODY & BODY OFFSET AXIS LO — C1
OG CDU 16X ERROR SIGNAL HI — A2
OG CDU 16X ERROR SIGNAL LO — B2
ROLL ERROR BODY AXIS HI — A4
ROLL ERROR BODY AXIS LO — B4
YAW ERROR BODY AXIS HI — C4
YAW ERROR BODY AXIS LO — D4
PITCH ERROR BODY & BODY OFFSET AXIS HI — D1
ROLL ERROR BODY OFFSET AXIS HI — A3
ROLL ERROR BODY OFFSET AXIS LO — B3
YAW ERROR BODY OFFSET AXIS HI — C3
IMU TD RELAY (NO) — F8
IMU TD RELAY (C) — D8
3200CPS-20VCT — P2
HEATER CURRENT AMPL OUTPUT — F3
HEATER CURRENT LO — N6
OVDC — S1, S2
800CPS 28V 5% /90° HI — R4
IMU BLOWER HI — P4
CURRENT SENSOR OUTPUT — F6
TRUNNION CDU ENCODER Ø1 — A6
TRUNNION CDU READOUT AMPL +ΔθHI — G6
TRUNNION CDU READOUT AMPL -ΔθHI — K6
TRUNNION CDU READOUT AMPL ±ΔθLO — H6
25.6KC OPTICS LO — N3
+ 28VDC OPTICS — T6
TRUNNION CDU ENCODER ELEC GND — R6
25.6KC OPTICS HI — P3
TRUNNION ENCODER Ø2 — A8
SXT POWER IND — A9
SXT POWER IND — B9
SHAFT ENCODER Ø1 — C9
SHAFT CDU READOUT AMPL +Δθ HI — G4
SHAFT CDU READOUT AMPL -Δθ HI — K4
SHAFT CDU READOUT AMPL ±Δθ LO — H4
SHAFT CDU ENCODER ELEC GND — S6
SHAFT CDU ENCODER ELEC Ø2 — F9
TRUNNION CDU ENCODER COMMON — A7
CONTROL HEATER LO — N1
SHAFT CDU ENCODER COMMON — D9
EMER HEATER HI — M4
+28V DC TRAY #1 — R1
TEMP CONTROL AMPL OUTPUT — M6
IMU TEMP SENSOR COMMON — M2
OVDC (STAND BY) TEMP CONT — M1
MAIN PANEL TEMP FAIL LT RELAY NC — M3
EMER HEATER LO — N4
CONDITION LAMP TEST — P6
IRIG TEMP CONTROL SENSOR HI — B6
IRIG TEMP CONTROL SENSOR RET — B5
CONTROL HEATER HI — P1
T2
28 VDC STAND BY — T1
MAIN PANEL TEMP FAIL LT RELAY NO — L2
MAIN PANEL TEMP FAIL LT RELAY C — L3
IRIG TEMP IND SENSOR HI — C6
IRIG TEMP GAIN SW — C8
IRIG TEMP IND SENSOR RET — C5
+120V DC — L5
+32V DC RET — S5
+32V DC — T5
+28V DC — T3, T4
12.8KC SYNC — R3
0V DC — S4, S3
+120V DC RET — L4
EMER & CONTROL HEATER CURRENT LO — M5
+ 28 VDC TEMP FAIL LT — R5
BACK-UP AMPL OUTPUT — N5
EMER HEATER CURRENT LO — L1
IMU TEMP FAIL LIGHT — P5
ALARM SIG AMPL INPUT LO — H2
ALARM AMPL PIN 14 — G1
ALARM AMPL PIN 15 — G2
IRIG IND AMPL OUTPUT — F4
ALARM SIG LO — H1
PULSE TORQUE POWER SUPPLY MONITOR — A5
ACCEL IND AMPL OUTPUT — F5
ACCEL TEMP +5°F DEV — D6
ACCEL TEMP IND SENSOR RET — D5
ACCEL TEMP 0°F DEV — D7
IRIG TEMP 0°F DEV — B8
ACCEL TEMP AMPL INPUT — F7
IRIG TEMP -5°F GAIN — B7
IRIG TEMP AMPL INPUT — C7
20V -3200 CPS SQ WAVE LO — R2
20V -3200 CPS SQ WAVE HI — N2
STRUCTURE GND — L6
45A7E1
45A7J1
4 — -Δθ HI TEST POINT SHAFT ENCODER
3 — +Δθ HI TEST POINT SHAFT ENCODER
12 — GRD SHAFT ENCODER
6 — -Δθ HI TEST POINT TRUNN ENCODER
5 — +Δθ HI TEST POINT TRUNN ENCODER
36 — YAW ERROR BODY OFFSET AXIS LO
15 — ROLL ERROR BODY AXIS LO
21 — PITCH ERROR BODY & BODY OFFSET AXIS LO
8 — YAW ERROR BODY AXIS LO
14 — ROLL ERROR BODY AXIS HI
7 — YAW ERROR BODY AXIS HI
20 — PITCH ERROR BODY & BODY OFFSET AXIS HI
27 — ROLL ERROR BODY OFFSET AXIS HI
35 — YAW ERROR BODY OFFSET AXIS HI
1 — +120V DC RET
2 — +120V DC PIPA SUPPLY MONITOR
10 — +32V DC MONITOR
18 — TEMP CONTROL BRIDGE EXCIT TEST POINT
9 — +32V DC RET
31 — TEMP CONT AMPL OUTPUT
26 — ACCEL TEMP IND BRIDGE HI
32 — IRIG TEMP IND BRIDGE LO
25 — ACCEL TEMP IND BRIDGE LO
33 — IRIG TEMP IND BRIDGE HI
28 — ROLL ERROR BODY OFFSET AXIS LO
13 — GRD TRUNNION ENCODER
17 — IMU TEMP CONTROLLER GRD
23 — HEATER CURRENT AMPL OUTPUT
24 — CURRENT SENSOR OUTPUT
11 — ACCEL IND AMPL OUTPUT
19 — IRIG IND AMPL OUTPUT
45A7E2 45A7E12
45A7E3 45A7E13
45A7E4 45A7E14
45A7E5 45A7E15
45A7E6 45A7E9
BUFFER RESISTORS ASSY 1007092
45A7E7 45A7E11
45A7E8 45A7E10
45A7E18 45A7E19
45A7E20 45A7E21
45A7J2
45A7A7P2
45A7J8 IMU TEMP INDICATOR, ALARM & BACK-UP CONTROLLER MODULE ASSY 1007081
45A7J7 PULSE TORQUING POWER SUPPLY MODULE ASSY 1007052

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:

ENCODER ELECTRONICS 1010034
FIXED RESOLUTION TRANSFORMATION & ENTRY MODE 1010057
IMU TEMP CONTROLLER 1010058
PULSE TORQUING POWER SUPPLY (PIPA & PULSE TORQUED GYRO) 1010052
IMU TEMP INDICATER ALARM & BACK-UP CONTROLLER 1010059

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
	LIST OF MATERIALS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN E. Van Leck DATE 7/24/63
CHECKED
APPROVAL 8-6-63
APPROVAL 8/7/63
NASA APPROVAL 8/7/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM TRAY #7

CODE IDENT NO. | SIZE E | NASA DRAWING NO. 1010097
SCALE | WT | SHEET 1 OF 1

1010097

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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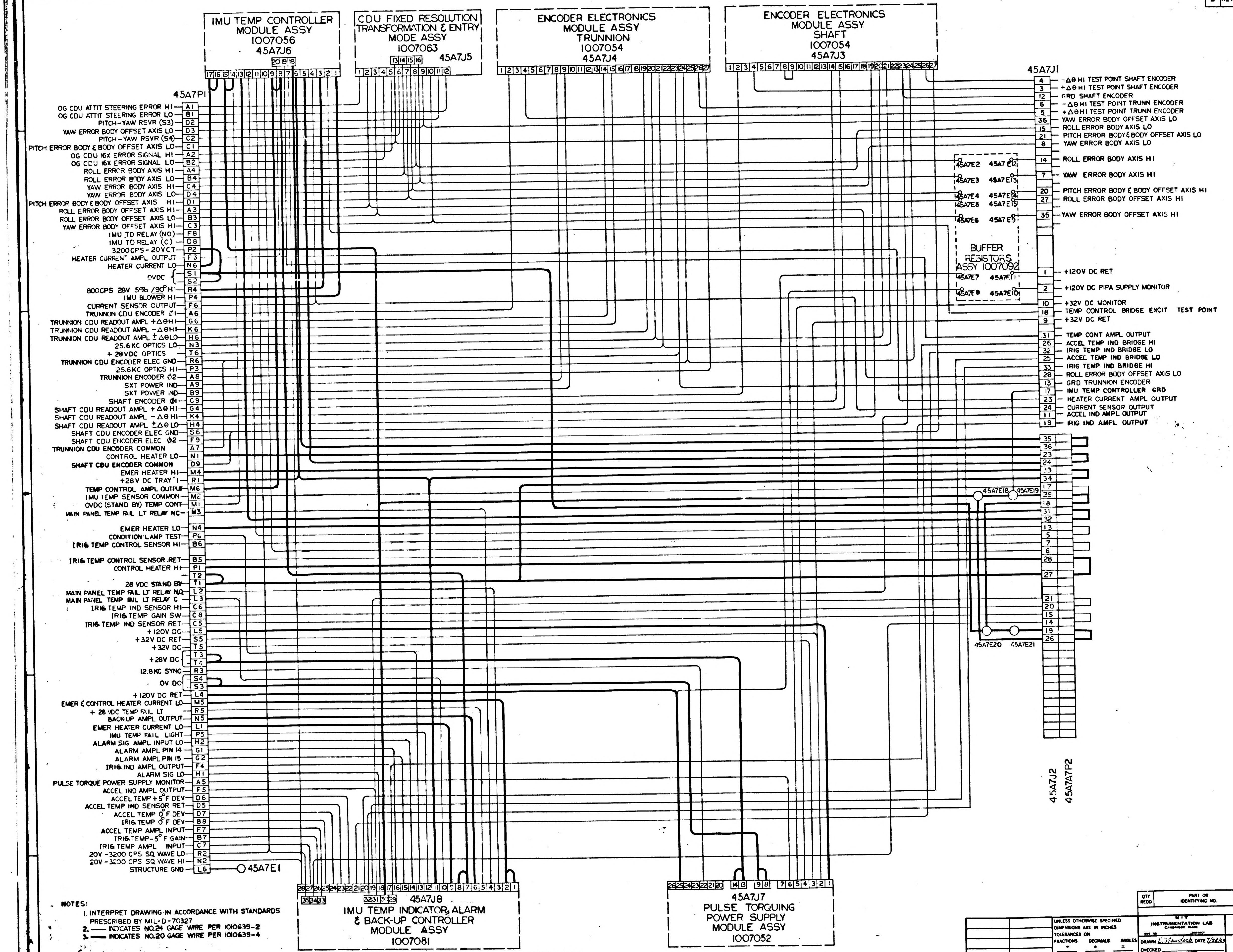
REVISIONS CLASS B TDRR 02437

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02533	[illegible] 63	WK
B	REVISED PER TDRR 02712	[illegible]	[illegible]
C	REVISED PER TDRR 03286	[illegible]	WK
D	REVISED PER TDRR 04108	[illegible]/63	WK


IMU TEMP CONTROLLER MODULE ASSY 1007056 45A7J6
CDU FIXED RESOLUTION TRANSFORMATION & ENTRY MODE ASSY 1007063 45A7J5
ENCODER ELECTRONICS MODULE ASSY TRUNNION 1007054 45A7J4
ENCODER ELECTRONICS MODULE ASSY SHAFT 1007054 45A7J3
45A7P1
OG CDU ATTIT STEERING ERROR HI — A1
OG CDU ATTIT STEERING ERROR LO — B1
PITCH-YAW RSVR (S3) — D2
YAW ERROR BODY OFFSET AXIS LO — D3
PITCH-YAW RSVR (S4) — C2
PITCH ERROR BODY & BODY OFFSET AXIS LO — C1
OG CDU 16X ERROR SIGNAL HI — A2
OG CDU 16X ERROR SIGNAL LO — B2
ROLL ERROR BODY AXIS HI — A4
ROLL ERROR BODY AXIS LO — B4
YAW ERROR BODY AXIS HI — C4
YAW ERROR BODY AXIS LO — D4
PITCH ERROR BODY & BODY OFFSET AXIS HI — D1
ROLL ERROR BODY OFFSET AXIS HI — A3
ROLL ERROR BODY OFFSET AXIS LO — B3
YAW ERROR BODY OFFSET AXIS HI — C3
IMU TD RELAY (NO) — F8
IMU TD RELAY (C) — D8
3200CPS-20VCT — P2
HEATER CURRENT AMPL OUTPUT — F3
HEATER CURRENT LO — N6
OVDC — S1, S2
800CPS 28V 5% /90° HI — R4
IMU BLOWER HI — P4
CURRENT SENSOR OUTPUT — F6
TRUNNION CDU ENCODER Ø1 — A6
TRUNNION CDU READOUT AMPL +ΔθHI — G6
TRUNNION CDU READOUT AMPL -ΔθHI — K6
TRUNNION CDU READOUT AMPL ±ΔθLO — H6
25.6KC OPTICS LO — N3
+28VDC OPTICS — T6
TRUNNION CDU ENCODER ELEC GND — R6
25.6KC OPTICS HI — P3
TRUNNION ENCODER Ø2 — A8
SXT POWER IND — A9
SXT POWER IND — B9
SHAFT ENCODER Ø1 — G9
SHAFT CDU READOUT AMPL +Δθ HI — G4
SHAFT CDU READOUT AMPL -Δθ HI — K4
SHAFT CDU READOUT AMPL ±Δθ LO — H4
SHAFT CDU ENCODER ELEC GND — S6
SHAFT CDU ENCODER ELEC Ø2 — F9
TRUNNION CDU ENCODER COMMON — A7
CONTROL HEATER LO — N1
SHAFT CDU ENCODER COMMON — D9
EMER HEATER HI — M4
+28V DC TRAY #1 — R1
TEMP CONTROL AMPL OUTPUT — M6
IMU TEMP SENSOR COMMON — M2
OVDC (STAND BY) TEMP CONT — M1
MAIN PANEL TEMP FAIL LT RELAY NC — M3
EMER HEATER LO — N4
CONDITION LAMP TEST — P6
IRIG TEMP CONTROL SENSOR HI — B6
IRIG TEMP CONTROL SENSOR RET — B5
CONTROL HEATER HI — P1
T2
28 VDC STAND BY — T1
MAIN PANEL TEMP FAIL LT RELAY NO — L2
MAIN PANEL TEMP FAIL LT RELAY C — L3
IRIG TEMP IND SENSOR HI — C6
IRIG TEMP GAIN SW — C8
IRIG TEMP IND SENSOR RET — C5
+120V DC — L5
+32V DC RET — S5
+32V DC — T5
+28V DC — T3, T4
12.8KC SYNC — R3
OV DC — S4, S3
+120V DC RET — L4
EMER & CONTROL HEATER CURRENT LO — M5
+28 VDC TEMP FAIL LT — R5
BACK-UP AMPL OUTPUT — N5
EMER HEATER CURRENT LO — L1
IMU TEMP FAIL LIGHT — P5
ALARM SIG AMPL INPUT LO — H2
ALARM AMPL PIN 14 — G1
ALARM AMPL PIN 15 — G2
IRIG IND AMPL OUTPUT — F4
ALARM SIG LO — H1
PULSE TORQUE POWER SUPPLY MONITOR — A5
ACCEL IND AMPL OUTPUT — F5
ACCEL TEMP +5°F DEV — D6
ACCEL TEMP IND SENSOR RET — D5
ACCEL TEMP 0°F DEV — D7
IRIG TEMP 0°F DEV — B8
ACCEL TEMP AMPL INPUT — F7
IRIG TEMP -5°F GAIN — B7
IRIG TEMP AMPL INPUT — C7
20V-3200 CPS SQ WAVE LO — R2
20V-3200 CPS SQ WAVE HI — N2
STRUCTURE GND — L6
45A7E1
45A7J1
4 — -Δθ HI TEST POINT SHAFT ENCODER
3 — +Δθ HI TEST POINT SHAFT ENCODER
12 — GRD SHAFT ENCODER
6 — -Δθ HI TEST POINT TRUNN ENCODER
5 — +Δθ HI TEST POINT TRUNN ENCODER
36 — YAW ERROR BODY OFFSET AXIS LO
15 — ROLL ERROR BODY AXIS LO
21 — PITCH ERROR BODY & BODY OFFSET AXIS LO
8 — YAW ERROR BODY AXIS LO
14 — ROLL ERROR BODY AXIS HI
7 — YAW ERROR BODY AXIS HI
20 — PITCH ERROR BODY & BODY OFFSET AXIS HI
27 — ROLL ERROR BODY OFFSET AXIS HI
35 — YAW ERROR BODY OFFSET AXIS HI
1 — +120V DC RET
2 — +120V DC PIPA SUPPLY MONITOR
10 — +32V DC MONITOR
18 — TEMP CONTROL BRIDGE EXCIT TEST POINT
9 — +32V DC RET
31 — TEMP CONT AMPL OUTPUT
26 — ACCEL TEMP IND BRIDGE HI
32 — IRIG TEMP IND BRIDGE LO
25 — ACCEL TEMP IND BRIDGE LO
33 — IRIG TEMP IND BRIDGE HI
28 — ROLL ERROR BODY OFFSET AXIS LO
13 — GRD TRUNNION ENCODER
17 — IMU TEMP CONTROLLER GRD
23 — HEATER CURRENT AMPL OUTPUT
24 — CURRENT SENSOR OUTPUT
11 — ACCEL IND AMPL OUTPUT
19 — IRIG IND AMPL OUTPUT
BUFFER RESISTORS ASSY 1007092
45A7E2
45A7E3
45A7E4
45A7E5
45A7E6
45A7E7
45A7E8
45A7E12
45A7E13
45A7E14
45A7E15
45A7E9
45A7E11
45A7E10
45A7E18
45A7E19
45A7E20
45A7E21
35 36 23 24 33 34 17 25 18 31 32 13 5 7 6 28 27 21 20 15 14 19 26
45A7J2
45A7A7P2
45A7J8
IMU TEMP INDICATOR, ALARM & BACK-UP CONTROLLER MODULE ASSY 1007081
45A7J7
PULSE TORQUING POWER SUPPLY MODULE ASSY 1007052

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. —— INDICATES NO.24 GAGE WIRE PER 1010639-2
3. ━━ INDICATES NO.20 GAGE WIRE PER 1010639-4

SCHEMATIC REF:

ENCODER ELECTRONICS 1010034
FIXED RESOLUTION TRANSFORMATION & ENTRY MODE 1010057
IMU TEMP CONTROLLER 1010058
PULSE TORQUING POWER SUPPLY (PIPA & PULSE TORQUED GYRO) 1010052
IMU TEMP INDICATER ALARM & BACK-UP CONTROLLER 1010059

1010097

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL — / /
HEAT TREATMENT — / /
FINAL FINISH — / /

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN E. Neudeck DATE 7/24/63
CHECKED
APPROVAL [illegible] 8-6-63
APPROVAL [illegible] 8/7/63
NASA APPROVAL [illegible] 8-7-63
MIT APPROVAL W Kupfer [illegible] 63

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HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010097
SCALE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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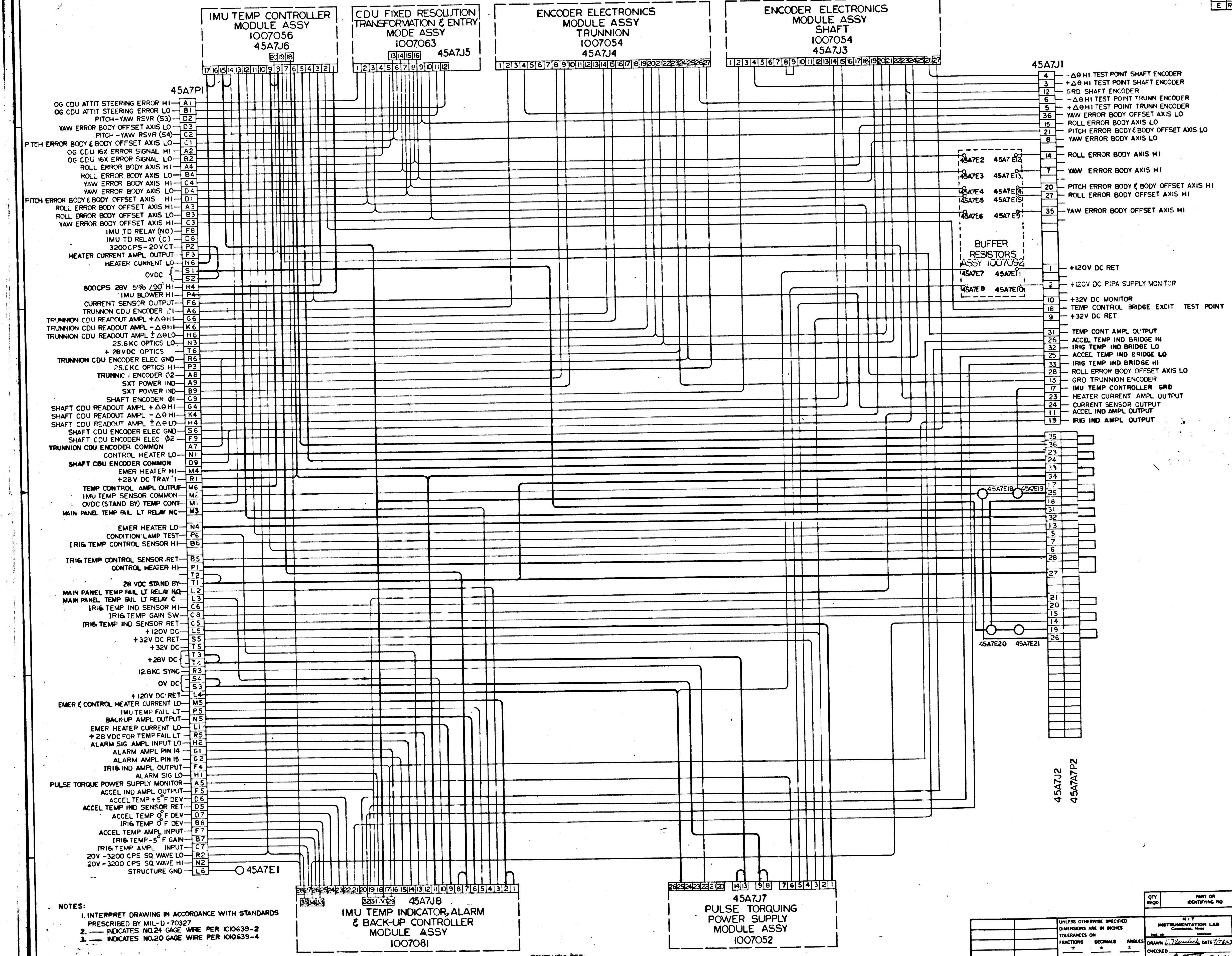
REVISIONS CLASS B TDRR 02437

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02533	[illegible]	WK
B	REVISED PER TDRR 02712	[illegible]	[illegible]
C	REVISED PER TDRR 03246	9/17/63	WK
D	REVISED PER TDRR 04108	10/4/63	WK
E	REVISED PER TDRR 04666	7 Nov 63	[illegible]



IMU TEMP CONTROLLER MODULE ASSY 1007056 45A7J6
CDU FIXED RESOLUTION TRANSFORMATION & ENTRY MODE ASSY 1007063 45A7J5
ENCODER ELECTRONICS MODULE ASSY TRUNNION 1007054 45A7J4
ENCODER ELECTRONICS MODULE ASSY SHAFT 1007054 45A7J3
45A7P1
OG CDU ATTIT STEERING ERROR HI — A1
OG CDU ATTIT STEERING ERROR LO — B1
PITCH-YAW RSVR (S3) — D2
YAW ERROR BODY OFFSET AXIS LO — D3
PITCH-YAW RSVR (S4) — C2
PITCH ERROR BODY & BODY OFFSET AXIS LO — C1
OG CDU 16X ERROR SIGNAL HI — A2
OG CDU 16X ERROR SIGNAL LO — B2
ROLL ERROR BODY AXIS HI — A4
ROLL ERROR BODY AXIS LO — B4
YAW ERROR BODY AXIS HI — C4
YAW ERROR BODY AXIS LO — D4
PITCH ERROR BODY & BODY OFFSET AXIS HI — D1
ROLL ERROR BODY OFFSET AXIS HI — A3
ROLL ERROR BODY OFFSET AXIS LO — B3
YAW ERROR BODY OFFSET AXIS HI — C3
IMU TD RELAY (NO) — F8
IMU TD RELAY (C) — D8
3200CPS-20VCT — P2
HEATER CURRENT AMPL OUTPUT — F3
HEATER CURRENT LO — N6
OVDC — S1, S2
800CPS 28V 5% /90° HI — R4
IMU BLOWER HI — P4
CURRENT SENSOR OUTPUT — F6
TRUNNION CDU ENCODER Ø1 — A6
TRUNNION CDU READOUT AMPL +ΔθHI — G6
TRUNNION CDU READOUT AMPL -ΔθHI — K6
TRUNNION CDU READOUT AMPL ±ΔθLO — H6
25.6KC OPTICS LO — N3
+28VDC OPTICS — T6
TRUNNION CDU ENCODER ELEC GND — R6
25.6KC OPTICS HI — P3
TRUNNION ENCODER Ø2 — A8
SXT POWER IND — A9
SXT POWER IND — B9
SHAFT ENCODER Ø1 — C9
SHAFT CDU READOUT AMPL +Δθ HI — G4
SHAFT CDU READOUT AMPL -Δθ HI — K4
SHAFT CDU READOUT AMPL ±Δθ LO — H4
SHAFT CDU ENCODER ELEC GND — S6
SHAFT CDU ENCODER ELEC Ø2 — F9
TRUNNION CDU ENCODER COMMON — A7
CONTROL HEATER LO — N1
SHAFT CDU ENCODER COMMON — D9
EMER HEATER HI — M4
+28V DC TRAY #1 — R1
TEMP CONTROL AMPL OUTPUT — M6
IMU TEMP SENSOR COMMON — M2
OVDC (STAND BY) TEMP CONT — M1
MAIN PANEL TEMP FAIL LT RELAY NC — M3
EMER HEATER LO — N4
CONDITION LAMP TEST — P6
IRIG TEMP CONTROL SENSOR HI — B6
IRIG TEMP CONTROL SENSOR RET — B5
CONTROL HEATER HI — P1
T2
28 VDC STAND BY — T1
MAIN PANEL TEMP FAIL LT RELAY NO — L2
MAIN PANEL TEMP FAIL LT RELAY C — L3
IRIG TEMP IND SENSOR HI — C6
IRIG TEMP GAIN SW — C8
IRIG TEMP IND SENSOR RET — C5
+120V DC — L5
+32V DC RET — S5
+32V DC — T5
+28V DC — T3, T4
12.8KC SYNC — R3
OV DC — S4, S3
+120V DC RET — L4
EMER & CONTROL HEATER CURRENT LO — M5
IMU TEMP FAIL LT — P5
BACK-UP AMPL OUTPUT — N5
EMER HEATER CURRENT LO — L1
+28 VDC FOR TEMP FAIL LT — R5
ALARM SIG AMPL INPUT LO — H2
ALARM AMPL PIN 14 — G1
ALARM AMPL PIN 15 — G2
IRIG IND AMPL OUTPUT — F4
ALARM SIG LO — H1
PULSE TORQUE POWER SUPPLY MONITOR — A5
ACCEL IND AMPL OUTPUT — F5
ACCEL TEMP +5°F DEV — D6
ACCEL TEMP IND SENSOR RET — D5
ACCEL TEMP 0°F DEV — D7
IRIG TEMP 0°F DEV — B8
ACCEL TEMP AMPL INPUT — F7
IRIG TEMP -5°F GAIN — B7
IRIG TEMP AMPL INPUT — C7
20V-3200 CPS SQ WAVE LO — R2
20V-3200 CPS SQ WAVE HI — N2
STRUCTURE GND — L6
45A7E1
45A7J1
4 — -Δθ HI TEST POINT SHAFT ENCODER
3 — +Δθ HI TEST POINT SHAFT ENCODER
12 — GRD SHAFT ENCODER
6 — -Δθ HI TEST POINT TRUNN ENCODER
5 — +Δθ HI TEST POINT TRUNN ENCODER
36 — YAW ERROR BODY OFFSET AXIS LO
15 — ROLL ERROR BODY AXIS LO
21 — PITCH ERROR BODY & BODY OFFSET AXIS LO
8 — YAW ERROR BODY AXIS LO
14 — ROLL ERROR BODY AXIS HI
7 — YAW ERROR BODY AXIS HI
20 — PITCH ERROR BODY & BODY OFFSET AXIS HI
27 — ROLL ERROR BODY OFFSET AXIS HI
35 — YAW ERROR BODY OFFSET AXIS HI
1 — +120V DC RET
2 — +120V DC PIPA SUPPLY MONITOR
10 — +32V DC MONITOR
18 — TEMP CONTROL BRIDGE EXCIT TEST POINT
9 — +32V DC RET
31 — TEMP CONT AMPL OUTPUT
26 — ACCEL TEMP IND BRIDGE HI
32 — IRIG TEMP IND BRIDGE LO
25 — ACCEL TEMP IND BRIDGE LO
33 — IRIG TEMP IND BRIDGE HI
28 — ROLL ERROR BODY OFFSET AXIS LO
13 — GRD TRUNNION ENCODER
17 — IMU TEMP CONTROLLER GRD
23 — HEATER CURRENT AMPL OUTPUT
24 — CURRENT SENSOR OUTPUT
11 — ACCEL IND AMPL OUTPUT
19 — IRIG IND AMPL OUTPUT
BUFFER RESISTORS ASSY 1007092
45A7E2 45A7E12
45A7E3 45A7E13
45A7E4 45A7E14
45A7E5 45A7E15
45A7E6 45A7E9
45A7E7 45A7E11
45A7E8 45A7E10
45A7E18 45A7E19
45A7E20 45A7E21
45A7J2
45A7P2
45A7J8 IMU TEMP INDICATOR, ALARM & BACK-UP CONTROLLER MODULE ASSY 1007081
45A7J7 PULSE TORQUING POWER SUPPLY MODULE ASSY 1007052

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. —— INDICATES NO.24 GAGE WIRE PER 1010639-2
3. —— INDICATES NO.20 GAGE WIRE PER 1010639-4

SCHEMATIC REF:

ENCODER ELECTRONICS 1010034
FIXED RESOLUTION TRANSFORMATION & ENTRY MODE 1010057
IMU TEMP CONTROLLER 1010058
PULSE TORQUING POWER SUPPLY (PIPA & PULSE TORQUED GYRO) 1010052
IMU TEMP INDICATER ALARM & BACK-UP CONTROLLER 1010059

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —/ /—
HEAT TREATMENT —/ /—
FINAL FINISH —/ /—

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN E. Mendick DATE 7/26/63
CHECKED
APPROVAL 8-6-63
APPROVAL 8/7/63
NASA APPROVAL
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM TRAY #7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010097
SCALE ——
WT
SHEET 1 OF 1

PHOTOGRAPHIC SCALE ONLY
INCHES 0 1 2

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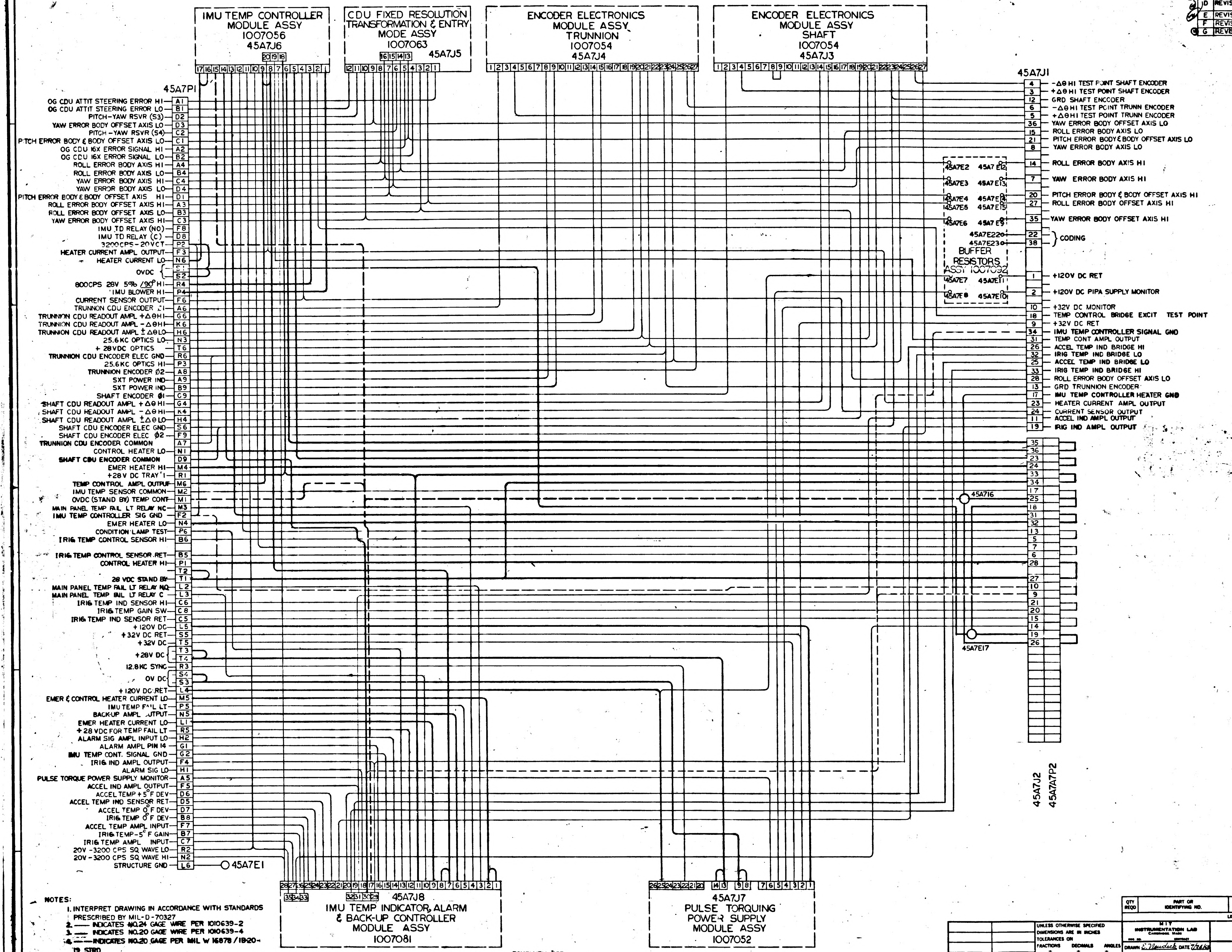
REVISIONS CLASS B TDRR 02537

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02533	[illegible]	[illegible]
B	REVISED PER TDRR 02712	[illegible]	[illegible]
C	REVISED PER TDRR 03246	[illegible]	[illegible]
D	REVISED PER TDRR 04108	[illegible]/63	[illegible]
E	REVISED PER TDRR 04666	[illegible] 63	[illegible]
F	REVISED PER TDRR 05665	1/21/64	[illegible]
G	REVISED PER TDRR 05865	1/24/64	[illegible]



IMU TEMP CONTROLLER
MODULE ASSY
1007056
45A7J6
CDU FIXED RESOLUTION
TRANSFORMATION & ENTRY
MODE ASSY
1007063
45A7J5
ENCODER ELECTRONICS
MODULE ASSY
TRUNNION
1007054
45A7J4
ENCODER ELECTRONICS
MODULE ASSY
SHAFT
1007054
45A7J3
45A7P1
45A7J1
OG CDU ATTIT STEERING ERROR HI — A1
OG CDU ATTIT STEERING ERROR LO — B1
PITCH-YAW RSVR (S3) — D2
YAW ERROR BODY OFFSET AXIS LO — D3
PITCH-YAW RSVR (S4) — C2
PITCH ERROR BODY & BODY OFFSET AXIS LO — C1
OG CDU 16X ERROR SIGNAL HI — A2
OG CDU 16X ERROR SIGNAL LO — B2
ROLL ERROR BODY AXIS HI — A4
ROLL ERROR BODY AXIS LO — B4
YAW ERROR BODY AXIS HI — C4
YAW ERROR BODY AXIS LO — D4
PITCH ERROR BODY & BODY OFFSET AXIS HI — D1
ROLL ERROR BODY OFFSET AXIS HI — A3
ROLL ERROR BODY OFFSET AXIS LO — B3
YAW ERROR BODY OFFSET AXIS HI — C3
IMU TD RELAY (NO) — F8
IMU TD RELAY (C) — D8
3200CPS-20VCT — P2
HEATER CURRENT AMPL OUTPUT — F3
HEATER CURRENT LO — N6
0VDC — E1, E2
800CPS 28V 5% /90° HI — R4
IMU BLOWER HI — P4
CURRENT SENSOR OUTPUT — F6
TRUNNION CDU ENCODER Ø1 — A6
TRUNNION CDU READOUT AMPL +ΔθHI — G6
TRUNNION CDU READOUT AMPL −ΔθHI — K6
TRUNNION CDU READOUT AMPL ±ΔθLO — H6
25.6KC OPTICS LO — N3
+28VDC OPTICS — T6
TRUNNION CDU ENCODER ELEC GND — R6
25.6KC OPTICS HI — P3
TRUNNION ENCODER Ø2 — A8
SXT POWER IND — A9
SXT POWER IND — B9
SHAFT CDU ENCODER Ø1 — G9
SHAFT CDU READOUT AMPL +ΔθHI — G4
SHAFT CDU READOUT AMPL −ΔθHI — K4
SHAFT CDU READOUT AMPL ±ΔθLO — H4
SHAFT CDU ENCODER ELEC GND — S6
SHAFT CDU ENCODER ELEC Ø2 — F9
TRUNNION CDU ENCODER COMMON — A7
CONTROL HEATER LO — N1
SHAFT CDU ENCODER COMMON — D9
EMER HEATER HI — M4
+28V DC TRAY 1 — R1
TEMP CONTROL AMPL OUTPUT — M6
IMU TEMP SENSOR COMMON — M2
0VDC (STAND BY) TEMP CONT — M1
MAIN PANEL TEMP FAIL LT RELAY NC — M3
IMU TEMP CONTROLLER SIG GND — F2
EMER HEATER LO — N4
CONDITION LAMP TEST — P6
IRIG TEMP CONTROL SENSOR HI — B6
IRIG TEMP CONTROL SENSOR RET — B5
CONTROL HEATER HI — P1
T2
28 VDC STAND BY — T1
MAIN PANEL TEMP FAIL LT RELAY NO — L2
MAIN PANEL TEMP FAIL LT RELAY C — L3
IRIG TEMP IND SENSOR HI — C6
IRIG TEMP GAIN SW — C8
IRIG TEMP IND SENSOR RET — C5
+120V DC — L5
+32V DC RET — S5
+32V DC — T5
+28V DC — T3, T4
12.8KC SYNC — R3
0V DC — S4, S3
+120V DC RET — L4
EMER & CONTROL HEATER CURRENT LO — M5
IMU TEMP FAIL LT — P5
BACK-UP AMPL OUTPUT — N5
EMER HEATER CURRENT LO — L1
+28 VDC FOR TEMP FAIL LT — R5
ALARM SIG AMPL INPUT LO — H2
ALARM AMPL PIN 14 — G1
IMU TEMP CONT. SIGNAL GND — G2
IRIG IND AMPL OUTPUT — F4
ALARM SIG LO — H1
PULSE TORQUE POWER SUPPLY MONITOR — A5
ACCEL IND AMPL OUTPUT — F5
ACCEL TEMP +5° F DEV — D6
ACCEL TEMP IND SENSOR RET — D5
ACCEL TEMP 0° F DEV — D7
IRIG TEMP 0° F DEV — B8
ACCEL TEMP AMPL INPUT — F7
IRIG TEMP −5° F GAIN — B7
IRIG TEMP AMPL INPUT — C7
20V-3200 CPS SQ WAVE LO — R2
20V-3200 CPS SQ WAVE HI — N2
STRUCTURE GND — L6
45A7E1
4 — −ΔθHI TEST POINT SHAFT ENCODER
3 — +ΔθHI TEST POINT SHAFT ENCODER
12 — GRD SHAFT ENCODER
6 — −ΔθHI TEST POINT TRUNN ENCODER
5 — +ΔθHI TEST POINT TRUNN ENCODER
36 — YAW ERROR BODY OFFSET AXIS LO
15 — ROLL ERROR BODY AXIS LO
21 — PITCH ERROR BODY & BODY OFFSET AXIS LO
8 — YAW ERROR BODY AXIS LO
14 — ROLL ERROR BODY AXIS HI
7 — YAW ERROR BODY AXIS HI
20 — PITCH ERROR BODY & BODY OFFSET AXIS HI
27 — ROLL ERROR BODY OFFSET AXIS HI
35 — YAW ERROR BODY OFFSET AXIS HI
22, 38 — CODING
1 — +120V DC RET
2 — +120V DC PIPA SUPPLY MONITOR
10 — +32V DC MONITOR
18 — TEMP CONTROL BRIDGE EXCIT TEST POINT
9 — +32V DC RET
34 — IMU TEMP CONTROLLER SIGNAL GND
31 — TEMP CONT AMPL OUTPUT
26 — ACCEL TEMP IND BRIDGE HI
32 — IRIG TEMP IND BRIDGE LO
25 — ACCEL TEMP IND BRIDGE LO
33 — IRIG TEMP IND BRIDGE HI
28 — ROLL ERROR BODY OFFSET AXIS LO
13 — GRD TRUNNION ENCODER
17 — IMU TEMP CONTROLLER HEATER GND
23 — HEATER CURRENT AMPL OUTPUT
24 — CURRENT SENSOR OUTPUT
11 — ACCEL IND AMPL OUTPUT
19 — IRIG IND AMPL OUTPUT
45A7E2
45A7E12
45A7E3
45A7E13
45A7E4
45A7E14
45A7E5
45A7E15
45A7E6
45A7E9
45A7E22
45A7E23
BUFFER
RESISTORS
ASSY 1007092
45A7E7
45A7E11
45A7E8
45A7E10
45A7I6
45A7E17
45A7J2
45A7A7P2
45A7J8
IMU TEMP INDICATOR, ALARM
& BACK-UP CONTROLLER
MODULE ASSY
1007081
45A7J7
PULSE TORQUING
POWER SUPPLY
MODULE ASSY
1007052

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. —— INDICATES NO.24 GAGE WIRE PER 1010639-2
3. —— INDICATES NO.20 GAGE WIRE PER 1010639-4
4. — — INDICATES NO.20 GAGE PER MIL W 16878 / 18-20-19 STRD
5. — — INDICATES NO.24 GAGE PER MIL W-16878 / 18-24-19 STRD

SCHEMATIC REF:

ENCODER ELECTRONICS 1010034
FIXED RESOLUTION TRANSFORMATION & ENTRY MODE 1010057
IMU TEMP CONTROLLER 1010058
PULSE TORQUING POWER SUPPLY (PIPA & PULSE TORQUED GYRO) 1010052
IMU TEMP INDICATER ALARM & BACK-UP CONTROLLER 1010059

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO. CONTRACT

DRAWN E. Neudeck DATE 7/26/62
CHECKED
APPROVAL 8-6-62
APPROVAL 8/7/62
NASA APPROVAL
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM TRAY #7

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010097
SCALE —— WT
SHEET 1 OF 1

1010097

INCHES
PHOTOGRAPHIC SCALE ONLY

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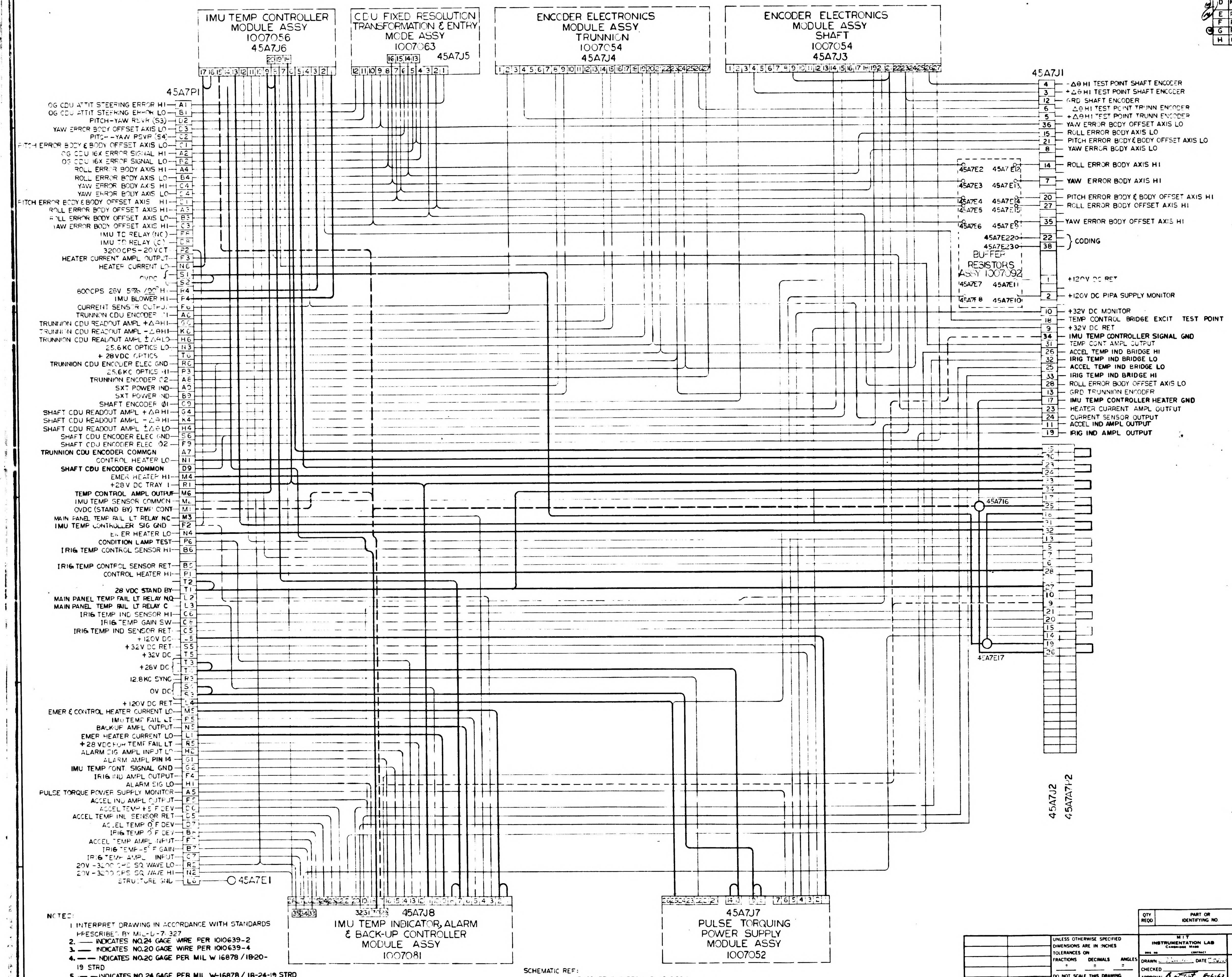
REVISIONS CLASS B TLER 02437

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 02533		WK
B	REVISED PER TDRR 02712		
C	REVISED PER TDRR 03246		WK
D	REVISED PER TDRR 04108		WK
E	REVISED PER TDRR 04666	NOV 63	
F	REVISED PER TDRR 05865	/21/64	
G	REVISED PER TDRR 05869	/21/64	
H	REVISED PER TDRR 10361	29 JUN	


6
5
4
3
2
1
IMU TEMP CONTROLLER MODULE ASSY 1007056 45A7J6
CDU FIXED RESOLUTION TRANSFORMATION & ENTRY MODE ASSY 1007063 45A7J5
ENCODER ELECTRONICS MODULE ASSY TRUNNION 1007054 45A7J4
ENCODER ELECTRONICS MODULE ASSY SHAFT 1007054 45A7J3
45A7P1
OG CDU ATTIT STEERING ERROR HI — A1
OG CDU ATTIT STEERING ERROR LO — B1
PITCH-YAW RSVR (S3) — D2
YAW ERROR BODY OFFSET AXIS LO — D3
PITCH-YAW RSVR (S4) — C2
PITCH ERROR BODY & BODY OFFSET AXIS LO — C1
OG CDU 16X ERROR SIGNAL HI — A2
OG CDU 16X ERROR SIGNAL LO — B2
ROLL ERROR BODY AXIS HI — A4
ROLL ERROR BODY AXIS LO — B4
YAW ERROR BODY AXIS HI — C4
YAW ERROR BODY AXIS LO — D4
PITCH ERROR BODY & BODY OFFSET AXIS HI — D1
ROLL ERROR BODY OFFSET AXIS HI — A3
ROLL ERROR BODY OFFSET AXIS LO — B3
YAW ERROR BODY OFFSET AXIS HI — C3
IMU TC RELAY (NC) — F8
IMU TC RELAY (C) — D8
3200CPS-20VCT — P2
HEATER CURRENT AMPL OUTPUT — F3
HEATER CURRENT LO — N6
OVDC — S1, S2
800CPS 28V 5% /90° HI — R4
IMU BLOWER HI — F4
CURRENT SENSOR OUTPUT — F6
TRUNNION CDU ENCODER Ø1 — A6
TRUNNION CDU READOUT AMPL +ΔθHI — G6
TRUNNION CDU READOUT AMPL -ΔθHI — K6
TRUNNION CDU READOUT AMPL ±ΔθLO — H6
25.6KC OPTICS LO — N3
+28VDC OPTICS — T6
TRUNNION CDU ENCODER ELEC GND — R6
25.6KC OPTICS HI — P3
TRUNNION ENCODER Ø2 — A8
SXT POWER IND — A9
SXT POWER IND — B9
SHAFT ENCODER Ø1 — C9
SHAFT CDU READOUT AMPL +ΔθHI — G4
SHAFT CDU READOUT AMPL -ΔθHI — K4
SHAFT CDU READOUT AMPL ±ΔθLO — H4
SHAFT CDU ENCODER ELEC GND — S6
SHAFT CDU ENCODER ELEC Ø2 — F9
TRUNNION CDU ENCODER COMMON — A7
CONTROL HEATER LO — N1
SHAFT CDU ENCODER COMMON — D9
EMER HEATER HI — M4
+28V DC TRAY 1 — R1
TEMP CONTROL AMPL OUTPUT — M6
IMU TEMP SENSOR COMMON — M2
OVDC (STAND BY) TEMP CONT — M1
MAIN PANEL TEMP FAIL LT RELAY NC — M3
IMU TEMP CONTROLLER SIG GND — F2
EMER HEATER LO — N4
CONDITION LAMP TEST — P6
IRIG TEMP CONTROL SENSOR HI — B6
IRIG TEMP CONTROL SENSOR RET — B5
CONTROL HEATER HI — P1
T2
28 VDC STAND BY — T1
MAIN PANEL TEMP FAIL LT RELAY NO — L2
MAIN PANEL TEMP FAIL LT RELAY C — L3
IRIG TEMP IND SENSOR HI — C6
IRIG TEMP GAIN SW — C8
IRIG TEMP IND SENSOR RET — C5
+120V DC — L5
+32V DC RET — S5
+32V DC — T5
+28V DC — T3, T4
12.8KC SYNC — R3
0V DC — S4, S3
+120V DC RET — L4
EMER & CONTROL HEATER CURRENT LO — M5
IMU TEMP FAIL LT — P5
BACKUP AMPL OUTPUT — N5
EMER HEATER CURRENT LO — L1
+28 VDC FOR TEMP FAIL LT — R5
ALARM SIG AMPL INPUT LO — H2
ALARM AMPL PIN 14 — G1
IMU TEMP CONT. SIGNAL GND — G2
IRIG IND AMPL OUTPUT — F4
ALARM SIG LO — H1
PULSE TORQUE POWER SUPPLY MONITOR — A5
ACCEL IND AMPL OUTPUT — F5
ACCEL TEMP +5°F DEV — D6
ACCEL TEMP IND SENSOR RET — D5
ACCEL TEMP 0°F DEV — D7
IRIG TEMP 0°F DEV — B8
ACCEL TEMP AMPL INPUT — F7
IRIG TEMP -5°F GAIN — B7
IRIG TEMP AMPL INPUT — C7
20V-3200 CPS SQ WAVE LO — R2
20V-3200 CPS SQ WAVE HI — N2
STRUCTURE GND — L6
45A7E1
45A7J1
4 — -ΔθHI TEST POINT SHAFT ENCODER
3 — +ΔθHI TEST POINT SHAFT ENCODER
12 — GRD SHAFT ENCODER
6 — -ΔθHI TEST POINT TRUNN ENCODER
5 — +ΔθHI TEST POINT TRUNN ENCODER
36 — YAW ERROR BODY OFFSET AXIS LO
15 — ROLL ERROR BODY AXIS LO
21 — PITCH ERROR BODY & BODY OFFSET AXIS LO
8 — YAW ERROR BODY AXIS LO
14 — ROLL ERROR BODY AXIS HI
7 — YAW ERROR BODY AXIS HI
20 — PITCH ERROR BODY & BODY OFFSET AXIS HI
27 — ROLL ERROR BODY OFFSET AXIS HI
35 — YAW ERROR BODY OFFSET AXIS HI
22, 38 — CODING
1 — +120V DC RET
2 — +120V DC PIPA SUPPLY MONITOR
10 — +32V DC MONITOR
18 — TEMP CONTROL BRIDGE EXCIT TEST POINT
9 — +32V DC RET
34 — IMU TEMP CONTROLLER SIGNAL GND
31 — TEMP CONT AMPL OUTPUT
26 — ACCEL TEMP IND BRIDGE HI
32 — IRIG TEMP IND BRIDGE LO
25 — ACCEL TEMP IND BRIDGE LO
33 — IRIG TEMP IND BRIDGE HI
28 — ROLL ERROR BODY OFFSET AXIS LO
13 — GRD TRUNNION ENCODER
17 — IMU TEMP CONTROLLER HEATER GND
23 — HEATER CURRENT AMPL OUTPUT
24 — CURRENT SENSOR OUTPUT
11 — ACCEL IND AMPL OUTPUT
19 — IRIG IND AMPL OUTPUT
45A7E2 45A7E12
45A7E3 45A7E13
45A7E4 45A7E14
45A7E5 45A7E15
45A7E6 45A7E8
45A7E22
45A7E23
BUFFER RESISTORS ASSY 1007092
45A7E7 45A7E11
45A7E8 45A7E10
45A7J6
45A7E17
45A7J2
45A7A7P2
45A7J8
IMU TEMP INDICATOR, ALARM & BACK-UP CONTROLLER MODULE ASSY 1007081
45A7J7
PULSE TORQUING POWER SUPPLY MODULE ASSY 1007052

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. —— INDICATES NO.24 GAGE WIRE PER 1010639-2
3. —— INDICATES NO.20 GAGE WIRE PER 1010639-4
4. — — INDICATES NO.20 GAGE PER MIL W 16878 / 1B-20-19 STRD
5. — — INDICATES NO.24 GAGE PER MIL W-16878 / 1B-24-19 STRD

SCHEMATIC REF:

ENCODER ELECTRONICS 1010034
FIXED RESOLUTION TRANSFORMATION & ENTRY MODE 1010057
IMU TEMP CONTROLLER 1010058
PULSE TORQUING POWER SUPPLY (PIPA & PULSE TORQUED GYRO) 1010052
IMU TEMP INDICATER ALARM & BACK-UP CONTROLLER 1010059

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —+—+—
HEAT TREATMENT —+—+—
FINAL FINISH —+—+—

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
APPROVAL 8-6-63
APPROVAL 8/7/63
NASA APPROVAL 8/7/63
MIT APPROVAL W Kiefer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM TRAY #7

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010097
SCALE —
WT
SHEET 1 OF 1

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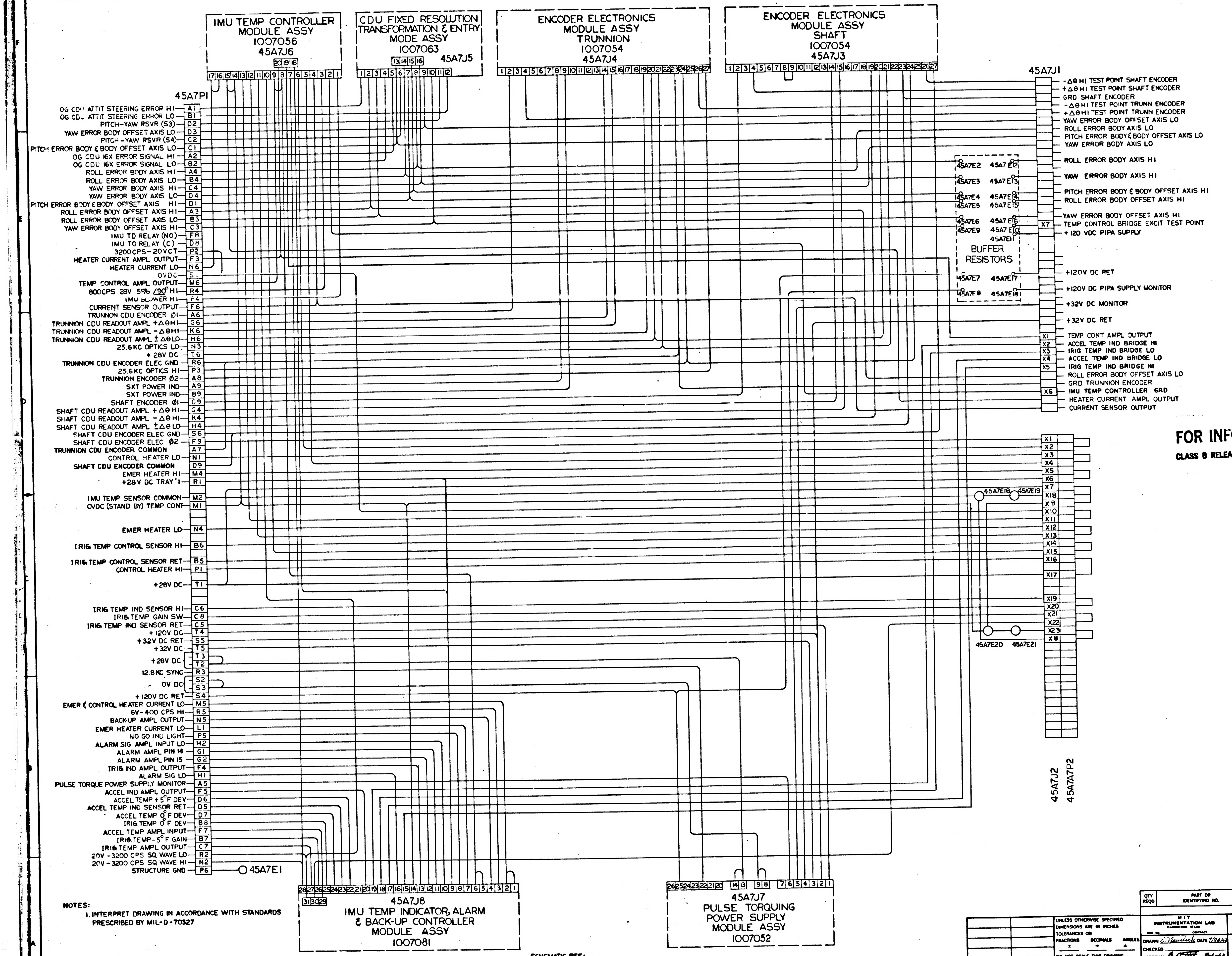
IMU TEMP CONTROLLER MODULE ASSY 1007056 45A7J6
CDU FIXED RESOLUTION TRANSFORMATION & ENTRY MODE ASSY 1007063 45A7J5
ENCODER ELECTRONICS MODULE ASSY TRUNNION 1007054 45A7J4
ENCODER ELECTRONICS MODULE ASSY SHAFT 1007054 45A7J3
45A7P1
OG CDU ATTIT STEERING ERROR HI — A1
OG CDU ATTIT STEERING ERROR LO — B1
PITCH-YAW RSVR (S3) — D2
YAW ERROR BODY OFFSET AXIS LO — D3
PITCH-YAW RSVR (S4) — C2
PITCH ERROR BODY & BODY OFFSET AXIS LO — C1
OG CDU 16X ERROR SIGNAL HI — A2
OG CDU 16X ERROR SIGNAL LO — B2
ROLL ERROR BODY AXIS HI — A4
ROLL ERROR BODY AXIS LO — B4
YAW ERROR BODY AXIS HI — C4
YAW ERROR BODY AXIS LO — D4
PITCH ERROR BODY & BODY OFFSET AXIS HI — D1
ROLL ERROR BODY OFFSET AXIS HI — A3
ROLL ERROR BODY OFFSET AXIS LO — B3
YAW ERROR BODY OFFSET AXIS HI — C3
IMU TD RELAY (NO) — F8
IMU TO RELAY (C) — D8
3200CPS-20VCT — P2
HEATER CURRENT AMPL OUTPUT — F3
HEATER CURRENT LO — N6
OVDC — S1
TEMP CONTROL AMPL OUTPUT — M6
800CPS 28V 5% /90° HI — R4
IMU BLOWER HI — F4
CURRENT SENSOR OUTPUT — F6
TRUNNION CDU ENCODER Ø1 — A6
TRUNNION CDU READOUT AMPL +ΔθHI — G6
TRUNNION CDU READOUT AMPL −ΔθHI — K6
TRUNNION CDU READOUT AMPL ±ΔθLO — H6
25.6KC OPTICS LO — N3
+28V DC — T6
TRUNNION CDU ENCODER ELEC GND — R6
25.6KC OPTICS HI — P3
TRUNNION ENCODER Ø2 — A8
SXT POWER IND — A9
SXT POWER IND — B9
SHAFT ENCODER Ø1 — C9
SHAFT CDU READOUT AMPL +Δθ HI — G4
SHAFT CDU READOUT AMPL −Δθ HI — K4
SHAFT CDU READOUT AMPL ±Δθ LO — H4
SHAFT CDU ENCODER ELEC GND — S6
SHAFT CDU ENCODER ELEC Ø2 — F9
TRUNNION CDU ENCODER COMMON — A7
CONTROL HEATER LO — N1
SHAFT CDU ENCODER COMMON — D9
EMER HEATER HI — M4
+28V DC TRAY #1 — R1
IMU TEMP SENSOR COMMON — M2
OVDC (STAND BY) TEMP CONT — M1
EMER HEATER LO — N4
IRIG TEMP CONTROL SENSOR HI — B6
IRIG TEMP CONTROL SENSOR RET — B5
CONTROL HEATER HI — P1
+28V DC — T1
IRIG TEMP IND SENSOR HI — C6
IRIG TEMP GAIN SW — C8
IRIG TEMP IND SENSOR RET — C5
+120V DC — T4
+32V DC RET — S5
+32V DC — T5
+28V DC — T3, T2
12.8KC SYNC — R3
0V DC — S2, S3
+120V DC RET — S4
EMER & CONTROL HEATER CURRENT LO — M5
6V-400 CPS HI — R5
BACK-UP AMPL OUTPUT — N5
EMER HEATER CURRENT LO — L1
NO GO IND LIGHT — P5
ALARM SIG AMPL INPUT LO — H2
ALARM AMPL PIN 14 — G1
ALARM AMPL PIN 15 — G2
IRIG IND AMPL OUTPUT — F4
ALARM SIG LO — H1
PULSE TORQUE POWER SUPPLY MONITOR — A5
ACCEL IND AMPL OUTPUT — F5
ACCEL TEMP +5°F DEV — D6
ACCEL TEMP IND SENSOR RET — D5
ACCEL TEMP 0°F DEV — D7
IRIG TEMP 0°F DEV — B8
ACCEL TEMP AMPL INPUT — F7
IRIG TEMP −5°F GAIN — B7
IRIG TEMP AMPL OUTPUT — C7
20V-3200 CPS SQ WAVE LO — R2
20V-3200 CPS SQ WAVE HI — N2
STRUCTURE GND — P6 — 45A7E1
45A7J1
−Δθ HI TEST POINT SHAFT ENCODER
+Δθ HI TEST POINT SHAFT ENCODER
GRD SHAFT ENCODER
−Δθ HI TEST POINT TRUNN ENCODER
+Δθ HI TEST POINT TRUNN ENCODER
YAW ERROR BODY OFFSET AXIS LO
ROLL ERROR BODY AXIS LO
PITCH ERROR BODY & BODY OFFSET AXIS LO
YAW ERROR BODY AXIS LO
ROLL ERROR BODY AXIS HI
YAW ERROR BODY AXIS HI
PITCH ERROR BODY & BODY OFFSET AXIS HI
ROLL ERROR BODY OFFSET AXIS HI
YAW ERROR BODY OFFSET AXIS HI
X7 TEMP CONTROL BRIDGE EXCIT TEST POINT
+120 VDC PIPA SUPPLY
+120V DC RET
+120V DC PIPA SUPPLY MONITOR
+32V DC MONITOR
+32V DC RET
X1 TEMP CONT AMPL OUTPUT
X2 ACCEL TEMP IND BRIDGE HI
X3 IRIG TEMP IND BRIDGE LO
X4 ACCEL TEMP IND BRIDGE LO
X5 IRIG TEMP IND BRIDGE HI
ROLL ERROR BODY OFFSET AXIS LO
GRD TRUNNION ENCODER
X6 IMU TEMP CONTROLLER GRD
HEATER CURRENT AMPL OUTPUT
CURRENT SENSOR OUTPUT
45A7E2 45A7E12
45A7E3 45A7E13
45A7E4 45A7E14
45A7E5 45A7E15
45A7E6 45A7E16
45A7E9 45A7E10
45A7E11
BUFFER RESISTORS
45A7E7 45A7E17
45A7E8 45A7E18
X1 X2 X3 X4 X5 X6 X7 X18 X9 X10 X11 X12 X13 X14 X15 X16 X17 X19 X20 X21 X22 X23 X8
45A7E18 45A7E19
45A7E20 45A7E21
45A7J2
45A7A7P2
45A7J8 IMU TEMP INDICATOR, ALARM & BACK-UP CONTROLLER MODULE ASSY 1007081
45A7J7 PULSE TORQUING POWER SUPPLY MODULE ASSY 1007052

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 DATE 8-7-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC REF:

ENCODER ELECTRONICS 1010034
FIXED RESOLUTION TRANSFORMATION & ENTRY MODE 1010057
IMU TEMP CONTROLLER 1010058
PULSE TORQUING POWER SUPPLY (PIPA & PULSE TORQUED GYRO) 1010052
IMU TEMP INDICATER ALARM & BACK-UP CONTROLLER 1010059

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN E. Mandeck DATE 7/24/63
CHECKED
APPROVAL 8-6-63
APPROVAL 8/7/63
NASA APPROVAL
MIT APPROVAL W Kupfer

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #7

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010097
SCALE WT SHEET 1 OF 1

1010097

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

			REVISIONS
SYM	DESCRIPTION	DATE	APPROVAL
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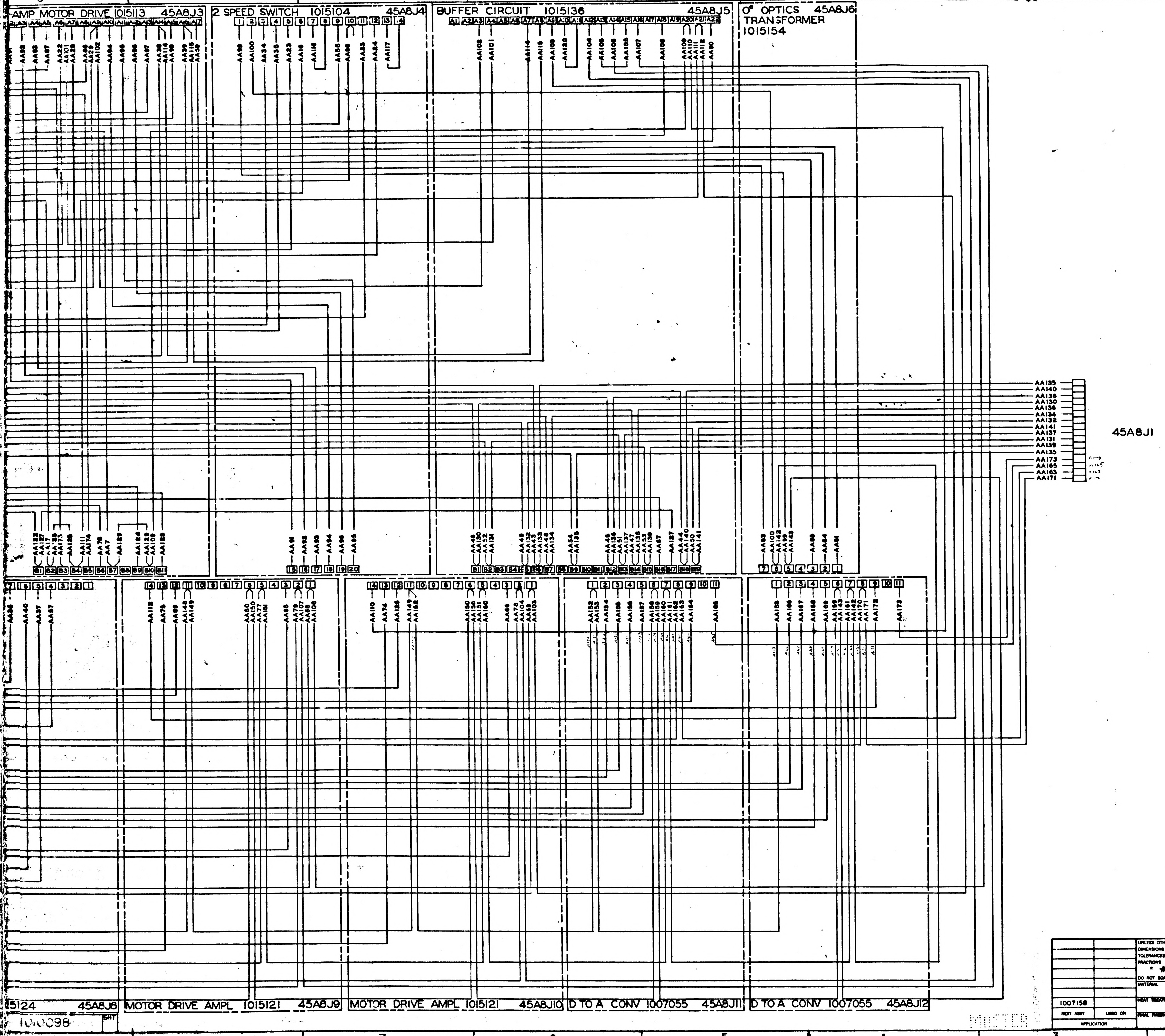
A 8600101



9
8
7
6
5
4
3
-AMP MOTOR DRIVE 1015113 45A8J3
2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS TRANSFORMER 1015154 45A8J6
A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17
AA91 AA92 AA93 AA87 AA22 AA101 AA28 AA86 AA29 AA102 AA94 AA95 AA96 AA97 AA38 AA114 AA98 AA39 AA115 AA50
1 2 3 4 5 6 7 8 9 10 11 12 13 14
AA99 AA100 AA34 AA35 AA23 AA16 AA116 AA55 AA56 AA33 AA84 AA117
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22
AA102 AA101 AA114 AA115 AA103 AA120 AA104 AA105 AA106 AA105 AA107 AA108 AA109 AA110 AA111 AA112 AA90
45A8J1
AA139
AA140
AA136
AA130
AA138
AA134
AA132
AA141
AA137
AA131
AA139
AA135
AA173
AA165
AA163
AA171
A173
A165
A163
A171
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11
5124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12
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CLASS B RELEASE TDR No. 02348 DATE 7-31-63

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		MATERIAL #	DRAWN E. Grover DATE 7/27/63
		HEAT TREATMENT #	CHECKED
1007158		FINAL FINISH #	APPROVAL
NEXT ASSY	USED ON		NASA APPROVAL
APPLICATION			MIT APPROVAL 31 Jul 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 8

CODE IDENT NO. | SIZE J | NASA DRAWING NO. 1010098

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1010098 A

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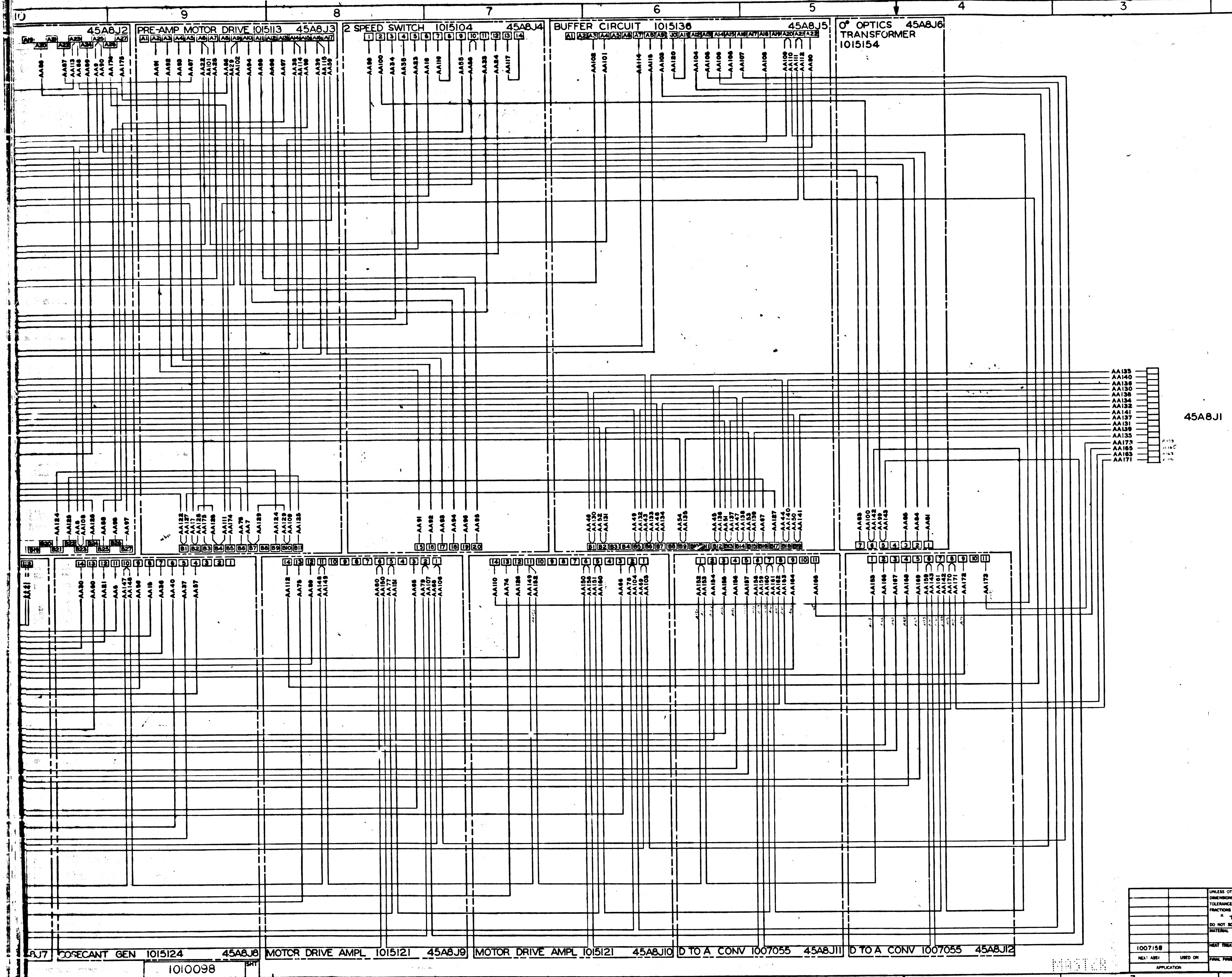

45A8J2
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2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS 45A8J6
TRANSFORMER
1015154
45A8J1
8J7
COSECANT GEN 1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12
AA133
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CLASS B RELEASE TDR No. 02348 DATE 9-3

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APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN E. Gross DATE 7/27/63
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APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 3/1/63

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HOUSTON, TEXAS

WIRING DIAGRAM TRAY 8

CODE IDENT NO.
SIZE J
1010098
SCALE NONE
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INCHES
PHOTOGRAPHIC SCALE ONLY

MASTER

E2

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷ MATES WITH A15J16

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SCHEMATIC DIAGRAM 1015160

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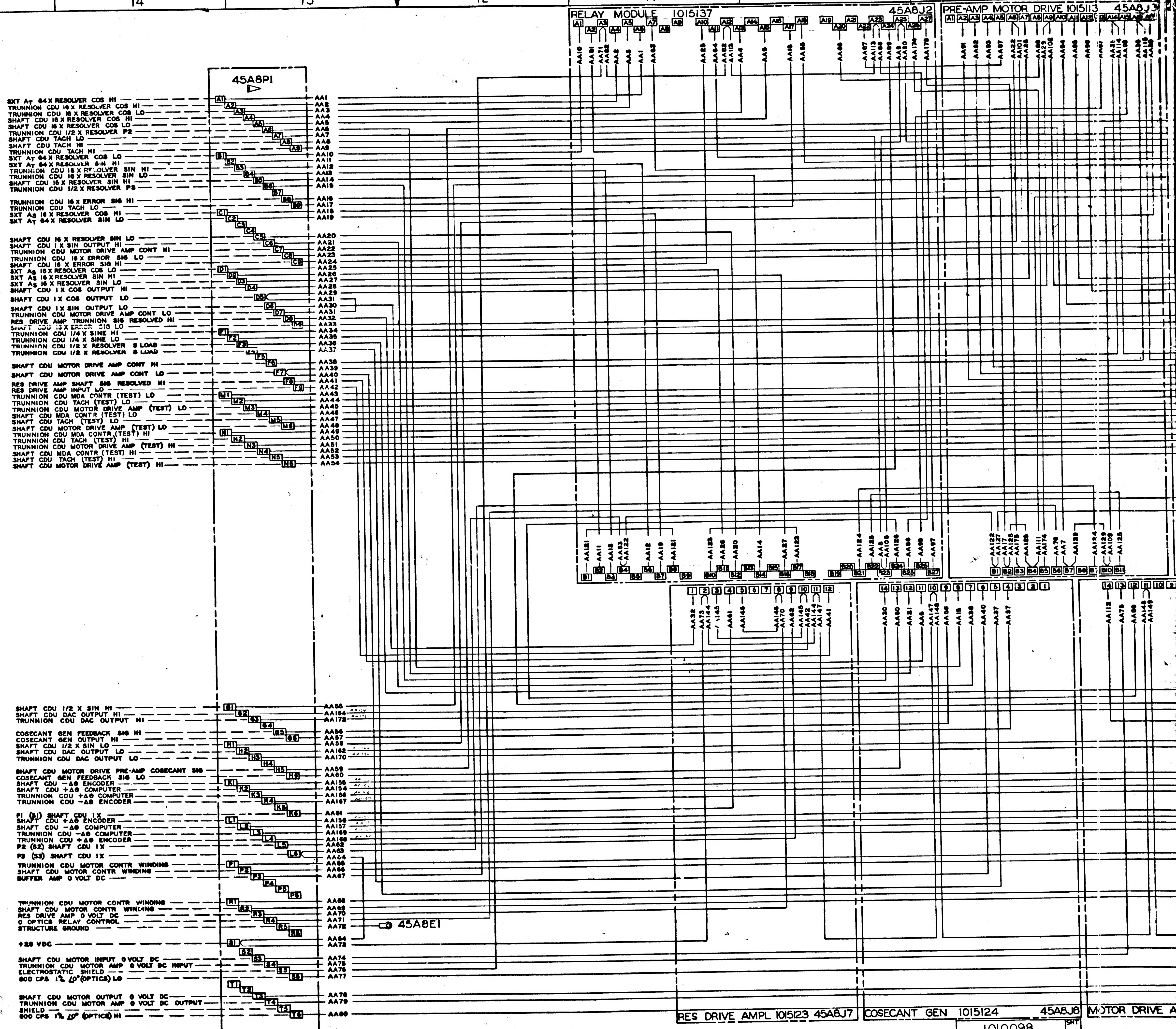
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TRUNNION CDU 16 X RESOLVER COS HI — A2 — AA2
TRUNNION CDU 16 X RESOLVER COS LO — A3 — AA3
SHAFT CDU 16 X RESOLVER COS HI — A4 — AA4
SHAFT CDU 16 X RESOLVER COS LO — A5 — AA5
TRUNNION CDU 1/2 X RESOLVER P2 — A6 — AA6
SHAFT CDU TACH LO — A7 — AA7
SHAFT CDU TACH HI — A8 — AA8
TRUNNION CDU TACH HI — A9 — AA9
SXT AT 64 X RESOLVER COS LO — B1 — AA10
SXT AT 64 X RESOLVER SIN HI — B2 — AA11
TRUNNION CDU 16 X RESOLVER SIN HI — B3 — AA12
TRUNNION CDU 16 X RESOLVER SIN LO — B4 — AA13
SHAFT CDU 16 X RESOLVER SIN HI — B5 — AA14
TRUNNION CDU 1/2 X RESOLVER P3 — B6 — AA15
TRUNNION CDU 16 X ERROR SIG HI — B8 — AA16
TRUNNION CDU TACH LO — B9 — AA17
SXT AS 16 X RESOLVER COS HI — C1 — AA18
SXT AT 64 X RESOLVER SIN LO — C2 — AA19
SHAFT CDU 16 X RESOLVER SIN LO — C5 — AA20
SHAFT CDU 1 X SIN OUTPUT HI — C6 — AA21
TRUNNION CDU MOTOR DRIVE AMP CONT HI — C7 — AA22
TRUNNION CDU 16 X ERROR SIG LO — C8 — AA23
SHAFT CDU 16 X ERROR SIG HI — C9 — AA24
SXT AS 16 X RESOLVER COS LO — D1 — AA25
SXT AS 16 X RESOLVER SIN HI — D2 — AA26
SXT AS 16 X RESOLVER SIN LO — D3 — AA27
SHAFT CDU 1 X COS OUTPUT HI — D4 — AA28
SHAFT CDU 1 X COS OUTPUT LO — D5 — AA29, AA31
SHAFT CDU 1 X SIN OUTPUT LO — D6 — AA30
TRUNNION CDU MOTOR DRIVE AMP CONT LO — D7 — AA31
RES DRIVE AMP TRUNNION SIG RESOLVED HI — D8 — AA32
SHAFT CDU 16 X ERROR SIG LO — D9 — AA33
TRUNNION CDU 1/4 X SINE HI — F1 — AA34
TRUNNION CDU 1/4 X SINE LO — F2 — AA35
TRUNNION CDU 1/2 X RESOLVER S LOAD — F3 — AA36
TRUNNION CDU 1/2 X RESOLVER S LOAD — F4 — AA37
SHAFT CDU MOTOR DRIVE AMP CONT HI — F6 — AA38
SHAFT CDU MOTOR DRIVE AMP CONT LO — F7 — AA39, AA40
RES DRIVE AMP SHAFT SIG RESOLVED HI — F8 — AA41
RES DRIVE AMP INPUT LO — F9 — AA42
TRUNNION CDU MDA CONTR (TEST) LO — M1 — AA43
TRUNNION CDU TACH (TEST) LO — M2 — AA44
TRUNNION CDU MOTOR DRIVE AMP (TEST) LO — M3 — AA45
SHAFT CDU MDA CONTR (TEST) LO — M4 — AA46
SHAFT CDU TACH (TEST) LO — M5 — AA47
SHAFT CDU MOTOR DRIVE AMP (TEST) LO — M6 — AA48
TRUNNION CDU MDA CONTR (TEST) HI — N1 — AA49
TRUNNION CDU TACH (TEST) HI — N2 — AA50
TRUNNION CDU MOTOR DRIVE AMP (TEST) HI — N3 — AA51
SHAFT CDU MDA CONTR (TEST) HI — N4 — AA52
SHAFT CDU TACH (TEST) HI — N5 — AA53
SHAFT CDU MOTOR DRIVE AMP (TEST) HI — N6 — AA54
SHAFT CDU 1/2 X SIN HI — G1 — AA55
SHAFT CDU DAC OUTPUT HI — G2 — AA164
TRUNNION CDU DAC OUTPUT HI — G3 — AA172
COSECANT GEN FEEDBACK SIG HI — G5 — AA56
COSECANT GEN OUTPUT HI — G6 — AA57
SHAFT CDU 1/2 X SIN LO — H1 — AA58
SHAFT CDU DAC OUTPUT LO — H2 — AA162
TRUNNION CDU DAC OUTPUT LO — H3 — AA170
SHAFT CDU MOTOR DRIVE PRE-AMP COSECANT SIG — H5 — AA59
COSECANT GEN FEEDBACK SIG LO — H6 — AA60
SHAFT CDU −Δθ ENCODER — K1 — AA155
SHAFT CDU +Δθ COMPUTER — K2 — AA154
TRUNNION CDU +Δθ COMPUTER — K3 — AA166
TRUNNION CDU −Δθ ENCODER — K4 — AA167
P1 (S1) SHAFT CDU 1X — K6 — AA61
SHAFT CDU +Δθ ENCODER — L1 — AA156
SHAFT CDU −Δθ COMPUTER — L2 — AA157
TRUNNION CDU −Δθ COMPUTER — L3 — AA169
TRUNNION CDU +Δθ ENCODER — L4 — AA168
P2 (S2) SHAFT CDU 1X — L5 — AA62
P3 (S3) SHAFT CDU 1X — L6 — AA63, AA64
TRUNNION CDU MOTOR CONTR WINDING — P1 — AA65
SHAFT CDU MOTOR CONTR WINDING — P2 — AA66
BUFFER AMP 0 VOLT DC — P3 — AA67
TRUNNION CDU MOTOR CONTR WINDING — R1 — AA68
SHAFT CDU MOTOR CONTR WINDING — R2 — AA69
RES DRIVE AMP 0 VOLT DC — R3 — AA70
0 OPTICS RELAY CONTROL — R4 — AA71
STRUCTURE GROUND — R5 — AA72
45A8E1
+28 VDC — S1 — AA64, AA73
SHAFT CDU MOTOR INPUT 0 VOLT DC — S3 — AA74
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT — S4 — AA75
ELECTROSTATIC SHIELD — S5 — AA76
800 CPS 1% ∠0° (OPTICS) LO — S6 — AA77
SHAFT CDU MOTOR OUTPUT 0 VOLT DC — T3 — AA78
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT — T4 — AA79
SHIELD
800 CPS 1% ∠0° (OPTICS) HI — T6 — AA80
RELAY MODULE 1015137 45A8J2
PRE-AMP MOTOR DRIVE 1015113 45A8J3
RES DRIVE AMPL 1015123 45A8J7
COSECANT GEN 1015124 45A8J8
MOTOR DRIVE A

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REVISIONS TDRR. 02348 7-31-63

SYM	DESCRIPTION	DATE	APPROVAL
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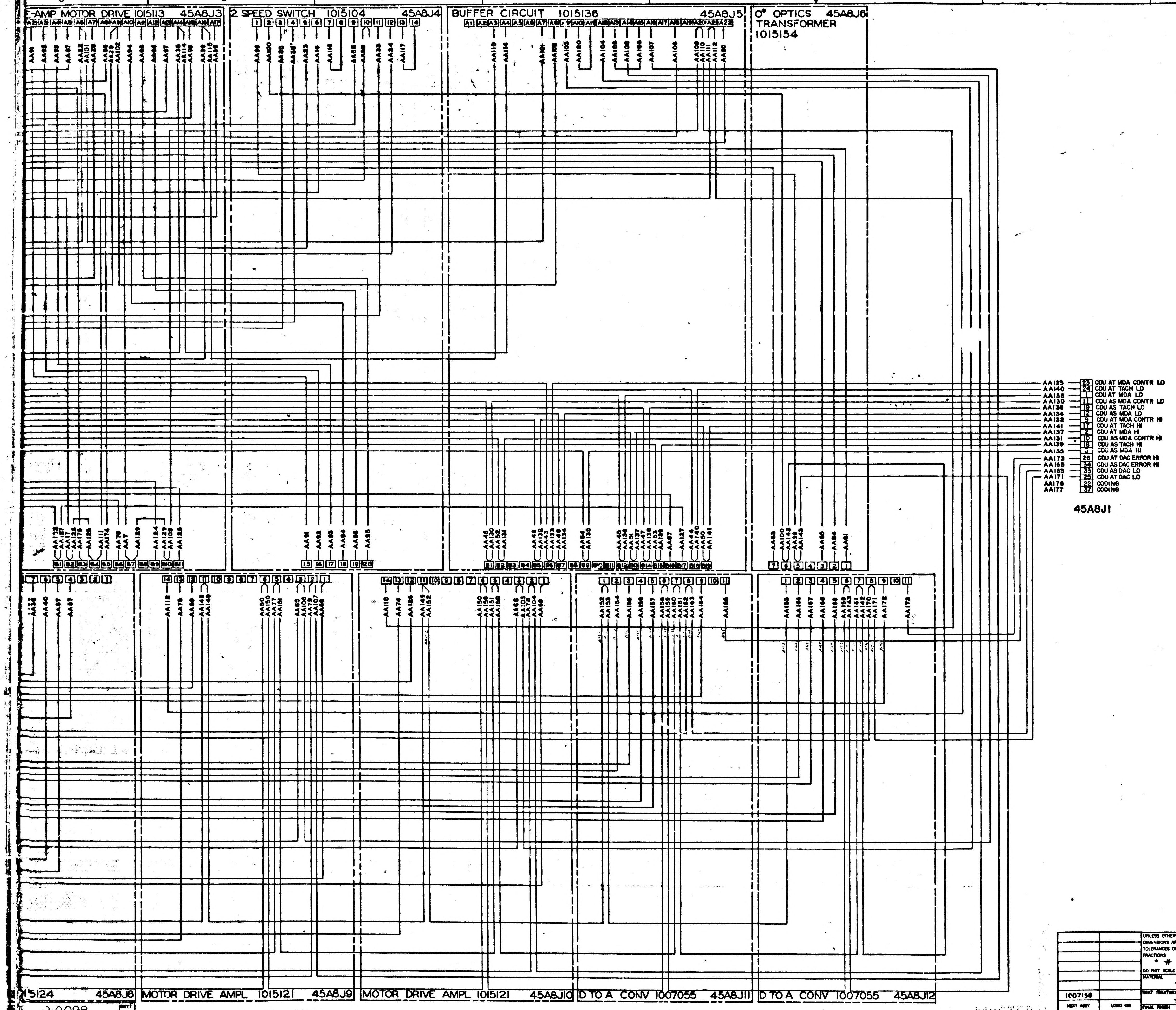
B	REVISED PER TDRR 03288	9-17-63	JJM WK



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2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS TRANSFORMER 1015154 45A8J6
15124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12
AA133 23 CDU AT MDA CONTR LO
AA140 24 CDU AT TACH LO
AA136 1 CDU AT MDA LO
AA130 11 CDU AS MDA CONTR LO
AA138 19 CDU AS TACH LO
AA134 12 CDU AS MDA LO
AA132 9 CDU AT MDA CONTR HI
AA141 17 CDU AT TACH HI
AA137 2 CDU AT MDA HI
AA131 10 CDU AS MDA CONTR HI
AA139 18 CDU AS TACH HI
AA135 3 CDU AS MDA HI
AA173 26 CDU AT DAC ERROR HI
AA165 34 CDU AS DAC ERROR HI
AA163 33 CDU AS DAC LO
AA171 25 CDU AT DAC LO
AA176 22 CODING
AA177 37 CODING
45A8J1

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN E. Gross DATE 7/27/63
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NASA APPROVAL
MIT APPROVAL 31 Jul 63

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HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 8

CODE IDENT NO. SIZE J NASA DRAWING NO. 1010098
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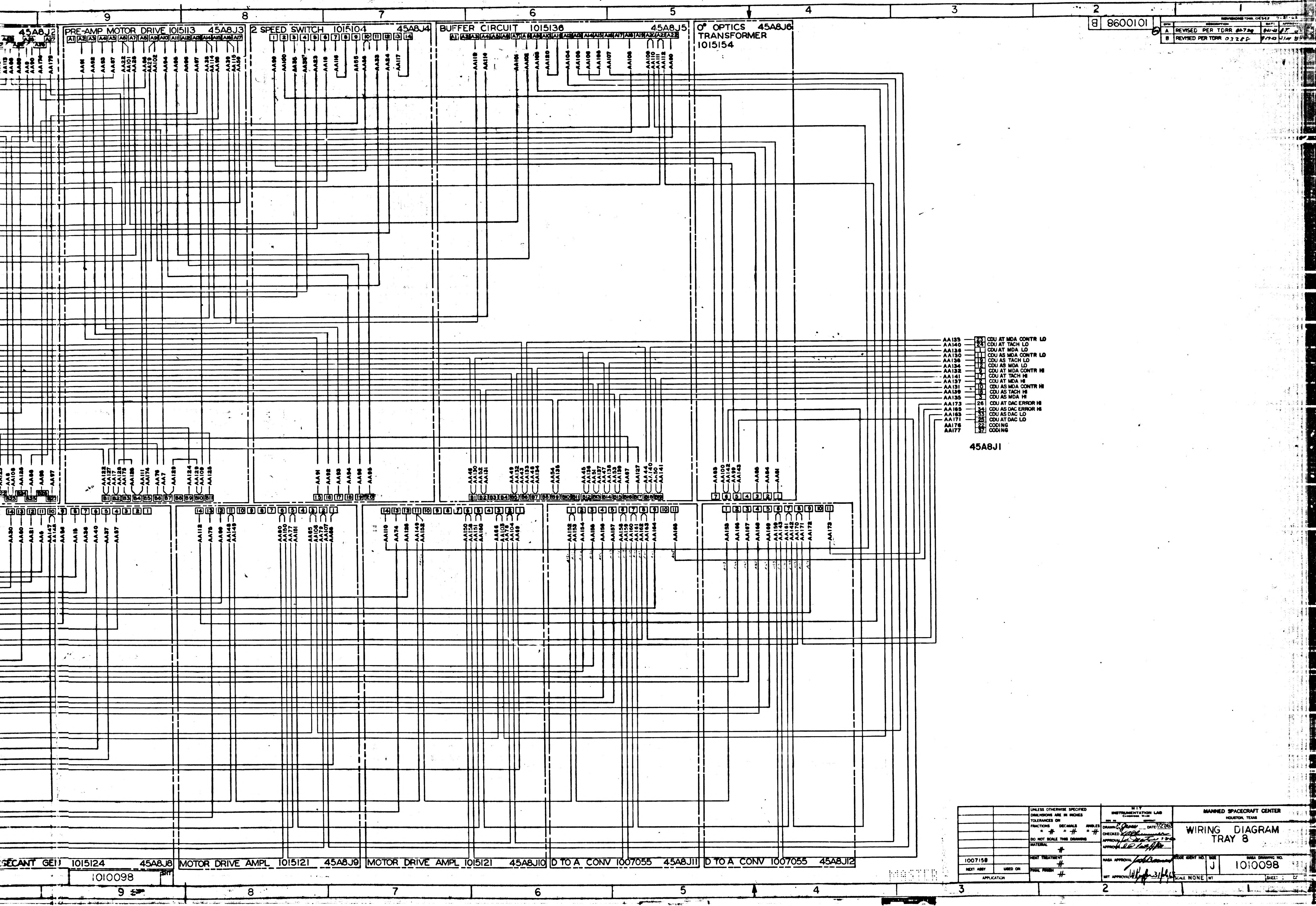
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2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS TRANSFORMER 1015154 45A8J6
45A8J2
SECANT GEN 1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12
AA133 23 CDU AT MDA CONTR LO
AA140 24 CDU AT TACH LO
AA136 1 CDU AT MDA LO
AA130 11 CDU AS MDA CONTR LO
AA138 19 CDU AS TACH LO
AA134 12 CDU AS MDA LO
AA132 9 CDU AT MDA CONTR HI
AA141 17 CDU AT TACH HI
AA137 2 CDU AT MDA HI
AA131 10 CDU AS MDA CONTR HI
AA139 18 CDU AS TACH HI
AA135 3 CDU AS MDA HI
AA173 26 CDU AT DAC ERROR HI
AA165 34 CDU AS DAC ERROR HI
AA163 33 CDU AS DAC LO
AA171 25 CDU AT DAC LO
AA176 22 CODING
AA177 37 CODING
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REVISIONS TDRR 02349 7-31-63

SYM	DESCRIPTION	DATE	APPROVAL
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B	REVISED PER TDRR 03288	9-19-63	J.W.

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APPLICATION

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MIT APPROVAL 3/ /63

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WIRING DIAGRAM
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INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷ MATES WITH A15J16

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SCHEMATIC DIAGRAM 1015160

ASSEMBLY DRAWING 1007156

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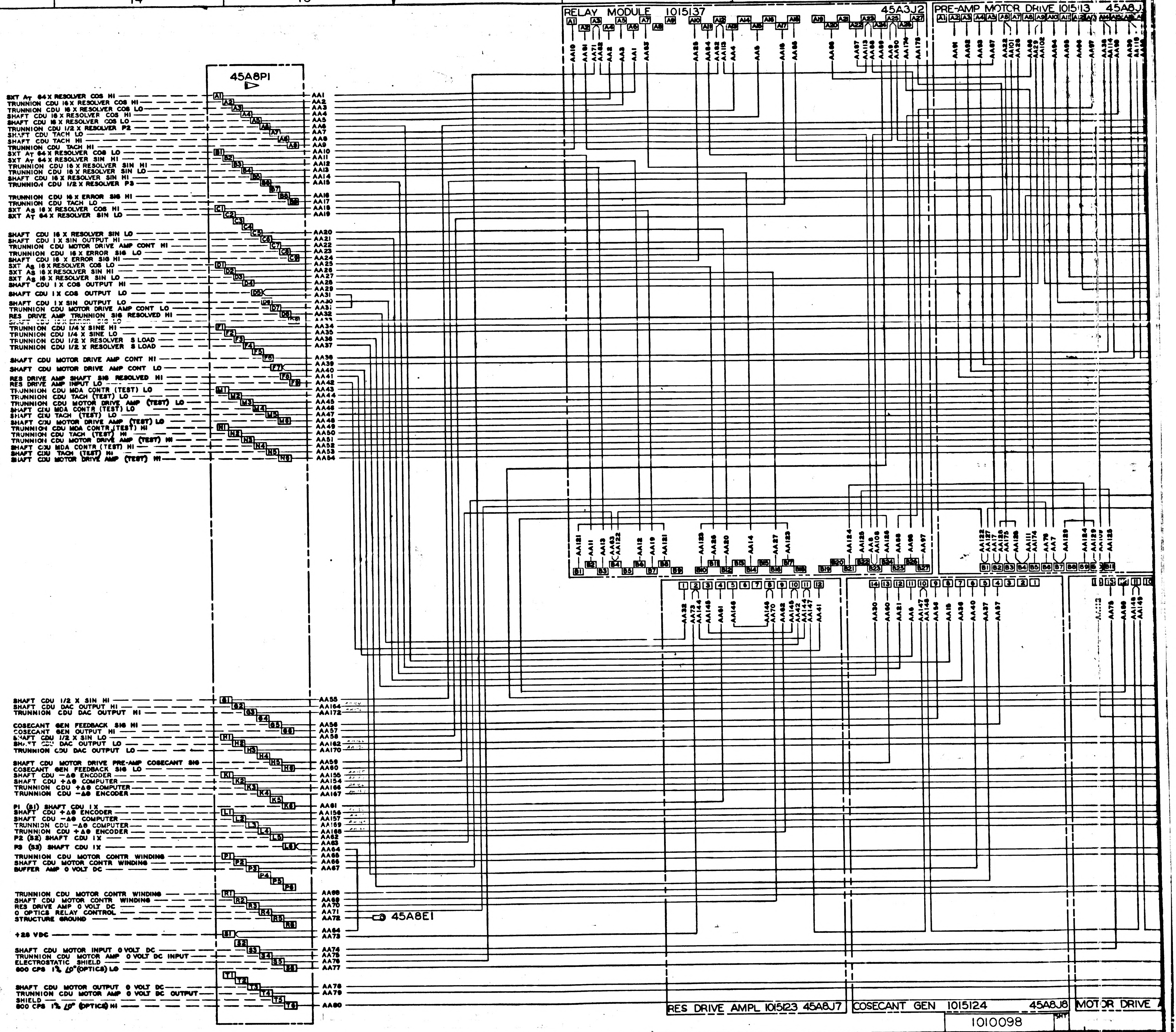
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TRUNNION CDU 16 X RESOLVER COS HI
TRUNNION CDU 16 X RESOLVER COS LO
SHAFT CDU 16 X RESOLVER COS HI
SHAFT CDU 16 X RESOLVER COS LO
TRUNNION CDU 1/2 X RESOLVER P2
SHAFT CDU TACH LO
SHAFT CDU TACH HI
TRUNNION CDU TACH HI
SXT AT 64 X RESOLVER COS LO
SXT AT 64 X RESOLVER SIN HI
TRUNNION CDU 16 X RESOLVER SIN HI
TRUNNION CDU 16 X RESOLVER SIN LO
SHAFT CDU 16 X RESOLVER SIN HI
TRUNNION CDU 1/2 X RESOLVER P3
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU TACH LO
SXT AS 16 X RESOLVER COS HI
SXT AT 64 X RESOLVER SIN LO
SHAFT CDU 16 X RESOLVER SIN LO
SHAFT CDU 1 X SIN OUTPUT HI
TRUNNION CDU MOTOR DRIVE AMP CONT HI
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT AS 16 X RESOLVER COS LO
SXT AS 16 X RESOLVER SIN HI
SXT AS 16 X RESOLVER SIN LO
SHAFT CDU 1 X COS OUTPUT HI
SHAFT CDU 1 X COS OUTPUT LO
SHAFT CDU 1 X SIN OUTPUT LO
TRUNNION CDU MOTOR DRIVE AMP CONT LO
RES DRIVE AMP TRUNNION SIG RESOLVED HI
SHAFT CDU 16 X ERROR SIG LO
TRUNNION CDU 1/4 X SINE HI
TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/2 X RESOLVER S LOAD
TRUNNION CDU 1/2 X RESOLVER S LOAD
SHAFT CDU MOTOR DRIVE AMP CONT HI
SHAFT CDU MOTOR DRIVE AMP CONT LO
RES DRIVE AMP SHAFT SIG RESOLVED HI
RES DRIVE AMP INPUT LO
TRUNNION CDU MDA CONTR (TEST) LO
TRUNNION CDU TACH (TEST) LO
TRUNNION CDU MOTOR DRIVE AMP (TEST) LO
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SHAFT CDU TACH (TEST) LO
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SHAFT CDU DAC OUTPUT HI
TRUNNION CDU DAC OUTPUT HI
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COSECANT GEN FEEDBACK SIG LO
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SHAFT CDU +Δθ COMPUTER
TRUNNION CDU +Δθ COMPUTER
TRUNNION CDU −Δθ ENCODER
P1 (S1) SHAFT CDU 1X
SHAFT CDU +Δθ ENCODER
SHAFT CDU −Δθ COMPUTER
TRUNNION CDU −Δθ COMPUTER
TRUNNION CDU +Δθ ENCODER
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P3 (S3) SHAFT CDU 1X
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SHAFT CDU MOTOR CONTR WINDING
BUFFER AMP 0 VOLT DC
TRUNNION CDU MOTOR CONTR WINDING
SHAFT CDU MOTOR CONTR WINDING
RES DRIVE AMP 0 VOLT DC
0 OPTICS RELAY CONTROL
STRUCTURE GROUND
+28 VDC
SHAFT CDU MOTOR INPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) LO
SHAFT CDU MOTOR OUTPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT
SHIELD
800 CPS 1% ∠0° (OPTICS) HI
45A8E1
RELAY MODULE 1015137
45A3J2
PRE-AMP MOTOR DRIVE 1015113
45A8J
RES DRIVE AMPL 1015123 45A8J7
COSECANT GEN 1015124
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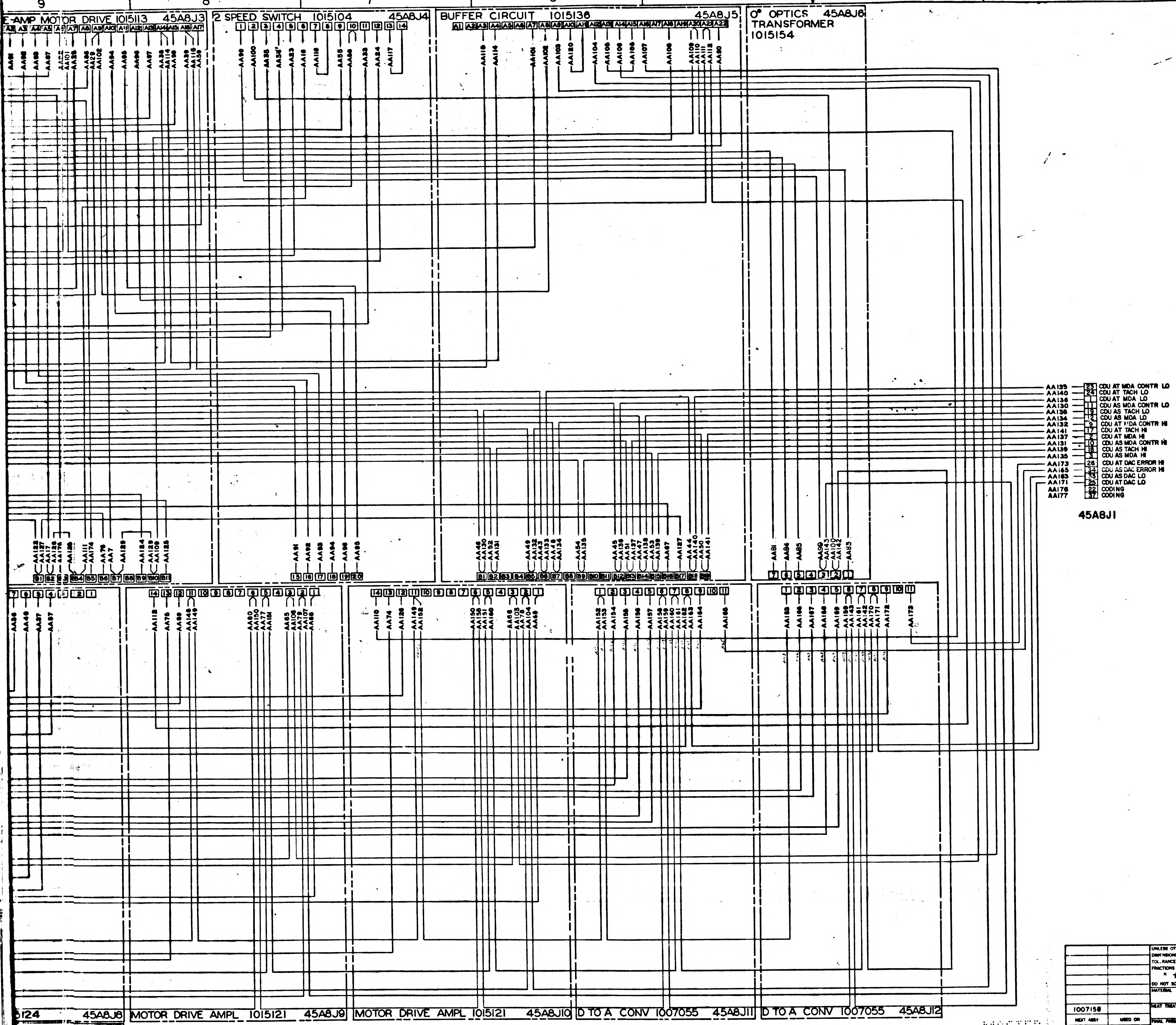
REVISIONS TDRR. 02347 7-31-63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MOTOR DRIVE AMPL 1015121 45A8J9
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AA173 26 CDU AT DAC ERROR HI
AA165 34 CDU AS DAC ERROR HI
AA163 33 CDU AS DAC LO
AA171 25 CDU AT DAC LO
AA176 22 CODING
AA177 37 CODING
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APPLICATION

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NASA APPROVAL
MIT APPROVAL 31 Jul 63

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HOUSTON, TEXAS

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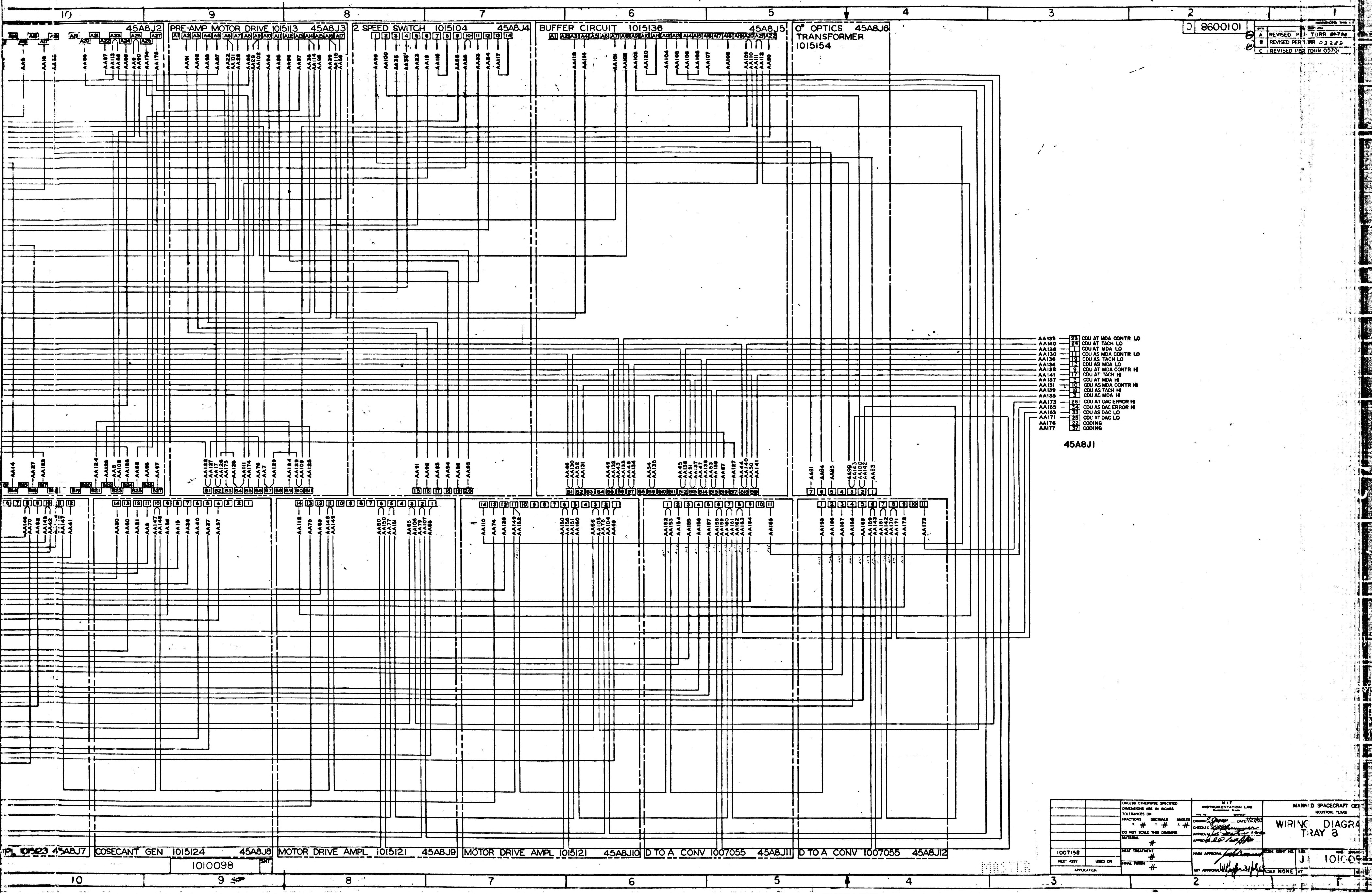
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TRANSFORMER
1015154
PL 1015123 45A8J7
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AA163 33 CDU AS DAC LO
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AA177 37 CODING
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SYM	DESCRIPTION
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B	REVISED PER TDRR 03286
C	REVISED PER TDRR 05701

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NEXT ASSY	USED ON
APPLICATION	

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CAMBRIDGE, MASS
DRAWN E. Jones DATE 7/27/63
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MIT APPROVAL 31

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HOUSTON, TEXAS

WIRING DIAGRA
TRAY 8

CODE IDENT NO. SIZE J 1010098
SCALE NONE WT

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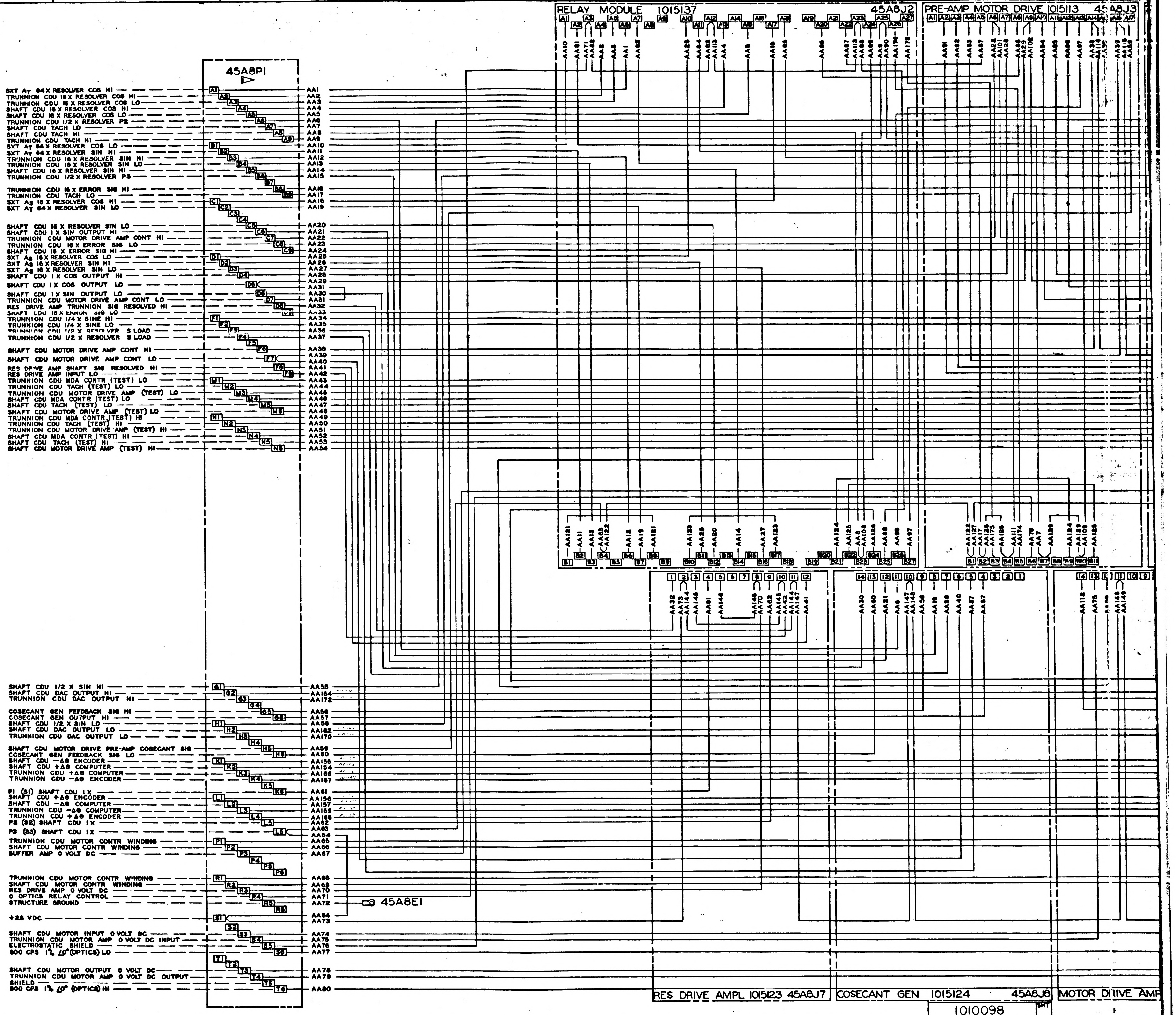
PRESCRIBED BY MIL-D-70327

▷ MATES WITH A15J16


45A8P1
SXT AT 64 X RESOLVER COS HI — A1 — AA1
TRUNNION CDU 16 X RESOLVER COS HI — A2 — AA2
TRUNNION CDU 16 X RESOLVER COS LO — A3 — AA3
SHAFT CDU 16 X RESOLVER COS HI — A4 — AA4
SHAFT CDU 16 X RESOLVER COS LO — A5 — AA5
TRUNNION CDU 1/2 X RESOLVER P2 — A6 — AA6
SHAFT CDU TACH LO — A7 — AA7
SHAFT CDU TACH HI — A8 — AA8
TRUNNION CDU TACH HI — A9 — AA9
SXT AT 64 X RESOLVER COS LO — B1 — AA10
SXT AT 64 X RESOLVER SIN HI — B2 — AA11
TRUNNION CDU 16 X RESOLVER SIN HI — B3 — AA12
TRUNNION CDU 16 X RESOLVER SIN LO — B4 — AA13
SHAFT CDU 16 X RESOLVER SIN HI — B5 — AA14
TRUNNION CDU 1/2 X RESOLVER P3 — B6 — AA15
B7
TRUNNION CDU 16 X ERROR SIG HI — B8 — AA16
TRUNNION CDU TACH LO — B9 — AA17
SXT AS 16 X RESOLVER COS HI — C1 — AA18
SXT AT 64 X RESOLVER SIN LO — C2 — AA19
C3
C4
SHAFT CDU 16 X RESOLVER SIN LO — C5 — AA20
SHAFT CDU 1 X SIN OUTPUT HI — C6 — AA21
TRUNNION CDU MOTOR DRIVE AMP CONT HI — C7 — AA22
TRUNNION CDU 16 X ERROR SIG LO — C8 — AA23
SHAFT CDU 16 X ERROR SIG HI — C9 — AA24
SXT AS 16 X RESOLVER COS LO — D1 — AA25
SXT AS 16 X RESOLVER SIN HI — D2 — AA26
SXT AS 16 X RESOLVER SIN LO — D3 — AA27
SHAFT CDU 1 X COS OUTPUT HI — D4 — AA28
SHAFT CDU 1 X COS OUTPUT LO — D5 — AA29, AA31
SHAFT CDU 1 X SIN OUTPUT LO — D6 — AA30
TRUNNION CDU MOTOR DRIVE AMP CONT LO — D7 — AA31
RES DRIVE AMP TRUNNION SIG RESOLVED HI — D8 — AA32
SHAFT CDU 16 X ERROR SIG LO — D9 — AA33
TRUNNION CDU 1/4 X SINE HI — F1 — AA34
TRUNNION CDU 1/4 X SINE LO — F2 — AA35
TRUNNION CDU 1/2 X RESOLVER S LOAD — F3 — AA36
TRUNNION CDU 1/2 X RESOLVER S LOAD — F4 — AA37
F5
SHAFT CDU MOTOR DRIVE AMP CONT HI — F6 — AA38
SHAFT CDU MOTOR DRIVE AMP CONT LO — F7 — AA39, AA40
RES DRIVE AMP SHAFT SIG RESOLVED HI — F8 — AA41
RES DRIVE AMP INPUT LO — F9 — AA42
TRUNNION CDU MDA CONTR (TEST) LO — M1 — AA43
TRUNNION CDU TACH (TEST) LO — M2 — AA44
TRUNNION CDU MOTOR DRIVE AMP (TEST) LO — M3 — AA45
SHAFT CDU MDA CONTR (TEST) LO — M4 — AA46
SHAFT CDU TACH (TEST) LO — M5 — AA47
SHAFT CDU MOTOR DRIVE AMP (TEST) LO — M6 — AA48
TRUNNION CDU MDA CONTR (TEST) HI — N1 — AA49
TRUNNION CDU TACH (TEST) HI — N2 — AA50
TRUNNION CDU MOTOR DRIVE AMP (TEST) HI — N3 — AA51
SHAFT CDU MDA CONTR (TEST) HI — N4 — AA52
SHAFT CDU TACH (TEST) HI — N5 — AA53
SHAFT CDU MOTOR DRIVE AMP (TEST) HI — N6 — AA54
SHAFT CDU 1/2 X SIN HI — G1 — AA55
SHAFT CDU DAC OUTPUT HI — G2 — AA164
TRUNNION CDU DAC OUTPUT HI — G3 — AA172
G4
COSECANT GEN FEEDBACK SIG HI — G5 — AA56
COSECANT GEN OUTPUT HI — G6 — AA57
SHAFT CDU 1/2 X SIN LO — H1 — AA58
SHAFT CDU DAC OUTPUT LO — H2 — AA162
TRUNNION CDU DAC OUTPUT LO — H3 — AA170
H4
SHAFT CDU MOTOR DRIVE PRE-AMP COSECANT SIG — H5 — AA59
COSECANT GEN FEEDBACK SIG LO — H6 — AA60
SHAFT CDU −Δθ ENCODER — K1 — AA155
SHAFT CDU +Δθ COMPUTER — K2 — AA154
TRUNNION CDU +Δθ COMPUTER — K3 — AA166
TRUNNION CDU −Δθ ENCODER — K4 — AA167
K5
P1 (S1) SHAFT CDU 1 X — K6 — AA61
SHAFT CDU +Δθ ENCODER — L1 — AA156
SHAFT CDU −Δθ COMPUTER — L2 — AA157
TRUNNION CDU −Δθ COMPUTER — L3 — AA169
TRUNNION CDU +Δθ ENCODER — L4 — AA168
P2 (S2) SHAFT CDU 1 X — L5 — AA62
P3 (S3) SHAFT CDU 1 X — L6 — AA63, AA64
TRUNNION CDU MOTOR CONTR WINDING — P1 — AA65
SHAFT CDU MOTOR CONTR WINDING — P2 — AA66
BUFFER AMP 0 VOLT DC — P3 — AA67
P4
P5
P6
TRUNNION CDU MOTOR CONTR WINDING — R1 — AA68
SHAFT CDU MOTOR CONTR WINDING — R2 — AA69
RES DRIVE AMP 0 VOLT DC — R3 — AA70
0 OPTICS RELAY CONTROL — R4 — AA71
STRUCTURE GROUND — R5 — AA72
R6
45A8E1
+28 VDC — S1 — AA64, AA73
S2
SHAFT CDU MOTOR INPUT 0 VOLT DC — S3 — AA74
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT — S4 — AA75
ELECTROSTATIC SHIELD — S5 — AA76
800 CPS 1% ∠0° (OPTICS) LO — S6 — AA77
T1
T2
SHAFT CDU MOTOR OUTPUT 0 VOLT DC — T3 — AA78
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT — T4 — AA79
SHIELD — T5
800 CPS 1% ∠0° (OPTICS) HI — T6 — AA80
RELAY MODULE 1015137 45A8J2
A1 AA10
A2 AA81
A3 AA71 AA82
A4 AA2
A5 AA3
A6 AA1
A7 AA83
A8
A9
A10 AA25
A11 AA84
A12 AA82 AA113
A13 AA4
A14
A15 AA5
A16
A17 AA18
A18 AA85
A19
A20 AA86
A21
A22 AA87
A23 AA113 AA88
A24 AA89
A25 AA9 AA90
A26 AA174
A27 AA175
B1 AA121
B2 AA11
B3 AA13
B4 AA63 AA122
B5 AA12
B6 AA19
B7 AA121
B8
B9
B10 AA123
B11 AA26
B12 AA20
B13
B14 AA14
B15
B16 AA27
B17 AA123
B18
B19
B20 AA124
B21 AA125
B22 AA8 AA106
B23 AA126
B24 AA88
B25 AA96
B26
B27 AA97
PRE-AMP MOTOR DRIVE 1015113 45A8J3
A1 AA91
A2 AA92
A3 AA93
A4
A5 AA87
A6 AA22 AA101
A7 AA28
A8 AA86
A9 AA29 AA102
A10 AA94
A11 AA95
A12 AA96
A13 AA97
A14 AA38 AA114
A16 AA39
A17 AA115 AA50
B1 AA122
B2 AA17
B3 AA128 AA128
B4 AA129
B5 AA111
B6 AA174
B7 AA76
B8 AA7
B9 AA129
B10 AA124
B11 AA130
B12 AA125
RES DRIVE AMPL 1015123 45A8J7
1 AA32
2 AA73
3 AA144 AA145
4 AA61
5 AA146
6
7
8 AA146
9 AA70
10 AA62
11 AA145 AA142 AA144 AA147
12 AA41
COSECANT GEN 1015124 45A8J8
14 AA30
13 AA90
12 AA21
11 AA6
10 AA147 AA143
9 AA56
8 AA15
7 AA36
6 AA40
5 AA37
4 AA57
3
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MOTOR DRIVE AMP
14 AA112
13 AA75
12 AA148
11 AA149
10
9

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SYM	DESCRIPTION	DATE	APPROVAL
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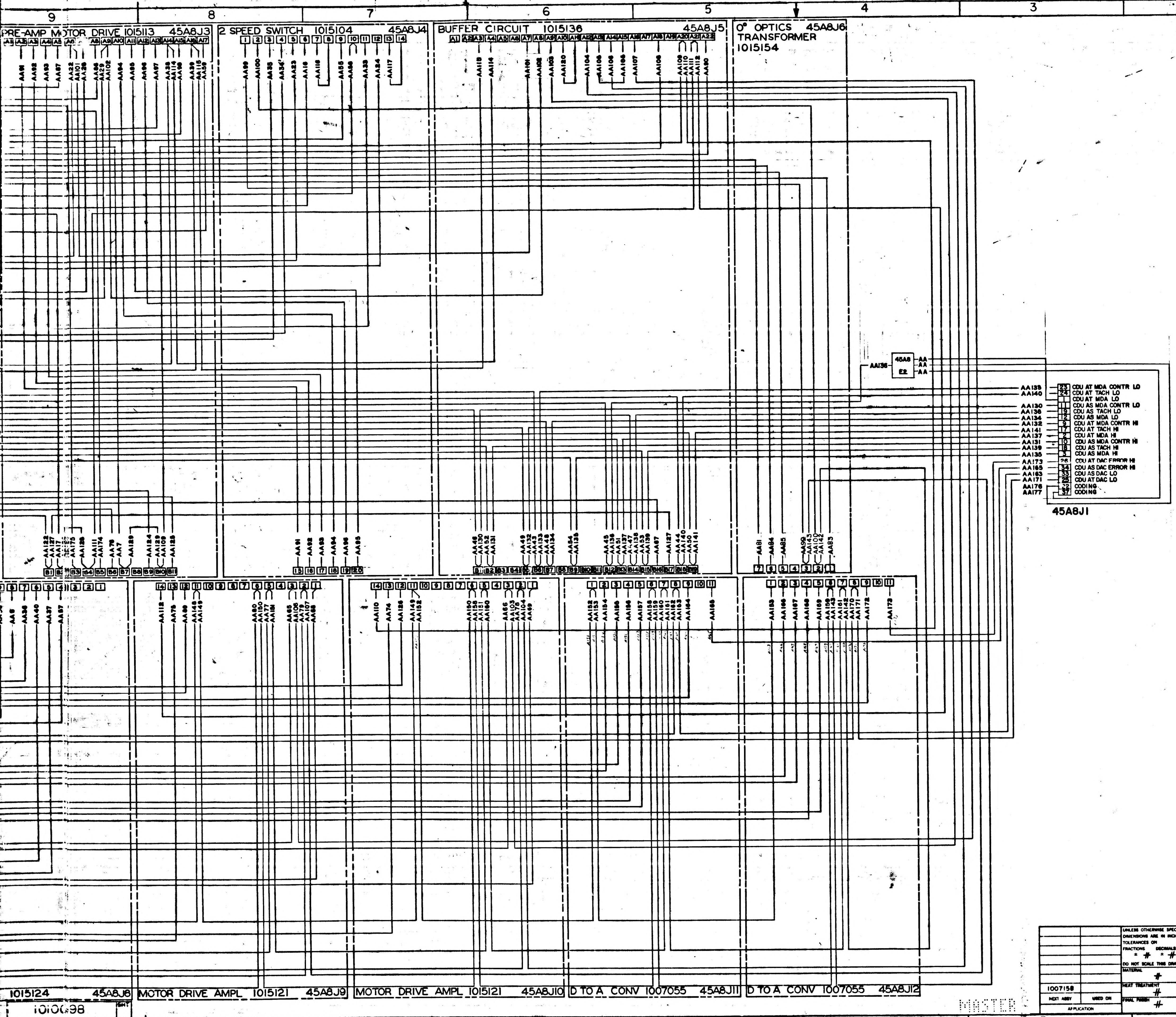
B	REVISED PER TDRR 03288	9-17-63	JJM
C	REVISED PER TDRR 05701		
D	REVISED PER TDRR 05874	16 JAN 64	

REVISIONS TDRR. 02348 7-31-63


PRE-AMP MOTOR DRIVE 1015113 45A8J3
2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS TRANSFORMER 1015154 45A8J6
45A8 E2
AA136
AA133 23 CDU AT MDA CONTR LO
AA140 24 CDU AT TACH LO
1 CDU AT MDA LO
AA130 11 CDU AS MDA CONTR LO
AA138 19 CDU AS TACH LO
AA134 12 CDU AS MDA LO
AA132 9 CDU AT MDA CONTR HI
AA141 17 CDU AT TACH HI
AA137 2 CDU AT MDA HI
AA131 10 CDU AS MDA CONTR HI
AA139 18 CDU AS TACH HI
AA135 3 CDU AS MDA HI
AA173 26 CDU AT DAC ERROR HI
AA165 34 CDU AS DAC ERROR HI
AA163 33 CDU AS DAC LO
AA171 25 CDU AT DAC LO
AA176 22 CODING
AA177 37 CODING
45A8J1
1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12
1010098

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		MATERIAL #	DRAWN E. Jones DATE 7/27/63	WIRING DIAGRAM TRAY 8
1007158		HEAT TREATMENT #	CHECKED	
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APPLICATION			MIT APPROVAL 31 Jul 63	SCALE NONE / WT / SHEET 1 OF

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SYM	DESCRIPTION	DATE	APPROVAL
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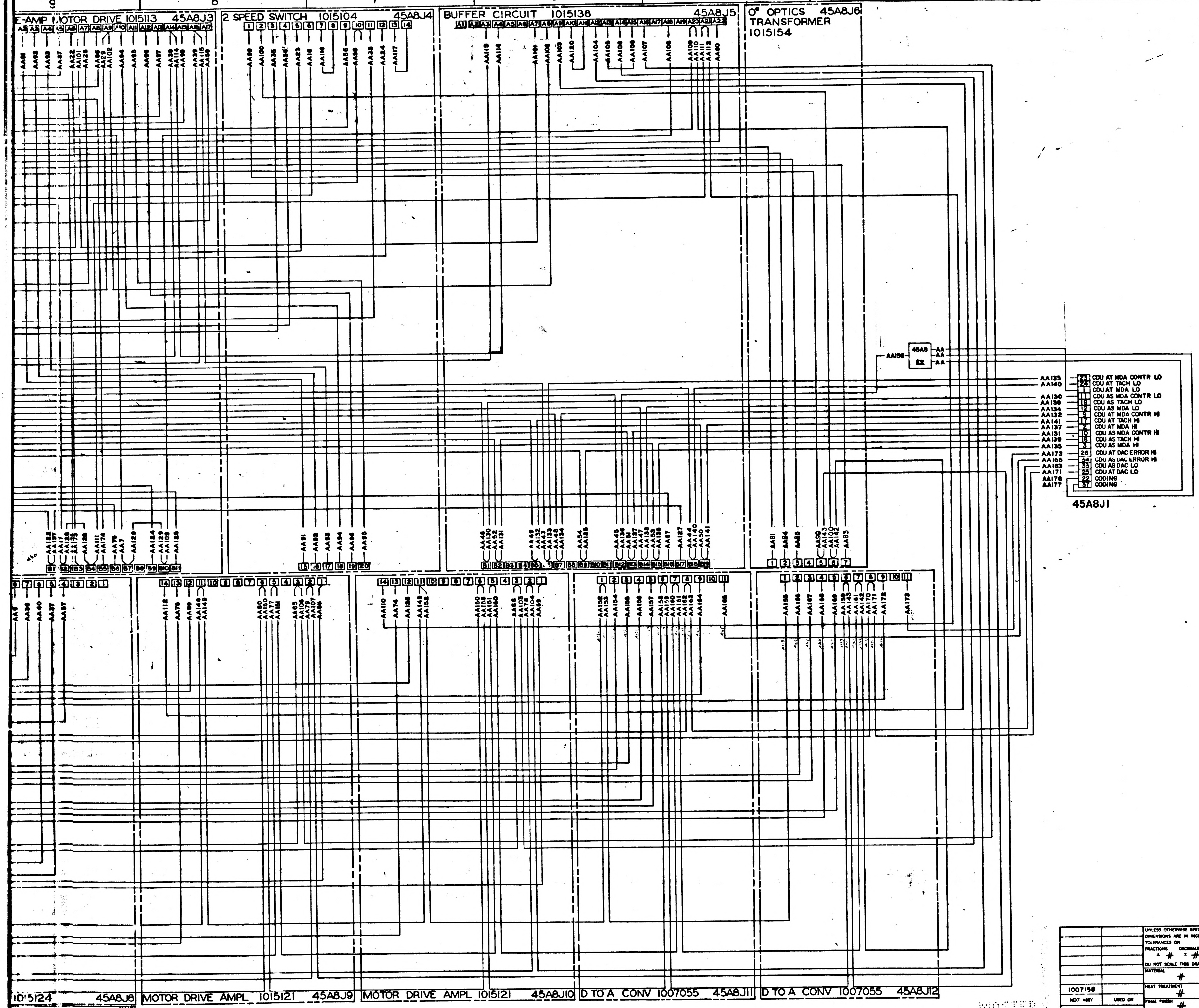
B	REVISED PER TDRR 03288	9-17-63	JJM
C	REVISED PER TDRR 05701	10 JAN 64	
D	REVISED PER TDRR 05874	16 JAN 64	UK
E	REVISED PER TDRR 05906	23 JAN 64	

REVISIONS TDRR. 02348 7-31-63



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2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS TRANSFORMER 1015154 45A8J6
45A8 E2
AA136
AA133 23 CDU AT MDA CONTR LO
AA140 24 CDU AT TACH LO
1 CDU AT MDA LO
AA130 11 CDU AS MDA CONTR LO
AA138 19 CDU AS TACH LO
AA134 12 CDU AS MDA LO
AA132 9 CDU AT MDA CONTR HI
AA141 17 CDU AT TACH HI
AA137 2 CDU AT MDA HI
AA131 10 CDU AS MDA CONTR HI
AA139 18 CDU AS TACH HI
AA135 3 CDU AS MDA HI
AA173 26 CDU AT DAC ERROR HI
AA165 34 CDU AS DAC ERROR HI
AA163 33 CDU AS DAC LO
AA171 25 CDU AT DAC LO
AA176 22 CODING
AA177 37 CODING
45A8J1
1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM TRAY 8

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DIMENSIONS ARE IN INCHES
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FRACTIONS ± # DECIMALS ± # ANGLES ± #
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DRAWN E. Gray DATE 7/27/63
CHECKED
APPROVAL 9-3-63
APPROVAL
NASA APPROVAL
MIT APPROVAL 31 July 63

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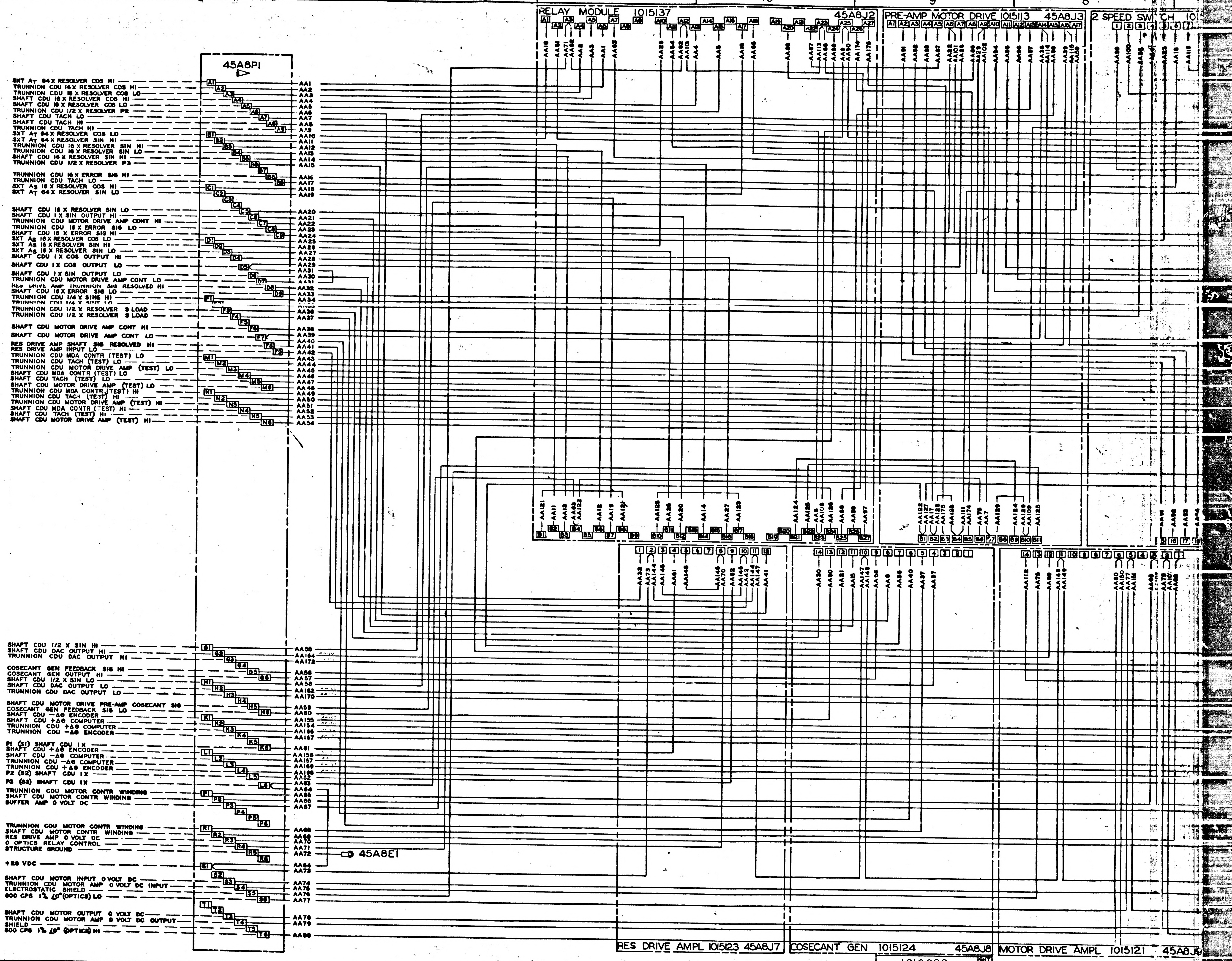
APPLICATION

CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010098
SCALE NONE WT SHEET 1 OF

1010098 E

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷ MATES WITH A1SJ16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TRUNNION CDU 16 X RESOLVER COS HI
TRUNNION CDU 16 X RESOLVER COS LO
SHAFT CDU 16 X RESOLVER COS HI
SHAFT CDU 16 X RESOLVER COS LO
TRUNNION CDU 1/2 X RESOLVER P2
SHAFT CDU TACH LO
SHAFT CDU TACH HI
TRUNNION CDU TACH HI
SXT AT 64 X RESOLVER COS LO
SXT AT 64 X RESOLVER SIN HI
TRUNNION CDU 16 X RESOLVER SIN HI
TRUNNION CDU 16 X RESOLVER SIN LO
SHAFT CDU 16 X RESOLVER SIN HI
TRUNNION CDU 1/2 X RESOLVER P3
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU TACH LO
SXT AS 16 X RESOLVER COS HI
SXT AT 64 X RESOLVER SIN LO
SHAFT CDU 16 X RESOLVER SIN LO
SHAFT CDU 1 X SIN OUTPUT HI
TRUNNION CDU MOTOR DRIVE AMP CONT HI
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT AS 16 X RESOLVER COS LO
SXT AS 16 X RESOLVER SIN HI
SXT AS 16 X RESOLVER SIN LO
SHAFT CDU 1 X COS OUTPUT HI
SHAFT CDU 1 X COS OUTPUT LO
SHAFT CDU 1 X SIN OUTPUT LO
TRUNNION CDU MOTOR DRIVE AMP CONT LO
RES DRIVE AMP TRUNNION SIG RESOLVED HI
SHAFT CDU 16 X ERROR SIG LO
TRUNNION CDU 1/4 X SINE HI
TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/2 X RESOLVER S LOAD
TRUNNION CDU 1/2 X RESOLVER S LOAD
SHAFT CDU MOTOR DRIVE AMP CONT HI
SHAFT CDU MOTOR DRIVE AMP CONT LO
RES DRIVE AMP SHAFT SIG RESOLVED HI
RES DRIVE AMP INPUT LO
TRUNNION CDU MDA CONTR (TEST) LO
TRUNNION CDU TACH (TEST) LO
TRUNNION CDU MOTOR DRIVE AMP (TEST) LO
SHAFT CDU MDA CONTR (TEST) LO
SHAFT CDU TACH (TEST) LO
SHAFT CDU MOTOR DRIVE AMP (TEST) LO
TRUNNION CDU MDA CONTR (TEST) HI
TRUNNION CDU TACH (TEST) HI
TRUNNION CDU MOTOR DRIVE AMP (TEST) HI
SHAFT CDU MDA CONTR (TEST) HI
SHAFT CDU TACH (TEST) HI
SHAFT CDU MOTOR DRIVE AMP (TEST) HI
SHAFT CDU 1/2 X SIN HI
SHAFT CDU DAC OUTPUT HI
TRUNNION CDU DAC OUTPUT HI
COSECANT GEN FEEDBACK SIG HI
COSECANT GEN OUTPUT HI
SHAFT CDU 1/2 X SIN LO
SHAFT CDU DAC OUTPUT LO
TRUNNION CDU DAC OUTPUT LO
SHAFT CDU MOTOR DRIVE PRE-AMP COSECANT SIG
COSECANT GEN FEEDBACK SIG LO
SHAFT CDU −Δθ ENCODER
SHAFT CDU +Δθ COMPUTER
TRUNNION CDU +Δθ COMPUTER
TRUNNION CDU −Δθ ENCODER
P1 (S1) SHAFT CDU 1X
SHAFT CDU +Δθ ENCODER
SHAFT CDU −Δθ COMPUTER
TRUNNION CDU −Δθ COMPUTER
TRUNNION CDU +Δθ ENCODER
P2 (S2) SHAFT CDU 1X
P3 (S3) SHAFT CDU 1X
TRUNNION CDU MOTOR CONTR WINDING
SHAFT CDU MOTOR CONTR WINDING
BUFFER AMP 0 VOLT DC
TRUNNION CDU MOTOR CONTR WINDING
SHAFT CDU MOTOR CONTR WINDING
RES DRIVE AMP 0 VOLT DC
0 OPTICS RELAY CONTROL
STRUCTURE GROUND
+28 VDC
SHAFT CDU MOTOR INPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) LO
SHAFT CDU MOTOR OUTPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT
SHIELD
800 CPS 1% ∠0° (OPTICS) HI
45A8E1
RELAY MODULE 1015137 45A8J2
PRE-AMP MOTOR DRIVE 1015113 45A8J3
2 SPEED SWITCH
RES DRIVE AMPL 1015123 45A8J7
COSECANT GEN 1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J

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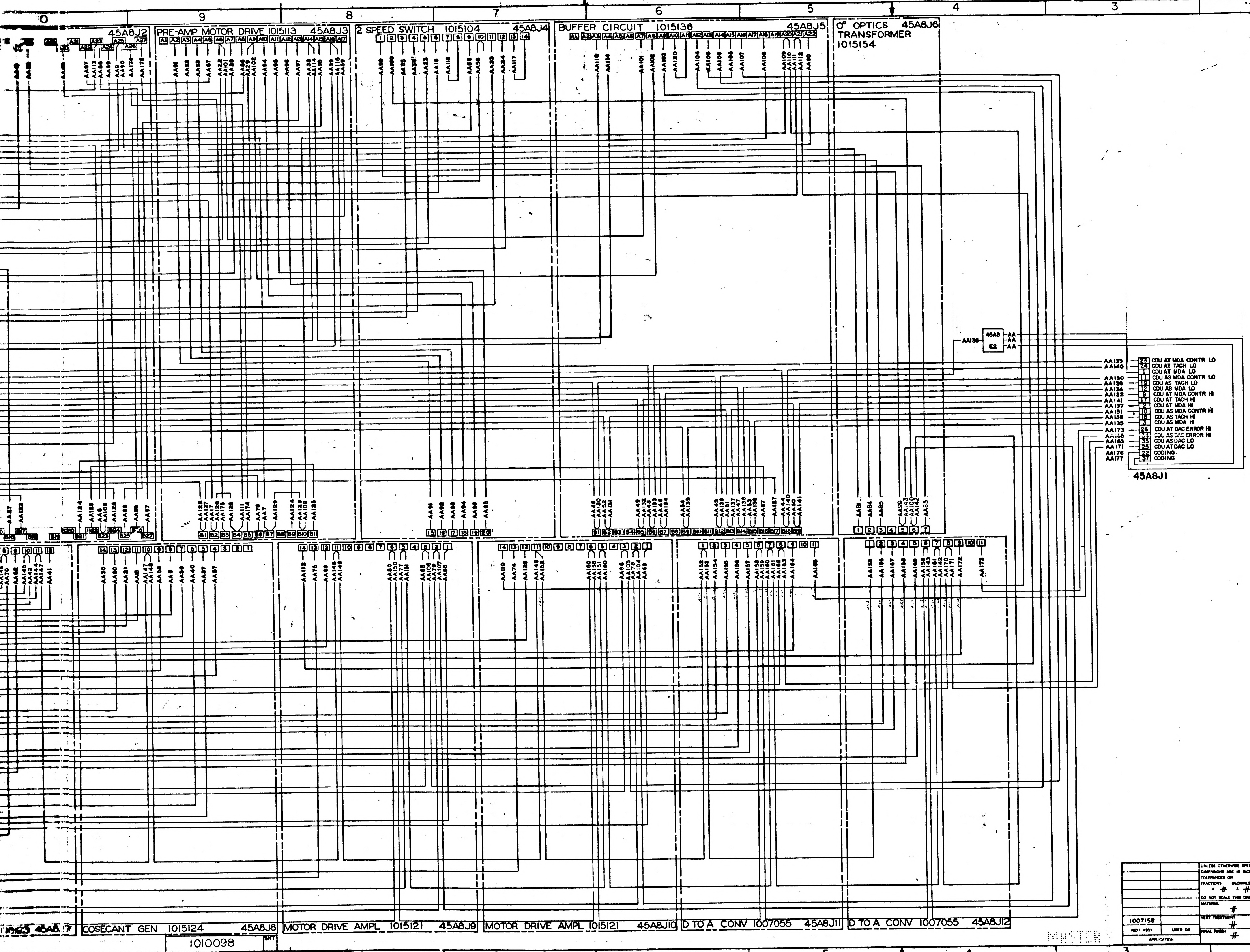
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45A8J2
PRE-AMP MOTOR DRIVE 1015113 45A8J3
2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS 45A8J6
TRANSFORMER
1015154
AA136
45A8
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23 CDU AT MDA CONTR LO
24 CDU AT TACH LO
1 CDU AT MDA LO
11 CDU AS MDA CONTR LO
19 CDU AS TACH LO
12 CDU AS MDA LO
9 CDU AT MDA CONTR HI
17 CDU AT TACH HI
2 CDU AT MDA HI
10 CDU AS MDA CONTR HI
18 CDU AS TACH HI
3 CDU AS MDA HI
26 CDU AT DAC ERROR HI
34 CDU AS DAC ERROR HI
33 CDU AS DAC LO
25 CDU AT DAC LO
22 CODING
37 CODING
45A8J1
45A8J7
COSECANT GEN 1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12

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REVISIONS

SYM	DESCRIPTION		DATE	
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B	REVISED PER TDRR 032		[illegible]	
C	REVISED PER TDRR 057			
D	REVISED PER TDRR 05 74			
E	REVISED PER TDRR 05 86			

MASTER

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DIMENSIONS ARE IN INCHES
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MIT
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DRAWN E. Gross DATE 7/27/63
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 31 Jul 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 8

CODE IDENT NO.
SIZE J
NASA DRAWING NO 1010098
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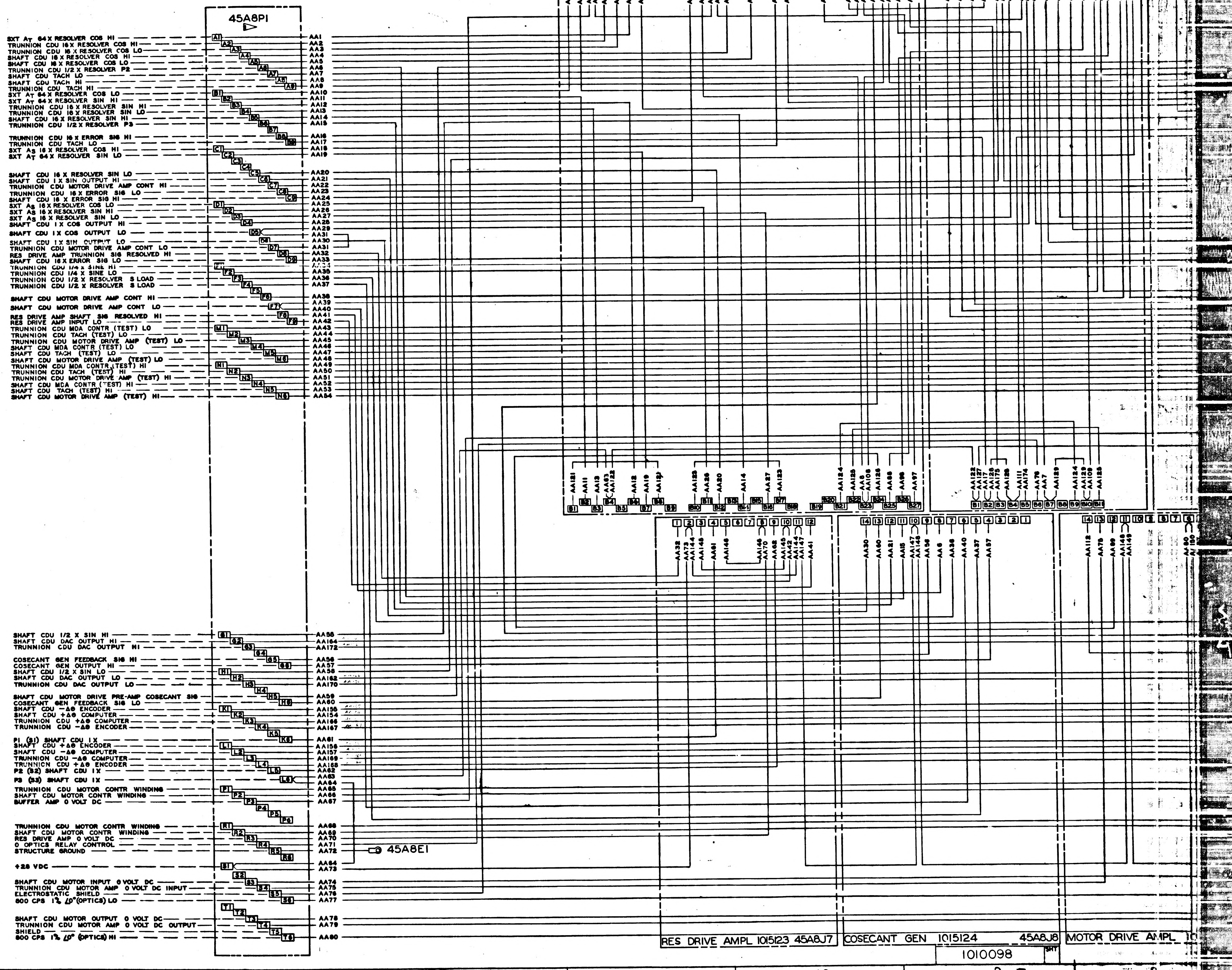
▷ MATES WITH A15J16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SHAFT CDU 16 X RESOLVER COS LO — A5 — AA5
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SXT AT 64 X RESOLVER SIN HI — B2 — AA11
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F5
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SHAFT CDU MOTOR DRIVE AMP CONT LO — F7 — AA39, AA40
RES DRIVE AMP SHAFT SIG RESOLVED HI — F8 — AA41
RES DRIVE AMP INPUT LO — F9 — AA42
TRUNNION CDU MDA CONTR (TEST) LO — M1 — AA43
TRUNNION CDU TACH (TEST) LO — M2 — AA44
TRUNNION CDU MOTOR DRIVE AMP (TEST) LO — M3 — AA45
SHAFT CDU MDA CONTR (TEST) LO — M4 — AA46
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COSECANT GEN OUTPUT HI — G6 — AA57
SHAFT CDU 1/2 X SIN LO — H1 — AA58
SHAFT CDU DAC OUTPUT LO — H2 — AA162
TRUNNION CDU DAC OUTPUT LO — H3 — AA170
H4
SHAFT CDU MOTOR DRIVE PRE-AMP COSECANT SIG — H5 — AA59
COSECANT GEN FEEDBACK SIG LO — H6 — AA60
SHAFT CDU −Δθ ENCODER — K1 — AA155
SHAFT CDU +Δθ COMPUTER — K2 — AA154
TRUNNION CDU +Δθ COMPUTER — K3 — AA166
TRUNNION CDU −Δθ ENCODER — K4 — AA167
K5
P1 (S1) SHAFT CDU 1X — K6 — AA61
SHAFT CDU +Δθ ENCODER — L1 — AA156
SHAFT CDU −Δθ COMPUTER — L2 — AA157
TRUNNION CDU −Δθ COMPUTER — L3 — AA169
TRUNNION CDU +Δθ ENCODER — L4 — AA168
P2 (S2) SHAFT CDU 1X — L5 — AA62
P3 (S3) SHAFT CDU 1X — L6 — AA63, AA64
TRUNNION CDU MOTOR CONTR WINDING — P1 — AA65
SHAFT CDU MOTOR CONTR WINDING — P2 — AA66
BUFFER AMP 0 VOLT DC — P3 — AA67
P4
P5
P6
TRUNNION CDU MOTOR CONTR WINDING — R1 — AA68
SHAFT CDU MOTOR CONTR WINDING — R2 — AA69
RES DRIVE AMP 0 VOLT DC — R3 — AA70
0 OPTICS RELAY CONTROL — R4 — AA71
STRUCTURE GROUND — R5 — AA72
R6
45A8E1
+28 VDC — S1 — AA64, AA73
S2
SHAFT CDU MOTOR INPUT 0 VOLT DC — S3 — AA74
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT — S4 — AA75
ELECTROSTATIC SHIELD — S5 — AA76
800 CPS 1% ∠0° (OPTICS) LO — S6 — AA77
T1
T2
SHAFT CDU MOTOR OUTPUT 0 VOLT DC — T3 — AA78
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT — T4 — AA79
SHIELD — T5
800 CPS 1% ∠0° (OPTICS) HI — T6 — AA80
RELAY MODULE 1015137 45A8J2
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25 A26 A27
AA10 AA61 AA71 AA62 AA2 AA3 AA1 AA63 AA28 AA64 AA82 AA113 AA4 AA5 AA15 AA85 AA86 AA67 AA113 AA88 AA89 AA9 AA90 AA174 AA175
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B19 B20 B21 B22 B23 B24 B25 B26 B27
PRE-AMP MOTOR DRIVE 1015113 45A8J3
A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17
AA91 AA92 AA93 AA87 AA22 AA101 AA23 AA96 AA29 AA102 AA94 AA95 AA96 AA97 AA38 AA114 AA98 AA39 AA115 AA59
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11
SPEED
RES DRIVE AMPL 1015123 45A8J7
1 2 3 4 5 6 7 8 9 10 11 12
COSECANT GEN 1015124 45A8J8
14 13 12 11 10 9 8 7 6 5 4 3 2 1
MOTOR DRIVE AMPL
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
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REVISIONS TDRR. 02348 7-31-63

SYM	DESCRIPTION	DATE	APPROVAL
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B	REVISED PER TDRR 03288	9-19-63	[illegible] WK
C	REVISED PER TDRR 05701	[illegible] 64	[illegible]
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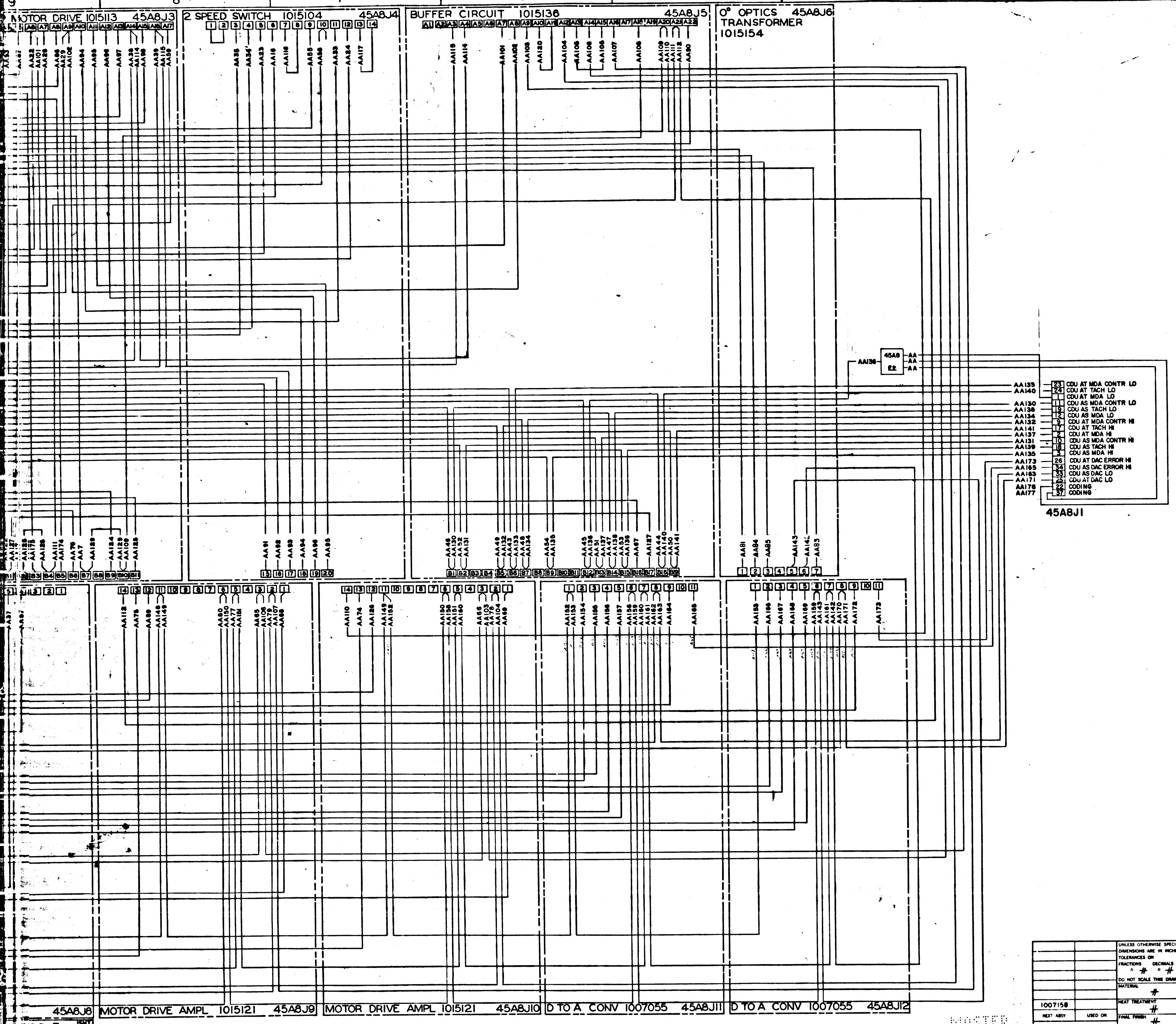
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2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS TRANSFORMER 1015154 45A8J6
45A8 E2
AA136
AA135 23 CDU AT MDA CONTR LO
AA140 24 CDU AT TACH LO
1 CDU AT MDA LO
AA130 11 CDU AS MDA CONTR LO
AA138 19 CDU AS TACH LO
AA134 12 CDU AS MDA LO
AA132 9 CDU AT MDA CONTR HI
AA141 17 CDU AT TACH HI
AA137 2 CDU AT MDA HI
AA131 10 CDU AS MDA CONTR HI
AA139 18 CDU AS TACH HI
AA135 3 CDU AS MDA HI
AA173 26 CDU AT DAC ERROR HI
AA165 34 CDU AS DAC ERROR HI
AA163 33 CDU AS DAC LO
AA171 25 CDU AT DAC LO
AA176 22 CODING
AA177 37 CODING
45A8J1
45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
D TO A CONV 1007055 45A8J12

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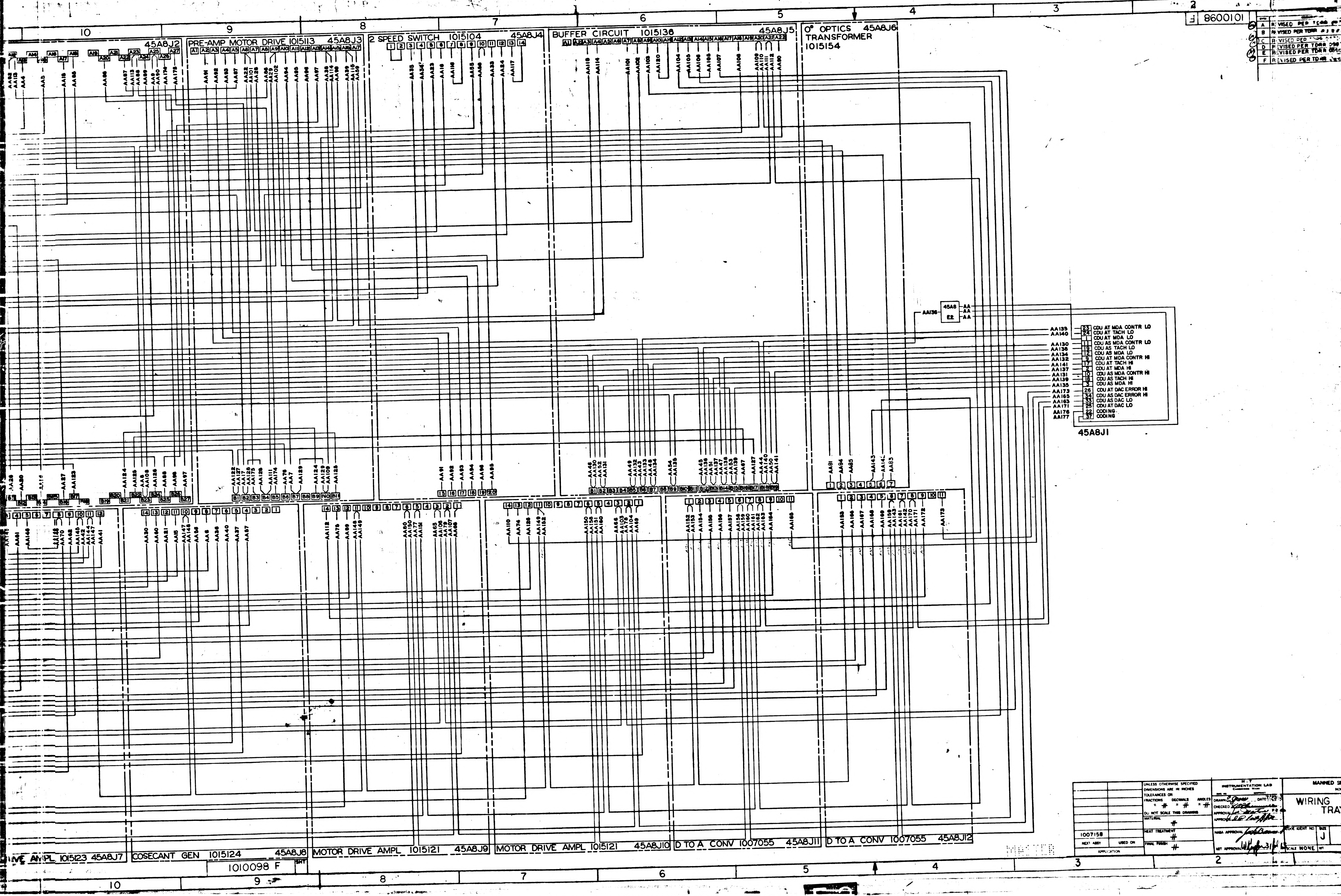

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PRE-AMP MOTOR DRIVE 1015113 45A8J3
2 SPEED SWITCH 1015104 45A8J4
BUFFER CIRCUIT 1015136 45A8J5
0° OPTICS TRANSFORMER 1015154 45A8J6
45A8 E2
AA136
AA133 23 CDU AT MDA CONTR LO
AA140 24 CDU AT TACH LO
1 CDU AT MDA LO
AA130 11 CDU AS MDA CONTR LO
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AA173 26 CDU AT DAC ERROR HI
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AA176 22 CODING
AA177 37 CODING
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DRIVE AMPL 1015123 45A8J7
COSECANT GEN 1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
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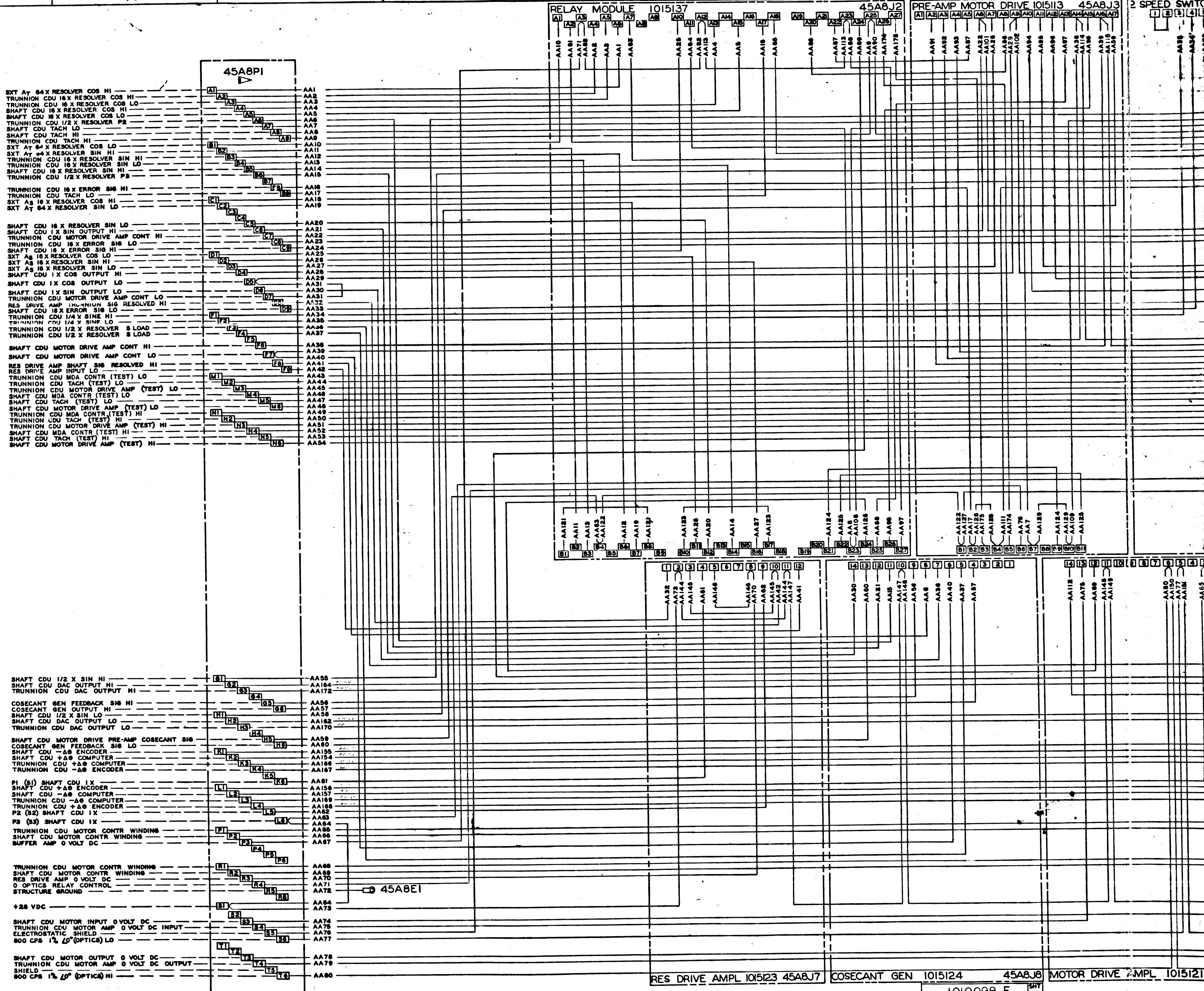
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TRUNNION CDU 16 X RESOLVER COS HI
TRUNNION CDU 16 X RESOLVER COS LO
SHAFT CDU 16 X RESOLVER COS HI
SHAFT CDU 16 X RESOLVER COS LO
TRUNNION CDU 1/2 X RESOLVER P2
SHAFT CDU TACH LO
SHAFT CDU TACH HI
TRUNNION CDU TACH HI
SXT AT 64 X RESOLVER COS LO
SXT AT 64 X RESOLVER SIN HI
TRUNNION CDU 16 X RESOLVER SIN HI
TRUNNION CDU 16 X RESOLVER SIN LO
SHAFT CDU 16 X RESOLVER SIN HI
TRUNNION CDU 1/2 X RESOLVER P3
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU TACH LO
SXT AS 16 X RESOLVER COS HI
SXT AT 64 X RESOLVER SIN LO
SHAFT CDU 16 X RESOLVER SIN LO
SHAFT CDU 1 X SIN OUTPUT HI
TRUNNION CDU MOTOR DRIVE AMP CONT HI
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT AS 16 X RESOLVER COS LO
SXT AS 16 X RESOLVER SIN HI
SXT AS 16 X RESOLVER SIN LO
SHAFT CDU 1 X COS OUTPUT HI
SHAFT CDU 1 X COS OUTPUT LO
SHAFT CDU 1 X SIN OUTPUT LO
TRUNNION CDU MOTOR DRIVE AMP CONT LO
RES DRIVE AMP TRUNNION SIG RESOLVED HI
SHAFT CDU 16 X ERROR SIG LO
TRUNNION CDU 1/4 X SINE HI
TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/2 X RESOLVER S LOAD
TRUNNION CDU 1/2 X RESOLVER S LOAD
SHAFT CDU MOTOR DRIVE AMP CONT HI
SHAFT CDU MOTOR DRIVE AMP CONT LO
RES DRIVE AMP SHAFT SIG RESOLVED HI
RES DRIVE AMP INPUT LO
TRUNNION CDU MDA CONTR (TEST) LO
TRUNNION CDU TACH (TEST) LO
TRUNNION CDU MOTOR DRIVE AMP (TEST) LO
SHAFT CDU MDA CONTR (TEST) LO
SHAFT CDU TACH (TEST) LO
SHAFT CDU MOTOR DRIVE AMP (TEST) LO
TRUNNION CDU MDA CONTR (TEST) HI
TRUNNION CDU TACH (TEST) HI
TRUNNION CDU MOTOR DRIVE AMP (TEST) HI
SHAFT CDU MDA CONTR (TEST) HI
SHAFT CDU TACH (TEST) HI
SHAFT CDU MOTOR DRIVE AMP (TEST) HI
SHAFT CDU 1/2 X SIN HI
SHAFT CDU DAC OUTPUT HI
TRUNNION CDU DAC OUTPUT HI
COSECANT GEN FEEDBACK SIG HI
COSECANT GEN OUTPUT HI
SHAFT CDU 1/2 X SIN LO
SHAFT CDU DAC OUTPUT LO
TRUNNION CDU DAC OUTPUT LO
SHAFT CDU MOTOR DRIVE PRE-AMP COSECANT SIG
COSECANT GEN FEEDBACK SIG LO
SHAFT CDU −Δθ ENCODER
SHAFT CDU +Δθ COMPUTER
TRUNNION CDU +Δθ COMPUTER
TRUNNION CDU −Δθ ENCODER
P1 (S1) SHAFT CDU 1 X
SHAFT CDU +Δθ ENCODER
SHAFT CDU −Δθ COMPUTER
TRUNNION CDU −Δθ COMPUTER
TRUNNION CDU +Δθ ENCODER
P2 (S2) SHAFT CDU 1 X
P3 (S3) SHAFT CDU 1 X
TRUNNION CDU MOTOR CONTR WINDING
SHAFT CDU MOTOR CONTR WINDING
BUFFER AMP 0 VOLT DC
TRUNNION CDU MOTOR CONTR WINDING
SHAFT CDU MOTOR CONTR WINDING
RES DRIVE AMP 0 VOLT DC
0 OPTICS RELAY CONTROL
STRUCTURE GROUND
+28 VDC
SHAFT CDU MOTOR INPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) LO
SHAFT CDU MOTOR OUTPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT
SHIELD
800 CPS 1% ∠0° (OPTICS) HI
45A8E1
RELAY MODULE 1015137
45A8J2
PRE-AMP MOTOR DRIVE 1015113 45A8J3
2 SPEED SWITC
RES DRIVE AMPL 1015123 45A8J7
COSECANT GEN 1015124
45A8J8
MOTOR DRIVE AMPL 1015121

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REVISIONS TDRR 02348 7-31-63			
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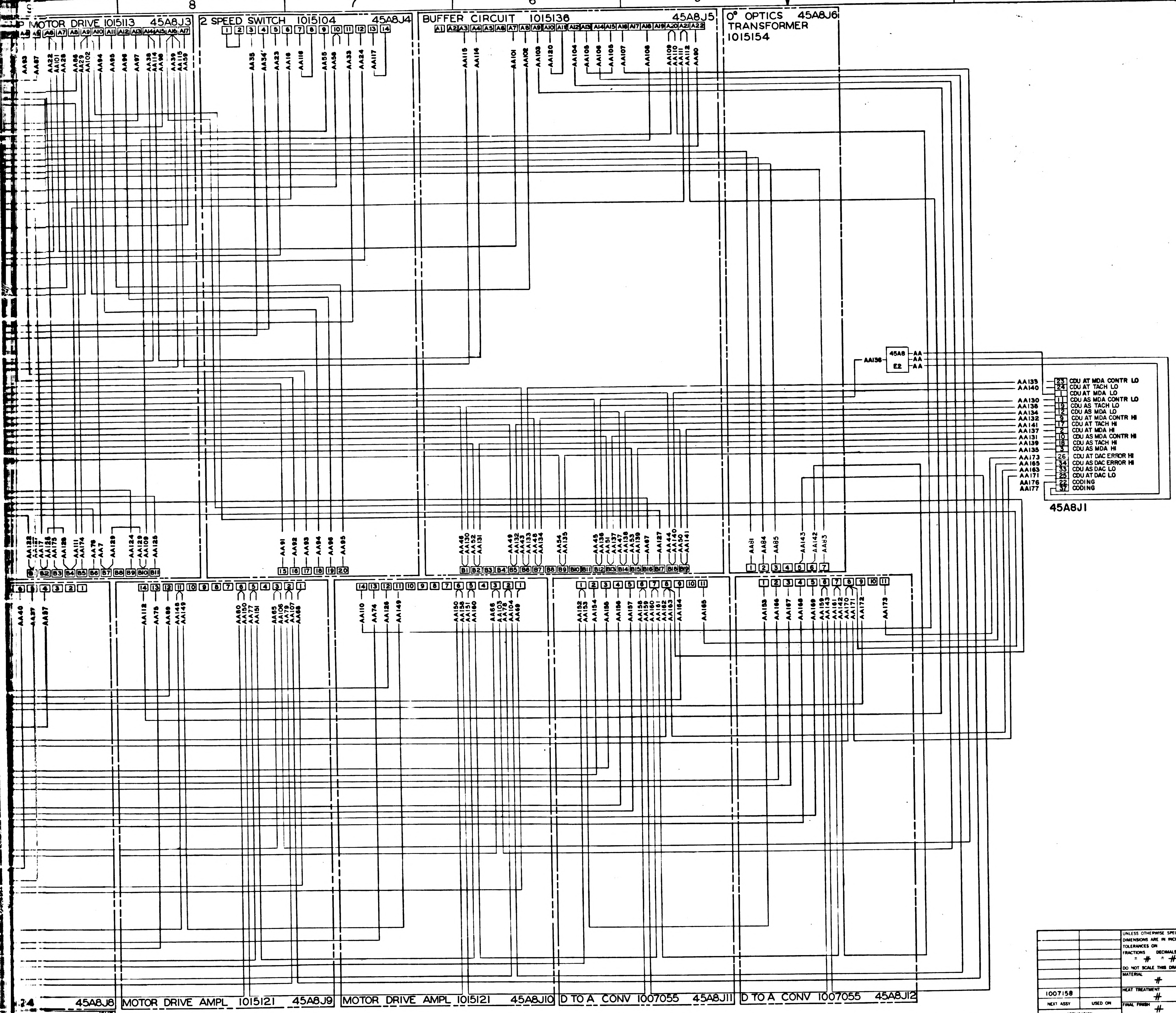
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45A8 E2
AA136
AA133 23 CDU AT MDA CONTR LO
AA140 24 CDU AT TACH LO
1 CDU AT MDA LO
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AA173 26 CDU AT DAC ERROR HI
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AA176 22 CODING
AA177 37 CODING
45A8J1
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MOTOR DRIVE AMPL 1015121 45A8J9
MOTOR DRIVE AMPL 1015121 45A8J10
D TO A CONV 1007055 45A8J11
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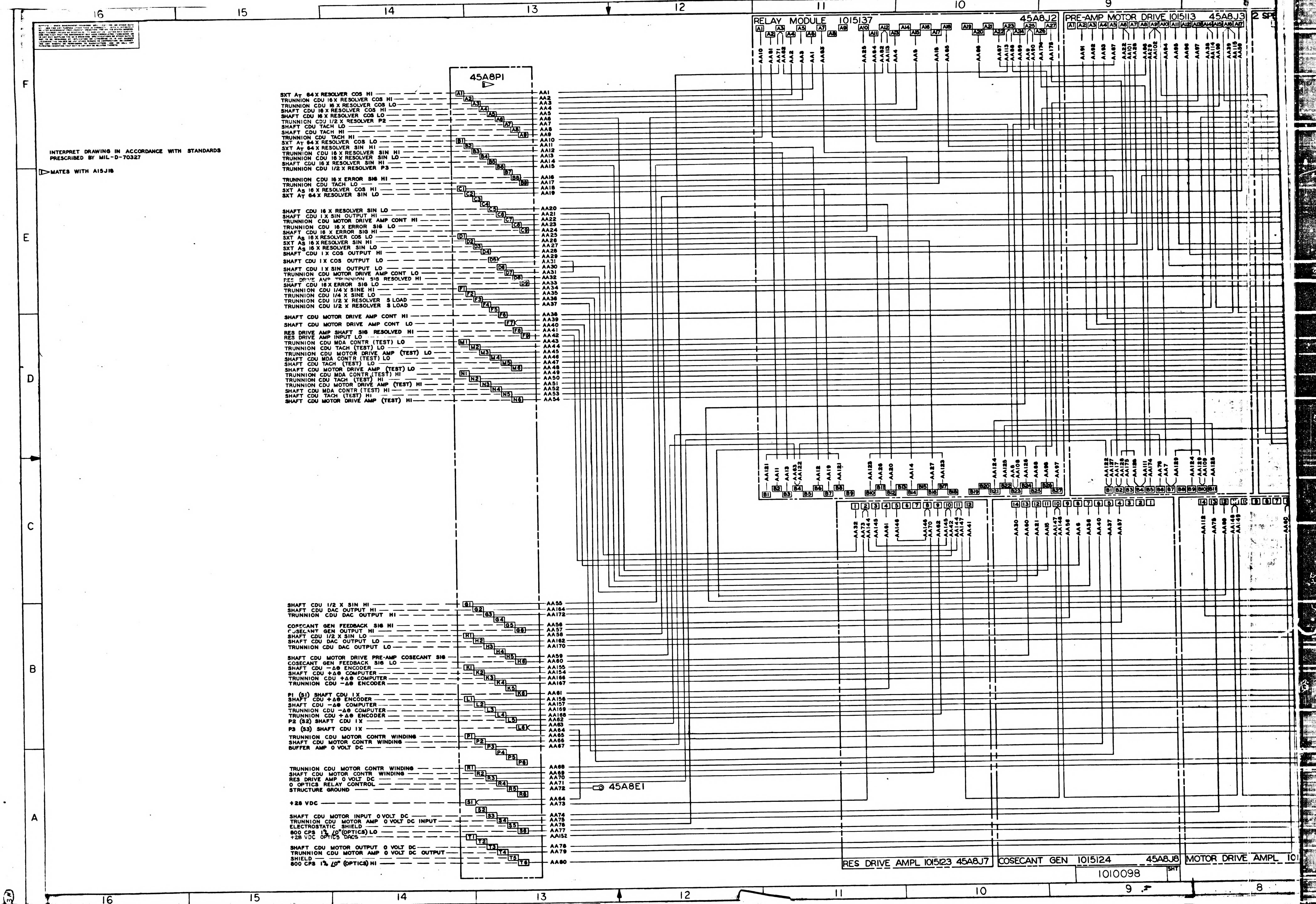
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SXT AT 64 X RESOLVER SIN HI
TRUNNION CDU 16 X RESOLVER SIN HI
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SHAFT CDU 16 X RESOLVER SIN HI
TRUNNION CDU 1/2 X RESOLVER P3
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU TACH LO
SXT AS 16 X RESOLVER COS HI
SXT AT 64 X RESOLVER SIN LO
SHAFT CDU 16 X RESOLVER SIN LO
SHAFT CDU 1 X SIN OUTPUT HI
TRUNNION CDU MOTOR DRIVE AMP CONT HI
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT AS 16 X RESOLVER COS LO
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SXT AS 16 X RESOLVER SIN LO
SHAFT CDU 1 X COS OUTPUT HI
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SHAFT CDU 1 X SIN OUTPUT LO
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TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/2 X RESOLVER S LOAD
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TRUNNION CDU DAC OUTPUT HI
COSECANT GEN FEEDBACK SIG HI
COSECANT GEN OUTPUT HI
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SHAFT CDU DAC OUTPUT LO
TRUNNION CDU DAC OUTPUT LO
SHAFT CDU MOTOR DRIVE PRE-AMP COSECANT SIG
COSECANT GEN FEEDBACK SIG LO
SHAFT CDU −Δθ ENCODER
SHAFT CDU +Δθ COMPUTER
TRUNNION CDU +Δθ COMPUTER
TRUNNION CDU −Δθ ENCODER
P1 (S1) SHAFT CDU 1X
SHAFT CDU +Δθ ENCODER
SHAFT CDU −Δθ COMPUTER
TRUNNION CDU −Δθ COMPUTER
TRUNNION CDU +Δθ ENCODER
P2 (S2) SHAFT CDU 1X
P3 (S3) SHAFT CDU 1X
TRUNNION CDU MOTOR CONTR WINDING
SHAFT CDU MOTOR CONTR WINDING
BUFFER AMP 0 VOLT DC
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SHAFT CDU MOTOR CONTR WINDING
RES DRIVE AMP 0 VOLT DC
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STRUCTURE GROUND
+28 VDC
SHAFT CDU MOTOR INPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) LO
+28 VDC OPTICS DACS
SHAFT CDU MOTOR OUTPUT 0 VOLT DC
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT
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RES DRIVE AMPL 1015123 45A8J7
COSECANT GEN 1015124 45A8J8
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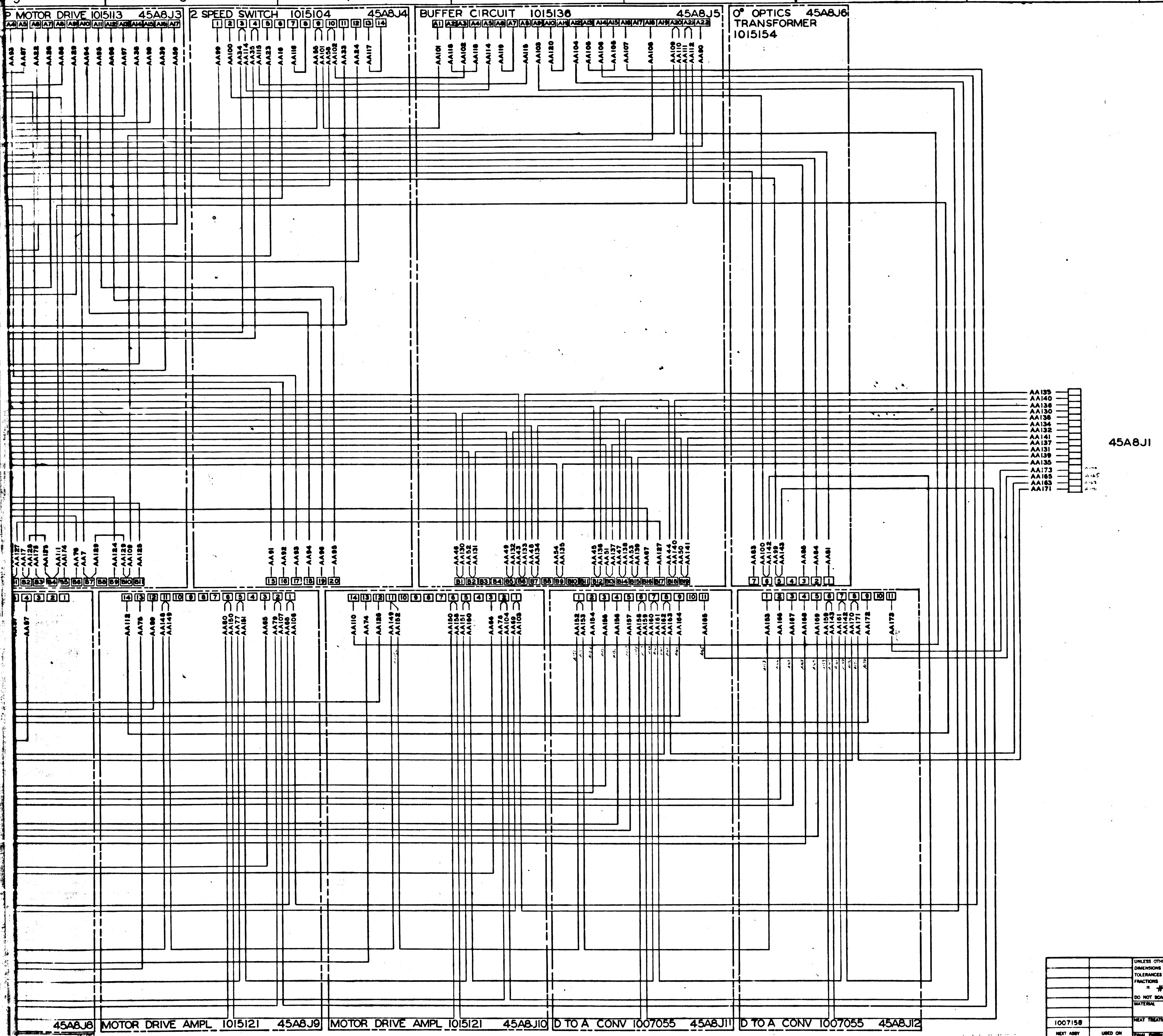

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45A8J1
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45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
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D TO A CONV 1007055 45A8J11
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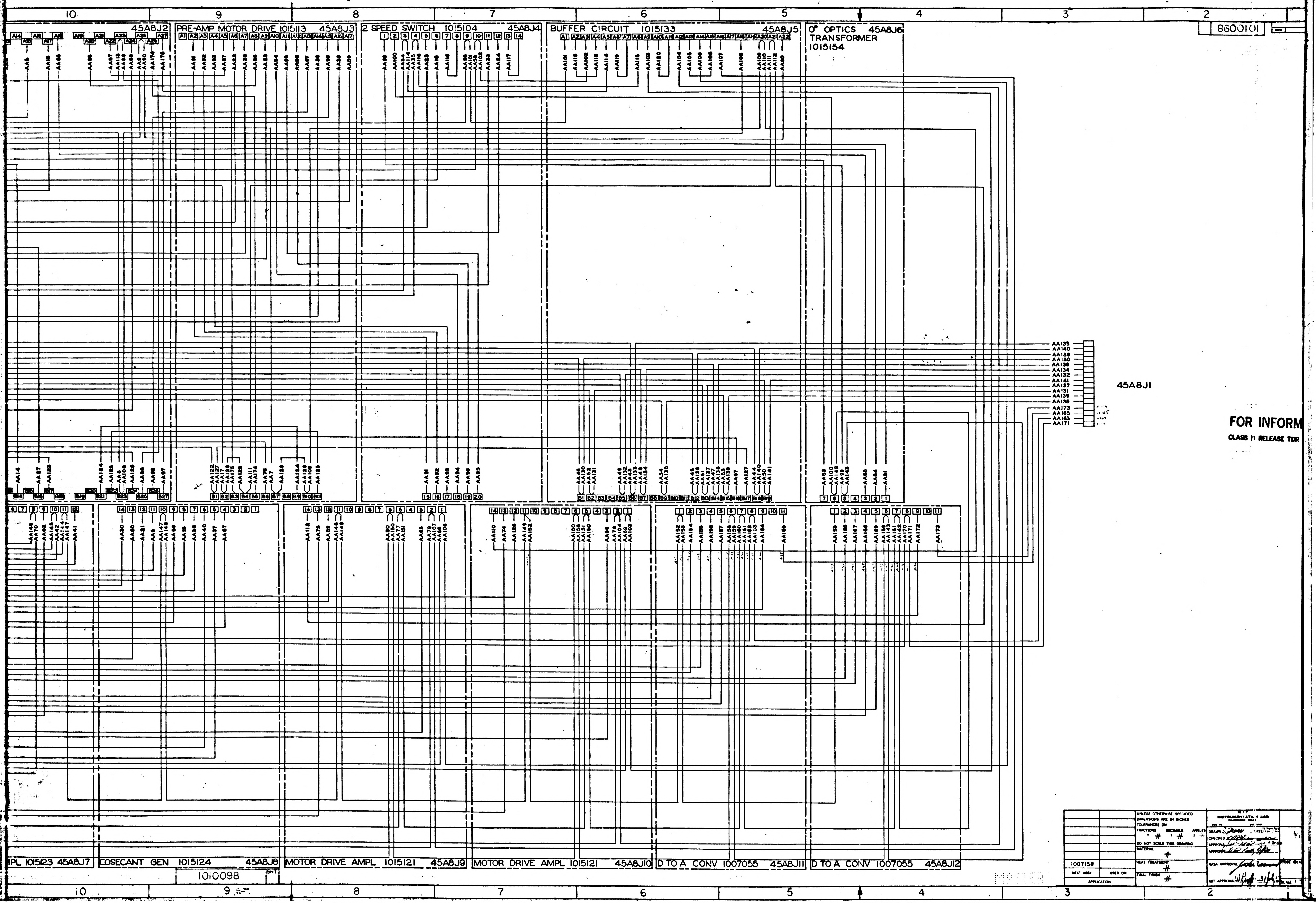
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BUFFER CIRCUIT 1015133 45A8J5
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COSECANT GEN 1015124 45A8J8
MOTOR DRIVE AMPL 1015121 45A8J9
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D TO A CONV 1007055 45A8J12
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ASSEMBLY DRAWING 1007158

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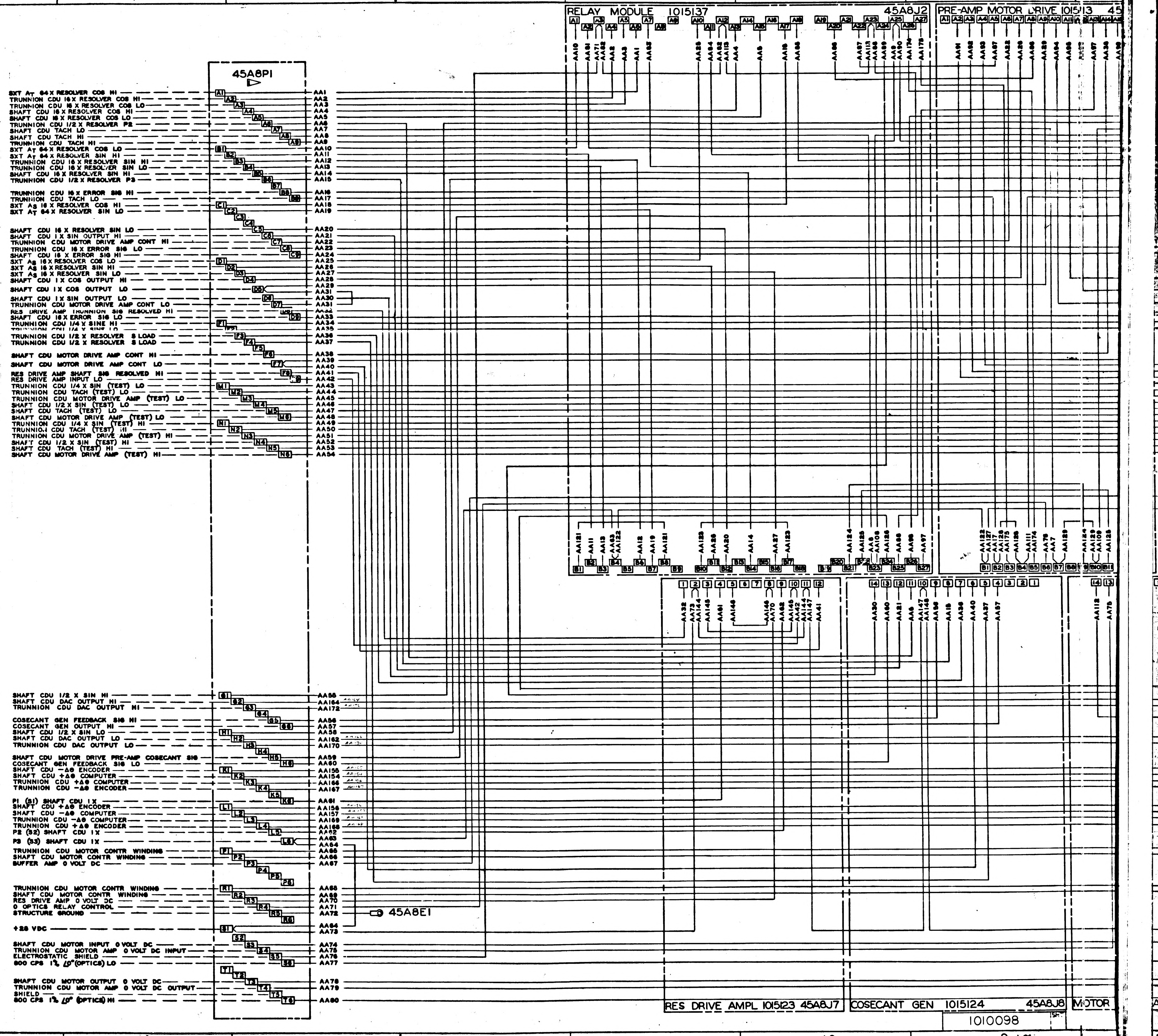
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TRUNNION CDU 16 X RESOLVER COS HI — A2 — AA2
TRUNNION CDU 16 X RESOLVER COS LO — A3 — AA3
SHAFT CDU 16 X RESOLVER COS HI — A4 — AA4
SHAFT CDU 16 X RESOLVER COS LO — A5 — AA5
TRUNNION CDU 1/2 X RESOLVER P2 — A6 — AA6
SHAFT CDU TACH LO — A7 — AA7
SHAFT CDU TACH HI — A8 — AA8
TRUNNION CDU TACH HI — A9 — AA9
SXT A$_T$ 64 X RESOLVER COS LO — B1 — AA10
SXT A$_T$ 64 X RESOLVER SIN HI — B2 — AA11
TRUNNION CDU 16 X RESOLVER SIN HI — B3 — AA12
TRUNNION CDU 16 X RESOLVER SIN LO — B4 — AA13
SHAFT CDU 16 X RESOLVER SIN HI — B5 — AA14
TRUNNION CDU 1/2 X RESOLVER P3 — B6 — AA15
B7
TRUNNION CDU 16 X ERROR SIG HI — B8 — AA16
TRUNNION CDU TACH LO — B9 — AA17
SXT A$_S$ 16 X RESOLVER COS HI — C1 — AA18
SXT A$_T$ 64 X RESOLVER SIN LO — C2 — AA19
C3
C4
SHAFT CDU 16 X RESOLVER SIN LO — C5 — AA20
SHAFT CDU 1 X SIN OUTPUT HI — C6 — AA21
TRUNNION CDU MOTOR DRIVE AMP CONT HI — C7 — AA22
TRUNNION CDU 16 X ERROR SIG LO — C8 — AA23
SHAFT CDU 16 X ERROR SIG HI — C9 — AA24
SXT A$_S$ 16 X RESOLVER COS LO — D1 — AA25
SXT A$_S$ 16 X RESOLVER SIN HI — D2 — AA26
SXT A$_S$ 16 X RESOLVER SIN LO — D3 — AA27
SHAFT CDU 1 X COS OUTPUT HI — D4 — AA28
SHAFT CDU 1 X COS OUTPUT LO — D5 — AA29, AA31
SHAFT CDU 1 X SIN OUTPUT LO — D6 — AA30
TRUNNION CDU MOTOR DRIVE AMP CONT LO — D7 — AA31
RES DRIVE AMP TRUNNION SIG RESOLVED HI — D8 — AA32
SHAFT CDU 16 X ERROR SIG LO — D9 — AA33
TRUNNION CDU 1/4 X SINE HI — F1 — AA34
TRUNNION CDU 1/4 X SINE LO — F2 — AA35
TRUNNION CDU 1/2 X RESOLVER S LOAD — F3 — AA36
TRUNNION CDU 1/2 X RESOLVER S LOAD — F4 — AA37
F5
SHAFT CDU MOTOR DRIVE AMP CONT HI — F6 — AA38
SHAFT CDU MOTOR DRIVE AMP CONT LO — F7 — AA39, AA40
RES DRIVE AMP SHAFT SIG RESOLVED HI — F8 — AA41
RES DRIVE AMP INPUT LO — F9 — AA42
TRUNNION CDU 1/4 X SIN (TEST) LO — M1 — AA43
TRUNNION CDU TACH (TEST) LO — M2 — AA44
TRUNNION CDU MOTOR DRIVE AMP (TEST) LO — M3 — AA45
SHAFT CDU 1/2 X SIN (TEST) LO — M4 — AA46
SHAFT CDU TACH (TEST) LO — M5 — AA47
SHAFT CDU MOTOR DRIVE AMP (TEST) LO — M6 — AA48
TRUNNION CDU 1/4 X SIN (TEST) HI — N1 — AA49
TRUNNION CDU TACH (TEST) HI — N2 — AA50
TRUNNION CDU MOTOR DRIVE AMP (TEST) HI — N3 — AA51
SHAFT CDU 1/2 X SIN (TEST) HI — N4 — AA52
SHAFT CDU TACH (TEST) HI — N5 — AA53
SHAFT CDU MOTOR DRIVE AMP (TEST) HI — N6 — AA54
SHAFT CDU 1/2 X SIN HI — G1 — AA55
SHAFT CDU DAC OUTPUT HI — G2 — AA164
TRUNNION CDU DAC OUTPUT HI — G3 — AA172
G4
COSECANT GEN FEEDBACK SIG HI — G5 — AA56
COSECANT GEN OUTPUT HI — G6 — AA57
SHAFT CDU 1/2 X SIN LO — H1 — AA58
SHAFT CDU DAC OUTPUT LO — H2 — AA162
TRUNNION CDU DAC OUTPUT LO — H3 — AA170
H4
SHAFT CDU MOTOR DRIVE PRE-AMP COSECANT SIG — H5 — AA59
COSECANT GEN FEEDBACK SIG LO — H6 — AA60
SHAFT CDU −Δθ ENCODER — K1 — AA155
SHAFT CDU +Δθ COMPUTER — K2 — AA154
TRUNNION CDU +Δθ COMPUTER — K3 — AA166
TRUNNION CDU −Δθ ENCODER — K4 — AA167
K5
P1 (S1) SHAFT CDU 1X — K6 — AA61
SHAFT CDU +Δθ ENCODER — L1 — AA156
SHAFT CDU −Δθ COMPUTER — L2 — AA157
TRUNNION CDU −Δθ COMPUTER — L3 — AA169
TRUNNION CDU +Δθ ENCODER — L4 — AA168
P2 (S2) SHAFT CDU 1X — L5 — AA62
P3 (S3) SHAFT CDU 1X — L6 — AA63, AA64
TRUNNION CDU MOTOR CONTR WINDING — P1 — AA65
SHAFT CDU MOTOR CONTR WINDING — P2 — AA66
BUFFER AMP 0 VOLT DC — P3 — AA67
P4
P5
P6
TRUNNION CDU MOTOR CONTR WINDING — R1 — AA68
SHAFT CDU MOTOR CONTR WINDING — R2 — AA69
RES DRIVE AMP 0 VOLT DC — R3 — AA70
0 OPTICS RELAY CONTROL — R4 — AA71
STRUCTURE GROUND — R5 — AA72
R6
45A8E1
+28 VDC — S1 — AA64, AA73
S2
SHAFT CDU MOTOR INPUT 0 VOLT DC — S3 — AA74
TRUNNION CDU MOTOR AMP 0 VOLT DC INPUT — S4 — AA75
ELECTROSTATIC SHIELD — S5 — AA76
800 CPS 1% ∠0° (OPTICS) LO — S6 — AA77
T1
T2
SHAFT CDU MOTOR OUTPUT 0 VOLT DC — T3 — AA78
TRUNNION CDU MOTOR AMP 0 VOLT DC OUTPUT — T4 — AA79
SHIELD — T5
800 CPS 1% ∠0° (OPTICS) HI — T6 — AA80
RELAY MODULE 1015137 45A8J2
PRE-AMP MOTOR DRIVE 1015113
RES DRIVE AMPL 1015123 45A8J7
COSECANT GEN 1015124 45A8J8
MOTOR

1010098

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REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
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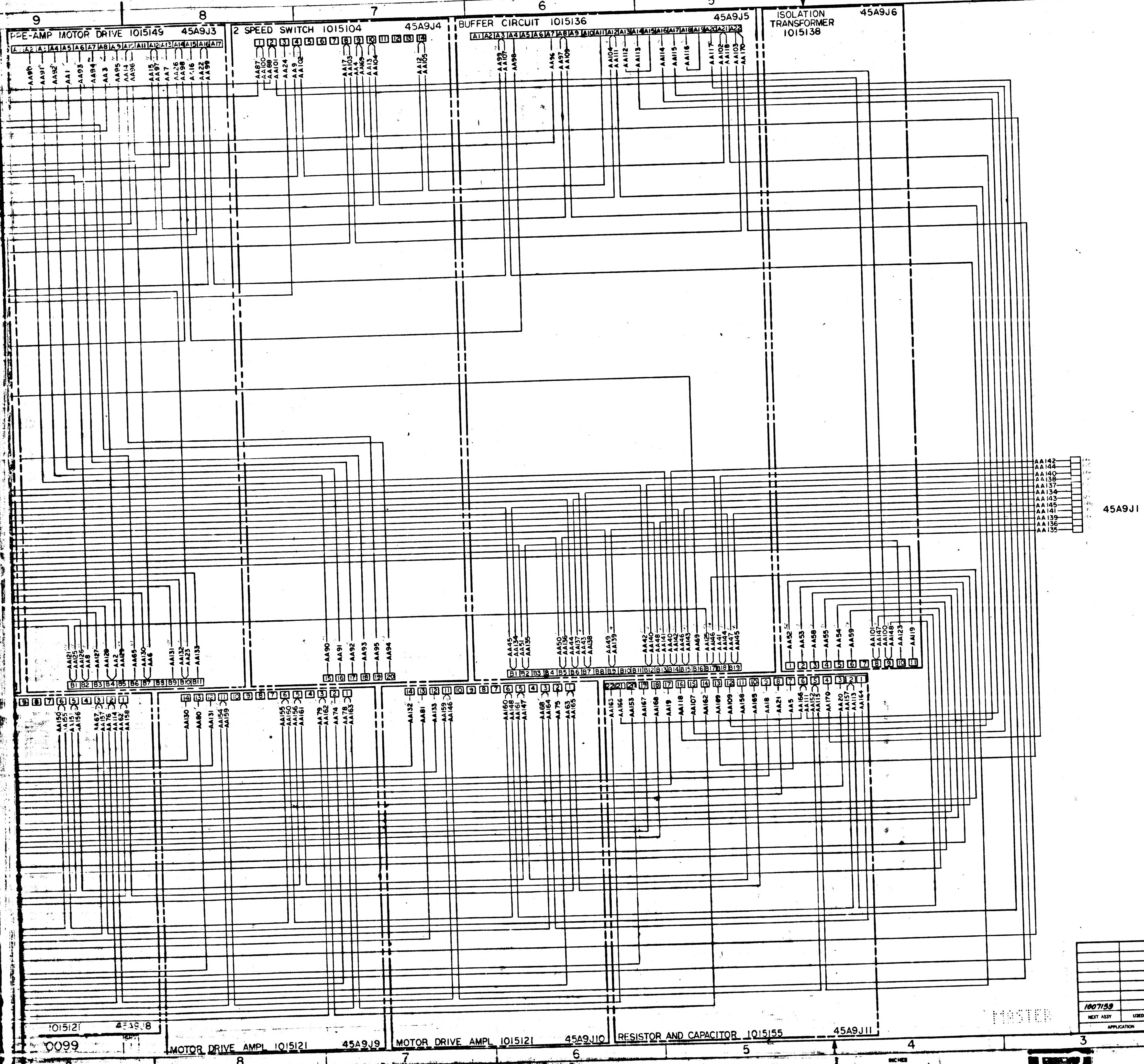
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BUFFER CIRCUIT 1015136 45A9J5
ISOLATION TRANSFORMER 1015138 45A9J6
45A9J1
AA142
AA144
AA140
AA138
AA137
AA134
AA143
AA145
AA141
AA139
AA136
AA135
1015121 45A9J8
MOTOR DRIVE AMPL 1015121 45A9J9
MOTOR DRIVE AMPL 1015121 45A9J10
RESISTOR AND CAPACITOR 1015155 45A9J11

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APPROVAL 9-31-63
NASA APPROVAL
MIT APPROVAL 31 Jul 63

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HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 9

CODE IDENT NO.	SIZE	NASA DRAWING NO.
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SCALE +	WT	SHEET 1 OF 1

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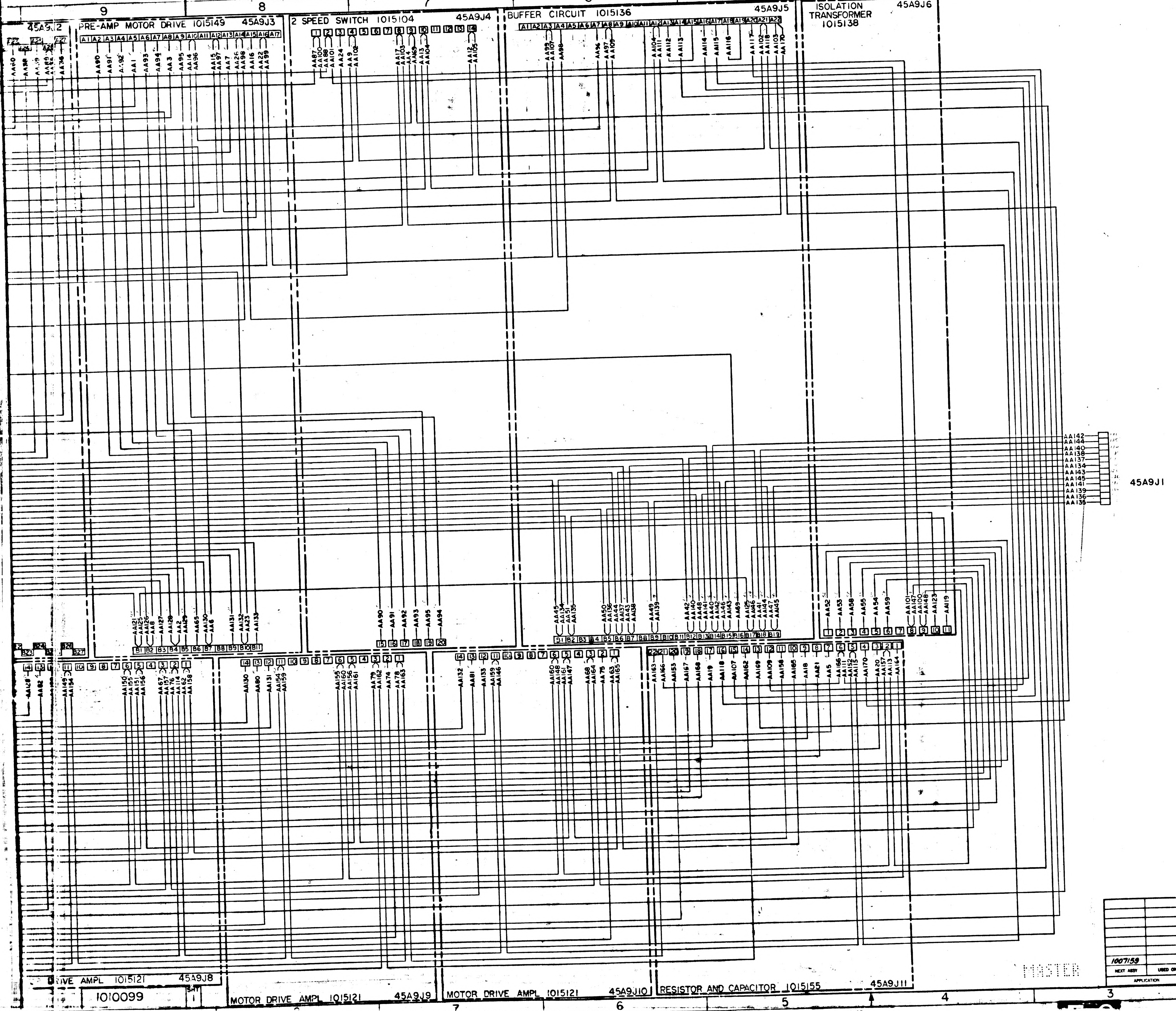

45A9J2
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BUFFER CIRCUIT 1015136 45A9J5
ISOLATION TRANSFORMER 1015138
45A9J6
45A9J1
DRIVE AMPL 1015121 45A9J8
MOTOR DRIVE AMPL 1015121 45A9J9
MOTOR DRIVE AMPL 1015121 45A9J10
RESISTOR AND CAPACITOR 1015155 45A9J11

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APPROVAL J. Nolan 9-3-63
APPROVAL R. Ratliff 9-31-63
NASA APPROVAL Jack Bonner
MIT APPROVAL W Kupfer 31 Jul 63

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CODE IDENT NO.
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1 ▷ MATES WITH A15J19

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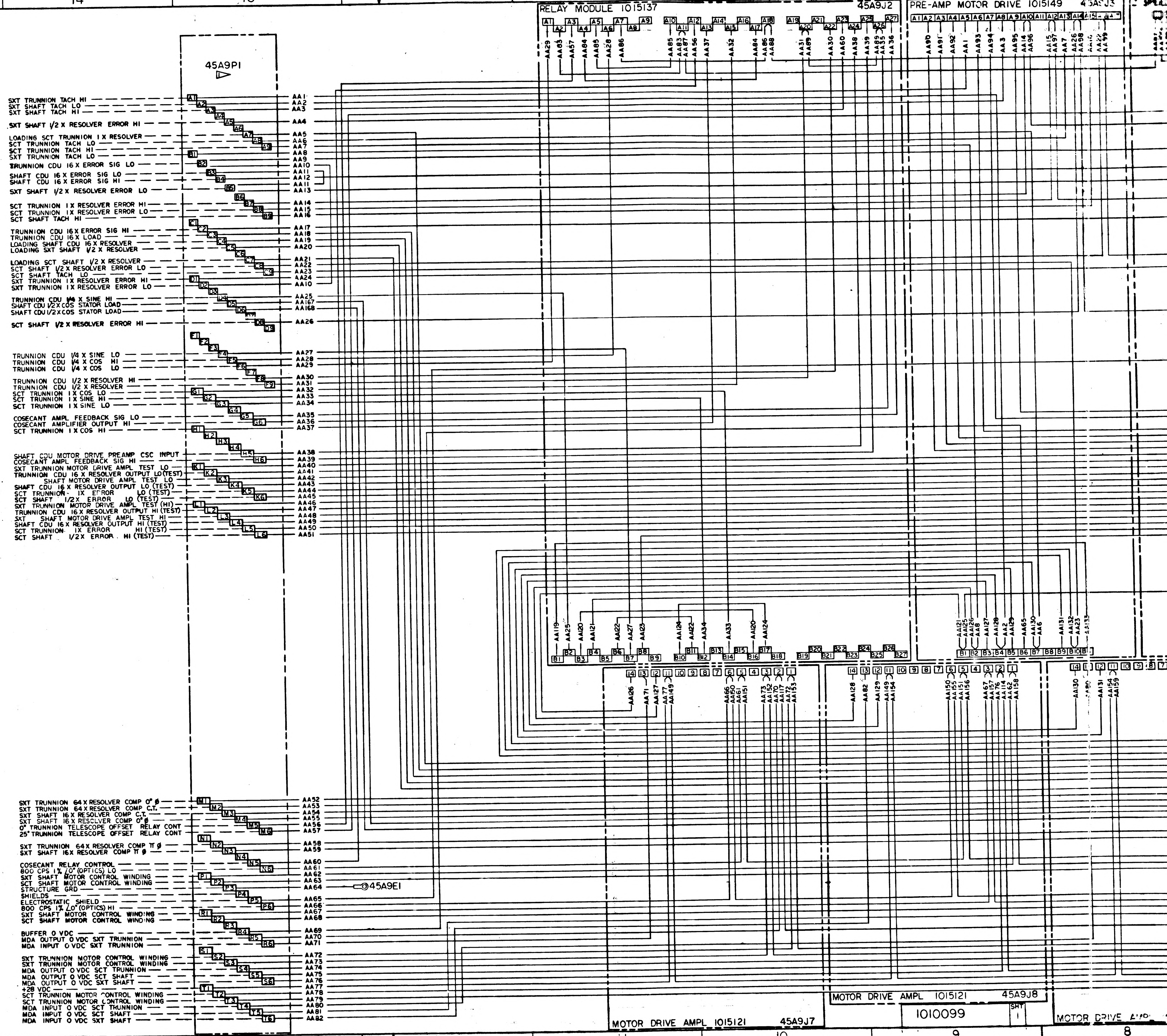
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SXT SHAFT TACH LO
SXT SHAFT TACH HI
SXT SHAFT 1/2 X RESOLVER ERROR HI
LOADING SCT TRUNNION 1 X RESOLVER
SCT TRUNNION TACH LO
SCT TRUNNION TACH HI
SXT TRUNNION TACH LO
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR LO
SCT TRUNNION 1 X RESOLVER ERROR HI
SCT TRUNNION 1 X RESOLVER ERROR LO
SCT SHAFT TACH HI
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU 16 X LOAD
LOADING SHAFT CDU 16 X RESOLVER
LOADING SXT SHAFT 1/2 X RESOLVER
LOADING SCT SHAFT 1/2 X RESOLVER
SCT SHAFT 1/2 X RESOLVER ERROR LO
SCT SHAFT TACH LO
SXT TRUNNION 1 X RESOLVER ERROR HI
SXT TRUNNION 1 X RESOLVER ERROR LO
TRUNNION CDU 1/4 X SINE HI
SHAFT CDU 1/2 X COS STATOR LOAD
SHAFT CDU 1/2 X COS STATOR LOAD
SCT SHAFT 1/2 X RESOLVER ERROR HI
TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/4 X COS HI
TRUNNION CDU 1/4 X COS LO
TRUNNION CDU 1/2 X RESOLVER HI
TRUNNION CDU 1/2 X RESOLVER
SCT TRUNNION 1 X COS LO
SCT TRUNNION 1 X SINE HI
SCT TRUNNION 1 X SINE LO
COSECANT AMPL FEEDBACK SIG LO
COSECANT AMPLIFIER OUTPUT HI
SCT TRUNNION 1 X COS HI
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT
COSECANT AMPL FEEDBACK SIG HI
SXT TRUNNION MOTOR DRIVE AMPL TEST LO
TRUNNION CDU 16 X RESOLVER OUTPUT LO (TEST)
SHAFT MOTOR DRIVE AMPL TEST LO
SHAFT CDU 16 X RESOLVER OUTPUT LO (TEST)
SCT TRUNNION 1X ERROR LO (TEST)
SCT SHAFT 1/2X ERROR LO (TEST)
SXT TRUNNION MOTOR DRIVE AMPL TEST (HI)
TRUNNION CDU 16 X RESOLVER OUTPUT HI (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST HI
SHAFT CDU 16 X RESOLVER OUTPUT HI (TEST)
SCT TRUNNION 1X ERROR HI (TEST)
SCT SHAFT 1/2X ERROR HI (TEST)
SXT TRUNNION 64 X RESOLVER COMP 0° ϕ
SXT TRUNNION 64 X RESOLVER COMP C.T.
SXT SHAFT 16 X RESOLVER COMP C.T.
SXT SHAFT 16 X RESOLVER COMP 0° ϕ
0° TRUNNION TELESCOPE OFFSET RELAY CONT
25° TRUNNION TELESCOPE OFFSET RELAY CONT
SXT TRUNNION 64 X RESOLVER COMP π ϕ
SXT SHAFT 16 X RESOLVER COMP π ϕ
COSECANT RELAY CONTROL
800 CPS 1% ∠0° (OPTICS) LO
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
STRUCTURE GRD
SHIELDS
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) HI
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
BUFFER 0 VDC
MDA OUTPUT 0 VDC SXT TRUNNION
MDA INPUT 0 VDC SXT TRUNNION
SXT TRUNNION MOTOR CONTROL WINDING
SXT TRUNNION MOTOR CONTROL WINDING
MDA OUTPUT 0 VDC SCT TRUNNION
MDA OUTPUT 0 VDC SCT SHAFT
MDA OUTPUT 0 VDC SXT SHAFT
+28 VDC
SCT TRUNNION MOTOR CONTROL WINDING
SCT TRUNNION MOTOR CONTROL WINDING
MDA INPUT 0 VDC SCT TRUNNION
MDA INPUT 0 VDC SCT SHAFT
MDA INPUT 0 VDC SXT SHAFT
45A9E1
RELAY MODULE 1015137 45A9J2
PRE-AMP MOTOR DRIVE 1015149 45A9J3
MOTOR DRIVE AMPL 1015121 45A9J7
MOTOR DRIVE AMPL 1015121 45A9J8
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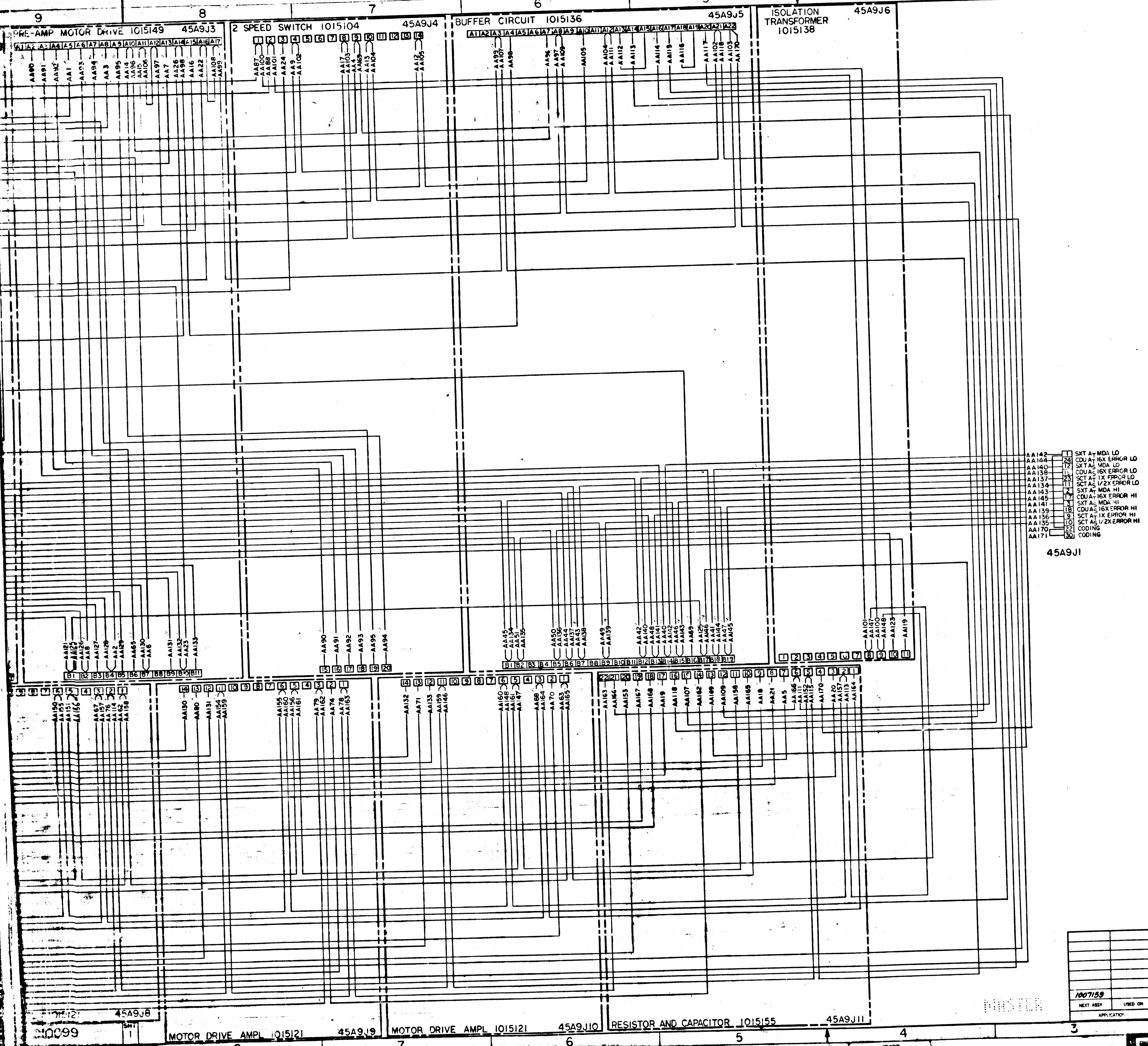
B	REVISED PER TDRR 03333	9-11-63	

REVISIONS TDRR 02348 7-31-63



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2 SPEED SWITCH 1015104 45A9J4
BUFFER CIRCUIT 1015136 45A9J5
ISOLATION TRANSFORMER 1015138 45A9J6
AA142 1 SXT A_T MDA LO
AA144 24 CDU A_T 16X ERROR LO
AA140 12 SXT A_S MDA LO
AA138 19 CDU A_S 16X ERROR LO
AA137 23 SCT A_T 1X ERROR LO
AA134 11 SCT A_S 1/2X ERROR LO
AA143 2 SXT A_T MDA HI
AA145 17 CDU A_T 16X ERROR HI
AA141 3 SXT A_S MDA HI
AA139 18 CDU A_S 16X ERROR HI
AA136 9 SCT A_T 1X ERROR HI
AA135 10 SCT A_S 1/2X ERROR HI
AA170 22 CODING
AA171 30 CODING
45A9J1
45A9J8
MOTOR DRIVE AMPL 1015121 45A9J9
MOTOR DRIVE AMPL 1015121 45A9J10
RESISTOR AND CAPACITOR 1015155 45A9J11

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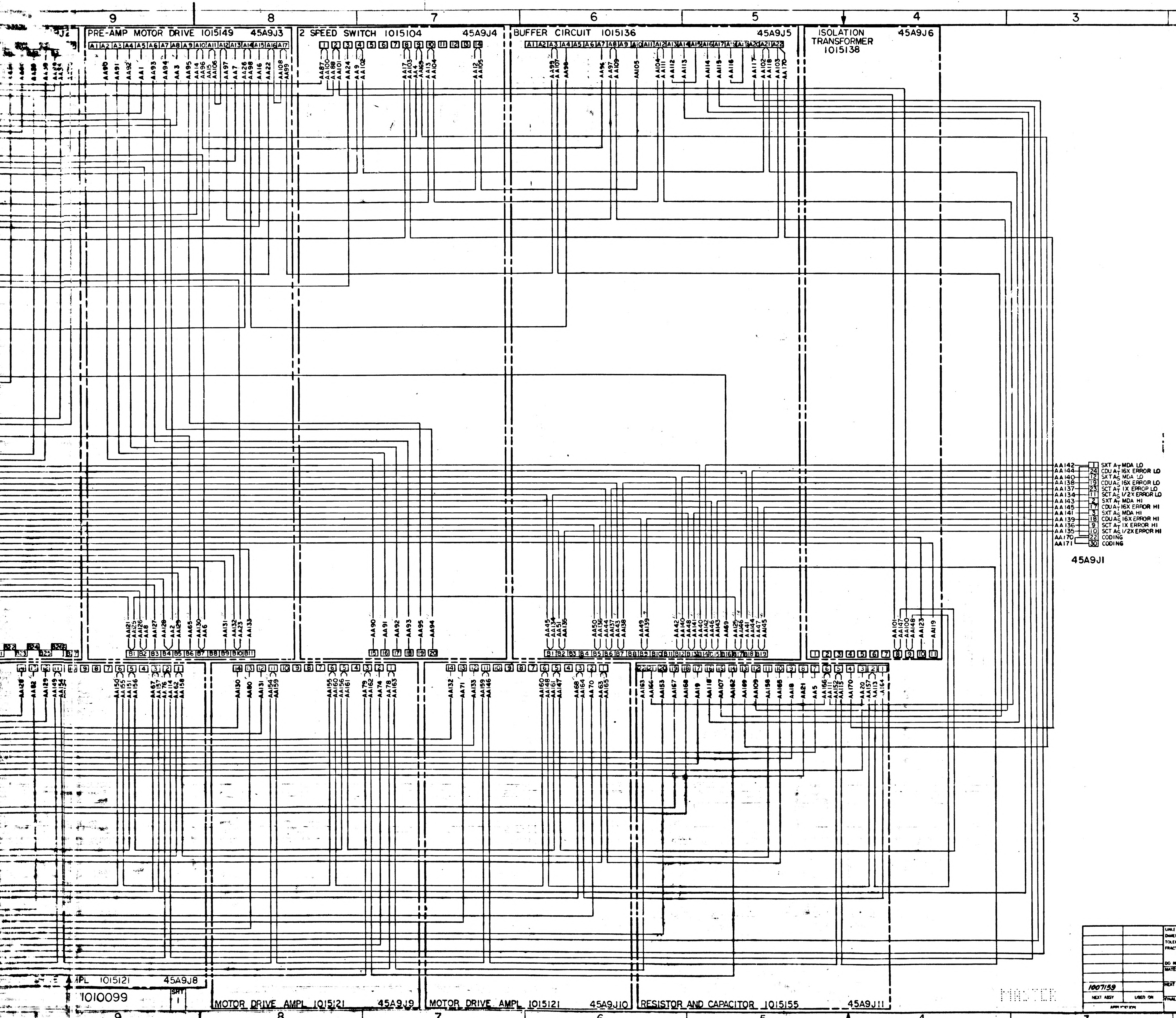

PRE-AMP MOTOR DRIVE 1015149 45A9J3
2 SPEED SWITCH 1015104 45A9J4
BUFFER CIRCUIT 1015136 45A9J5
ISOLATION TRANSFORMER 1015138 45A9J6
AA142 1 SXT A_T MDA LO
AA144 24 CDU A_T 16X ERROR LO
AA140 12 SXT A_S MDA LO
AA138 19 CDU A_S 16X ERROR LO
AA137 23 SCT A_T 1X ERROR LO
AA134 11 SCT A_S 1/2X ERROR LO
AA143 2 SXT A_T MDA HI
AA145 17 CDU A_T 16X ERROR HI
AA141 3 SXT A_S MDA HI
AA139 18 CDU A_S 16X ERROR HI
AA136 9 SCT A_T 1X ERROR HI
AA135 10 SCT A_S 1/2X ERROR HI
AA170 22 CODING
AA171 30 CODING
45A9J1
MPL 1015121 45A9J8
MOTOR DRIVE AMPL 1015121 45A9J9
MOTOR DRIVE AMPL 1015121 45A9J10
RESISTOR AND CAPACITOR 1015155 45A9J11
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1010099 B

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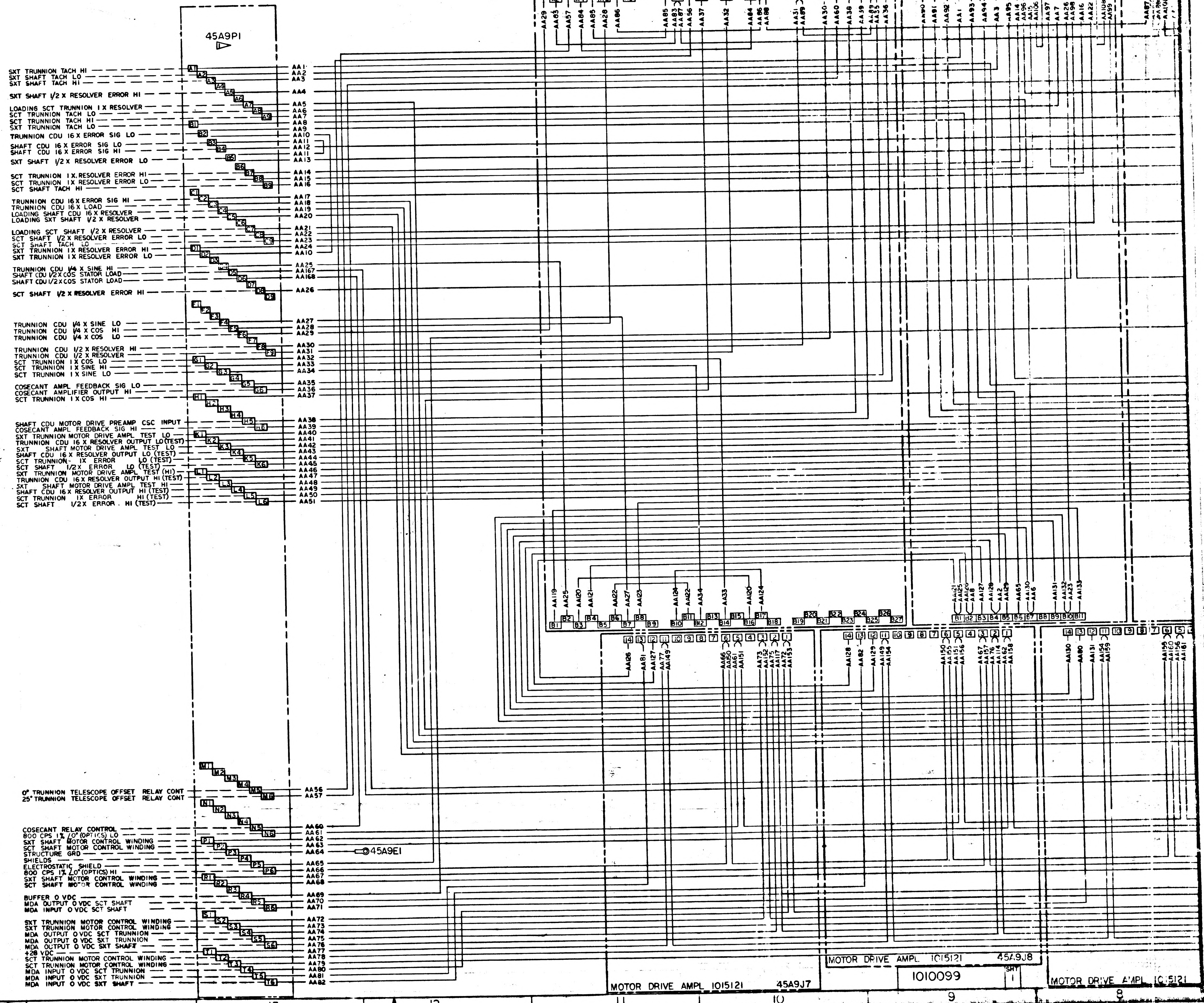
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SXT SHAFT TACH LO
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LOADING SCT TRUNNION 1 X RESOLVER
SCT TRUNNION TACH LO
SCT TRUNNION TACH HI
SXT TRUNNION TACH LO
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR LO
SCT TRUNNION 1 X RESOLVER ERROR HI
SCT TRUNNION 1 X RESOLVER ERROR LO
SCT SHAFT TACH HI
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU 16 X LOAD
LOADING SHAFT CDU 16 X RESOLVER
LOADING SXT SHAFT 1/2 X RESOLVER
LOADING SCT SHAFT 1/2 X RESOLVER
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SCT SHAFT TACH LO
SXT TRUNNION 1 X RESOLVER ERROR HI
SXT TRUNNION 1 X RESOLVER ERROR LO
TRUNNION CDU 1/4 X SINE HI
SHAFT CDU 1/2 X COS STATOR LOAD
SHAFT CDU 1/2 X COS STATOR LOAD
SCT SHAFT 1/2 X RESOLVER ERROR HI
TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/4 X COS HI
TRUNNION CDU 1/4 X COS LO
TRUNNION CDU 1/2 X RESOLVER HI
TRUNNION CDU 1/2 X RESOLVER
SCT TRUNNION 1 X COS LO
SCT TRUNNION 1 X SINE HI
SCT TRUNNION 1 X SINE LO
COSECANT AMPL FEEDBACK SIG LO
COSECANT AMPLIFIER OUTPUT HI
SCT TRUNNION 1 X COS HI
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT
COSECANT AMPL FEEDBACK SIG HI
SXT TRUNNION MOTOR DRIVE AMPL TEST LO
TRUNNION CDU 16 X RESOLVER OUTPUT LO (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST LO
SHAFT CDU 16 X RESOLVER OUTPUT LO (TEST)
SCT TRUNNION 1X ERROR LO (TEST)
SCT SHAFT 1/2X ERROR LO (TEST)
SXT TRUNNION MOTOR DRIVE AMPL TEST (HI)
TRUNNION CDU 16 X RESOLVER OUTPUT HI (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST HI
SHAFT CDU 16 X RESOLVER OUTPUT HI (TEST)
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SCT SHAFT 1/2X ERROR HI (TEST)
0° TRUNNION TELESCOPE OFFSET RELAY CONT
25° TRUNNION TELESCOPE OFFSET RELAY CONT
COSECANT RELAY CONTROL
800 CPS 1% ∠0° (OPTICS) LO
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
STRUCTURE GRD
SHIELDS
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) HI
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SCT SHAFT MOTOR CONTROL WINDING
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MDA INPUT 0 VDC SCT SHAFT
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MDA OUTPUT 0 VDC SCT TRUNNION
MDA OUTPUT 0 VDC SXT TRUNNION
MDA OUTPUT 0 VDC SXT SHAFT
+28 VDC
SCT TRUNNION MOTOR CONTROL WINDING
SCT TRUNNION MOTOR CONTROL WINDING
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MDA INPUT 0 VDC SXT TRUNNION
MDA INPUT 0 VDC SXT SHAFT
A1 A2 A3 A4 A5 A6 A7 A8 A9
B1 B2 B3 B4 B5 B6 B7 B8 B9
C1 C2 C3 C4 C5 C6 C7 C8 C9
D1 D2 D3 D4 D5 D6 D7 D8 D9
F1 F2 F3 F4 F5 F6 F7 F8 F9
G1 G2 G3 G4 G5 G6
H1 H2 H3 H4 H5 H6
K1 K2 K3 K4 K5 K6
L1 L2 L3 L4 L5 L6
M1 M2 M3 M4 M5 M6
N1 N2 N3 N4 N5 N6
P1 P2 P3 P4 P5 P6
R1 R2 R3 R4 R5 R6
S1 S2 S3 S4 S5 S6
T1 T2 T3 T4 T5 T6
AA1 AA2 AA3 AA4 AA5 AA6 AA7 AA8 AA9 AA10 AA11 AA12 AA11 AA13 AA14 AA15 AA16
AA17 AA18 AA19 AA20 AA21 AA22 AA23 AA24 AA10 AA25 AA167 AA168 AA26
AA27 AA28 AA29 AA30 AA31 AA32 AA33 AA34 AA35 AA36 AA37
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AA56 AA57
AA60 AA61 AA62 AA63 AA64 AA65 AA66 AA67 AA68 AA69 AA70 AA71
AA72 AA73 AA74 AA75 AA76 AA77 AA78 AA79 AA80 AA81 AA82
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A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23 A24 A25 A26 A27
AA29 AA83 AA57 AA84 AA85 AA28 AA86 AA85 AA83 AA87 AA56 AA37 AA32 AA84 AA86 AA88 AA31 AA89 AA30 AA60 AA38 AA39 AA89 AA35 AA36
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12 B13 B14 B15 B16 B17 B18 B19 B20 B21 B22 B23 B24 B25 B26 B27
AA119 AA25 AA120 AA121 AA22 AA27 AA123 AA124 AA22 AA34 AA33 AA120 AA124
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AA90 AA91 AA92 AA1 AA93 AA94 AA3 AA95 AA14 AA96 AA15 AA106 AA97 AA7 AA26 AA98 AA16 AA22 AA108 AA99
B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11
AA121 AA126 AA8 AA127 AA128 AA2 AA129 AA65 AA130 AA6 AA131 AA132 AA23 AA133
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AA87
14 13 12 11 10 9 8 7 6 5 4 3 2 1
AA26 AA81 AA127 AA77 AA149 AA66 AA50 AA61 AA151 AA73 AA152 AA75 AA117 AA72 AA153
AA128 AA82 AA129 AA154
AA150 AA155 AA156 AA67 AA157 AA114 AA62 AA158
AA130 AA80 AA131 AA154 AA159
AA155 AA160 AA156 AA161
MOTOR DRIVE AMPL 1015121
45A9J7
MOTOR DRIVE AMPL. 1015121
45A9J8
MOTOR DRIVE AMPL 1015121
15 14 13 12 11 10 9 8
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REVISIONS ~~~2398 7-31-63

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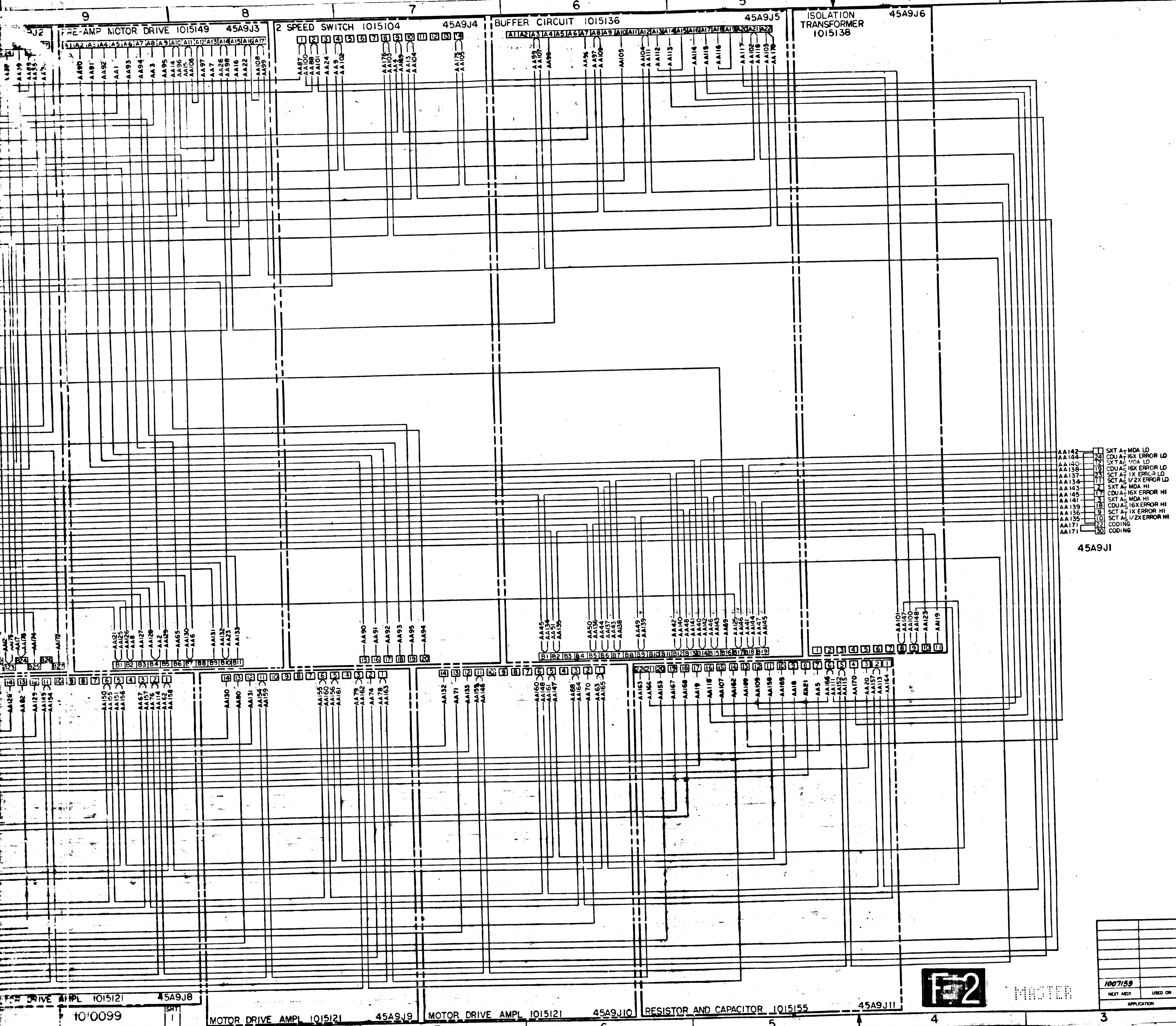
B	REVISED PER TDRR 03333	1963	
C	REVISED PER TDRR 04668	63	



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45A9J3
2 SPEED SWITCH 1015104
45A9J4
BUFFER CIRCUIT 1015136
45A9J5
ISOLATION TRANSFORMER 1015138
45A9J6
AA142 1 SXT AT MDA LO
AA144 24 CDU AT 16X ERROR LO
AA140 12 SXT AS MDA LO
AA138 19 CDU AS 16X ERROR LO
AA137 23 SCT AT 1X ERROR LO
AA134 11 SCT AS 1/2X ERROR LO
AA143 2 SXT AT MDA HI
AA145 17 CDU AT 16X ERROR HI
AA141 3 SXT AS MDA HI
AA139 18 CDU AS 16X ERROR HI
AA136 9 SCT AT 1X ERROR HI
AA135 10 SCT AS 1/2X ERROR HI
AA171 22 CODING
AA171 30 CODING
45A9J1
MOTOR DRIVE AMPL 1015121
45A9J8
MOTOR DRIVE AMPL 1015121
45A9J9
MOTOR DRIVE AMPL 1015121
45A9J10
RESISTOR AND CAPACITOR 1015155
45A9J11

1010099	SHT 1		

F-2

MASTER

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± # DECIMALS ± # ANGLES ± #	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS		MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
		DO NOT SCALE THIS DRAWING	DRAWN E. Gray DATE 22 Jul 63		WIRING DIAGRAM TRAY 9		
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1007159		HEAT TREATMENT	NASA APPROVAL	CODE IDENT NO	SIZE J	NASA DRAWING NO. 1010099	
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APPLICATION							

INCHES

PHOTOGRAPHIC SCALE ONLY

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷ MATES WITH A15J19

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ASSEMBLY DRAWING 1007159
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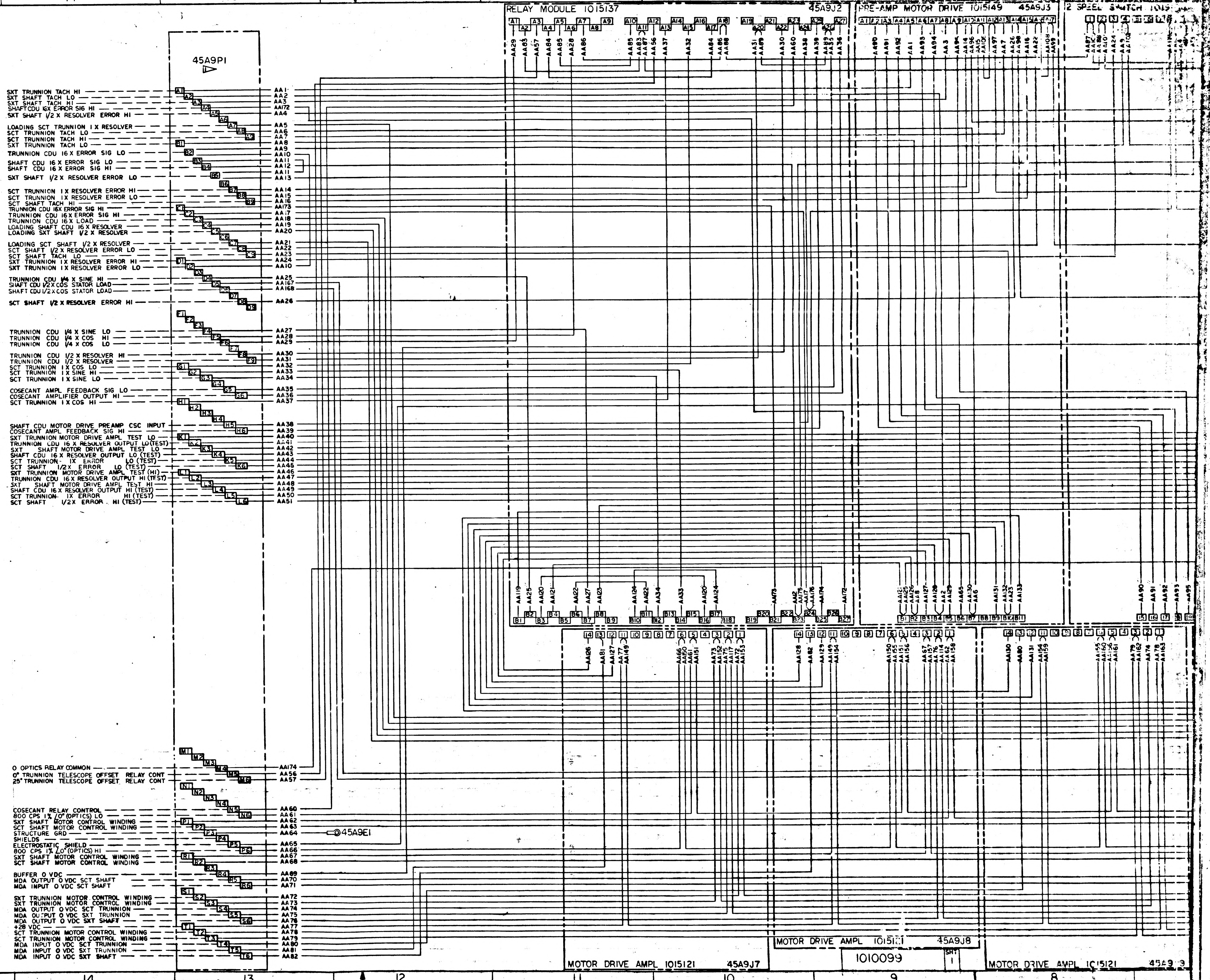
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SXT SHAFT TACH LO
SXT SHAFT TACH HI
SHAFT CDU 16X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR HI
LOADING SCT TRUNNION 1 X RESOLVER
SCT TRUNNION TACH LO
SCT TRUNNION TACH HI
SXT TRUNNION TACH LO
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR LO
SCT TRUNNION 1 X RESOLVER ERROR HI
SCT TRUNNION 1 X RESOLVER ERROR LO
SCT SHAFT TACH HI
TRUNNION CDU 16X ERROR SIG HI
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU 16 X LOAD
LOADING SHAFT CDU 16 X RESOLVER
LOADING SXT SHAFT 1/2 X RESOLVER
LOADING SCT SHAFT 1/2 X RESOLVER
SCT SHAFT 1/2 X RESOLVER ERROR LO
SCT SHAFT TACH LO
SXT TRUNNION 1 X RESOLVER ERROR HI
SXT TRUNNION 1 X RESOLVER ERROR LO
TRUNNION CDU 1/4 X SINE HI
SHAFT CDU 1/2 X COS STATOR LOAD
SHAFT CDU 1/2 X COS STATOR LOAD
SCT SHAFT 1/2 X RESOLVER ERROR HI
TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/4 X COS HI
TRUNNION CDU 1/4 X COS LO
TRUNNION CDU 1/2 X RESOLVER HI
TRUNNION CDU 1/2 X RESOLVER
SCT TRUNNION 1 X COS LO
SCT TRUNNION 1 X SINE HI
SCT TRUNNION 1 X SINE LO
COSECANT AMPL FEEDBACK SIG LO
COSECANT AMPLIFIER OUTPUT HI
SCT TRUNNION 1 X COS HI
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT
COSECANT AMPL FEEDBACK SIG HI
SXT TRUNNION MOTOR DRIVE AMPL TEST LO
TRUNNION CDU 16 X RESOLVER OUTPUT LO (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST LO
SHAFT CDU 16 X RESOLVER OUTPUT LO (TEST)
SCT TRUNNION 1X ERROR LO (TEST)
SCT SHAFT 1/2X ERROR LO (TEST)
SXT TRUNNION MOTOR DRIVE AMPL TEST (HI)
TRUNNION CDU 16 X RESOLVER OUTPUT HI (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST HI
SHAFT CDU 16 X RESOLVER OUTPUT HI (TEST)
SCT TRUNNION 1X ERROR HI (TEST)
SCT SHAFT 1/2X ERROR HI (TEST)
0 OPTICS RELAY COMMON
0° TRUNNION TELESCOPE OFFSET RELAY CONT
25° TRUNNION TELESCOPE OFFSET RELAY CONT
COSECANT RELAY CONTROL
800 CPS 1% ∠0° (OPTICS) LO
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
STRUCTURE GRD
SHIELDS
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) HI
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
BUFFER 0 VDC
MDA OUTPUT 0 VDC SCT SHAFT
MDA INPUT 0 VDC SCT SHAFT
SXT TRUNNION MOTOR CONTROL WINDING
SXT TRUNNION MOTOR CONTROL WINDING
MDA OUTPUT 0 VDC SCT TRUNNION
MDA OUTPUT 0 VDC SXT TRUNNION
MDA OUTPUT 0 VDC SXT SHAFT
+28 VDC
SCT TRUNNION MOTOR CONTROL WINDING
SCT TRUNNION MOTOR CONTROL WINDING
MDA INPUT 0 VDC SCT TRUNNION
MDA INPUT 0 VDC SXT TRUNNION
MDA INPUT 0 VDC SXT SHAFT
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RELAY MODULE 1015137 45A9J2
PRE-AMP MOTOR DRIVE 1015149 45A9J3
2 SPEED SWITCH
MOTOR DRIVE AMPL 1015121 45A9J7
MOTOR DRIVE AMPL 1015121 45A9J8
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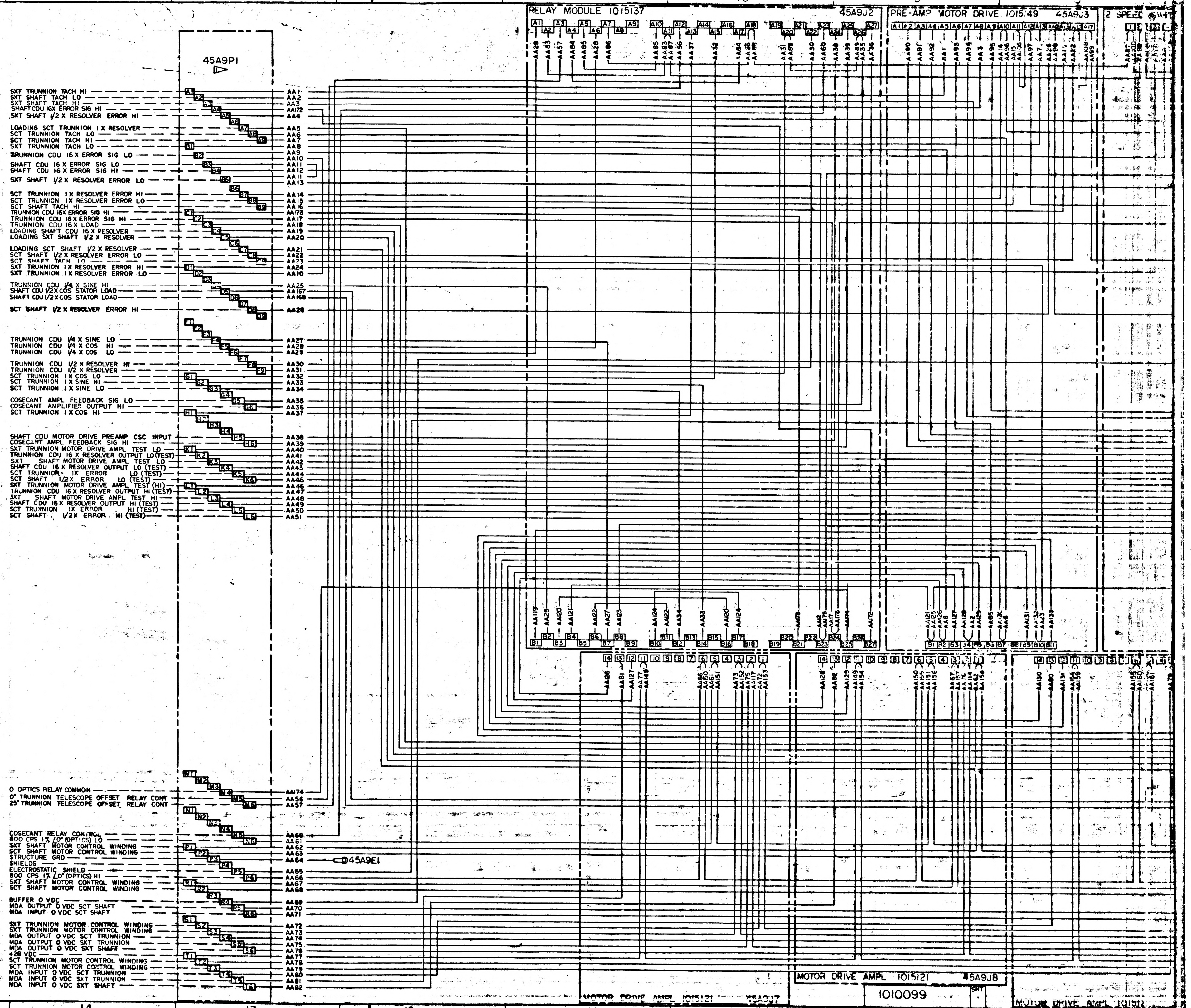
PHOTOGRAPHIC SCALE ONLY

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

1 MATES WITH A.5J19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SXT SHAFT TACH LO
SXT SHAFT TACH HI
SHAFT CDU 16X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR HI
LOADING SCT TRUNNION 1 X RESOLVER
SCT TRUNNION TACH LO
SCT TRUNNION TACH HI
SXT TRUNNION TACH LO
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR LO
SCT TRUNNION 1 X RESOLVER ERROR HI
SCT TRUNNION 1 X RESOLVER ERROR LO
SCT SHAFT TACH HI
TRUNNION CDU 16X ERROR SIG HI
TRUNNION CDU 16 X ERROR SIG HI
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LOADING SHAFT CDU 16 X RESOLVER
LOADING SXT SHAFT 1/2 X RESOLVER
LOADING SCT SHAFT 1/2 X RESOLVER
SCT SHAFT 1/2 X RESOLVER ERROR LO
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SXT TRUNNION 1 X RESOLVER ERROR LO
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SHAFT CDU 1/2 X COS STATOR LOAD
SHAFT CDU 1/2 X COS STATOR LOAD
SCT SHAFT 1/2 X RESOLVER ERROR HI
TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/4 X COS HI
TRUNNION CDU 1/4 X COS LO
TRUNNION CDU 1/2 X RESOLVER HI
TRUNNION CDU 1/2 X RESOLVER
SCT TRUNNION 1 X COS LO
SCT TRUNNION 1 X SINE HI
SCT TRUNNION 1 X SINE LO
COSECANT AMPL FEEDBACK SIG LO
COSECANT AMPLIFIER OUTPUT HI
SCT TRUNNION 1 X COS HI
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT
COSECANT AMPL FEEDBACK SIG HI
SXT TRUNNION MOTOR DRIVE AMPL TEST LO
TRUNNION CDU 16 X RESOLVER OUTPUT LO (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST LO
SHAFT CDU 16 X RESOLVER OUTPUT LO (TEST)
SCT TRUNNION 1X ERROR LO (TEST)
SCT SHAFT 1/2X ERROR LO (TEST)
SXT TRUNNION MOTOR DRIVE AMPL TEST (HI)
TRUNNION CDU 16 X RESOLVER OUTPUT HI (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST HI
SHAFT CDU 16 X RESOLVER OUTPUT HI (TEST)
SCT TRUNNION 1X ERROR HI (TEST)
SCT SHAFT 1/2X ERROR HI (TEST)
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25° TRUNNION TELESCOPE OFFSET RELAY CONT
COSECANT RELAY CONTROL
800 CPS 1% ∠0° (OPTICS) LO
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
STRUCTURE GRD
SHIELDS
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) HI
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
BUFFER 0 VDC
MDA OUTPUT 0 VDC SCT SHAFT
MDA INPUT 0 VDC SCT SHAFT
SXT TRUNNION MOTOR CONTROL WINDING
SXT TRUNNION MOTOR CONTROL WINDING
MDA OUTPUT 0 VDC SCT TRUNNION
MDA OUTPUT 0 VDC SXT TRUNNION
MDA OUTPUT 0 VDC SXT SHAFT
+28 VDC
SCT TRUNNION MOTOR CONTROL WINDING
SCT TRUNNION MOTOR CONTROL WINDING
MDA INPUT 0 VDC SCT TRUNNION
MDA INPUT 0 VDC SXT TRUNNION
MDA INPUT 0 VDC SXT SHAFT
AA1 AA2 AA3 AA172 AA4 AA5 AA6 AA7 AA8 AA9 AA10 AA11 AA12 AA11 AA13 AA14 AA15 AA16 AA178 AA17 AA18 AA19 AA20 AA21 AA22 AA23 AA24 AA10 AA25 AA167 AA168 AA26 AA27 AA28 AA29 AA30 AA31 AA32 AA33 AA34 AA35 AA36 AA37 AA38 AA39 AA40 AA41 AA42 AA43 AA44 AA45 AA46 AA47 AA48 AA49 AA50 AA51
AA174 AA56 AA57 AA60 AA61 AA62 AA63 AA64 AA65 AA66 AA67 AA68 AA69 AA70 AA71 AA72 AA73 AA74 AA75 AA76 AA77 AA78 AA79 AA80 AA81 AA82
45A9E1
RELAY MODULE 1015137
45A9J2
PRE-AMP MOTOR DRIVE 1015149
45A9J3
2 SPEED
MOTOR DRIVE AMPL 1015121
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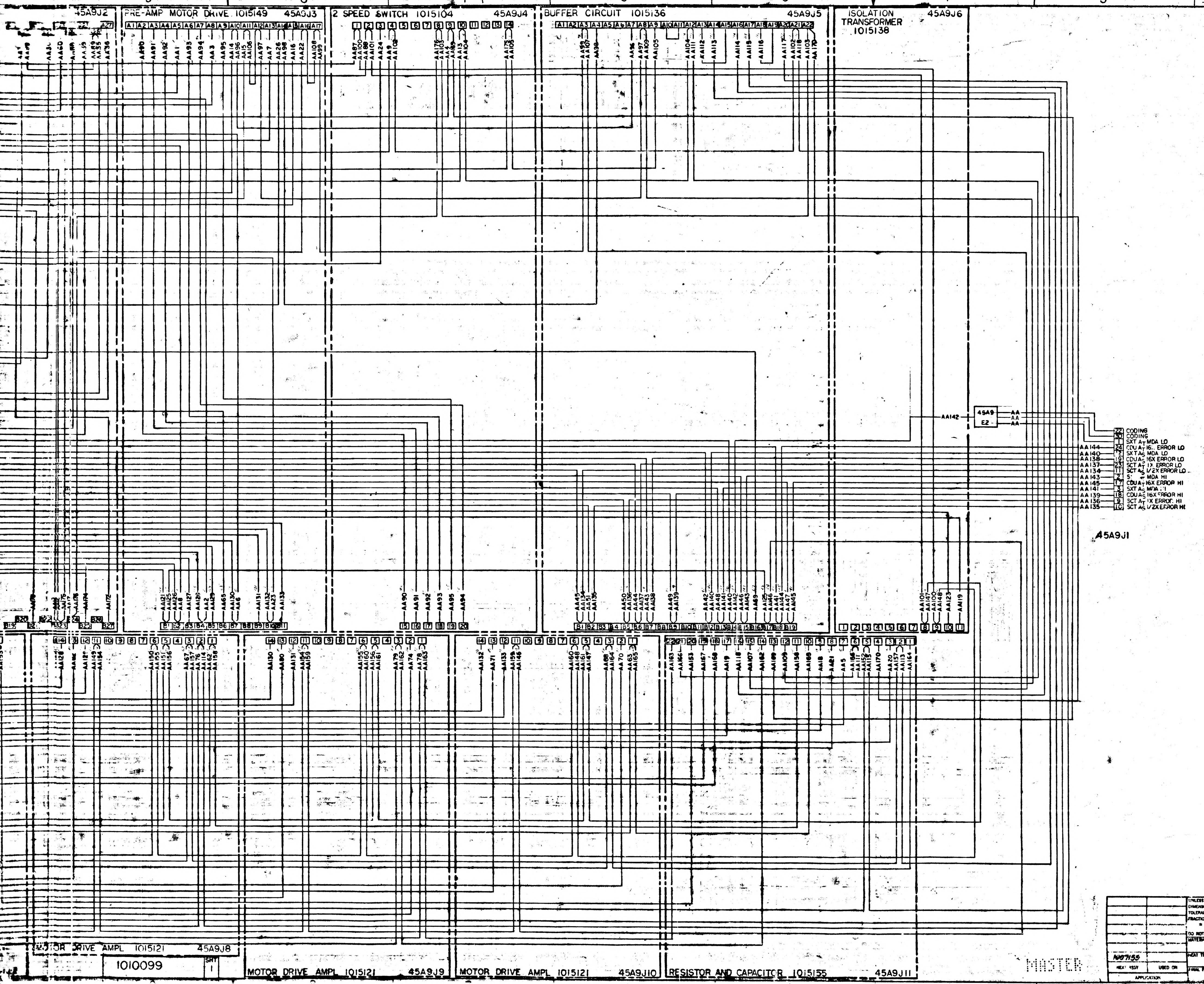
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22 CODING
30 CODING
1 SXT A_T MDA LO
AA144 24 CDU A_T 16X ERROR LO
AA140 2 SXT A_S MDA LO
AA138 19 CDU A_S 16X ERROR LO
AA137 23 SCT A_T 1X ERROR LO
AA134 11 SCT A_S 1/2X ERROR LO
AA143 2 SXT A_T MDA HI
AA145 17 CDU A_T 16X ERROR HI
AA141 3 SXT A_S MDA HI
AA139 18 CDU A_S 16X ERROR HI
AA136 9 SCT A_T 1X ERROR HI
AA135 10 SCT A_S 1/2X ERROR HI
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AA142
MOTOR DRIVE AMPL 1015121
45A9J8
MOTOR DRIVE AMPL 1015121
45A9J9
MOTOR DRIVE AMPL 1015121
45A9J10
RESISTOR AND CAPACITOR 1015155
45A9J11
MASTER

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REVISIONS

SYM	DESCRIPTION	DATE	APPR
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B	REVISED PER TDRR 03333	4-19-63	
C	REVISED PER TDRR 04668		
D	REVISED PER TDRR 05711		
E	REVISED PER TDRR 05875		

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APPLICATION

INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN C. Gray DATE
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APPROVED
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
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CODE IDENT NO.
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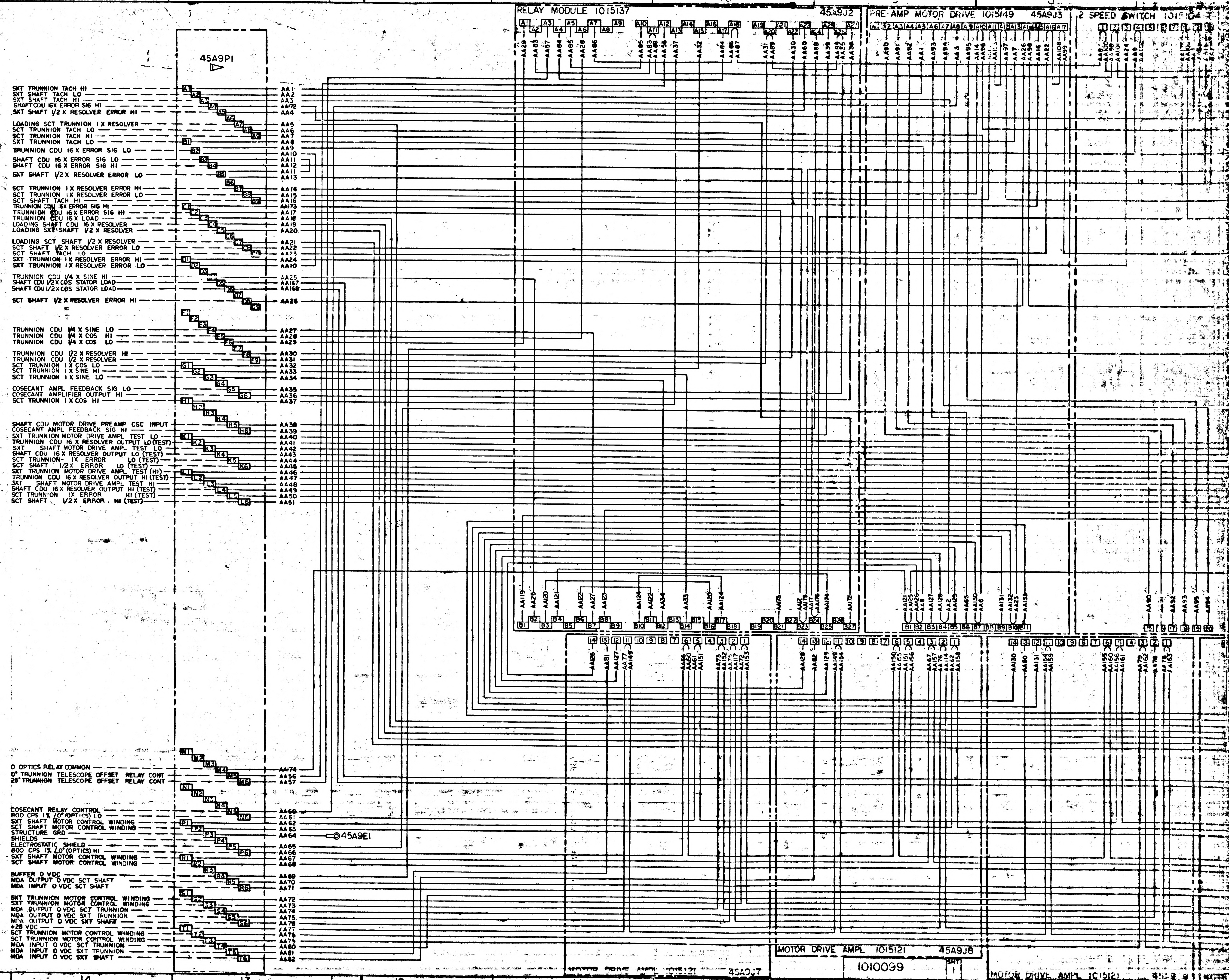
▷ MATES WITH A15J19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SXT SHAFT 1/2 X RESOLVER ERROR HI — A5 — AA4
LOADING SCT TRUNNION 1 X RESOLVER — A7 — AA5
SCT TRUNNION TACH LO — A8 — AA6
SCT TRUNNION TACH HI — A9 — AA7
SXT TRUNNION TACH LO — B1 — AA8
TRUNNION CDU 16 X ERROR SIG LO — B2 — AA9
AA10
SHAFT CDU 16 X ERROR SIG LO — B3 — AA11
SHAFT CDU 16 X ERROR SIG HI — B4 — AA12
AA11
SXT SHAFT 1/2 X RESOLVER ERROR LO — B5 — AA13
SCT TRUNNION 1 X RESOLVER ERROR HI — B7 — AA14
SCT TRUNNION 1 X RESOLVER ERROR LO — B8 — AA15
SCT SHAFT TACH HI — B9 — AA16
TRUNNION CDU 16X ERROR SIG HI — C1 — AA173
TRUNNION CDU 16 X ERROR SIG HI — C2 — AA17
TRUNNION CDU 16 X LOAD — C3 — AA18
LOADING SHAFT CDU 16 X RESOLVER — C4 — AA19
LOADING SXT SHAFT 1/2 X RESOLVER — C5 — AA20
LOADING SCT SHAFT 1/2 X RESOLVER — C7 — AA21
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SXT TRUNNION 1 X RESOLVER ERROR LO — D2 — AA10
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SHAFT CDU 1/2 X COS STATOR LOAD — D6 — AA168
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TRUNNION CDU 1/4 X COS HI — F5 — AA28
TRUNNION CDU 1/4 X COS LO — F6 — AA29
TRUNNION CDU 1/2 X RESOLVER HI — F8 — AA30
TRUNNION CDU 1/2 X RESOLVER — F9 — AA31
SCT TRUNNION 1 X COS LO — G1 — AA32
SCT TRUNNION 1 X SINE HI — G2 — AA33
SCT TRUNNION 1 X SINE LO — G3 — AA34
COSECANT AMPL FEEDBACK SIG LO — G5 — AA35
COSECANT AMPLIFIER OUTPUT HI — G6 — AA36
SCT TRUNNION 1 X COS HI — H1 — AA37
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT — H5 — AA38
COSECANT AMPL FEEDBACK SIG HI — H6 — AA39
SXT TRUNNION MOTOR DRIVE AMPL TEST LO — K1 — AA40
TRUNNION CDU 16 X RESOLVER OUTPUT LO (TEST) — K2 — AA41
SXT SHAFT MOTOR DRIVE AMPL TEST LO — K3 — AA42
SHAFT CDU 16 X RESOLVER OUTPUT LO (TEST) — K4 — AA43
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SCT SHAFT 1/2X ERROR LO (TEST) — K6 — AA45
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SXT SHAFT MOTOR DRIVE AMPL TEST HI — L3 — AA48
SHAFT CDU 16 X RESOLVER OUTPUT HI (TEST) — L4 — AA49
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SCT SHAFT 1/2X ERROR HI (TEST) — L6 — AA51
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SCT SHAFT MOTOR CONTROL WINDING — P2 — AA63
STRUCTURE GRD — P3 — AA64
SHIELDS — P4
ELECTROSTATIC SHIELD — P5 — AA65
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SCT SHAFT MOTOR CONTROL WINDING — R2 — AA68
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MDA INPUT 0 VDC SCT SHAFT — R6 — AA71
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SXT TRUNNION MOTOR CONTROL WINDING — S2 — AA73
MDA OUTPUT 0 VDC SCT TRUNNION — S3 — AA74
MDA OUTPUT 0 VDC SXT TRUNNION — S5 — AA75
MDA OUTPUT 0 VDC SXT SHAFT — S6 — AA76
+28 VDC — T1 — AA77
SCT TRUNNION MOTOR CONTROL WINDING — T2 — AA78
SCT TRUNNION MOTOR CONTROL WINDING — T3 — AA79
MDA INPUT 0 VDC SCT TRUNNION — T4 — AA80
MDA INPUT 0 VDC SXT TRUNNION — T5 — AA81
MDA INPUT 0 VDC SXT SHAFT — T6 — AA82
45A9E1
RELAY MODULE 1015137 45A9J2
PRE AMP MOTOR DRIVE 1015149 45A9J3
2 SPEED SWITCH 1015[illegible]
MOTOR DRIVE AMPL 1015121 45A9J7
MOTOR DRIVE AMPL 1015121 45A9J8
MOTOR DRIVE AMPL 1015121
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SYM	DESCRIPTION	DATE	APPROVAL
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B	REVISED PER TDRR 03333		
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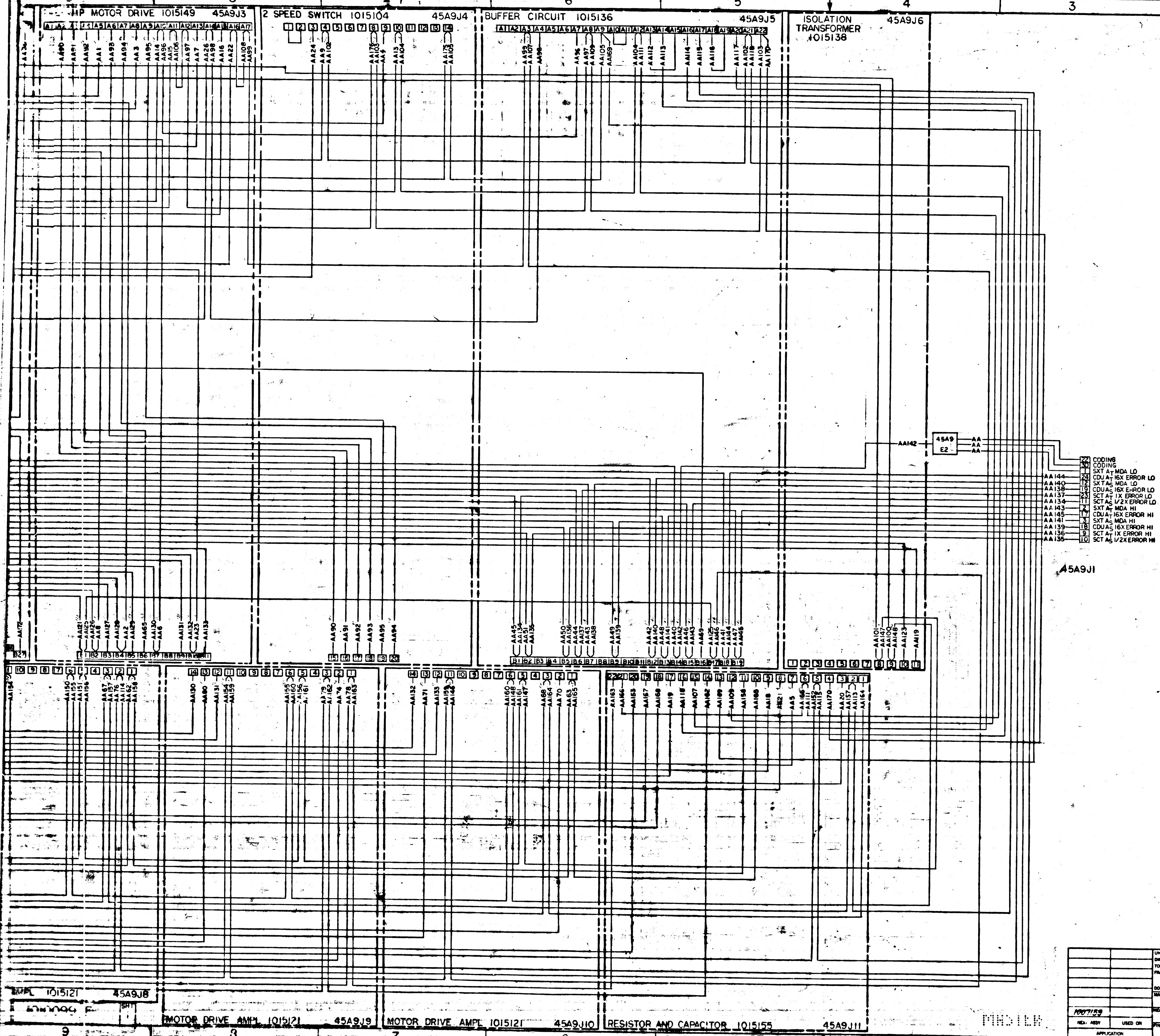

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2 SPEED SWITCH 1015104 45A9J4
BUFFER CIRCUIT 1015136 45A9J5
ISOLATION TRANSFORMER 1015138 45A9J6
45A9 E2
AA142
22 CODING
30 CODING
1 SXT A$_T$ MDA LO
AA144 24 CDU A$_T$ 16X ERROR LO
AA140 12 SXT A$_S$ MDA LO
AA138 19 CDU A$_S$ 16X ERROR LO
AA137 23 SCT A$_T$ 1X ERROR LO
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AA143 2 SXT A$_T$ MDA HI
AA145 17 CDU A$_T$ 16X ERROR HI
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AA135 10 SCT A$_S$ 1/2X ERROR HI
45A9J1
AMPL 1015121 45A9J8
MOTOR DRIVE AMPL 1015121 45A9J9
MOTOR DRIVE AMPL 1015121 45A9J10
RESISTOR AND CAPACITOR 1015155 45A9J11

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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
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SIZE J NASA DRAWING NO. 1010099

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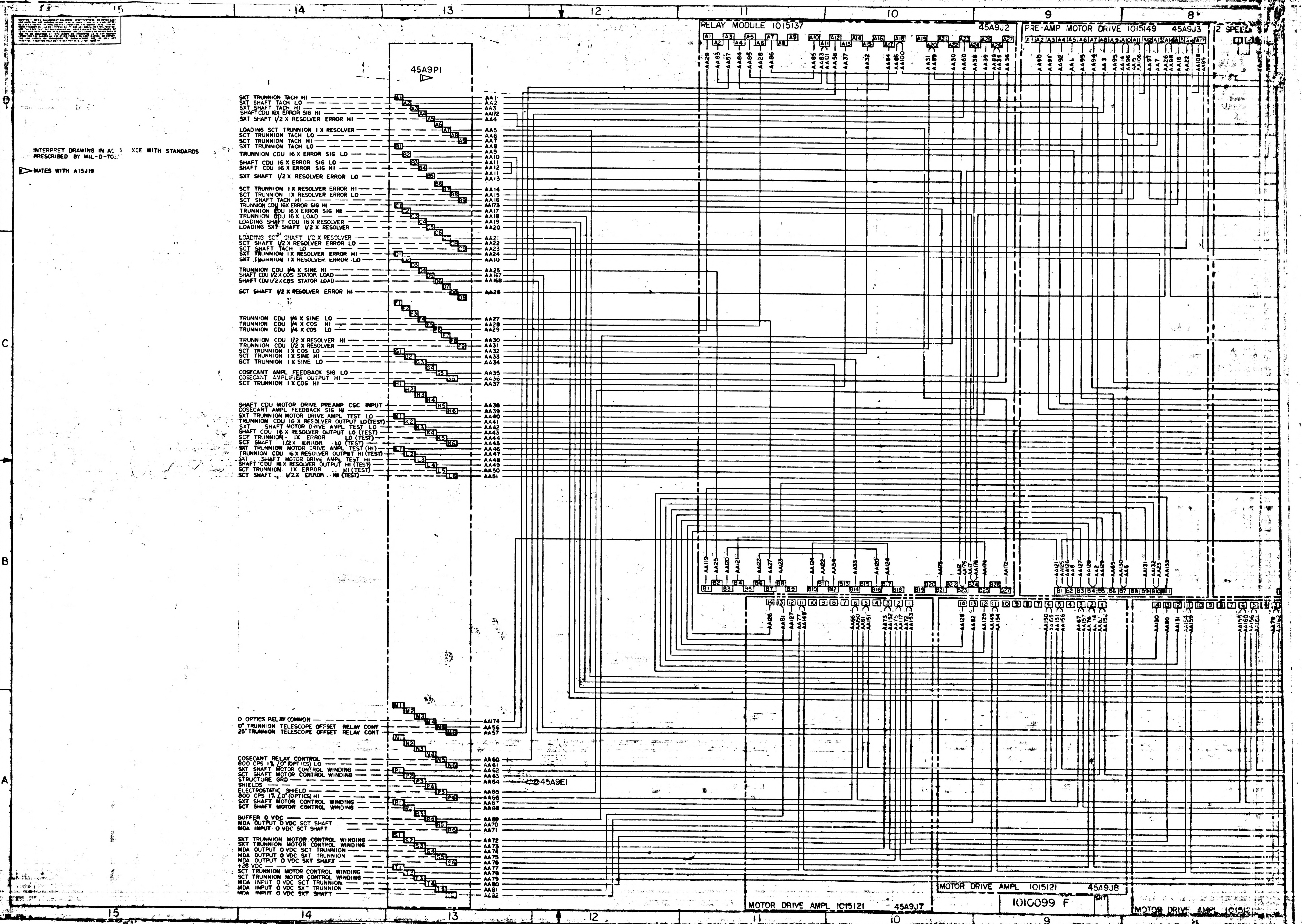
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SXT TRUNNION TACH HI
SXT SHAFT TACH LO
SXT SHAFT TACH HI
SHAFT CDU 16X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR HI
LOADING SCT TRUNNION 1 X RESOLVER
SCT TRUNNION TACH LO
SCT TRUNNION TACH HI
SXT TRUNNION TACH LO
TRUNNION CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG LO
SHAFT CDU 16 X ERROR SIG HI
SXT SHAFT 1/2 X RESOLVER ERROR LO
SCT TRUNNION 1 X RESOLVER ERROR HI
SCT TRUNNION 1 X RESOLVER ERROR LO
SCT SHAFT TACH HI
TRUNNION CDU 16X ERROR SIG HI
TRUNNION CDU 16 X ERROR SIG HI
TRUNNION CDU 16 X LOAD
LOADING SHAFT CDU 16 X RESOLVER
LOADING SXT SHAFT 1/2 X RESOLVER
LOADING SCT SHAFT 1/2 X RESOLVER
SCT SHAFT 1/2 X RESOLVER ERROR LO
SCT SHAFT TACH LO
SXT TRUNNION 1 X RESOLVER ERROR HI
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TRUNNION CDU 1/4 X SINE HI
SHAFT CDU 1/2 X COS STATOR LOAD
SHAFT CDU 1/2 X COS STATOR LOAD
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TRUNNION CDU 1/4 X SINE LO
TRUNNION CDU 1/4 X COS HI
TRUNNION CDU 1/4 X COS LO
TRUNNION CDU 1/2 X RESOLVER HI
TRUNNION CDU 1/2 X RESOLVER
SCT TRUNNION 1 X COS LO
SCT TRUNNION 1 X SINE HI
SCT TRUNNION 1 X SINE LO
COSECANT AMPL FEEDBACK SIG LO
COSECANT AMPLIFIER OUTPUT HI
SCT TRUNNION 1 X COS HI
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT
COSECANT AMPL FEEDBACK SIG HI
SXT TRUNNION MOTOR DRIVE AMPL TEST LO
TRUNNION CDU 16 X RESOLVER OUTPUT LO (TEST)
SXT SHAFT MOTOR DRIVE AMPL TEST LO
SHAFT CDU 16 X RESOLVER OUTPUT LO (TEST)
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SCT SHAFT 1/2 X ERROR LO (TEST)
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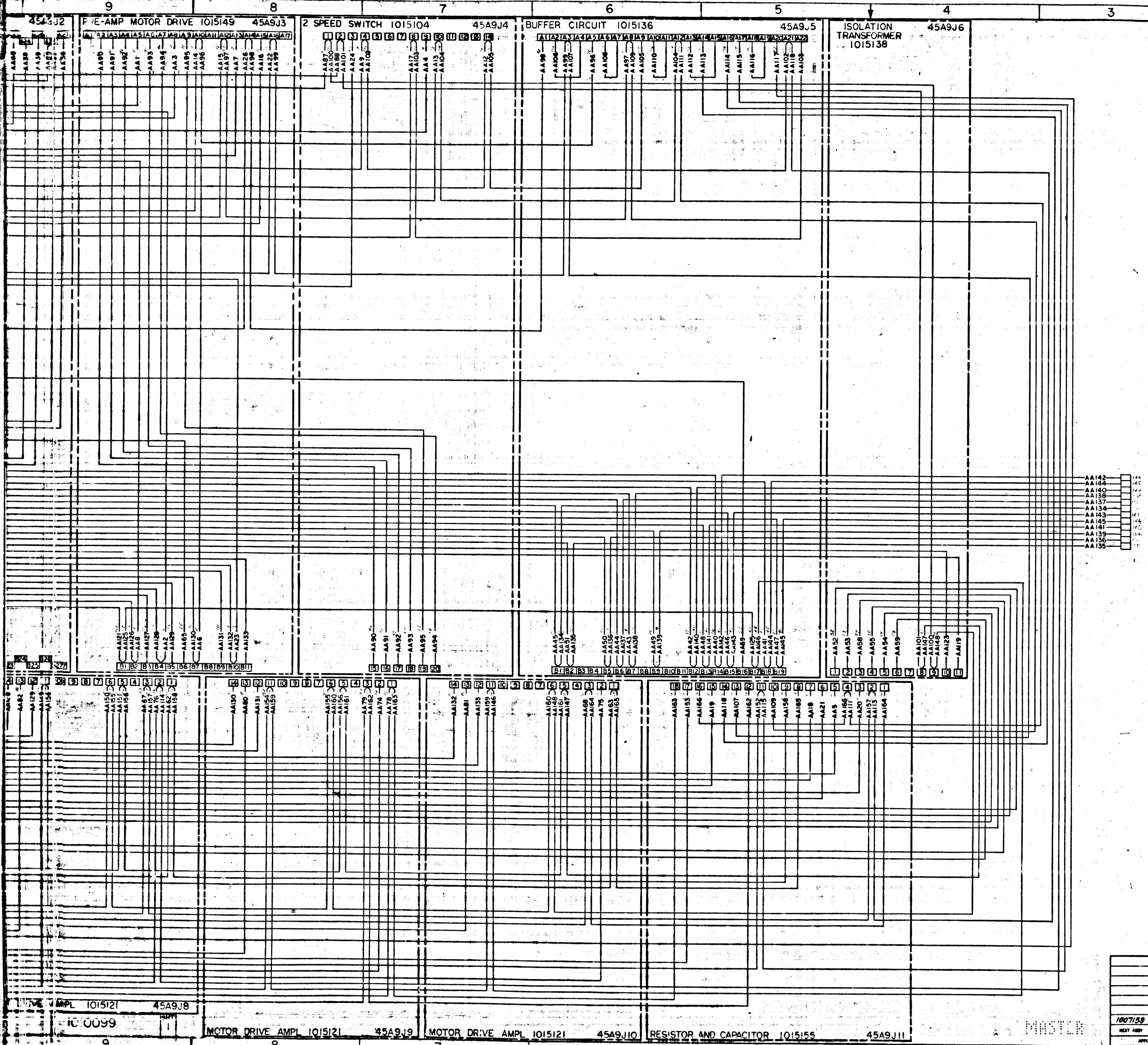
SCT SHAFT 1/2 X ERROR HI (TEST)
0 OPTICS RELAY COMMON
0° TRUNNION TELESCOPE OFFSET RELAY CONT
25° TRUNNION TELESCOPE OFFSET RELAY CONT
COSECANT RELAY CONTROL
800 CPS 1% ∠0° (OPTICS) LO
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
STRUCTURE GRD
SHIELDS
ELECTROSTATIC SHIELD
800 CPS 1% ∠0° (OPTICS) HI
SXT SHAFT MOTOR CONTROL WINDING
SCT SHAFT MOTOR CONTROL WINDING
BUFFER 0 VDC
MDA OUTPUT 0 VDC SCT SHAFT
MDA INPUT 0 VDC SCT SHAFT
SXT TRUNNION MOTOR CONTROL WINDING
SXT TRUNNION MOTOR CONTROL WINDING
MDA OUTPUT 0 VDC SCT TRUNNION
MDA OUTPUT 0 VDC SXT TRUNNION
MDA OUTPUT 0 VDC SXT SHAFT
+28 VDC
SCT TRUNNION MOTOR CONTROL WINDING
SCT TRUNNION MOTOR CONTROL WINDING
MDA INPUT 0 VDC SCT TRUNNION
MDA INPUT 0 VDC SXT TRUNNION
MDA INPUT 0 VDC SXT SHAFT
A1 A2 A3 A4 A5 A6 A7 A8 A9
B1 B2 B3 B4 B5 B6 B7 B8 B9
C1 C2 C3 C4 C5 C6 C7 C8 C9
D1 D2 D3 D4 D5 D6 D7 D8 D9
E1 E2 E3 E4 E5 E6 E7 E8 E9
G1 G2 G3 G4 G5 G6
H1 H2 H3 H4 H5 H6
K1 K2 K3 K4 K5 K6
L1 L2 L3 L4 L5 L6
M1 M2 M3 M4 M5 M6
N1 N2 N3 N4 N5 N6
P1 P2 P3 P4 P5 P6
R1 R2 R3 R4 R5 R6
S1 S2 S3 S4 S5 S6
T1 T2 T3 T4 T5 T6
AA1 AA2 AA3 AA172 AA4
AA5 AA6 AA7 AA8 AA9 AA10 AA11 AA12 AA11 AA13
AA14 AA15 AA16 AA173 AA17 AA18 AA19 AA20
AA21 AA22 AA23 AA24 AA10
AA25 AA167 AA168 AA26
AA27 AA28 AA29 AA30 AA31 AA32 AA33 AA34
AA35 AA36 AA37
AA38 AA39 AA40 AA41 AA42 AA43 AA44 AA45 AA46 AA47 AA48 AA49 AA50 AA51
AA174 AA56 AA57
AA60 AA61 AA62 AA63 AA64
AA65 AA66 AA67 AA68
AA69 AA70 AA71
AA72 AA73 AA74 AA75 AA76 AA77 AA78 AA79 AA80 AA81 AA82
45A9E1
RELAY MODULE 1015137
45A9J2
PRE-AMP MOTOR DRIVE 1015149
45A9J3
2 SPEE
MOTOR DRIVE AMPL 1015121 45A9J7
MOTOR DRIVE AMPL 1015121 45A9J8
MOTOR DRIVE AMPL 10151

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70[illegible]

▷ MATES WITH A15J19

1010099 F

SHT


PRE-AMP MOTOR DRIVE 1015149 45A9J3
2 SPEED SWITCH 1015104 45A9J4
BUFFER CIRCUIT 1015136 45A9J5
ISOLATION TRANSFORMER 1015138 45A9J6
45A9J2
45A9J1
AMPL 1015121 45A9J8
MOTOR DRIVE AMPL 1015121 45A9J9
MOTOR DRIVE AMPL 1015121 45A9J10
RESISTOR AND CAPACITOR 1015155 45A9J11
1C 0099
AA142
AA144
AA140
AA138
AA137
AA134
AA143
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AA141
AA139
AA136
AA135

6600101

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02348 DATE 3-31-65

1007159	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN E. Gross DATE 22 Jun 65
CHECKED
APPROVAL 3-31-65
APPROVAL 3-31-65
NASA APPROVAL Jack Bennett
MIT APPROVAL 3/31/65

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY 9

CODE IDENT NO. SIZE J NASA DRAWING NO. 1010099
SCALE — WT SHEET 1 OF 1

MASTER

[illegible]

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷ MATES WITH A15J19

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ASSEMBLY DRAWING 1007159
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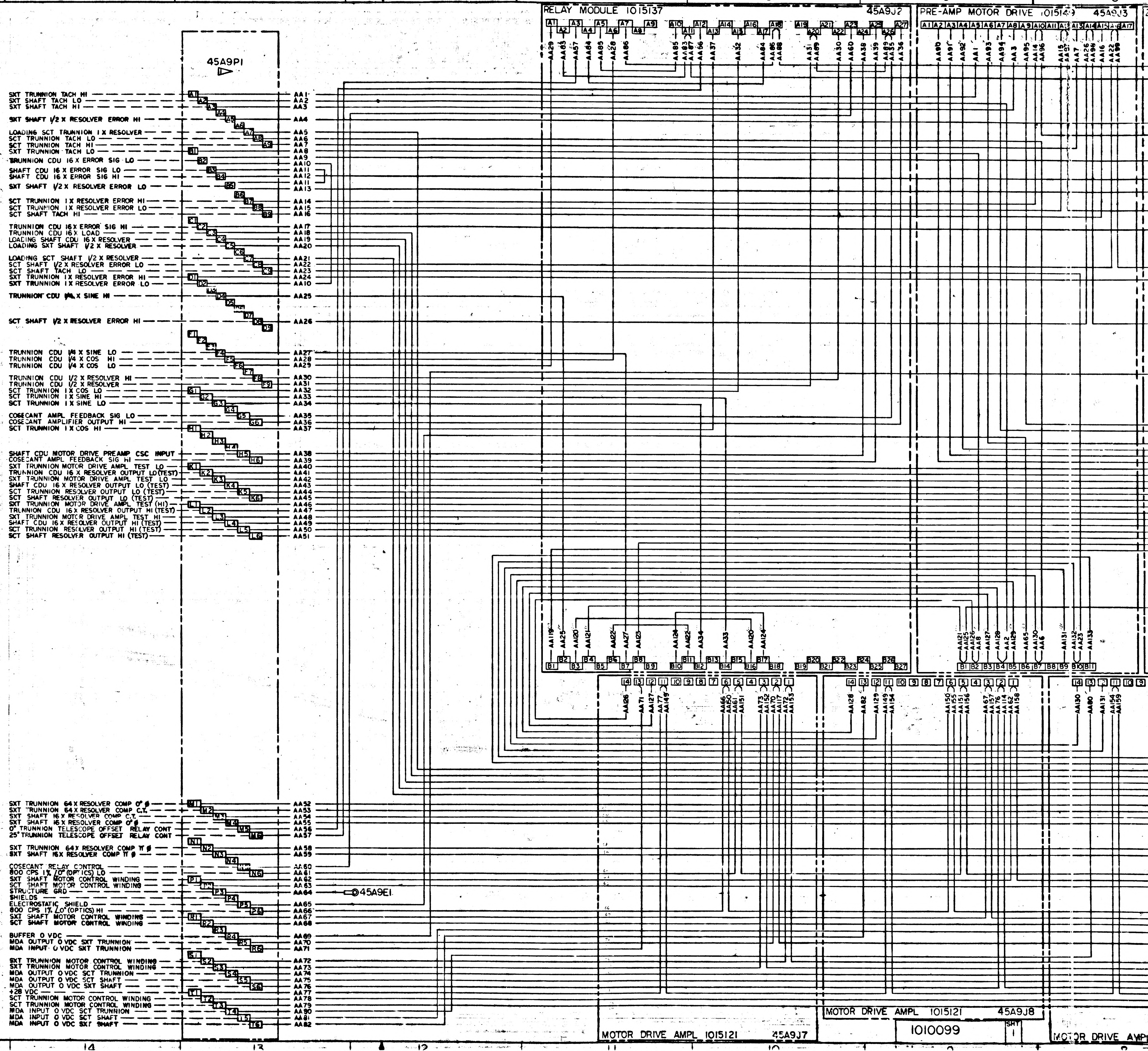
45A9P1
SXT TRUNNION TACH HI — A1 — AA1
SXT SHAFT TACH LO — A2 — AA2
SXT SHAFT TACH HI — A3 — AA3
SXT SHAFT 1/2 X RESOLVER ERROR HI — AA4
LOADING SCT TRUNNION 1 X RESOLVER — AA5
SCT TRUNNION TACH LO — AA6
SCT TRUNNION TACH HI — AA7
SXT TRUNNION TACH LO — B1 — AA8
AA9
TRUNNION CDU 16 X ERROR SIG LO — B2 — AA10
SHAFT CDU 16 X ERROR SIG LO — B3 — AA11
SHAFT CDU 16 X ERROR SIG HI — B4 — AA12
AA11
SXT SHAFT 1/2 X RESOLVER ERROR LO — B5 — AA13
SCT TRUNNION 1 X RESOLVER ERROR HI — AA14
SCT TRUNNION 1 X RESOLVER ERROR LO — AA15
SCT SHAFT TACH HI — B9 — AA16
TRUNNION CDU 16 X ERROR SIG HI — AA17
TRUNNION CDU 16 X LOAD — AA18
LOADING SHAFT CDU 16 X RESOLVER — AA19
LOADING SXT SHAFT 1/2 X RESOLVER — AA20
LOADING SCT SHAFT 1/2 X RESOLVER — AA21
SCT SHAFT 1/2 X RESOLVER ERROR LO — AA22
SCT SHAFT TACH LO — C9 — AA23
SXT TRUNNION 1 X RESOLVER ERROR HI — D1 — AA24
SXT TRUNNION 1 X RESOLVER ERROR LO — D2 — AA10
TRUNNION CDU 1/4 X SINE HI — D4 — AA25
SCT SHAFT 1/2 X RESOLVER ERROR HI — D8 — AA26
TRUNNION CDU 1/4 X SINE LO — F4 — AA27
TRUNNION CDU 1/4 X COS HI — F5 — AA28
TRUNNION CDU 1/4 X COS LO — F6 — AA29
TRUNNION CDU 1/2 X RESOLVER HI — F8 — AA30
TRUNNION CDU 1/2 X RESOLVER — F9 — AA31
SCT TRUNNION 1 X COS LO — G1 — AA32
SCT TRUNNION 1 X SINE HI — G2 — AA33
SCT TRUNNION 1 X SINE LO — G3 — AA34
COSECANT AMPL FEEDBACK SIG LO — G5 — AA35
COSECANT AMPLIFIER OUTPUT HI — G6 — AA36
SCT TRUNNION 1 X COS HI — H1 — AA37
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT — H5 — AA38
COSECANT AMPL FEEDBACK SIG HI — H6 — AA39
SXT TRUNNION MOTOR DRIVE AMPL TEST LO — K1 — AA40
TRUNNION CDU 16 X RESOLVER OUTPUT LO (TEST) — K2 — AA41
SXT TRUNNION MOTOR DRIVE AMPL TEST LO — K3 — AA42
SHAFT CDU 16 X RESOLVER OUTPUT LO (TEST) — K4 — AA43
SCT TRUNNION RESOLVER OUTPUT LO (TEST) — K5 — AA44
SCT SHAFT RESOLVER OUTPUT LO (TEST) — K6 — AA45
SXT TRUNNION MOTOR DRIVE AMPL TEST (HI) — L1 — AA46
TRUNNION CDU 16 X RESOLVER OUTPUT HI (TEST) — L2 — AA47
SXT TRUNNION MOTOR DRIVE AMPL TEST HI — L3 — AA48
SHAFT CDU 16 X RESOLVER OUTPUT HI (TEST) — L4 — AA49
SCT TRUNNION RESOLVER OUTPUT HI (TEST) — L5 — AA50
SCT SHAFT RESOLVER OUTPUT HI (TEST) — L6 — AA51
SXT TRUNNION 64 X RESOLVER COMP 0° ϕ — M1 — AA52
SXT TRUNNION 64 X RESOLVER COMP C.T. — M2 — AA53
SXT SHAFT 16 X RESOLVER COMP C.T. — M3 — AA54
SXT SHAFT 16 X RESOLVER COMP 0° ϕ — M4 — AA55
0° TRUNNION TELESCOPE OFFSET RELAY CONT — M5 — AA56
25° TRUNNION TELESCOPE OFFSET RELAY CONT — M6 — AA57
SXT TRUNNION 64 X RESOLVER COMP π ϕ — N2 — AA58
SXT SHAFT 16 X RESOLVER COMP π ϕ — N3 — AA59
COSECANT RELAY CONTROL — AA60
800 CPS 1% ∠0° (OPTICS) LO — N6 — AA61
SXT SHAFT MOTOR CONTROL WINDING — P1 — AA62
SCT SHAFT MOTOR CONTROL WINDING — P2 — AA63
STRUCTURE GRD — P3 — AA64 — 45A9E1
SHIELDS — P4
ELECTROSTATIC SHIELD — P5 — AA65
800 CPS 1% ∠0° (OPTICS) HI — P6 — AA66
SXT SHAFT MOTOR CONTROL WINDING — R1 — AA67
SCT SHAFT MOTOR CONTROL WINDING — R2 — AA68
BUFFER 0 VDC — R4 — AA69
MDA OUTPUT 0 VDC SXT TRUNNION — R5 — AA70
MDA INPUT 0 VDC SXT TRUNNION — R6 — AA71
SXT TRUNNION MOTOR CONTROL WINDING — S1 — AA72
SXT TRUNNION MOTOR CONTROL WINDING — S2 — AA73
MDA OUTPUT 0 VDC SCT TRUNNION — S4 — AA74
MDA OUTPUT 0 VDC SCT SHAFT — S5 — AA75
MDA OUTPUT 0 VDC SXT SHAFT — S6 — AA76
+28 VDC — T1 — AA77
SCT TRUNNION MOTOR CONTROL WINDING — T2 — AA78
SCT TRUNNION MOTOR CONTROL WINDING — T3 — AA79
MDA INPUT 0 VDC SCT TRUNNION — T4 — AA80
MDA INPUT 0 VDC SCT SHAFT — T5 — AA81
MDA INPUT 0 VDC SXT SHAFT — T6 — AA82
RELAY MODULE 1015137
45A9J2
PRE-AMP MOTOR DRIVE 1015149
45A9J3
MOTOR DRIVE AMPL 1015121
45A9J7
MOTOR DRIVE AMPL 1015121
45A9J8
MOTOR DRIVE AMPL
15
14
13
12
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D
C
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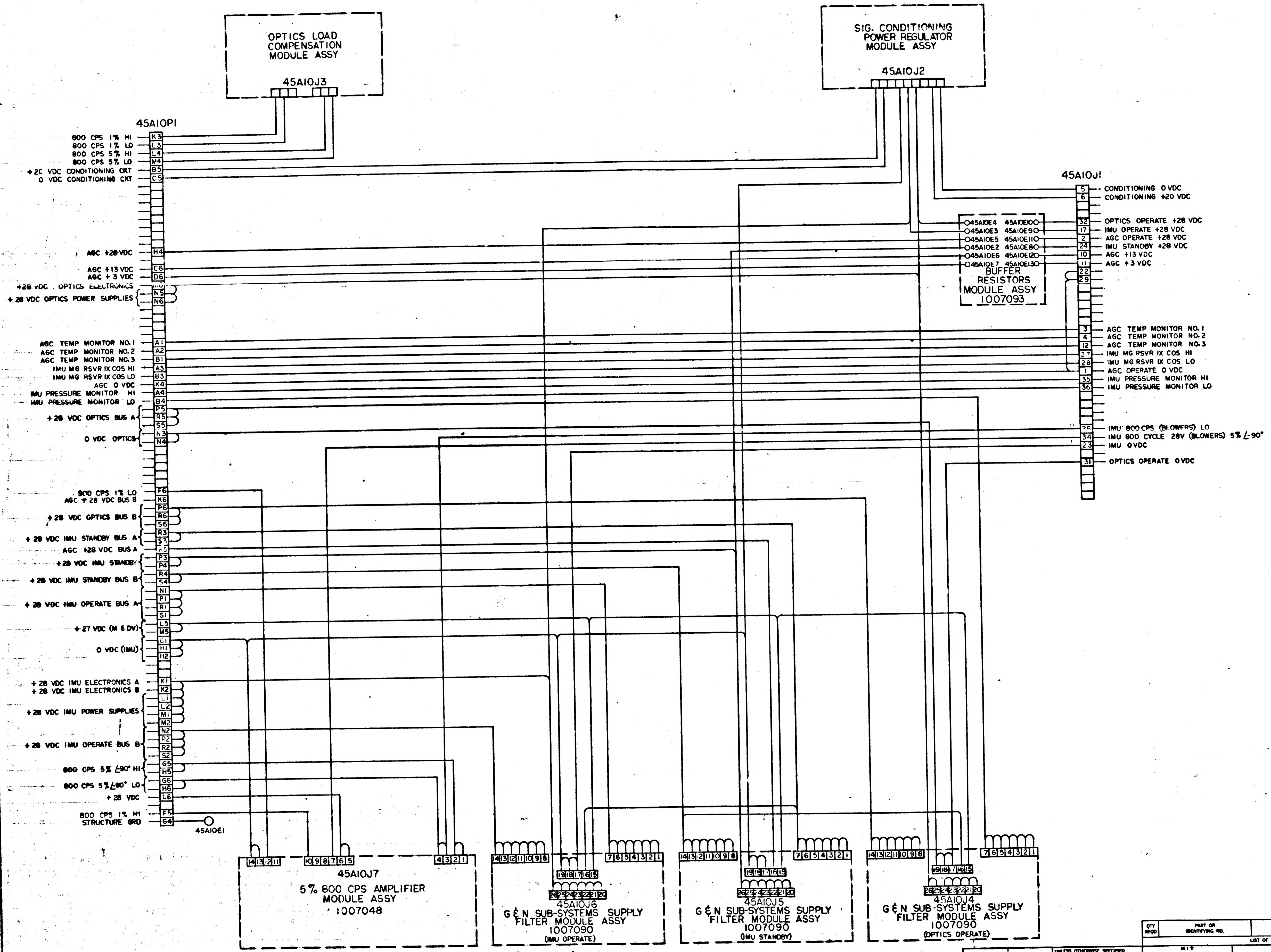
1010099 SHT 1

REVISIONS TDRR 02233			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 03290	9-19-66	


OPTICS LOAD COMPENSATION MODULE ASSY
45A10J3
SIG. CONDITIONING POWER REGULATOR MODULE ASSY
45A10J2
45A10P1
800 CPS 1% HI — K3
800 CPS 1% LO — L3
800 CPS 5% HI — L4
800 CPS 5% LO — M4
+20 VDC CONDITIONING CKT — B5
0 VDC CONDITIONING CKT — C5
AGC +28 VDC — H4
AGC +13 VDC — C6
AGC + 3 VDC — D6
+28 VDC OPTICS ELECTRONICS — M6
+ 28 VDC OPTICS POWER SUPPLIES — N5, N6
AGC TEMP MONITOR NO.1 — A1
AGC TEMP MONITOR NO.2 — A2
AGC TEMP MONITOR NO.3 — B1
IMU MG RSVR IX COS HI — A3
IMU MG RSVR IX COS LO — B3
AGC 0 VDC — K4
IMU PRESSURE MONITOR HI — A4
IMU PRESSURE MONITOR LO — B4
+ 28 VDC OPTICS BUS A — P5, R5, S5
0 VDC OPTICS — N3, N4
800 CPS 1% LO — F6
AGC + 28 VDC BUS B — K6
+ 28 VDC OPTICS BUS B — P6, R6, S6
+ 28 VDC IMU STANDBY BUS A — R3, S3
AGC +28 VDC BUS A — K5
+ 28 VDC IMU STANDBY — P3, P4
+ 28 VDC IMU STANDBY BUS B — R4, S4
+ 28 VDC IMU OPERATE BUS A — N1, P1, R1, S1
+ 27 VDC (M & DV) — L5, M5
0 VDC (IMU) — G1, H1, H2
+ 28 VDC IMU ELECTRONICS A — K1
+ 28 VDC IMU ELECTRONICS B — K2
+ 28 VDC IMU POWER SUPPLIES — L1, L2, M1, M2
+ 28 VDC IMU OPERATE BUS B — N2, P2, R2, S2
800 CPS 5% ∠90° HI — G5, H5
800 CPS 5% ∠90° LO — G6, H6
+ 28 VDC — L6
800 CPS 1% HI — F5
STRUCTURE GRD — G4
45A10E1
45A10J1
5 — CONDITIONING 0 VDC
6 — CONDITIONING +20 VDC
32 — OPTICS OPERATE +28 VDC
17 — IMU OPERATE +28 VDC
2 — AGC OPERATE +28 VDC
24 — IMU STANDBY +28 VDC
10 — AGC +13 VDC
11 — AGC +3 VDC
22
29
3 — AGC TEMP MONITOR NO.1
4 — AGC TEMP MONITOR NO.2
12 — AGC TEMP MONITOR NO.3
27 — IMU MG RSVR IX COS HI
28 — IMU MG RSVR IX COS LO
1 — AGC OPERATE 0 VDC
35 — IMU PRESSURE MONITOR HI
36 — IMU PRESSURE MONITOR LO
26 — IMU 800 CPS (BLOWERS) LO
34 — IMU 800 CYCLE 28V (BLOWERS) 5% ∠-90°
23 — IMU 0 VDC
31 — OPTICS OPERATE 0 VDC
45A10E4 45A10E10
45A10E3 45A10E9
45A10E5 45A10E11
45A10E2 45A10E8
45A10E6 45A10E12
45A10E7 45A10E13
BUFFER RESISTORS MODULE ASSY 1007093
14 13 12 11 10 9 8 7 6 5 4 3 2 1
45A10J7
5% 800 CPS AMPLIFIER MODULE ASSY 1007048
14 13 12 11 10 9 8 19 18 17 16 15 26 25 24 23 22 21 20 7 6 5 4 3 2 1
45A10J6
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY 1007090 (IMU OPERATE)
45A10J5
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY 1007090 (IMU STANDBY)
45A10J4
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY 1007090 (OPTICS OPERATE)

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

SCHEMATIC REF:
G & N SUB-SYSTEMS SUPPLY FILTER 1010104
5% 800 CPS AMPLIFIER 1010046
OPTICS LOAD COMPENSATION
SIG. CONDITIONING POWER SUPPLY
BUFFER RESISTORS 1010103

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
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MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN E. Gross DATE 16 AUG 63
CHECKED
APPROVAL
APPROVAL 8-21-63
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #10

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010100
SCALE —
WT
SHEET 1 OF 1

1010100

[illegible]

REVISIONS TDRR 02732			
SYM	DESCRIPTION	DATE	APPROVAL
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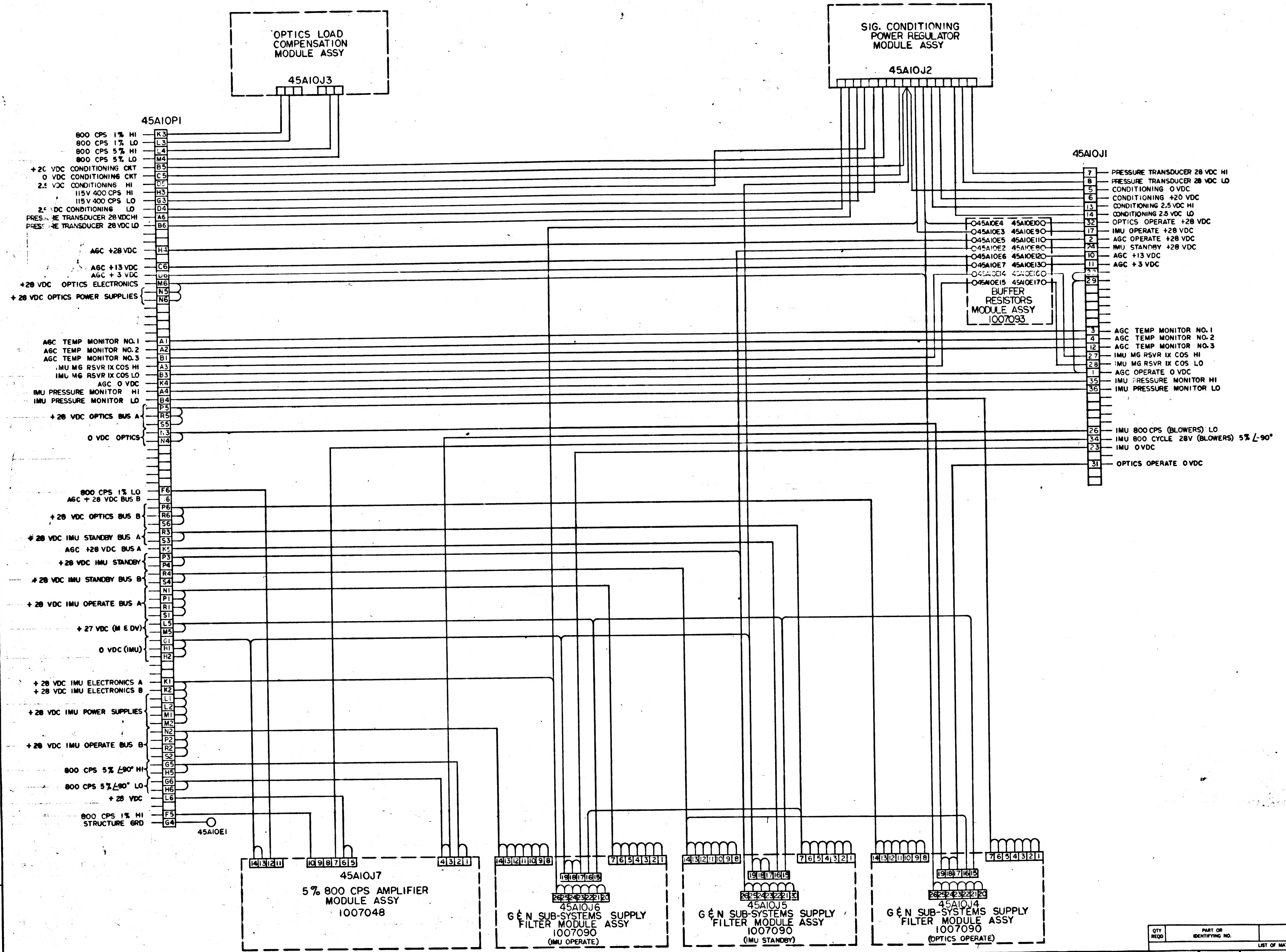
B	REVISED PER TDRR 23790	10-11-63	WK



OPTICS LOAD COMPENSATION MODULE ASSY
45A10J3
SIG. CONDITIONING POWER REGULATOR MODULE ASSY
45A10J2
45A10P1
800 CPS 1% HI K3
800 CPS 1% LO L3
800 CPS 5% HI L4
800 CPS 5% LO M4
+20 VDC CONDITIONING CKT B5
0 VDC CONDITIONING CKT C5
2.5 VDC CONDITIONING HI D5
115 V 400 CPS HI H3
115 V 400 CPS LO G3
2.5 VDC CONDITIONING LO D4
PRESSURE TRANSDUCER 28 VDC HI A6
PRESSURE TRANSDUCER 28 VDC LO B6
AGC +28 VDC H4
AGC +13 VDC C6
AGC + 3 VDC D6
+28 VDC OPTICS ELECTRONICS M6
+ 28 VDC OPTICS POWER SUPPLIES N5 N6
AGC TEMP MONITOR NO. 1 A1
AGC TEMP MONITOR NO. 2 A2
AGC TEMP MONITOR NO. 3 B1
IMU MG RSVR IX COS HI A3
IMU MG RSVR IX COS LO B3
AGC 0 VDC K4
IMU PRESSURE MONITOR HI A4
IMU PRESSURE MONITOR LO B4
+ 28 VDC OPTICS BUS A P5 R5 S5
0 VDC OPTICS N3 N4
800 CPS 1% LO F6
AGC + 28 VDC BUS B 6
+ 28 VDC OPTICS BUS B P6 R6 S6
+ 28 VDC IMU STANDBY BUS A R3 S3
AGC +28 VDC BUS A K5
+ 28 VDC IMU STANDBY P3 P4
+ 28 VDC IMU STANDBY BUS B R4 S4
+ 28 VDC IMU OPERATE BUS A N1 P1 R1 S1
+ 27 VDC (M & DV) L5 M5
0 VDC (IMU) G1 H1 H2
+ 28 VDC IMU ELECTRONICS A K1
+ 28 VDC IMU ELECTRONICS B K2
+ 28 VDC IMU POWER SUPPLIES L1 L2 M1 M2
+ 28 VDC IMU OPERATE BUS B N2 P2 R2 S2
800 CPS 5% ∠-90° HI G5 H5
800 CPS 5% ∠-90° LO G6 H6
+ 28 VDC L6
800 CPS 1% HI F5
STRUCTURE GRD G4
45A10E1
45A10J1
7 PRESSURE TRANSDUCER 28 VDC HI
8 PRESSURE TRANSDUCER 28 VDC LO
5 CONDITIONING 0 VDC
6 CONDITIONING +20 VDC
13 CONDITIONING 2.5 VDC HI
14 CONDITIONING 2.5 VDC LO
32 OPTICS OPERATE +28 VDC
17 IMU OPERATE +28 VDC
2 AGC OPERATE +28 VDC
24 IMU STANDBY +28 VDC
10 AGC +13 VDC
11 AGC +3 VDC
22
29
3 AGC TEMP MONITOR NO. 1
4 AGC TEMP MONITOR NO. 2
12 AGC TEMP MONITOR NO. 3
27 IMU MG RSVR IX COS HI
28 IMU MG RSVR IX COS LO
1 AGC OPERATE 0 VDC
35 IMU PRESSURE MONITOR HI
36 IMU PRESSURE MONITOR LO
26 IMU 800 CPS (BLOWERS) LO
34 IMU 800 CYCLE 28V (BLOWERS) 5% ∠-90°
23 IMU 0 VDC
31 OPTICS OPERATE 0 VDC
45A10E4 45A10E10
45A10E3 45A10E9
45A10E5 45A10E11
45A10E2 45A10E8
45A10E6 45A10E12
45A10E7 45A10E13
45A10E14 45A10E16
45A10E15 45A10E17
BUFFER RESISTORS MODULE ASSY 1007093
14 13 12 11 10 9 8 7 6 5 4 3 2 1
45A10J7
5% 800 CPS AMPLIFIER MODULE ASSY
1007048
14 13 12 11 10 9 8 19 18 17 16 15 26 25 24 23 22 21 20 7 6 5 4 3 2 1
45A10J6
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY
1007090
(IMU OPERATE)
45A10J5
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY
1007090
(IMU STANDBY)
45A10J4
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY
1007090
(OPTICS OPERATE)

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

SCHEMATIC REF:
G & N SUB-SYSTEMS SUPPLY FILTER 1010104
5% 800 CPS AMPLIFIER 1010046
OPTICS LOAD COMPENSATION
SIG. CONDITIONING POWER SUPPLY
BUFFER RESISTORS 1010103

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN E. Gross DATE 16 AUG 63
CHECKED
APPROVAL
APPROVAL D.B. 8-21-63
NASA APPROVAL 8/21/63
MIT APPROVAL 8/21/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM TRAY #10

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010100
SCALE —
WT
SHEET 1 OF 1

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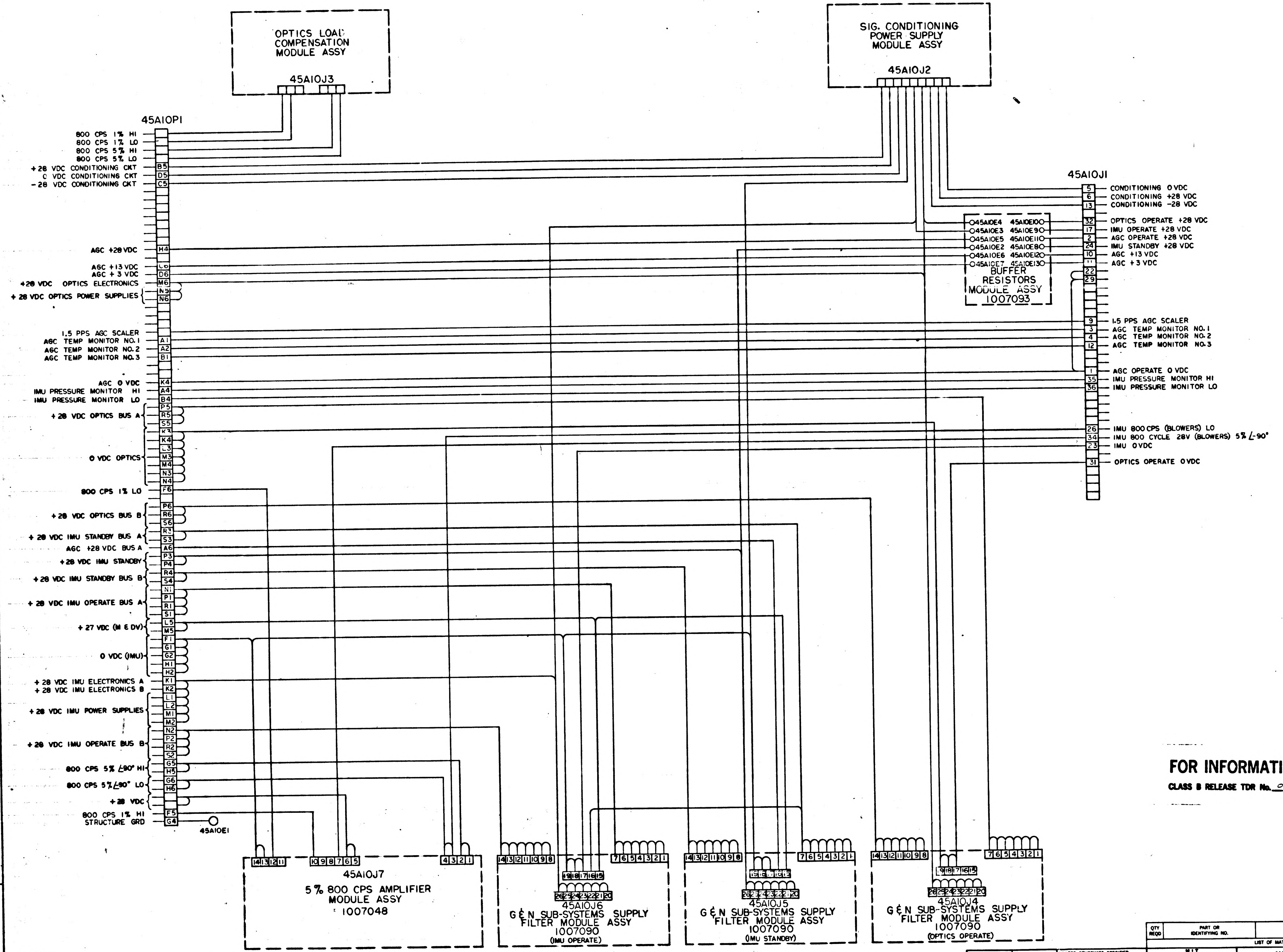
SYM	DESCRIPTION	DATE	APPROVAL


OPTICS LOAD COMPENSATION MODULE ASSY
45A10J3
SIG. CONDITIONING POWER SUPPLY MODULE ASSY
45A10J2
45A10P1
800 CPS 1% HI
800 CPS 1% LO
800 CPS 5% HI
800 CPS 5% LO
+28 VDC CONDITIONING CKT B5
0 VDC CONDITIONING CKT D5
-28 VDC CONDITIONING CKT C5
AGC +28 VDC H4
AGC +13 VDC C6
AGC + 3 VDC D6
+28 VDC OPTICS ELECTRONICS M6
+ 28 VDC OPTICS POWER SUPPLIES N5 N6
1.5 PPS AGC SCALER
AGC TEMP MONITOR NO. 1 A1
AGC TEMP MONITOR NO. 2 A2
AGC TEMP MONITOR NO. 3 B1
AGC 0 VDC K4
IMU PRESSURE MONITOR HI A4
IMU PRESSURE MONITOR LO B4
+ 28 VDC OPTICS BUS A P5 R5 S5
0 VDC OPTICS K3 K4 L3 M3 M4 N3 N4
800 CPS 1% LO F6
+ 28 VDC OPTICS BUS B P6 R6 S6
+ 28 VDC IMU STANDBY BUS A R3 S3
AGC +28 VDC BUS A A6
+ 28 VDC IMU STANDBY P3 P4
+ 28 VDC IMU STANDBY BUS B R4 S4
+ 28 VDC IMU OPERATE BUS A N1 P1 R1 S1
+ 27 VDC (M & DV) L5 M5
0 VDC (IMU) F1 G1 G2 H1 H2
+ 28 VDC IMU ELECTRONICS A K1
+ 28 VDC IMU ELECTRONICS B K2
+ 28 VDC IMU POWER SUPPLIES L1 L2 M1 M2
+ 28 VDC IMU OPERATE BUS B N2 P2 R2 S2
800 CPS 5% ∠90° HI G5 H5
800 CPS 5% ∠90° LO G6 H6
+ 28 VDC
800 CPS 1% HI F5
STRUCTURE GRD G4
45A10E1
45A10J1
5 CONDITIONING 0 VDC
6 CONDITIONING +28 VDC
13 CONDITIONING -28 VDC
32 OPTICS OPERATE +28 VDC
17 IMU OPERATE +28 VDC
2 AGC OPERATE +28 VDC
24 IMU STANDBY +28 VDC
10 AGC +13 VDC
11 AGC + 3 VDC
22
29
9 1.5 PPS AGC SCALER
3 AGC TEMP MONITOR NO. 1
4 AGC TEMP MONITOR NO. 2
12 AGC TEMP MONITOR NO. 3
1 AGC OPERATE 0 VDC
35 IMU PRESSURE MONITOR HI
36 IMU PRESSURE MONITOR LO
26 IMU 800 CPS (BLOWERS) LO
34 IMU 800 CYCLE 28V (BLOWERS) 5% ∠-90°
23 IMU 0 VDC
31 OPTICS OPERATE 0 VDC
45A10E4 45A10E10
45A10E3 45A10E9
45A10E5 45A10E11
45A10E2 45A10E8
45A10E6 45A10E12
45A10E7 45A10E13
BUFFER RESISTORS MODULE ASSY 1007093
14 13 12 11 K 9 8 7 6 5 4 3 2 1
45A10J7
5% 800 CPS AMPLIFIER MODULE ASSY 1007048
14 13 12 11 10 9 8 7 6 5 4 3 2 1
19 18 17 16 15
26 25 24 23 22 21 20
45A10J6
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY 1007090 (IMU OPERATE)
45A10J5
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY 1007090 (IMU STANDBY)
45A10J4
G & N SUB-SYSTEMS SUPPLY FILTER MODULE ASSY 1007090 (OPTICS OPERATE)

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02732 **DATE** 8-21-63

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

SCHEMATIC REF:
G & N SUB-SYSTEMS SUPPLY FILTER 1010104
5% 800 CPS AMPLIFIER 1010046
OPTICS LOAD COMPENSATION
SIG. CONDITIONING POWER SUPPLY
BUFFER RESISTORS 1010103

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG NO. CONTRACT
DRAWN E. Gross DATE 16 AUG 63
CHECKED
APPROVAL
APPROVAL D. R. Fot 8-21-63
NASA APPROVAL 8/21/63
MIT APPROVAL 8/21/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
TRAY #10

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010100
SCALE —
WT
SHEET 1 OF 1

1010100

INCHES
0 1
PHOTOGRAPHIC SCALE ONLY

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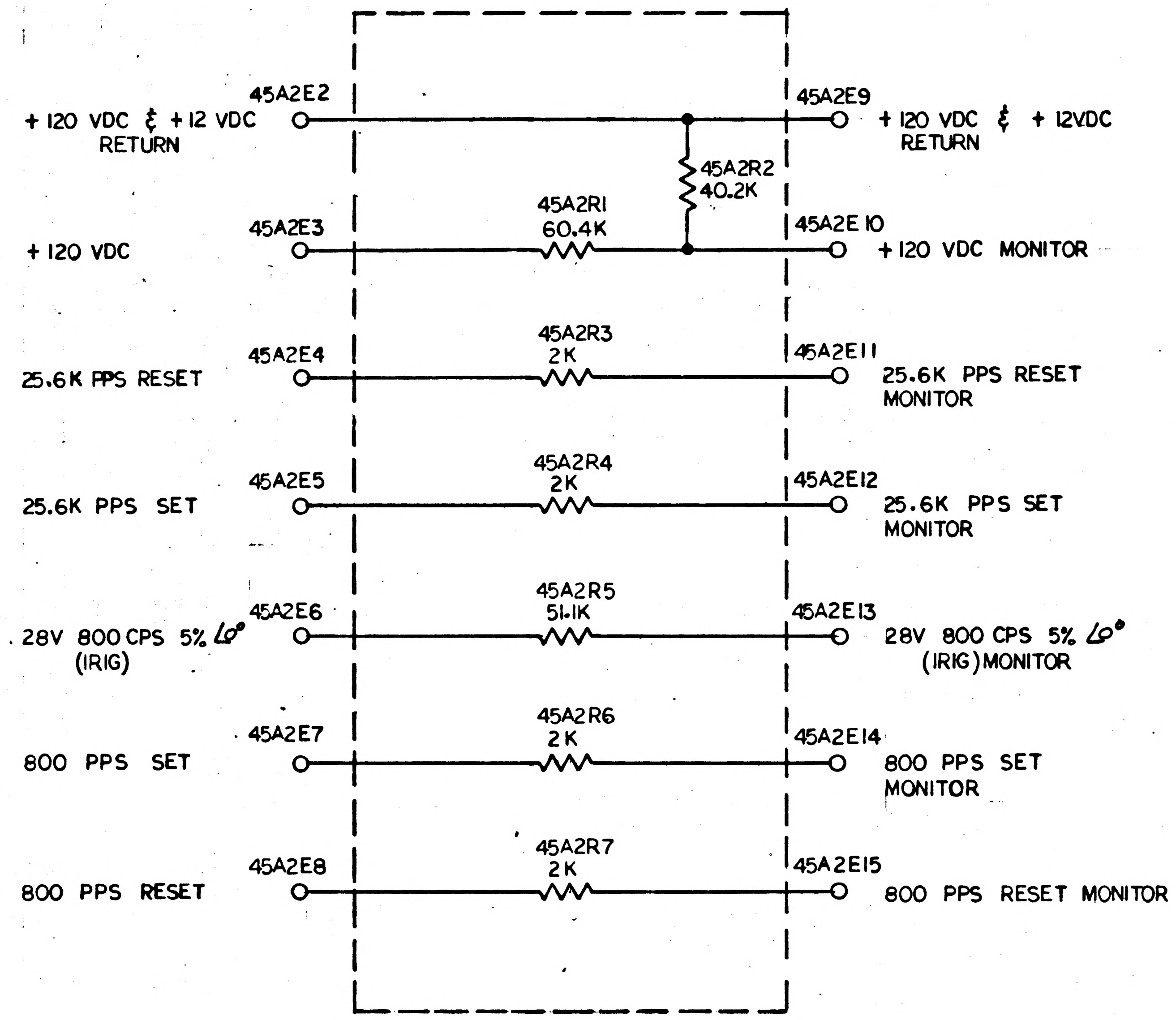
1010102

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


45A2E2
+120 VDC & +12 VDC RETURN
45A2E9
+120 VDC & +12VDC RETURN
45A2R2
40.2K
45A2R1
60.4K
45A2E3
+120 VDC
45A2E 10
+120 VDC MONITOR
45A2R3
2K
45A2E4
25.6K PPS RESET
45A2E11
25.6K PPS RESET MONITOR
45A2R4
2K
45A2E5
25.6K PPS SET
45A2E12
25.6K PPS SET MONITOR
45A2R5
51.1K
45A2E6
28V 800 CPS 5% 60° (IRIG)
45A2E13
28V 800 CPS 5% 60° (IRIG) MONITOR
45A2R6
2K
45A2E7
800 PPS SET
45A2E14
800 PPS SET MONITOR
45A2R7
2K
45A2E8
800 PPS RESET
45A2E15
800 PPS RESET MONITOR

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-593	RESISTOR	60.4K	± 1%	1/8W
R2	1010364-559		40.2K	± 1%	1/8W
R3	1006750-39		2K	± 2%	1/4W
R4	1006750-39		2K	± 2%	1/4W
R5	1010364-579		51.1K	± 1%	1/8W
R6	1006750-39		2K	± 2%	1/4W
R7	1006750-39		2K	± 2%	1/4W

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02437 **DATE** 8-7-63

REFERENCE DRAWING: BUFFER RESISTORS MODULE ASSY 1007091

NOTES:–
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

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CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Louis A Lowe DATE Aug 9 1963
CHECKED
APPROVAL 8-6-63
APPROVAL
NASA APPROVAL 8/7/63
MIT APPROVAL Aug 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
BUFFER RESISTORS
TRAY #2

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010102
SCALE —
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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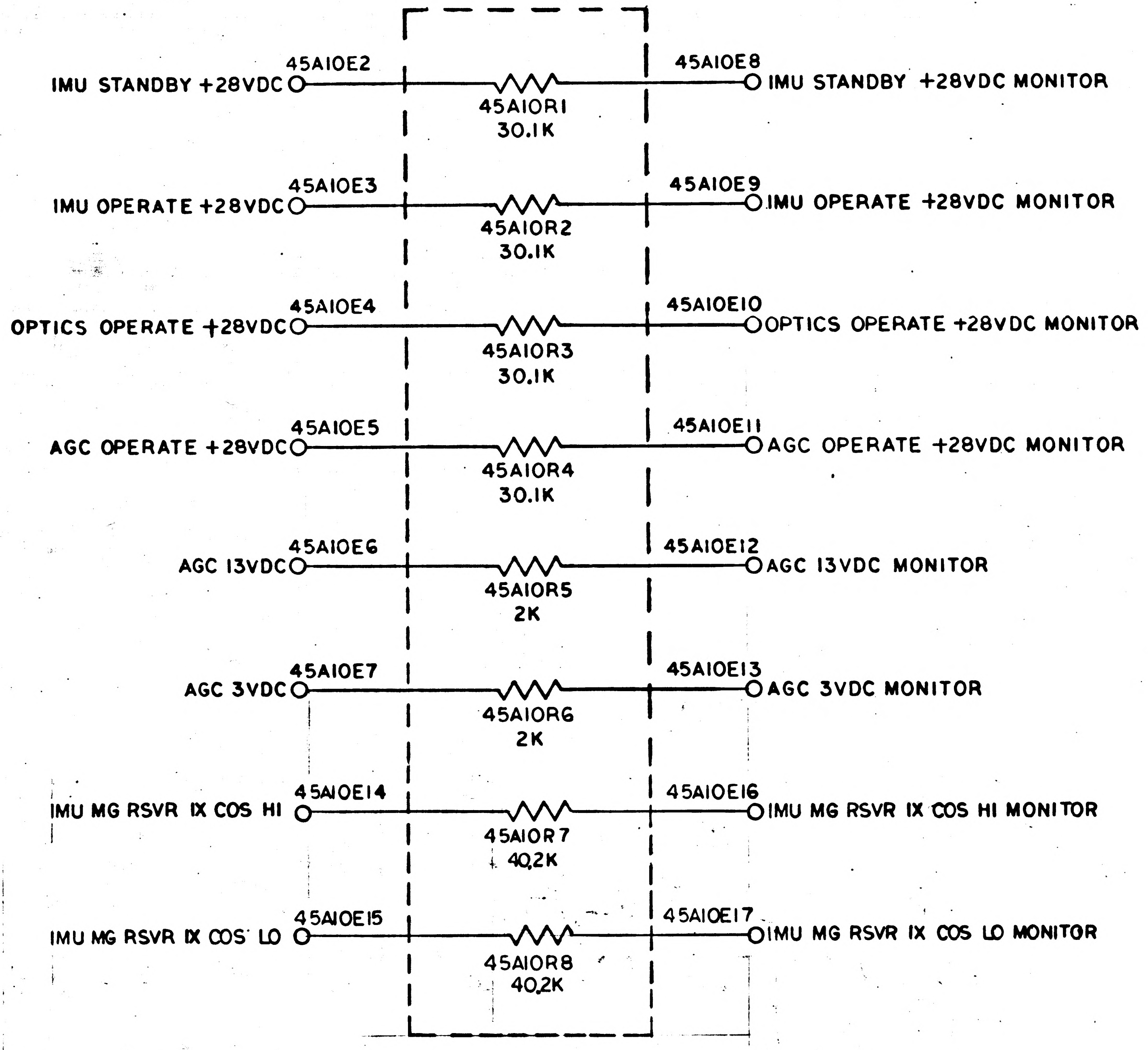
A | 1010103 (M)

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 03789	10-23-63	WR


45A10E2
IMU STANDBY +28VDC
45A10R1
30.1K
45A10E8
IMU STANDBY +28VDC MONITOR
45A10E3
IMU OPERATE +28VDC
45A10R2
30.1K
45A10E9
IMU OPERATE +28VDC MONITOR
45A10E4
OPTICS OPERATE +28VDC
45A10R3
30.1K
45A10E10
OPTICS OPERATE +28VDC MONITOR
45A10E5
AGC OPERATE +28VDC
45A10R4
30.1K
45A10E11
AGC OPERATE +28VDC MONITOR
45A10E6
AGC 13VDC
45A10R5
2K
45A10E12
AGC 13VDC MONITOR
45A10E7
AGC 3VDC
45A10R6
2K
45A10E13
AGC 3VDC MONITOR
45A10E14
IMU MG RSVR IX COS HI
45A10R7
40.2K
45A10E16
IMU MG RSVR IX COS HI MONITOR
45A10E15
IMU MG RSVR IX COS LO
45A10R8
40.2K
45A10E17
IMU MG RSVR IX COS LO MONITOR

REF DES	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010364-535	RESISTOR	30.1K	±1%	1/8 W
R2	↓	↓	↓	↓	↓
R3					
R4					
R5	1010364-309		2K		
R6	1010364-309		2K		
R7	1010364-559		40.2K		
R8	1010364-559		40.2K		

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02729 DATE 8-21-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± -//- DECIMALS ± -//- ANGLES ± -//-
DO NOT SCALE THIS DRAWING
MATERIAL -//-
HEAT TREATMENT -//-
FINAL FINISH -//-

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN J Falzano DATE 6 Aug 63
CHECKED
APPROVAL E Hoilak 8-16-63
APPROVAL D.A. Fost 8-21-63
NASA APPROVAL 8/19/63
MIT APPROVAL L Hazel 8/21/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC BUFFER RESISTORS TRAY NO. 10

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010103
SCALE -//-
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010103

SYM	DESCRIPTION	DATE	APPROVAL

REVISIONS

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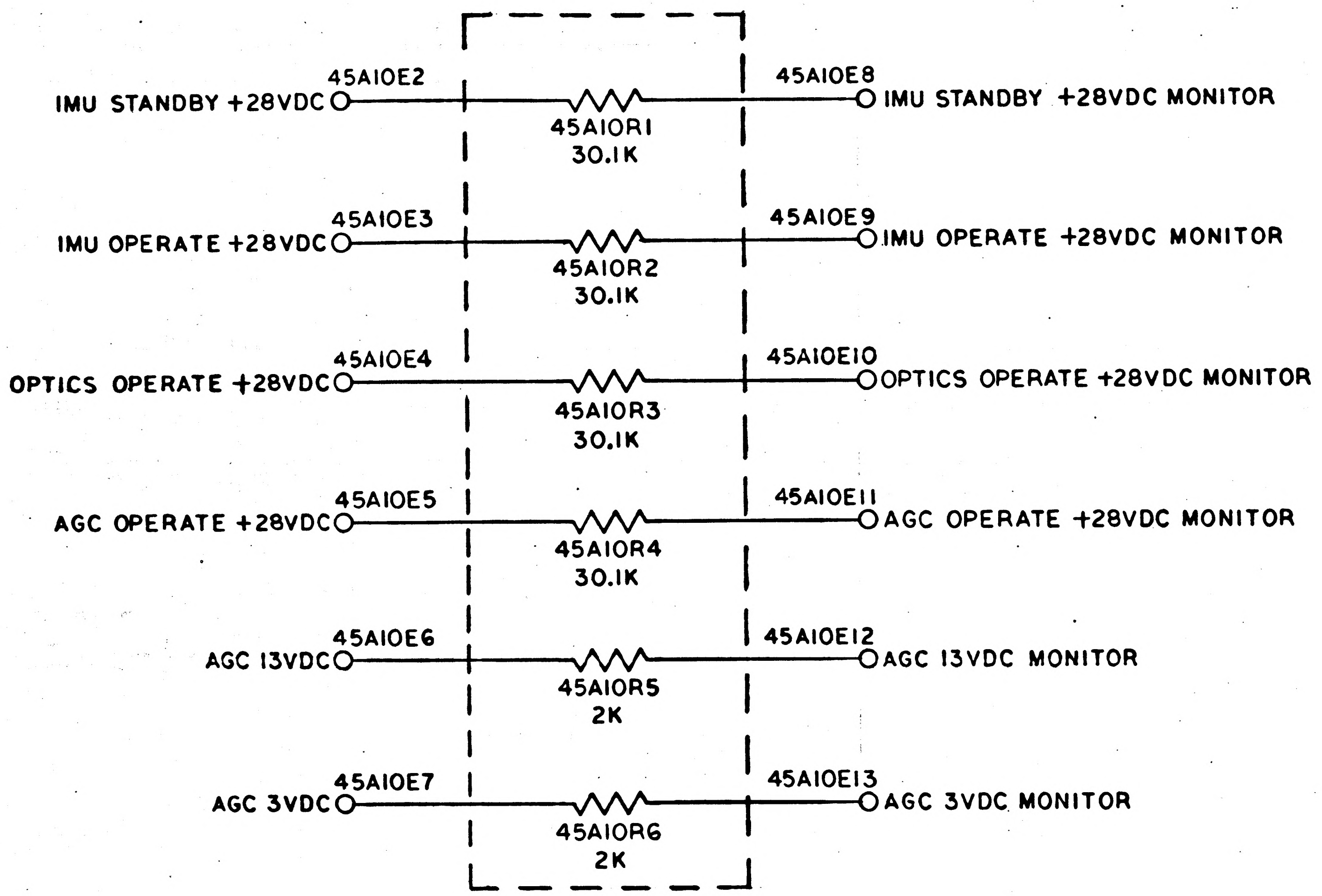
45A10E2
IMU STANDBY +28VDC
45A10R1
30.1K
45A10E8
IMU STANDBY +28VDC MONITOR
45A10E3
IMU OPERATE +28VDC
45A10R2
30.1K
45A10E9
IMU OPERATE +28VDC MONITOR
45A10E4
OPTICS OPERATE +28VDC
45A10R3
30.1K
45A10E10
OPTICS OPERATE +28VDC MONITOR
45A10E5
AGC OPERATE +28VDC
45A10R4
30.1K
45A10E11
AGC OPERATE +28VDC MONITOR
45A10E6
AGC 13VDC
45A10R5
2K
45A10E12
AGC 13VDC MONITOR
45A10E7
AGC 3VDC
45A10R6
2K
45A10E13
AGC 3VDC MONITOR

REF DES	PART NO.	DESCRIPTION	VALUE	TOL.	RATING
R1	1010364-535	RESISTOR	30.1K	±1%	1/8 W
R2					
R3	↓		↓		
R4					
R5	1010364-309		2K		
R6	1010364-309	↓	2K	↓	↓

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 02729 **DATE** 8-21-63

NOTES

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
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CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN J Falzano DATE 6 Aug 63
CHECKED
APPROVAL E Hall 8-16-63
APPROVAL D.A. Test 8-21-63
NASA APPROVAL W.S. Swan Jr 8/21/63
MIT APPROVAL L Hazel 8/21/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC BUFFER RESISTORS TRAY NO. 10

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010103
SCALE —
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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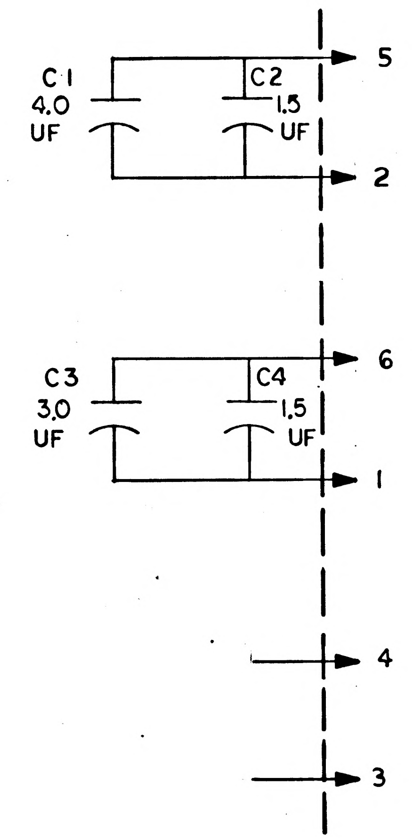
1010105

REVISIONS TDRR 03321			
SYM	DESCRIPTION	DATE	APPROVAL



REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
C1	1010264-41	CAPACITOR	4.0 UF	± 5%	200 VDC
C2	1010264-38	↓	1.5 UF	↓	↓
C3	1010264-40	↓	3.0 UF	↓	↓
C4	1010264-38	↓	1.5 UF	↓	↓

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN J Cowley DATE 9-20-63
CHECKED
APPROVAL [illegible] M Kramer 9/[illegible]
APPROVAL
NASA APPROVAL [illegible] 9/26/63
MIT APPROVAL [illegible] 9/26/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
800 CPS LOAD COMPENSATION MODULE

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010105
SCALE
WT
SHEET OF

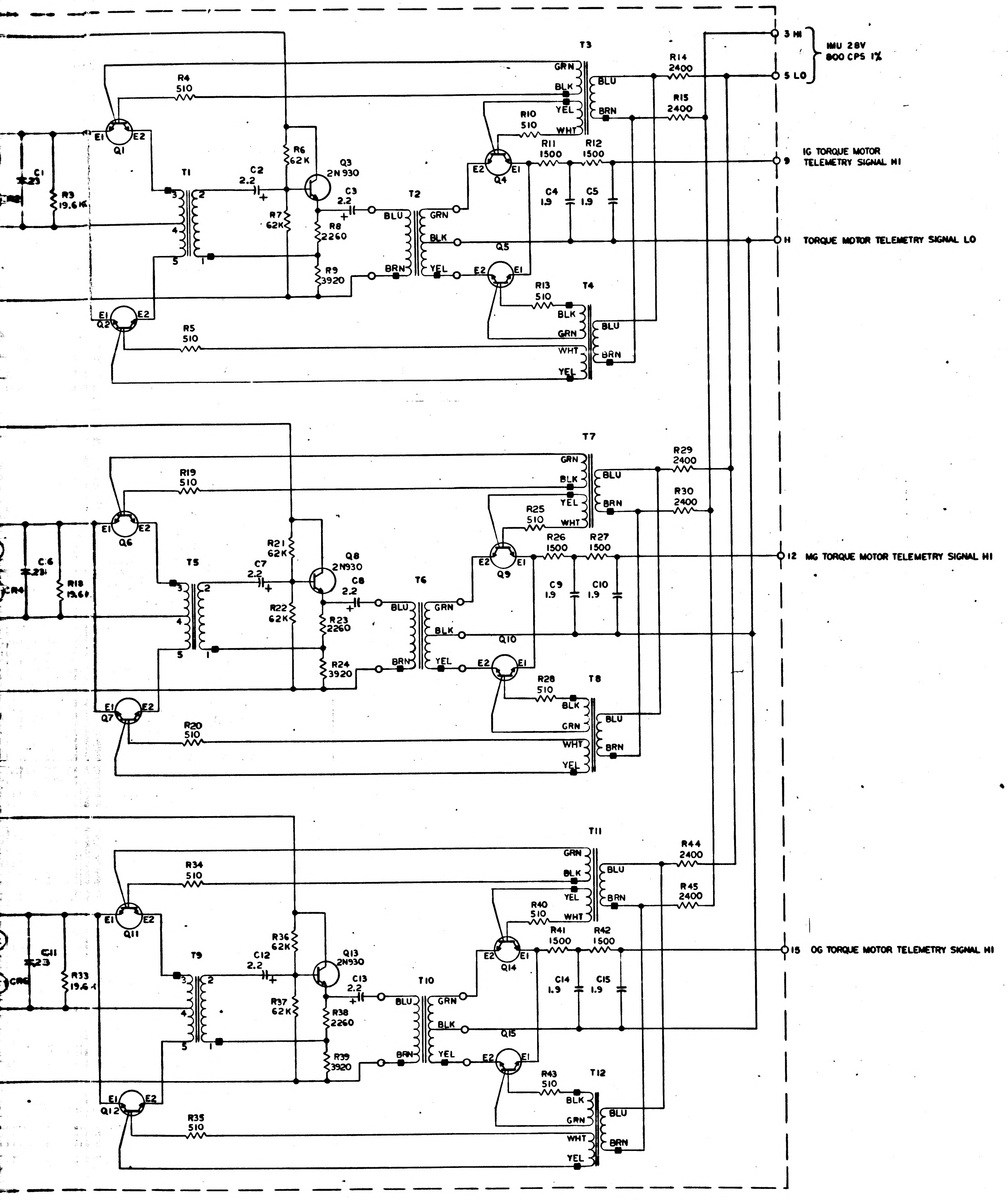
MASTER

1010105

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

REVISIONS TDRR 08778

SYM	DESCRIPTION	DATE	APPROVAL


3 HI
5 LO
IMU 28V 800 CPS 1%
9 IG TORQUE MOTOR TELEMETRY SIGNAL HI
H TORQUE MOTOR TELEMETRY SIGNAL LO
12 MG TORQUE MOTOR TELEMETRY SIGNAL HI
15 OG TORQUE MOTOR TELEMETRY SIGNAL HI
Q1
Q2
Q3 2N930
Q4
Q5
Q6
Q7
Q8 2N930
Q9
Q10
Q11
Q12
Q13 2N930
Q14
Q15
E1
E2
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
R3 19.6K
R4 510
R5 510
R6 62K
R7 62K
R8 2260
R9 3920
R10 510
R11 1500
R12 1500
R13 510
R14 2400
R15 2400
R18 19.6K
R19 510
R20 510
R21 62K
R22 62K
R23 2260
R24 3920
R25 510
R26 1500
R27 1500
R28 510
R29 2400
R30 2400
R33 19.6K
R34 510
R35 510
R36 62K
R37 62K
R38 2260
R39 3920
R40 510
R41 1500
R42 1500
R43 510
R44 2400
R45 2400
C1 .23
C2 2.2
C3 2.2
C4 1.9
C5 1.9
C6 .23
C7 2.2
C8 2.2
C9 1.9
C10 1.9
C11 .23
C12 2.2
C13 2.2
C14 1.9
C15 1.9
CR2
CR4
CR6
GRN
BLK
YEL
WHT
BLU
BRN
1
2
3
4
5

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364 -411	RESISTOR	6810	1%	1/8W
R2	1010364 -411		6810	1%	1/8W
R3	1010364 -499		19.6K	1%	1/8W
R4	1006750-25		510	2%	1/4W
R5	1006750-25		510	2%	1/4W
R6	1006750-75		62K	2%	1/4W
R7	1006750-75		62K	2%	1/4W
R8	1010364 -319		2260	1%	1/8W
R9	1010364 -365		3920	1%	1/8W
R10	1006750-25		510	2%	1/4W
R11	1006750-36		1500	2%	1/4W
R12	1006750-36		1500	2%	1/4W
R13	1006750-25		510	2%	1/4W
R14	1006750-41		2400	2%	1/4W
R15	1006750-41		2400	2%	1/4W
R16	1010364 -411		6810	1%	1/8W
R17	1010364 -411		6810	1%	1/8W
R18	1010364 -499		19.6K	1%	1/8W
R19	1006750-25		510	2%	1/4W
R20	1006750-25		510	2%	1/4W
R21	1006750-75		62K	2%	1/4W
R22	1006750-75		62K	2%	1/4W
R23	1010364 -319		2260	1%	1/8W
R24	1010364 -365		3920	1%	1/8W
R25	1006750-25		510	2%	1/4W
R26	1006750-36		1500	2%	1/4W
R27	1006750-36		1500	2%	1/4W
R28	1006750-25		510	2%	1/4W
R29	1006750-41		2400	2%	1/4W
R30	1006750-41		2400	2%	1/4W
R31	1010364 -411		6810	1%	1/8W
R32	1010364 -411		6810	1%	1/8W
R33	1010364 -499		19.6K	1%	1/8W
R34	1006750-25		510	2%	1/4W
R35	1006750-25		510	2%	1/4W
R36	1006750-75		62K	2%	1/4W
R37	1006750-75		62K	2%	1/4W
R38	1010364 -319		2260	1%	1/8W
R39	1010364 -365		3920	1%	1/8W
R40	1006750-25		510	2%	1/4W
R41	1006750-36		1500	2%	1/4W
R42	1006750-36		1500	2%	1/4W
R43	1006750-25		510	2%	1/4W
R44	1006750-41		2400	2%	1/4W
R45	1006750-41	RESISTOR	2400	2%	1/4W
C1	1010279-104	CAPACITOR	.23	10%	15VDC
C2	1010393 -033		2.2	10%	50VDC
C3	1010393 -033		2.2	10%	50VDC
C4	1010279 -16		1.9	10%	6VDC
C5	1010279 -16		1.9	10%	6VDC
C6	1010279 -104		.23	10%	15VDC
C7	1010393 -033		2.2	10%	50VDC
C8	1010393 -033		2.2	10%	50VDC
C9	1010279 -16		1.9	10%	6VDC
C10	1010279 -16		1.9	10%	6VDC
C11	1010279 -104		.23	10%	15VDC
C12	1010393 -033		2.2	10%	50VDC
C13	1010393 -033		2.2	10%	50VDC
C14	1010279 -16		1.9	10%	6VDC
C15	1010279 -16	CAPACITOR	1.9	10%	6VDC
CR1	1010372 -12	DIODE			250MW
CR2	1010372 -12				250MW
CR3	1010372 -12				250MW
CR4	1010372 -12				250MW
CR5	1010372 -12				250MW
CR6	1010372 -12	DIODE			250MW
T1	1010710	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010323				
T5	1010710				
T6	1010324				
T7	1010323				
T8	1010323				
T9	1010710				
T10	1010324				
T11	1010323				
T12	1010323	TRANSFORMER			
Q1	1010367	CHOPPER			
Q2	1010367	CHOPPER			
Q3	1010397-1	TRANSISTOR	2N930		
Q4	1010367	CHOPPER			
Q5	1010367	CHOPPER			
Q6	1010367	CHOPPER			
Q7	1010367	CHOPPER			
Q8	1010397-1	TRANSISTOR	2N930		
Q9	1010367	CHOPPER			
Q10	1010367	CHOPPER			
Q11	1010367	CHOPPER			
Q12	1010367	CHOPPER			
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010367	CHOPPER			
Q15	1010367	CHOPPER			

REF DWG:
SIGNAL CONDITIONER ASSEMBLY
TORQUE MOTOR
DWG NO. 1007124

1010110

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN [illegible] DATE 1/22/64
CHECKED [illegible] 17 APR 64
APPROVAL [illegible] 5/25/64
APPROVAL
NASA APPROVAL [illegible] 5/13/64
MIT APPROVAL [illegible]

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

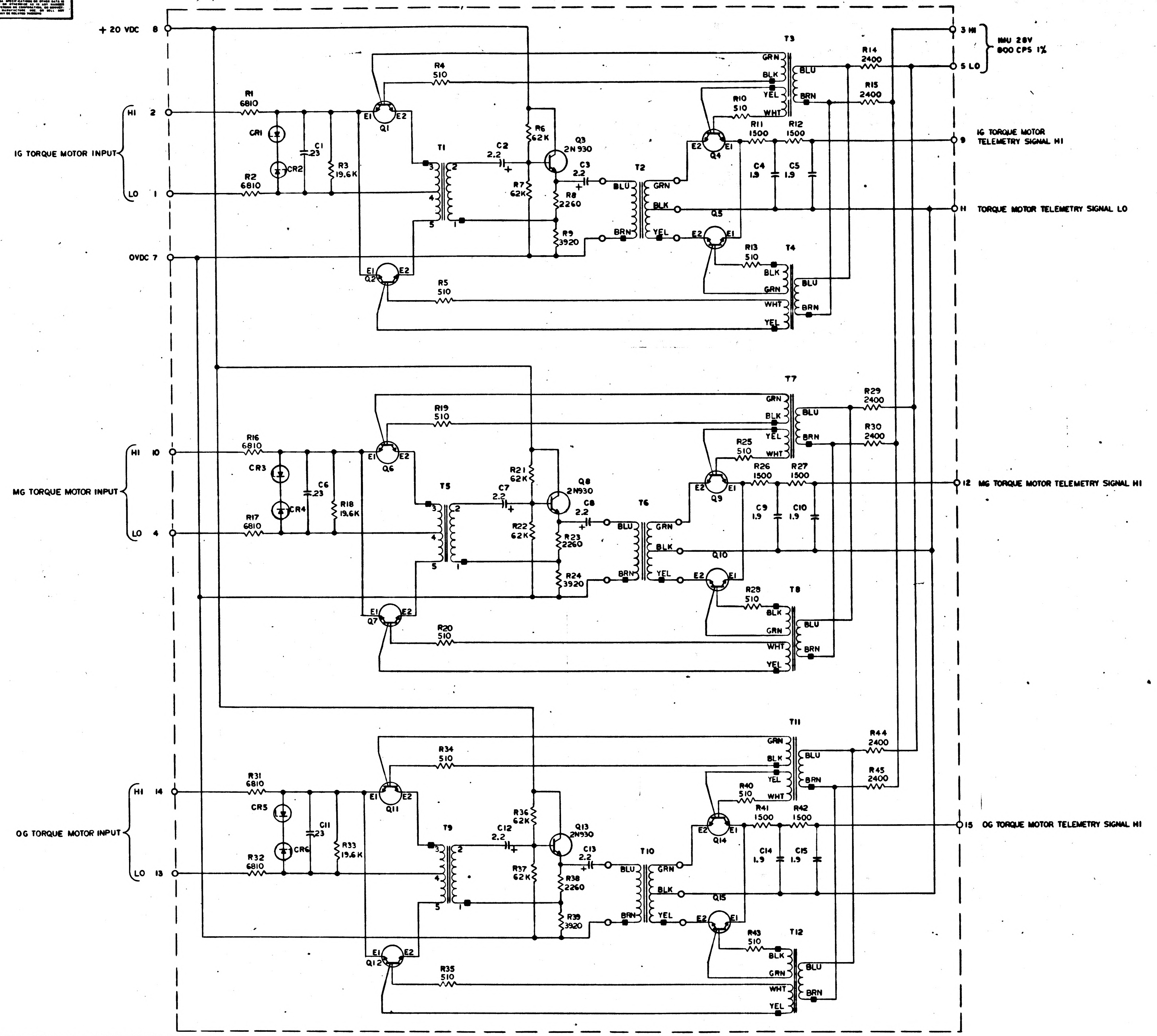
SCHEMATIC, SIGNAL CONDITIONER, TORQUE MOTOR

CODE IDENT NO. —
SIZE J
NASA DRAWING NO. 1010110
SCALE —
WT —
SHEET 1 OF 1

MASTER

5D"

INCHES
0 1 2


+20 VDC 8
HI 2
IG TORQUE MOTOR INPUT
LO 1
0VDC 7
R1 6810
R2 6810
CR1
CR2
C1 .23
R3 19.6K
Q1
E1 E2
R4 510
R5 510
Q2
T1
C2 2.2
R6 62K
Q3 2N930
C3 2.2
R7 62K
R8 2260
R9 3920
T2
BLU
BRN
GRN
BLK
YEL
Q4
Q5
R10 510
R11 1500
R12 1500
C4 1.9
C5 1.9
R13 510
T3
T4
GRN
BLK
YEL
WHT
BLU
BRN
R14 2400
R15 2400
3 HI
5 LO
IMU 28V 800 CPS 1%
IG TORQUE MOTOR TELEMETRY SIGNAL HI
9
11 TORQUE MOTOR TELEMETRY SIGNAL LO
HI 10
MG TORQUE MOTOR INPUT
LO 4
R16 6810
R17 6810
CR3
CR4
C6 .23
R18 19.6K
Q6
Q7
R19 510
R20 510
T5
C7 2.2
R21 62K
Q8 2N930
C8 2.2
R22 62K
R23 2260
R24 3920
T6
Q9
Q10
R25 510
R26 1500
R27 1500
C9 1.9
C10 1.9
R28 510
T7
T8
R29 2400
R30 2400
12 MG TORQUE MOTOR TELEMETRY SIGNAL HI
HI 14
OG TORQUE MOTOR INPUT
LO 13
R31 6810
R32 6810
CR5
CR6
C11 .23
R33 19.6K
Q11
Q12
R34 510
R35 510
T9
C12 2.2
R36 62K
Q13 2N930
C13 2.2
R37 62K
R38 2260
R39 3920
T10
Q14
Q15
R40 510
R41 1500
R42 1500
C14 1.9
C15 1.9
R43 510
T11
T12
R44 2400
R45 2400
15 OG TORQUE MOTOR TELEMETRY SIGNAL HI

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364 -411	RESISTOR	6810	1%	1/8W
R2	1010364 -411		6810	1%	1/8W
R3	1010364 -499		19.6K	1%	1/8W
R4	1006750-25		510	2%	1/4W
R5	1006750-25		510	2%	1/4W
R6	1006750-75		62K	2%	1/4W
R7	1006750-75		62K	2%	1/4W
R8	1010364 -319		2260	1%	1/8W
R9	1010364 -365		3920	1%	1/8W
R10	1006750-25		510	2%	1/4W
R11	1006750-36		1500	2%	1/4W
R12	1006750-36		1500	2%	1/4W
R13	1006750-25		510	2%	1/4W
R14	1006750-41		2400	2%	1/4W
R15	1006750-41		2400	2%	1/4W
R16	1010364 -411		6810	1%	1/8W
R17	1010364 -411		6810	1%	1/8W
R18	1010364 -499		19.6K	1%	1/8W
R19	1006750-25		510	2%	1/4W
R20	1006750-25		510	2%	1/4W
R21	1006750-75		62K	2%	1/4W
R22	1006750-75		62K	2%	1/4W
R23	1010364 -319		2260	1%	1/8W
R24	1010364 -365		3920	1%	1/8W
R25	1006750-25		510	2%	1/4W
R26	1006750-36		1500	2%	1/4W
R27	1006750-36		1500	2%	1/4W
R28	1006750-25		510	2%	1/4W
R29	1006750-41		2400	2%	1/4W
R30	1006750-41		2400	2%	1/4W
R31	1010364 -411		6810	1%	1/8W
R32	1010364 -411		6810	1%	1/8W
R33	1010364 -499		19.6K	1%	1/8W
R34	1006750-25		510	2%	1/4W
R35	1006750-25		510	2%	1/4W
R36	1006750-75		62K	2%	1/4W
R37	1006750-75		62K	2%	1/4W
R38	1010364 -319		2260	1%	1/8W
R39	1010364 -365		3920	1%	1/8W
R40	1006750-25		510	2%	1/4W
R41	1006750-36		1500	2%	1/4W
R42	1006750-36		1500	2%	1/4W
R43	1006750-25		510	2%	1/4W
R44	1006750-41		2400	2%	1/4W
R45	1006750-41	RESISTOR	2400	2%	1/4W
C1	1010279-104	CAPACITOR	.23	10%	15VDC
C2	1010393 -033		2.2	10%	50VDC
C3	1010393 -033		2.2	10%	50VDC
C4	1010279 -16		1.9	10%	6VDC
C5	1010279 -16		1.9	10%	6VDC
C6	1010279 -104		.23	10%	15VDC
C7	1010393 -033		2.2	10%	50VDC
C8	1010393 -033		2.2	10%	50VDC
C9	1010279 -16		1.9	10%	6VDC
C10	1010279 -16		1.9	10%	6VDC
C11	1010279 -104		.23	10%	15VDC
C12	1010393 -033		2.2	10%	50VDC
C13	1010393 -033		2.2	10%	50VDC
C14	1010279 -16		1.9	10%	6VDC
C15	1010279 -16	CAPACITOR	1.9	10%	6VDC
CR1	1010372 -12	DIODE			250MW
CR2	1010372 -12				250MW
CR3	1010372 -12				250MW
CR4	1010372 -12				250MW
CR5	1010372 -12				250MW
CR6	1010372 -12	DIODE			250MW
T1	1010710	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010323				
T5	1010710				
T6	1010324				
T7	1010323				
T8	1010323				
T9	1010710				
T10	1010324				
T11	1010323				
T12	1010323	TRANSFORMER			
Q1	1010367	CHOPPER			
Q2	1010367	CHOPPER			
Q3	1010397-1	TRANSISTOR	2N930		
Q4	1010367	CHOPPER			
Q5	1010367	CHOPPER			
Q6	1010367	CHOPPER			
Q7	1010367	CHOPPER			
Q8	1010397-1	TRANSISTOR	2N930		
Q9	1010367	CHOPPER			
Q10	1010367	CHOPPER			
Q11	1010367	CHOPPER			
Q12	1010367	CHOPPER			
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010367	CHOPPER			
Q15	1010367	CHOPPER			

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS UNLESS OTHEWISE SPECIFIED
3. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS UNLESS OTHERWISE SPECIFIED

REF DWG:
SIGNAL CONDITIO
TORQUE MOTOR
DWG. NO. 1007124

QTY REQD	PART OR IDENTIFYING NO.

LIST OF MATERIAL

MIT
INSTRUMENTATION LAB
Cambridge, Mass.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

DRAWN DATE
CHECKED 17 MAR 64
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

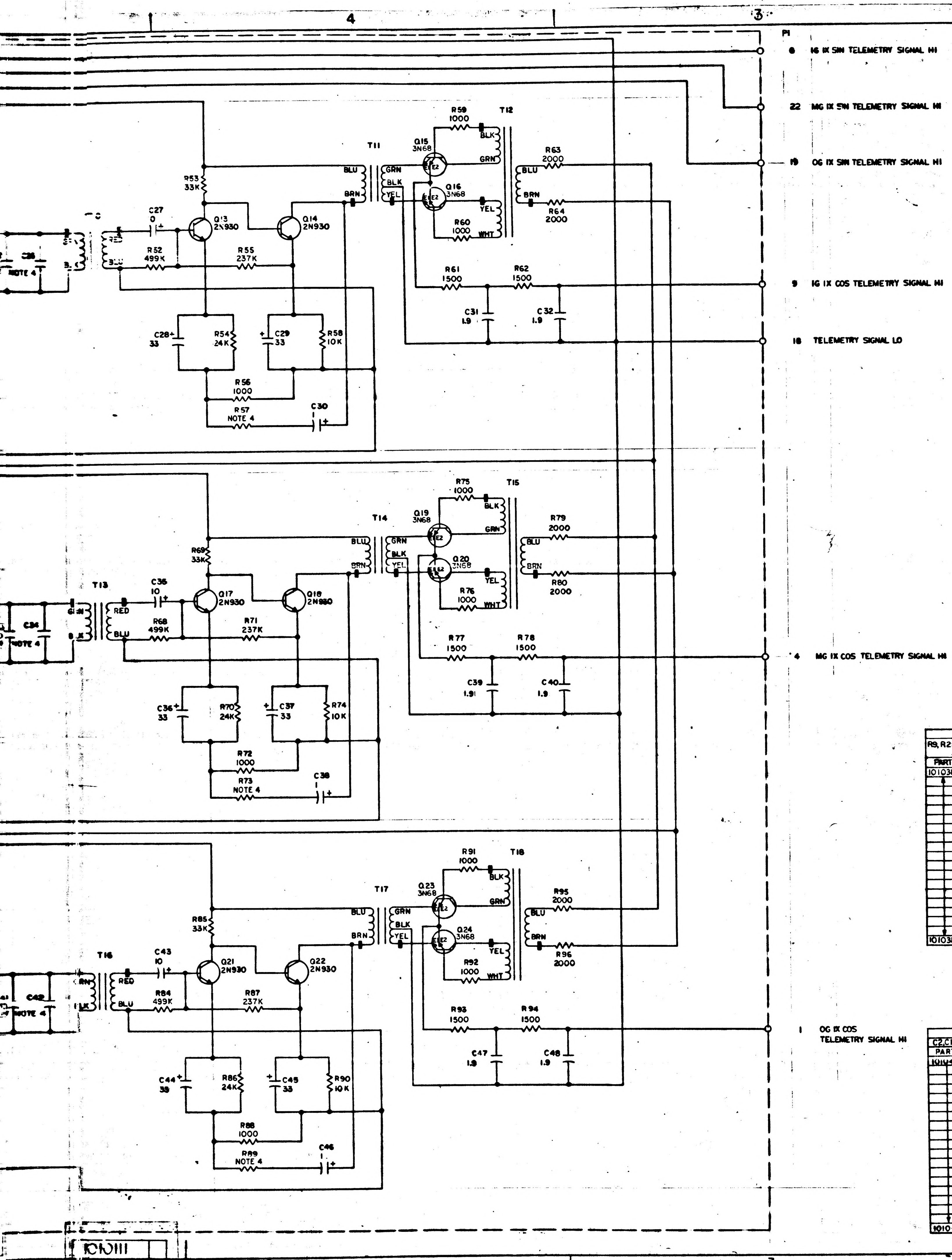
NEXT ASSY | USED ON
APPLICATION

1010110

MASTER

1110101

REVISIONS TDRR 06778			
SYM	DESCRIPTION	DATE	APPROVAL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6 IG IX SIN TELEMETRY SIGNAL HI
22 MG IX SIN TELEMETRY SIGNAL HI
19 OG IX SIN TELEMETRY SIGNAL HI
9 IG IX COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG IX COS TELEMETRY SIGNAL HI
1 OG IX COS TELEMETRY SIGNAL HI
T11
T12
T13
T14
T15
T16
T17
T18
Q13 2N930
Q14 2N930
Q15 3N68
Q16 3N68
Q17 2N930
Q18 2N930
Q19 3N68
Q20 3N68
Q21 2N930
Q22 2N930
Q23 3N68
Q24 3N68
R52 499K
R53 33K
R54 24K
R55 237K
R56 1000
R57 NOTE 4
R58 10K
R59 1000
R60 1000
R61 1500
R62 1500
R63 2000
R64 2000
R68 499K
R69 33K
R70 24K
R71 237K
R72 1000
R73 NOTE 4
R74 10K
R75 1000
R76 1000
R77 1500
R78 1500
R79 2000
R80 2000
R84 499K
R85 33K
R86 24K
R87 237K
R88 1000
R89 NOTE 4
R90 10K
R91 1000
R92 1000
R93 1500
R94 1500
R95 2000
R96 2000
C26 NOTE 4
C27 10
C28 33
C29 33
C30 1
C31 1.9
C32 1.9
C34 NOTE 4
C35 10
C36 33
C37 33
C38 1
C39 1.91
C40 1.9
C42 NOTE 4
C43 10
C44 33
C45 33
C46 1
C47 1.9
C48 1.9
RED
BLU
BLK
GRN
YEL
BRN
WHT
4
3
2
1
D
C
B
A

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
R3	1010311-291		52.3 K	±1%	1/10 W
R4	1010364-769		499 K	±1%	1/8 W
R5	1006750-68		33 K	±2%	1/4 W
R6	1006750-65		24 K	±2%	1/4 W
R7	1010364-707		237 K	±1%	1/8 W
R8	1010311-126		1000	±1%	1/10 W
R9	SEE NOTE 4			±1%	1/10 W
R10	1006750-56		10 K	±2%	1/4 W
R11	1010311-126		1000	±1%	1/10 W
R12	1010311-126		1000	±1%	1/10 W
R13	1006750-36		1500	±2%	1/4 W
R14	1006750-36		1500	±2%	1/4 W
R15	1006750-39		2000	±2%	1/4 W
R16	1006750-39		2000	±2%	1/4 W
R17	1010364-769		499 K	±1%	1/8 W
R18	1010364-769		499 K	±1%	1/8 W
R19	1010311-291		52.3 K	±1%	1/10 W
R20	1010364-769		499 K	±1%	1/8 W
R21	1006750-68		33 K	±2%	1/4 W
R22	1006750-65		24 K	±2%	1/4 W
R23	1010364-707		237 K	±1%	1/8 W
R24	1010311-126		1000	±1%	1/10 W
R25	SEE NOTE 4			±1%	1/10 W
R26	1006750-56		10 K	±2%	1/4 W
R27	1010311-126		1000	±1%	1/10 W
R28	1010311-126		1000	±1%	1/10 W
R29	1006750-36		1500	±2%	1/4 W
R30	1006750-36		1500	±2%	1/4 W
R31	1006750-39		2000	±2%	1/4 W
R32	1006750-39		2000	±2%	1/4 W
R33	1010364-769		499 K	±1%	1/8 W
R34	1010364-769		499 K	±1%	1/8 W
R35	1010311-291		52.3 K	±1%	1/10 W
R36	1010364-769		499 K	±1%	1/8 W
R37	1006750-68		33 K	±2%	1/4 W
R38	1006750-65		24 K	±2%	1/4 W
R39	1010364-707		237 K	±1%	1/8 W
R40	1010311-126		1000	±1%	1/10 W
R41	SEE NOTE 4			±1%	1/10 W
R42	1006750-56		10 K	±2%	1/4 W
R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-126		1000	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-126		1000	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-126		1000	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-9	CAPACITOR	470 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006755-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C4	1006755-34	CAPACITOR	33	±10%	20 VDC
C5	1006755-34		33	±10%	20 VDC
C6	1006755-69		1	±10%	35 VDC
C7	1010279-16		1.9	±10%	6 VDC
C8	1010279-16		1.9	±10%	6 VDC
C9	1010410-9		470 PF	± 2%	500 VDC
C10	SEE NOTE 4			± 2%	
C11	1006755-31		10	±10%	20 VDC
C12	1006755-34		33	±10%	20 VDC
C13	1006755-34		33	±10%	20 VDC
C14	1006755-69		1	±10%	35 VDC
C15	1010279-16		1.9	±10%	6 VDC
C16	1010279-16		1.9	±10%	6 VDC
C17	1010410-9		470 PF	± 2%	500 VDC
C18	SEE NOTE 4			± 2%	
C19	1006755-31		10	±10%	20 VDC
C20	1006755-34		33	±10%	20 VDC
C21	1006755-34		33	±10%	20 VDC
C22	1006755-69		1	±10%	35 VDC
C23	1010279-16		1.9	±10%	6 VDC
C24	1010279-16		1.9	±10%	6 VDC
C25	1010410-9		470 PF	± 2%	500 VDC
C26	SEE NOTE 4			± 2%	
C27	1006755-31		10	±10%	20 VDC
C28	1006755-34		33	±10%	20 VDC
C29	1006755-34		33	±10%	20 VDC
C30	1006755-69		1	±10%	35 VDC
C31	1010279-16		1.9	±10%	6 VDC
C32	1010279-16		1.9	±10%	6 VDC
C33	1010410-9		470 PF	± 2%	500 VDC
C34	SEE NOTE 4			± 2%	
C35	1006755-31		10	±10%	20 VDC
C36	1006755-34		33	±10%	20 VDC
C37	1006755-34		33	±10%	20 VDC
C38	1006755-69		1	±10%	35 VDC
C39	1010279-16		1.9	±10%	6 VDC
C40	1010279-16		1.9	±10%	6 VDC
C41	1010410-9		470 PF	± 2%	500 VDC
C42	SEE NOTE 4			± 2%	
C43	1006755-31		10	±10%	20 VDC
C44	1006755-34		33	±10%	20 VDC
C45	1006755-34		33	±10%	20 VDC
C46	1006755-69		1	±10%	35 VDC
C47	1010279-16		1.9	±10%	6 VDC
C48	1010279-16	CAPACITOR	1.9	±10%	6 VDC
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010712				
T5	1010324				
T6	1010323				
T7	1010712				
T8	1010324				
T9	1010323				
T10	1010712				
T11	1010324				
T12	1010323				
T13	1010712				
T14	1010324				
T15	1010323				
T16	1010712				
T17	1010324				
T18	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010397-1	TRANSISTOR	2N930		
Q15	1010367	CHOPPER	3N68		
Q16	1010367	CHOPPER	3N68		
Q17	1010397-1	TRANSISTOR	2N930		
Q18	1010397-1	TRANSISTOR	2N930		
Q19	1010367	CHOPPER	3N68		
Q20	1010367	CHOPPER	3N68		
Q21	1010397-1	TRANSISTOR	2N930		
Q22	1010397-1	TRANSISTOR	2N930		
Q23	1010367	CHOPPER	3N68		
Q24	1010367	CHOPPER	3N68		

CHART B R9, R25, R41, R57, R73 & R89 ±1%, 1/10W	
PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A C2, C10, C18, C26, C34 & C42		
PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	480	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

REF DWG:
SIGNAL CONDITIONER ASSEMBLY
GIMBAL RESOLVER
DWG NO. 1007123

QTY REQD	PART OR IDENTIFYING NO.		NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, SIGNAL CONDITIONER, GIMBAL RESOLVER

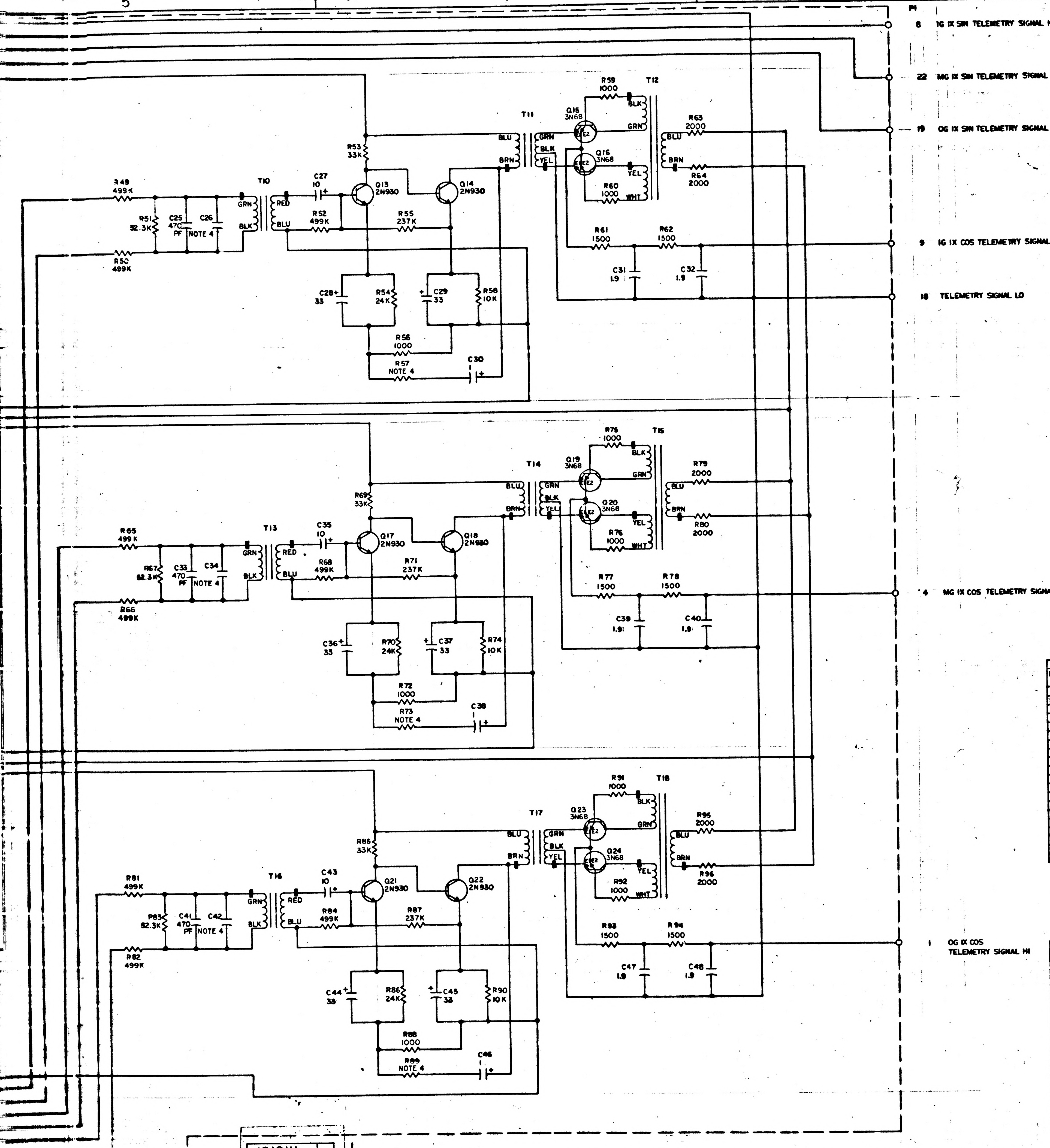
CODE IDENT NO. —
SIZE J
NASA DRAWING NO. 1010111
SCALE —
WT —
SHEET 1 OF 1

1010111

MASTER

INCHES 0 1 2

1110101


P1
8 IG IX SIN TELEMETRY SIGNAL HI
22 MG IX SIN TELEMETRY SIGNAL HI
19 OG IX SIN TELEMETRY SIGNAL HI
9 IG IX COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG IX COS TELEMETRY SIGNAL HI
1 OG IX COS TELEMETRY SIGNAL HI
R49 499K
R50 499K
R51 52.3K
C25 470 PF
C26 NOTE 4
T10
GRN
BLK
RED
BLU
C27 10
R52 499K
R53 33K
Q13 2N930
Q14 2N930
R55 237K
C28 33
R54 24K
C29 33
R58 10K
R56 1000
R57 NOTE 4
C30 1
T11
BLU
BRN
GRN
BLK
YEL
Q15 3N68
Q16 3N68
E1 E2
R59 1000
R60 1000
T12
WHT
R63 2000
R64 2000
R61 1500
R62 1500
C31 1.9
C32 1.9
R65 499K
R66 499K
R67 52.3K
C33 470 PF
C34 NOTE 4
T13
C35 10
R68 499K
R69 33K
Q17 2N930
Q18 2N930
R71 237K
C36 33
R70 24K
C37 33
R74 10K
R72 1000
R73 NOTE 4
C38 1
T14
Q19 3N68
Q20 3N68
R75 1000
R76 1000
T15
R79 2000
R80 2000
R77 1500
R78 1500
C39 1.9
C40 1.9
R81 499K
R82 499K
R83 52.3K
C41 470 PF
C42 NOTE 4
T16
C43 10
R84 499K
R85 33K
Q21 2N930
Q22 2N930
R87 237K
C44 33
R86 24K
C45 33
R90 10K
R88 1000
R89 NOTE 4
C46 1
T17
Q23 3N68
Q24 3N68
R91 1000
R92 1000
T18
R95 2000
R96 2000
R93 1500
R94 1500
C47 1.9
C48 1.9

1010111

CHART B	
R9, R25, R41, R57, R73 & R89 ±1%, 1/10W	
PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A		
C2, C10, C18, C26, C34 & C42		
PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
R3	1010311-291		52.3 K	±1%	1/10 W
R4	1010364-769		499 K	±1%	1/8 W
R5	1006750-68		33 K	±2%	1/4 W
R6	1006750-65		24 K	±2%	1/4 W
R7	1010364-707		237 K	±1%	1/8 W
R8	1010311-126		1000	±1%	1/10 W
R9	SEE NOTE 4			±1%	1/10 W
R10	1006750-56		10 K	±2%	1/4 W
R11	1010311-126		1000	±1%	1/10 W
R12	1010311-126		1000	±1%	1/10 W
R13	1006750-36		1500	±2%	1/4 W
R14	1006750-36		1500	±2%	1/4 W
R15	1006750-39		2000	±2%	1/4 W
R16	1006750-39		2000	±2%	1/4 W
R17	1010364-769		499 K	±1%	1/8 W
R18	1010364-769		499 K	±1%	1/8 W
R19	1010311-291		52.3 K	±1%	1/10 W
R20	1010364-769		499 K	±1%	1/8 W
R21	1006750-68		33 K	±2%	1/4 W
R22	1006750-65		24 K	±2%	1/4 W
R23	1010364-707		237 K	±1%	1/8 W
R24	1010311-126		1000	±1%	1/10 W
R25	SEE NOTE 4			±1%	1/10 W
R26	1006750-56		10 K	±2%	1/4 W
R27	1010311-126		1000	±1%	1/10 W
R28	1010311-126		1000	±1%	1/10 W
R29	1006750-36		1500	±2%	1/4 W
R30	1006750-36		1500	±2%	1/4 W
R31	1006750-39		2000	±2%	1/4 W
R32	1006750-39		2000	±2%	1/4 W
R33	1010364-769		499 K	±1%	1/8 W
R34	1010364-769		499 K	±1%	1/8 W
R35	1010311-291		52.3 K	±1%	1/10 W
R36	1010364-769		499 K	±1%	1/8 W
R37	1006750-68		33 K	±2%	1/4 W
R38	1006750-65		24 K	±2%	1/4 W
R39	1010364-707		237 K	±1%	1/8 W
R40	1010311-126		1000	±1%	1/10 W
R41	SEE NOTE 4			±1%	1/10 W
R42	1006750-56		10 K	±2%	1/4 W
R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-126		1000	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-126		1000	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-126		1000	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-9	CAPACITOR	470 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006756-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C4	1006755-34	CAPACITOR	33	±10%	20 VDC
C5	1006755-34		33	±10%	20 VDC
C6	1006755-69		1	±10%	35 VDC
C7	1010279-16		1.9	±10%	6 VDC
C8	1010279-16		1.9	±10%	6 VDC
C9	1010410-9		470 PF	±2%	500 VDC
C10	SEE NOTE 4			±2%	
C11	1006756-31		10	±10%	20 VDC
C12	1006755-34		33	±10%	20 VDC
C13	1006755-34		33	±10%	20 VDC
C14	1006755-69		1	±10%	35 VDC
C15	1010279-16		1.9	±10%	6 VDC
C16	1010279-16		1.9	±10%	6 VDC
C17	1010410-9		470 PF	±2%	500 VDC
C18	SEE NOTE 4			±2%	
C19	1006755-31		10	±10%	20 VDC
C20	1006755-34		33	±10%	20 VDC
C21	1006755-34		33	±10%	20 VDC
C22	1006755-69		1	±10%	35 VDC
C23	1010279-16		1.9	±10%	6 VDC
C24	1010279-16		1.9	±10%	6 VDC
C25	1010410-9		470 PF	±2%	500 VDC
C26	SEE NOTE 4			±2%	
C27	1006755-31		10	±10%	20 VDC
C28	1006755-34		33	±10%	20 VDC
C29	1006755-34		33	±10%	20 VDC
C30	1006755-69		1	±10%	35 VDC
C31	1010279-16		1.9	±10%	6 VDC
C32	1010279-16		1.9	±10%	6 VDC
C33	1010410-9		470 PF	±2%	500 VDC
C34	SEE NOTE 4			±2%	
C35	1006755-31		10	±10%	20 VDC
C36	1006755-34		33	±10%	20 VDC
C37	1006755-34		33	±10%	20 VDC
C38	1006755-69		1	±10%	35 VDC
C39	1010279-16		1.9	±10%	6 VDC
C40	1010279-16		1.9	±10%	6 VDC
C41	1010410-9		470 PF	±2%	500 VDC
C42	SEE NOTE 4			±2%	
C43	1006755-31		10	±10%	20 VDC
C44	1006755-34		33	±10%	20 VDC
C45	1006755-34		33	±10%	20 VDC
C46	1006755-69		1	±10%	35 VDC
C47	1010279-16		1.9	±10%	6 VDC
C48	1010279-16	CAPACITOR	1.9	±10%	6 VDC
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010712				
T5	1010324				
T6	1010323				
T7	1010712				
T8	1010324				
T9	1010323				
T10	1010712				
T11	1010324				
T12	1010323				
T13	1010712				
T14	1010324				
T15	1010323				
T16	1010712				
T17	1010324				
T18	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010397-1	TRANSISTOR	2N930		
Q15	1010367	CHOPPER	3N68		
Q16	1010367	CHOPPER	3N68		
Q17	1010397-1	TRANSISTOR	2N930		
Q18	1010397-1	TRANSISTOR	2N930		
Q19	1010367	CHOPPER	3N68		
Q20	1010367	CHOPPER	3N68		
Q21	1010397-1	TRANSISTOR	2N930		
Q22	1010397-1	TRANSISTOR	2N930		
Q23	1010367	CHOPPER	3N68		
Q24	1010367	CHOPPER	3N68		

REF DWG:
SIGNAL CONDITIONER ASSEMBLY
GIMBAL RESOLVER

QTY REQD	PART OR IDENTIFYING NO.		NOMENCLATURE OR DESCRIPTION
LIST OF MATERIALS			

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± — DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL —	DRAWN — DATE — CHECKED — 64 APPROVAL — APPROVAL —	SCHEMATIC, SIGNAL CONDITIONER, GIMBAL RESOLVER
HEAT TREATMENT —	NASA APPROVAL —	CODE IDENT NO. — SIZE J DRAWING NO. 1010111
FINAL FINISH —	MIT APPROVAL —	SCALE — WT — SHEET

NEXT ASSY	USED ON
APPLICATION	

MASTER

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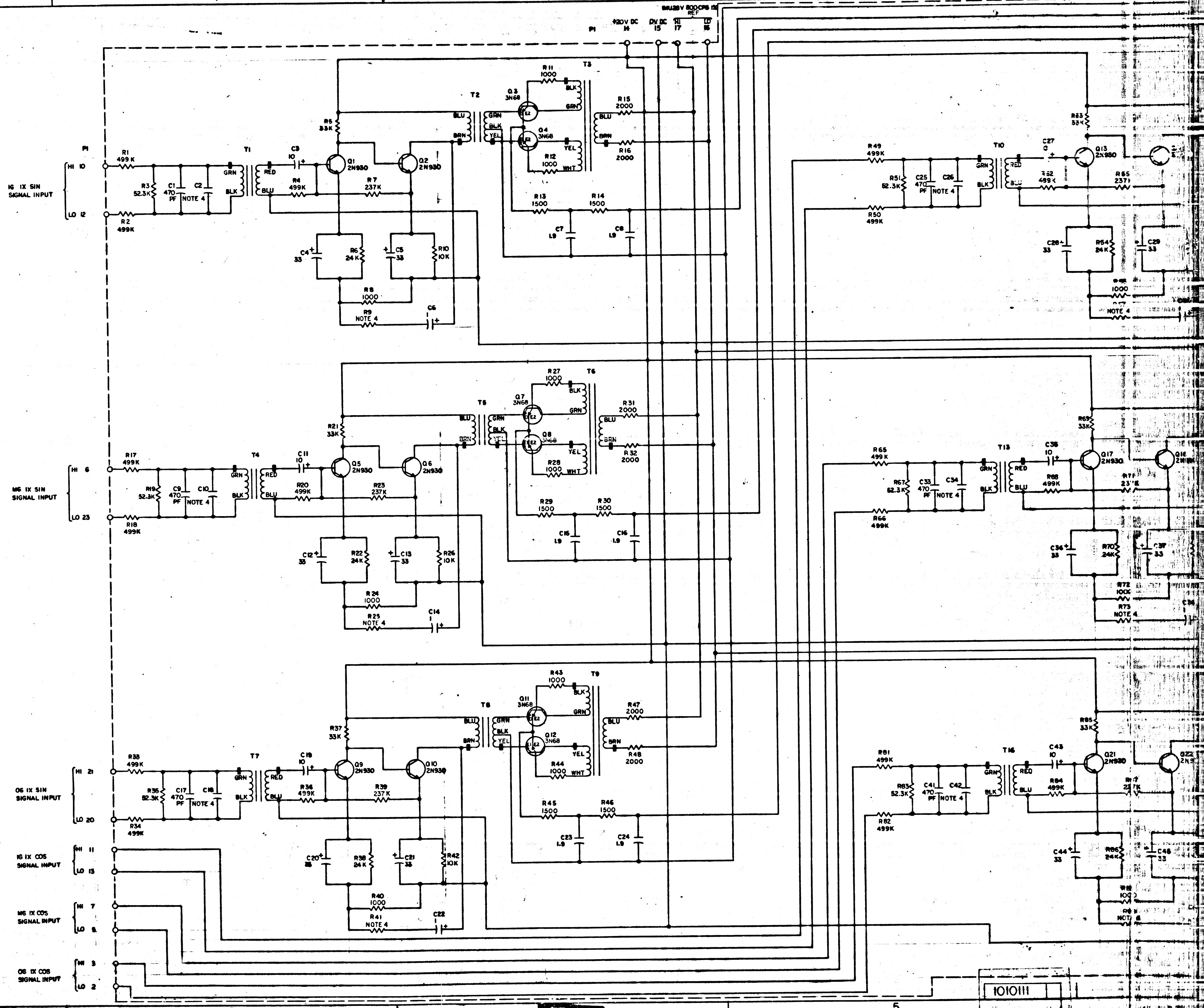

P1
+20V DC 14
0V DC 15
26V 400CPS 17 HI
REF 16 LO
1G 1X SIN SIGNAL INPUT
HI 10
LO 12
MG 1X SIN SIGNAL INPUT
HI 6
LO 23
OG 1X SIN SIGNAL INPUT
HI 21
LO 20
1G 1X COS SIGNAL INPUT
HI 11
LO 13
MG 1X COS SIGNAL INPUT
HI 7
LO 8
OG 1X COS SIGNAL INPUT
HI 3
LO 2
R1 499K
R2 499K
R3 52.3K
C1 470 PF
C2 NOTE 4
T1
GRN
BLK
RED
BLU
C3 10
R4 499K
R5 33K
Q1 2N930
Q2 2N930
R7 237K
C4 33
R6 24K
C5 33
R10 10K
R8 1000
R9 NOTE 4
C6
T2
Q3 3N68
Q4 3N68
R11 1000
R12 1000
T3
YEL
WHT
R13 1500
R14 1500
C7 1.9
C8 1.9
R15 2000
R16 2000
R17 499K
R18 499K
R19 52.3K
C9 470 PF
C10 NOTE 4
T4
C11 10
R20 499K
R21 33K
Q5 2N930
Q6 2N930
R23 237K
C12 33
R22 24K
C13 33
R26 10K
R24 1000
R25 NOTE 4
C14
T5
Q7 3N68
Q8 3N68
R27 1000
R28 1000
T6
R29 1500
R30 1500
C15 1.9
C16 1.9
R31 2000
R32 2000
R33 499K
R34 499K
R35 52.3K
C17 470 PF
C18 NOTE 4
T7
C19 10
R36 499K
R37 33K
Q9 2N930
Q10 2N930
R39 237K
C20 33
R38 24K
C21 33
R42 10K
R40 1000
R41 NOTE 4
C22
T8
Q11 3N68
Q12 3N68
R43 1000
R44 1000
T9
R45 1500
R46 1500
C23 1.9
C24 1.9
R47 2000
R48 2000
R49 499K
R50 499K
R51 52.3K
C25 470 PF
C26 NOTE 4
T10
C27 10
R52 499K
Q13 2N930
R53 33K
R55 237K
C28 33
R54 24K
C29 33
R65 499K
R66 499K
R67 52.3K
C33 470 PF
C34 NOTE 4
T13
C35 10
R68 499K
Q17 2N930
R69 33K
R71 237K
C36 33
R70 24K
C37 33
R72 1000
R73 NOTE 4
R81 499K
R82 499K
R83 52.3K
C41 470 PF
C42 NOTE 4
T16
C43 10
R84 499K
Q21 2N930
R85 33K
C44 33
R86 24K
C45 33
8
7
6
5
D
C
B
A

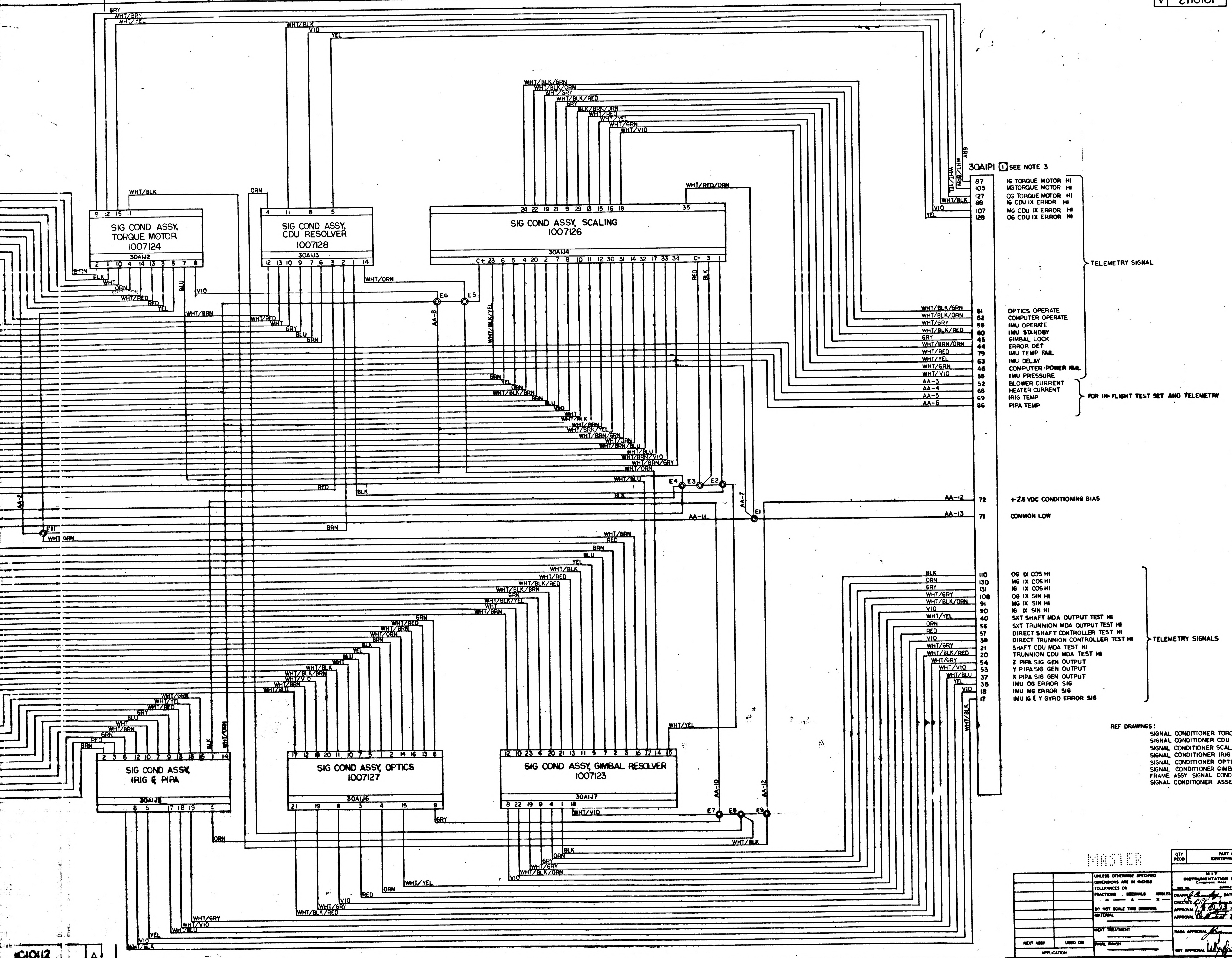
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST FROM CHARTS A AND B

1010111

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 15592		JK

REVISIONS 11097

1010112 A


4
3
2
D
C
B
A
SIG COND ASSY, TORQUE MOTOR 1007124
30A1J2
SIG COND ASSY, CDU RESOLVER 1007128
30A1J3
SIG COND ASSY, SCALING 1007126
30A1J4
SIG COND ASSY, IRIG & PIPA
30A1J5
SIG COND ASSY, OPTICS 1007127
30A1J6
SIG COND ASSY, GIMBAL RESOLVER 1007123
30A1J7
30A1P1 ① SEE NOTE 3
E1
E2
E3
E4
E5
E6
E7
E8
E9
E11
AA-2
AA-3
AA-4
AA-5
AA-6
AA-7
AA-8
AA-10
AA-11
AA-12
AA-13
WHT/BLK
WHT/BLK/GRN
WHT/BLK/ORN
WHT/GRY
WHT/BLK/RED
GRY
WHT/BRN/ORN
WHT/RED
WHT/YEL
WHT/GRN
WHT/VIO
WHT/BRN
WHT/BLU
WHT/RED/ORN
BLK
ORN
RED
BRN
BLU
YEL
GRN
VIO
WHT
87 IG TORQUE MOTOR HI
105 MG TORQUE MOTOR HI
127 OG TORQUE MOTOR HI
88 IG CDU IX ERROR HI
107 MG CDU IX ERROR HI
128 OG CDU IX ERROR HI
61 OPTICS OPERATE
62 COMPUTER OPERATE
59 IMU OPERATE
60 IMU STANDBY
45 GIMBAL LOCK
44 ERROR DET
79 IMU TEMP FAIL
63 IMU DELAY
46 COMPUTER POWER FAIL
55 IMU PRESSURE
TELEMETRY SIGNAL
52 BLOWER CURRENT
68 HEATER CURRENT
69 IRIG TEMP
86 PIPA TEMP
FOR IN-FLIGHT TEST SET AND TELEMETRY
72 +2.5 VDC CONDITIONING BIAS
71 COMMON LOW
110 OG IX COS HI
130 MG IX COS HI
131 IG IX COS HI
108 OG IX SIN HI
91 MG IX SIN HI
90 IG IX SIN HI
40 SXT SHAFT MDA OUTPUT TEST HI
56 SXT TRUNNION MDA OUTPUT TEST HI
57 DIRECT SHAFT CONTROLLER TEST HI
38 DIRECT TRUNNION CONTROLLER TEST HI
21 SHAFT CDU MDA TEST HI
20 TRUNNION CDU MDA TEST HI
54 Z PIPA SIG GEN OUTPUT
53 Y PIPA SIG GEN OUTPUT
37 X PIPA SIG GEN OUTPUT
35 IMU OG ERROR SIG
18 IMU MG ERROR SIG
17 IMU IG & Y GYRO ERROR SIG
TELEMETRY SIGNALS

REF DRAWINGS:

SIGNAL CONDITIONER TORQUE MOTOR	1010110	SCHEMATIC
SIGNAL CONDITIONER CDU RESOLVER	1010114	
SIGNAL CONDITIONER SCALING	1010108	
SIGNAL CONDITIONER IRIG & PIPA	1010115	
SIGNAL CONDITIONER OPTICS	1010113	
SIGNAL CONDITIONER GIMBAL RESOLVER	1010111	
FRAME ASSY SIGNAL CONDITIONER	1007130	
SIGNAL CONDITIONER ASSEMBLY	1007121	

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE
CHECKED
APPROVAL 7/21/64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

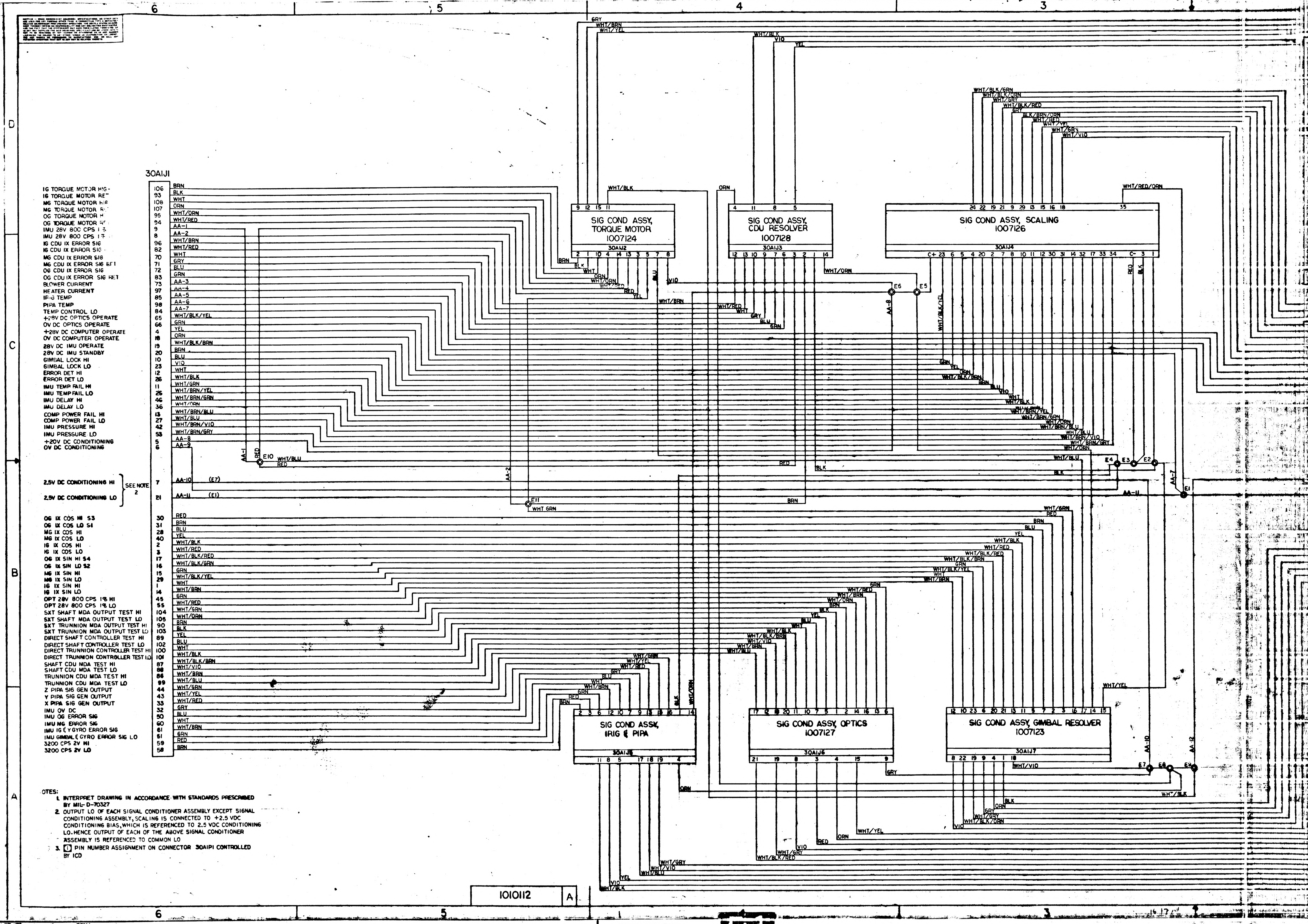
WIRING DIAGRAM
SIGNAL CONDITIONER ASSEMBLY

CODE IDENT NO. —
SIZE J
NASA DRAWING NO. 1010112
SCALE —
WT
SHEET 1 OF 1

1010112 A

1617

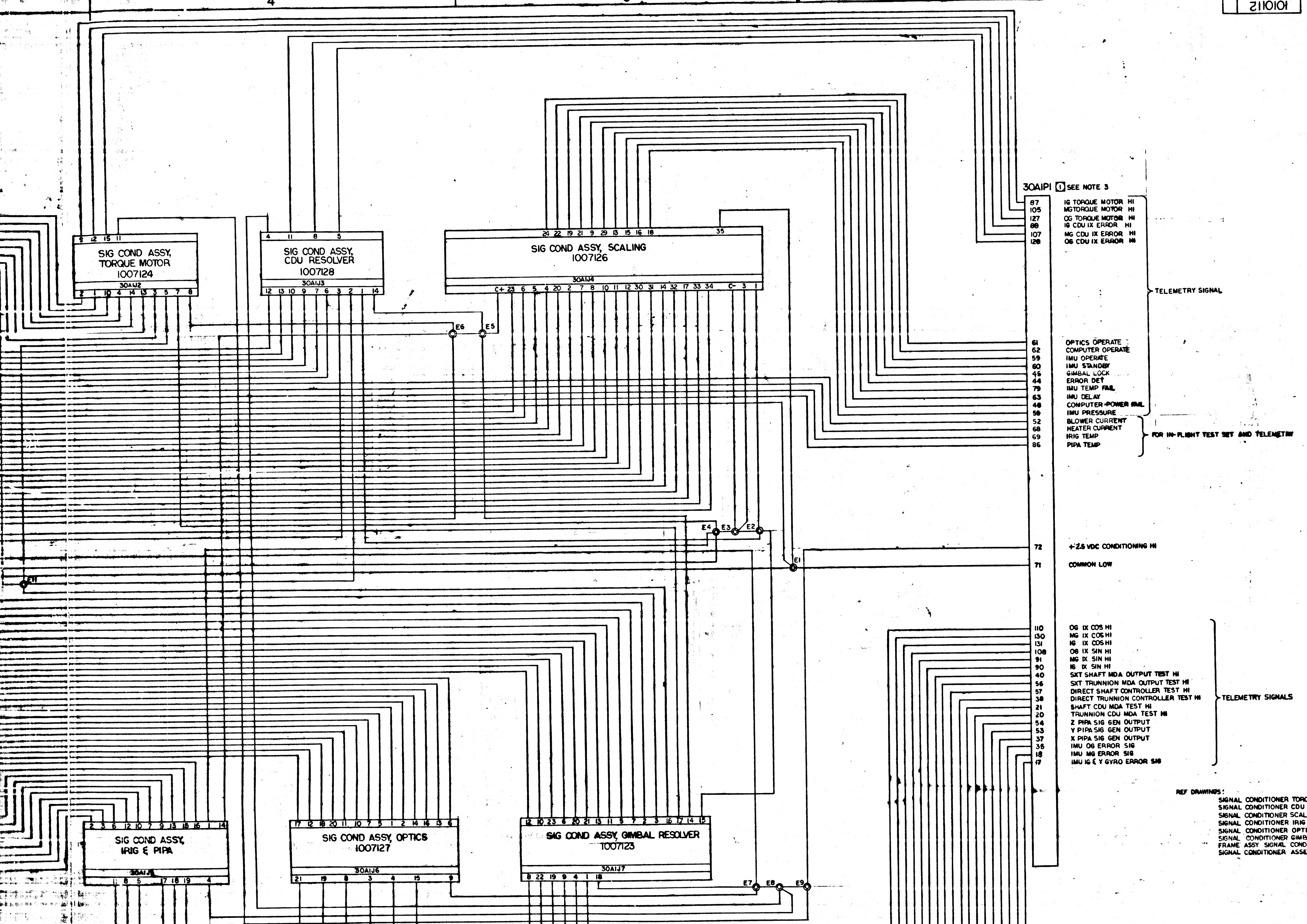
F-2


30A1J1
IG TORQUE MOTOR HIG- 106 BRN
IG TORQUE MOTOR RET 93 BLK
MG TORQUE MOTOR HIG 108 WHT
MG TORQUE MOTOR RET 107 ORN
OG TORQUE MOTOR HI 95 WHT/ORN
OG TORQUE MOTOR RET 94 WHT/RED
IMU 28V 800 CPS 1Ø 9 AA-1
IMU 28V 800 CPS 1Ø 8 AA-2
IG CDU IX ERROR SIG 96 WHT/BRN
IG CDU IX ERROR SIG 82 WHT/RED
MG CDU IX ERROR SIG 70 WHT
MG CDU IX ERROR SIG RET 71 GRY
OG CDU IX ERROR SIG 72 BLU
OG CDU IX ERROR SIG RET 83 GRN
BLOWER CURRENT 73 AA-3
HEATER CURRENT 97 AA-4
IRIG TEMP 85 AA-5
PIPA TEMP 98 AA-6
TEMP CONTROL LO 84 AA-7
+28V DC OPTICS OPERATE 65 WHT/BLK/YEL
OV DC OPTICS OPERATE 66 GRN
+28V DC COMPUTER OPERATE 4 YEL
OV DC COMPUTER OPERATE 18 ORN
28V DC IMU OPERATE 19 WHT/BLK/BRN
28V DC IMU STANDBY 20 BRN
GIMBAL LOCK HI 10 BLU
GIMBAL LOCK LO 23 VIO
ERROR DET HI 12 WHT
ERROR DET LO 26 WHT/BLK
IMU TEMP FAIL HI 11 WHT/GRN
IMU TEMP FAIL LO 25 WHT/BRN/YEL
IMU DELAY HI 46 WHT/BRN/GRN
IMU DELAY LO 36 WHT/ORN
COMP POWER FAIL HI 13 WHT/BRN/BLU
COMP POWER FAIL LO 27 WHT/BLU
IMU PRESSURE HI 42 WHT/BRN/VIO
IMU PRESSURE LO 53 WHT/BRN/GRY
+20V DC CONDITIONING 5 AA-8
OV DC CONDITIONING 6 AA-9
2.5V DC CONDITIONING HI 7 AA-10 (E7)
2.5V DC CONDITIONING LO 21 AA-11 (E1)
SEE NOTE 2
OG IX COS HI S3 30 RED
OG IX COS LO S1 31 BRN
MG IX COS HI 28 BLU
MG IX COS LO 40 YEL
IG IX COS HI 2 WHT/BLK
IG IX COS LO 3 WHT/RED
OG IX SIN HI S4 17 WHT/BLK/RED
OG IX SIN LO S2 16 WHT/BLK/GRN
MG IX SIN HI 15 GRN
MG IX SIN LO 29 WHT/BLK/YEL
IG IX SIN HI 1 WHT
IG IX SIN LO 14 WHT/BRN
OPT 28V 800 CPS 1Ø HI 45 GRN
OPT 28V 800 CPS 1Ø LO 55 WHT/RED
SXT SHAFT MDA OUTPUT TEST HI 104 WHT/GRN
SXT SHAFT MDA OUTPUT TEST LO 105 WHT/ORN
SXT TRUNNION MDA OUTPUT TEST HI 90 BRN
SXT TRUNNION MDA OUTPUT TEST LO 103 BLK
DIRECT SHAFT CONTROLLER TEST HI 89 YEL
DIRECT SHAFT CONTROLLER TEST LO 102 BLU
DIRECT TRUNNION CONTROLLER TEST HI 100 WHT
DIRECT TRUNNION CONTROLLER TEST LO 101 WHT/BLK
SHAFT CDU MDA TEST HI 87 WHT/BLK/BRN
SHAFT CDU MDA TEST LO 88 WHT/VIO
TRUNNION CDU MDA TEST HI 86 WHT/BRN
TRUNNION CDU MDA TEST LO 99 WHT/BLU
Z PIPA SIG GEN OUTPUT 44 WHT/GRN
Y PIPA SIG GEN OUTPUT 43 WHT/YEL
X PIPA SIG GEN OUTPUT 33 WHT/RED
IMU OV DC 32 GRY
IMU OG ERROR SIG 50 BLU
IMU MG ERROR SIG 60 WHT
IMU IG & Y GYRO ERROR SIG 61 WHT/BRN
IMU GIMBAL & GYRO ERROR SIG LO 51 GRN
3200 CPS 2V HI 59 RED
3200 CPS 2V LO 58 BRN
SIG COND ASSY, TORQUE MOTOR 1007124
30A1J2
SIG COND ASSY, CDU RESOLVER 1007128
30A1J3
SIG COND ASSY, SCALING 1007126
30A1J4
SIG COND ASSY, IRIG & PIPA
30A1J5
SIG COND ASSY, OPTICS 1007127
30A1J6
SIG COND ASSY, GIMBAL RESOLVER 1007123
30A1J7
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
AA-1
AA-2
AA-7
AA-8
AA-10
AA-11
AA-12
6
5
4
3
D
C
B
A

OTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. OUTPUT LO OF EACH SIGNAL CONDITIONER ASSEMBLY EXCEPT SIGNAL CONDITIONING ASSEMBLY, SCALING IS CONNECTED TO +2.5 VDC CONDITIONING BIAS, WHICH IS REFERENCED TO 2.5 VDC CONDITIONING LO. HENCE OUTPUT OF EACH OF THE ABOVE SIGNAL CONDITIONER ASSEMBLY IS REFERENCED TO COMMON LO
3. ① PIN NUMBER ASSIGNMENT ON CONNECTOR 30A1P1 CONTROLLED BY ICD

1010112 A


4
3
2
1
D
C
B
A
SIG COND ASSY, TORQUE MOTOR
1007124
30A1J2
9 12 15 11
2 1 10 4 14 13 3 5 7 8
SIG COND ASSY, CDU RESOLVER
1007128
30A1J3
4 11 8 5
12 13 10 9 7 6 3 2 1 14
SIG COND ASSY, SCALING
1007126
30A1J4
24 22 19 21 9 29 13 15 16 18 35
C+ 23 6 5 4 20 2 7 8 10 11 12 30 31 14 32 17 33 34 C- 3 1
SIG COND ASSY, IRIG & PIPA
30A1J5
2 3 6 12 10 7 9 13 15 16 1 14
11 8 5 17 18 19 4
SIG COND ASSY, OPTICS
1007127
30A1J6
17 12 18 20 11 10 7 5 1 2 14 16 13 6
21 19 8 3 4 15 9
SIG COND ASSY, GIMBAL RESOLVER
1007123
30A1J7
12 10 23 6 20 21 13 11 5 7 2 3 16 17 14 15
8 22 19 9 4 1 18
E1
E2
E3
E4
E5
E6
E7
E8
E9
E11
30A1P1 ① SEE NOTE 3
87 IG TORQUE MOTOR HI
105 MGTORQUE MOTOR HI
127 OG TORQUE MOTOR HI
88 IG CDU IX ERROR HI
107 MG CDU IX ERROR HI
128 OG CDU IX ERROR HI
TELEMETRY SIGNAL
61 OPTICS OPERATE
62 COMPUTER OPERATE
59 IMU OPERATE
60 IMU STANDBY
45 GIMBAL LOCK
44 ERROR DET
79 IMU TEMP FAIL
63 IMU DELAY
48 COMPUTER POWER FAIL
58 IMU PRESSURE
52 BLOWER CURRENT
68 HEATER CURRENT
69 IRIG TEMP
86 PIPA TEMP
FOR IN-FLIGHT TEST SET AND TELEMETRY
72 +2.5 VDC CONDITIONING HI
71 COMMON LOW
110 OG IX COS HI
130 MG IX COS HI
131 IG IX COS HI
108 OG IX SIN HI
91 MG IX SIN HI
90 IG IX SIN HI
40 SXT SHAFT MDA OUTPUT TEST HI
56 SXT TRUNNION MDA OUTPUT TEST HI
57 DIRECT SHAFT CONTROLLER TEST HI
38 DIRECT TRUNNION CONTROLLER TEST HI
21 SHAFT CDU MDA TEST HI
20 TRUNNION CDU MDA TEST HI
54 Z PIPA SIG GEN OUTPUT
53 Y PIPA SIG GEN OUTPUT
37 X PIPA SIG GEN OUTPUT
35 IMU OG ERROR SIG
18 IMU MG ERROR SIG
17 IMU IG & Y GYRO ERROR SIG
TELEMETRY SIGNALS

1010112

REVISIONS

REF DRAWINGS:

SIGNAL CONDITIONER TORQUE MOTOR	1010110	SCHEMATIC
SIGNAL CONDITIONER CDU RESOLVER	1010114	
SIGNAL CONDITIONER SCALING	1010108	
SIGNAL CONDITIONER IRIG & PIPA	1010115	
SIGNAL CONDITIONER OPTICS	1010113	
SIGNAL CONDITIONER GIMBAL RESOLVER	1010111	
FRAME ASSY SIGNAL CONDITIONER	1007130	
SIGNAL CONDITIONER ASSEMBLY	1007121	

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
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MIT
INSTRUMENTATION LAB
Cambridge, Mass.
DRAWN DATE 3/7/68
CHECKED
APPROVAL 7/20/69
APPROVAL 7/20/69
NASA APPROVAL
MIT APPROVAL

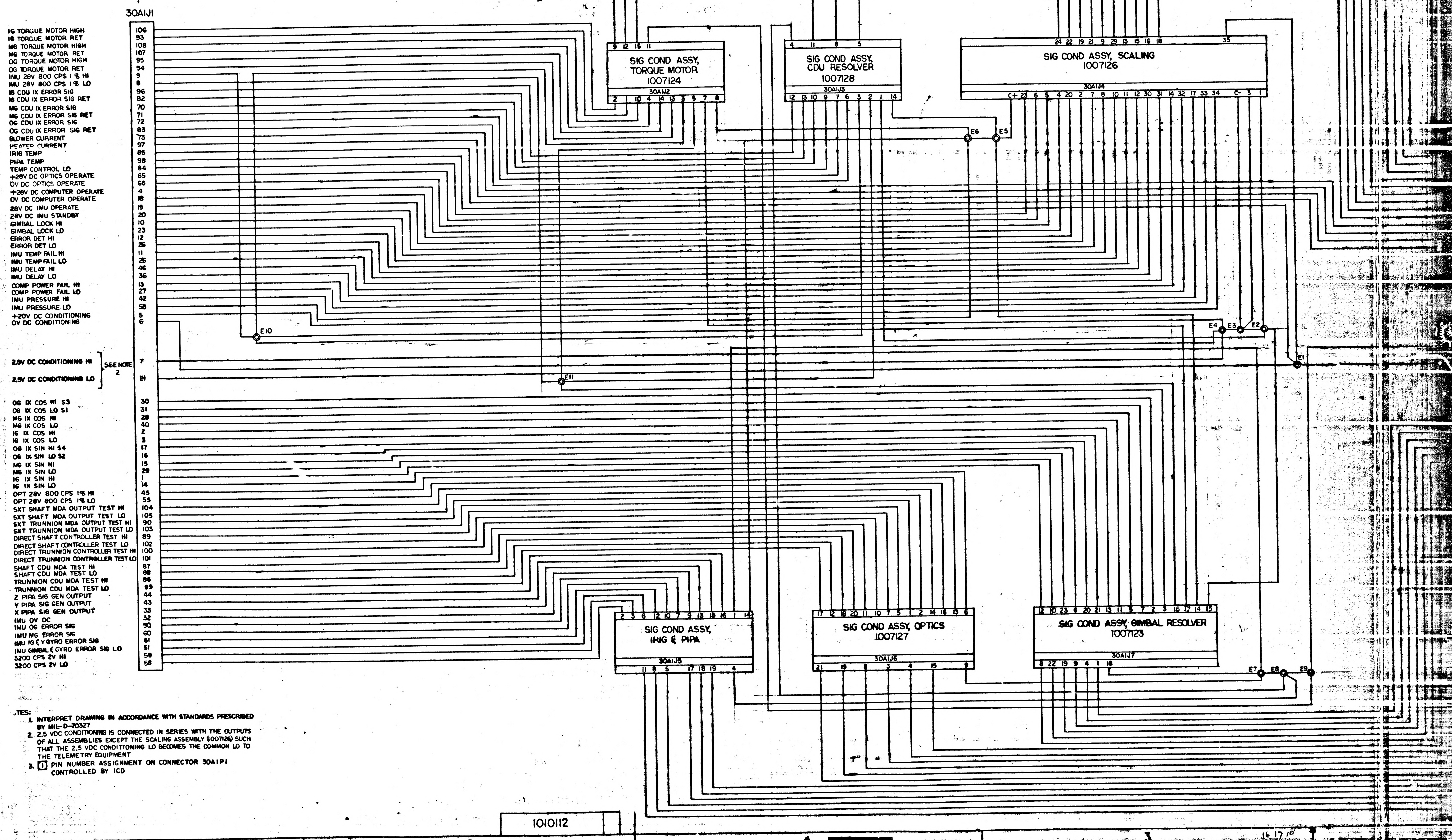
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
SIGNAL CONDITIONER ASSEMBLY

CODE IDENT NO. —— SIZE J NASA DRAWING NO. 1010112
SCALE —— WT —— SHEET 1 OF 1

24

1617


30A1J1
IG TORQUE MOTOR HIGH 106
IG TORQUE MOTOR RET 93
MG TORQUE MOTOR HIGH 108
MG TORQUE MOTOR RET 107
OG TORQUE MOTOR HIGH 95
OG TORQUE MOTOR RET 94
IMU 28V 800 CPS 1 ϕ HI 9
IMU 28V 800 CPS 1 ϕ LO 8
IG CDU IX ERROR SIG 96
IG CDU IX ERROR SIG RET 82
MG CDU IX ERROR SIG 70
MG CDU IX ERROR SIG RET 71
OG CDU IX ERROR SIG 72
OG CDU IX ERROR SIG RET 83
BLOWER CURRENT 73
HEATER CURRENT 97
IRIG TEMP 85
PIPA TEMP 98
TEMP CONTROL LO 84
+28V DC OPTICS OPERATE 65
0V DC OPTICS OPERATE 66
+28V DC COMPUTER OPERATE 4
0V DC COMPUTER OPERATE 18
28V DC IMU OPERATE 19
28V DC IMU STANDBY 20
GIMBAL LOCK HI 10
GIMBAL LOCK LO 23
ERROR DET HI 12
ERROR DET LO 26
IMU TEMP FAIL HI 11
IMU TEMP FAIL LO 25
IMU DELAY HI 46
IMU DELAY LO 36
COMP POWER FAIL HI 13
COMP POWER FAIL LO 27
IMU PRESSURE HI 42
IMU PRESSURE LO 53
+20V DC CONDITIONING 5
0V DC CONDITIONING 6
2.5V DC CONDITIONING HI 7
2.5V DC CONDITIONING LO 21
SEE NOTE 2
OG IX COS HI S3 30
OG IX COS LO S1 31
MG IX COS HI 28
MG IX COS LO 40
IG IX COS HI 2
IG IX COS LO 3
OG IX SIN HI S4 17
OG IX SIN LO S2 16
MG IX SIN HI 15
MG IX SIN LO 29
IG IX SIN HI 1
IG IX SIN LO 14
OPT 28V 800 CPS 1ϕ HI 45
OPT 28V 800 CPS 1ϕ LO 55
SXT SHAFT MDA OUTPUT TEST HI 104
SXT SHAFT MDA OUTPUT TEST LO 105
SXT TRUNNION MDA OUTPUT TEST HI 90
SXT TRUNNION MDA OUTPUT TEST LO 103
DIRECT SHAFT CONTROLLER TEST HI 89
DIRECT SHAFT CONTROLLER TEST LO 102
DIRECT TRUNNION CONTROLLER TEST HI 100
DIRECT TRUNNION CONTROLLER TEST LO 101
SHAFT CDU MDA TEST HI 87
SHAFT CDU MDA TEST LO 88
TRUNNION CDU MDA TEST HI 86
TRUNNION CDU MDA TEST LO 99
Z PIPA SIG GEN OUTPUT 44
Y PIPA SIG GEN OUTPUT 43
X PIPA SIG GEN OUTPUT 33
IMU 0V DC 32
IMU OG ERROR SIG 50
IMU MG ERROR SIG 60
IMU IG & Y GYRO ERROR SIG 61
IMU GIMBAL & GYRO ERROR SIG LO 51
3200 CPS 2V HI 59
3200 CPS 2V LO 58
SIG COND ASSY, TORQUE MOTOR 1007124
30A1J2
9 12 15 11
2 1 10 4 14 13 3 5 7 8
SIG COND ASSY, CDU RESOLVER 1007128
30A1J3
4 11 8 5
12 13 10 9 7 6 3 2 1 14
SIG COND ASSY, SCALING 1007126
30A1J4
24 22 19 21 9 29 13 15 16 18 35
C+ 23 6 5 4 20 2 7 8 10 11 12 30 31 14 32 17 33 34 C- 3 1
SIG COND ASSY, IRIG & PIPA
30A1J5
2 3 6 12 10 7 9 13 15 16 1 14
11 8 5 17 18 19 4
SIG COND ASSY, OPTICS 1007127
30A1J6
17 12 18 20 11 10 7 5 1 2 14 16 13 6
21 19 8 3 4 15 9
SIG COND ASSY, GIMBAL RESOLVER 1007123
30A1J7
12 10 23 6 20 21 13 11 5 7 2 3 16 17 14 15
8 22 19 9 4 1 18
E1
E2
E3
E4
E5
E6
E7
E8
E9
E10
E11
6
5
4
3
D
C
B

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. 2.5 VDC CONDITIONING IS CONNECTED IN SERIES WITH THE OUTPUTS OF ALL ASSEMBLIES EXCEPT THE SCALING ASSEMBLY (1007126) SUCH THAT THE 2.5 VDC CONDITIONING LO BECOMES THE COMMON LO TO THE TELEMETRY EQUIPMENT
3. ☐1 PIN NUMBER ASSIGNMENT ON CONNECTOR 30A1P1 CONTROLLED BY ICD

1010112

1010115

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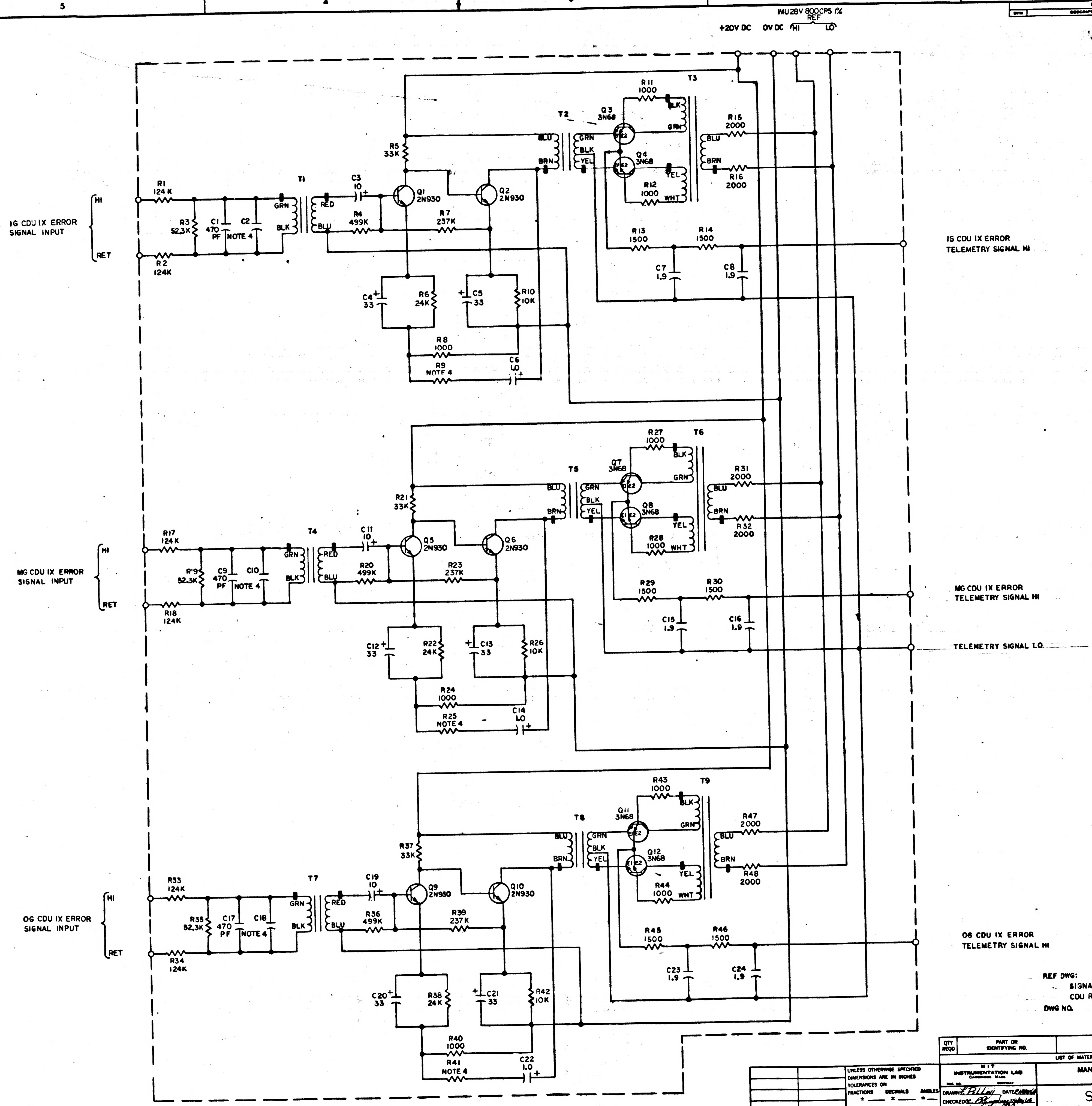
REVISIONS 7DRR 08778			
SYM	DESCRIPTION	DATE	APPROVAL


IMU 28V 800CPS 1%
REF
+20V DC
0V DC
HI
LO
IG CDU 1X ERROR SIGNAL INPUT
HI
RET
R1 124K
R2 124K
R3 52.3K
C1 470 PF
C2 NOTE 4
T1
GRN
BLK
RED
BLU
C3 10
R4 499K
Q1 2N930
Q2 2N930
R5 33K
R7 237K
C4 33
R6 24K
C5 33
R10 10K
R8 1000
R9 NOTE 4
C6 1.0
T2
BLU
BRN
GRN
BLK
YEL
Q3 3N68
Q4 3N68
R11 1000
R12 1000
T3
BLK
GRN
YEL
WHT
R15 2000
R16 2000
R13 1500
R14 1500
C7 1.9
C8 1.9
IG CDU 1X ERROR TELEMETRY SIGNAL HI
MG CDU 1X ERROR SIGNAL INPUT
R17 124K
R18 124K
R19 52.3K
C9 470 PF
C10 NOTE 4
T4
C11 10
R20 499K
Q5 2N930
Q6 2N930
R21 33K
R23 237K
C12 33
R22 24K
C13 33
R26 10K
R24 1000
R25 NOTE 4
C14 1.0
T5
Q7 3N68
Q8 3N68
R27 1000
R28 1000
T6
R31 2000
R32 2000
R29 1500
R30 1500
C15 1.9
C16 1.9
MG CDU 1X ERROR TELEMETRY SIGNAL HI
TELEMETRY SIGNAL LO
OG CDU 1X ERROR SIGNAL INPUT
R33 124K
R34 124K
R35 52.3K
C17 470 PF
C18 NOTE 4
T7
C19 10
R36 499K
Q9 2N930
Q10 2N930
R37 33K
R39 237K
C20 33
R38 24K
C21 33
R42 10K
R40 1000
R41 NOTE 4
C22 1.0
T8
Q11 3N68
Q12 3N68
R43 1000
R44 1000
T9
R47 2000
R48 2000
R45 1500
R46 1500
C23 1.9
C24 1.9
OG CDU 1X ERROR TELEMETRY SIGNAL HI

REF DWG:
SIGNAL CONDITIONER ASSY
CDU RESOLVER
DWG NO.

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS
3. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST FROM CHARTS A & B

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO.
CONTRACT
DRAWN E. Pollini DATE [illegible]
CHECKED [illegible]
APPROVAL [illegible]
APPROVAL
NASA APPROVAL [illegible] 5/20/67
MIT APPROVAL [illegible] 26 May 67

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER
CDU RESOLVER

CODE IDENT NO
SIZE E
NASA DRAWING NO. 1010114
SCALE NONE
WT
SHEET 1 OF 2

MASTER

1010114

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REVISIONS TDRR 08775			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-653	RESISTOR	124K	± 1%	1/8W
R2	1010364-653		124K	± 1%	1/8W
R3	1010311-291		52.3K	± 1%	1/10W
R4	1010364-769		499K	± 1%	1/8W
R5	1006750-68		33K	± 2%	1/4W
R6	1006750-65		24K	± 2%	1/4W
R7	1010364-707		237K	± 1%	1/8W
R8	1010311-126		1000	± 1%	1/10W
R9	SEE NOTE 4			± 1%	1/10W
R10	1006750-56		10K	± 2%	1/4W
R11	1010311-126		1000	± 1%	1/10W
R12	1010311-126		1000	± 1%	1/10W
R13	1006750-36		1500	± 2%	1/4W
R14	1006750-36		1500	± 2%	1/4W
R15	1006750-39		2000	± 2%	1/4W
R16	1006750-39		2000	± 2%	1/4W
R17	1010364-653		124K	± 1%	1/8W
R18	1010364-653		124K	± 1%	1/8W
R19	1010311-291		52.3K	± 1%	1/10W
R20	1010364-769		499K	± 1%	1/8W
R21	1006750-68		33K	± 2%	1/4W
R22	1006750-65		24K	± 2%	1/4W
R23	1010364-707		237K	± 1%	1/8W
R24	1010311-126		1000	± 1%	1/10W
R25	SEE NOTE 4			± 1%	1/10W
R26	1006750-56		10K	± 2%	1/4W
R27	1010311-126		1000	± 1%	1/10W
R28	1010311-126		1000	± 1%	1/10W
R29	1006750-36		1500	± 2%	1/4W
R30	1006750-36		1500	± 2%	1/4W
R31	1006750-39		2000	± 2%	1/4W
R32	1006750-39		2000	± 2%	1/4W
R33	1010364-653		124K	± 1%	1/8W
R34	1010364-653		124K	± 1%	1/8W
R35	1010311-291		52.3K	± 1%	1/10W
R36	1010364-769		499K	± 1%	1/8W
R37	1006750-68		33K	± 2%	1/4W
R38	1006750-65		24K	± 2%	1/4W
R39	1010364-707		237K	± 1%	1/8W
R40	1010311-126		1000	± 1%	1/10W
R41	SEE NOTE 4			± 1%	1/10W
R42	1006750-56		10K	± 2%	1/4W
R43	1010311-126		1000	± 1%	1/10W
R44	1010311-126		1000	± 1%	1/10W
R45	1006750-36		1500	± 2%	1/4W
R46	1006750-36		1500	± 2%	1/4W
R47	1006750-39		2000	± 2%	1/4W
R48	1006750-39	RESISTOR	2000	± 2%	1/4W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010410-9	CAPACITOR	470PF	± 2%	500VDC
C2	SEE NOTE 4			± 2%	
C3	1006755-31		10UF	± 10%	20VDC
C4	1006755-34		33UF	± 10%	20VDC
C5	1006755-34		33UF	± 10%	20VDC
C6	1006755-69		1UF	± 10%	35VDC
C7	1010279-16		1.9UF	± 10%	6VDC
C8	1010279-16		1.9UF	± 10%	6VDC
C9	1010410-9		470PF	± 2%	500VDC
C10	SEE NOTE 4			± 2%	
C11	1006755-31		10UF	± 10%	20VDC
C12	1006755-34		33UF	± 10%	20VDC
C13	1006755-34		33UF	± 10%	20VDC
C14	1006755-69		1UF	± 10%	35VDC
C15	1010279-16		1.9UF	± 10%	6VDC
C16	1010279-16		1.9UF	± 10%	6VDC
C17	1010410-9		470PF	± 2%	500VDC
C18	SEE NOTE 4			± 2%	
C19	1006755-31		10UF	± 10%	20VDC
C20	1006755-34		33UF	± 10%	20VDC
C21	1006755-34		33UF	± 10%	20VDC
C22	1006755-69		1UF	± 10%	35VDC
C23	1010279-16		1.9UF	± 10%	6VDC
C24	1010279-16	CAPACITOR	1.9UF	± 10%	6VDC
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010712				
T5	1010324				
T6	1010323				
T7	1010712				
T8	1010324				
T9	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		

CHART A

C2, C10 & C18

PART NO.	VALUE	± 2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

CHART B

R9, R25 & R41 ±1% 1/10W

PART NO.	VALUE
1010311-296	59.0K
-297	60.4K
-298	61.9K
-299	63.4K
-300	64.9K
-301	66.5K
-302	68.1K
-303	69.8K
-304	71.5K
-305	73.2K
-306	75.0K
-307	76.8K
-308	78.7K
-309	80.6K
-310	82.5K
-311	84.5K
-312	86.6K
-313	88.7K
1010311-314	90.9K

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN P. Pallini DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

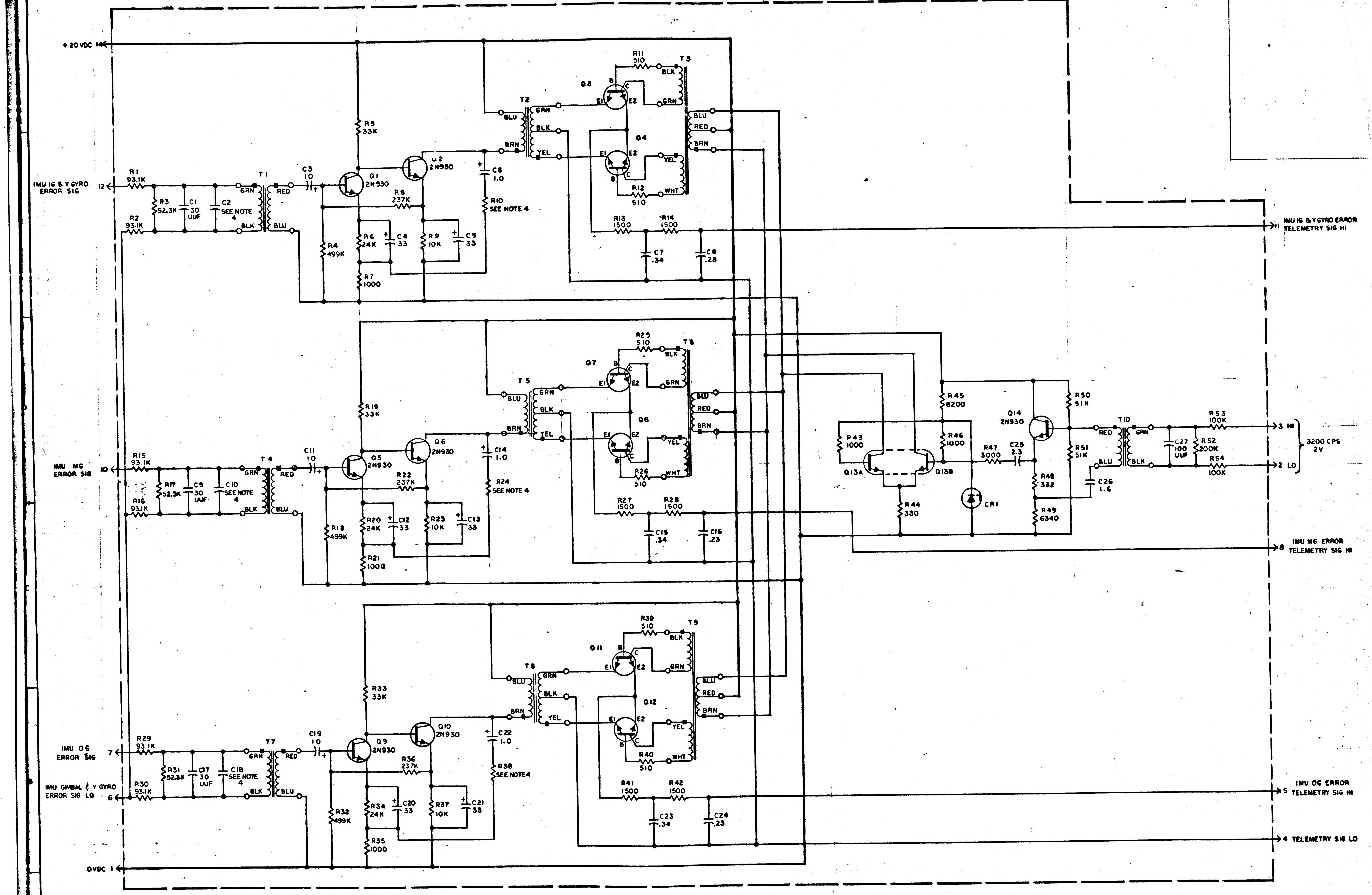
SCHEMATIC
SIGNAL CONDITIONER
CDU RESOLVER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010114
SCALE NONE WT SHEET 2 OF 2

1010114

MASTER

SYM	DESCRIPTION	DATE	APPROVAL


+20 VDC 14
IMU IG & Y GYRO ERROR SIG 12
R1 93.1K
R2 93.1K
R3 52.3K
C1 30 UUF
C2 SEE NOTE 4
T1
GRN
BLK
RED
BLU
C3 10
Q1 2N930
Q2 2N930
R4 499K
R5 33K
R6 24K
R7 1000
R8 237K
R9 10K
C4 33
C5 33
C6 1.0
R10 SEE NOTE 4
T2
T3
Q3
Q4
R11 510
R12 510
R13 1500
R14 1500
C7 .34
C8 .23
YEL
WHT
E1
E2
B
C
IMU IG & Y GYRO ERROR TELEMETRY SIG HI 11
IMU MG ERROR SIG 10
R15 93.1K
R16 93.1K
R17 52.3K
C9 30 UUF
C10 SEE NOTE 4
T4
C11 10
Q5 2N930
Q6 2N930
R18 499K
R19 33K
R20 24K
R21 1000
R22 237K
R23 10K
C12 33
C13 33
C14 1.0
R24 SEE NOTE 4
T5
T6
Q7
Q8
R25 510
R26 510
R27 1500
R28 1500
C15 .34
C16 .23
IMU MG ERROR TELEMETRY SIG HI 8
IMU OG ERROR SIG 7
IMU GIMBAL & Y GYRO ERROR SIG LO 6
R29 93.1K
R30 93.1K
R31 52.3K
C17 30 UUF
C18 SEE NOTE 4
T7
C19 10
Q9 2N930
Q10 2N930
R32 499K
R33 33K
R34 24K
R35 1000
R36 237K
R37 10K
C20 33
C21 33
C22 1.0
R38 SEE NOTE 4
T8
T9
Q11
Q12
R39 510
R40 510
R41 1500
R42 1500
C23 .34
C24 .23
IMU OG ERROR TELEMETRY SIG HI 5
4 TELEMETRY SIG LO
OVDC 1
R43 1000
Q13A
Q13B
R44 330
R45 8200
R46 1000
CR1
R47 3000
C25 2.3
Q14 2N930
R48 332
R49 6340
R50 51K
R51 51K
C26 1.6
T10
C27 100 UUF
R52 200K
R53 100K
R54 100K
3 HI
2 LO
3200 CPS 2V

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS
3. UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN MICROFARADS
4. THE VALUE OF R10, R24, R38, C2, C10, C18 TO BE SELECTED AT FINAL TEST PART TO BE SELECTED FROM CHART A AND CHART B

REF DWG:
SIGNAL CONDITIONER-IRIG ASSY
DWG NO. 1007131

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

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CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC, SIGNAL CONDITIONER IRIG

CODE IDENT NO. — SIZE E NASA DRAWING NO. 1010115
SCALE — WT — SHEET 1 OF 2

MASTER

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REVISIONS 11097			
SYM	DESCRIPTION	DATE	APPROVAL

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311-315	RESISTOR	93.1K	±1%	1/10 W
R2	-315		93.1K		
R3	↓ -291		52.3K		↓
R4	1010364-769		499K	↓	1/8 W
R5	1006750-68		33K	±2%	1/4 W
R6	1006750-65		24K	±2%	1/4 W
R7	1010311-126		1000	±1%	1/10 W
R8	1010364-707		237K	±1%	1/8 W
R9	1006750-56		10K	±2%	1/4 W
R10	SEE NOTE 4			±1%	1/10 W
R11	1006750-25		510	±2%	1/4 W
R12	-25		510		
R13	-36		1500		
R14	↓ -36		1500	↓	↓
R15	1010311-315		93.1K	±1%	1/10 W
R16	-315		93.1K		
R17	↓ -291		52.3K		↓
R18	1010364-769		499K	↓	1/8 W
R19	1006750-68		33K	±2%	1/4 W
R20	1006750-65		24K	±2%	1/4 W
R21	1010311-126		1000	±1%	1/10 W
R22	1010364-707		237K	±1%	1/8 W
R23	1006750-56		10K	±2%	1/4 W
R24	SEE NOTE 4			±1%	1/10 W
R25	1006750-25		510	±2%	1/4 W
R26	-25		510		
R27	-36		1500		
R28	↓ -36		1500	↓	↓
R29	1010311-315		93.1K	±1%	1/10 W
R30	-315		93.1K		
R31	↓ -291		52.3K		↓
R32	1010364-769		499K	↓	1/8 W
R33	1006750-68		33K	±2%	1/4 W
R34	1006750-65		24K	±2%	1/4 W
R35	1010311-126		1000	±1%	1/10 W
R36	1010364-707		237K	±1%	1/8 W
R37	1006750-56		10K	±2%	1/4 W
R38	SEE NOTE 4			±1%	1/10 W
R39	1006750-25		510	±2%	1/4 W
R40	-25		510		
R41	-36		1500		
R42	↓ -36		1500	↓	↓
R43	1010311-126		1000	±1%	1/10 W
R44	1006750-20		330	±2%	1/4 W
R45	1006750-54		8200	±2%	1/4 W
R46	1010311-126		1000	±1%	1/10 W
R47	1006750-43		3000	±2%	1/4 W
R48	1010311-80		332	±1%	1/10 W
R49	1010311-203		6340	±1%	1/10 W
R50	1006750-73		51K	±2%	1/4 W
R51	1006750-73		51K	±2%	1/4 W
R52	1010364-693		200K	±1%	1/8 W
R53	1006750-80		100K	±2%	1/4 W
R54	1006750-80	↓	100K	±2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010409-12	CAPACITOR	30 UUF	±2%	500 VDC
C2	SEE NOTE 4				
C3	1006755-31		10	±10%	20
C4	-34		33		20
C5	-34		33		20
C6	↓ -69		1.0		35
C7	1010279-7		.34		6
C8	1010279-5		.23	↓	6
C9	1010409-12		30 UUF	±2%	500
C10	SEE NOTE 4				
C11	1006755-31		10	±10%	20
C12	-34		33		20
C13	-34		33		20
C14	↓ -69		1.0		35
C15	1010279-7		.34		6
C16	1010279-5		.23	↓	6
C17	1010409-12		30 UUF	±2%	500
C18	SEE NOTE 4				
C19	1006755-31		10	±10%	20
C20	-34		33		20
C21	-34		33		20
C22	↓ -69		1.0		35
C23	1010279-7		.34		6
C24	-5		.23		6
C25	-236		2.3		35
C26	↓ -114		1.6	↓	15 ↓
C27	1010409-25	↓	100UUF	±2%	500VDC
CR1	1010372-4	DIODE	2.7V		250MW
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER			
Q4	1010367	CHOPPER			
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER			
Q8	1010367	CHOPPER			
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER			
Q12	1010367	CHOPPER			
Q13	1010376-3	TRANSISTOR			
Q14	1010397-1	TRANSISTOR	2N930		
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010315-1				
T4	1010712				
T5	1010324				
T6	1010315-1				
T7	1010712				
T8	1010324				
T9	1010315-1				
T10	1010712	↓			

CHART A		
C2 C10 C18 ±2%		
PART NO.	VALUE	RATING
1010409-1	10 UUF	500VDC
-8	20	
-12	30	
-16	43	
-19	56	
-21	68	
-23	82	
-24	91	
-25	100	
-26	110	
-27	120	
-28	130	↓
-29	150	500VDC
-30	160	300VDC
-31	180	
-32	200	
↓ -33	220 ↓	↓
1010409-34	240UUF	300VDC

CHART B	
R10 R24 R38 ±1% 1/10 W	
PART NO.	VALUE
1010311-296	59.0K
-297	60.4K
-298	61.9K
-299	63.4K
-300	64.9K
-301	66.5K
-302	68.1K
-303	69.8K
-304	71.5K
-305	73.2K
-306	75.0K
-307	76.8K
-308	78.7K
-309	80.6K
-310	82.5K
-311	84.5K
-312	86.6K
↓ -313	88.7K
1010311-314	90.9K

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± ___ DECIMALS ± ___ ANGLES ± ___
DO NOT SCALE THIS DRAWING
MATERIAL ___
HEAT TREATMENT ___
FINAL FINISH ___

MIT
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DWG. NO. CONTRACT
DRAWN A. D. Lan DATE Jul 64
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

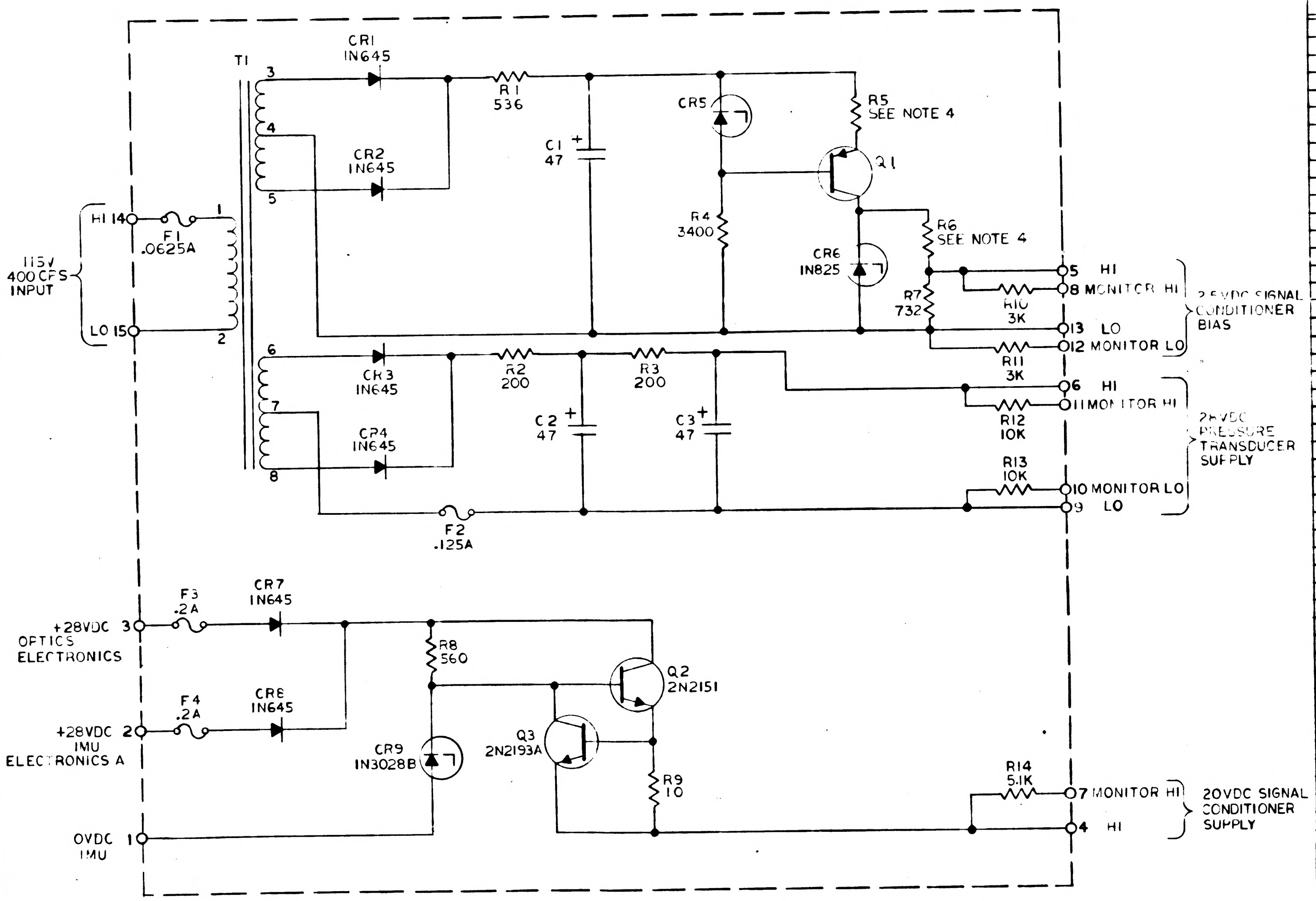
SCHEMATIC,
SIGNAL CONDITIONER
IRIG

CODE IDENT NO. —
SIZE E
NASA DRAWING NO. 1010115
SCALE —
WT —
SHEET 2 OF 2

1010115

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 6834	5 MAR 65	R.W.T.


T1
3
4
5
6
7
8
1
2
CR1 1N645
CR2 1N645
CR3 1N645
CR4 1N645
R1 536
C1 + 47
CR5
R5 SEE NOTE 4
Q1
R4 3400
CR6 1N825
R6 SEE NOTE 4
R7 732
R10 3K
R11 3K
R2 200
R3 200
C2 + 47
C3 + 47
R12 10K
R13 10K
F2 .125A
HI 14
LO 15
F1 .0625A
115V 400 CPS INPUT
5 HI
8 MONITOR HI
13 LO
12 MONITOR LO
25VDC SIGNAL CONDITIONER BIAS
6 HI
11 MONITOR HI
9 LO
10 MONITOR LO
28VDC PRESSURE TRANSDUCER SUPPLY
+28VDC 3 OPTICS ELECTRONICS
+28VDC 2 IMU ELECTRONICS A
OVDC 1 IMU
F3 .2A
F4 .2A
CR7 1N645
CR8 1N645
R8 560
Q2 2N2151
Q3 2N2193A
CR9 1N3028B
R9 10
R14 5.1K
7 MONITOR HI
4 HI
20VDC SIGNAL CONDITIONER SUPPLY

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010452-129	RESISTOR	536	1%	1 W
R2	1010389-39	↑	200	↑	3 W
R3	1010389-39		200		3 W
R4	1010364-353		3400		1/8 W
R5	1010267-		SEE NOTE 4		1/2 W
R6	1010364-		SEE NOTE 4		1/8 W
R7	1010364-225		732	↓	1/8 W
R8	1010389-50		560	1%	3 W
R9	1010369-141		10	5%	1/8 W
R10	1006750-43		3K	2%	1/4 W
R11	1006750-43		3K	↑	↑
R12	1006750-56		10K		
R13	1006750-56	↓	10K	↓	↓
R14	1006750-49	RESISTOR	5.1K	2%	1/4 W
C1	1006789-002	CAPACITOR	47	10%	50 V
C2	1006789-002	CAPACITOR	47	10%	50 V
C3	1006789-002	CAPACITOR	47	10%	50 V
CR1	1010362-001	DIODE			
CR2	1010362-001	↑			
CR3	1010362-001				
CR4	1010362-001				
CR5	1010372-24		18V	5%	250 MW
CR6	1010259		6.325V		400 MW
CR7	1010362-001				
CR8	1010362-001	↓			
CR9	1010829-25	DIODE	22V	2%	1W
Q1	1010633-1	TRANSISTOR			
Q2	1010269-1	TRANSISTOR			
Q3	1010398-1	TRANSISTOR			
T1	1010751	TRANSFORMER			
F1	1000170-2	FUSE			.0625A
F2	1000170-4	↑			.125A
F3	1000170-6	↓			.2A
F4	1000170-6	FUSE			.2A

TABLE I			
R5 1010267		R6 1010364	
DASH NO.	VALUE OHMS	DASH NO.	VALUE OHMS
171	1470	255	1050
172	1500	257	1070
173	1540	259	1100
174	1580	261	1130
175	1620	263	1150
176	1650	265	1180
177	1690		

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES TO BE IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES TO BE IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. R5 AND R6 TO BE SELECTED BY ELECTRICAL TEST FROM VALUES LISTED IN TABLE I

REF DWG:
POWER SUPPLIES, SIGNAL CONDITIONER
ASS'Y DWG NO. 1007125

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE
CHECKED
APPROVAL 5/25/64
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kuffer 26 May 64

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

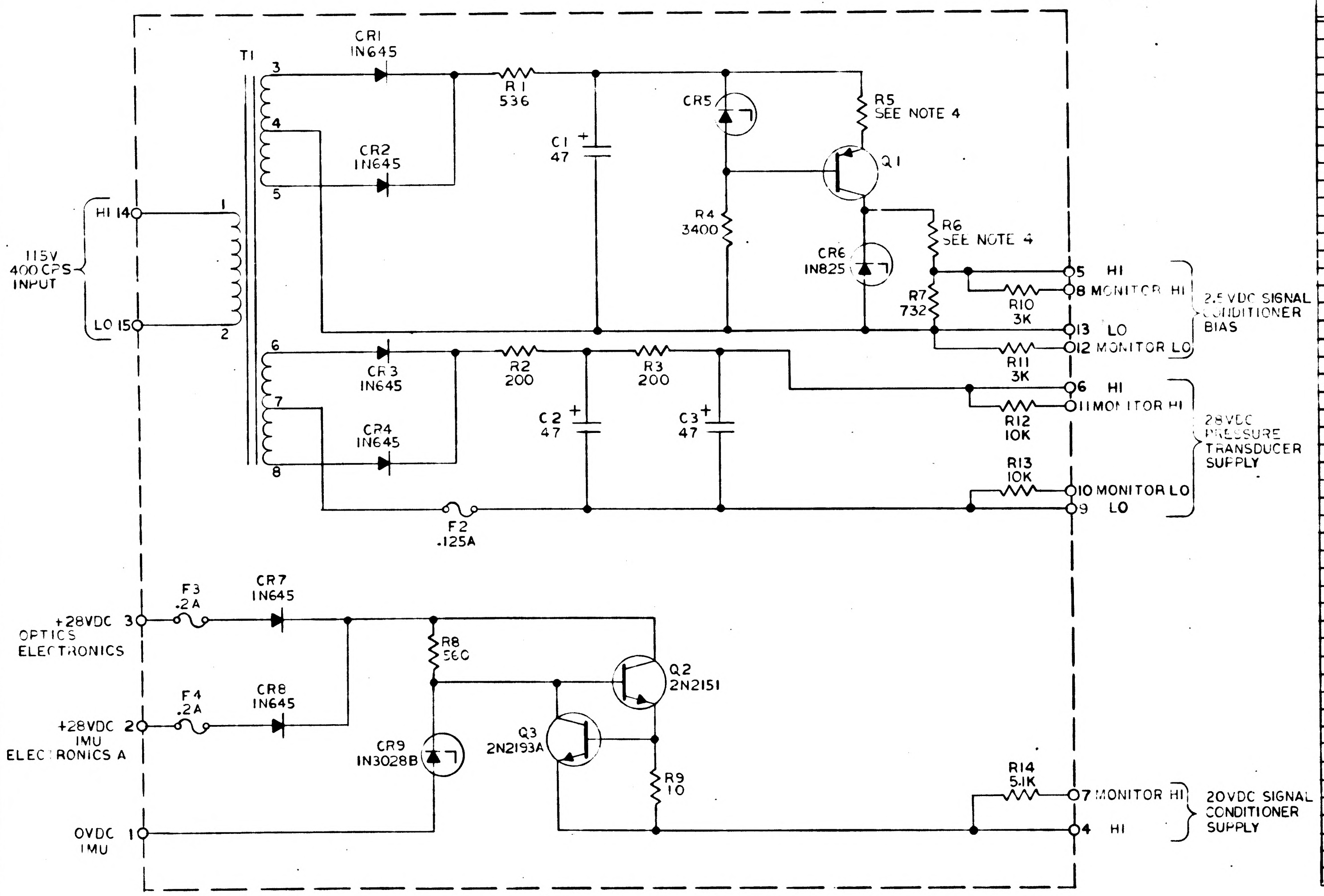
SCHEMATIC POWER SUPPLIES SIGNAL CONDITIONER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010120
SCALE NONE
WT
SHEET 1 OF 1

1010120 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 16834	5 MAR 65	R.W.T.
B	REVISED PER TDRR 20432	1 JUL 65	RLP E.T.


T1
CR1
IN645
CR2
IN645
R1
536
C1
47
CR5
R5
SEE NOTE 4
Q1
R4
3400
CR6
IN825
R6
SEE NOTE 4
R7
732
HI 14
115V
400 CPS
INPUT
LO 15
1
2
3
4
5
6
7
8
CR3
IN645
CR4
IN645
R2
200
R3
200
C2
47
C3
47
F2
.125A
5 HI
8 MONITOR HI
R10
3K
13 LO
12 MONITOR LO
R11
3K
2.5 VDC SIGNAL CONDITIONER BIAS
6 HI
11 MONITOR HI
R12
10K
R13
10K
10 MONITOR LO
9 LO
28 VDC PRESSURE TRANSDUCER SUPPLY
F3
.2A
CR7
IN645
+28VDC 3
OPTICS
ELECTRONICS
R8
560
Q2
2N2151
F4
.2A
CR8
IN645
+28VDC 2
IMU
ELECTRONICS A
CR9
IN3028B
Q3
2N2193A
R9
10
R14
5.1K
7 MONITOR HI
4 HI
20VDC SIGNAL CONDITIONER SUPPLY
OVDC 1
IMU

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010452-129	RESISTOR	536	1%	1 W
R2	1010389-39		200		3 W
R3	1010389-39		200		3 W
R4	1010364-353		3400		1/8 W
R5	1010267-		SEE NOTE 4		1/2 W
R6	1010364-		SEE NOTE 4		1/8 W
R7	1010364-225		732		1/8 W
R8	1010389-50		560	1%	3 W
R9	1010369-141		10	5%	1/8 W
R10	1006750-43		3K	2%	1/4 W
R11	1006750-43		3K		
R12	1006750-56		10K		
R13	1006750-56		10K		
R14	1006750-49	RESISTOR	5.1K	2%	1/4 W
C1	1006789-002	CAPACITOR	47	10%	50 V
C2	1006789-002	CAPACITOR	47	10%	50 V
C3	1006789-002	CAPACITOR	47	10%	50 V
CR1	1010362-001	DIODE			
CR2	1010362-001				
CR3	1010362-001				
CR4	1010362-001				
CR5	1010372-24		18V	5%	250 MW
CR6	1010259		6.325V		400 MW
CR7	1010362-001				
CR8	1010362-001				
CR9	1010265	DIODE	22V	2%	1W
Q1	1010633-1	TRANSISTOR			
Q2	1010269-1	TRANSISTOR			
Q3	1010398-1	TRANSISTOR			
T1	1010751	TRANSFORMER			
F2	1000170-4				.125A
F3	1000170-6				.2A
F4	1000170-6	FUSE			.2A

REF DWG:
POWER SUPPLIES, SIGNAL CONDITIONER
ASS'Y DWG NO. 1007125

TABLE I			
R5 1010267		R6 1010364	
DASH NO.	VALUE OHMS	DASH NO.	VALUE OHMS
171	1470	255	1050
172	1500	257	1070
173	1540	259	1100
174	1580	261	1130
175	1620	263	1150
176	1650	265	1180
177	1690		

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES TO BE IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES TO BE IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. R5 AND R6 TO BE SELECTED BY ELECTRICAL TEST FROM VALUES LISTED IN TABLE I

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

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INSTRUMENTATION LAB
CAMBRIDGE, MASS
DWG NO CONTRACT
DRAWN F. White DATE 3/-/64
CHECKED
APPROVAL Bruce L. Hinkle 5/25/64
APPROVAL
NASA APPROVAL
MIT APPROVAL 26 May 64

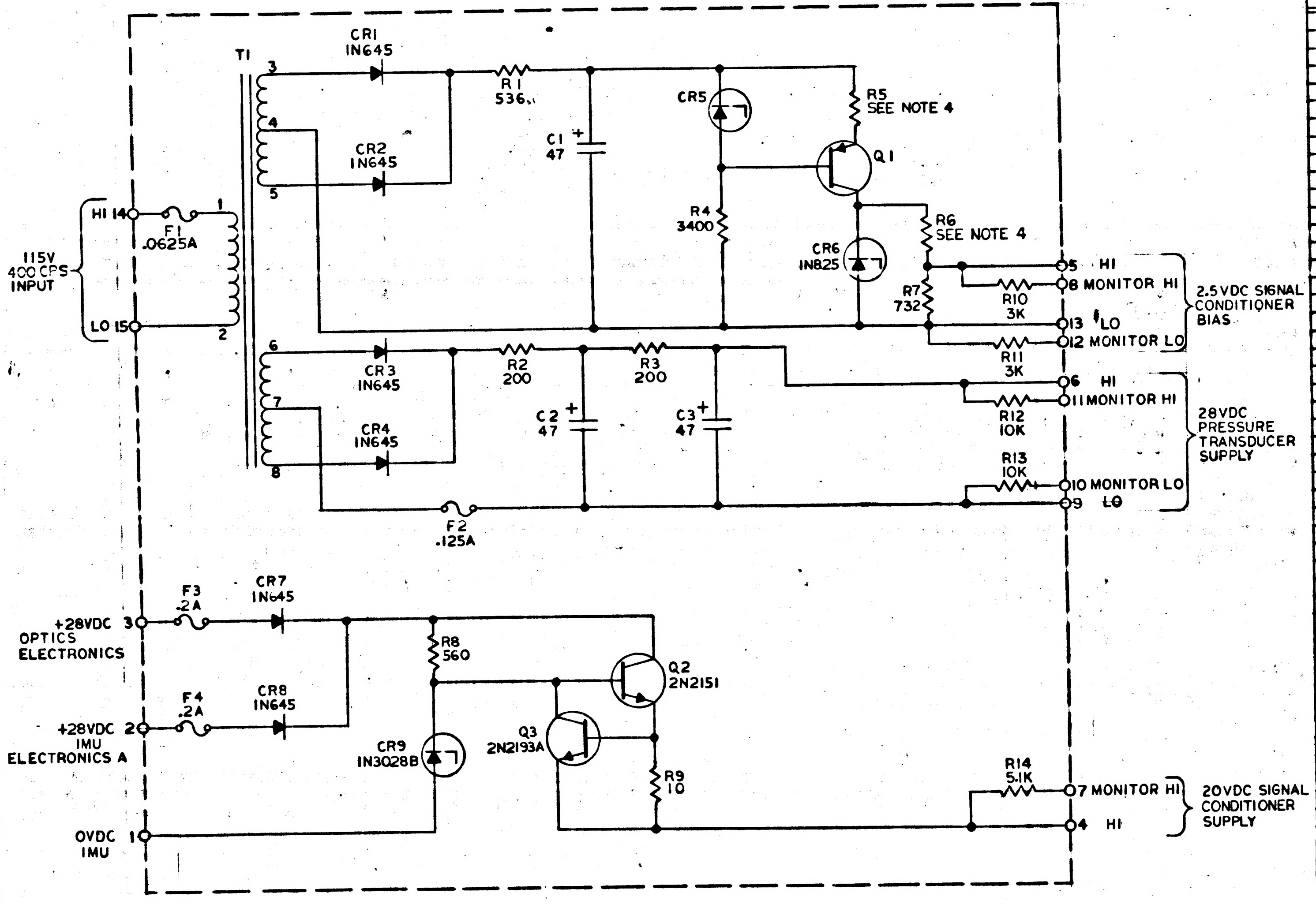
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC POWER SUPPLIES SIGNAL CONDITIONER

CODE IDENT NO. 80230
SIZE D
NASA DRAWING NO. 1010120
SCALE NONE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS TDRR 08278			
SYM	DESCRIPTION	DATE	APPROVAL


T1
CR1
1N645
CR2
1N645
R1
536
C1
47
CR5
R5
SEE NOTE 4
Q1
R4
3400
CR6
1N825
R6
SEE NOTE 4
R7
732
HI 14
F1
.0625A
115V
400 CPS
INPUT
LO 15
5 HI
8 MONITOR HI
R10
3K
13 LO
12 MONITOR LO
R11
3K
2.5VDC SIGNAL CONDITIONER BIAS
CR3
1N645
CR4
1N645
R2
200
R3
200
C2
47
C3
47
6 HI
11 MONITOR HI
R12
10K
R13
10K
10 MONITOR LO
9 LO
28VDC PRESSURE TRANSDUCER SUPPLY
F2
.125A
F3
.2A
CR7
1N645
+28VDC 3
OPTICS ELECTRONICS
F4
.2A
CR8
1N645
+28VDC 2
IMU ELECTRONICS A
R8
560
Q2
2N2151
Q3
2N2193A
CR9
1N3028B
R9
10
R14
5.1K
7 MONITOR HI
4 HI
20VDC SIGNAL CONDITIONER SUPPLY
OVDC 1
IMU

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010452-129	RESISTOR	536	1%	1 W
R2	1010389-39		200		3 W
R3	1010389-39		200		3 W
R4	1010364-353		3400		1/8 W
R5	1010267-		SEE NOTE 4		1/2 W
R6	1010364-		SEE NOTE 4		1/8 W
R7	1010364-225		732		1/8 W
R8	1010389-50		560	1%	3 W
R9	1010369-141		10	5%	1/8 W
R10	1006750-43		3K	2%	1/4 W
R11	1006750-43		3K		
R12	1006750-56		10K		
R13	1006750-56		10K		
R14	1006750-49	RESISTOR	5.1K	2%	1/4 W
C1	1006789-002	CAPACITOR	47	10%	50 V
C2	1006789-002	CAPACITOR	47	10%	50 V
C3	1006789-002	CAPACITOR	47	10%	50 V
CR1	1010362-001	DIODE			
CR2	1010362-001				
CR3	1010362-001				
CR4	1010362-001				
CR5	1010372-24		18V	5%	250 MW
CR6	1010259		6.325V		400 MW
CR7	1010362-001				
CR8	1010362-001				
CR9	1010265-25	DIODE	22V	2%	1W
Q1	1010633-1	TRANSISTOR			
Q2	1010269-1	TRANSISTOR			
Q3	1010398-1	TRANSISTOR			
T1	1010751	TRANSFORMER			
F1	1000170-2	FUSE			.0625A
F2	1000170-4				.125A
F3	1000170-6				.2A
F4	1000170-6	FUSE			.2A

REF DWG:
POWER SUPPLIES, SIGNAL CONDITIONER
ASS'Y DWG NO. 1007125

TABLE I

R5 1010267		R6 1010364	
DASH NO.	VALUE OHMS	DASH NO.	VALUE OHMS
171	1470	255	1050
172	1500	257	1070
173	1540	259	1100
174	1580	261	1130
175	1620	263	1150
176	1650	265	1180
177	1690		

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES TO BE IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES TO BE IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. R5 AND R6 TO BE SELECTED BY ELECTRICAL TEST FROM VALUES LISTED IN TABLE I

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± // DECIMALS ± // ANGLES ± //
DO NOT SCALE THIS DRAWING
MATERIAL //
HEAT TREATMENT //
FINAL FINISH //

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC POWER SUPPLIES SIGNAL CONDITIONER

CODE IDENT NO.
SIZE D
NASA DRAWING NO. 1010120
SCALE NONE
WT
SHEET 1 OF 1

MASTER

INCHES 0 1 2

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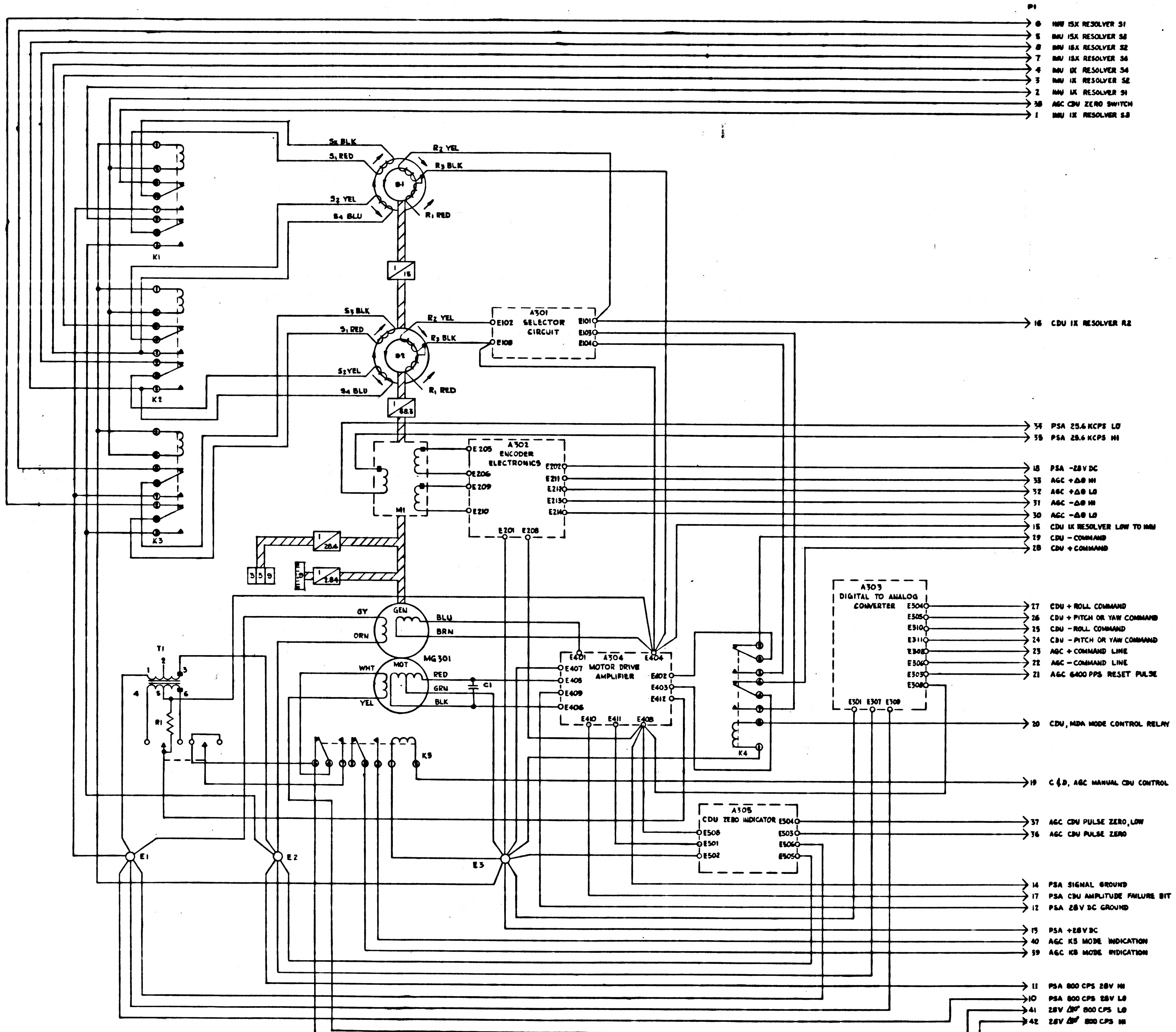
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	ADDED CDU SIGNAL DESCRIPTIONS	OCT 3 62	TC [illegible] JKK


P1
6 IMU 15X RESOLVER S1
5 IMU 15X RESOLVER S3
8 IMU 15X RESOLVER S2
7 IMU 15X RESOLVER S4
4 IMU 1X RESOLVER S4
3 IMU 1X RESOLVER S2
2 IMU 1X RESOLVER S1
38 AGC CDU ZERO SWITCH
1 IMU 1X RESOLVER S3
S3 BLK
S1 RED
S2 YEL
S4 BLU
R2 YEL
R3 BLK
R1 RED
B1
K1
1
15
B2
K2
1
68.3
A301
SELECTOR
CIRCUIT
E102
E108
E101
E103
E104
16 CDU 1X RESOLVER R2
34 PSA 25.6 KCPS LO
35 PSA 25.6 KCPS HI
A302
ENCODER
ELECTRONICS
E205
E206
E209
E210
E202
E211
E212
E213
E214
E201
E208
M1
K3
1
28.4
1
2.84
3 5 9
18 PSA -28 V DC
33 AGC +Δθ HI
32 AGC +Δθ LO
31 AGC -Δθ HI
30 AGC -Δθ LO
15 CDU 1X RESOLVER LOW TO IMU
29 CDU - COMMAND
28 CDU + COMMAND
GEN
GY
ORN
BLU
BRN
MOT
MG 301
WHT
YEL
RED
GRN
BLK
C1
T1
1
2
3
4
5
6
R1
A304
MOTOR DRIVE
AMPLIFIER
E401
E404
E407
E405
E409
E406
E402
E403
E412
E410
E411
E408
K5
K4
A303
DIGITAL TO ANALOG
CONVERTER
E304
E305
E310
E311
E302
E306
E303
E308
E301
E307
E309
27 CDU + ROLL COMMAND
26 CDU + PITCH OR YAW COMMAND
25 CDU - ROLL COMMAND
24 CDU - PITCH OR YAW COMMAND
23 AGC + COMMAND LINE
22 AGC - COMMAND LINE
21 AGC 6400 PPS RESET PULSE
20 CDU, MDA MODE CONTROL RELAY
19 C & D, AGC MANUAL CDU CONTROL
A305
CDU ZERO INDICATOR
E508
E501
E502
E504
E503
E506
E505
37 AGC CDU PULSE ZERO, LOW
36 AGC CDU PULSE ZERO
E1
E2
E3
14 PSA SIGNAL GROUND
17 PSA CDU AMPLITUDE FAILURE BIT
12 PSA 28V DC GROUND
13 PSA +28V DC
40 AGC K5 MODE INDICATION
39 AGC K8 MODE INDICATION
11 PSA 800 CPS 28V HI
10 PSA 800 CPS 28V LO
41 28V ∠0° 800 CPS LO
42 28V ∠0° 800 CPS HI

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00030 DATE 9-27-62

INCHES
PHOTOGRAPHIC SCALE ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN R. [illegible] DATE 12 SEPT 62
CHECKED [illegible]
APPROVAL [illegible] 9/26/62
APPROVAL R. J. [illegible] 9/26/62
NASA APPROVAL W. J. [illegible] 9-27-62
MIT APPROVAL [illegible] 9/27/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

INTERCONNECTION DIAGRAM CDU

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010126
SCALE —
WT
SHEET 1 OF 1

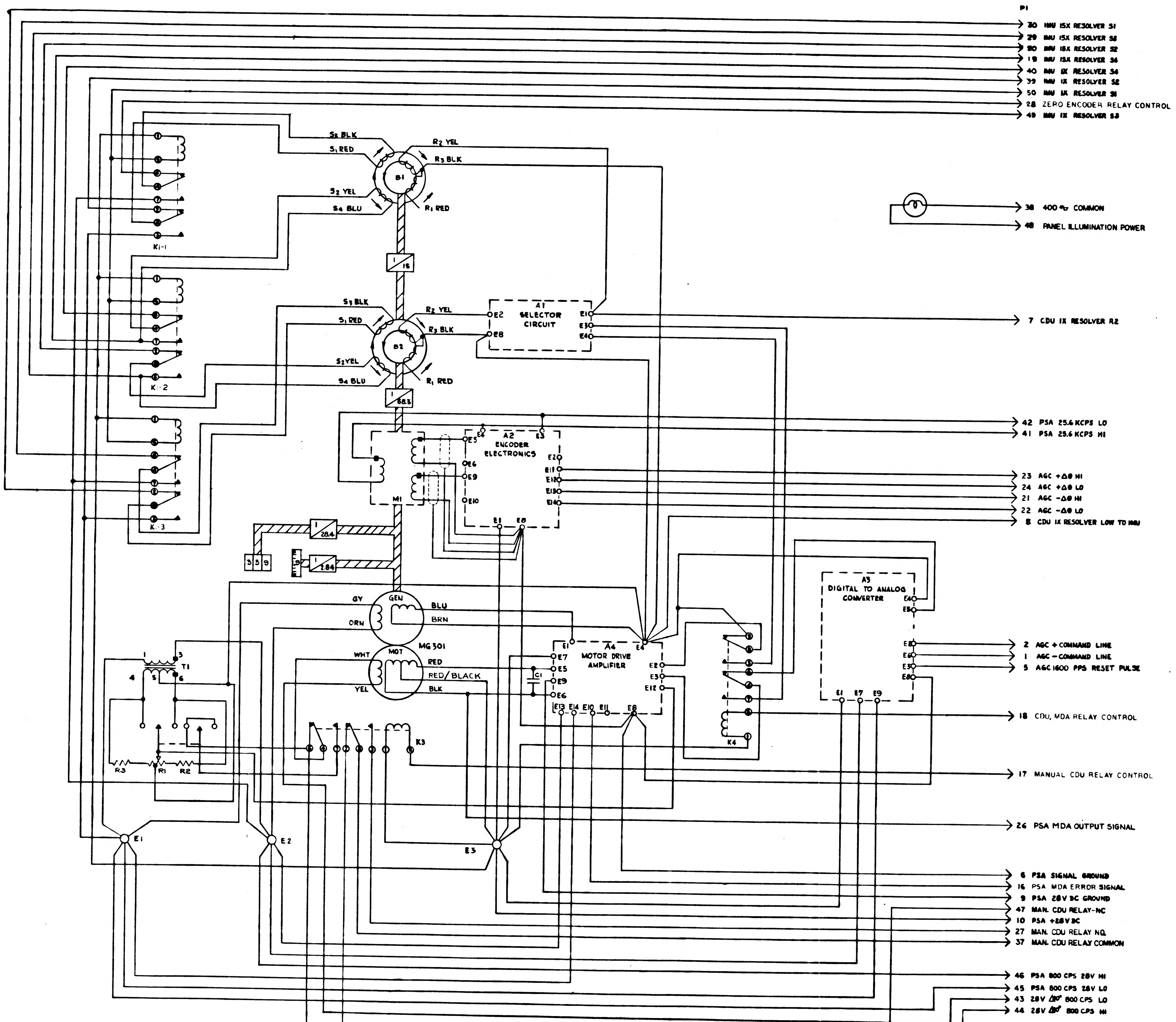
1010126 A

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	ADDED CDU SIGNAL DESCRIPTIONS	OCT 2, '62	TO ... WJK
B	REVISED PER TDRR 00118	10-29-62	R.J.T.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00030 DATE 9-27-62


P1
30 IMU 15X RESOLVER S1
29 IMU 15X RESOLVER S3
20 IMU 15X RESOLVER S2
19 IMU 15X RESOLVER S4
40 IMU 1X RESOLVER S4
39 IMU 1X RESOLVER S2
50 IMU 1X RESOLVER S1
28 ZERO ENCODER RELAY CONTROL
49 IMU 1X RESOLVER S3
38 400 ~ COMMON
48 PANEL ILLUMINATION POWER
7 CDU 1X RESOLVER R2
42 PSA 25.6 KCPS LO
41 PSA 25.6 KCPS HI
23 AGC +Δθ HI
24 AGC +Δθ LO
21 AGC -Δθ HI
22 AGC -Δθ LO
8 CDU 1X RESOLVER LOW TO IMU
2 AGC + COMMAND LINE
1 AGC - COMMAND LINE
5 AGC 1600 PPS RESET PULSE
18 CDU, MDA RELAY CONTROL
17 MANUAL CDU RELAY CONTROL
26 PSA MDA OUTPUT SIGNAL
6 PSA SIGNAL GROUND
16 PSA MDA ERROR SIGNAL
9 PSA 28V DC GROUND
47 MAN. CDU RELAY-NC
10 PSA +28V DC
27 MAN. CDU RELAY NO.
37 MAN. CDU RELAY COMMON
46 PSA 800 CPS 28V HI
45 PSA 800 CPS 28V LO
43 28V ∠0° 800 CPS LO
44 28V ∠0° 800 CPS HI
S3 BLK
S1 RED
S2 YEL
S4 BLU
R2 YEL
R3 BLK
R1 RED
B1
B2
K1-1
K1-2
K-3
1/15
1/68.3
A1 SELECTOR CIRCUIT
E1 E2 E3 E4 E8
A2 ENCODER ELECTRONICS
E1 E2 E3 E4 E5 E6 E8 E9 E10 E11 E12 E13 E14
M1
1/28.4
1/2.84
3 5 9
.9
GEN
GY
ORN
BLU
BRN
MOT
MG 301
WHT
YEL
RED
RED/BLACK
BLK
A4 MOTOR DRIVE AMPLIFIER
E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11 E12 E13 E14
C1
A3 DIGITAL TO ANALOG CONVERTER
E4 E5 E2 E6 E3 E8 E1 E7 E9
K4
K3
T1
1 3 4 5 6
R3 R1 R2
E1
E2
E3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

MIT
INSTRUMENTATION LAB
Cambridge Mass.
DWG NO CONTRACT

DRAWN R. [illegible] DATE 12 SEPT 62
CHECKED [illegible]
APPROVAL [illegible] 9/26/62
APPROVAL [illegible] 9/26/62
NASA APPROVAL [illegible] 9-27-62
MIT APPROVAL [illegible] 9/27/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

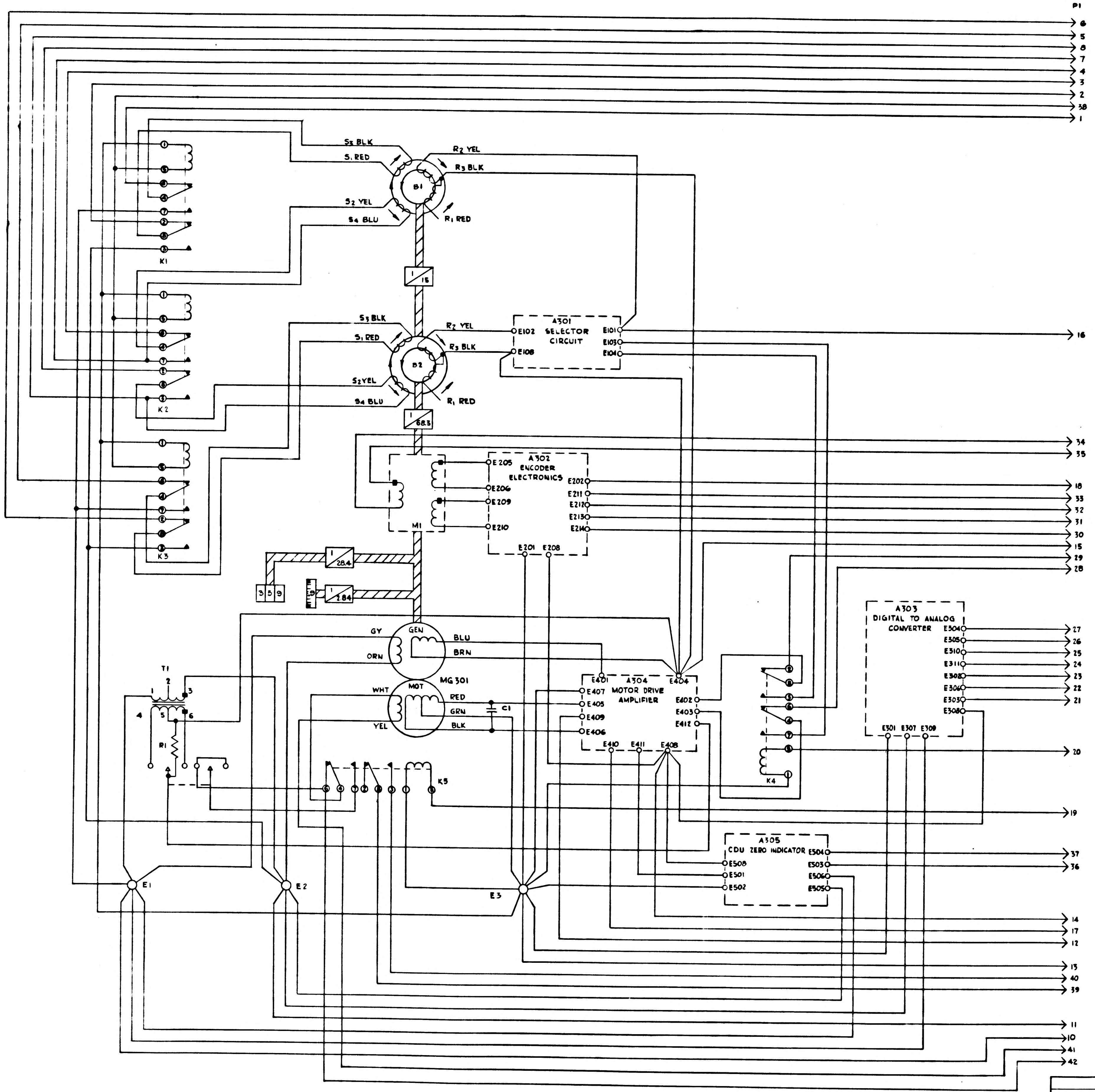
INTERCONNECTION DIAGRAM CDU

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010126
SCALE —
WT
SHEET 1 OF 1

1010126 B

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


P1
6
5
8
7
4
3
2
38
1
S3 BLK
S1 RED
R2 YEL
R3 BLK
B1
S2 YEL
S4 BLU
R1 RED
K1
1/16
S3 BLK
S1 RED
R2 YEL
R3 BLK
B2
S2 YEL
S4 BLU
R1 RED
K2
1/68.3
A301
SELECTOR CIRCUIT
E102
E108
E101
E103
E104
16
34
35
A302
ENCODER ELECTRONICS
E205
E206
E209
E210
E202
E211
E212
E213
E214
E201
E208
M1
K3
18
33
32
31
30
15
29
28
1/28.4
1/284
3 5 9
A303
DIGITAL TO ANALOG CONVERTER
E304
E305
E310
E311
E302
E306
E303
E308
E301
E307
E309
27
26
25
24
23
22
21
GY
GEN
BLU
ORN
BRN
MG 301
WHT
MOT
RED
GRN
BLK
YEL
C1
T1
R1
E401
A304
MOTOR DRIVE AMPLIFIER
E404
E407
E405
E409
E406
E402
E403
E412
E410
E411
E408
K4
20
K5
19
A305
CDU ZERO INDICATOR
E508
E501
E502
E504
E503
E506
E505
37
36
E1
E2
E3
14
17
12
13
40
39
11
10
41
42

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00030 DATE 9-27-62

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

QTY REQD	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
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HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN R. Faber DATE 12 SEPT 62
CHECKED
APPROVAL J.L.Coffey 9/26/62
APPROVAL R.J. Thomas 9/26/62
NASA APPROVAL W.J. Rhine 9-27-62
MIT APPROVAL 9/27/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

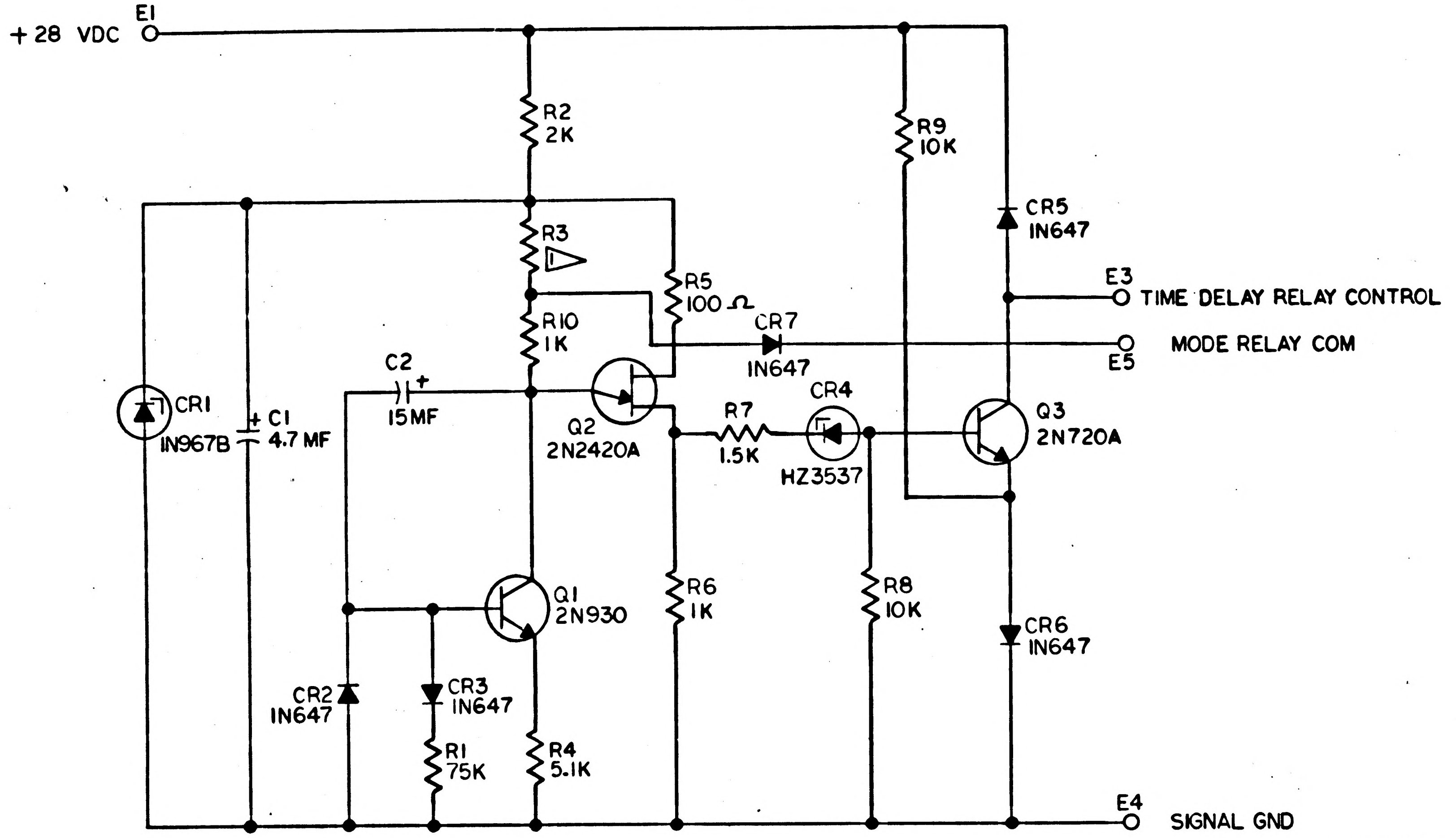
INTERCONNECTION DIAGRAM CDU

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010126
SCALE —
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

A 1010127

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED & released Class "A"	4-4-63	
	TDRR II 00787	4-10-63	WK


E1
+28 VDC
R2
2K
R3
1
R10
1K
R5
100 Ω
CR7
IN647
C2
+
15MF
Q2
2N2420A
R9
10K
CR5
IN647
E3
TIME DELAY RELAY CONTROL
MODE RELAY COM
E5
CR1
IN967B
+ C1
4.7 MF
R7
1.5K
CR4
HZ3537
Q3
2N720A
Q1
2N930
R6
1K
R8
10K
CR6
IN647
CR2
IN647
CR3
IN647
R1
75K
R4
5.1K
E4
SIGNAL GND

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷ 2. VALUE SELECTED AT ASSY FOR 40±5% SECOND TIME DELAY APPROXIMATE VALUE 300K

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-77	CAPACITOR	4.7MF	10	35 V
C2	1010393-043	CAPACITOR	15 MF	10	50 V
CR1	1010286	DIODE ZENER		5	400MW
CR2	1010362-2				
CR3	1010362-2				
CR4	1010372-8	ZENER		5	250MW
CR5	1010362-2				
CR6	1010362-2				
CR7	1010362-2				
Q1	1010397	TRANSISTOR			
Q2	1010408				
Q3	1010357				
R1	1006750 -77	RESISTOR	75 K	2	250MW
R2	-39		2 K		
R3	-		▷1		
R4	-49		5.1 K		
R5	- 8		100Ω		
R6	-32		1 K		
R7	-36		1.5 K		
R8	-56		10 K		
R9	-56		10 K		
R10	-32		1 K		

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN THENO DATE 3-15-63
CHECKED 19 Mar '63
APPROVAL 20 Mar 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 20 Mar 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010127
SCALE —
WT
SHEET OF

MASTER

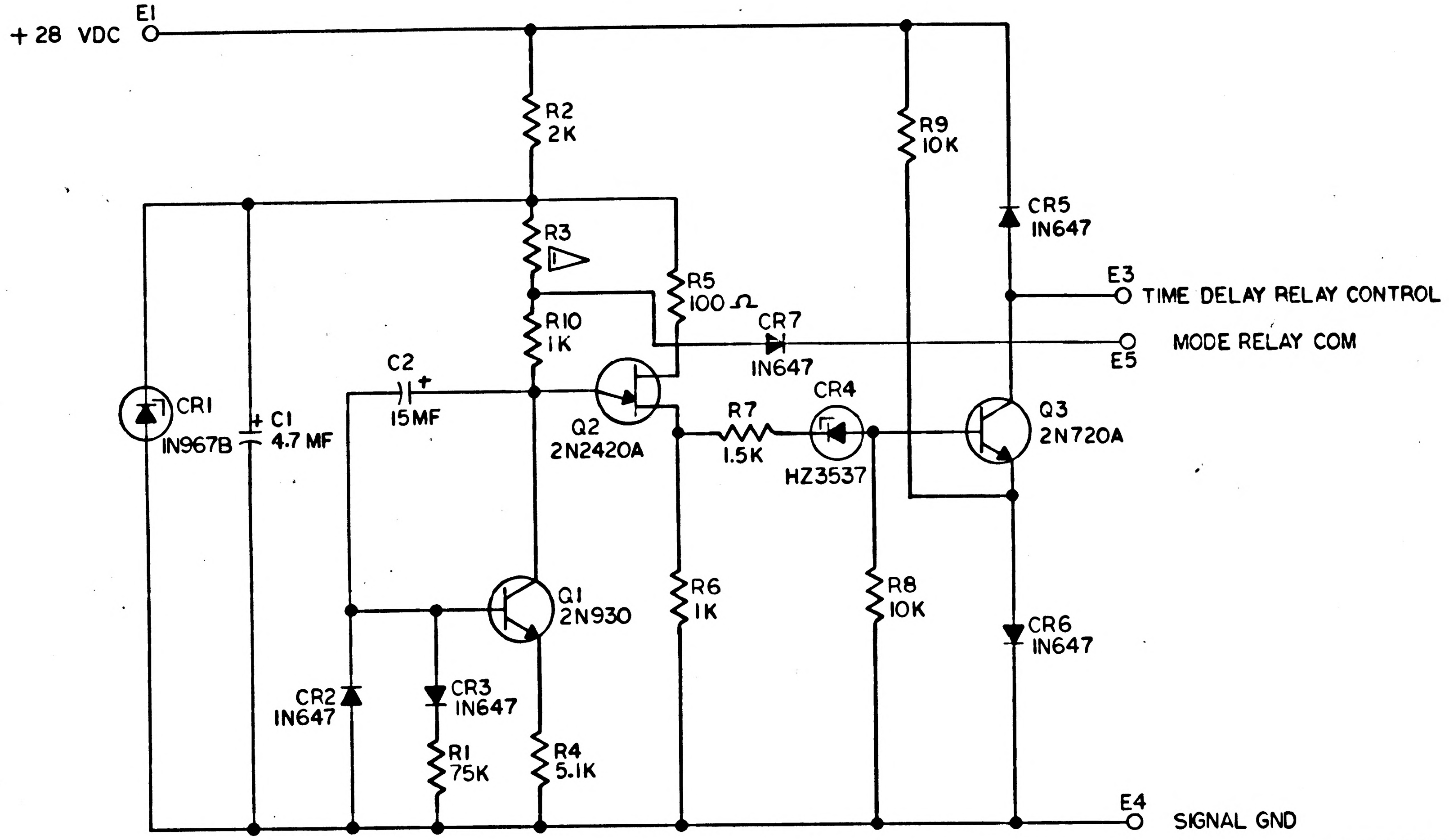
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

B 6210101

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED & released Class "A"	4-4-63	
	TDRR II 00787	4-10-63	WK
B	REVISED PER TDRR 01112	5-1-63	JJM WK



+28 VDC
E1
R2
2K
R9
10K
R3
1
CR5
IN647
R5
100 Ω
E3
TIME DELAY RELAY CONTROL
R10
1K
CR7
IN647
MODE RELAY COM
E5
C2
+
15MF
CR4
CR1
IN967B
+
C1
4.7 MF
Q2
2N2420A
R7
1.5K
HZ3537
Q3
2N720A
R6
1K
R8
10K
Q1
2N930
CR6
IN647
CR2
IN647
CR3
IN647
R1
75K
R4
5.1K
E4
SIGNAL GND

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷2. VALUE SELECTED AT ASSY FOR 40±5% SECOND TIME DELAY APPROXIMATE VALUE 300K

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-77	CAPACITOR	4.7MF	10	35 V
C2	1010393-043	CAPACITOR	15 MF	10	50 V
CR1	1010286	DIODE ZENER		5	400MW
CR2	1010362-2				
CR3	1010362-2				
CR4	1010372-8	ZENER		5	250MW
CR5	1010362-2				
CR6	1010362-2				
CR7	1010362-2	↓			
Q1	1010397	TRANSISTOR			
Q2	1010408				
Q3	1010357	↓			
R1	1006750-77	RESISTOR	75 K	2	250MW
R2	1006750-39		2 K		
R3	1010364-		▷1		
R4	1006750-49		5.1 K		
R5	-8		100Ω		
R6	-32		1 K		
R7	-36		1.5 K		
R8	-56		10 K		
R9	-56		10 K		
R10	↓ -32	↓	1 K	↓	↓

MASTER

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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MATERIAL
HEAT TREATMENT
FINAL FINISH

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DWG. NO. CONTRACT
DRAWN THENO DATE 3-15-63
CHECKED J. Cushman 19 Mar '63
APPROVAL John E. Miller 20 Mar 63
APPROVAL
NASA APPROVAL
MIT APPROVAL W Kupfer 20 Mar 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010127
SCALE —
WT
SHEET OF

INCHES
0 1 2
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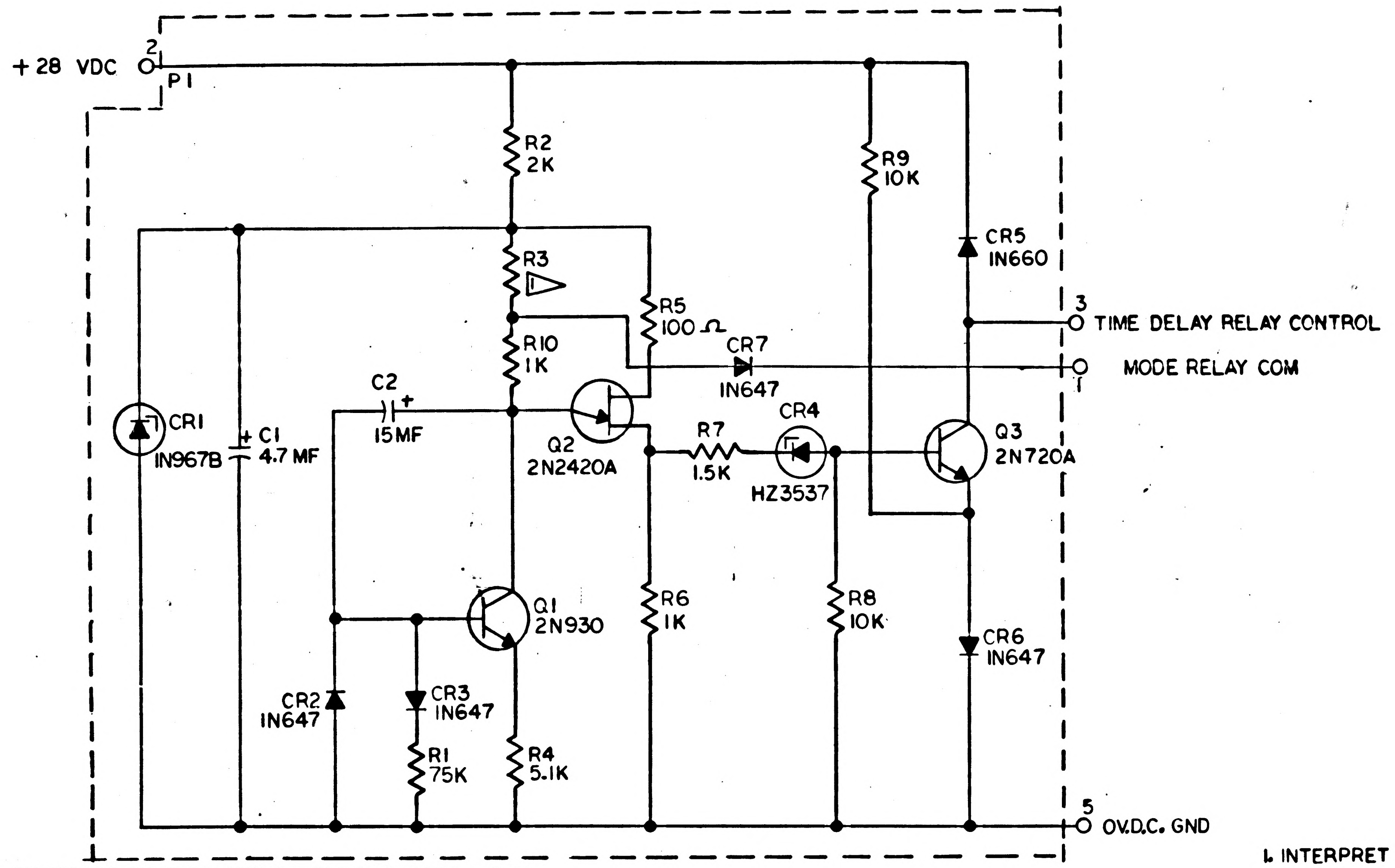
C 1010127

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED & released Class "A"	4-4-63	
	TDRR II 00787	4-10-1	WK
B	REVISED PER TDRR 01112	5-1-63	JJA WK
C	REVISED PER TDRR 01435	6-19-63	WK


+28 VDC
2
P1
R2
2K
R9
10K
CR5
1N660
R3
1
R5
100 Ω
3
TIME DELAY RELAY CONTROL
CR7
1N647
MODE RELAY COM
1
R10
1K
C2
15MF
CR1
1N967B
C1
4.7 MF
Q2
2N2420A
R7
1.5K
CR4
HZ3537
Q3
2N720A
Q1
2N930
R6
1K
R8
10K
CR6
1N647
CR2
1N647
CR3
1N647
R1
75K
R4
5.1K
5
OV.D.C. GND

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷ 2. VALUE SELECTED AT ASSY FOR 40±5% SECOND TIME DELAY APPROXIMATE VALUE 300K

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-77	CAPACITOR	4.7MF	10	35 V
C2	1010393-043	CAPACITOR	15 MF	10	50 V
CR1	1010286	DIODE ZENER		5	400MW
CR2	1010362-2				
CR3	1010362-2				
CR4	1010372-8	ZENER		5	250MW
CR5	1010385				
CR6	1010362-2				
CR7	1010362-2				
Q1	1010397-001	TRANSISTOR			
Q2	1010408				
Q3	1010357				
R1	1006750 -77	RESISTOR	75 K	2	250MW
R2	1006750 -39		2 K		
R3	1010364 -		▷1		
R4	1006750 -49		5.1 K		
R5	-8		100Ω		
R6	-32		1 K		
R7	-36		1.5 K		
R8	-56		10 K		
R9	-56		10 K		
R10	-32		1 K		

MASTER

QTY. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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APPROVAL
NASA APPROVAL 3/20/63
MIT APPROVAL W Kupfer 20 Mar 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010127
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SHEET OF

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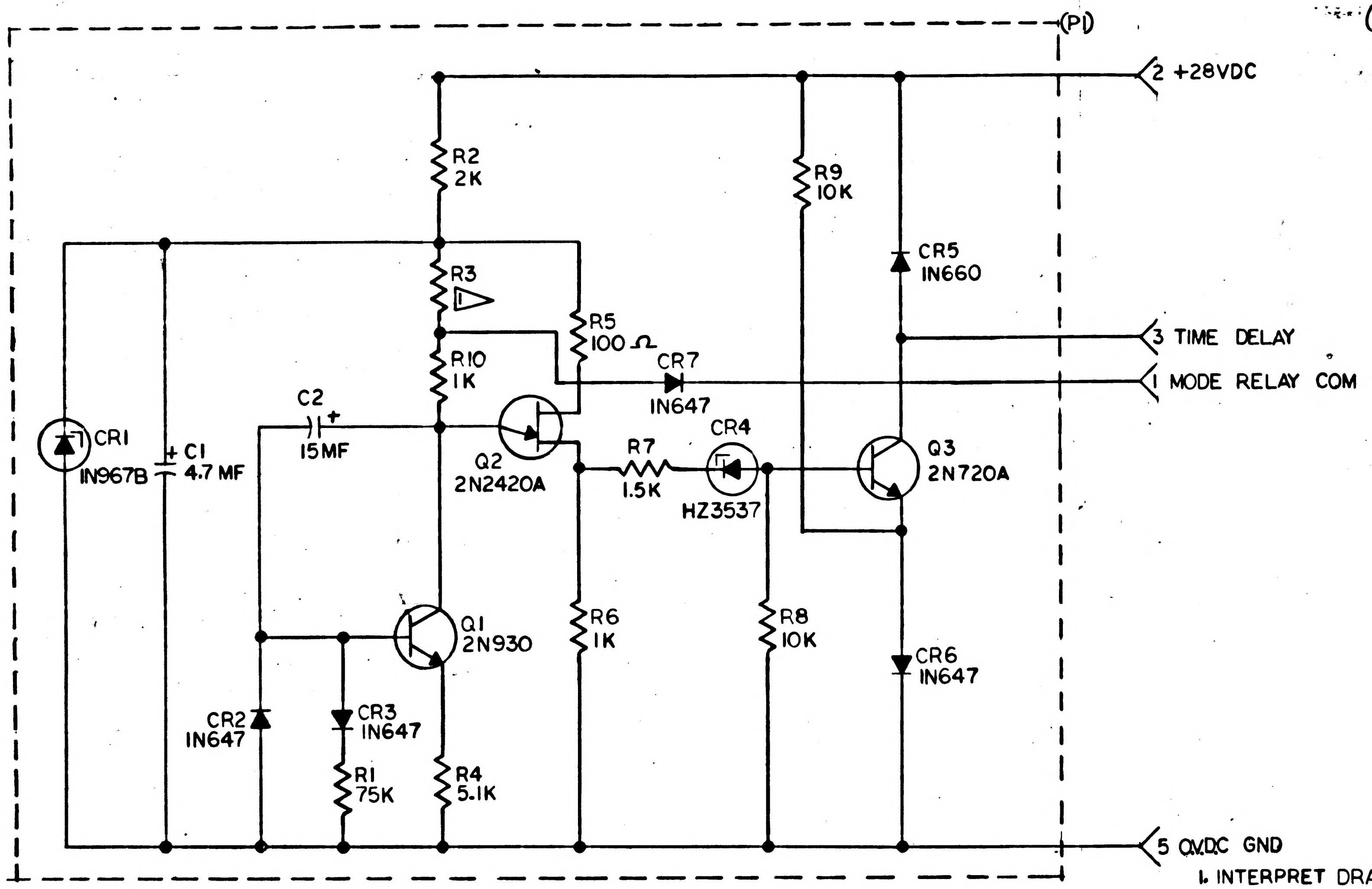
1010127 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED & released Class "A"	4-4-63	
	TDRR II 00787	4-10-63	WK
B	REVISED PER TDRR 01112	5-1-63	JJM WK.
C	REVISED PER TDRR 01435	6-19-63	WK
D	REVISED PER TDRR 02156	7-24-63	WK.



1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷2. VALUE SELECTED AT ASSY FOR 40±5% SECOND TIME DELAY APPROXIMATE VALUE 300K

REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1006755-77	CAPACITOR	4.7MF	10	35 V
C2	1010393-043	CAPACITOR	15 MF	10	50 V
CR1	1010286-11	DIODE ZENER		5	400MW
CR2	1010362-2				
CR3	1010362-2				
CR4	1010372-8	ZENER		5	250MW
CR5	1010385				
CR6	1010362-2				
CR7	1010362-2				
Q1	1010397-001	TRANSISTOR			
Q2	1010408				
Q3	1010357				
R1	1006750-77	RESISTOR	75 K	2	250MW
R2	1006750-39		2 K		
R3	1010364 -		▷1		
R4	1006750-49		5.1 K		
R5	-8		100Ω		
R6	-32		1 K		
R7	-36		1.5 K		
R8	-56		10 K		
R9	-56		10 K		
R10	-32		1 K		
P1	1010318-2	CONNECTOR			

MASTER

MASTER

QTY. REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
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APPROVAL
NASA APPROVAL
MIT APPROVAL 21 Mar 63

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HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010127
SCALE — WT SHEET OF

1010127 D

INCHES
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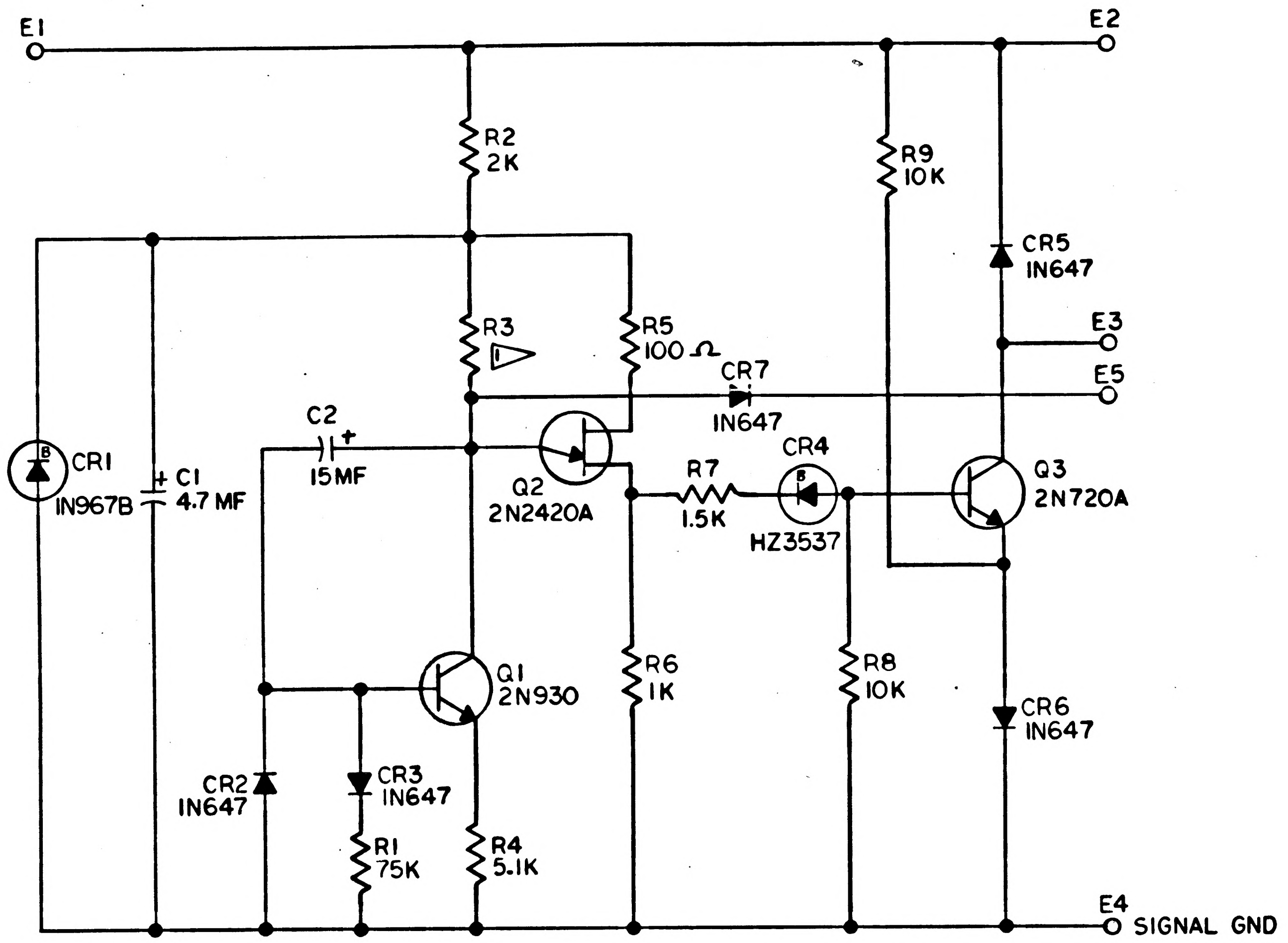
REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL



REF DES	PART NUMBER	DESCRIPTION	VALUE	TOL %	RATING
C1	1010393-037	CAPACITOR	4.7MF	10	50 V
C2	1010393-043	CAPACITOR	15 MF	10	50 V
CR1	1010286	DIODE ZENER		5	400MW
CR2	1010362-2				
CR3	1010362-2				
CR4	1010372-8	ZENER		5	250MW
CR5	1010362-2				
CR6	1010362-2				
CR7	1010362-2	↓			
Q1	1010397	TRANSISTOR			
Q2	1010408				
Q3	1010357	↓			
R1	1006750-77	RESISTOR	75 K	3	250MW
R2	-39		2 K		
R3	-		▷1		
R4	-49		5.1 K		
R5	-8		100Ω		
R6	-32		1 K		
R7	-36		1.5 K		
R8	-56		10 K		
R9	↓ -56	↓	10 K	↓	↓

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

▷2. VALUE SELECTED AT ASSY FOR 40±5% SECOND TIME DELAY APPROXIMATE VALUE 300K

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00604 **DATE** 20 MAR 63

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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DWG. NO. CONTRACT
DRAWN THENO DATE 3-15-63
CHECKED J. Cushman 19 Mar '63
APPROVAL John E. Miller 20 Mar 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 20 Mar 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
40 SECOND TIME DELAY

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010127
SCALE —
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INCHES
0 1 2
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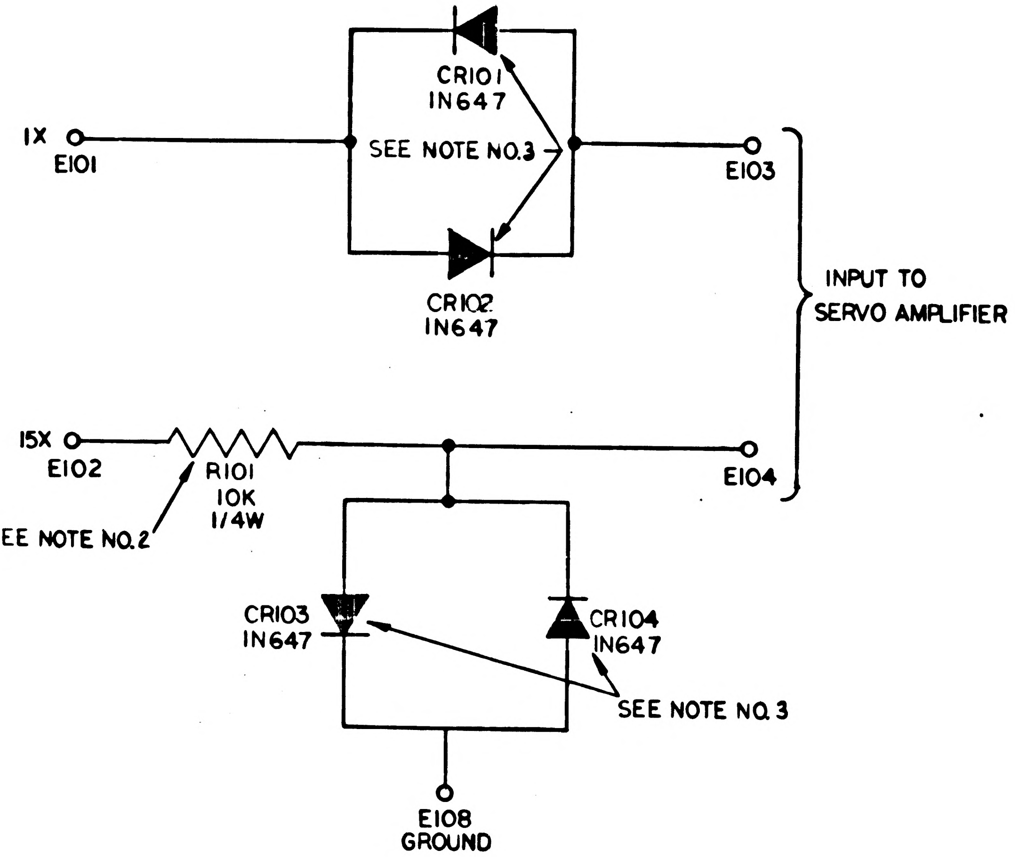
1010128

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



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CLASS B RELEASE TDR No. 00030 **DATE** 9-27-62

NOTES-

1-INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PERSCRIBED BY MIL-D-70327

2-FOR R101 SEE FIND NO.1

3-FOR CR101, CR102, CR103, CR104 SEE FIND NO.2

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
4		DIODE, 480V, 600MW	2
1		RESISTOR, 10K, 1/4W, 1%	1

LIST OF MATERIALS

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NEXT ASSY	USED ON
APPLICATION	

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DRAWN C. J. Kotik DATE 9-11-62
CHECKED
APPROVAL S L Copps 9/26/62
APPROVAL R. J. Therrien 9/24/62
NASA APPROVAL W J Rhine 9-27-62
MIT APPROVAL R. Hazel 9/27/62

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SCHEMATIC
SELECTOR CIRCUIT

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010128
SCALE — WT — SHEET 1 OF 1

1010128

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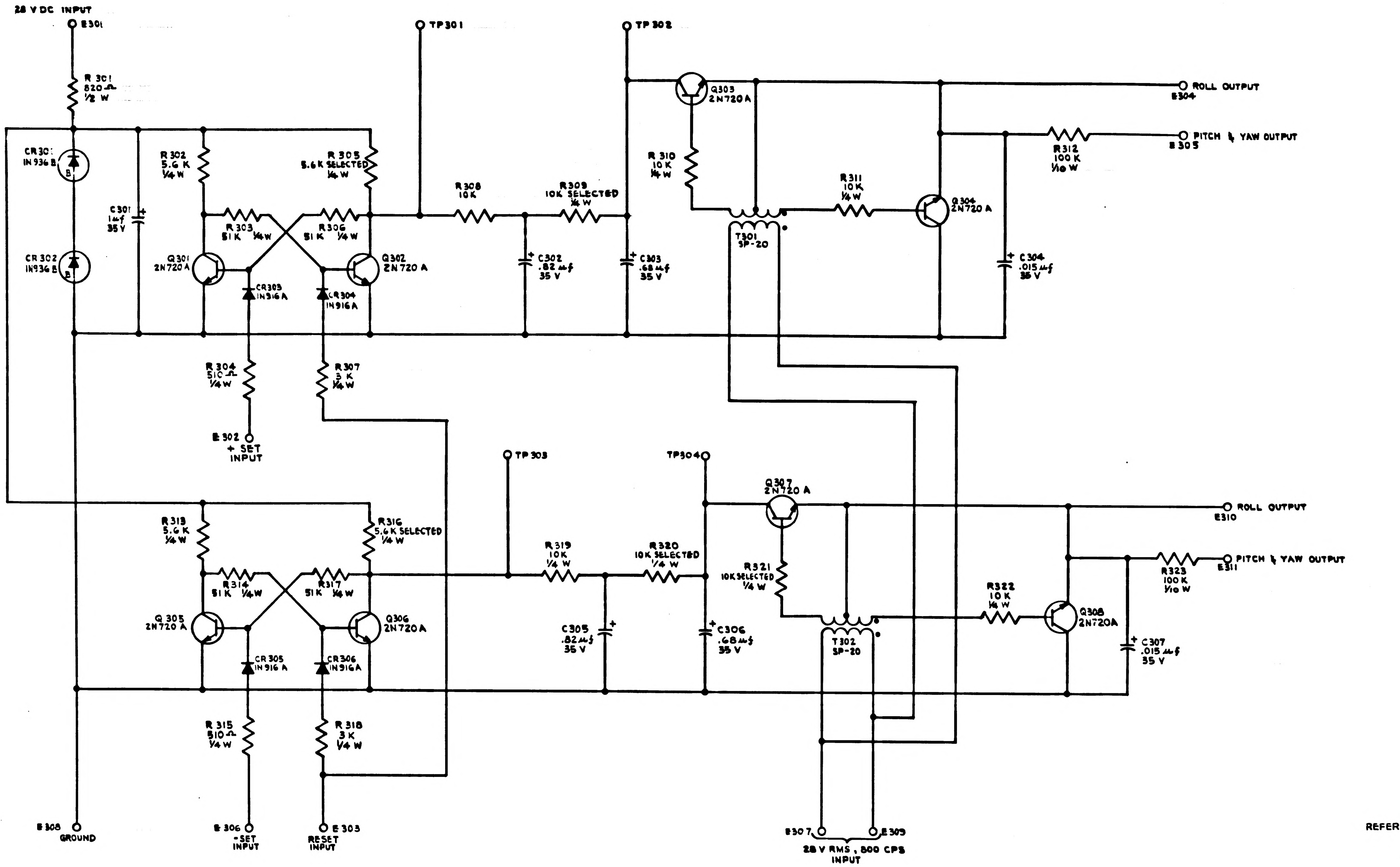
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL


28 V DC INPUT
E301
R301 820 Ω 1/2 W
CR301 1N936 B
CR302 1N936 B
C301 1 µf 35 V
R302 5.6 K 1/4 W
R305 5.6 K SELECTED 1/4 W
R303 51 K 1/4 W
R306 51 K 1/4 W
Q301 2N720 A
Q302 2N720 A
CR303 1N916 A
CR304 1N916 A
R304 510 Ω 1/4 W
R307 3 K 1/4 W
E302 + SET INPUT
TP301
TP302
R308 10 K
R309 10 K SELECTED 1/4 W
C302 .82 µf 35 V
C303 .68 µf 35 V
Q303 2N720 A
R310 10 K 1/4 W
T301 SP-20
R311 10 K 1/4 W
Q304 2N720 A
R312 100 K 1/10 W
C304 .015 µf 35 V
ROLL OUTPUT E304
PITCH & YAW OUTPUT E305
TP303
TP304
R313 5.6 K 1/4 W
R316 5.6 K SELECTED 1/4 W
R314 51 K 1/4 W
R317 51 K 1/4 W
Q305 2N720 A
Q306 2N720 A
CR305 1N916 A
CR306 1N916 A
R315 510 Ω 1/4 W
R318 3 K 1/4 W
R319 10 K 1/4 W
R320 10 K SELECTED 1/4 W
C305 .82 µf 35 V
C306 .68 µf 35 V
Q307 2N720 A
R321 10 K SELECTED 1/4 W
T302 SP-20
R322 10 K 1/4 W
Q308 2N720A
R323 100 K 1/10 W
C307 .015 µf 35 V
ROLL OUTPUT E310
PITCH & YAW OUTPUT E311
E308 GROUND
E306 -SET INPUT
E303 RESET INPUT
E307
E309
28 V RMS, 800 CPS INPUT

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00030 DATE 9-27-62

REFERENCE :

NOTES –
1 – INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2 – FOR C i SEE FIND NO. 1
3 – FOR
4 – FOR
5 – FOR
6 – FOR

PARTS LIST FOR ENGINEERING REF ONLY

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
8		TRANSISTOR, 2N720 A	17
2		TRANSFORMER, SP-20	16
2		RESISTOR, 100 K 1/10 W 1%	15
3		RESISTOR, 10 K SELECTED 1/4 W 5%	14
5		RESISTOR, 10 K 1/4 W 5%	13
2		RESISTOR, 3 K 1/4 W 5%	12
2		RESISTOR, 510 Ω 1/4 W 5%	11
4		RESISTOR, 51 K 1/4 W 5%	10
2		RESISTOR, 5.6 K SELECTED 1/4 W 5%	9
2		RESISTOR, 5.6 K 1/4 W 5%	8
1		RESISTOR, 820 Ω 1/2 W 5%	7
4		DIODE 1N916 A	6
2		DIODE 1N936 B	5
2		CAPACITOR, .015 µf 35V 10%	4
2		CAPACITOR, .68 µf 35 V 5%	3
2		CAPACITOR, .82 µf 35V 5%	2
1		CAPACITOR, 1 µf 35 V 20%	1

LIST OF MATERIALS

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NEXT ASSY	USED ON
APPLICATION	

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INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN A. J. De Salvo DATE 9-12-62
CHECKED
APPROVAL L. Coffey 9/26/62
APPROVAL R. J. Therrien 9/26/62
NASA APPROVAL W. J. Rhine 9-27-62
MIT APPROVAL D. Hoag 9/27/62

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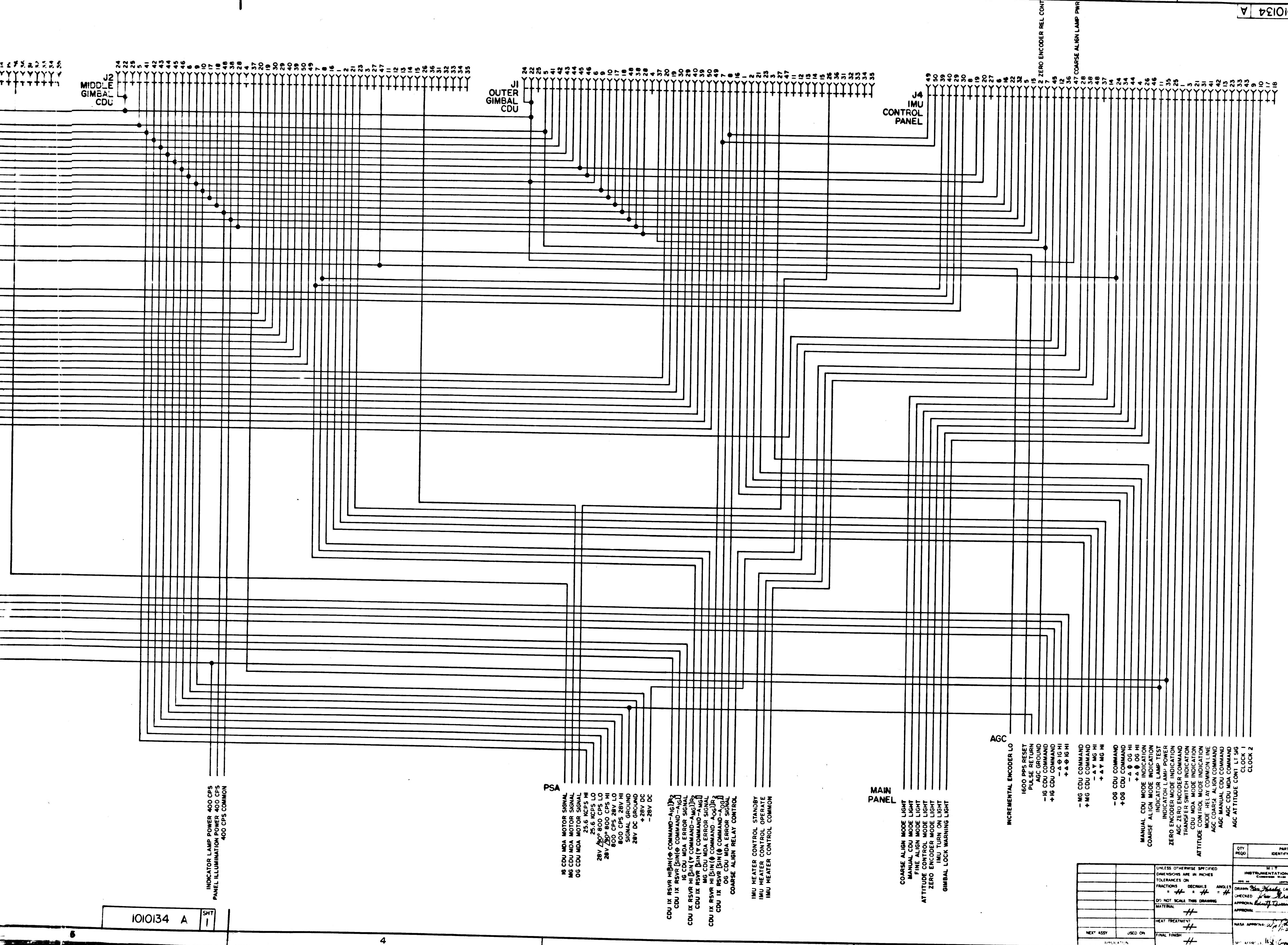
SCHEMATIC DIAGRAM,
DIGITAL TO ANALOG
CONVERTER

CODE IDENT NO
SIZE E
NASA DRAWING NO 1010129
SCALE —
WT
SHEET 1 OF 1

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED AND REDRAWN PER TDRR 00119	25 MAR	[illegible]

1010134 A



J2
MIDDLE
GIMBAL
CDU
24 22 25 5 41 42 43 44 45 46 6 9 10 17 18 48 38 28 4 37 20 19 30 29 40 39 50 49 7 8 16 1 2 21 23 3 27 47 11 12 13 14 15 26 36 31 32 33 34 35
J1
OUTER
GIMBAL
CDU
24 22 25 5 41 42 43 44 45 46 6 9 10 17 18 48 38 28 4 37 20 19 30 29 40 39 50 49 7 8 16 1 2 21 23 3 27 47 11 12 13 14 15 26 36 31 32 33 34 35
J4
IMU
CONTROL
PANEL
49 50 39 40 29 30 8 19 20 27 6 16 22 32 5 15 2 7 45 12 36 47 28 38 48 37 14 24 34 44 4 26 46 11 35 25 1 3 21 31 41 42 13 23 33 43 9 10 17 18
ZERO ENCODER REL CONT
COARSE ALIGN LAMP PWR
INDICATOR LAMP POWER 400 CPS
PANEL ILLUMINATION POWER 400 CPS
400 CPS COMMON
PSA
IG CDU MDA MOTOR SIGNAL
MG CDU MDA MOTOR SIGNAL
OG CDU MDA MOTOR SIGNAL
25.6 KCPS HI
25.6 KCPS LO
28V /90° 800 CPS LO
28V /90° 800 CPS HI
800 CPS 28V LO
800 CPS 28V HI
SIGNAL GROUND
28V DC GROUND
+28V DC
−28V DC
CDU IX RSVR HI[SIN(Φ COMMAND−A_IG)]R_2
CDU IX RSVR [SIN(Φ COMMAND−A_IG)]
IG CDU MDA ERROR SIGNAL
CDU IX RSVR HI [SIN(Y COMMAND−A_MG)]R_2
CDU IX RSVR [SIN(Y COMMAND−A_MG)]
MG CDU MDA ERROR SIGNAL
CDU IX RSVR HI [SIN(Φ COMMAND−A_OG)]R_2
CDU IX RSVR [SIN(Φ COMMAND−A_OG)]
OG CDU MDA ERROR SIGNAL
COARSE ALIGN RELAY CONTROL
IMU HEATER CONTROL STANDBY
IMU HEATER CONTROL OPERATE
IMU HEATER CONTROL COMMON
MAIN
PANEL
COARSE ALIGN MODE LIGHT
MANUAL CDU MODE LIGHT
FINE ALIGN MODE LIGHT
ATTITUDE CONTROL MODE LIGHT
ZERO ENCODER MODE LIGHT
IMU TURN ON LIGHT
GIMBAL LOCK WARNING LIGHT
AGC
INCREMENTAL ENCODER LO
1600 PPS RESET
PULSE RETURN
AGC GROUND
−IG CDU COMMAND
+IG CDU COMMAND
−ΔΦ IG HI
+ΔΦ IG HI
−MG CDU COMMAND
+MG CDU COMMAND
−ΔY MG HI
+ΔY MG HI
−OG CDU COMMAND
+OG CDU COMMAND
−ΔΦ OG HI
+ΔΦ OG HI
MANUAL CDU MODE INDICATION
COARSE ALIGN MODE INDICATION
INDICATOR LAMP TEST
INDICATOR LAMP POWER
ZERO ENCODER MODE INDICATION
AGC ZERO ENCODER COMMAND
TRANSFER SWITCH INDICATION
CDU MDA MODE INDICATION
ATTITUDE CONTROL MODE INDICATION
MODE RELAY COMMON LINE
AGC COARSE ALIGN COMMAND
AGC MANUAL CDU COMMAND
AGC CDU MDA COMMAND
AGC ATTITUDE CONT LT SIG
CLOCK 1
CLOCK 2

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00047 DATE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	IND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
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DRAWN Ken Healy DATE 11-6-62
CHECKED John Green
APPROVAL Robert Thomas 27 NOV 62
APPROVAL
NASA APPROVAL W. J. Pfau 11-25-62
MIT APPROVAL W. Crosby 25

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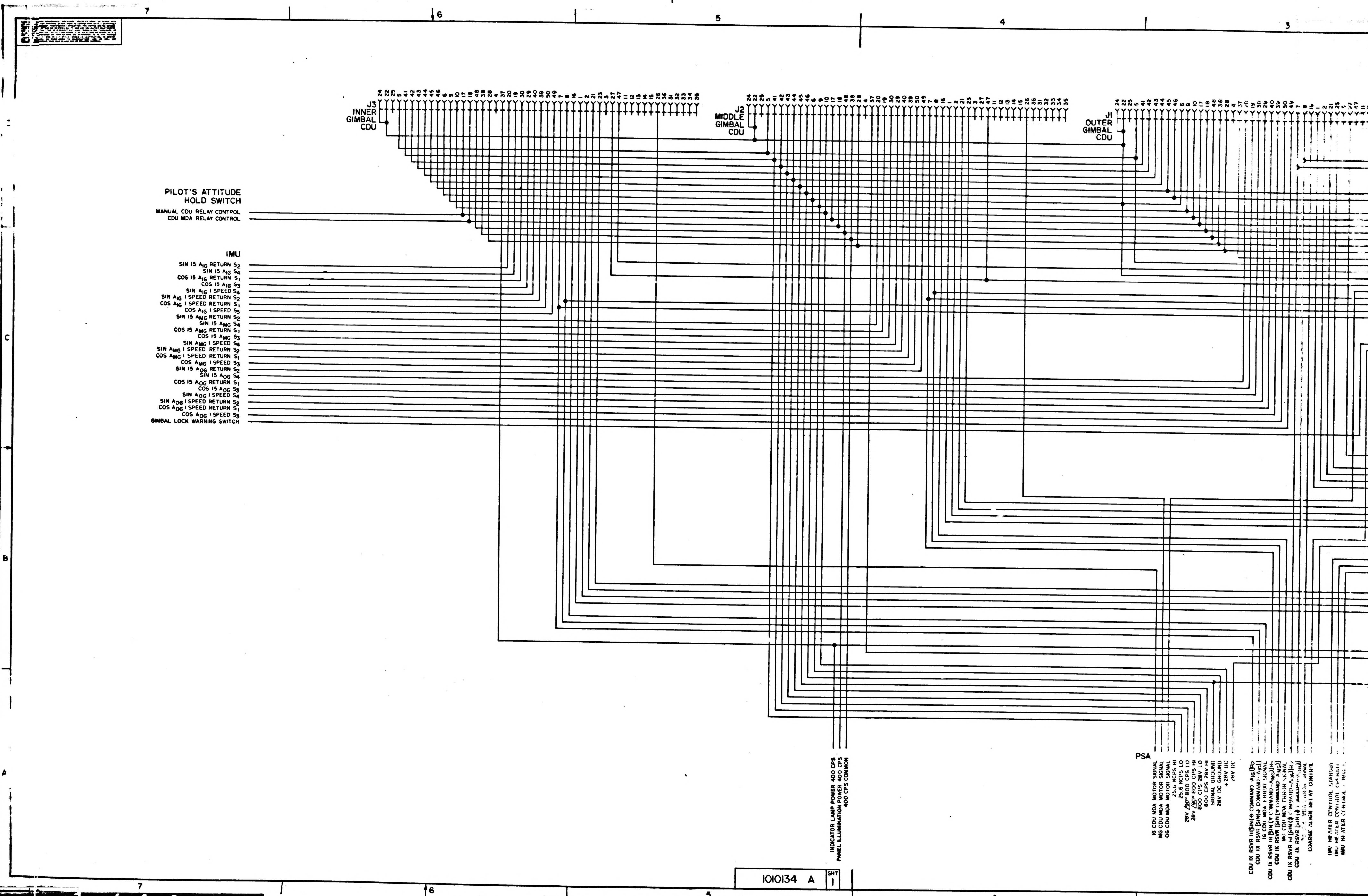
HOUSTON TEXAS

INTERCONNECT DIAGRAM
CDU JUNCTION BOX

CODE IDENT NO | SIZE J | NASA DRAWING NO 1010134
SCALE — | WT | SHEET OF

1010134 A	SHT 1

2/42


J3 INNER GIMBAL CDU
J2 MIDDLE GIMBAL CDU
J1 OUTER GIMBAL CDU
PILOT'S ATTITUDE HOLD SWITCH
MANUAL CDU RELAY CONTROL
CDU MDA RELAY CONTROL
IMU
SIN 15 A_IG RETURN S2
SIN 15 A_IG S4
COS 15 A_IG RETURN S1
COS 15 A_IG S3
SIN A_IG 1 SPEED S4
SIN A_IG 1 SPEED RETURN S2
COS A_IG 1 SPEED RETURN S1
COS A_IG 1 SPEED S3
SIN 15 A_MG RETURN S2
SIN 15 A_MG S4
COS 15 A_MG RETURN S1
COS 15 A_MG S3
SIN A_MG 1 SPEED S4
SIN A_MG 1 SPEED RETURN S2
COS A_MG 1 SPEED RETURN S1
COS A_MG 1 SPEED S3
SIN 15 A_OG RETURN S2
SIN 15 A_OG S4
COS 15 A_OG RETURN S1
COS 15 A_OG S3
SIN A_OG 1 SPEED S4
SIN A_OG 1 SPEED RETURN S2
COS A_OG 1 SPEED RETURN S1
COS A_OG 1 SPEED S3
GIMBAL LOCK WARNING SWITCH
INDICATOR LAMP POWER 400 CPS
PANEL ILLUMINATION POWER 400 CPS
400 CPS COMMON
PSA
IG CDU MDA MOTOR SIGNAL
MG CDU MDA MOTOR SIGNAL
OG CDU MDA MOTOR SIGNAL
25.6 KCPS HI
25.6 KCPS LO
28V /90° 800 CPS LO
28V /90° 800 CPS HI
800 CPS 28V LO
800 CPS 28V HI
SIGNAL GROUND
28V DC GROUND
+28V DC
28V DC
CDU IX RSVR HI [SIN(θ COMMAND - A_IG)] R2
CDU IX RSVR [SIN(θ COMMAND - A_IG)]
IG CDU MDA ERROR SIGNAL
CDU IX RSVR HI [SIN(ψ COMMAND - A_MG)] R2
CDU IX RSVR [SIN(ψ COMMAND - A_MG)]
MG CDU MDA ERROR SIGNAL
CDU IX RSVR HI [SIN(φ COMMAND - A_OG)] R2
CDU IX RSVR [SIN(φ COMMAND - A_OG)]
COARSE ALIGN RELAY CONTROL
IMU HEATER CONTROL STANDBY
IMU HEATER CONTROL OPERATE
IMU HEATER CONTROL

1010134 A SHT 1

1/42

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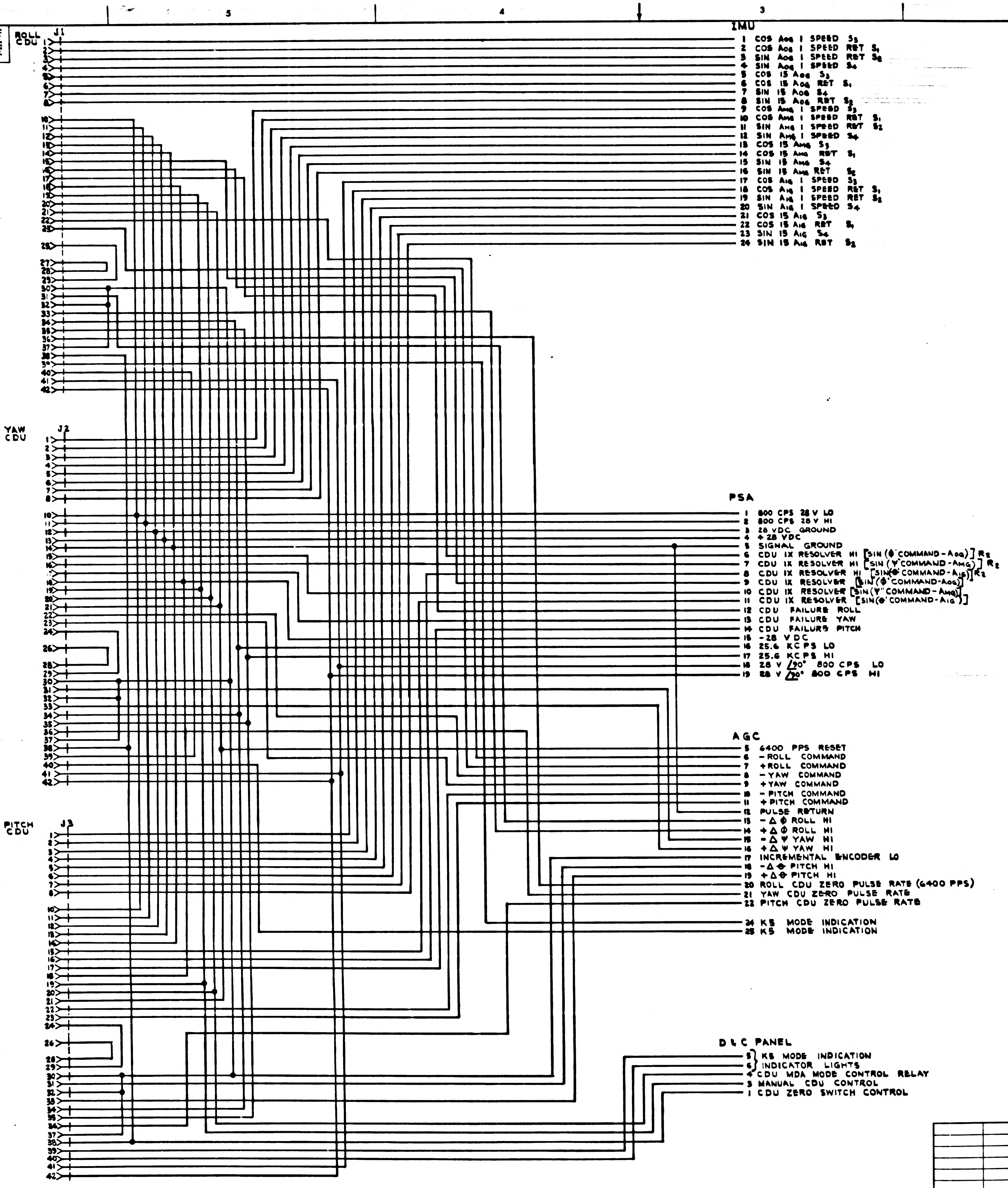


ROLL CDU J1
YAW CDU J2
PITCH CDU J3
IMU
1 COS A_{OG} 1 SPEED S_3
2 COS A_{OG} 1 SPEED RET S_1
3 SIN A_{OG} 1 SPEED RET S_2
4 SIN A_{OG} 1 SPEED S_4
5 COS 15 A_{OG} S_3
6 COS 15 A_{OG} RET S_1
7 SIN 15 A_{OG} S_4
8 SIN 15 A_{OG} RET S_2
9 COS A_{MG} 1 SPEED S_3
10 COS A_{MG} 1 SPEED RET S_1
11 SIN A_{MG} 1 SPEED RET S_2
12 SIN A_{MG} 1 SPEED S_4
13 COS 15 A_{MG} S_3
14 COS 15 A_{MG} RET S_1
15 SIN 15 A_{MG} S_4
16 SIN 15 A_{MG} RET S_2
17 COS A_{IG} 1 SPEED S_3
18 COS A_{IG} 1 SPEED RET S_1
19 SIN A_{IG} 1 SPEED RET S_2
20 SIN A_{IG} 1 SPEED S_4
21 COS 15 A_{IG} S_3
22 COS 15 A_{IG} RET S_1
23 SIN 15 A_{IG} S_4
24 SIN 15 A_{IG} RET S_2
PSA
1 800 CPS 28 V LO
2 800 CPS 28 V HI
3 28 VDC GROUND
4 + 28 VDC
5 SIGNAL GROUND
6 CDU 1X RESOLVER HI [SIN (Φ' COMMAND - A_{OG})] R_2
7 CDU 1X RESOLVER HI [SIN (Ψ' COMMAND - A_{MG})] R_2
8 CDU 1X RESOLVER HI [SIN (Θ' COMMAND - A_{IG})] R_2
9 CDU 1X RESOLVER [SIN (Φ' COMMAND - A_{OG})]
10 CDU 1X RESOLVER [SIN (Ψ'' COMMAND - A_{MG})]
11 CDU 1X RESOLVER [SIN (Θ' COMMAND - A_{IG})]
12 CDU FAILURE ROLL
13 CDU FAILURE YAW
14 CDU FAILURE PITCH
15 -28 VDC
16 25.6 KCPS LO
17 25.6 KCPS HI
18 28 V ∠90° 800 CPS LO
19 28 V ∠90° 800 CPS HI
AGC
5 6400 PPS RESET
6 - ROLL COMMAND
7 + ROLL COMMAND
8 - YAW COMMAND
9 + YAW COMMAND
10 - PITCH COMMAND
11 + PITCH COMMAND
12 PULSE RETURN
13 - Δ Φ ROLL HI
14 + Δ Φ ROLL HI
15 - Δ Ψ YAW HI
16 + Δ Ψ YAW HI
17 INCREMENTAL ENCODER LO
18 - Δ Θ PITCH HI
19 + Δ Θ PITCH HI
20 ROLL CDU ZERO PULSE RATE (6400 PPS)
21 YAW CDU ZERO PULSE RATE
22 PITCH CDU ZERO PULSE RATE
24 K5 MODE INDICATION
25 K5 MODE INDICATION
D & C PANEL
5 } K5 MODE INDICATION
6 } INDICATOR LIGHTS
4 CDU MDA MODE CONTROL RELAY
3 MANUAL CDU CONTROL
1 CDU ZERO SWITCH CONTROL

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00047 DATE 10-4-62

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN S.J. DeSilva DATE 10-3-62
CHECKED 10/3/62
APPROVAL
APPROVAL
NASA APPROVAL 10-4-62
MIT APPROVAL 10/4/62

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

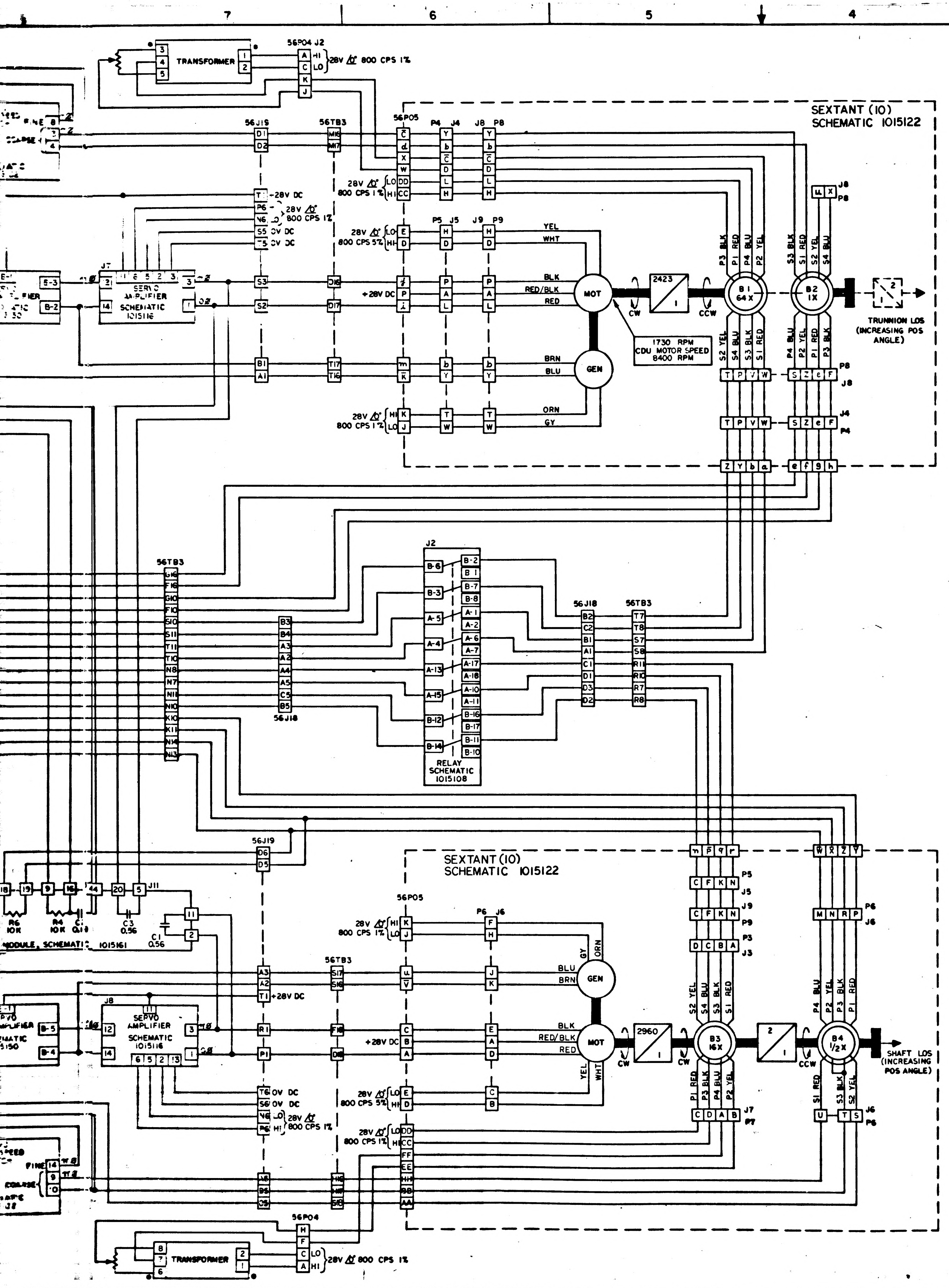
CDU JUNCTION BOX
INTERCONNECT
WIRING DIAGRAM

CODE IDENT NO.
SIZE E
NASA DRAWING NO. 1010134
SCALE —
WT
SHEET 1 OF 1

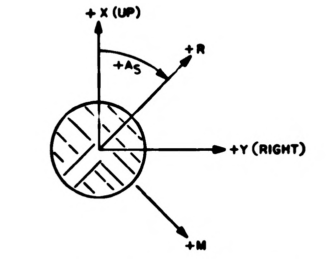
1010134

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD



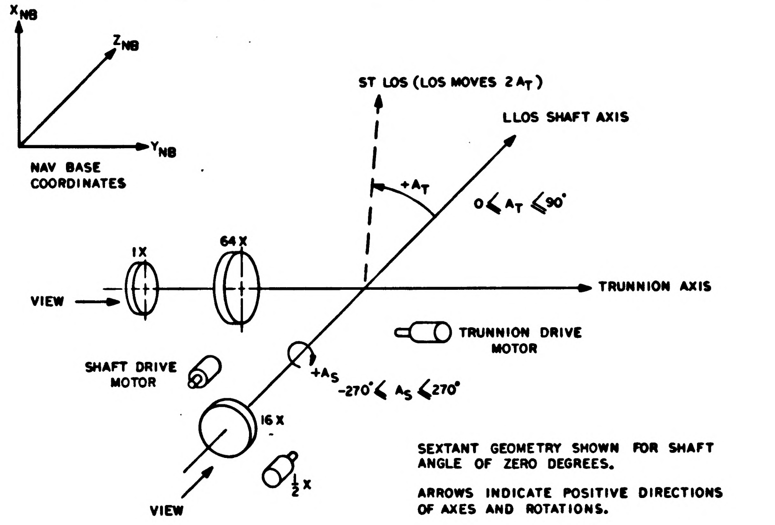
TRANSFORMER
56P04 J2
28V ∆ 800 CPS 1%
HI
LO
SEXTANT (10) SCHEMATIC 1015122
56J19
56TB3
56P05
P4 J4 J8 P8
P5 J5 J9 P9
-28V DC
28V ∆ 800 CPS 1%
0V DC
28V ∆ 800 CPS 5%
+28V DC
SERVO AMPLIFIER SCHEMATIC 1015116
MOT
GEN
YEL
WHT
BLK
RED/BLK
RED
BRN
BLU
ORN
GY
2423 : 1
1730 RPM CDU MOTOR SPEED 8400 RPM
CW
CCW
B1 64X
B2 1X
TRUNNION LOS (INCREASING POS ANGLE)
J2
RELAY SCHEMATIC 1015108
56J18
R6 10K
R4 10K
C3 0.56
C1 0.56
MODULE, SCHEMATIC 1015161
J11
J8
SEXTANT (10) SCHEMATIC 1015122
2960 : 1
B3 16X
2 : 1
B4 1/2X
SHAFT LOS (INCREASING POS ANGLE)
J7 P7
J6 P6
J3
56P04
TRANSFORMER
28V ∆ 800 CPS 1%
FINE
COARSE



+X (UP)
+R
$+A_S$
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE, SHAFT ANGLE AT ZERO.

CONTROLLER MOTION	TRUNNION CDU READOUT	SHAFT CDU READOUT	SEXTANT TRUNNION ANGLE	SEXTANT SHAFT ANGLE	RESOLVED MODE APPARENT IMAGE MOTION
UP	DECREASE		DECREASE		+X
DOWN	INCREASE		INCREASE		−X
RIGHT		DECREASE		DECREASE	+Y
LEFT		INCREASE		INCREASE	−Y



X_{NB}
Z_{NB}
Y_{NB}
NAV BASE COORDINATES
ST LOS (LOS MOVES $2A_T$)
LLOS SHAFT AXIS
$+A_T$
$0 < A_T < 90°$
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
$+A_S$
$-270° < A_S < 270°$
16X
VIEW
$\frac{1}{2}$X

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS:

SXT TRUNNION-FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION.
1. MOTOR—TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 64X AND 1X RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

SXT SHAFT—FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION.
1. MOTOR—TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2 1/2 X RESOLVER ROTATES CCW WHEN LOOKING AT THE SHAFT END.
3 16X RESOLVER ROTATES CW WHEN LOOKING IN DIRECTION OF ARROW.

1010135

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ — + — + —
− — − — − —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Kindeschiek DATE 12-31-63
CHECKED R. W. Brozenske
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL W Jaffe 3/3/64

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

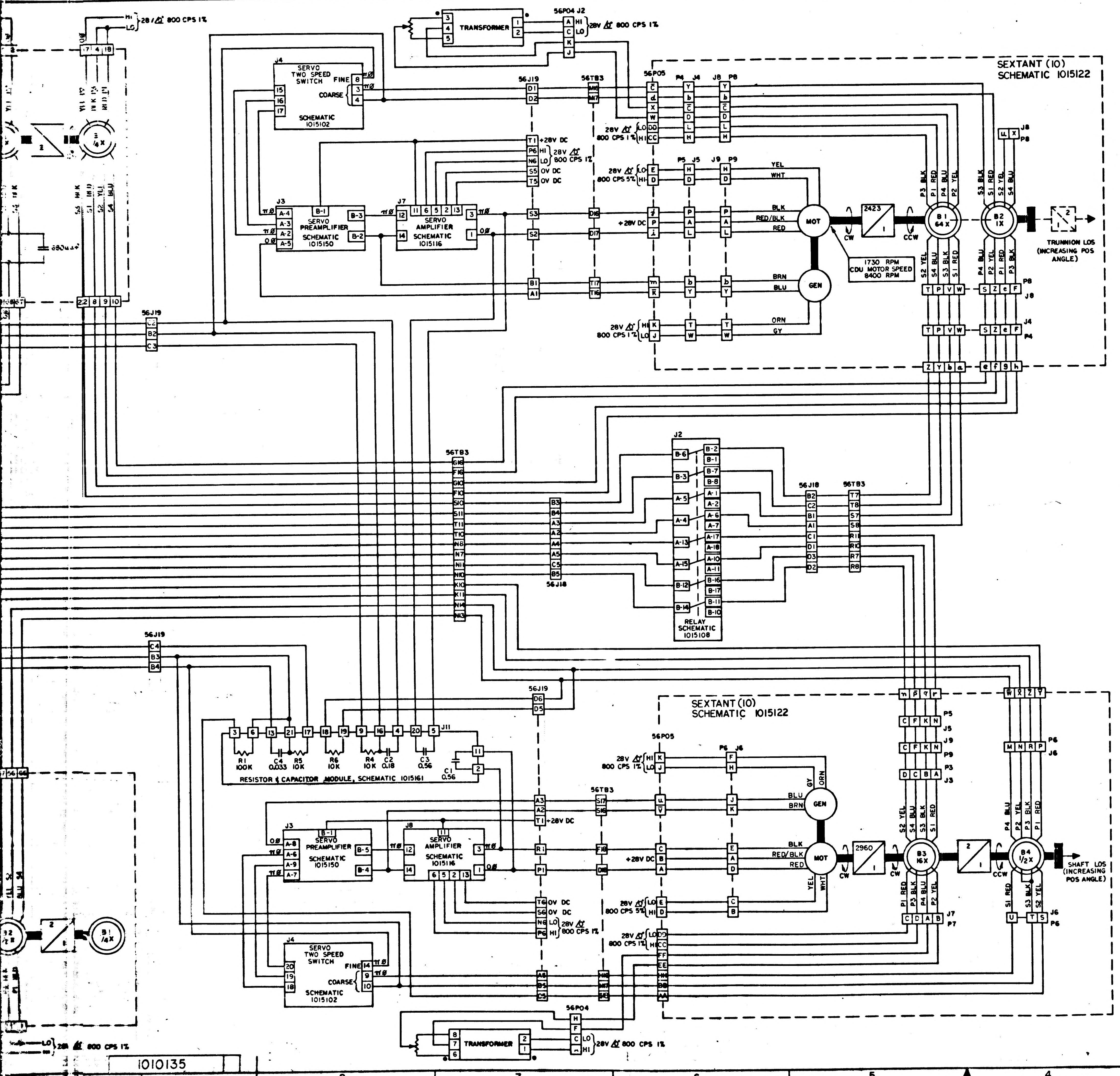
SEXTANT
OPTICS
RESOLVED MODE

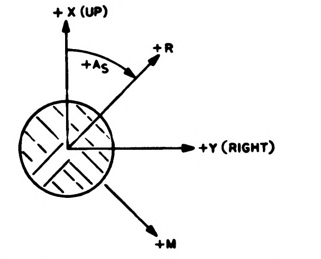
CODE IDENT NO.
SIZE J2
1010135
SCALE ~
SHEET 1 OF 1

3H

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY
F3

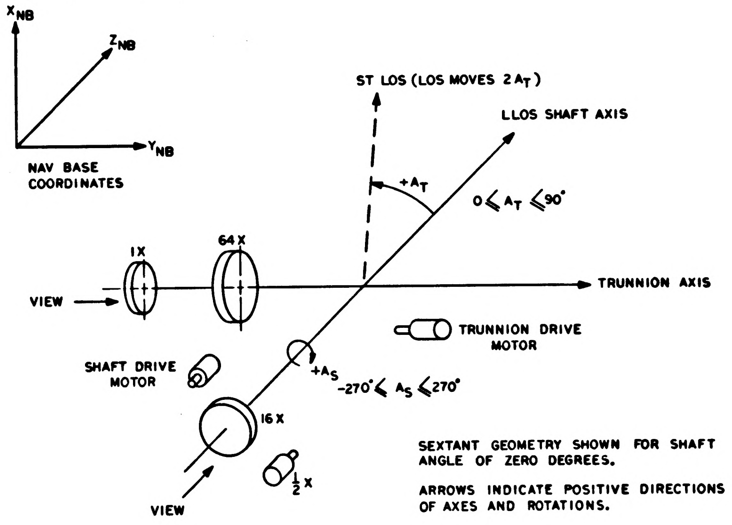
REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD


28V ∆0° 800 CPS 1%
HI
LO
TRANSFORMER
56P04 J2
A HI
C LO
K
J
28V ∆0° 800 CPS 1%
J4
SERVO TWO SPEED SWITCH
FINE
COARSE
SCHEMATIC 1015102
56J19
D1
D2
56TB3
M16
M17
56P05
P4 J4
J8 P8
T1 +28V DC
P6 HI
N6 LO
28V ∆0° 800 CPS 1%
S5 0V DC
T5 0V DC
28V ∆0° 800 CPS 1%
28V ∆0° 800 CPS 5%
P5 J5
J9 P9
J3
SERVO PREAMPLIFIER
SCHEMATIC 1015150
πØ
0Ø
J7
SERVO AMPLIFIER
SCHEMATIC 1015116
S3
S2
D16
D17
+28V DC
B1
A1
T17
T16
28V ∆0° 800 CPS 1%
YEL
WHT
BLK
RED/BLK
RED
BRN
BLU
ORN
GY
MOT
GEN
CW
CCW
2423
1730 RPM CDU MOTOR SPEED 8400 RPM
SEXTANT (10) SCHEMATIC 1015122
P3 BLK
P1 RED
P4 BLU
P2 YEL
S3 BLK
S1 RED
S2 YEL
S4 BLU
B1 64X
B2 1X
TRUNNION LOS (INCREASING POS ANGLE)
J8
P8
J4
P4
680 μμf
1/4X
1/2X
B1 64X
C2
B2
C3
22 8 9 10
17 4 18
56TB3
G16
F16
G10
F10
S10
S11
T11
T10
N8
N7
N11
N10
K10
K11
N14
N13
B3
B4
A3
A2
A4
A5
C5
B5
56J18
J2
RELAY SCHEMATIC 1015108
56J18
56TB3
T7
T8
S7
S8
R11
R10
R7
R8
56J19
C4
B3
B4
D6
D5
J11
R1 100K
C4 0.033
R5 10K
R6 10K
R4 10K
C2 0.18
C3 0.56
C1 0.56
RESISTOR & CAPACITOR MODULE, SCHEMATIC 1015161
A3
A2
T1 +28V DC
S17
S16
J3
SERVO PREAMPLIFIER
SCHEMATIC 1015150
J8
SERVO AMPLIFIER
SCHEMATIC 1015116
R1
P1
F18
D18
T6 0V DC
S6 0V DC
N6 LO
P6 HI
28V ∆0° 800 CPS 1%
J4
SERVO TWO SPEED SWITCH
FINE
COARSE
SCHEMATIC 1015102
56P04
TRANSFORMER
28V ∆0° 800 CPS 1%
SEXTANT (10) SCHEMATIC 1015122
56P05
P6 J6
28V ∆0° 800 CPS 1%
28V ∆0° 800 CPS 5%
28V ∆0° 800 CPS 1%
GEN
MOT
2960
B3 16X
B4 1/2X
SHAFT LOS (INCREASING POS ANGLE)
P5
J5
J9
P9
P3
J3
P6
J6
J7
P7
S2 YEL
S4 BLU
S3 BLK
S1 RED
P1 RED
P3 BLK
P4 BLU
P2 YEL
1010135


+X (UP)
+R
+A$_S$
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE, SHAFT ANGLE AT ZERO.

CONTROLLER MOTION	TRUNNION CDU READOUT	SHAFT CDU READOUT	SEXTANT TRUNNION ANGLE	SEXTANT SHAFT ANGLE	RESOLVED MODE APPARENT IMAGE MOTION
UP	DECREASE		DECREASE		+ X
DOWN	INCREASE		INCREASE		− X
RIGHT		DECREASE		DECREASE	+ Y
LEFT		INCREASE		INCREASE	− Y


X$_{NB}$
Z$_{NB}$
Y$_{NB}$
NAV BASE COORDINATES
ST LOS (LOS MOVES 2A$_T$)
LLOS SHAFT AXIS
+A$_T$
0 < A$_T$ < 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
+A$_S$
−270° < A$_S$ < 270°
16X
1/2 X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS:

SXT TRUNNION—FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION.

1. MOTOR—TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 64X AND 1X RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

SXT SHAFT—FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION.

1. MOTOR—TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 1/2 X RESOLVER ROTATES CCW WHEN LOOKING AT THE SHAFT END.
3. 16X RESOLVER ROTATES CW WHEN LOOKING IN DIRECTION OF ARROW.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ — + — + —
− — − — − —
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Hendrick DATE 12-31-63
CHECKED R. W. Drozewski
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL 3/7/64

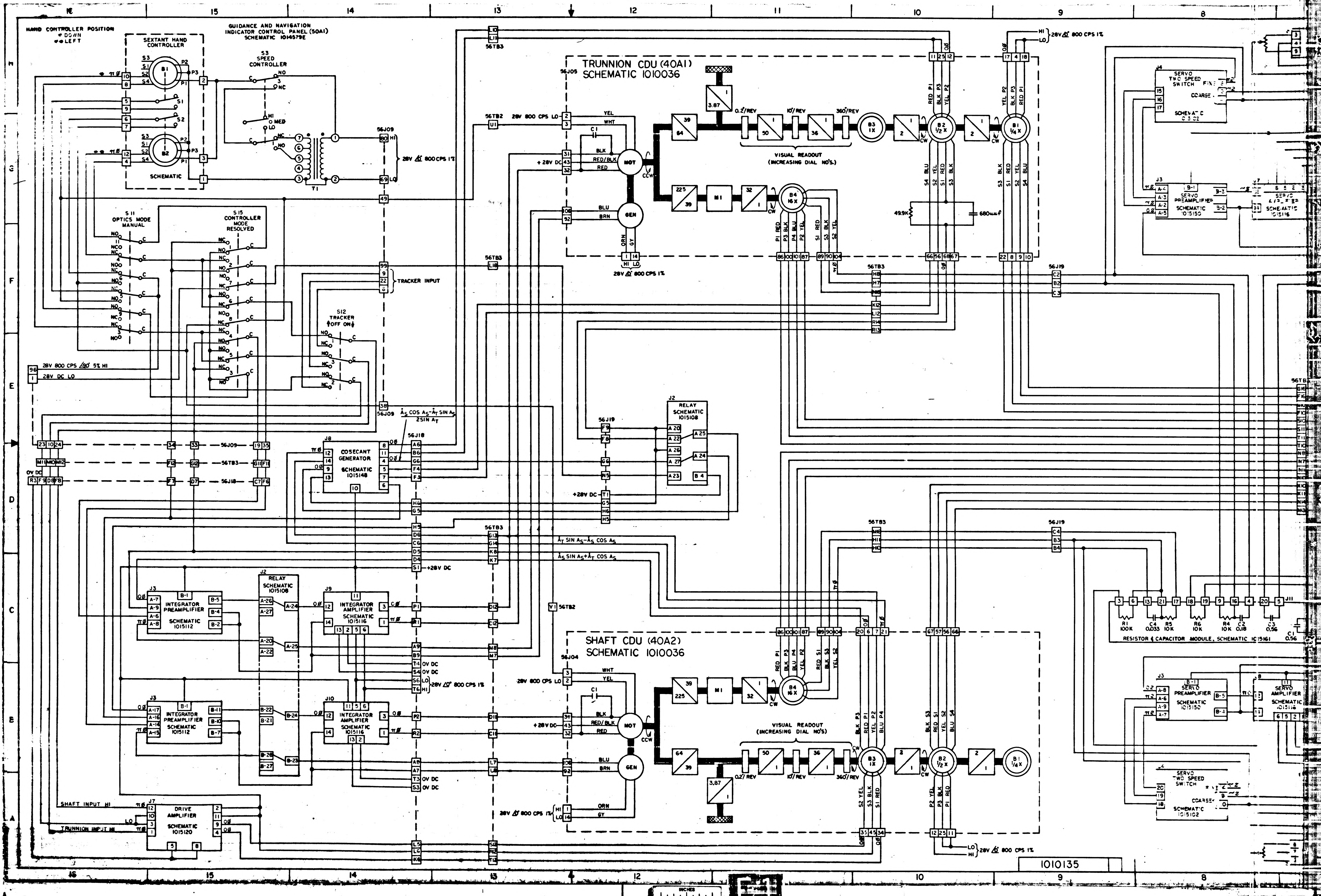
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

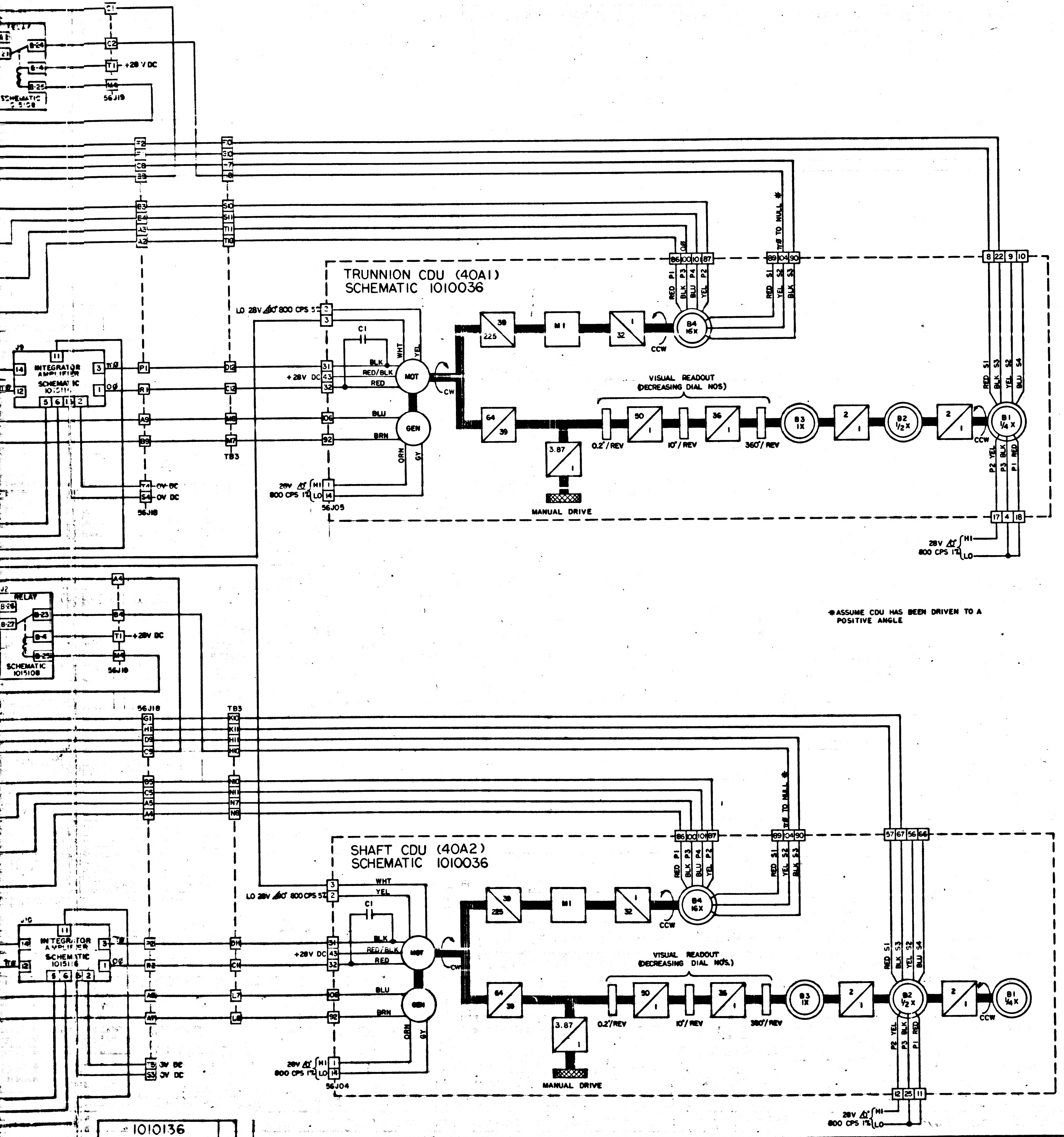
SEXTANT
OPTICS
RESOLVED MODE

CODE IDENT NO.
SIZE J$_2$
1010135
SCALE ~
SHEET OF

1010135

INCHES
PHOTOGRAPHIC SCALE ONLY


HAND CONTROLLER POSITION
↑ DOWN
↑ LEFT
GUIDANCE AND NAVIGATION INDICATOR CONTROL PANEL (50A1) SCHEMATIC 1014579E
SEXTANT HAND CONTROLLER
S3 SPEED CONTROLLER
SCHEMATIC
T1
56J09
28V ∠0° 800 CPS 1%
S11 OPTICS MODE MANUAL
S15 CONTROLLER MODE RESOLVED
TRACKER INPUT
S12 TRACKER OFF ON
28V 800 CPS ∠90° 5% HI
28V DC LO
56TB3
56J18
TRUNNION CDU (40A1) SCHEMATIC 1010036
56J05
28V 800 CPS LO
+28V DC
MOT
GEN
0.2°/REV
10°/REV
360°/REV
VISUAL READOUT (INCREASING DIAL NO'S.)
B3 1X
B2 1/2 X
B1 1/4 X
B4 16X
49.9K
680μμf
28V ∠0° 800 CPS 1%
56J19
J2 RELAY SCHEMATIC 1015108
J8 COSECANT GENERATOR SCHEMATIC 1015148
$\dot{A}_S$ COS A_S - $\dot{A}_T$ SIN A_S / 2 SIN A_T
$\dot{A}_T$ SIN A_S - $\dot{A}_S$ COS A_S
$\dot{A}_S$ SIN A_S + $\dot{A}_T$ COS A_S
+28V DC
J3 INTEGRATOR PREAMPLIFIER SCHEMATIC 1015112
J2 RELAY SCHEMATIC 1015108
J9 INTEGRATOR AMPLIFIER SCHEMATIC 1015116
J10 INTEGRATOR AMPLIFIER SCHEMATIC 1015116
0V DC
28V ∠0° 800 CPS 1%
J7 DRIVE AMPLIFIER SCHEMATIC 1015120
SHAFT INPUT HI
TRUNNION INPUT HI
SHAFT CDU (40A2) SCHEMATIC 1010036
56J04
56TB2
J4 SERVO TWO SPEED SWITCH SCHEMATIC 1015102
J3 SERVO PREAMPLIFIER SCHEMATIC 1015150
SERVO AMPLIFIER SCHEMATIC 1015116
RESISTOR & CAPACITOR MODULE, SCHEMATIC 1015161
R1 100K
C4 0.033
R5 10K
R6 10K
R4 10K
C2 0.18
C3 0.56
C1 0.56
J11
FINE
COARSE
1010135
INCHES
PHOTOGRAPHIC SCALE ONLY



TRUNNION CDU (40A1)
SCHEMATIC 1010036
SHAFT CDU (40A2)
SCHEMATIC 1010036
INTEGRATOR AMPLIFIER SCHEMATIC 1015116
RELAY
SCHEMATIC 1015108
+28 V DC
56J19
56J18
TB3
56J05
56J04
LO 28V ∠0° 800 CPS 5%
28V ∠0° 800 CPS 1%
HI
LO
MOT
GEN
WHT
YEL
BLK
RED/BLK
RED
BLU
BRN
ORN
GY
C1
CW
CCW
M1
B4 16X
B3 1X
B2 1/2X
B1 1/4X
VISUAL READOUT (DECREASING DIAL NOS)
0.2°/REV
10°/REV
360°/REV
3.87
MANUAL DRIVE
TIØ TO NULL *
0V DC
3V DC
RED P1
BLK P3
BLU P4
YEL P2
RED S1
YEL S2
BLK S3
BLU S4

*ASSUME CDU HAS BEEN DRIVEN TO A POSITIVE ANGLE

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Hendrick DATE 12-3-63
CHECKED R. W. Drozewski
APPROVAL D.W. Koso
APPROVAL
NASA APPROVAL
MIT APPROVAL 3/3/64

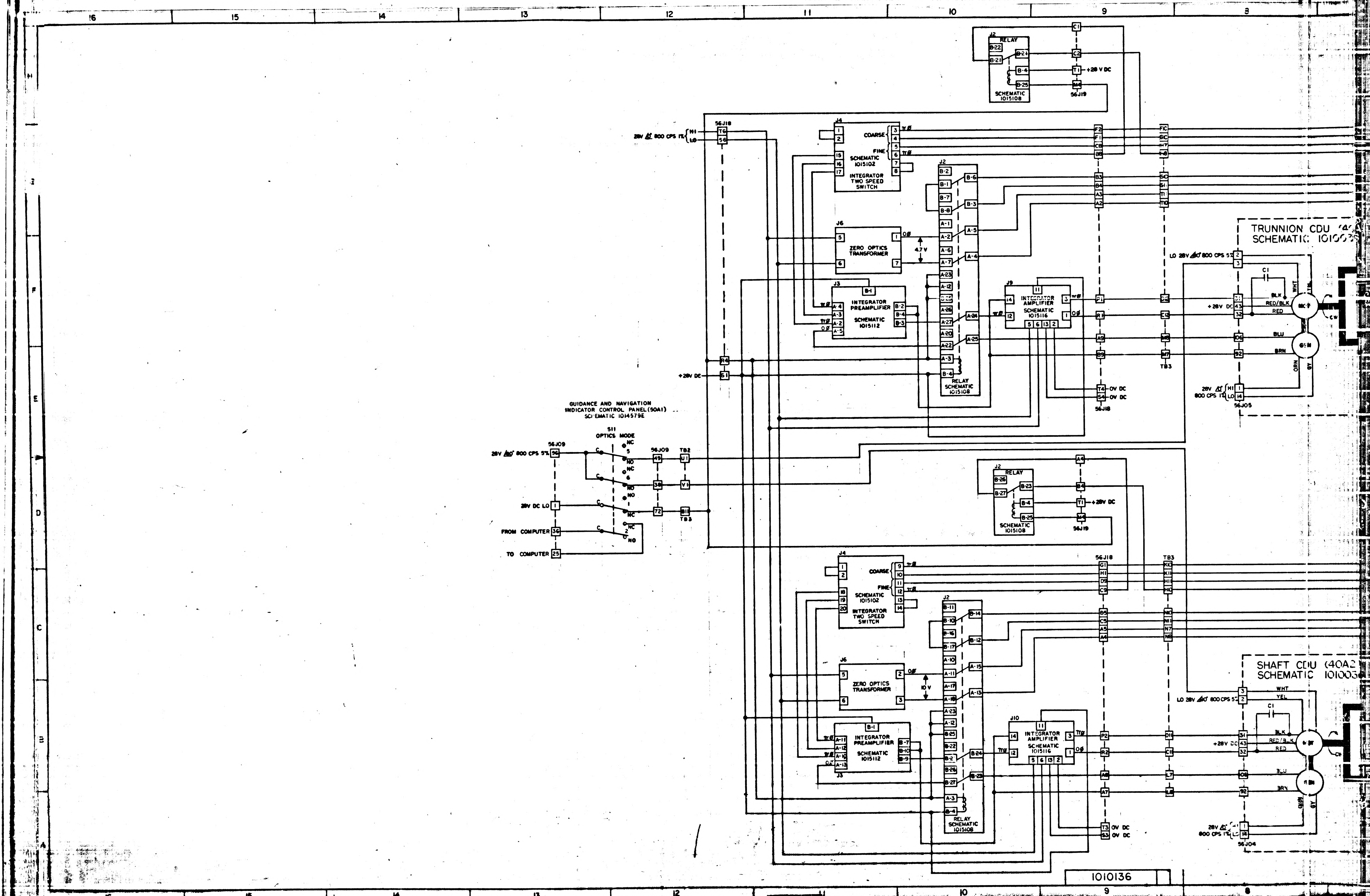
MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

ZERO
OPTICS MODE

CODE IDENT NO.
SIZE J2
1010136
SCALE ~
SHEET 1 OF 1

1010136

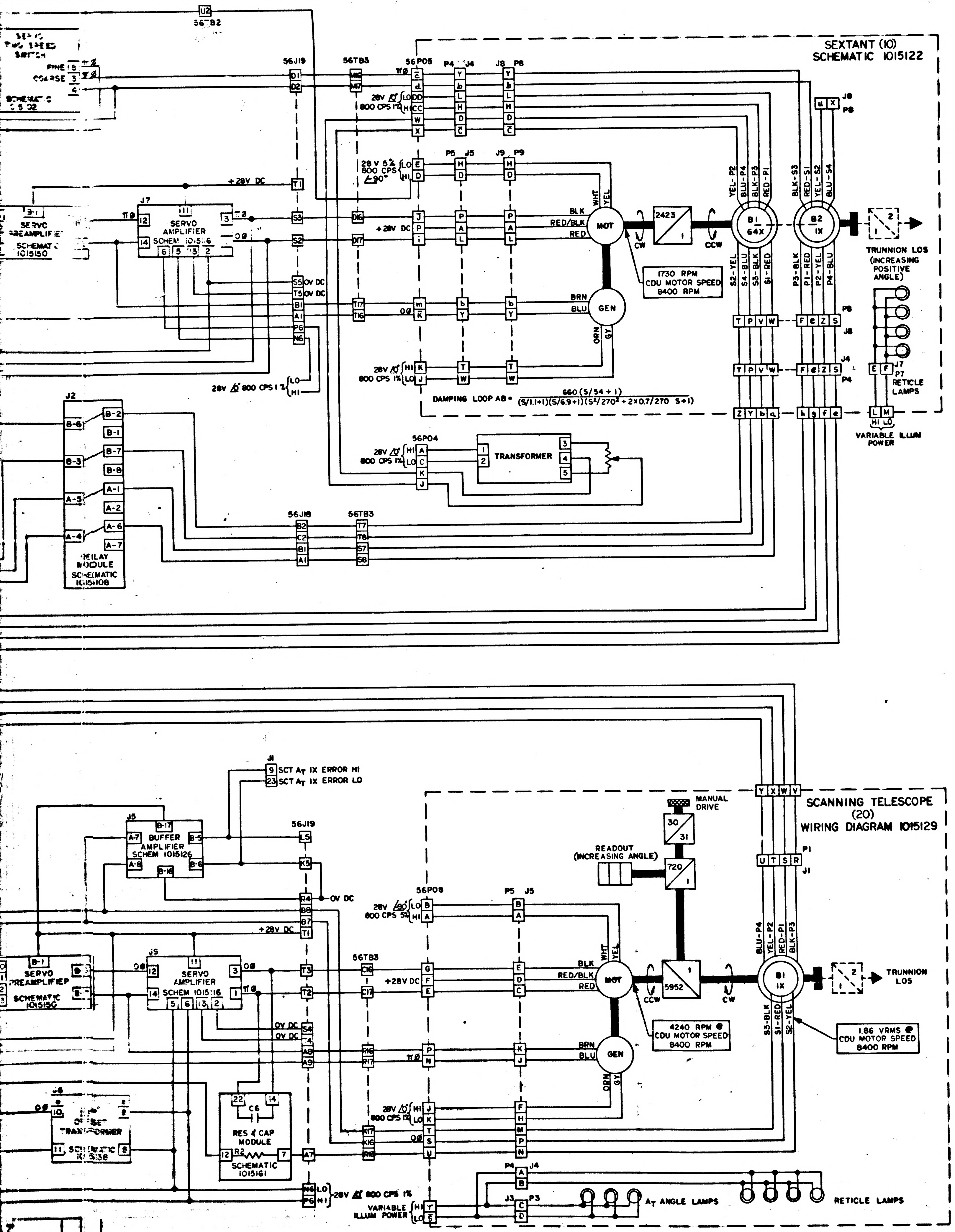
INCHES
PHOTOGRAPHIC SCALE ONLY

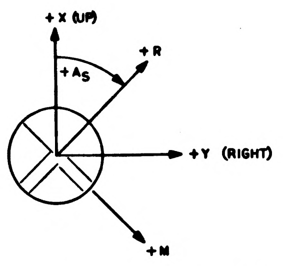

16
15
14
13
12
11
10
9
8
J2
RELAY
B-22
B-21
B-24
B-4
B-25
SCHEMATIC 1015108
C1
C2
T1
+28 V DC
56J19
56J18
28V ∠0° 800 CPS 1% HI LO
T6
S6
J4
COARSE
FINE
SCHEMATIC 1015102
INTEGRATOR TWO SPEED SWITCH
J6
ZERO OPTICS TRANSFORMER
4.7 V
J3
INTEGRATOR PREAMPLIFIER
SCHEMATIC 1015112
J9
INTEGRATOR AMPLIFIER
SCHEMATIC 1015116
RELAY SCHEMATIC 1015108
+28V DC
0V DC
TB3
TRUNNION CDU
SCHEMATIC 10100
LO 28V ∠0° 800 CPS 5%
C1
WHT
BLK
RED/BLK
RED
BLU
BRN
ORN
CW
56J05
GUIDANCE AND NAVIGATION INDICATOR CONTROL PANEL (50A1)
SCHEMATIC 1014579E
S11
OPTICS MODE
28V ∠0° 800 CPS 5%
56J09
TB2
NC
NO
C
28V DC LO
FROM COMPUTER
TO COMPUTER
10 V
J10
SHAFT CDU (40A2
SCHEMATIC 10100
YEL
56J04
INCHES
PHOTOGRAPHIC SCALE ONLY

1010136

REVISIONS

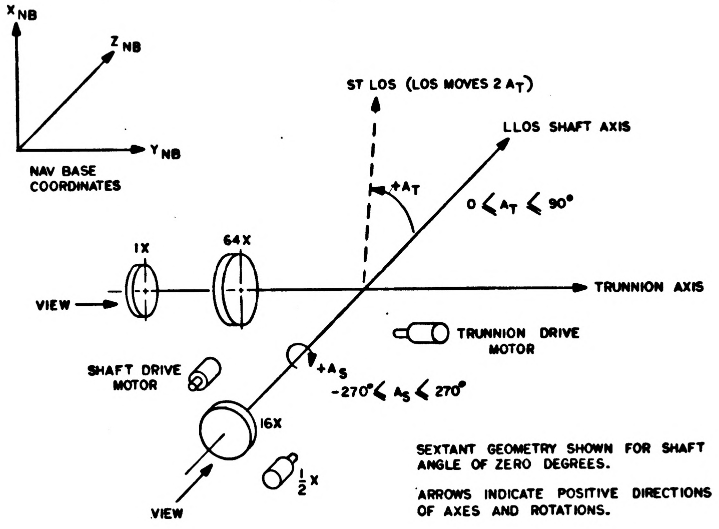
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD


SEXTANT (10) SCHEMATIC 1015122
SCANNING TELESCOPE (20) WIRING DIAGRAM 1015129
SERVO TWO SPEED SWITCH
FINE
COARSE
SCHEMATIC 1015102
SERVO PREAMPLIFIER SCHEMATIC 1015150
SERVO AMPLIFIER SCHEM 1015116
RELAY MODULE SCHEMATIC 1015108
TRANSFORMER
BUFFER AMPLIFIER SCHEM 1015126
RES & CAP MODULE SCHEMATIC 1015161
OFFSET TRANSFORMER SCHEMATIC 1015138
+28V DC
28V 5% 800 CPS ∠-90°
28V ∠0° 800 CPS 1%
0V DC
MOT
GEN
2423
5952
720
1730 RPM CDU MOTOR SPEED 8400 RPM
4240 RPM @ CDU MOTOR SPEED 8400 RPM
1.86 VRMS @ CDU MOTOR SPEED 8400 RPM
CW
CCW
B1 64X
B2 1X
B1 1X
TRUNNION LOS (INCREASING POSITIVE ANGLE)
TRUNNION LOS
DAMPING LOOP AB = 660 (S/54 + 1) / (S/1.1+1)(S/6.9+1)(S²/270² + 2×0.7/270 S+1)
RETICLE LAMPS
VARIABLE ILLUM POWER
MANUAL DRIVE
READOUT (INCREASING ANGLE)
SCT A_T 1X ERROR HI
SCT A_T 1X ERROR LO
A_T ANGLE LAMPS
56J19
56TB3
56P05
56J18
56P04
56P08


+X (UP)
$+A_S$
+R
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	TRUNNION CDU READOUT	SEXTANT TRUNNION ANGLE	DIRECT MODE APPARENT IMAGE MOTION
UP	INCREASE	INCREASE	- R
DOWN	DECREASE	DECREASE	+ R


X_{NB}
Z_{NB}
Y_{NB}
NAV BASE COORDINATES
ST LOS (LOS MOVES 2 A_T)
LLOS SHAFT AXIS
$+A_T$
$0 < A_T < 90°$
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
$+A_S$
$-270° < A_S < 270°$
16X
$\frac{1}{2}$X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

SXT TRUNNION - FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION.

1. MOTOR-TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 64X AND 1X RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

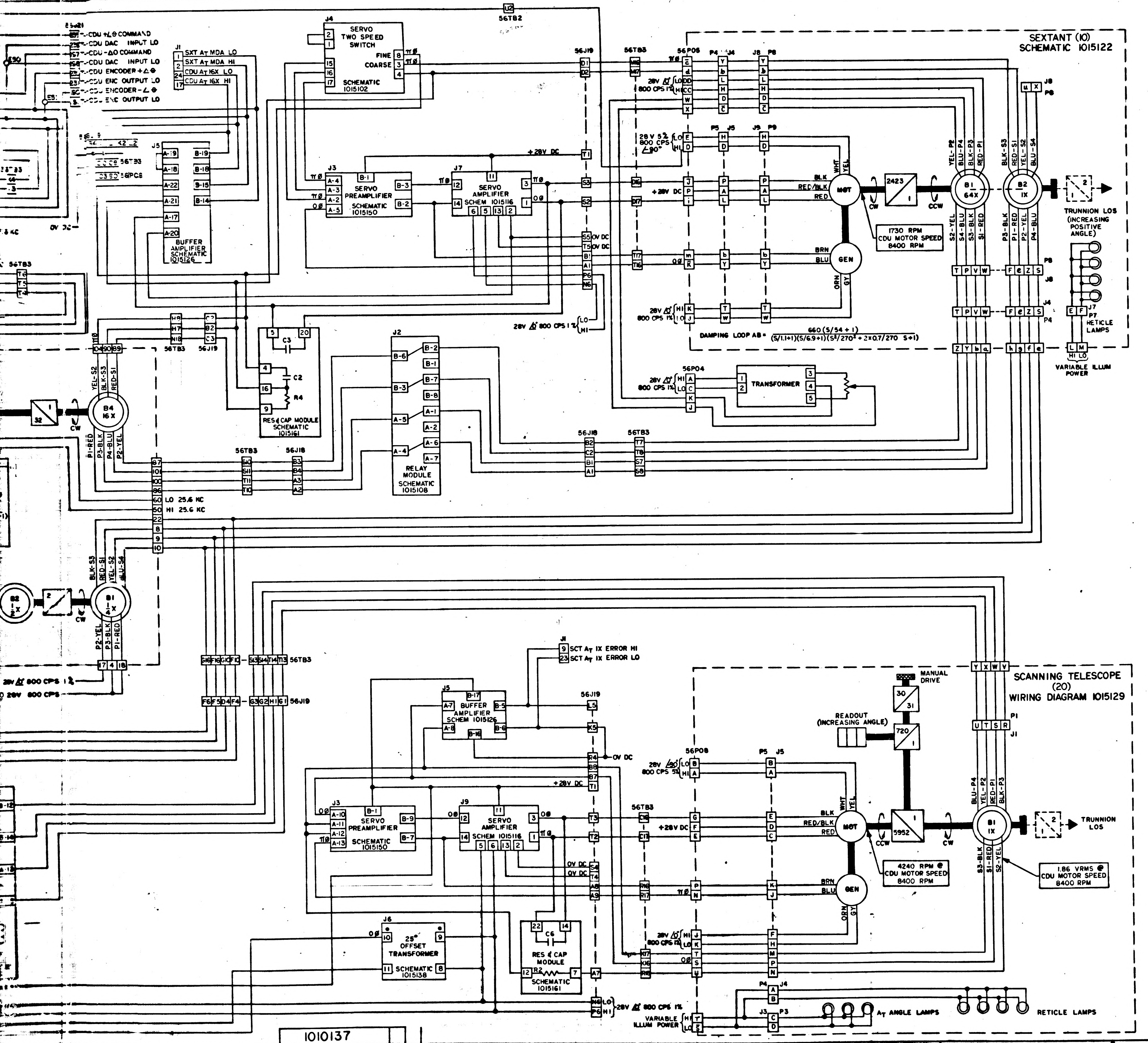
1010137

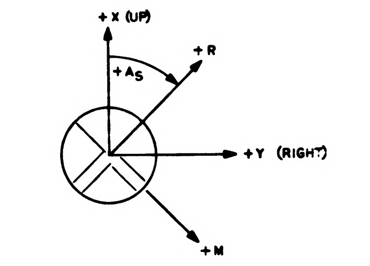
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ±	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
	ACSP PN	
	DRAWN J Koss DATE JAN 6, 64 CHECKED R.W. Drogowski APPROVAL APPROVAL	TRUNNION MANUAL MODE
DO NOT SCALE THIS DRAWING		
MATERIAL	NASA APPROVAL MIT APPROVAL 3/3/64	CODE IDENT NO. — SIZE J2 — 1010137
CONTRACT		SCALE — SHEET 1 OF 1

(34)

INCHES
PHOTOGRAPHIC SCALE ONLY

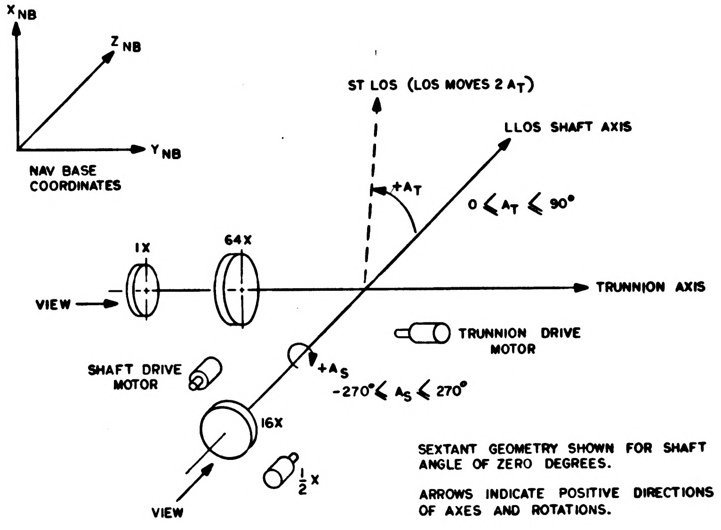
F3


CDU +∆θ COMMAND
CDU DAC INPUT LO
CDU -∆θ COMMAND
CDU DAC INPUT LO
CDU ENCODER +∆θ
CDU ENC OUTPUT LO
CDU ENCODER -∆θ
CDU ENC OUTPUT LO
J1
SXT A_T MDA LO
SXT A_T MDA HI
CDU A_T 16X LO
CDU A_T 16X HI
J4
SERVO TWO SPEED SWITCH
FINE
COARSE
SCHEMATIC 1015102
56TB2
56J19
56TB3
56P05
J5
BUFFER AMPLIFIER SCHEMATIC 1015126
J3
SERVO PREAMPLIFIER SCHEMATIC 1015150
J7
SERVO AMPLIFIER SCHEM 1015116
+28V DC
0V DC
28V ∠0° 800 CPS 1%
C3
C2
R4
RES & CAP MODULE SCHEMATIC 1015161
J2
RELAY MODULE SCHEMATIC 1015108
LO 25.6 KC
HI 25.6 KC
B4 16X
B1 ½X
B2 ½X
CW
SEXTANT (10) SCHEMATIC 1015122
28V 5% 800 CPS ∠90°
MOT
GEN
2423
1730 RPM CDU MOTOR SPEED 8400 RPM
B1 64X
B2 1X
CCW
TRUNNION LOS (INCREASING POSITIVE ANGLE)
RETICLE LAMPS
VARIABLE ILLUM POWER
DAMPING LOOP AB = 660(S/54 + 1) / (S/1.1+1)(S/6.9+1)(S²/270² + 2×0.7/270 S+1)
56P04
TRANSFORMER
56J18
J1
SCT A_T 1X ERROR HI
SCT A_T 1X ERROR LO
J5
BUFFER AMPLIFIER SCHEM 1015126
J3
SERVO PREAMPLIFIER SCHEMATIC 1015150
J9
SERVO AMPLIFIER SCHEM 1015116
J6
25° OFFSET TRANSFORMER SCHEMATIC 1015138
C6
R2
RES & CAP MODULE SCHEMATIC 1015161
56P08
28V ∠90° 800 CPS 5%
SCANNING TELESCOPE (20) WIRING DIAGRAM 1015129
MANUAL DRIVE
READOUT (INCREASING ANGLE)
30/31
720/1
5952
4240 RPM @ CDU MOTOR SPEED 8400 RPM
B1 1X
1.86 VRMS @ CDU MOTOR SPEED 8400 RPM
TRUNNION LOS
A_T ANGLE LAMPS
RETICLE LAMPS
VARIABLE ILLUM POWER
28V ∠0° 800 CPS 1%


+X (UP)
+R
+A_S
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	TRUNNION CDU READOUT	SEXTANT TRUNNION ANGLE	DIRECT MODE APPARENT IMAGE MOTION
UP	INCREASE	INCREASE	-R
DOWN	DECREASE	DECREASE	+R


X_NB
Z_NB
Y_NB
NAV BASE COORDINATES
ST LOS (LOS MOVES 2 A_T)
LLOS SHAFT AXIS
+A_T
0 ≤ A_T ≤ 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
+A_S
-270° ≤ A_S ≤ 270°
16X
½X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

SXT TRUNNION - FOR INCREASING TRUNNION ANGLE IN A POSITIVE DIRECTION.

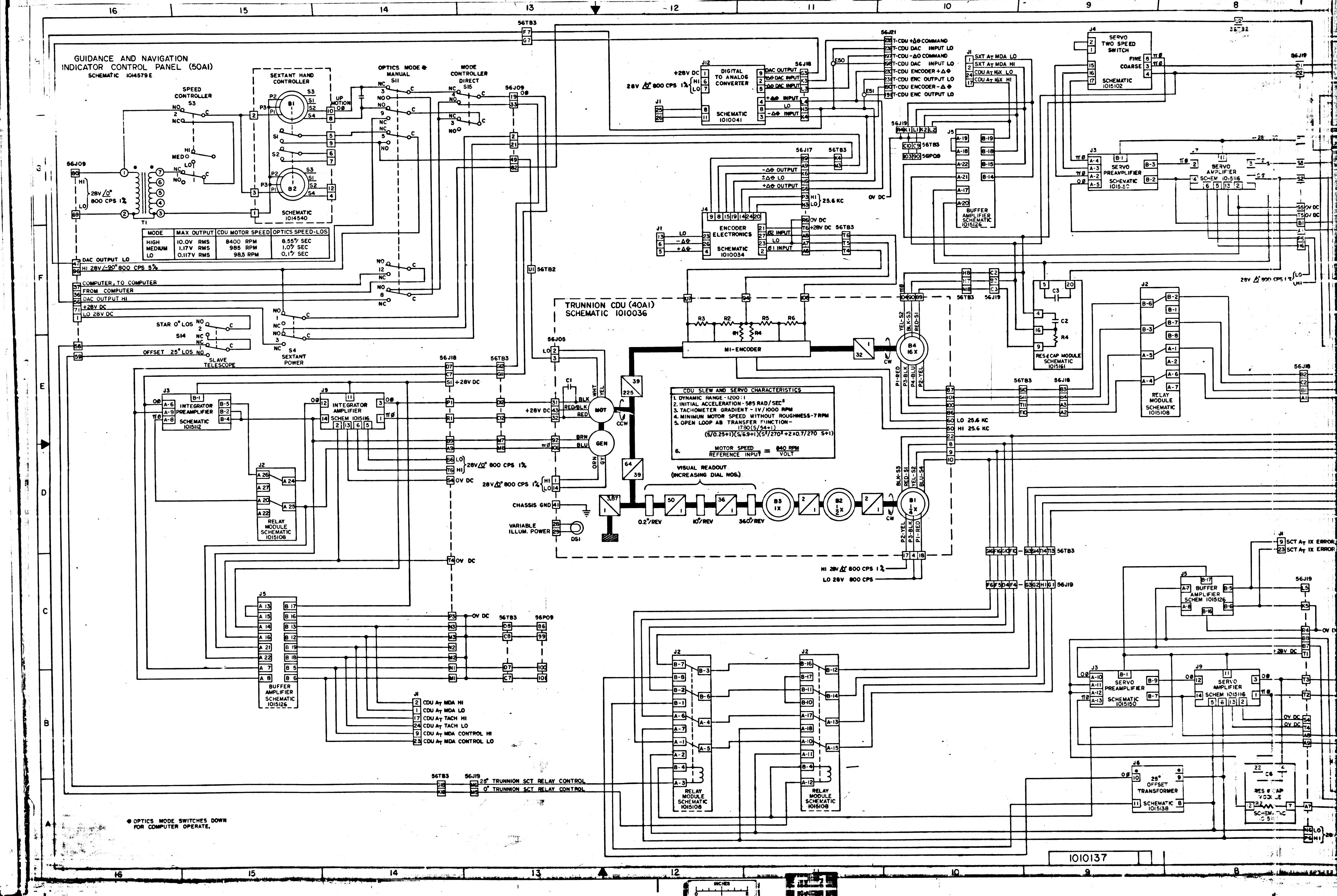
1. MOTOR-TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 64X AND 1X RESOLVER ROTORS ROTATE CW WHEN LOOKING IN DIRECTION OF ARROW.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN
DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL
CODE IDENT NO.
SCALE

1010137

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY



GUIDANCE AND NAVIGATION INDICATOR CONTROL PANEL (50A1)
SCHEMATIC 1014579E
SPEED CONTROLLER S3
SEXTANT HAND CONTROLLER
SCHEMATIC 1014540
OPTICS MODE ✱ MANUAL S11
MODE CONTROLLER DIRECT S15
MEDO
28V /0° 800 CPS 1%
T1
DAC OUTPUT LO
HI 28V/-90° 800 CPS 5%
COMPUTER, TO COMPUTER
FROM COMPUTER
DAC OUTPUT HI
+28V DC
LO 28V DC
STAR 0° LOS
S14
OFFSET 25° LOS
SLAVE TELESCOPE
S4 SEXTANT POWER
DIGITAL TO ANALOG CONVERTER
SCHEMATIC 1010041
ENCODER ELECTRONICS
SCHEMATIC 1010034
25.6 KC
SERVO TWO SPEED SWITCH
FINE
COARSE
SCHEMATIC 1015102
SXT AT MDA LO
SXT AT MDA HI
CDU AT 16X LO
CDU AT 16X HI
T-CDU +Δθ COMMAND
T-CDU DAC INPUT LO
T-CDU -Δθ COMMAND
T-CDU DAC INPUT HI
T-CDU ENCODER +Δθ
T-CDU ENC OUTPUT LO
T-CDU ENCODER -Δθ
T-CDU ENC OUTPUT HI
BUFFER AMPLIFIER SCHEMATIC 1015126
SERVO PREAMPLIFIER SCHEMATIC 1015150
SERVO AMPLIFIER SCHEM 1015116
TRUNNION CDU (40A1)
SCHEMATIC 1010036
MI-ENCODER
RES & CAP MODULE SCHEMATIC 1015161
RELAY MODULE SCHEMATIC 1015108
INTEGRATOR PREAMPLIFIER SCHEMATIC 1015112
INTEGRATOR AMPLIFIER SCHEM 1015116
MOT
GEN
CHASSIS GND
VARIABLE ILLUM. POWER
DS1
VISUAL READOUT (INCREASING DIAL NOS.)
0.2°/REV
10°/REV
360°/REV
B1 1X
B2 1/2X
B3 1X
B4 16X
CW
CCW
HI 28V /0° 800 CPS 1%
LO 28V 800 CPS
LO 25.6 KC
HI 25.6 KC
CDU AT MDA HI
CDU AT MDA LO
CDU AT TACH HI
CDU AT TACH LO
CDU AT MDA CONTROL HI
CDU AT MDA CONTROL LO
25° TRUNNION SCT RELAY CONTROL
0° TRUNNION SCT RELAY CONTROL
SCT AT 1X ERROR
25° OFFSET TRANSFORMER SCHEMATIC 1015138
✱ OPTICS MODE SWITCHES DOWN FOR COMPUTER OPERATE.
16
15
14
13
12
11
10
9
8
G
F
E
D
C
B
A
INCHES
PHOTOGRAPHIC SCALE ONLY

MODE	MAX OUTPUT	CDU MOTOR SPEED	OPTICS SPEED-LOS
HIGH	10.0V RMS	8400 RPM	8.55°/ SEC
MEDIUM	1.17V RMS	985 RPM	1.0°/ SEC
LO	0.117V RMS	98.5 RPM	0.1°/ SEC

CDU SLEW AND SERVO CHARACTERISTICS

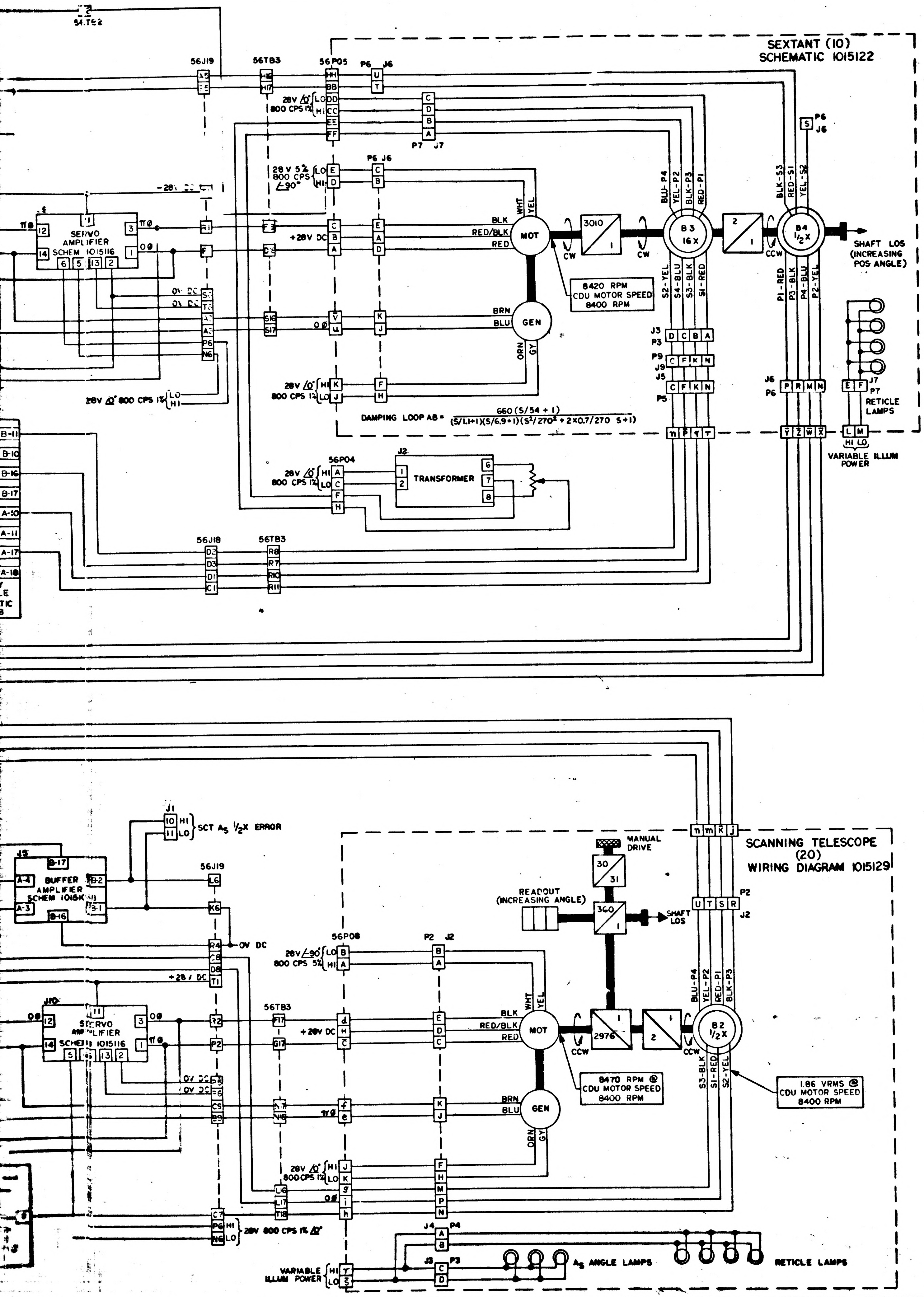
1. DYNAMIC RANGE - 1200:1
2. INITIAL ACCELERATION - 585 RAD/SEC^2
3. TACHOMETER GRADIENT - 1V/1000 RPM
4. MINIMUN MOTOR SPEED WITHOUT ROUGHNESS - 7 RPM
5. OPEN LOOP AB TRANSFER FUNCTION -

$$\frac{1780(S/54+1)}{(S/0.25+1)(S/6.9+1)(S^2/270^2+2\times0.7/270\ S+1)}$$

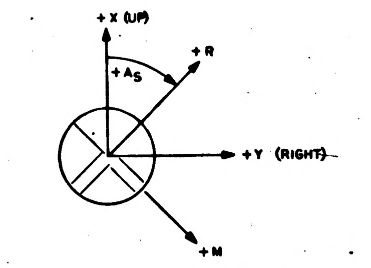
6. $$\frac{\text{MOTOR SPEED}}{\text{REFERENCE INPUT}} = \frac{840\ \text{RPM}}{\text{VOLT}}$$

1010137

REVISIONS 06739					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD



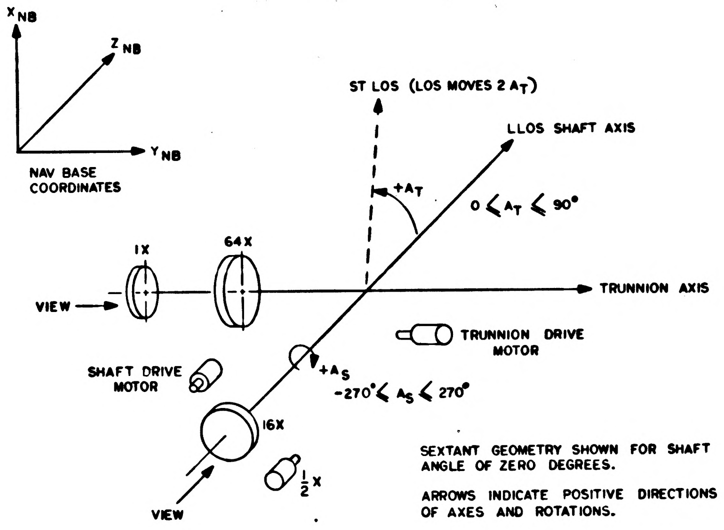
SEXTANT (10)
SCHEMATIC 1015122
56J19
56TB3
56P05
P6 J6
P7 J7
28V /0° LO / 800 CPS 1% HI
28V 5% 800 CPS /-90° LO HI
SERVO AMPLIFIER SCHEM 1015116
+28V DC
MOT
GEN
BLK
RED/BLK
RED
WHT
YEL
BRN
BLU
ORN
GY
3010
B3 16X
B4 1/2X
CW
CCW
SHAFT LOS (INCREASING POS ANGLE)
8420 RPM CDU MOTOR SPEED 8400 RPM
RETICLE LAMPS
VARIABLE ILLUM POWER
DAMPING LOOP AB = 660(S/54 + 1) / (S/1.1+1)(S/6.9+1)(S²/270² + 2×0.7/270 S+1)
56P04
J2
TRANSFORMER
56J18
SCANNING TELESCOPE (20)
WIRING DIAGRAM 1015129
MANUAL DRIVE
READOUT (INCREASING ANGLE)
SHAFT LOS
SCT A_S 1/2X ERROR
BUFFER AMPLIFIER SCHEM 1015K
OV DC
56P08
28V/-90° LO 800 CPS 5% HI
2976
B2 1/2X
8470 RPM @ CDU MOTOR SPEED 8400 RPM
1.86 VRMS @ CDU MOTOR SPEED 8400 RPM
28V /0° 800 CPS 1%
A_S ANGLE LAMPS
RETICLE LAMPS
VARIABLE ILLUM POWER



+X (UP)
+R
+A_S
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	SHAFT CDU READOUT	SEXTANT SHAFT ANGLE	DIRECT MODE APPARENT IMAGE MOTION
RIGHT	INCREASE	INCREASE	-M
LEFT	DECREASE	DECREASE	+M



X_NB
Z_NB
Y_NB
NAV BASE COORDINATES
ST LOS (LOS MOVES 2 A_T)
LLOS SHAFT AXIS
+A_T
0 < A_T < 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
+A_S
-270° < A_S < 270°
16X
1/2 X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

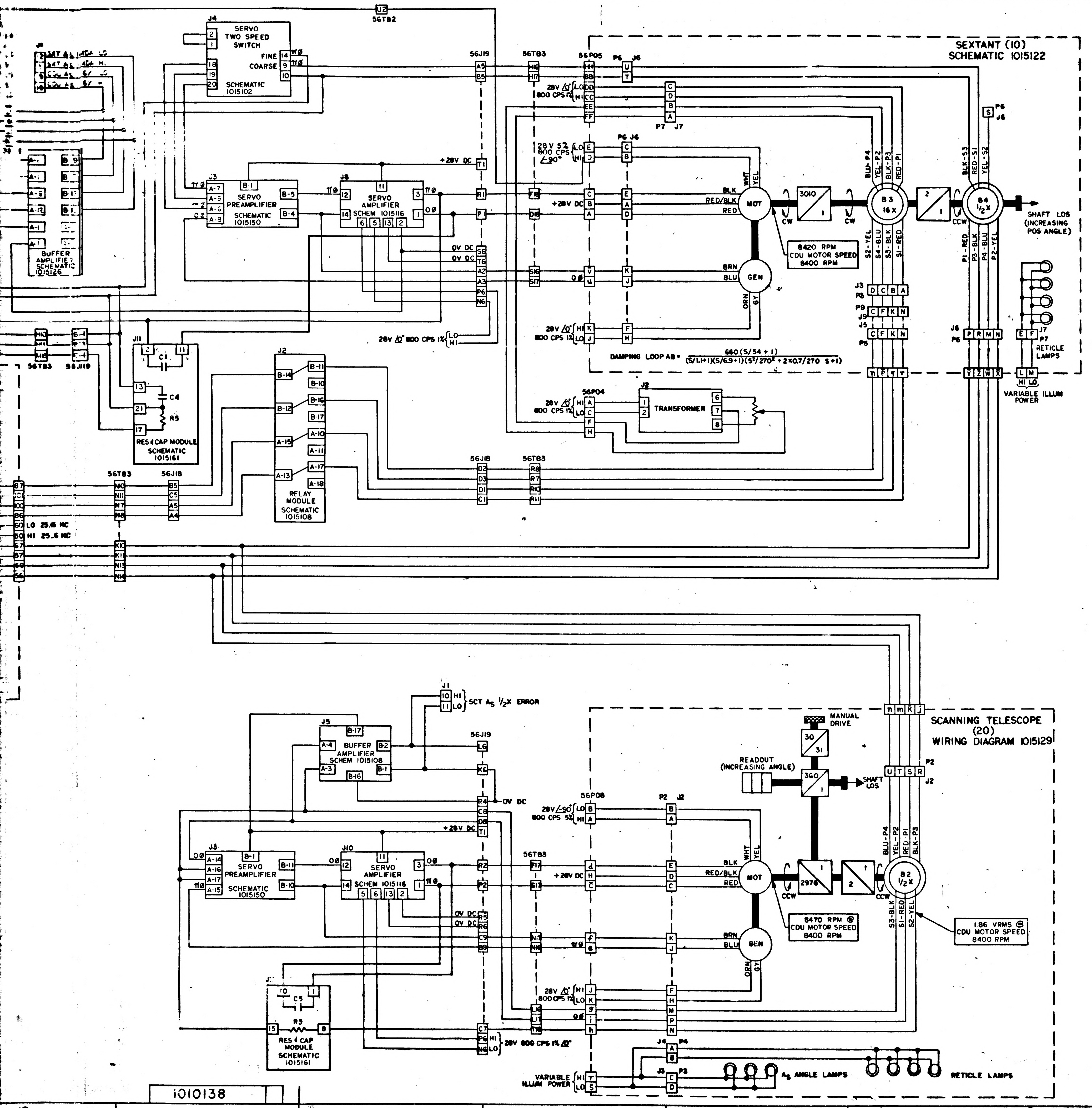
ROTATING COMPONENTS

SXT SHAFT - FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION.

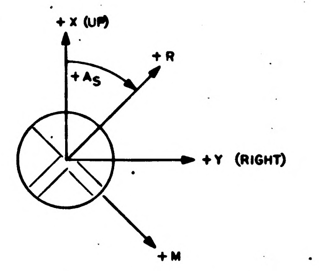
1. MOTOR-TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 1/2 X RESOLVER ROTATES CCW WHEN LOOKING AT SHAFT END.
3 16X RESOLVER ROTATES ↓ WHEN LOOKING IN DIRECTION OF ARROW.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES + + + − − −	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DO NOT SCALE THIS DRAWING	ACSP PN	SHAFT MANUAL MODE
MATERIAL	DRAWN J. Kaas DATE JAN 9, 64 CHECKED R. W. Drzewiecki APPROVAL D. U. Kosso APPROVAL	CODE IDENT NO. — SIZE J2 — 1010138
CONTRACT	NASA APPROVAL MIT APPROVAL 3/3/64	SCALE — SHEET 1 OF 1

1010138



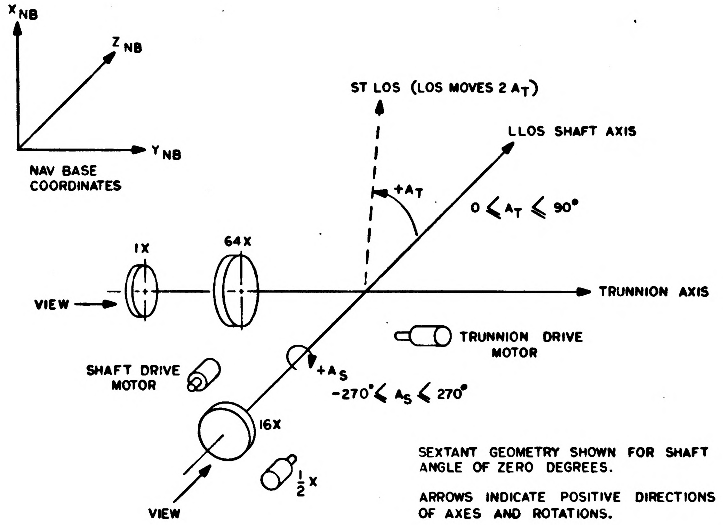
SEXTANT (10) SCHEMATIC 1015122
SCANNING TELESCOPE (20) WIRING DIAGRAM 1015129
J4 SERVO TWO SPEED SWITCH SCHEMATIC 1015102
FINE
COARSE
J3 SERVO PREAMPLIFIER SCHEMATIC 1015150
J8 SERVO AMPLIFIER SCHEM 1015116
BUFFER AMPLIFIER SCHEMATIC 1015126
J11 RES & CAP MODULE SCHEMATIC 1015161
J2 RELAY MODULE SCHEMATIC 1015108
J2 TRANSFORMER
J5 BUFFER AMPLIFIER SCHEM 1015108
J10 SERVO AMPLIFIER SCHEM 1015116
RES & CAP MODULE SCHEMATIC 1015161
MOT
GEN
3010
B3 16X
B4 1/2X
SHAFT LOS (INCREASING POS ANGLE)
8420 RPM CDU MOTOR SPEED 8400 RPM
8470 RPM @ CDU MOTOR SPEED 8400 RPM
1.86 VRMS @ CDU MOTOR SPEED 8400 RPM
DAMPING LOOP AB = $\frac{660(S/54+1)}{(S/1.1+1)(S/6.9+1)(S^2/270^2+2\times0.7/270\ S+1)}$
28V 800 CPS
+28V DC
0V DC
RETICLE LAMPS
VARIABLE ILLUM POWER
LO 25.6 KC
HI 25.6 KC
SCT AS 1/2X ERROR
MANUAL DRIVE
READOUT (INCREASING ANGLE)
SHAFT LOS
2976
B2 1/2X
AS ANGLE LAMPS
CW
CCW



+X (UP)
+R
+AS
+Y (RIGHT)
+M

DIRECTION OF IMAGE MOTION AS VIEWED THRU SEXTANT EYEPIECE.

CONTROLLER MOTION	SHAFT CDU READOUT	SEXTANT SHAFT ANGLE	DIRECT MODE APPARENT IMAGE MOTION
RIGHT	INCREASE	INCREASE	−M
LEFT	DECREASE	DECREASE	+M



X_{NB}
Z_{NB}
Y_{NB}
NAV BASE COORDINATES
ST LOS (LOS MOVES 2 AT)
LLOS SHAFT AXIS
+AT
0 ≤ AT ≤ 90°
1X
64X
VIEW
TRUNNION AXIS
TRUNNION DRIVE MOTOR
SHAFT DRIVE MOTOR
+AS
−270° ≤ AS ≤ 270°
16X
1/2 X
VIEW

SEXTANT GEOMETRY SHOWN FOR SHAFT ANGLE OF ZERO DEGREES.

ARROWS INDICATE POSITIVE DIRECTIONS OF AXES AND ROTATIONS.

ROTATING COMPONENTS

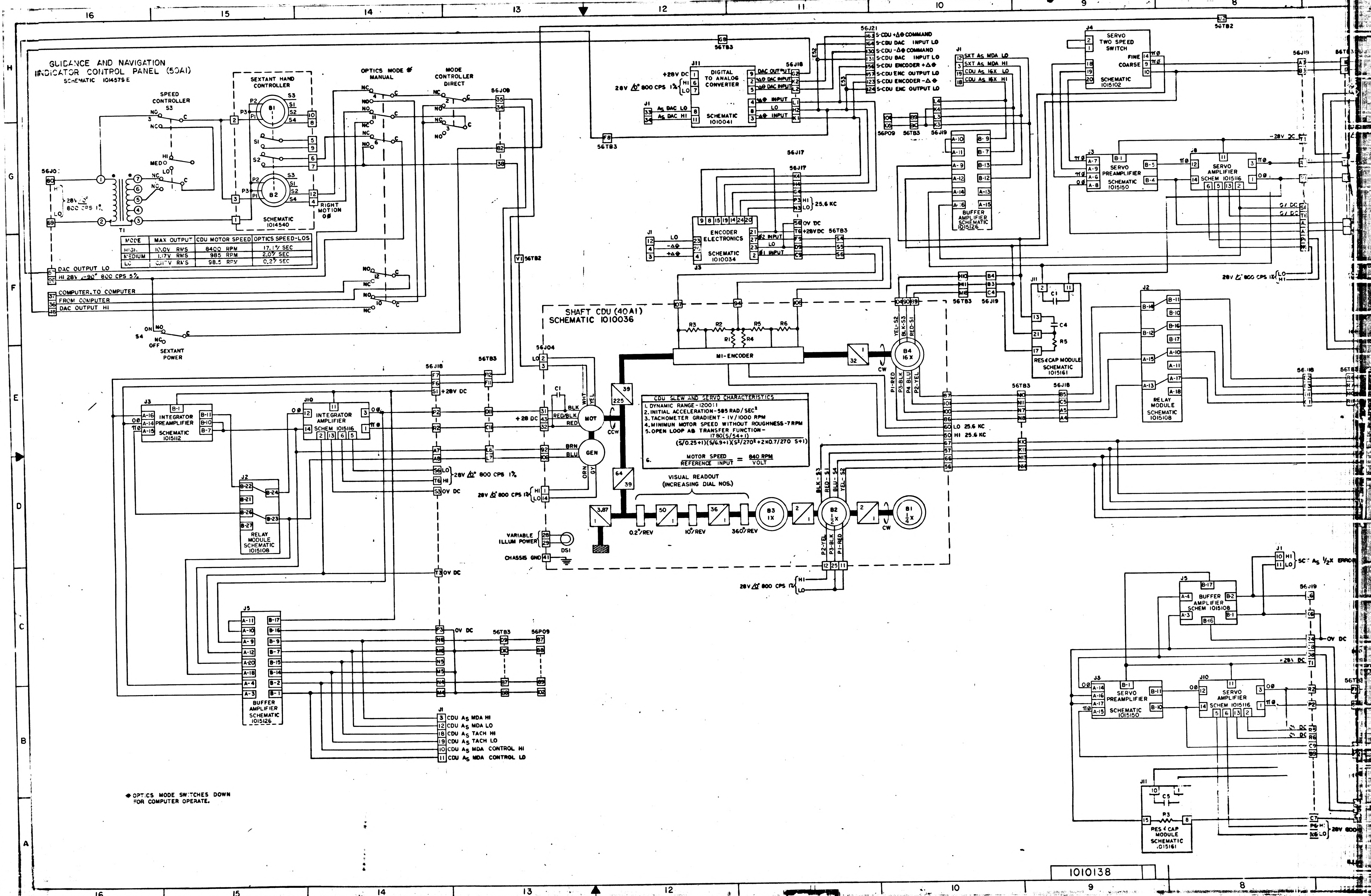
SXT SHAFT - FOR INCREASING SHAFT ANGLE IN A POSITIVE DIRECTION.

1. MOTOR-TACH ROTATES CW WHEN LOOKING AT THE SHAFT END.
2. 1/2 X RESOLVER ROTATES CCW WHEN LOOKING AT SHAFT END.
3 16X RESOLVER ROTATES CW WHEN LOOKING IN DIRECTION OF ARROW.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	AC SPARK PLUG DIVISION, GMC MILWAUKEE, WISCONSIN	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
FRACTIONS + − / DECIMALS + − / ANGLES + −	ACSP PN	
DO NOT SCALE THIS DRAWING	DRAWN J. Kuss DATE JAN 3 62 CHECKED R W Urbanick APPROVAL D.U. Koso APPROVAL	SHAFT MANUAL MODE
MATERIAL	NASA APPROVAL	CODE IDENT NO. / SIZE J2 / 1010138
CONTRACT	MIT APPROVAL	SCALE / SHEET 1 OF 1

1010138

INCHES
PHOTOGRAPHIC SCALE ONLY


GUIDANCE AND NAVIGATION INDICATOR CONTROL PANEL (50A1)
SCHEMATIC 1014579 E
SEXTANT HAND CONTROLLER
SCHEMATIC 1014540
SPEED CONTROLLER S3
HI MED LO
OPTICS MODE * MANUAL
MODE CONTROLLER DIRECT
RIGHT MOTION 0Ø
56J01
28V /0° 800 CPS 1%
T1
DAC OUTPUT LO
HI 28V /-90° 800 CPS 5%
COMPUTER TO COMPUTER
FROM COMPUTER
DAC OUTPUT HI
S4 ON OFF
SEXTANT POWER
56J09
56TB2
56TB3
56J18
J3 INTEGRATOR PREAMPLIFIER SCHEMATIC 1015112
J10 INTEGRATOR AMPLIFIER SCHEM 1015116
J2 RELAY MODULE SCHEMATIC 1015108
J5 BUFFER AMPLIFIER SCHEMATIC 1015126
+28V DC
28V /0° 800 CPS 1%
0V DC
56TB3 56P09
J1
CDU A_S MDA HI
CDU A_S MDA LO
CDU A_S TACH HI
CDU A_S TACH LO
CDU A_S MDA CONTROL HI
CDU A_S MDA CONTROL LO
SHAFT CDU (40A1) SCHEMATIC 1010036
56J04
MOT
GEN
+28 DC
C1
RED/BLK
VARIABLE ILLUM POWER
DS1
CHASSIS GND
MI-ENCODER
R1 R2 R3 R4 R5 R6
B4 16X
B3 1X
B2 1/2X
B1 1/4X
VISUAL READOUT (INCREASING DIAL NOS.)
0.2°/REV 10°/REV 360°/REV
CW CCW
J11 DIGITAL TO ANALOG CONVERTER SCHEMATIC 1010041
+28V DC
28V /0° 800 CPS 1%
A_S DAC LO
A_S DAC HI
DAC OUTPUT
+ΔΦ DAC INPUT
-ΔΦ DAC INPUT
+ΔΦ INPUT
LO
-ΔΦ INPUT
56J21
S-CDU +ΔΦ COMMAND
S-CDU DAC INPUT LO
S-CDU -ΔΦ COMMAND
S-CDU DAC INPUT LO
S-CDU ENCODER +ΔΦ
S-CDU ENC OUTPUT LO
S-CDU ENCODER -ΔΦ
S-CDU ENC OUTPUT LO
56J16
56J17
25.6 KC
J3 ENCODER ELECTRONICS SCHEMATIC 1010034
0V DC
+28VDC
Ø2 INPUT
LO
Ø1 INPUT
SXT A_S MDA LO
SXT A_S MDA HI
CDU A_S 16X LO
CDU A_S 16X HI
56P09 56TB3 56J19
J5 BUFFER AMPLIFIER SCHEMATIC 1015126
J4 SERVO TWO SPEED SWITCH SCHEMATIC 1015102
FINE COARSE
J3 SERVO PREAMPLIFIER SCHEMATIC 1015150
J8 SERVO AMPLIFIER SCHEM 1015116
J11 RES & CAP MODULE SCHEMATIC 1015161
C1 C4 R5
J2 RELAY MODULE SCHEMATIC 1015108
56J19
LO 25.6 KC
HI 25.6 KC
SC A_S 1/2X ERROR
J5 BUFFER AMPLIFIER SCHEM 1015108
J3 SERVO PREAMPLIFIER SCHEMATIC 1015150
J10 SERVO AMPLIFIER SCHEM 1015116
J11 RES & CAP MODULE SCHEMATIC 1015161
C5 R3
28V 800
-28V DC
0V DC
16 15 14 13 12 11 10 9 8
H G F E D C B A

MODE	MAX OUTPUT	CDU MOTOR SPEED	OPTICS SPEED-LOS
HIGH	10.0V RMS	8400 RPM	17.1°/ SEC
MEDIUM	1.17V RMS	985 RPM	2.0°/ SEC
LO	0.117V RMS	98.5 RPM	0.2°/ SEC

CDU SLEW AND SERVO CHARACTERISTICS

1. DYNAMIC RANGE - 1200:1
2. INITIAL ACCELERATION - 585 RAD/SEC^2
3. TACHOMETER GRADIENT - 1V/1000 RPM
4. MINIMUN MOTOR SPEED WITHOUT ROUGHNESS - 7 RPM
5. OPEN LOOP AB TRANSFER FUNCTION -

$$\frac{1780(S/54+1)}{(S/0.25+1)(S/6.9+1)(S^2/270^2+2\times0.7/270\ S+1)}$$

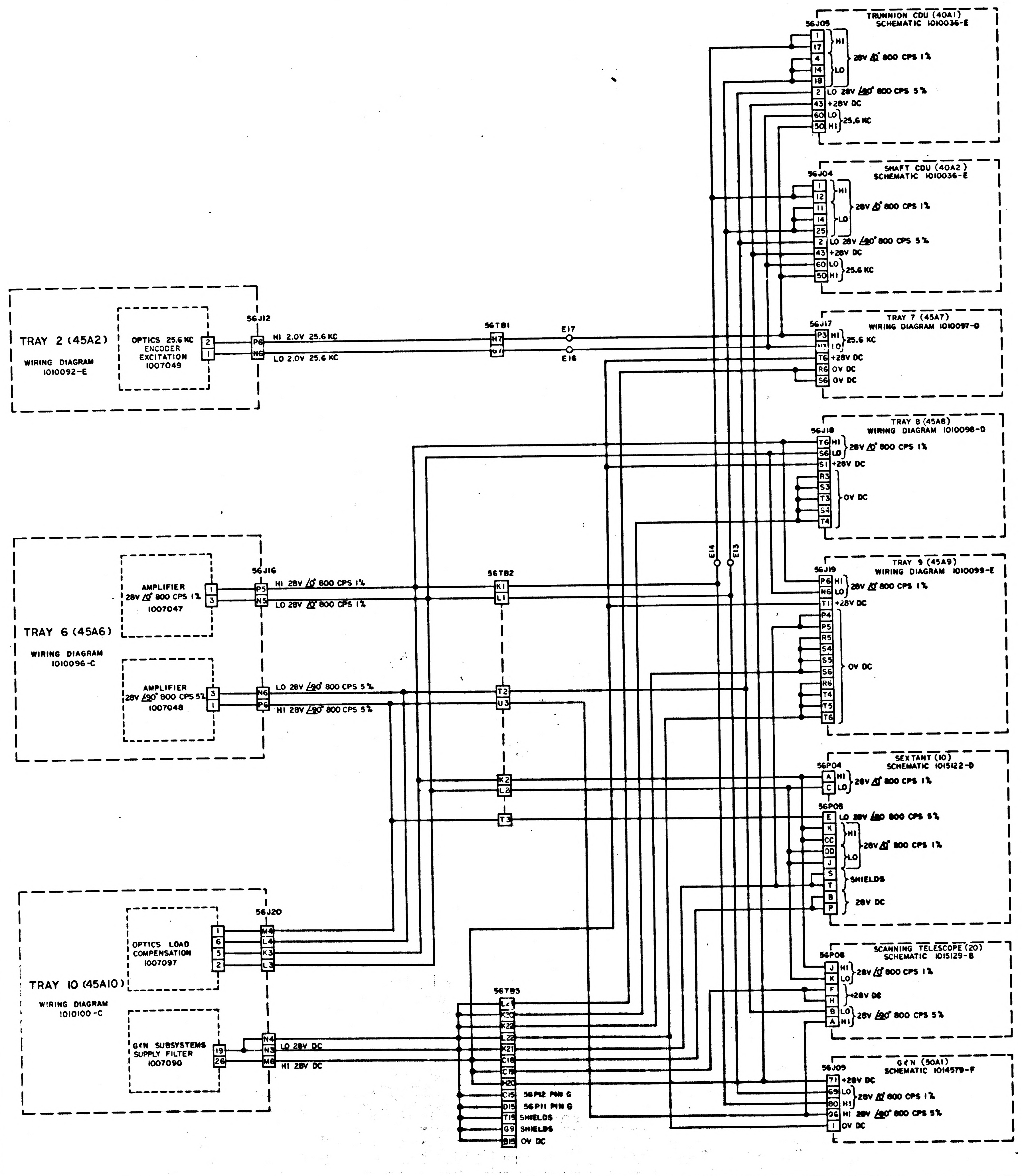
6. $$\frac{\text{MOTOR SPEED}}{\text{REFERENCE INPUT}} = \frac{840\ \text{RPM}}{\text{VOLT}}$$

* OPTICS MODE SWITCHES DOWN FOR COMPUTER OPERATE.

1010138

INCHES
PHOTOGRAPHIC SCALE ONLY

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.


TRUNNION CDU (40A1)
SCHEMATIC 1010036-E
56J05
1
17
4
14
18
2
43
60
50
HI
LO
28V ∠0° 800 CPS 1%
LO 28V ∠90° 800 CPS 5%
+28V DC
LO
HI
25.6 KC
SHAFT CDU (40A2)
SCHEMATIC 1010036-E
56J04
1
12
11
14
25
2
43
60
50
HI
LO
28V ∠0° 800 CPS 1%
LO 28V ∠90° 800 CPS 5%
+28V DC
25.6 KC
TRAY 7 (45A7)
WIRING DIAGRAM 1010097-D
56J17
P3
N3
T6
R6
S6
HI
LO
25.6 KC
+28V DC
0V DC
0V DC
TRAY 8 (45A8)
WIRING DIAGRAM 1010098-D
56J18
T6
S6
S1
R3
S3
T3
S4
T4
HI
LO
28V ∠0° 800 CPS 1%
+28V DC
0V DC
TRAY 9 (45A9)
WIRING DIAGRAM 1010099-E
56J19
P6
N6
T1
P4
P5
R5
S4
S5
S6
R6
T4
T5
T6
HI
LO
28V ∠0° 800 CPS 1%
+28V DC
0V DC
SEXTANT (10)
SCHEMATIC 1015122-D
56P04
A
C
HI
LO
28V ∠0° 800 CPS 1%
56P05
E
K
CC
DD
J
S
T
B
P
LO 28V ∠90 800 CPS 5%
HI
LO
28V ∠0° 800 CPS 1%
SHIELDS
28V DC
SCANNING TELESCOPE (20)
SCHEMATIC 1015129-B
56P08
J
K
F
H
B
A
HI
LO
28V ∠0° 800 CPS 1%
+28V DC
LO
HI
28V ∠90° 800 CPS 5%
G&N (50A1)
SCHEMATIC 1014579-F
56J09
71
69
80
96
1
+28V DC
LO
HI
28V ∠0° 800 CPS 1%
HI 28V ∠90° 800 CPS 5%
0V DC
TRAY 2 (45A2)
WIRING DIAGRAM
1010092-E
OPTICS 25.6 KC
ENCODER
EXCITATION
1007049
2
1
56J12
P6
N6
HI 2.0V 25.6 KC
LO 2.0V 25.6 KC
56TB1
H7
G7
E17
E16
E14
E13
TRAY 6 (45A6)
WIRING DIAGRAM
1010096-C
AMPLIFIER
28V ∠0° 800 CPS 1%
1007047
1
3
56J16
P5
N5
HI 28V ∠0° 800 CPS 1%
LO 28V ∠0° 800 CPS 1%
56TB2
K1
L1
AMPLIFIER
28V ∠90° 800 CPS 5%
1007048
3
1
N6
P6
LO 28V ∠90° 800 CPS 5%
HI 28V ∠90° 800 CPS 5%
T2
U3
K2
L2
T3
TRAY 10 (45A10)
WIRING DIAGRAM
1010100-C
OPTICS LOAD
COMPENSATION
1007097
1
6
5
2
56J20
M4
L4
K3
L3
G&N SUBSYSTEMS
SUPPLY FILTER
1007090
19
26
N4
N3
M6
LO 28V DC
HI 28V DC
56TB3
L21
K20
K22
L22
K21
C18
C19
H20
C15
D15
T15
G9
B15
56P12 PIN G
56P11 PIN G
SHIELDS
SHIELDS
0V DC
8
7
6
5
4
3
2
1
H
G
F
E
D
C
B
A

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AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN Kinderlich DATE 30 Jan 64
CHECKED R W Wrogowski
APPROVAL DAK
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

OPTICAL SUBSYSTEM
POWER DISTRIBUTION

CODE IDENT NO
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1010139
SCALE ~
SHEET 1 OF 1

1010139

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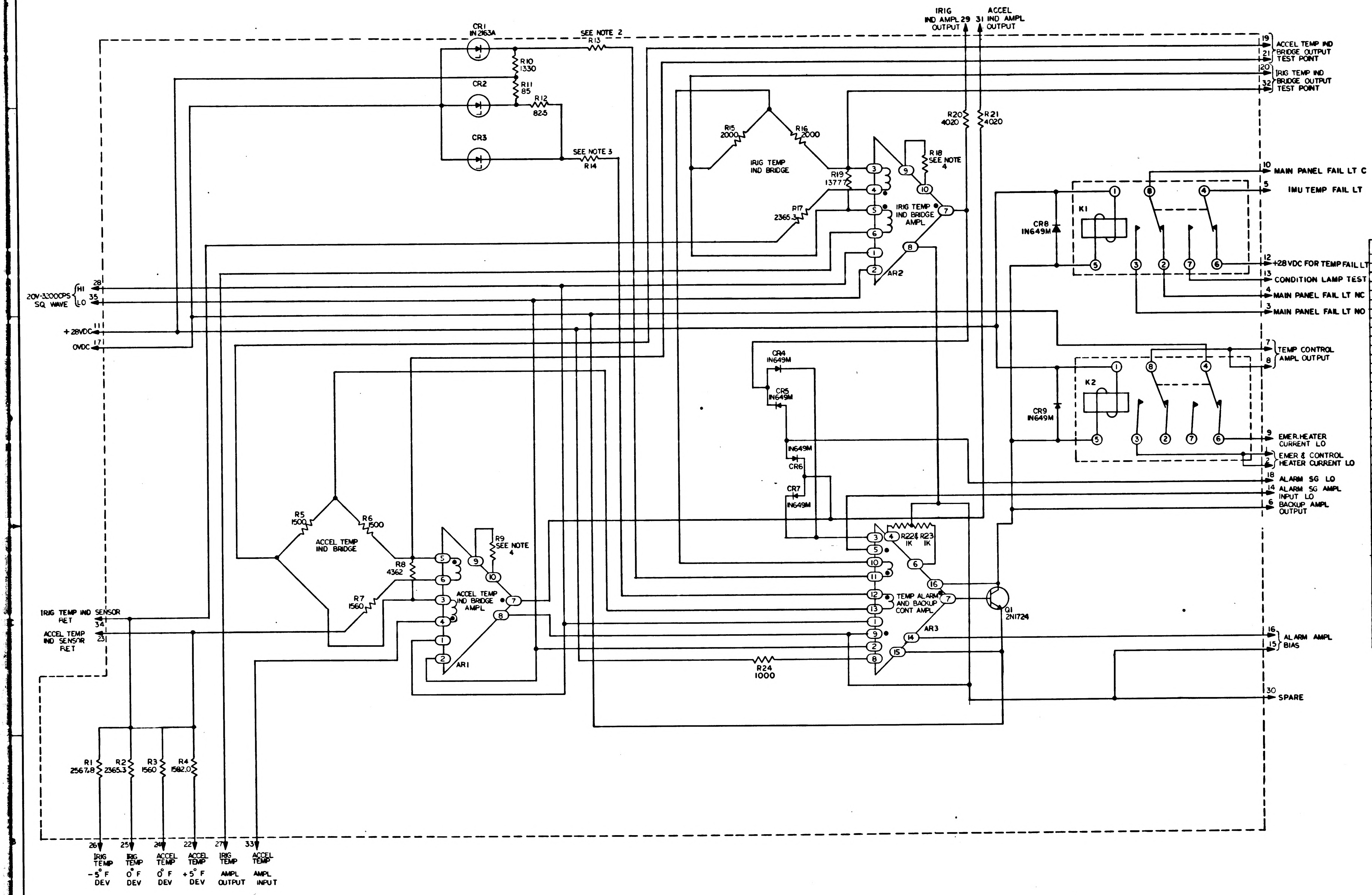
[illegible] GOVERNMENT DRAWINGS, SPECIFICATIONS OR OTHER DATA [illegible] FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY [illegible] PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT [illegible] INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER [illegible] THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR [illegible] SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA [illegible] REGARDED BY IMPLICATION OR OTHERWISE [illegible] IN ANY MANNER [illegible] HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	REVISED PER TDRR 12150	8 SEP 64	FL / CF


CR1 IN2163A
SEE NOTE 2
R13
R10 1330
R11 85
R12 82.5
CR2
CR3
SEE NOTE 3
R14
IRIG IND AMPL 29 OUTPUT
ACCEL 31 IND AMPL OUTPUT
19 21 ACCEL TEMP IND BRIDGE OUTPUT TEST POINT
20 32 IRIG TEMP IND BRIDGE OUTPUT TEST POINT
R15 2000
R16 2000
IRIG TEMP IND BRIDGE
R19 13777
R17 2365.3
R18 SEE NOTE 4
IRIG TEMP IND BRIDGE AMPL
AR2
R20 4020
R21 4020
10 MAIN PANEL FAIL LT C
5 IMU TEMP FAIL LT
K1
CR8 IN649M
12 +28VDC FOR TEMP FAIL LT
13 CONDITION LAMP TEST
1 MAIN PANEL FAIL LT NC
3 MAIN PANEL FAIL LT NO
20V-3200CPS SQ WAVE 28 HI 35 LO
+28VDC 11
0VDC 17
CR4 IN649M
CR5 IN649M
IN649M CR6
CR7 IN649M
7 8 TEMP CONTROL AMPL OUTPUT
K2
CR9 IN649M
9 EMER.HEATER CURRENT LO
4 2 EMER & CONTROL HEATER CURRENT LO
18 ALARM SG LO
14 ALARM SG AMPL INPUT LO
6 BACKUP AMPL OUTPUT
R5 1500
R6 1500
ACCEL TEMP IND BRIDGE
R8 4362
R7 1560
R9 SEE NOTE 4
ACCEL TEMP IND BRIDGE AMPL
AR1
R22 IK
R23 IK
TEMP ALARM AND BACKUP CONT AMPL
AR3
Q1 2N1724
16 15 ALARM AMPL BIAS
30 SPARE
R24 1000
IRIG TEMP IND SENSOR RET 34
ACCEL TEMP IND SENSOR RET 23
R1 2567.8
R2 2365.3
R3 1560
R4 1582.0
26 IRIG TEMP -5° F DEV
25 IRIG TEMP 0° F DEV
24 ACCEL TEMP 0° F DEV
22 ACCEL TEMP +5° F DEV
27 IRIG TEMP AMPL OUTPUT
33 ACCEL TEMP AMPL INPUT

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010450 -13	RESISTOR	2567.8	±.01%	1/8W
R2	-12		2365.3		
R3	-3		1560		
R4	-14		1582		
R5	-2		1500		
R6	-2		1500		
R7	-3		1560		
R8	-11		4362		
R9	SEE NOTE 4				1/10W
R10	1010452-167		1330	±1%	1W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	±1%	1/8W
R13	SEE NOTE 2			±1%	1/10W
R14	SEE NOTE 3			±1%	1/10W
R15	1010450 - 9		2000	±.01%	1/8W
R16	-9		2000		
R17	-12		2365.3		
R18	SEE NOTE 4				1/10W
R19	1010450 -10		13777	±.01%	1/8W
R20	1010364-368		4020	±1%	
R21	-368		4020		
R22	1010377-237		1000	±.1%	1/10W
R23	1010377-237		1000	±.1%	1/10W
R24	1010604-22		1000	± 1%	1W
CR1	1010440	DIODE	IN2163A	± 27°	3/4W
CR2	1010331-20		—	± 5%	10W
CR3	1010441-2		—	± 5%	2W
CR4	1010362 -3		IN649M		600MW
CR5					
CR6					
CR7					
CR8					
CR9					
Q1	1010273 -1	TRANSISTOR	2N1724		
K1	1010353 -1	RELAY	33WK-2		
K2	1010353 -1	RELAY	33WK-2		
AR1	1000284	AMPL			
AR2	1000284	AMPL			
AR3	1018900	AMPL			

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R13 TO BE SELECTED PER ATP 1007162 RANGE OF VALUES PER PART NO. 1010377-113 THRU-206 IN 2 OHM INCREMENTS
3. R14 TO BE SELECTED PER ATP 1007162. RANGE OF VALUES PER PART NO. 1010377-57 THRU-69 AND PART NO. 1010377-113 THRU-191
4. R9 AND R18 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO. AS MARKED ON AMPLIFIER. RANGE OF VALUES 1K THRU 30.1K PER PART NO. 1010311-126 THRU PART NO. 1010311-288
5. RESISTOR VALUES ARE IN OHMS
6. ~~CR2 1010331-20 AND CR3 1010441-2 SHALL BE SELECTED SUCH THAT CR2 ZENER VOLTAGE EXCEEDS CR3 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS PER ATP 1007162~~

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE 3/21/64
CHECKED
APPROVAL 3/24/64
APPROVAL
NASA APPROVAL 3/24/64
MIT APPROVAL 24 Jan 64

MANNED SPACECRAFT CENTER
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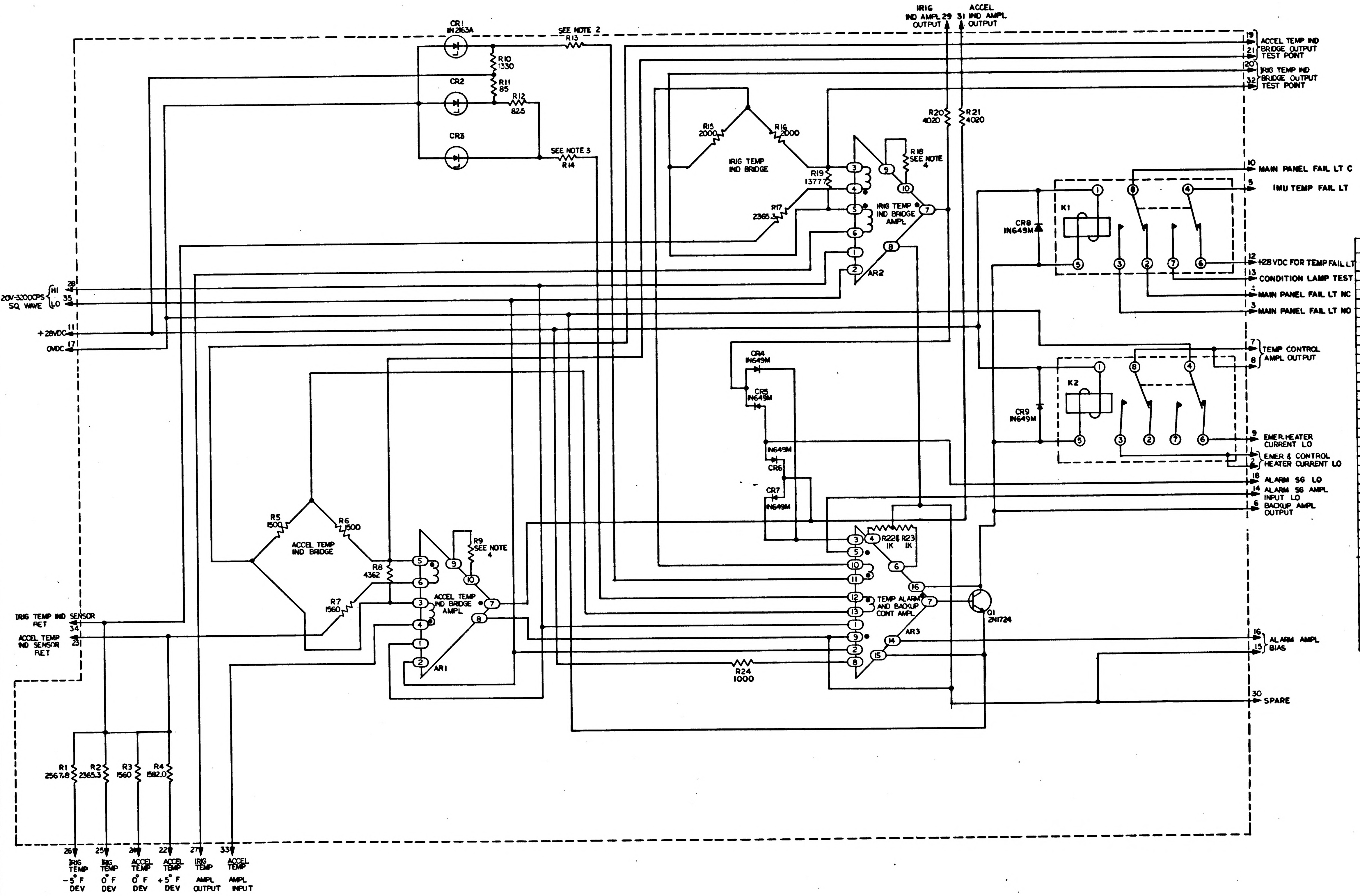
SCHEMATIC
IMU TEMP INDICATOR ALARM AND BACKUP CONTROLLER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010140
SCALE — WT SHEET 1 OF 1


CR1
IN 2163A
SEE NOTE 2
R13
R10
1330
CR2
R11
85
R12
825
CR3
SEE NOTE 3
R14
IRIG IND AMPL OUTPUT 29
31 ACCEL IND AMPL OUTPUT
19
21
ACCEL TEMP IND BRIDGE OUTPUT TEST POINT
20
32
IRIG TEMP IND BRIDGE OUTPUT TEST POINT
R15
2000
R16
2000
IRIG TEMP IND BRIDGE
R19
13777
R17
2365.3
R18
SEE NOTE 4
IRIG TEMP IND BRIDGE AMPL
AR2
R20
4020
R21
4020
10 MAIN PANEL FAIL LT C
5 IMU TEMP FAIL LT
K1
CR8
IN649M
12 +28 VDC FOR TEMP FAIL LT
13 CONDITION LAMP TEST
4 MAIN PANEL FAIL LT NC
3 MAIN PANEL FAIL LT NO
20V-3200CPS SQ WAVE
HI 28
LO 35
+28VDC 11
OVDC 17
7
8
TEMP CONTROL AMPL OUTPUT
CR4
IN649M
CR5
IN649M
K2
CR9
IN649M
9 EMER.HEATER CURRENT LO
2 EMER & CONTROL HEATER CURRENT LO
IN649M
CR6
CR7
IN649M
18 ALARM SG LO
14 ALARM SG AMPL INPUT LO
6 BACKUP AMPL OUTPUT
R5
1500
R6
1500
ACCEL TEMP IND BRIDGE
R8
4362
R7
1560
R9
SEE NOTE 4
ACCEL TEMP IND BRIDGE AMPL
AR1
R22
R23
1K
1K
TEMP ALARM AND BACKUP CONT AMPL
AR3
Q1
2N1724
R24
1000
16
15
ALARM AMPL BIAS
30 SPARE
IRIG TEMP IND SENSOR RET 34
ACCEL TEMP IND SENSOR RET 23
R1
2567.8
R2
2365.3
R3
1560
R4
1582.0
26 IRIG TEMP -5° F DEV
25 IRIG TEMP 0° F DEV
24 ACCEL TEMP 0° F DEV
22 ACCEL TEMP +5° F DEV
27 IRIG TEMP AMPL OUTPUT
33 ACCEL TEMP AMPL INPUT

REF DES	PART NO	DESCRIPTION	VALUE	TOL	RATING
R1	1010450 -13	RESISTOR	2567.8	±.01%	1/8W
R2	-12		2365.3		
R3	-3		1560		
R4	-14		1582		
R5	-2		1500		
R6	-2		1500		
R7	-3		1560		
R8	-11		4362		
R9	SEE NOTE 4				1/10W
R10	1010452-167		1330	±1%	1W
R11	1010361-112		85	3%	5W
R12	1010364-44		82.5	±1%	1/8W
R13	SEE NOTE 2			±1%	1/10W
R14	SEE NOTE 3			±1%	1/10W
R15	1010450 - 9		2000	±.01%	1/8W
R16	-9		2000		
R17	-12		2365.3		
R18	SEE NOTE 4				1/10W
R19	1010450 -10		13777	±.01%	1/8W
R20	1010364-368		4020	±1%	
R21	-368		4020		
R22	1010377-237		1000	±1%	1/10W
R23	1010377-237		1000	±1%	1/10W
R24	1010604-22		1000	± 1%	1W
CR1	1010440	DIODE	IN2163A	± 27°	3/4W
CR2	SEE NOTE 6			± 5%	10W
CR3	SEE NOTE 6			± 5%	2W
CR4	1010362 -3		IN649M		600 MW
CR5					
CR6					
CR7					
CR8					
CR9					
Q1	1010273 -1	TRANSISTOR	2N1724		
K1	1010353 -1	RELAY	33WK-2		
K2	1010353 -1	RELAY	33WK-2		
AR1	1000284	AMPL			
AR2	1000294	AMPL			
AR3	1018900	AMPL			

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. R13 TO BE SELECTED PER ATP 1007162 RANGE OF VALUES PER PART NO. 1010377-113 THRU-206 IN 2 OHM INCREMENTS
3. R14 TO BE SELECTED PER ATP 1007056. RANGE OF VALUES PER PART NO. 1010377-57 THRU-69 AND PART NO. 1010377-113 THRU-191
4. R9 AND R18 TO BE SELECTED AT ASSEMBLY, PART NO. AND DASH NO. AS MARKED ON AMPLIFIER. RANGE OF VALUES 1K THRU 30.1K PER PART NO. 1010311-126 THRU PART NO. 1010311-268
5. RESISTOR VALUES ARE IN OHMS
6. CR2 1010331-20 AND CR3 1010441-2 SHALL BE SELECTED SUCH THAT CR2 ZENER VOLTAGE EXCEEDS CR3 ZENER VOLTAGE BY AT LEAST 1.6 VOLTS PER ATP 1007162

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

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FINAL FINISH -//-

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CAMBRIDGE, MASS
DWG. NO. CONTRACT
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL 3/24/64
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

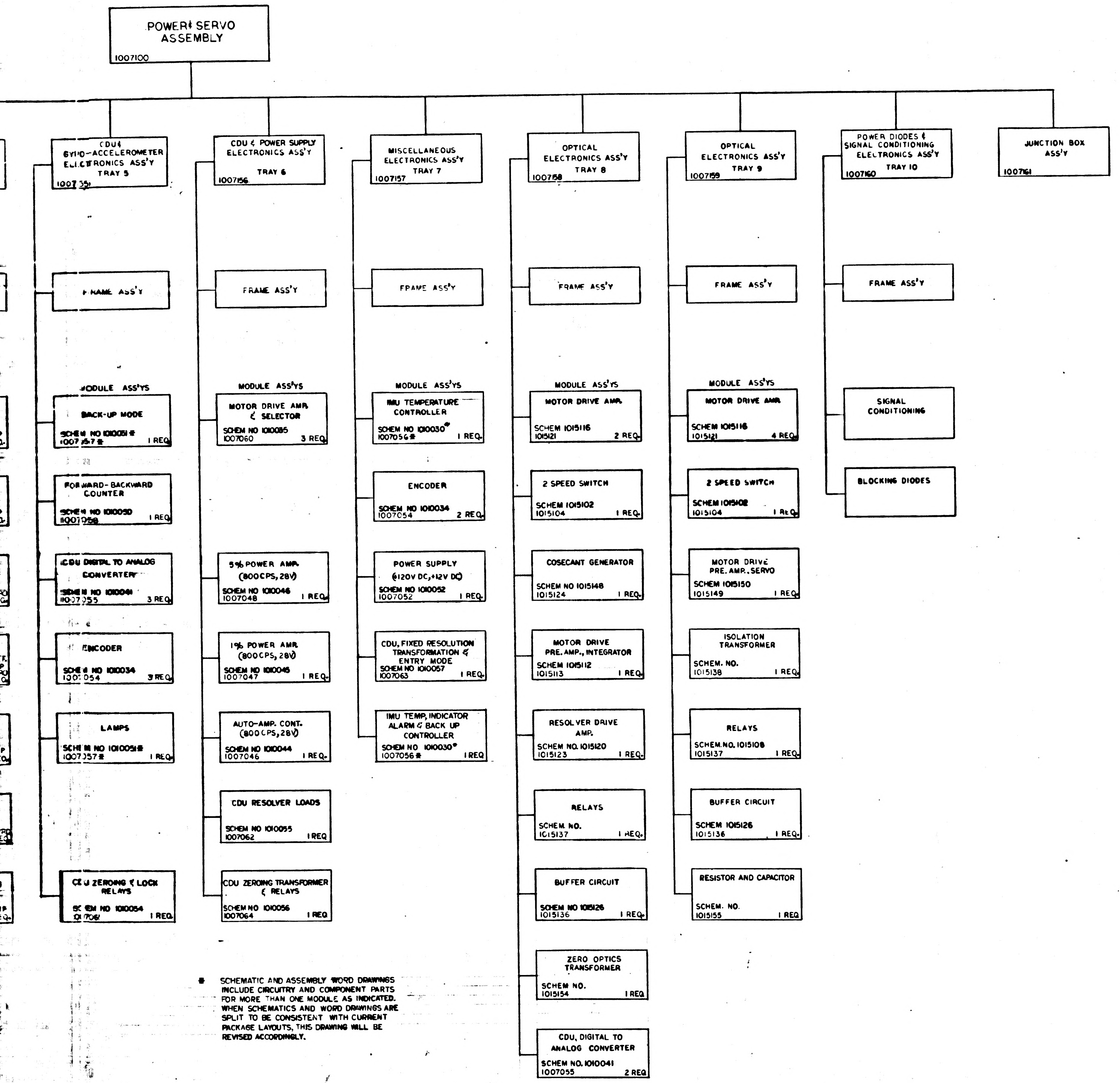
SCHEMATIC
IMU TEMP INDICATOR ALARM
AND BACKUP CONTROLLER

CODE IDENT NO. SIZE E NASA DRAWING NO. 1010140
SCALE -//- WT SHEET 1 OF 1

1010140

1010150

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			



POWER & SERVO ASSEMBLY 1007100
CDU & GYRO-ACCELEROMETER ELECTRONICS ASS'Y TRAY 5 1007155
FRAME ASS'Y
MODULE ASS'YS
BACK-UP MODE SCHEM NO 1010051 # 1007057 # 1 REQ
FORWARD-BACKWARD COUNTER SCHEM NO 1010050 1007058 1 REQ
CDU DIGITAL TO ANALOG CONVERTER SCHEM NO 1010041 1007055 3 REQ
ENCODER SCHEM NO 1010034 1007054 3 REQ
LAMPS SCHEM NO 1010051 # 1007057 # 1 REQ
CDU ZEROING & LOCK RELAYS SCHEM NO 1010054 1007061 1 REQ
CDU & POWER SUPPLY ELECTRONICS ASS'Y TRAY 6 1007156
FRAME ASS'Y
MODULE ASS'YS
MOTOR DRIVE AMP. & SELECTOR SCHEM NO 1010085 1007060 3 REQ
5% POWER AMP. (800CPS, 28V) SCHEM NO 1010046 1007048 1 REQ
1% POWER AMP. (800CPS, 28V) SCHEM NO 1010045 1007047 1 REQ
AUTO-AMP. CONT. (800CPS, 28V) SCHEM NO 1010044 1007046 1 REQ
CDU RESOLVER LOADS SCHEM NO 1010055 1007062 1 REQ
CDU ZEROING TRANSFORMER & RELAYS SCHEM NO 1010056 1007064 1 REQ
MISCELLANEOUS ELECTRONICS ASS'Y TRAY 7 1007157
FRAME ASS'Y
MODULE ASS'YS
IMU TEMPERATURE CONTROLLER SCHEM NO 1010030* 1007056 # 1 REQ
ENCODER SCHEM NO 1010034 1007054 2 REQ
POWER SUPPLY (120V DC, +12V DC) SCHEM NO 1010052 1007052 1 REQ
CDU, FIXED RESOLUTION TRANSFORMATION & ENTRY MODE SCHEM NO 1010057 1007063 1 REQ
IMU TEMP. INDICATOR ALARM & BACK UP CONTROLLER SCHEM NO 1010030* 1007056 # 1 REQ
OPTICAL ELECTRONICS ASS'Y TRAY 8 1007158
FRAME ASS'Y
MODULE ASS'YS
MOTOR DRIVE AMP. SCHEM 1015116 1015121 2 REQ
2 SPEED SWITCH SCHEM 1015102 1015104 1 REQ
COSECANT GENERATOR SCHEM NO 1015148 1015124 1 REQ
MOTOR DRIVE PRE. AMP., INTEGRATOR SCHEM 1015112 1015113 1 REQ
RESOLVER DRIVE AMP. SCHEM NO. 1015120 1015123 1 REQ
RELAYS SCHEM. NO. 1015137 1 REQ
BUFFER CIRCUIT SCHEM NO 1015126 1015136 1 REQ
ZERO OPTICS TRANSFORMER SCHEM NO. 1015154 1 REQ
CDU, DIGITAL TO ANALOG CONVERTER SCHEM NO. 1010041 1007055 2 REQ
OPTICAL ELECTRONICS ASS'Y TRAY 9 1007159
FRAME ASS'Y
MODULE ASS'YS
MOTOR DRIVE AMP. SCHEM 1015116 1015121 4 REQ
2 SPEED SWITCH SCHEM 1015102 1015104 1 REQ
MOTOR DRIVE PRE. AMP., SERVO SCHEM 1015150 1015149 1 REQ
ISOLATION TRANSFORMER SCHEM. NO. 1015138 1 REQ
RELAYS SCHEM. NO. 1015108 1015137 1 REQ
BUFFER CIRCUIT SCHEM 1015126 1015136 1 REQ
RESISTOR AND CAPACITOR SCHEM. NO. 1015155 1 REQ
POWER DIODES & SIGNAL CONDITIONING ELECTRONICS ASS'Y TRAY 10 1007160
FRAME ASS'Y
SIGNAL CONDITIONING
BLOCKING DIODES
JUNCTION BOX ASS'Y 1007161

# SCHEMATIC AND ASSEMBLY WORD DRAWINGS INCLUDE CIRCUITRY AND COMPONENT PARTS FOR MORE THAN ONE MODULE AS INDICATED. WHEN SCHEMATICS AND WORD DRAWINGS ARE SPLIT TO BE CONSISTENT WITH CURRENT PACKAGE LAYOUTS, THIS DRAWING WILL BE REVISED ACCORDINGLY.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 01401 DATE 5-29-63

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LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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TOLERANCES ON
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DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB CAMBRIDGE MASS.
106907
DRAWN J.E. Welch DATE 5/29/63
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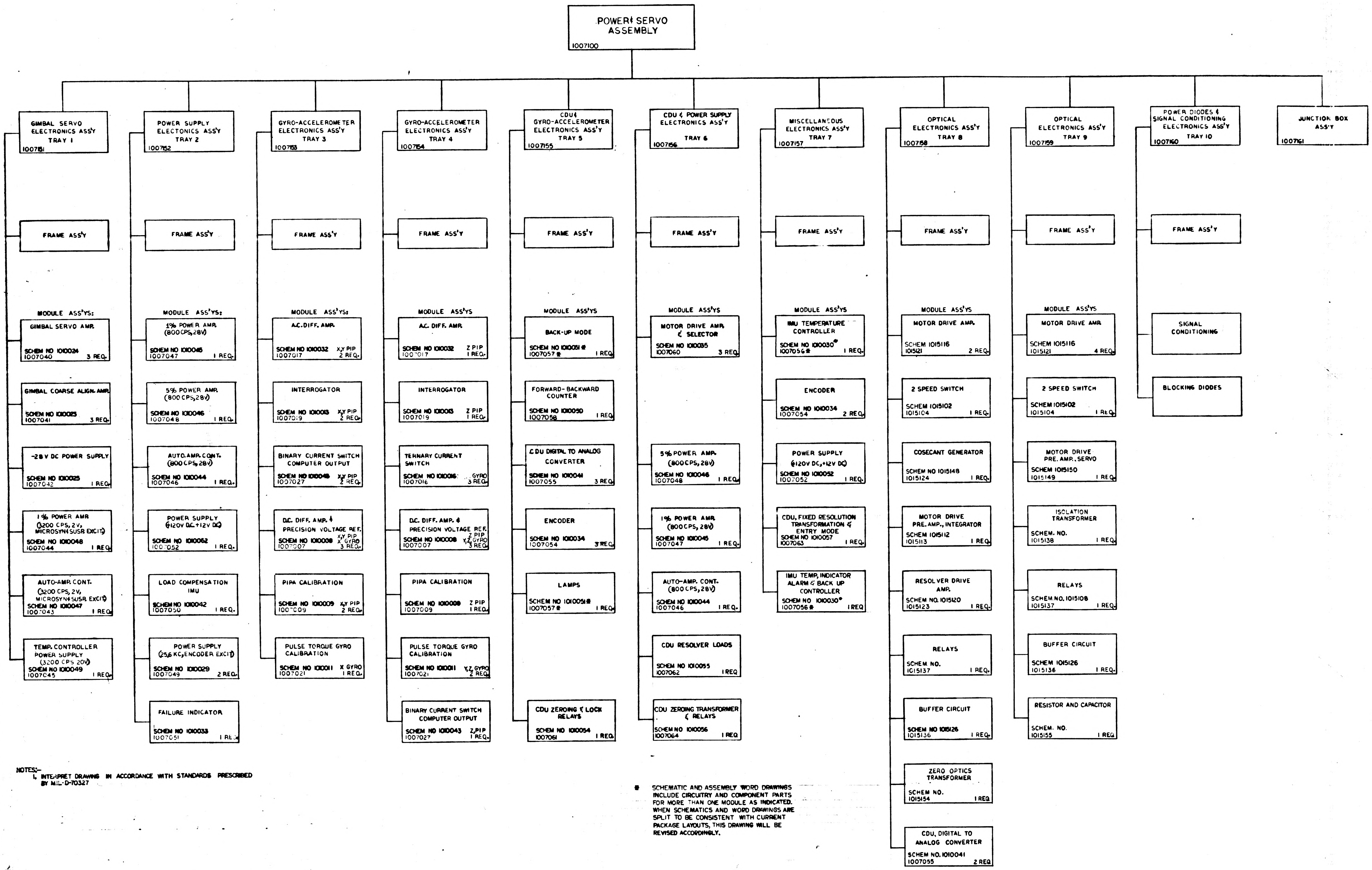
APPROVAL 5/29/63
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

POWER & SERVO ASS'Y
FAMILY TREE
(TO MODULE LEVEL)

CODE IDENT NO. — SIZE J NASA DRAWING NO. 1010150
SCALE — WT SHEET OF

INCHES
PHOTOGRAPHIC SCALE ONLY


POWER & SERVO ASSEMBLY
1007100
GIMBAL SERVO ELECTRONICS ASS'Y TRAY 1
1007151
FRAME ASS'Y
MODULE ASS'YS:
GIMBAL SERVO AMP.
SCHEM NO 1010024
1007040 3 REQ.
GIMBAL COARSE ALIGN. AMP.
SCHEM NO 1010023
1007041 3 REQ.
-28 V DC POWER SUPPLY
SCHEM NO 1010025
1007042 1 REQ.
1% POWER AMP. (3200 CPS, 2V, MICROSYN & SUSP. EXCIT.)
SCHEM NO 1010048
1007044 1 REQ.
AUTO-AMP. CONT. (3200 CPS, 2V, MICROSYN & SUSP. EXCIT.)
SCHEM NO 1010047
1007043 1 REQ.
TEMP. CONTROLLER POWER SUPPLY (3200 CPS 20V)
SCHEM NO 1010049
1007045 1 REQ.
POWER SUPPLY ELECTONICS ASS'Y TRAY 2
1007152
FRAME ASS'Y
MODULE ASS'YS:
1% POWER AMP. (800 CPS, 28V)
SCHEM NO 1010045
1007047 1 REQ.
5% POWER AMP. (800 CPS, 28V)
SCHEM NO 1010046
1007048 1 REQ.
AUTO. AMP. CONT. (800 CPS, 28V)
SCHEM NO 1010044
1007046 1 REQ.
POWER SUPPLY (+120V DC +12V DC)
SCHEM NO 1010062
1007052 1 REQ.
LOAD COMPENSATION IMU
SCHEM NO 1010042
1007050 1 REQ.
POWER SUPPLY (25.6 KC, ENCODER EXCIT.)
SCHEM NO 1010029
1007049 2 REQ.
FAILURE INDICATOR
SCHEM NO 1010033
1007051 1 REQ.
GYRO-ACCELEROMETER ELECTRONICS ASS'Y TRAY 3
1007153
FRAME ASS'Y
MODULE ASS'YS:
A.C. DIFF. AMP.
SCHEM NO 1010032 X,Y PIP
1007017 2 REQ.
INTERROGATOR
SCHEM NO 1010013 X,Y PIP
1007019 2 REQ.
BINARY CURRENT SWITCH COMPUTER OUTPUT
SCHEM NO 1010043 X,Y PIP
1007027 2 REQ.
D.C. DIFF. AMP. & PRECISION VOLTAGE REF.
SCHEM NO 1010008 X,Y PIP X GYRO
1007007 3 REQ.
PIPA CALIBRATION
SCHEM NO 1010009 X,Y PIP
1007009 2 REQ.
PULSE TORQUE GYRO CALIBRATION
SCHEM NO 1010011 X GYRO
1007021 1 REQ.
GYRO-ACCELEROMETER ELECTRONICS ASS'Y TRAY 4
1007154
FRAME ASS'Y
MODULE ASS'YS
A.C. DIFF. AMP.
SCHEM NO 1010032 Z PIP
1007017 1 REQ.
INTERROGATOR
SCHEM NO 1010013 Z PIP
1007019 1 REQ.
TERNARY CURRENT SWITCH
SCHEM NO 1010016 GYRO
1007016 3 REQ.
D.C. DIFF. AMP. & PRECISION VOLTAGE REF.
SCHEM NO 1010008 Z PIP Y,Z GYRO
1007007 3 REQ.
PIPA CALIBRATION
SCHEM NO 1010009 Z PIP
1007009 1 REQ.
PULSE TORQUE GYRO CALIBRATION
SCHEM NO 1010011 Y,Z GYRO
1007021 2 REQ.
BINARY CURRENT SWITCH COMPUTER OUTPUT
SCHEM NO 1010043 Z PIP
1007027 1 REQ.
CDU & GYRO-ACCELEROMETER ELECTRONICS ASS'Y TRAY 5
1007155
FRAME ASS'Y
MODULE ASS'YS
BACK-UP MODE
SCHEM NO 1010051 #
1007057 # 1 REQ.
FORWARD-BACKWARD COUNTER
SCHEM NO 1010050
1007058 1 REQ.
CDU DIGITAL TO ANALOG CONVERTER
SCHEM NO 1010041
1007055 3 REQ.
ENCODER
SCHEM NO 1010034
1007054 3 REQ.
LAMPS
SCHEM NO 1010051 #
1007057 # 1 REQ.
CDU ZEROING & LOCK RELAYS
SCHEM NO 1010054
1007061 1 REQ.
CDU & POWER SUPPLY ELECTRONICS ASS'Y TRAY 6
1007156
FRAME ASS'Y
MODULE ASS'YS
MOTOR DRIVE AMP. & SELECTOR
SCHEM NO 1010035
1007060 3 REQ.
5% POWER AMP. (800 CPS, 28V)
SCHEM NO 1010046
1007048 1 REQ.
1% POWER AMP. (800 CPS, 28V)
SCHEM NO 1010045
1007047 1 REQ.
AUTO-AMP. CONT. (800 CPS, 28V)
SCHEM NO 1010044
1007046 1 REQ.
CDU RESOLVER LOADS
SCHEM NO 1010055
1007062 1 REQ
CDU ZEROING TRANSFORMER & RELAYS
SCHEM NO 1010056
1007064 1 REQ
MISCELLANEOUS ELECTRONICS ASS'Y TRAY 7
1007157
FRAME ASS'Y
MODULE ASS'YS
IMU TEMPERATURE CONTROLLER
SCHEM NO 1010030 #
1007056 # 1 REQ.
ENCODER
SCHEM NO 1010034
1007054 2 REQ.
POWER SUPPLY (+120V DC, +12V DC)
SCHEM NO 1010052
1007052 1 REQ.
CDU, FIXED RESOLUTION TRANSFORMATION & ENTRY MODE
SCHEM NO 1010057
1007063 1 REQ.
IMU TEMP. INDICATOR ALARM & BACK UP CONTROLLER
SCHEM NO 1010030 #
1007056 # 1 REQ
OPTICAL ELECTRONICS ASS'Y TRAY 8
1007158
FRAME ASS'Y
MODULE ASS'YS
MOTOR DRIVE AMP.
SCHEM 1015116
1015121 2 REQ.
2 SPEED SWITCH
SCHEM 1015102
1015104 1 REQ.
COSECANT GENERATOR
SCHEM NO 1015148
1015124 1 REQ.
MOTOR DRIVE PRE. AMP., INTEGRATOR
SCHEM 1015112
1015113 1 REQ.
RESOLVER DRIVE AMP.
SCHEM NO. 1015120
1015123 1 REQ.
RELAYS
SCHEM. NO.
1015137 1 REQ.
BUFFER CIRCUIT
SCHEM NO 1015126
1015136 1 REQ.
ZERO OPTICS TRANSFORMER
SCHEM. NO.
1015154 1 REQ
CDU, DIGITAL TO ANALOG CONVERTER
SCHEM NO. 1010041
1007055 2 REQ
OPTICAL ELECTRONICS ASS'Y TRAY 9
1007159
FRAME ASS'Y
MODULE ASS'YS
MOTOR DRIVE AMP.
SCHEM 1015116
1015121 4 REQ.
2 SPEED SWITCH
SCHEM 1015102
1015104 1 REQ.
MOTOR DRIVE PRE. AMP., SERVO
SCHEM 1015150
1015149 1 REQ.
ISOLATION TRANSFORMER
SCHEM. NO.
1015138 1 REQ.
RELAYS
SCHEM. NO. 1015108
1015137 1 REQ.
BUFFER CIRCUIT
SCHEM 1015126
1015136 1 REQ.
RESISTOR AND CAPACITOR
SCHEM. NO.
1015155 1 REQ
POWER DIODES & SIGNAL CONDITIONING ELECTRONICS ASS'Y TRAY 10
1007160
FRAME ASS'Y
SIGNAL CONDITIONING
BLOCKING DIODES
JUNCTION BOX ASS'Y
1007161

NOTES:-
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

SCHEMATIC AND ASSEMBLY WORD DRAWINGS INCLUDE CIRCUITRY AND COMPONENT PARTS FOR MORE THAN ONE MODULE AS INDICATED. WHEN SCHEMATICS AND WORD DRAWINGS ARE SPLIT TO BE CONSISTENT WITH CURRENT PACKAGE LAYOUTS, THIS DRAWING WILL BE REVISED ACCORDINGLY.

INCHES
PHOTOGRAPHIC SCALE ONLY

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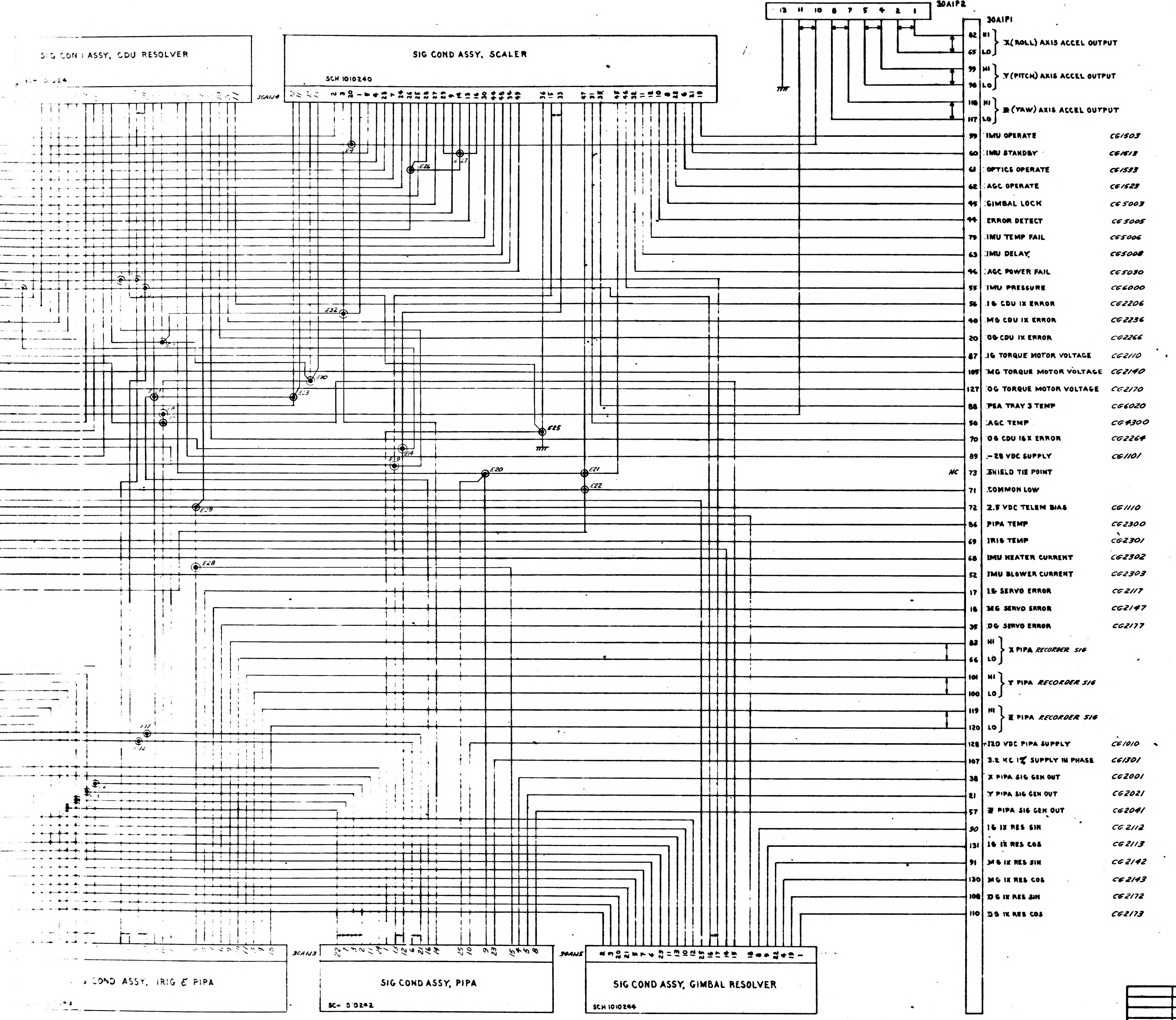
SIG COND ASSY, CDU RESOLVER
SIG COND ASSY, SCALER
SCH 1010240
30A1J4
30A1P2
13 11 10 8 7 5 4 2 1
30A1P1
82 HI
65 LO
X (ROLL) AXIS ACCEL OUTPUT
99 HI
98 LO
Y (PITCH) AXIS ACCEL OUTPUT
118 HI
117 LO
Z (YAW) AXIS ACCEL OUTPUT
59 IMU OPERATE CG1503
60 IMU STANDBY CG1513
61 OPTICS OPERATE CG1533
62 AGC OPERATE CG1523
45 GIMBAL LOCK CG5003
44 ERROR DETECT CG5005
79 IMU TEMP FAIL CG5006
63 IMU DELAY CG5008
46 AGC POWER FAIL CG5030
55 IMU PRESSURE CG6000
56 IG CDU 1X ERROR CG2206
40 MG CDU 1X ERROR CG2236
20 OG CDU 1X ERROR CG2266
87 IG TORQUE MOTOR VOLTAGE CG2110
105 MG TORQUE MOTOR VOLTAGE CG2140
127 OG TORQUE MOTOR VOLTAGE CG2170
88 PSA TRAY 3 TEMP CG6020
50 AGC TEMP CG4300
70 OG CDU 16X ERROR CG2264
89 -28 VDC SUPPLY CG1101
NC
73 SHIELD TIE POINT
71 COMMON LOW
72 2.5 VDC TELEM BIAS CG1110
86 PIPA TEMP CG2300
69 IRIG TEMP CG2301
68 IMU HEATER CURRENT CG2302
52 IMU BLOWER CURRENT CG2303
17 IG SERVO ERROR CG2117
18 MG SERVO ERROR CG2147
35 OG SERVO ERROR CG2177
83 HI
66 LO
X PIPA RECORDER SIG
101 HI
100 LO
Y PIPA RECORDER SIG
119 HI
120 LO
Z PIPA RECORDER SIG
128 +120 VDC PIPA SUPPLY CG1010
107 3.2 KC 1% SUPPLY IN PHASE CG1301
38 X PIPA SIG GEN OUT CG2001
21 Y PIPA SIG GEN OUT CG2021
57 Z PIPA SIG GEN OUT CG2041
90 IG 1X RES SIN CG2112
131 IG 1X RES COS CG2113
91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2143
108 OG 1X RES SIN CG2172
110 OG 1X RES COS CG2173
E4
E26
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E30
E23
E25
E24
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E20
E21
E22
E29
E28
E11
E12
30A1J3
30A1J5
SIG COND ASSY, IRIG & PIPA
SIG COND ASSY, PIPA
SCH 1010242
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL

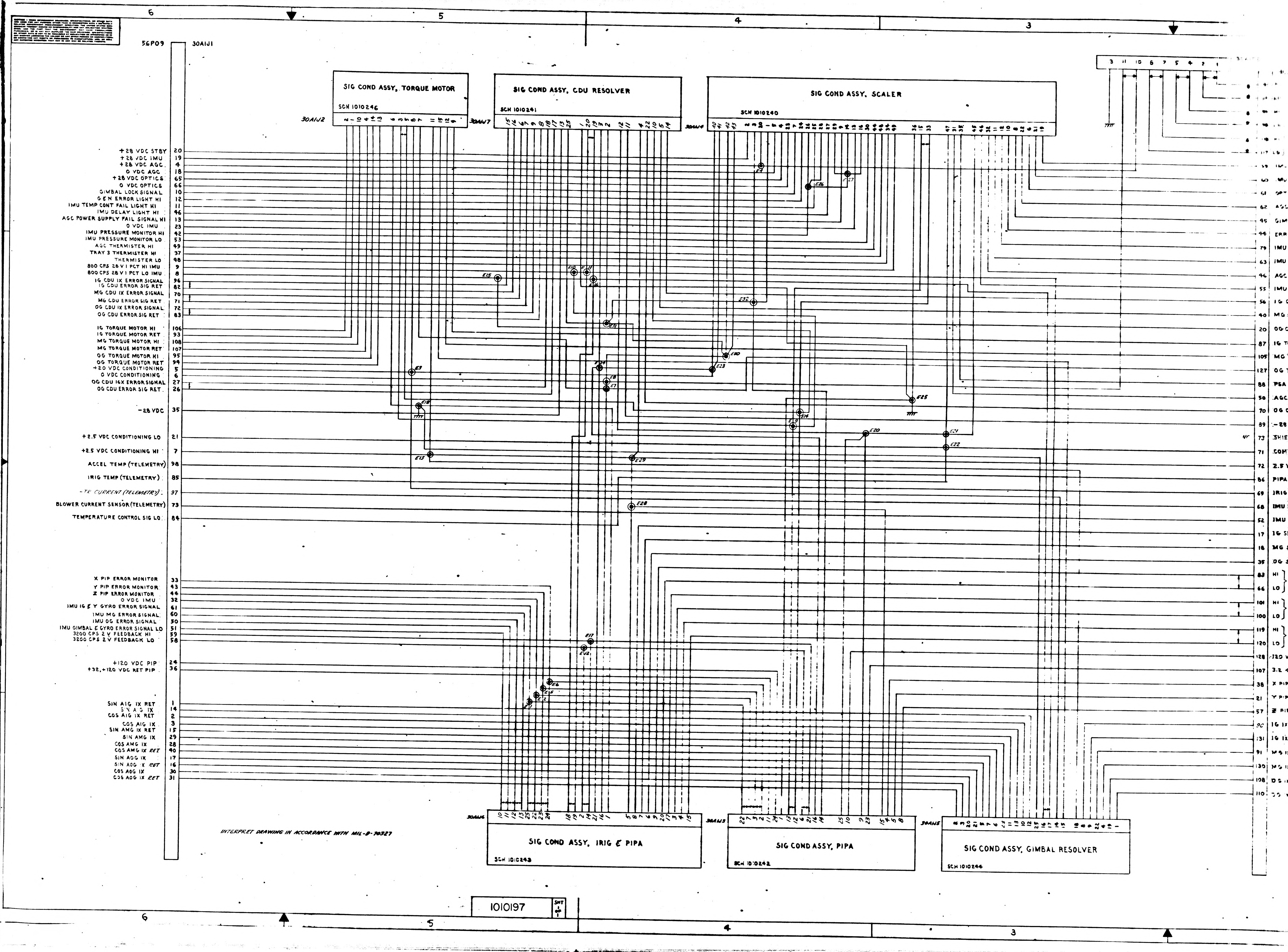
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN P. DUNCAN 9-1-65
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
SIG COND ASSY.
SYSTEM 017

CODE IDENT NO.
SIZE J
DRAWING NO. 1010 97
SCALE —
SHEET 1 OF 1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4
3
56P09
30A1J1
SIG COND ASSY, TORQUE MOTOR
SCH 1010246
30A1J2
SIG COND ASSY, CDU RESOLVER
SCH 1010241
30A1J7
SIG COND ASSY, SCALER
SCH 1010240
30A1J4
+28 VDC STBY 20
+28 VDC IMU 19
+28 VDC AGC 4
0 VDC AGC 18
+28 VDC OPTICS 65
0 VDC OPTICS 66
GIMBAL LOCK SIGNAL 10
GEN ERROR LIGHT HI 12
IMU TEMP CONT FAIL LIGHT HI 11
IMU DELAY LIGHT HI 46
AGC POWER SUPPLY FAIL SIGNAL HI 13
0 VDC IMU 23
IMU PRESSURE MONITOR HI 42
IMU PRESSURE MONITOR LO 53
AGC THERMISTER HI 49
TRAY 3 THERMISTER HI 37
THERMISTER LO 98
800 CPS 28 V 1 PCT HI IMU 9
800 CPS 28 V 1 PCT LO IMU 8
IG CDU IX ERROR SIGNAL 96
IG CDU ERROR SIG RET 82
MG CDU IX ERROR SIGNAL 70
MG CDU ERROR SIG RET 71
OG CDU IX ERROR SIGNAL 72
OG CDU ERROR SIG RET 83
IG TORQUE MOTOR HI 106
IG TORQUE MOTOR RET 93
MG TORQUE MOTOR HI 108
MG TORQUE MOTOR RET 107
OG TORQUE MOTOR HI 95
OG TORQUE MOTOR RET 94
+20 VDC CONDITIONING 5
0 VDC CONDITIONING 6
OG CDU 16X ERROR SIGNAL 27
OG CDU ERROR SIG RET 26
-28 VDC 35
+2.5 VDC CONDITIONING LO 21
+2.5 VDC CONDITIONING HI 7
ACCEL TEMP (TELEMETRY) 98
IRIG TEMP (TELEMETRY) 85
-TR CURRENT (TELEMETRY) 97
BLOWER CURRENT SENSOR (TELEMETRY) 73
TEMPERATURE CONTROL SIG LO 84
X PIP ERROR MONITOR 33
Y PIP ERROR MONITOR 43
Z PIP ERROR MONITOR 44
0 VDC IMU 32
IMU IG & Y GYRO ERROR SIGNAL 61
IMU MG ERROR SIGNAL 60
IMU OG ERROR SIGNAL 50
IMU GIMBAL & GYRO ERROR SIGNAL LO 51
3200 CPS 2 V FEEDBACK HI 59
3200 CPS 2 V FEEDBACK LO 58
+120 VDC PIP 24
+32, +120 VDC RET PIP 36
SIN AIG IX RET 1
SIN AIG IX 14
COS AIG IX RET 2
COS AIG IX 3
SIN AMG IX RET 15
SIN AMG IX 29
COS AMG IX 28
COS AMG IX RET 40
SIN AOG IX 17
SIN AOG IX RET 16
COS AOG IX 30
COS AOG IX RET 31
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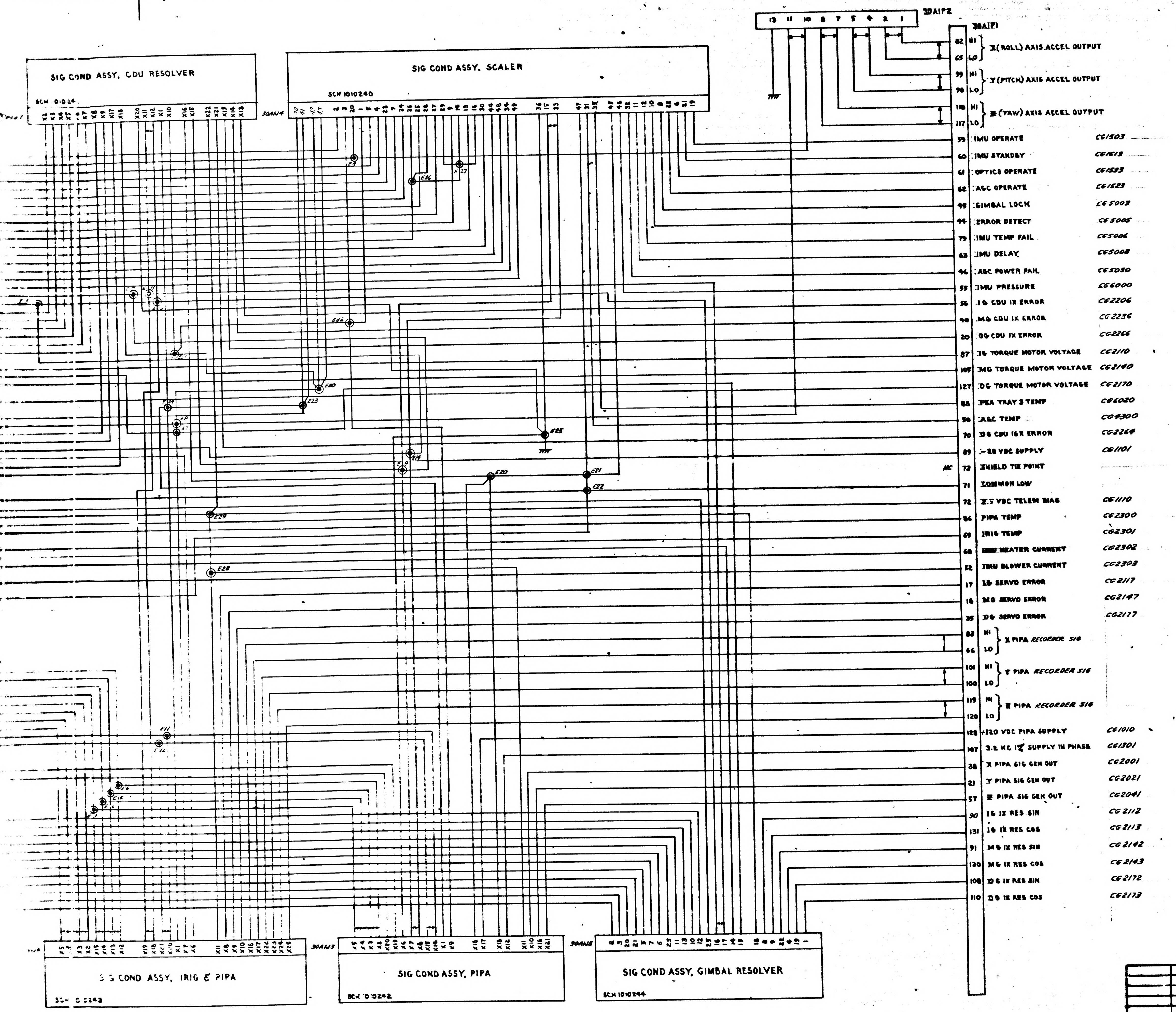
E29
E30
E31
E32
30A1J6
SIG COND ASSY, IRIG & PIPA
SCH 1010243
30A1J3
SIG COND ASSY, PIPA
SCH 1010242
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244
INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
59
60
61
62 AGC
45 GIM
44 ERR
79 IMU
63 IMU
46 AGC
55 IMU
56 IG
40 MG
20 OG
87 IG
105 MG
127 OG
88 PSA
50 AGC
70 OG
89 -28
NC 73 SHIE
71 COM
72 2.5
86 PIPA
69 IRIG
68 IMU
52 IMU
17 IG S
18 MG
35 OG
83 HI
66 LO
101 HI
100 LO
119 HI
120 LO
128 -120 V
107 3.2
38 X PIP
21 Y PIP
57 Z PI
90 IG IX
131 IG IX
91 MG
130 MG
108 OG
110 OG
1010197
SHT 1 OF 1


30A1P2
30A1P1
SIG COND ASSY, CDU RESOLVER
SCH 1010241
SIG COND ASSY, SCALER
SCH 1010240
30A1J4
82 HI
65 LO
X (ROLL) AXIS ACCEL OUTPUT
99 HI
98 LO
Y (PITCH) AXIS ACCEL OUTPUT
118 HI
117 LO
Z (YAW) AXIS ACCEL OUTPUT
59 IMU OPERATE CG1503
60 IMU STANDBY CG1513
61 OPTICS OPERATE CG1533
62 AGC OPERATE CG1523
45 GIMBAL LOCK CG5003
44 ERROR DETECT CG5005
79 IMU TEMP FAIL CG5006
63 IMU DELAY CG5008
46 AGC POWER FAIL CG5030
55 IMU PRESSURE CG6000
56 IG CDU 1X ERROR CG2206
40 MG CDU 1X ERROR CG2236
20 OG CDU 1X ERROR CG2266
87 IG TORQUE MOTOR VOLTAGE CG2110
105 MG TORQUE MOTOR VOLTAGE CG2140
127 OG TORQUE MOTOR VOLTAGE CG2170
88 PSA TRAY 3 TEMP CG6020
50 AGC TEMP CG4300
70 OG CDU 16X ERROR CG2264
89 -28 VDC SUPPLY CG1101
NC
73 SHIELD TIE POINT
71 COMMON LOW
72 2.5 VDC TELEM BIAS CG1110
86 PIPA TEMP CG2300
69 IRIG TEMP CG2301
68 IMU HEATER CURRENT CG2302
52 IMU BLOWER CURRENT CG2303
17 IG SERVO ERROR CG2117
18 MG SERVO ERROR CG2147
35 OG SERVO ERROR CG2177
83 HI
66 LO
X PIPA RECORDER SIG
101 HI
100 LO
Y PIPA RECORDER SIG
119 HI
120 LO
Z PIPA RECORDER SIG
128 +120 VDC PIPA SUPPLY CG1010
107 3.2 KC 1% SUPPLY IN PHASE CG1301
38 X PIPA SIG GEN OUT CG2001
21 Y PIPA SIG GEN OUT CG2021
57 Z PIPA SIG GEN OUT CG2041
90 IG 1X RES SIN CG2112
131 IG 1X RES COS CG2113
91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2143
108 OG 1X RES SIN CG2172
110 OG 1X RES COS CG2173
E9
E26
E27
E32
E30
E23
E25
E24
E19
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E21
E22
E29
E28
E11
E16
30A1J3
SIG COND ASSY, IRIG & PIPA
SCH 1010243
SIG COND ASSY, PIPA
SCH 1010242
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244
4
3
2
1
D
C

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN P. DUNCAN 9-1-65
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
SN 77 65 812

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
SIG. COND. ASSY.
SYSTEM 017

CODE IDENT NO. | SIZE J | DRAWING NO. 1010197
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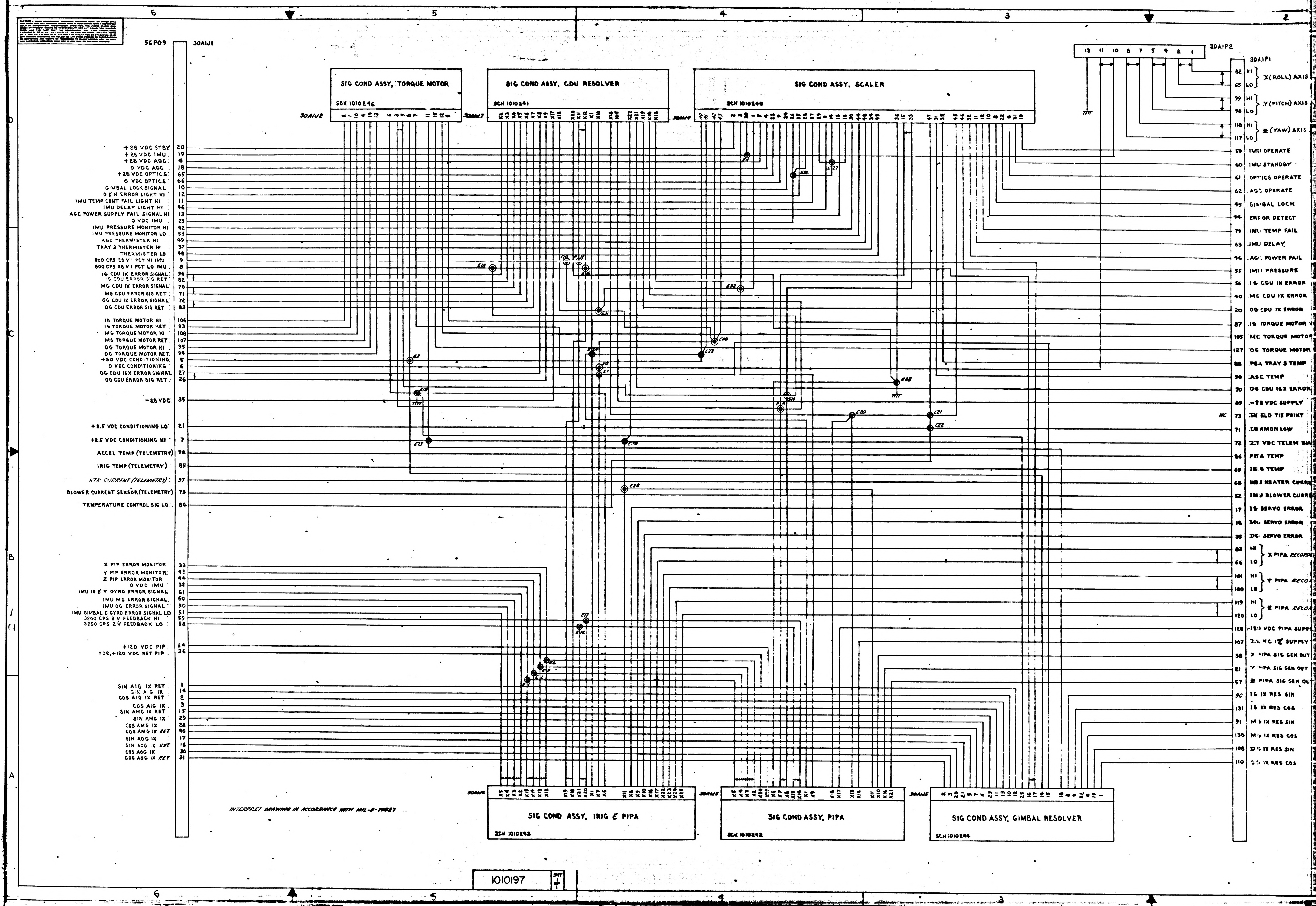
SHEET 1 OF 1

1010197 SHT 1 OF 1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30A1J1
30A1J2
30A1J7
30A1J6
30A1J5
30A1J3
30A1J4
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SCH 1010246
SIG COND ASSY, CDU RESOLVER
SCH 1010241
SIG COND ASSY, SCALER
SCH 1010240
SIG COND ASSY, IRIG & PIPA
SCH 1010243
SIG COND ASSY, PIPA
SCH 1010242
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244
30A1P2
30A1P1
+28 VDC STBY 20
+28 VDC IMU 19
+28 VDC AGC 4
0 VDC AGC 18
+28 VDC OPTICS 65
0 VDC OPTICS 66
GIMBAL LOCK SIGNAL 10
G & N ERROR LIGHT HI 12
IMU TEMP CONT FAIL LIGHT HI 11
IMU DELAY LIGHT HI 46
AGC POWER SUPPLY FAIL SIGNAL HI 13
0 VDC IMU 23
IMU PRESSURE MONITOR HI 42
IMU PRESSURE MONITOR LO 53
AGC THERMISTER HI 49
TRAY 3 THERMISTER HI 37
THERMISTER LO 48
800 CPS 28 V 1 PCT HI IMU 9
800 CPS 28 V 1 PCT LO IMU 8
IG CDU IX ERROR SIGNAL 96
IG CDU ERROR SIG RET 82
MG CDU IX ERROR SIGNAL 70
MG CDU ERROR SIG RET 71
OG CDU IX ERROR SIGNAL 72
OG CDU ERROR SIG RET 83
IG TORQUE MOTOR HI 106
IG TORQUE MOTOR RET 93
MG TORQUE MOTOR HI 108
MG TORQUE MOTOR RET 107
OG TORQUE MOTOR HI 95
OG TORQUE MOTOR RET 94
+20 VDC CONDITIONING 5
0 VDC CONDITIONING 6
OG CDU 16X ERROR SIGNAL 27
OG CDU ERROR SIG RET 26
-28 VDC 35
+2.5 VDC CONDITIONING LO 21
+2.5 VDC CONDITIONING HI 7
ACCEL TEMP (TELEMETRY) 98
IRIG TEMP (TELEMETRY) 85
HTR CURRENT (TELEMETRY) 97
BLOWER CURRENT SENSOR (TELEMETRY) 73
TEMPERATURE CONTROL SIG LO 84
X PIP ERROR MONITOR 33
Y PIP ERROR MONITOR 43
Z PIP ERROR MONITOR 44
0 VDC IMU 32
IMU IG & Y GYRO ERROR SIGNAL 61
IMU MG ERROR SIGNAL 60
IMU OG ERROR SIGNAL 50
IMU GIMBAL & GYRO ERROR SIGNAL LO 51
3200 CPS 2 V FEEDBACK HI 59
3200 CPS 2 V FEEDBACK LO 58
+120 VDC PIP 24
+32, +120 VDC RET PIP 36
SIN AIG IX RET 1
SIN AIG IX 14
COS AIG IX RET 2
COS AIG IX 3
SIN AMG IX RET 15
SIN AMG IX 29
COS AMG IX 28
COS AMG IX RET 40
SIN AOG IX 17
SIN AOG IX RET 16
COS AOG IX 30
COS AOG IX RET 31
82 HI 65 LO X (ROLL) AXIS
99 HI 98 LO Y (PITCH) AXIS
118 HI 117 LO Z (YAW) AXIS
59 IMU OPERATE
60 IMU STANDBY
61 OPTICS OPERATE
62 AGC OPERATE
45 GIMBAL LOCK
44 ERROR DETECT
79 IMU TEMP FAIL
63 IMU DELAY
46 AGC POWER FAIL
55 IMU PRESSURE
56 IG CDU IX ERROR
40 MG CDU IX ERROR
20 OG CDU IX ERROR
87 IG TORQUE MOTOR
105 MG TORQUE MOTOR
127 OG TORQUE MOTOR
88 PSA TRAY 3 TEMP
50 AGC TEMP
70 OG CDU 16X ERROR
89 -28 VDC SUPPLY
NC
73 SHIELD TIE POINT
71 COMMON LOW
72 2.5 VDC TELEM BIA
86 PIPA TEMP
69 IRIG TEMP
68 IMU HEATER CURRE
52 IMU BLOWER CURRE
17 IG SERVO ERROR
18 MG SERVO ERROR
35 OG SERVO ERROR
83 HI 66 LO X PIPA RECORD
101 HI 100 LO Y PIPA RECO
119 HI 120 LO Z PIPA RECO
128 +120 VDC PIPA SUPP
107 3.2 KC 1% SUPPLY
38 X PIPA SIG GEN OUT
21 Y PIPA SIG GEN OUT
57 Z PIPA SIG GEN OU
90 IG IX RES SIN
131 IG IX RES COS
91 MG IX RES SIN
130 MG IX RES COS
108 OG IX RES SIN
110 OG IX RES COS
13 11 10 8 7 5 4 2 1
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INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

1010197

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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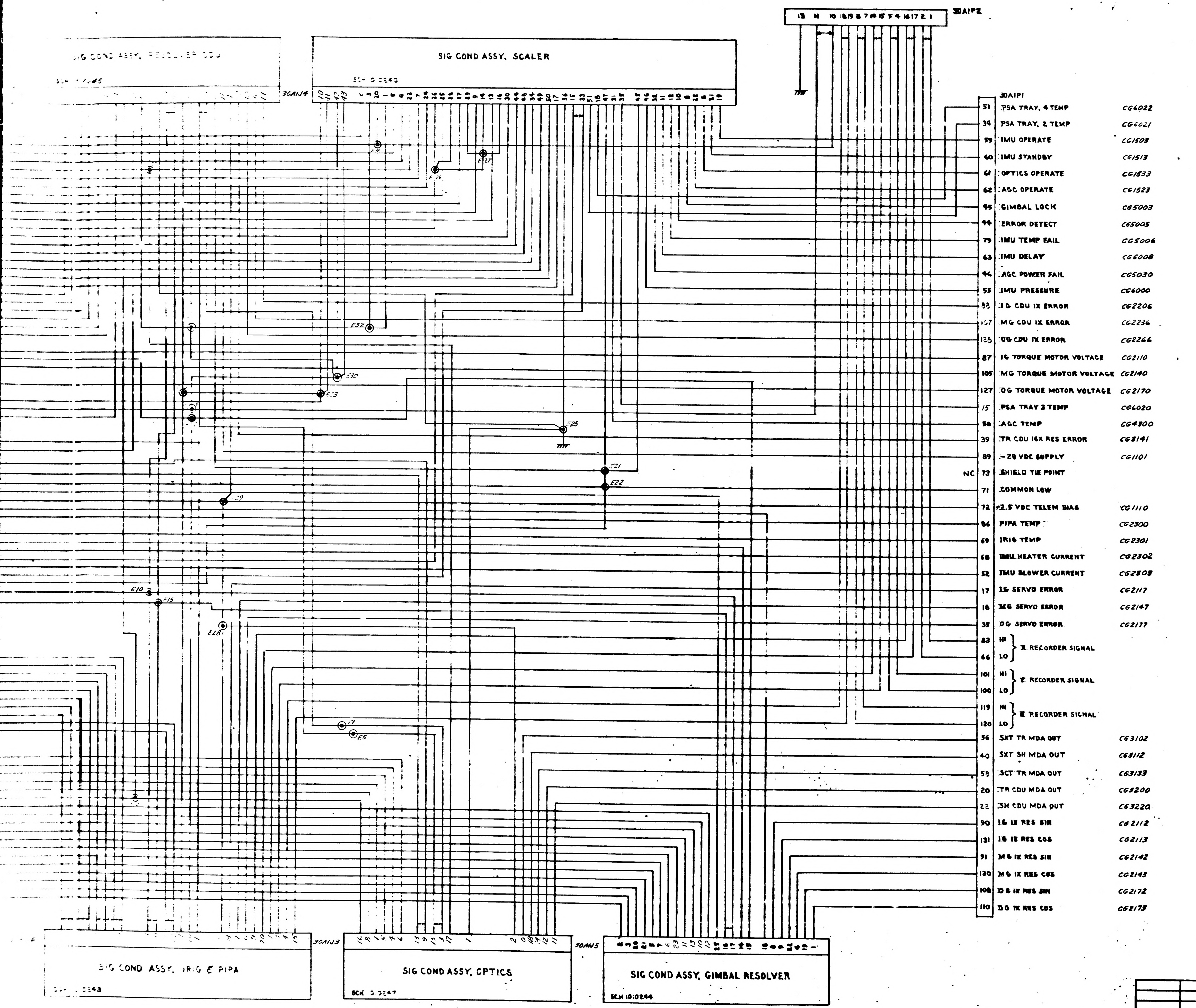

SIG COND ASSY, RESOLVER CDU
SCH 10:0245
SIG COND ASSY, SCALER
SCH 10:0240
30A1J4
30A1P2
13 11 10 18 19 8 7 14 15 5 3 4 16 17 2 1
30A1P1
51 PSA TRAY, 4 TEMP CG6022
34 PSA TRAY, 2 TEMP CG6021
59 IMU OPERATE CG1503
60 IMU STANDBY CG1513
61 OPTICS OPERATE CG1533
62 AGC OPERATE CG1523
45 GIMBAL LOCK CG5003
44 ERROR DETECT CG5005
79 IMU TEMP FAIL CG5006
63 IMU DELAY CG5008
46 AGC POWER FAIL CG5030
55 IMU PRESSURE CG6000
88 IG CDU 1X ERROR CG2206
107 MG CDU 1X ERROR CG2236
128 OG CDU 1X ERROR CG2266
87 IG TORQUE MOTOR VOLTAGE CG2110
105 MG TORQUE MOTOR VOLTAGE CG2140
127 OG TORQUE MOTOR VOLTAGE CG2170
15 PSA TRAY 3 TEMP CG6020
50 AGC TEMP CG4300
39 TR CDU 16X RES ERROR CG3141
89 -28 VDC SUPPLY CG1101
NC 73 SHIELD TIE POINT
71 COMMON LOW
72 +2.5 VDC TELEM BIAS CG1110
86 PIPA TEMP CG2300
69 IRIG TEMP CG2301
68 IMU HEATER CURRENT CG2302
52 IMU BLOWER CURRENT CG2303
17 IG SERVO ERROR CG2117
18 MG SERVO ERROR CG2147
35 OG SERVO ERROR CG2177
83 HI
66 LO
X RECORDER SIGNAL
101 HI
100 LO
Y RECORDER SIGNAL
119 HI
120 LO
Z RECORDER SIGNAL
56 SXT TR MDA OUT CG3102
40 SXT SH MDA OUT CG3112
58 SCT TR MDA OUT CG3133
20 TR CDU MDA OUT CG3200
22 SH CDU MDA OUT CG3220
90 IG 1X RES SIN CG2112
131 IG 1X RES COS CG2113
91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2143
108 OG 1X RES SIN CG2172
110 OG 1X RES COS CG2173
E4
E27
E26
E32
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SIG COND ASSY, IRIG & PIPA
SCH 10:0243
30A1J3
SIG COND ASSY, OPTICS
SCH 10:0247
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCH 10:0244

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN P. DUNCAN 9-3-65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
SIG. COND ASSY.
SYSTEM 012

CODE IDENT NO. | SIZE J | DRAWING NO. 1010198
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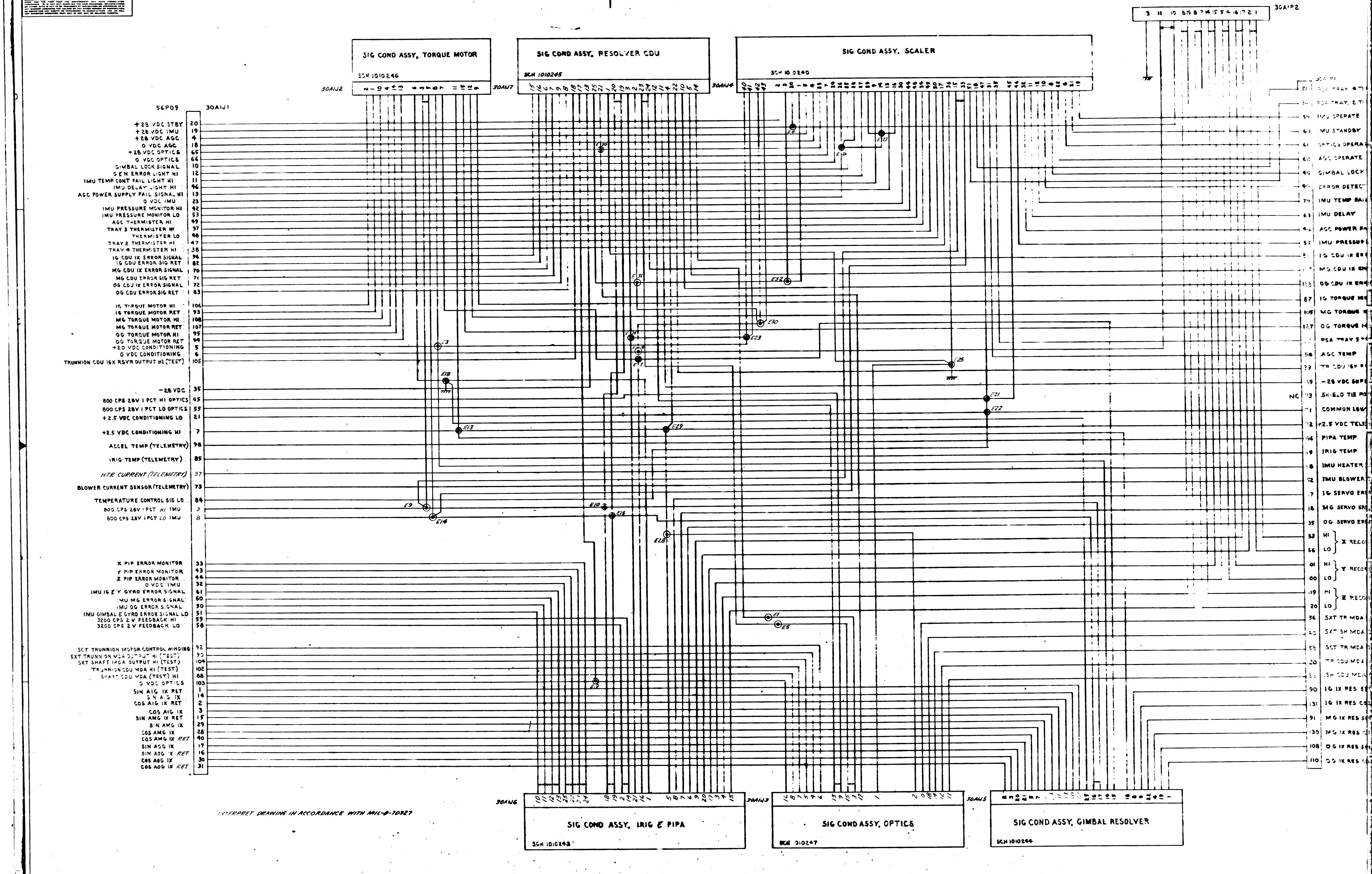
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SIG COND ASSY, RESOLVER CDU
SCH 1010245
30A1J7
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SCH 1010240
30A1J4
30A1P2
56P09
30A1J1
+28 VDC STBY 20
+28 VDC IMU 19
+28 VDC AGC 4
0 VDC AGC 18
+28 VDC OPTICS 65
0 VDC OPTICS 66
GIMBAL LOCK SIGNAL 10
G & N ERROR LIGHT HI 12
IMU TEMP CONT FAIL LIGHT HI 11
IMU DELAY LIGHT HI 46
AGC POWER SUPPLY FAIL SIGNAL HI 13
0 VDC IMU 23
IMU PRESSURE MONITOR HI 42
IMU PRESSURE MONITOR LO 53
AGC THERMISTER HI 49
TRAY 3 THERMISTER HI 37
THERMISTER LO 48
TRAY 2 THERMISTER HI 47
TRAY 4 THERMISTER HI 38
IG CDU IX ERROR SIGNAL 96
IG CDU ERROR SIG RET 82
MG CDU IX ERROR SIGNAL 70
MG CDU ERROR SIG RET 71
OG CDU IX ERROR SIGNAL 72
OG CDU ERROR SIG RET 83
IG TORQUE MOTOR HI 106
IG TORQUE MOTOR RET 93
MG TORQUE MOTOR HI 108
MG TORQUE MOTOR RET 107
OG TORQUE MOTOR HI 95
OG TORQUE MOTOR RET 94
+20 VDC CONDITIONING 5
0 VDC CONDITIONING 6
TRUNNION CDU 16X RSVR OUTPUT HI (TEST) 105
-28 VDC 35
800 CPS 28V 1 PCT HI OPTICS 45
800 CPS 28V 1 PCT LO OPTICS 55
+2.5 VDC CONDITIONING LO 21
+2.5 VDC CONDITIONING HI 7
ACCEL TEMP (TELEMETRY) 98
IRIG TEMP (TELEMETRY) 85
HTR CURRENT (TELEMETRY) 97
BLOWER CURRENT SENSOR (TELEMETRY) 73
TEMPERATURE CONTROL SIG LO 84
800 CPS 28V 1 PCT HI IMU 9
800 CPS 28V 1 PCT LO IMU 8
X PIP ERROR MONITOR 33
Y PIP ERROR MONITOR 43
Z PIP ERROR MONITOR 44
0 VDC IMU 32
IMU IG & Y GYRO ERROR SIGNAL 61
IMU MG ERROR SIGNAL 60
IMU OG ERROR SIGNAL 50
IMU GIMBAL & GYRO ERROR SIGNAL LO 51
3200 CPS 2 V FEEDBACK HI 59
3200 CPS 2 V FEEDBACK LO 58
SCT TRUNNION MOTOR CONTROL WINDING 92
SXT TRUNNION MDA OUTPUT HI (TEST) 90
SXT SHAFT MDA OUTPUT HI (TEST) 104
TRUNNION CDU MDA HI (TEST) 102
SHAFT CDU MDA (TEST) HI 88
0 VDC OPTICS 103
SIN AIG IX RET 1
SIN AIG IX 14
COS AIG IX RET 2
COS AIG IX 3
SIN AMG IX RET 15
SIN AMG IX 29
COS AMG IX 28
COS AMG IX RET 40
SIN AOG IX 17
SIN AOG IX RET 16
COS AOG IX 30
COS AOG IX RET 31
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51 PSA TRAY 4 T
34 PSA TRAY, 2 T
59 IMU OPERATE
60 IMU STANDBY
61 OPTICS OPERA
62 AGC OPERATE
45 GIMBAL LOCK
44 ERROR DETECT
79 IMU TEMP FAI
63 IMU DELAY
43 AGC POWER FA
53 IMU PRESSUR
IG CDU IX ER
MG CDU IX ER
OG CDU IX ER
87 IG TORQUE M
105 MG TORQUE
127 OG TORQUE
PSA TRAY 3
50 AGC TEMP
39 TR CDU 16X
-28 VDC SUP
NC 13 SHIELD TIE PO
COMMON LOW
12 +2.5 VDC TELE
PIPA TEMP
IRIG TEMP
IMU HEATER
IMU BLOWER
IG SERVO ER
18 MG SERVO ER
35 OG SERVO ER
33 HI X RECO
56 LO
01 HI Y RECO
00 LO
119 HI Z RECO
20 LO
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SXT SH MDA
SCT TR MDA
20 TR CDU MDA
SH CDU MDA
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91 MG IX RES S
130 MG IX RES
108 OG IX RES S
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SIG COND ASSY, IRIG & PIPA
SCH 1010243
30A1J13
SIG COND ASSY, OPTICS
SCH 1010247
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244
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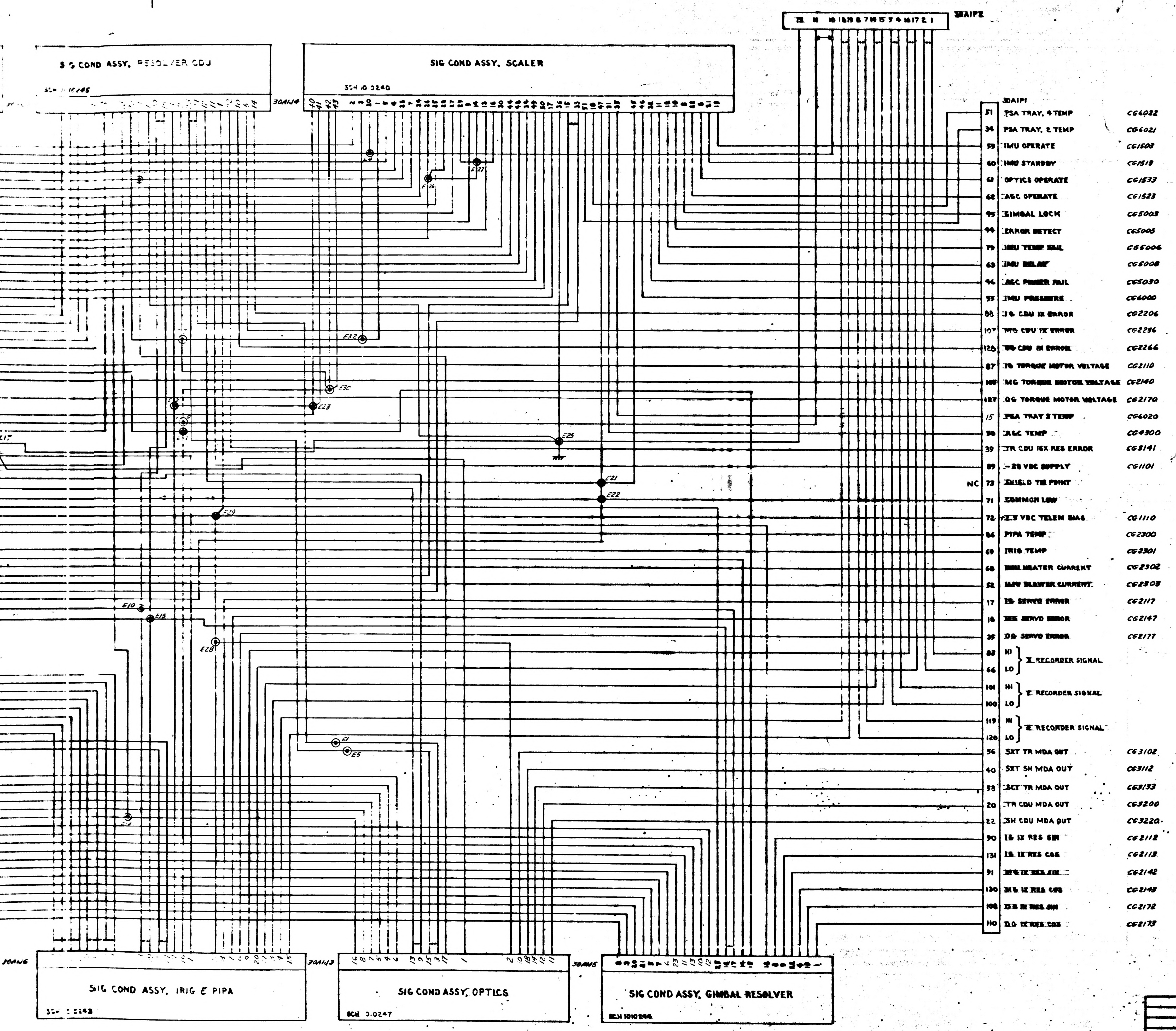
INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

1010198 SHT 1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60 IMU STANDBY CG1513
61 OPTICS OPERATE CG1533
62 AGC OPERATE CG1523
95 GIMBAL LOCK CG5003
94 ERROR DETECT CG5005
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55 IMU PRESSURE CG6000
88 IG CDU 1X ERROR CG2206
107 MG CDU 1X ERROR CG2236
126 OG CDU 1X ERROR CG2266
87 IG TORQUE MOTOR VOLTAGE CG2110
105 MG TORQUE MOTOR VOLTAGE CG2140
127 OG TORQUE MOTOR VOLTAGE CG2170
15 PSA TRAY 3 TEMP CG6020
50 AGC TEMP CG4300
39 TR CDU 16X RES ERROR CG3141
89 -28 VDC SUPPLY CG1101
NC 73 SHIELD TIE POINT
71 COMMON LOW
72 +2.5 VDC TELEM BIAS CG1110
86 PIPA TEMP CG2300
69 IRIG TEMP CG2301
68 IMU HEATER CURRENT CG2302
52 IMU BLOWER CURRENT CG2303
17 IG SERVO ERROR CG2117
18 MG SERVO ERROR CG2147
35 OG SERVO ERROR CG2177
83 HI, 66 LO X RECORDER SIGNAL
101 HI, 100 LO Y RECORDER SIGNAL
119 HI, 120 LO Z RECORDER SIGNAL
56 SXT TR MDA OUT CG3102
40 SXT SH MDA OUT CG3112
58 SCT TR MDA OUT CG3133
20 TR CDU MDA OUT CG3200
22 SH CDU MDA OUT CG3220
90 IG 1X RES SIN CG2112
131 IG 1X RES COS CG2113
91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2143
108 OG 1X RES SIN CG2172
110 OG 1X RES COS CG2173
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30A1J6
SIG COND ASSY, IRIG & PIPA
SCH 1010243
30A1J13
SIG COND ASSY, OPTICS
SCH 1010247
30A1J15
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
4		REVISED PER TDRR 24548			1-7-66	JK
3		REVISED PER TDRR - 29124			3-24-66	

REVISIONS 22328

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
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DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN P. DUNCAN 9-3-65
CHECKED
APPROVED
APPROVED

APPROVED MIT
NOT R... PER LETTER
APPROVED ... 012
MSC
DATE

WIRING DIAGRAM SIG. COND ASSY. SYSTEM 012

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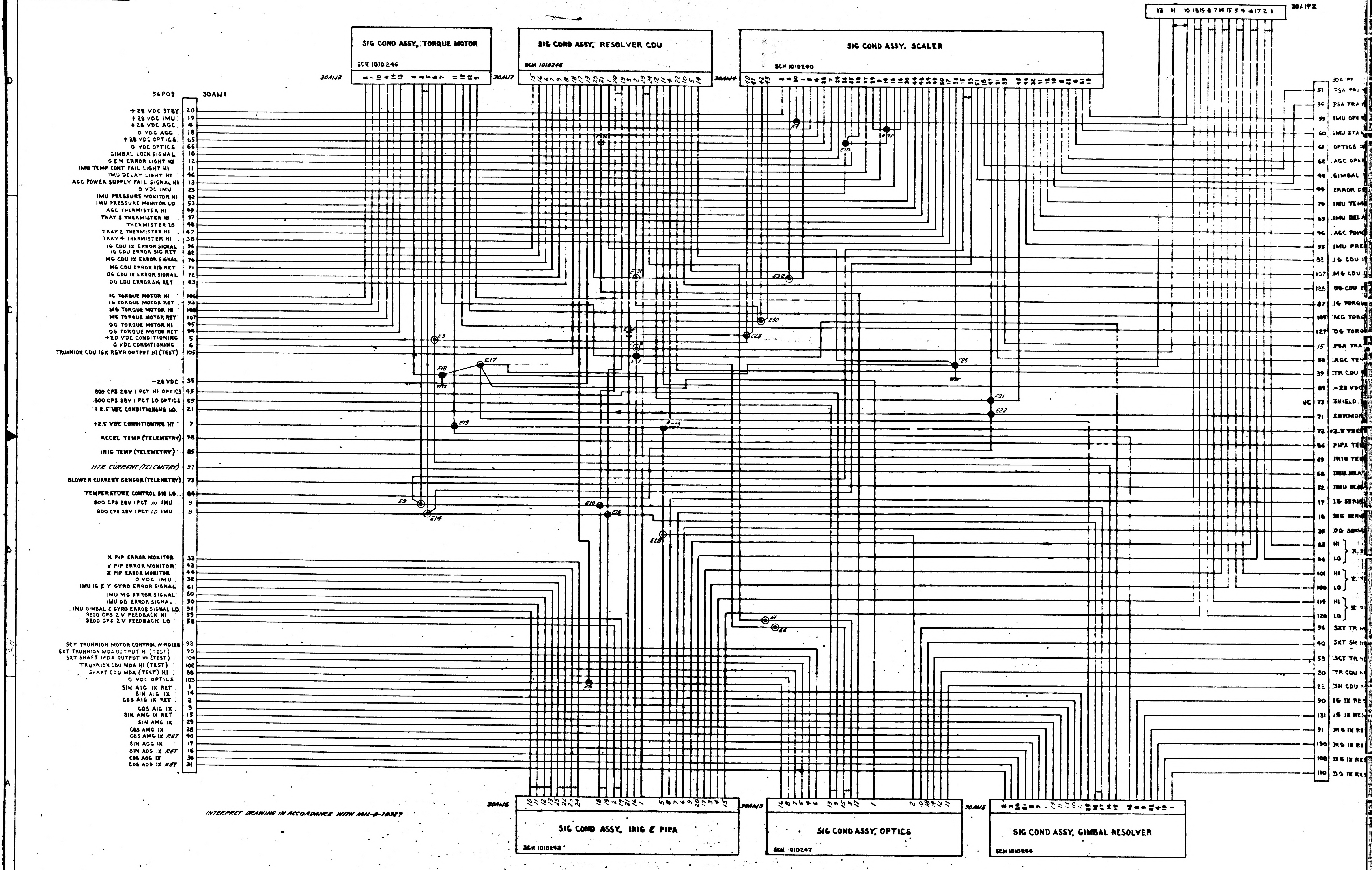
SIZE J
DRAWING NO. 1010198
SCALE
SHEET 1 OF 1

010198 SHT 1 OF 1 REV 3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SCH 1010245
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SCH 1010240
30A1J4
30A1P2
30A P1
56P09
30A1J1
+28 VDC STBY 20
+28 VDC IMU 19
+28 VDC AGC 4
0 VDC AGC 18
+28 VDC OPTICS 65
0 VDC OPTICS 66
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G & N ERROR LIGHT HI 12
IMU TEMP CONT FAIL LIGHT HI 11
IMU DELAY LIGHT HI 46
AGC POWER SUPPLY FAIL SIGNAL HI 13
0 VDC IMU 23
IMU PRESSURE MONITOR HI 42
IMU PRESSURE MONITOR LO 53
AGC THERMISTER HI 49
TRAY 3 THERMISTER HI 37
THERMISTER LO 48
TRAY 2 THERMISTER HI 47
TRAY 4 THERMISTER HI 38
IG CDU IX ERROR SIGNAL 96
IG CDU ERROR SIG RET 82
MG CDU IX ERROR SIGNAL 70
MG CDU ERROR SIG RET 71
OG CDU IX ERROR SIGNAL 72
OG CDU ERROR SIG RET 83
IG TORQUE MOTOR HI 106
IG TORQUE MOTOR RET 93
MG TORQUE MOTOR HI 108
MG TORQUE MOTOR RET 107
OG TORQUE MOTOR HI 95
OG TORQUE MOTOR RET 94
+20 VDC CONDITIONING 5
0 VDC CONDITIONING 6
TRUNNION CDU 16X RSVR OUTPUT HI (TEST) 105
-28 VDC 35
800 CPS 28V 1 PCT HI OPTICS 45
800 CPS 28V 1 PCT LO OPTICS 55
+2.5 VDC CONDITIONING LO 21
+2.5 VDC CONDITIONING HI 7
ACCEL TEMP (TELEMETRY) 98
IRIG TEMP (TELEMETRY) 85
HTR CURRENT (TELEMETRY) 97
BLOWER CURRENT SENSOR (TELEMETRY) 73
TEMPERATURE CONTROL SIG LO 84
800 CPS 28V 1 PCT HI IMU 9
800 CPS 28V 1 PCT LO IMU 8
X PIP ERROR MONITOR 33
Y PIP ERROR MONITOR 43
Z PIP ERROR MONITOR 44
0 VDC IMU 32
IMU IG & Y GYRO ERROR SIGNAL 61
IMU MG ERROR SIGNAL 60
IMU OG ERROR SIGNAL 50
IMU GIMBAL & GYRO ERROR SIGNAL LO 51
3200 CPS 2 V FEEDBACK HI 59
3200 CPS 2 V FEEDBACK LO 58
SCT TRUNNION MOTOR CONTROL WINDING 92
SXT TRUNNION MDA OUTPUT HI (TEST) 90
SXT SHAFT MDA OUTPUT HI (TEST) 104
TRUNNION CDU MDA HI (TEST) 102
SHAFT CDU MDA (TEST) HI 88
0 VDC OPTICS 103
SIN AIG IX RET 1
SIN AIG IX 14
COS AIG IX RET 2
COS AIG IX 3
SIN AMG IX RET 15
SIN AMG IX 29
COS AMG IX 28
COS AMG IX RET 40
SIN AOG IX 17
SIN AOG IX RET 16
COS AOG IX 30
COS AOG IX RET 31
51 PSA TR
34 PSA TRA
59 IMU OPE
60 IMU STA
61 OPTICS
62 AGC OPE
45 GIMBAL
44 ERROR D
79 IMU TEM
63 IMU DELA
46 AGC POW
55 IMU PRE
33 IG CDU
107 MG CDU
128 OG CDU
87 IG TORQU
105 MG TORQ
127 OG TORQ
15 PSA TRA
50 AGC TE
39 TR CDU
89 -28 VDC
NC 73 SHIELD
71 COMMON
72 +2.5 VDC
86 PIPA TE
69 IRIG TE
68 IMU HEA
52 IMU BL
17 IG SERV
18 MG SERV
35 OG SERV
83 HI
66 LO
101 HI
100 LO
119 HI
120 LO
56 SXT TR
40 SXT SH
58 SCT TR
20 TR CDU
22 SH CDU
90 IG IX RE
131 IG IX RES
91 MG IX RE
130 MG IX RE
108 OG IX RE
110 OG IX RE
E3 E4 E7 E8 E9 E10 E11 E13 E14 E16 E17 E18 E19 E20 E21 E22 E23 E25 E26 E27 E28 E29 E30 E31 E32
30A1J6
SIG COND ASSY, IRIG & PIPA
SCH 1010243
30A1J3
SIG COND ASSY, OPTICS
SCH 1010247
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244
INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
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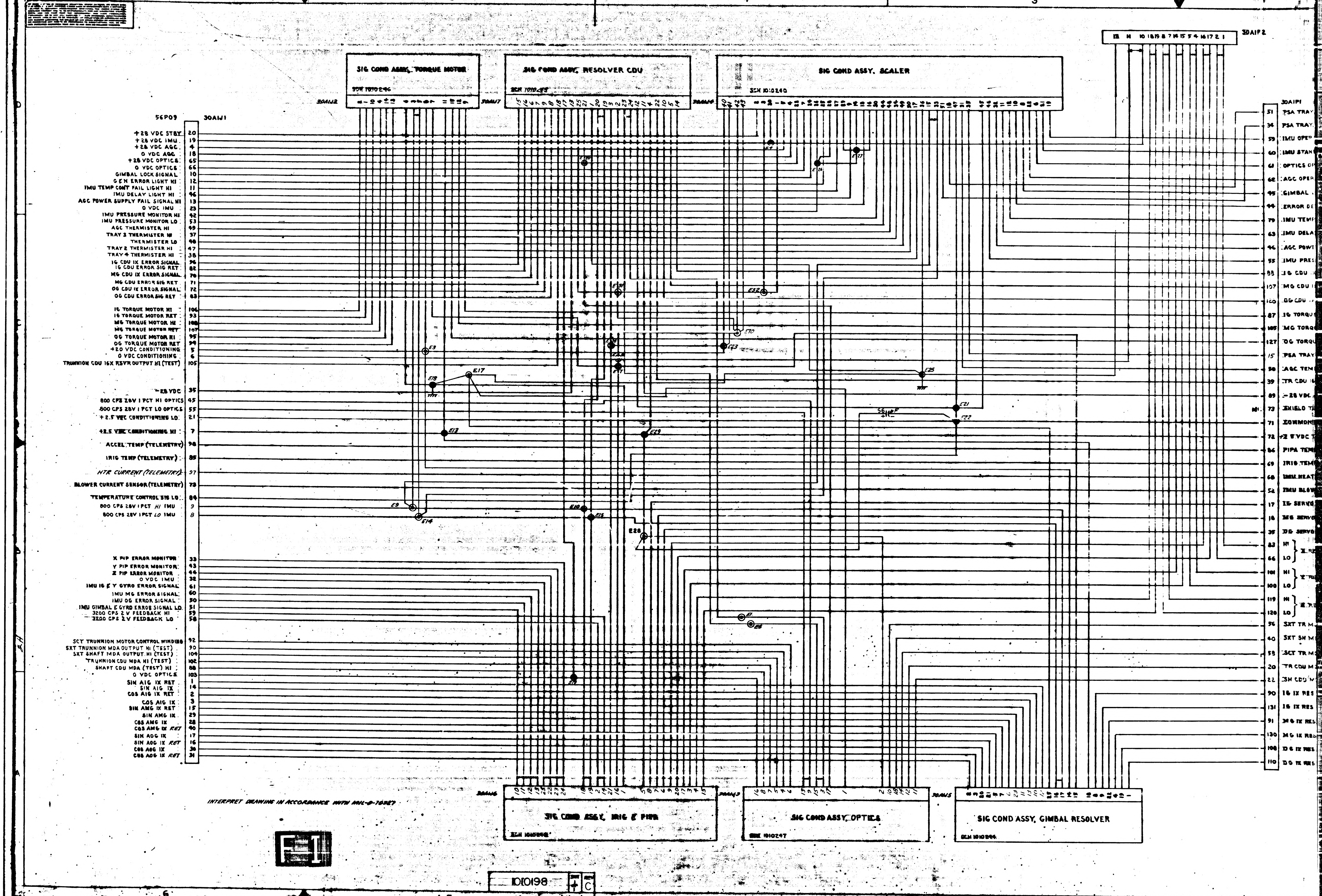
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SIG COND ASSY, TORQUE MOTOR
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+28 VDC STBY 20
+28 VDC IMU 19
+28 VDC AGC 4
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IMU TEMP CONT FAIL LIGHT HI 11
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AGC POWER SUPPLY FAIL SIGNAL HI 13
0 VDC IMU 23
IMU PRESSURE MONITOR HI 42
IMU PRESSURE MONITOR LO 53
AGC THERMISTER HI 49
TRAY 3 THERMISTER HI 37
THERMISTER LO 48
TRAY 2 THERMISTER HI 47
TRAY 4 THERMISTER HI 38
IG CDU 1X ERROR SIGNAL 96
IG CDU ERROR SIG RET 82
MG CDU 1X ERROR SIGNAL 70
MG CDU ERROR SIG RET 71
OG CDU 1X ERROR SIGNAL 72
OG CDU ERROR SIG RET 83
IG TORQUE MOTOR HI 106
IG TORQUE MOTOR RET 93
MG TORQUE MOTOR HI 108
MG TORQUE MOTOR RET 107
OG TORQUE MOTOR HI 95
OG TORQUE MOTOR RET 94
+20 VDC CONDITIONING 5
0 VDC CONDITIONING 6
TRUNNION CDU 16X RSVR OUTPUT HI (TEST) 105
-28 VDC 35
800 CPS 28V 1 PCT HI OPTICS 45
800 CPS 28V 1 PCT LO OPTICS 55
+2.5 VDC CONDITIONING LO 21
+2.5 VDC CONDITIONING HI 7
ACCEL TEMP (TELEMETRY) 98
IRIG TEMP (TELEMETRY) 85
HTR CURRENT (TELEMETRY) 97
BLOWER CURRENT SENSOR (TELEMETRY) 73
TEMPERATURE CONTROL SIG LO 84
800 CPS 28V 1 PCT HI IMU 9
800 CPS 28V 1 PCT LO IMU 8
X PIP ERROR MONITOR 33
Y PIP ERROR MONITOR 43
Z PIP ERROR MONITOR 44
0 VDC IMU 32
IMU IG & Y GYRO ERROR SIGNAL 61
IMU MG ERROR SIGNAL 60
IMU OG ERROR SIGNAL 50
IMU GIMBAL & GYRO ERROR SIGNAL LO 51
3200 CPS 2 V FEEDBACK HI 59
3200 CPS 2 V FEEDBACK LO 58
SCT TRUNNION MOTOR CONTROL WINDING 92
SXT TRUNNION MDA OUTPUT HI (TEST) 90
SXT SHAFT MDA OUTPUT HI (TEST) 104
TRUNNION CDU MDA HI (TEST) 102
SHAFT CDU MDA (TEST) HI 88
0 VDC OPTICS 103
SIN AIG 1X RET 1
SIN AIG 1X 14
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COS AIG 1X 3
SIN AMG 1X RET 15
SIN AMG 1X 29
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COS AMG 1X RET 40
SIN AOG 1X 17
SIN AOG 1X RET 16
COS AOG 1X 30
COS AOG 1X RET 31
51 PSA TRAY
34 PSA TRAY
59 IMU OPER
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61 OPTICS OP
62 AGC OPER
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44 ERROR DE
79 IMU TEMP
63 IMU DELA
46 AGC POW
55 IMU PRES
88 IG CDU
107 MG CDU
120 OG CDU
87 IG TORQU
105 MG TORQ
127 OG TORQU
15 PSA TRAY
50 AGC TEM
39 TR CDU 16
89 -28 VDC
NC 73 SHIELD T
71 COMMON
72 +2.5 VDC T
86 PIPA TEM
69 IRIG TEM
68 IMU HEAT
52 IMU BLOW
17 IG SERVO
18 MG SERVO
35 OG SERVO
83 HI
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X RE
101 HI
100 LO
Y RE
119 HI
120 LO
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40 SXT SH M
58 SCT TR M
20 TR CDU M
22 SH CDU M
90 IG 1X RES
131 IG 1X RES
91 MG 1X RES
130 MG 1X RES
108 OG 1X RES
110 OG 1X RES
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30A1J6
SIG COND ASSY, IRIG & PIPA
SCN 1010248
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SIG COND ASSY, OPTICS
SCN 1010247
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCN 1010244

INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

1010198 SHT 4 REV C
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SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
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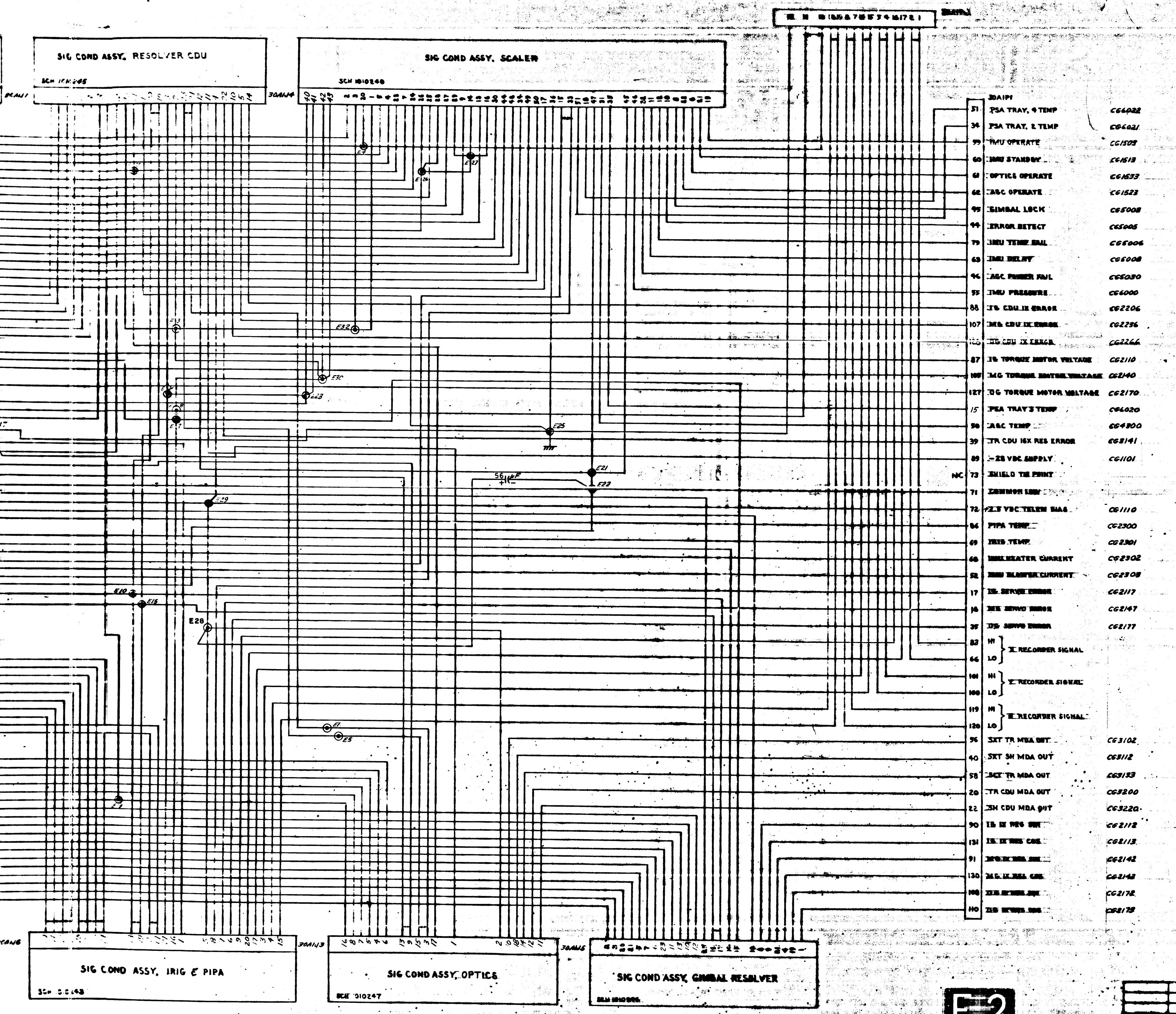
REVISIONS 22928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63 IMU DELAY CG5008
46 AGC POWER FAIL CG5030
55 IMU PRESSURE CG6000
88 IG CDU 1X ERROR CG2206
107 MG CDU 1X ERROR CG2236
125 OG CDU 1X ERROR CG2266
87 IG TORQUE MOTOR VOLTAGE CG2110
105 MG TORQUE MOTOR VOLTAGE CG2140
127 OG TORQUE MOTOR VOLTAGE CG2170
15 PSA TRAY 3 TEMP CG6020
50 AGC TEMP CG4300
39 TR CDU 16X RES ERROR CG3141
89 -28 VDC SUPPLY CG1101
NC 73 SHIELD TIE POINT
71 COMMON LOW
72 +2.5 VDC TELEM BIAS CG1110
86 PIPA TEMP CG2300
69 IRIG TEMP CG2301
68 IMU HEATER CURRENT CG2302
52 IMU BLOWER CURRENT CG2303
17 IG SERVO ERROR CG2117
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22 SH CDU MDA OUT CG3220
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91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2143
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SIG COND ASSY, IRIG & PIPA
SCH 1010243
30A1J3
SIG COND ASSY, OPTICS
SCH 1010247
30A1J6
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010246

F2

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES CAPACITOR VALUES ARE IN µf RESISTOR VALUES ARE IN OHMS TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ± DO NOT SCALE THIS DRAWING	MATERIAL
NEXT ASSY	USED ON
APPLICATION	

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN P. DUNCAN 9-3-65
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER PP7-66-612

WIRING DIAGRAM
SIG. COND. ASSY.
SYSTEM 012

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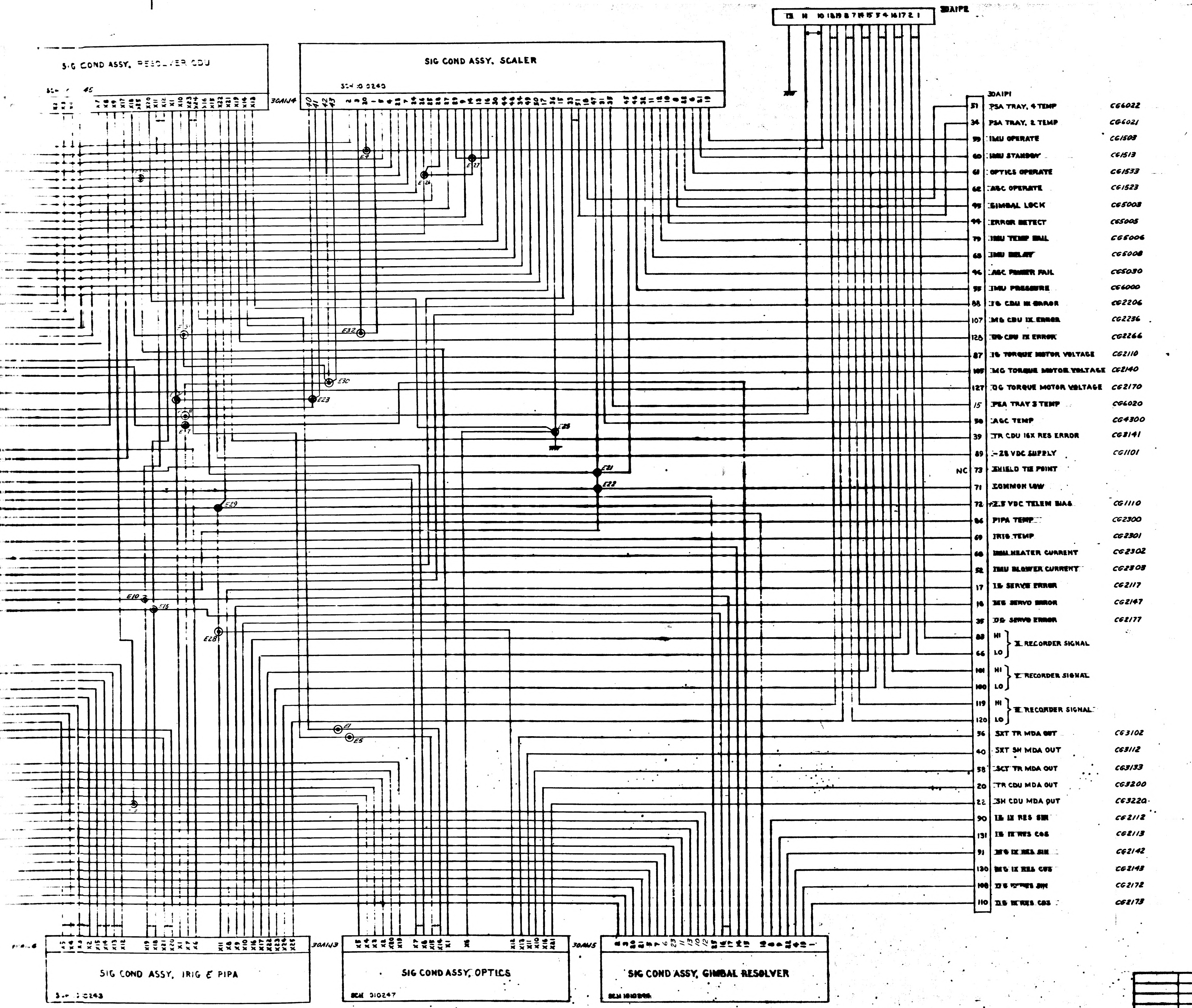
SIZE J
DRAWING NO. 1010198
SCALE
SHEET OF

1010198 SHT 1 C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71 COMMON LOW
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91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2143
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110 OG 1X RES COS CG2173
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SIG COND ASSY, IRIG & PIPA
SIG COND ASSY, OPTICS
SCM 310247
30A1J5
SIG COND ASSY, GIMBAL RESOLVER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

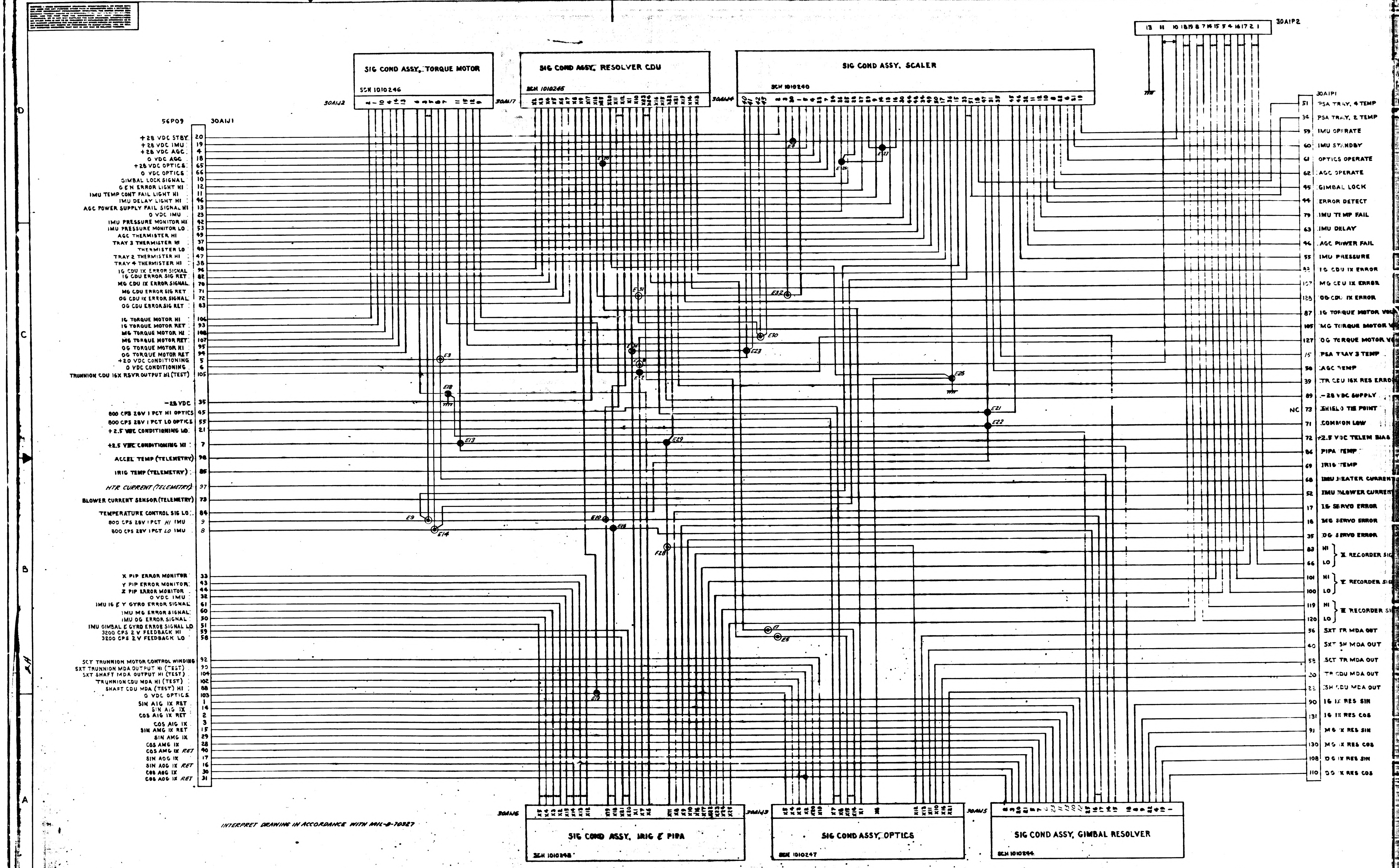
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN P. DUNCAN 9-3-65
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
PR 65-612
MSC
DATE

WIRING DIAGRAM
SIG. COND ASSY.
SYSTEM 012

CODE IDENT NO.
SIZE J
DRAWING NO. 1010198
SCALE
SHEET 1 OF 1

1010198 SHT 1 OF 1


SIG COND ASSY, TORQUE MOTOR
SCN 1010246
30A1J2
SIG COND ASSY, RESOLVER CDU
SCN 1010245
30A1J7
SIG COND ASSY, SCALER
SCN 1010240
30A1J4
30A1P2
30A1P1
56P09
30A1J1
+28 VDC STBY 20
+28 VDC IMU 19
+28 VDC AGC 4
0 VDC AGC 18
+28 VDC OPTICS 65
0 VDC OPTICS 66
GIMBAL LOCK SIGNAL 10
GEN ERROR LIGHT HI 12
IMU TEMP CONT FAIL LIGHT HI 11
IMU DELAY LIGHT HI 46
AGC POWER SUPPLY FAIL SIGNAL HI 13
0 VDC IMU 23
IMU PRESSURE MONITOR HI 42
IMU PRESSURE MONITOR LO 53
AGC THERMISTER HI 49
TRAY 3 THERMISTER HI 37
THERMISTER LO 48
TRAY 2 THERMISTER HI 47
TRAY 4 THERMISTER HI 38
IG CDU IX ERROR SIGNAL 96
IG CDU ERROR SIG RET 82
MG CDU IX ERROR SIGNAL 70
MG CDU ERROR SIG RET 71
OG CDU IX ERROR SIGNAL 72
OG CDU ERROR SIG RET 83
IG TORQUE MOTOR HI 106
IG TORQUE MOTOR RET 93
MG TORQUE MOTOR HI 108
MG TORQUE MOTOR RET 107
OG TORQUE MOTOR HI 95
OG TORQUE MOTOR RET 94
+20 VDC CONDITIONING 5
0 VDC CONDITIONING 6
TRUNNION CDU 16X RSVR OUTPUT HI (TEST) 105
-28 VDC 35
800 CPS 28V 1 PCT HI OPTICS 45
800 CPS 28V 1 PCT LO OPTICS 55
+2.5 VDC CONDITIONING LO 21
+2.5 VDC CONDITIONING HI 7
ACCEL TEMP (TELEMETRY) 98
IRIG TEMP (TELEMETRY) 85
HTR CURRENT (TELEMETRY) 97
BLOWER CURRENT SENSOR (TELEMETRY) 73
TEMPERATURE CONTROL SIG LO 84
800 CPS 28V 1 PCT HI IMU 9
800 CPS 28V 1 PCT LO IMU 8
X PIP ERROR MONITOR 33
Y PIP ERROR MONITOR 43
Z PIP ERROR MONITOR 44
0 VDC IMU 32
IMU IG & Y GYRO ERROR SIGNAL 61
IMU MG ERROR SIGNAL 60
IMU OG ERROR SIGNAL 50
IMU GIMBAL & GYRO ERROR SIGNAL LO 51
3200 CPS 2 V FEEDBACK HI 59
3200 CPS 2 V FEEDBACK LO 58
SCT TRUNNION MOTOR CONTROL WINDING 92
SXT TRUNNION MDA OUTPUT HI (TEST) 90
SXT SHAFT MDA OUTPUT HI (TEST) 104
TRUNNION CDU MDA HI (TEST) 102
SHAFT CDU MDA (TEST) HI 88
0 VDC OPTICS 103
SIN AIG IX RET 1
SIN AIG IX 14
COS AIG IX RET 2
COS AIG IX 3
SIN AMG IX RET 15
SIN AMG IX 29
COS AMG IX 28
COS AMG IX RET 40
SIN AOG IX 17
SIN AOG IX RET 16
COS AOG IX 30
COS AOG IX RET 31
51 PSA TRAY, 4 TEMP
34 PSA TRAY, 2 TEMP
59 IMU OPERATE
60 IMU STANDBY
61 OPTICS OPERATE
62 AGC OPERATE
45 GIMBAL LOCK
44 ERROR DETECT
79 IMU TEMP FAIL
63 IMU DELAY
46 AGC POWER FAIL
55 IMU PRESSURE
82 IG CDU IX ERROR
107 MG CDU IX ERROR
128 OG CDU IX ERROR
87 IG TORQUE MOTOR V
105 MG TORQUE MOTOR V
127 OG TORQUE MOTOR V
15 PSA TRAY 3 TEMP
50 AGC TEMP
39 TR CDU 16X RES ERRO
89 -28 VDC SUPPLY
NC 73 SHIELD TIE POINT
71 COMMON LOW
72 +2.5 VDC TELEM BIAS
86 PIPA TEMP
69 IRIG TEMP
68 IMU HEATER CURRENT
52 IMU BLOWER CURRENT
17 IG SERVO ERROR
18 MG SERVO ERROR
35 OG SERVO ERROR
83 HI
66 LO
X RECORDER SIG
101 HI
100 LO
Y RECORDER SIG
119 HI
120 LO
Z RECORDER SI
56 SXT TR MDA OUT
40 SXT SH MDA OUT
58 SCT TR MDA OUT
20 TR CDU MDA OUT
22 SH CDU MDA OUT
90 IG IX RES SIN
131 IG IX RES COS
91 MG IX RES SIN
130 MG IX RES COS
108 OG IX RES SIN
110 OG IX RES COS
E3
E7
E9
E10
E13
E14
E16
E18
E19
E20
E21
E22
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E24
E25
E26
E27
E28
E29
E30
E31
E32
30A1J6
SIG COND ASSY, IRIG & PIPA
SCN 1010248
30A1J3
SIG COND ASSY, OPTICS
SCN 1010247
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCN 1010244
6
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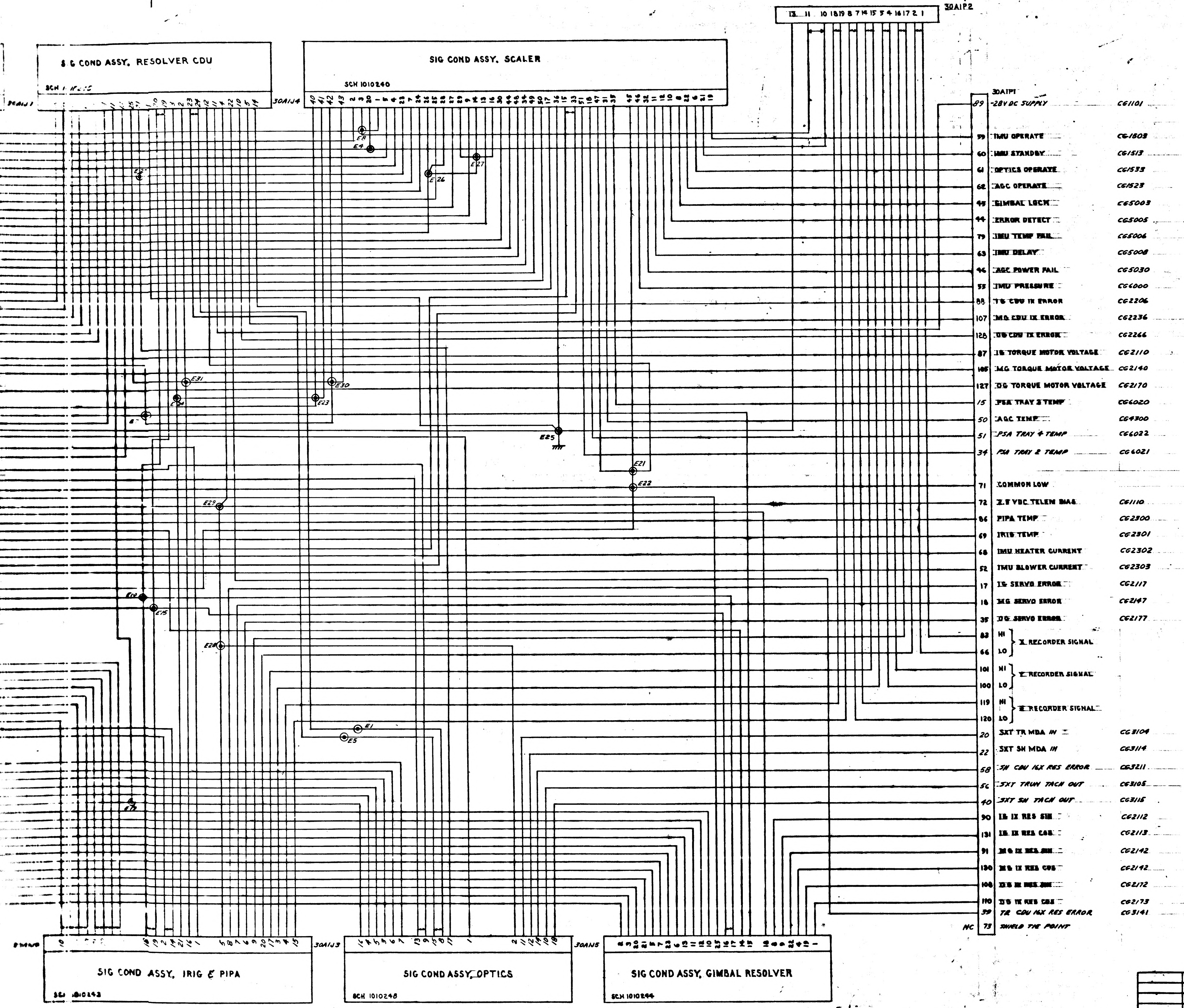
D
C
B
A

INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

1010198

SHT 4

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TCRR 24549				
B		REVISED PER TCRR 29127				



S G COND ASSY, RESOLVER CDU
30A1J4
SIG COND ASSY, SCALER
SCH 1010240
30A1P2
30A1P1
E8
E4
E27
E26
E31
E30
E24
E23
E25
E21
E22
E29
E14
E15
E28
E1
E5
89 -28V DC SUPPLY CG1101
59 IMU OPERATE CG1508
60 IMU STANDBY CG1513
61 OPTICS OPERATE CG1533
62 AGC OPERATE CG1523
45 GIMBAL LOCK CG5003
44 ERROR DETECT CG5005
79 IMU TEMP FAIL CG5006
63 IMU DELAY CG5008
46 AGC POWER FAIL CG5030
55 IMU PRESSURE CG6000
88 IG CDU 1X ERROR CG2206
107 MG CDU 1X ERROR CG2236
128 OG CDU 1X ERROR CG2266
87 IG TORQUE MOTOR VOLTAGE CG2110
105 MG TORQUE MOTOR VOLTAGE CG2140
127 OG TORQUE MOTOR VOLTAGE CG2170
15 PSA TRAY 3 TEMP CG6020
50 AGC TEMP CG4300
51 PSA TRAY 4 TEMP CG6022
34 PSA TRAY 2 TEMP CG6021
71 COMMON LOW
72 2.5 VDC TELEM BIAS CG1110
86 PIPA TEMP CG2300
69 IRIG TEMP CG2301
68 IMU HEATER CURRENT CG2302
52 IMU BLOWER CURRENT CG2303
17 IG SERVO ERROR CG2117
18 MG SERVO ERROR CG2147
35 OG SERVO ERROR CG2177
83 HI
66 LO
X RECORDER SIGNAL
101 HI
100 LO
Y RECORDER SIGNAL
119 HI
120 LO
Z RECORDER SIGNAL
20 SXT TR MDA IN CG3104
22 SXT SH MDA IN CG3114
58 SH CDU 16X RES ERROR CG3211
56 SXT TRUN TACH OUT CG3105
40 SXT SH TACH OUT CG3115
90 IG 1X RES SIN CG2112
131 IG 1X RES COS CG2113
91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2142
108 OG 1X RES SIN CG2172
110 OG 1X RES COS CG2173
39 TR CDU 16X RES ERROR CG3141
NC 73 SHIELD TIE POINT
30A1J3
SIG COND ASSY, IRIG & PIPA
SCH 1010243
SIG COND ASSY, OPTICS
SCH 1010248
30A1N5
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN F. DUNCAN 9-3-65
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER NASA PP7-65-617
APPROVED MSC
DATE

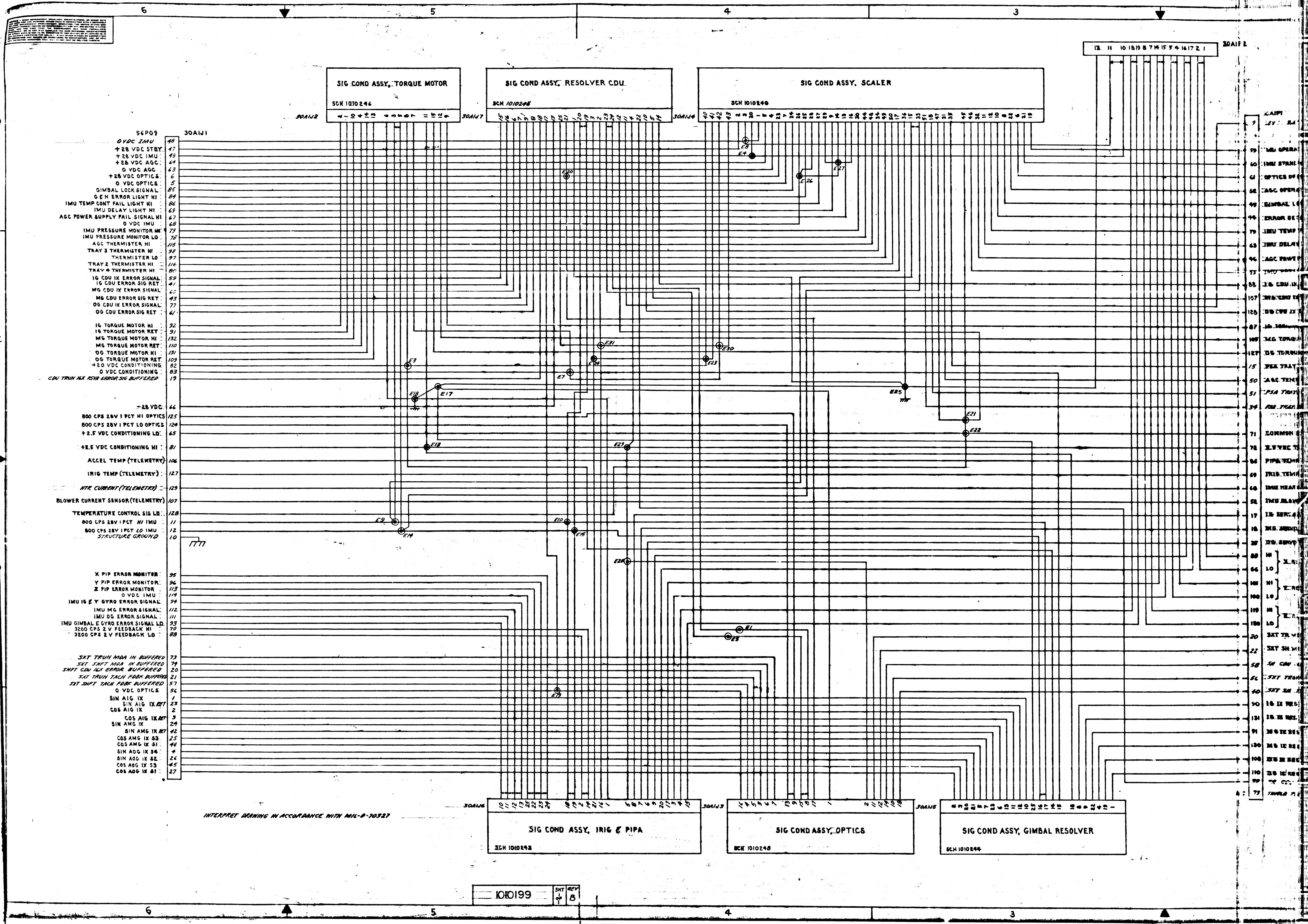
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
SIG. COND. ASSY.
100 SERIES

CODE IDENT NO. | SIZE J | DRAWING NO. 1010199
SCALE — | SHEET 1 OF 1

MASTER

1010199 | SHT 1 of 1 | REV B


6
5
4
3
D
C
SIG COND ASSY, TORQUE MOTOR
SCH 1010246
30A1J2
SIG COND ASSY, RESOLVER CDU
SCH 1010245
30A1J7
SIG COND ASSY, SCALER
SCH 1010240
30A1J4
30A1F2
56P09
30A1J1
0VDC IMU 48
+28 VDC STBY 47
+28 VDC IMU 49
+28 VDC AGC 64
0 VDC AGC 63
+28 VDC OPTICS 6
0 VDC OPTICS 5
GIMBAL LOCK SIGNAL 85
G & N ERROR LIGHT HI 84
IMU TEMP CONT FAIL LIGHT HI 86
IMU DELAY LIGHT HI 69
AGC POWER SUPPLY FAIL SIGNAL HI 67
0 VDC IMU 68
IMU PRESSURE MONITOR HI 79
IMU PRESSURE MONITOR LO 78
AGC THERMISTER HI 115
TRAY 3 THERMISTER HI 98
THERMISTER LO 97
TRAY 2 THERMISTER HI 116
TRAY 4 THERMISTER HI 80
IG CDU IX ERROR SIGNAL 59
IG CDU ERROR SIG RET 41
MG CDU IX ERROR SIGNAL 60
MG CDU ERROR SIG RET 43
OG CDU IX ERROR SIGNAL 77
OG CDU ERROR SIG RET 61
IG TORQUE MOTOR HI 92
IG TORQUE MOTOR RET 91
MG TORQUE MOTOR HI 132
MG TORQUE MOTOR RET 110
OG TORQUE MOTOR HI 131
OG TORQUE MOTOR RET 109
+20 VDC CONDITIONING 82
0 VDC CONDITIONING 83
CDU TRUN 16X RSVR ERROR SIG BUFFERED 19
-28 VDC 66
800 CPS 28V 1 PCT HI OPTICS 125
800 CPS 28V 1 PCT LO OPTICS 124
+2.5 VDC CONDITIONING LO 65
+2.5 VDC CONDITIONING HI 81
ACCEL TEMP (TELEMETRY) 106
IRIG TEMP (TELEMETRY) 127
HTR CURRENT (TELEMETRY) 129
BLOWER CURRENT SENSOR (TELEMETRY) 107
TEMPERATURE CONTROL SIG LO 128
800 CPS 28V 1 PCT HI IMU 11
800 CPS 28V 1 PCT LO IMU 12
STRUCTURE GROUND 10
X PIP ERROR MONITOR 95
Y PIP ERROR MONITOR 96
Z PIP ERROR MONITOR 113
0 VDC IMU 114
IMU IG & Y GYRO ERROR SIGNAL 94
IMU MG ERROR SIGNAL 112
IMU OG ERROR SIGNAL 111
IMU GIMBAL & GYRO ERROR SIGNAL LO 93
3200 CPS 2 V FEEDBACK HI 70
3200 CPS 2 V FEEDBACK LO 88
SXT TRUN MDA IN BUFFERED 73
SXT SHFT MDA IN BUFFERED 74
SHFT CDU 16X ERROR BUFFERED 20
SXT TRUN TACH FDBK BUFFERED 21
SXT SHFT TACH FDBK BUFFERED 57
0 VDC OPTICS 56
SIN AIG IX 1
SIN AIG IX RET 23
COS AIG IX 2
COS AIG IX RET 3
SIN AMG IX 24
SIN AMG IX RET 42
COS AMG IX S3 25
COS AMG IX S1 44
SIN AOG IX S4 4
SIN AOG IX S2 26
COS AOG IX S3 45
COS AOG IX S1 27
E1
E3
E4
E7
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E17
E18
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E20
E21
E22
E23
E24
E25
E26
E27
E28
E29
E30
E31
30A1J6
SIG COND ASSY, IRIG & PIPA
SCH 1010243
30A1J3
SIG COND ASSY, OPTICS
SCH 1010248
30A1J5
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244
HI
LO
6
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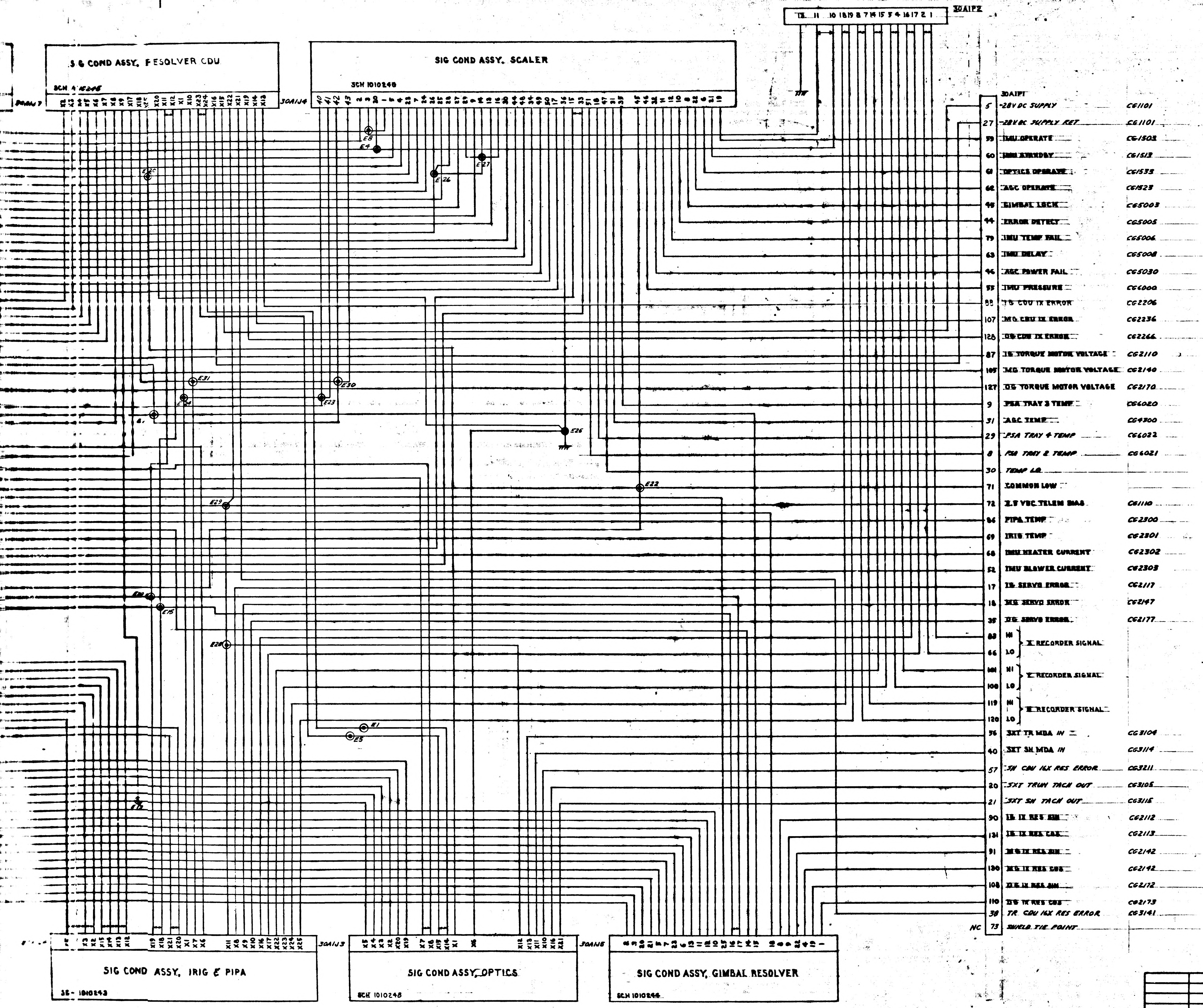
INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327

1010199	SHT 1 OF 1	REV B

REVISIONS 22928



S G COND ASSY, RESOLVER CDU
SCH 1010246
SIG COND ASSY, SCALER
SCH 1010249
30A1J4
30A1P2
30A1P1
5 +28V DC SUPPLY CG1101
27 +28V DC SUPPLY RET CG1101
59 IMU OPERATE CG1503
60 IMU STANDBY CG1513
61 OPTICS OPERATE CG1533
62 AGC OPERATE CG1523
45 GIMBAL LOCK CG5003
44 ERROR DETECT CG5005
79 IMU TEMP FAIL CG5006
63 IMU DELAY CG5008
46 AGC POWER FAIL CG5030
55 IMU PRESSURE CG6000
88 IG CDU 1X ERROR CG2206
107 MG CDU 1X ERROR CG2236
128 OG CDU 1X ERROR CG2266
87 IG TORQUE MOTOR VOLTAGE CG2110
105 MG TORQUE MOTOR VOLTAGE CG2140
127 OG TORQUE MOTOR VOLTAGE CG2170
9 PSA TRAY 3 TEMP CG6020
31 AGC TEMP CG4300
29 PSA TRAY 4 TEMP CG6022
8 PSA TRAY 2 TEMP CG6021
30 TEMP LO
71 COMMON LOW
72 2.5 VDC TELEM BIAS CG1110
86 PIPA TEMP CG2300
69 IRIG TEMP CG2301
68 IMU HEATER CURRENT CG2302
52 IMU BLOWER CURRENT CG2303
17 IG SERVO ERROR CG2117
18 MG SERVO ERROR CG2147
35 OG SERVO ERROR CG2177
83 HI
66 LO
X RECORDER SIGNAL
101 HI
100 LO
Y RECORDER SIGNAL
119 HI
120 LO
Z RECORDER SIGNAL
56 SXT TR MDA IN CG3104
40 SXT SH MDA IN CG3114
57 SH CDU 16X RES ERROR CG3211
20 SXT TRUN TACH OUT CG3105
21 SXT SH TACH OUT CG3115
90 IG 1X RES SIN CG2112
131 IG 1X RES COS CG2113
91 MG 1X RES SIN CG2142
130 MG 1X RES COS CG2142
108 OG 1X RES SIN CG2172
110 OG 1X RES COS CG2173
38 TR CDU 16X RES ERROR CG3141
NC 73 SHIELD TIE POINT
E1
E3
E4
E8
E12
E15
E22
E23
E25
E26
E27
E28
E29
E30
E31
30A1J3
30A1J5
SIG COND ASSY, IRIG & PIPA
SC 1010243
SIG COND ASSY, OPTICS
SCH 1010248
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN F. DUNCAN 9-3-65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED NASA NOT REQUIRED PER LETTER PP7-65-612
DATE

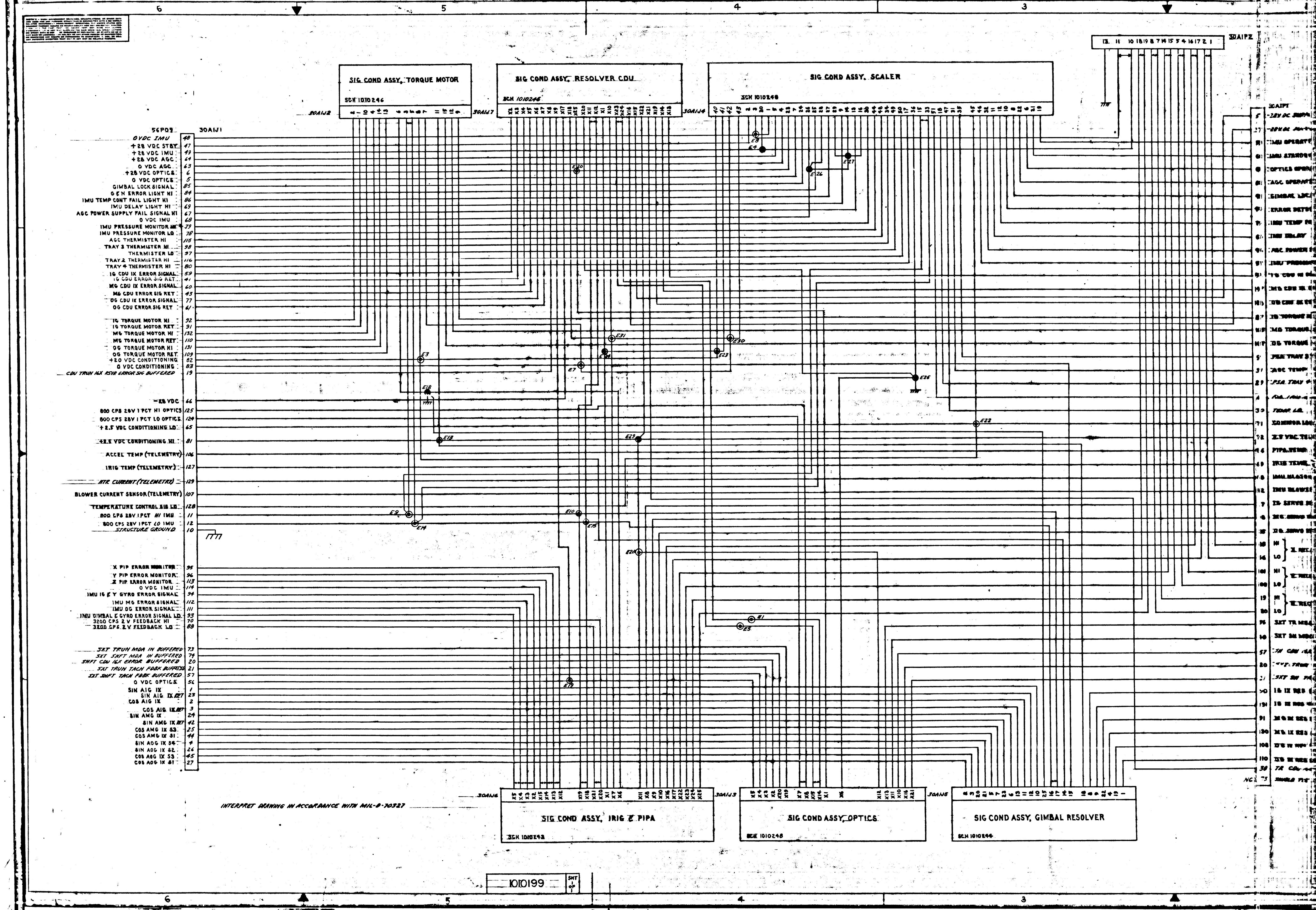
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM
SIG. COND. ASSY.
100 SERIES

CODE IDENT NO. | SIZE J | DRAWING NO. 1010199
SCALE — SHEET 1 OF 1

1010199 SHT 1/1

MASTER


SIG COND ASSY, TORQUE MOTOR
SCH 1010246
SIG COND ASSY, RESOLVER CDU
SCH 1010246
SIG COND ASSY, SCALER
SCH 1010248
30AIJ2
30AIJ7
30AIJ4
30AIP2
30AIP1
56P02
30AIJ1
0VDC IMU 48
+28 VDC STBY 47
+28 VDC IMU 49
+28 VDC AGC 64
0 VDC AGC 63
+28 VDC OPTICS 6
0 VDC OPTICS 5
GIMBAL LOCK SIGNAL 85
G & N ERROR LIGHT HI 84
IMU TEMP CONT FAIL LIGHT HI 86
IMU DELAY LIGHT HI 69
AGC POWER SUPPLY FAIL SIGNAL HI 67
0 VDC IMU 68
IMU PRESSURE MONITOR HI 79
IMU PRESSURE MONITOR LO 78
AGC THERMISTER HI 115
TRAY 3 THERMISTER HI 98
THERMISTER LO 97
TRAY 2 THERMISTER HI 116
TRAY 4 THERMISTER HI 80
IG CDU IX ERROR SIGNAL 59
IG CDU ERROR SIG RET 41
MG CDU IX ERROR SIGNAL 60
MG CDU ERROR SIG RET 43
OG CDU IX ERROR SIGNAL 77
OG CDU ERROR SIG RET 61
IG TORQUE MOTOR HI 92
IG TORQUE MOTOR RET 91
MG TORQUE MOTOR HI 132
MG TORQUE MOTOR RET 110
OG TORQUE MOTOR HI 131
OG TORQUE MOTOR RET 109
+20 VDC CONDITIONING 82
0 VDC CONDITIONING 83
CDU TRUN 16X RSVR ERROR SIG BUFFERED 19
-28 VDC 66
800 CPS 28V 1 PCT HI OPTICS 125
800 CPS 28V 1 PCT LO OPTICS 124
+2.5 VDC CONDITIONING LO 65
+2.5 VDC CONDITIONING HI 81
ACCEL TEMP (TELEMETRY) 106
IRIG TEMP (TELEMETRY) 127
HTR CURRENT (TELEMETRY) 129
BLOWER CURRENT SENSOR (TELEMETRY) 107
TEMPERATURE CONTROL SIG LO 128
800 CPS 28V 1 PCT HI IMU 11
800 CPS 28V 1 PCT LO IMU 12
STRUCTURE GROUND 10
X PIP ERROR MONITOR 95
Y PIP ERROR MONITOR 96
Z PIP ERROR MONITOR 113
0 VDC IMU 114
IMU IG & Y GYRO ERROR SIGNAL 94
IMU MG ERROR SIGNAL 112
IMU OG ERROR SIGNAL 111
IMU GIMBAL & GYRO ERROR SIGNAL LO 93
3200 CPS 2 V FEEDBACK HI 70
3200 CPS 2 V FEEDBACK LO 88
SXT TRUN MDA IN BUFFERED 73
SXT SHFT MDA IN BUFFERED 74
SHFT CDU 16X ERROR BUFFERED 20
SXT TRUN TACH FDBK BUFFERED 21
SXT SHFT TACH FDBK BUFFERED 57
0 VDC OPTICS 56
SIN AIG IX 1
SIN AIG IX RET 23
COS AIG IX 2
COS AIG IX RET 3
SIN AMG IX 24
SIN AMG IX RET 42
COS AMG IX S3 25
COS AMG IX S1 44
SIN AOG IX S4 4
SIN AOG IX S2 26
COS AOG IX S3 45
COS AOG IX S1 27
E1
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E29
E30
E31
30AIJ6
30AIJ3
30AIJ5
SIG COND ASSY, IRIG & PIPA
SCH 1010243
SIG COND ASSY, OPTICS
SCH 1010248
SIG COND ASSY, GIMBAL RESOLVER
SCH 1010244
INTERPRET DRAWING IN ACCORDANCE WITH MIL-D-70327
1010199
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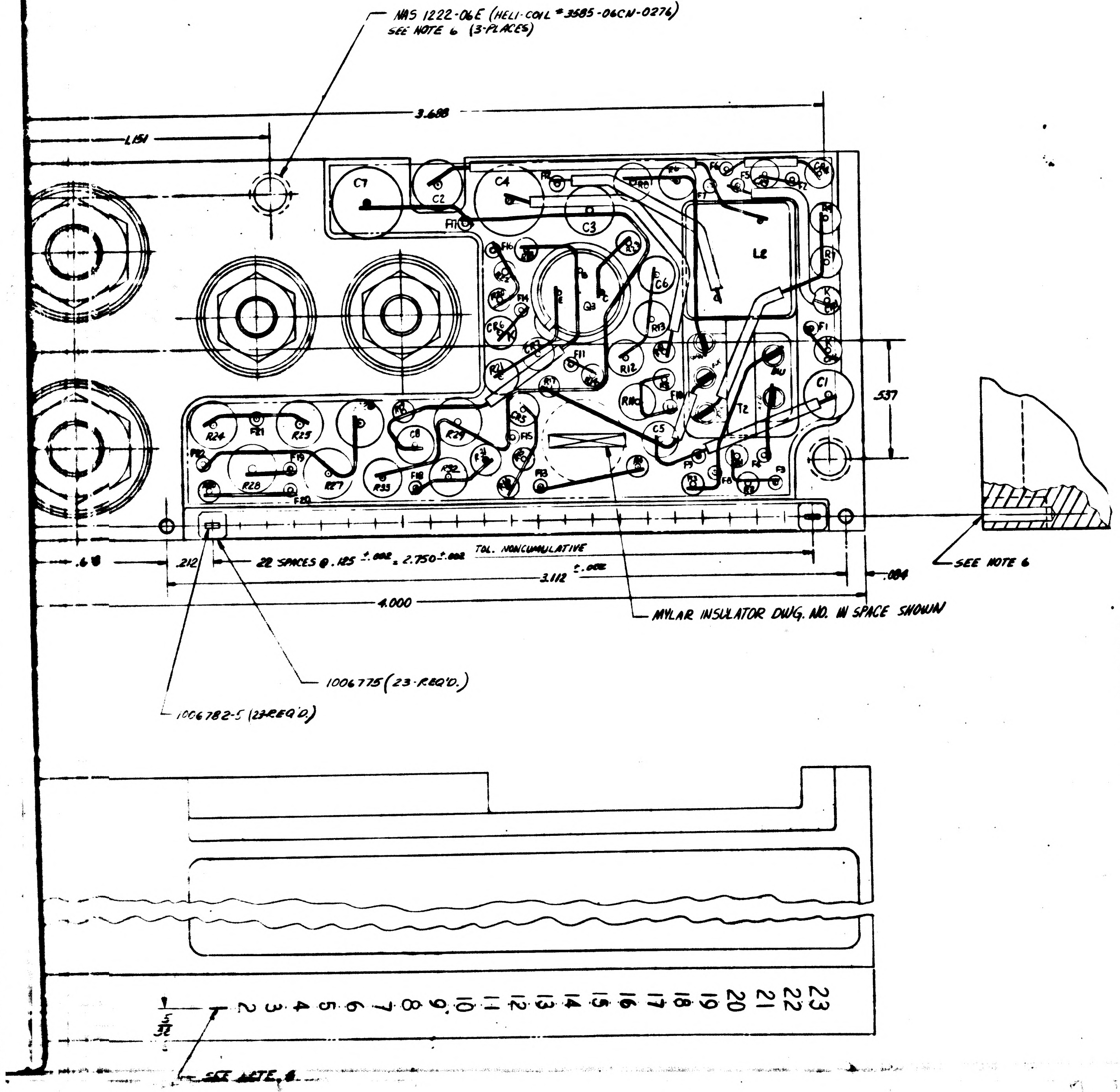
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	CHANGED PER TDR-E 00494	3-6-63	WK

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00410 DATE 2-18-6


NAS 1222-06E (HELI-COIL # 3585-06CN-0276)
SEE NOTE 6 (3-PLACES)
3.688
1.151
C7
C2
C4
C3
F17
F16
F14
F11
Q3
C6
R13
R12
L2
R24
F21
R25
R28
R27
R33
F18
R32
C8
R29
CR5
F15
F13
R17
C5
T2
C1
F1
F3
F8
F9
.537
.6
.212
22 SPACES @ .125 ±.002 = 2.750 ±.002 TOL. NONCUMULATIVE
3.112 ±.002
.084
4.000
SEE NOTE 6
MYLAR INSULATOR DWG. NO. IN SPACE SHOWN
1006775 (23-REQ'D.)
1006782-5 (23-REQ'D.)
1
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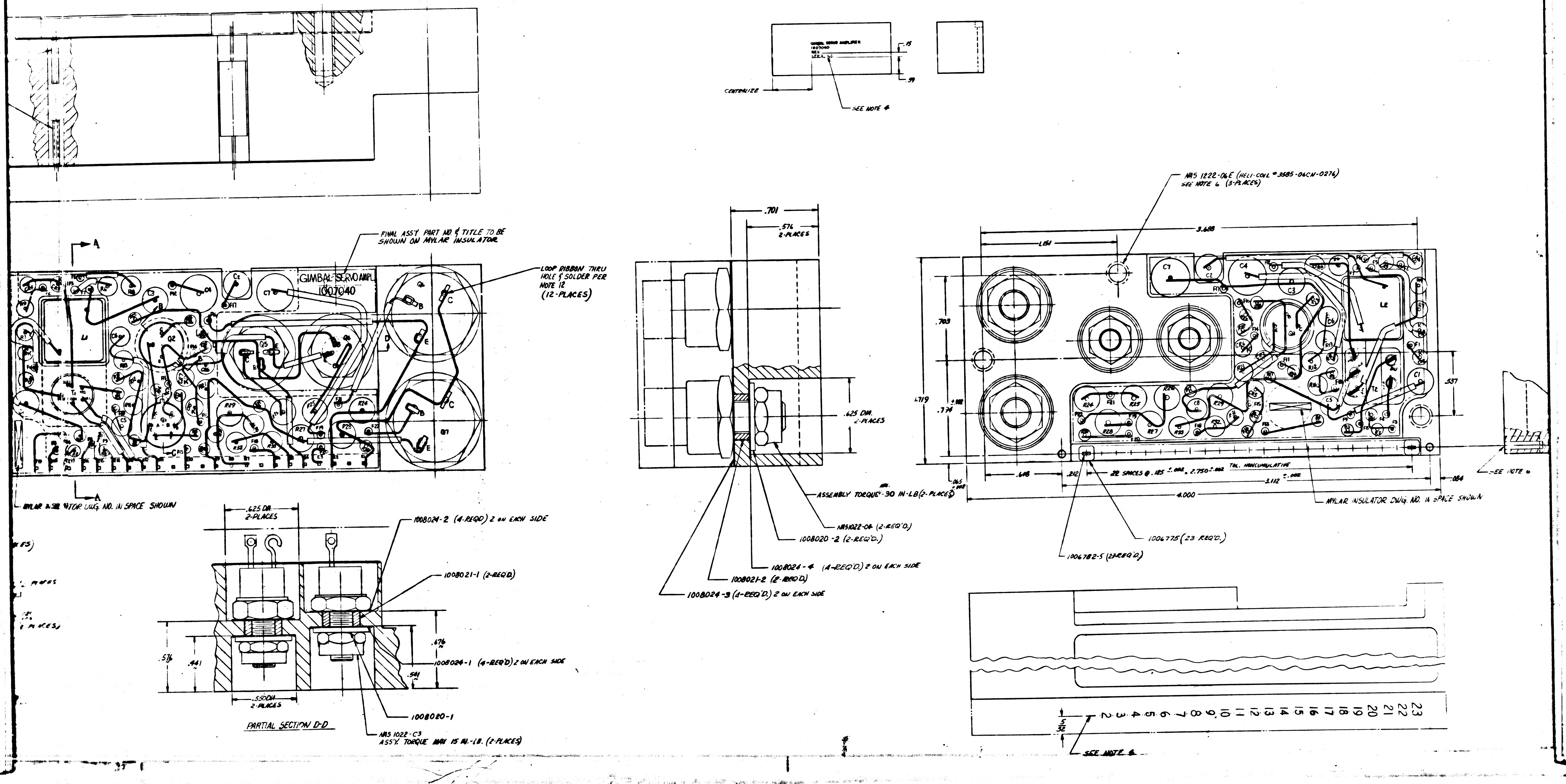
23
5/32
SEE NOTE 6

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

1. WELD PER ND1002005 & ND1002003.
2. RIBBON PATHS SHOWN DARK ARE UPPER LEVEL PER DIMENSION SHOWN.
3. ENCAPSULATE MODULE PER ND1002002 (BLACK POLYURETHANE FOAM).
4. MARK NUMBERS .080 HIGH, WHITE PER ND1002019.
5. COMPONENTS TO BE CEMENTED IN PLACE PER ND 1002004.
6. HEATSINK TO BE PER DRAWING D-1068288 UNLESS OTHERWISE SHOWN.
7. COMPONENTS ARE LOCATED ON .025 GRID.
8. SEE WIRING SCHEMATIC 1010024.
9. FINAL ASS'Y. DRAWING TITLE: GIMBAL SERVO AMPLIFIER MODULE ASS'Y.
10. FINAL ASS'Y. PART NO.: 1007040
11. SLEEVING PER MIL-T-18057.
12. SOLDER PER MIL-S-6872

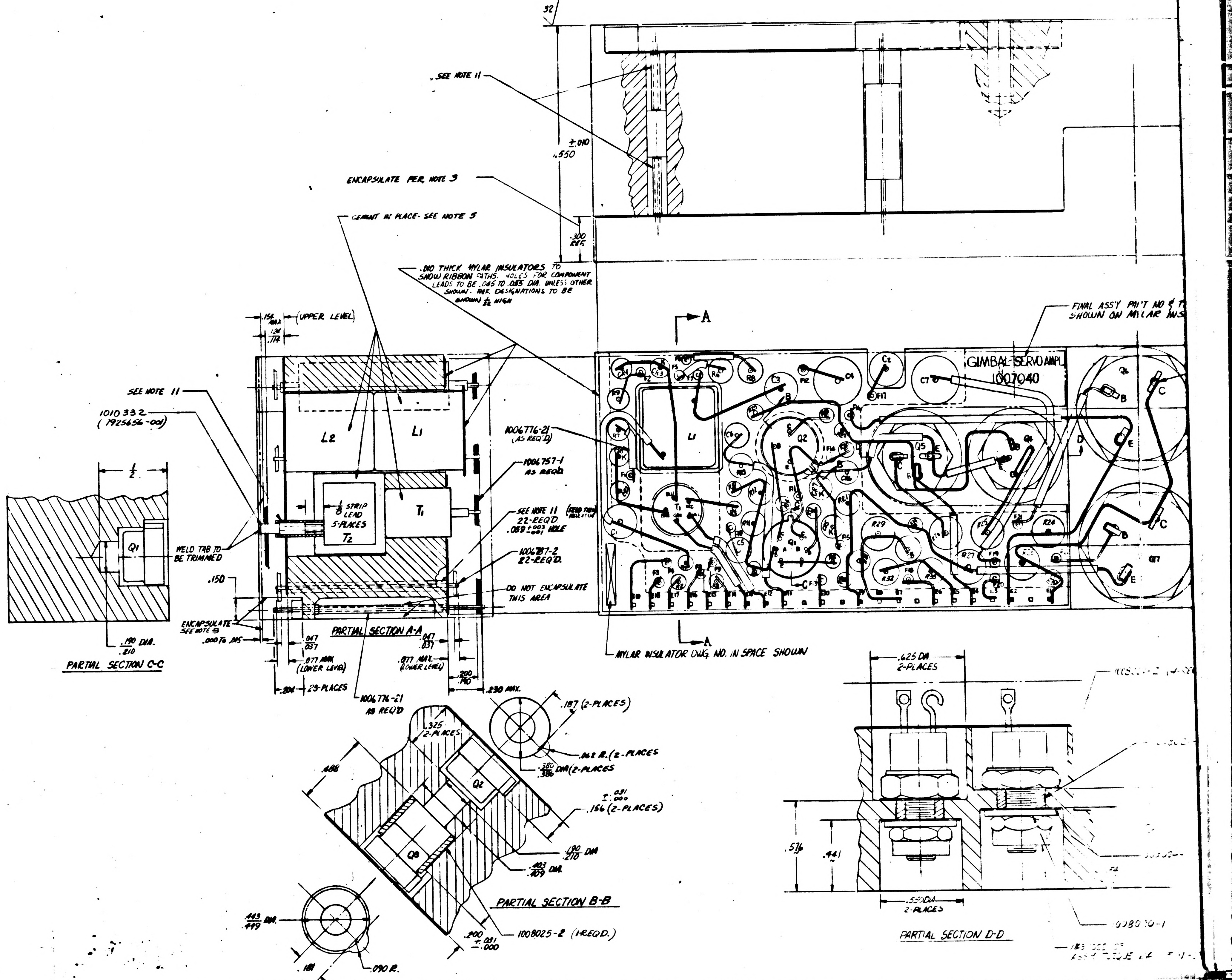
Ⓜ

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DRAWN [illegible] DATE [illegible] CHECKED [illegible] APPROVAL [illegible] APPROVAL [illegible]	DESIGN LAYOUT GIMBAL SERVO AMP.
NASA APPROVAL [illegible] MIT APPROVAL [illegible]	CODE IDENT NO. / SIZE / NASA DRAWING NO. 1010200
	SCALE 4:1 / WT / SHEET 1 OF 1



GIMBAL SERVO AMPLIFIER
1007040
REV.
SERIAL NO.
.15
.59
CENTRALIZE
SEE NOTE 4
FINAL ASS'Y PART NO. & TITLE TO BE SHOWN ON MYLAR INSULATOR
GIMBAL SERVO AMPL
1007040
LOOP RIBBON THRU HOLE & SOLDER PER NOTE 12 (12-PLACES)
A
A
D
D
MYLAR INSULATOR DWG. NO. IN SPACE SHOWN
.625 DIA 2-PLACES
1008024-2 (4-REQD) 2 ON EACH SIDE
1008021-1 (2-REQ'D)
.676
.576
.441
.541
1008024-1 (4-REQ'D) 2 ON EACH SIDE
.550DIA 2-PLACES
1008020-1
PARTIAL SECTION D-D
NAS 1022-C3
ASS'Y. TORQUE MAX 15 IN.-LB. (2-PLACES)
.701
.576 2-PLACES
.625 DIA. 2-PLACES
ASSEMBLY TORQUE MIN. -30 IN-LB (2-PLACES)
NAS1022-C4 (2-REQ'D.)
1008020-2 (2-REQ'D.)
1008024-4 (4-REQ'D.) 2 ON EACH SIDE
1008021-2 (2-REQ'D.)
1008024-3 (4-REQ'D.) 2 ON EACH SIDE
NAS 1222-06E (HELI-COIL #3585-06CN-0276)
SEE NOTE 6 (3-PLACES)
3.688
1.151
.703
1.719
.774 ±.002
.537
.065 ±.002
.648
.212
22 SPACES @ .125 ±.002 = 2.750 ±.002 TOL. NONCUMULATIVE
3.112 ±.002
.084
4.000
SEE NOTE 6
MYLAR INSULATOR DWG. NO. IN SPACE SHOWN
1006775 (23 REQ'D.)
1006782-5 (23 REQ'D.)
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
5/32
SEE NOTE 4

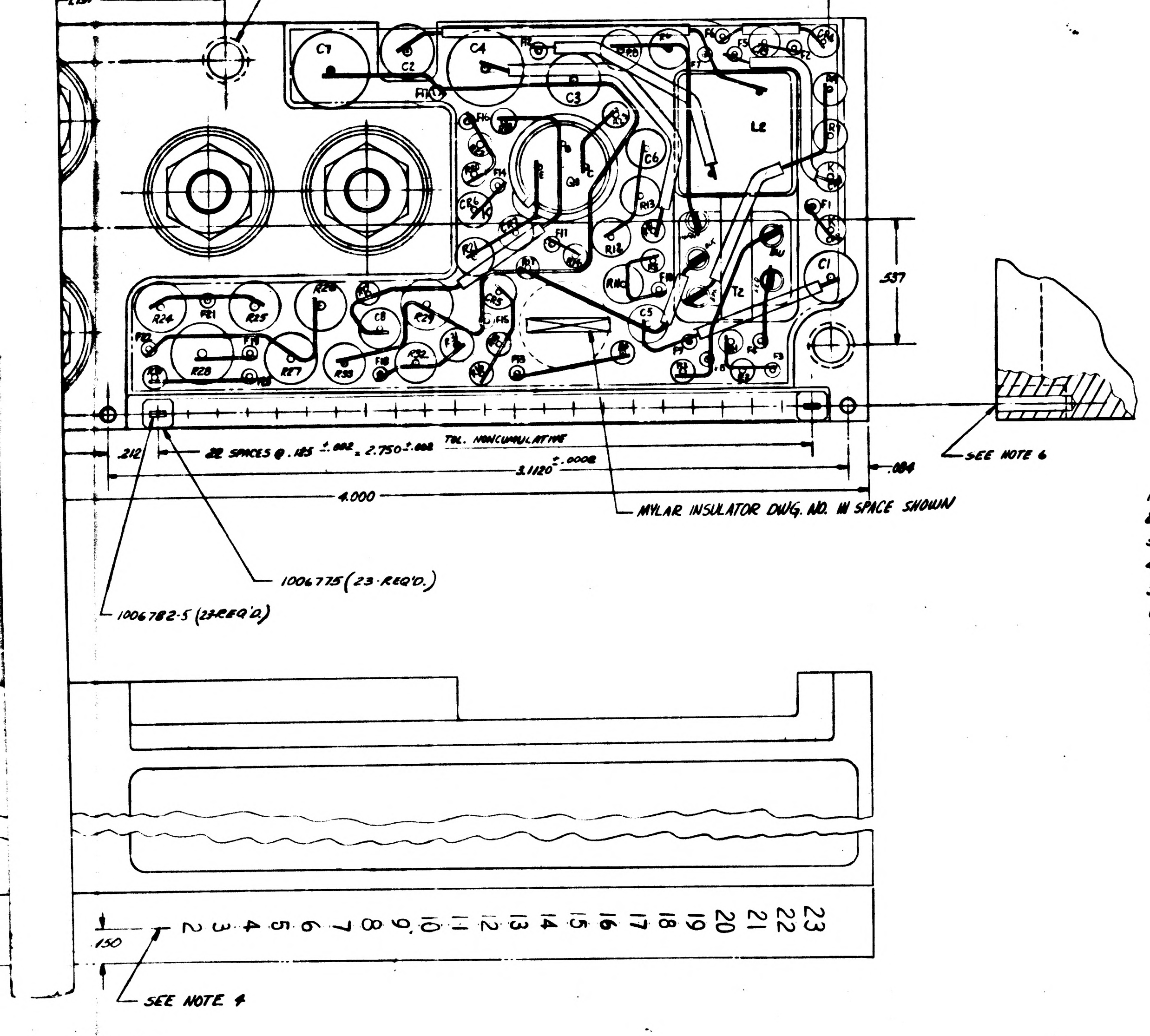
REF. DESIG.	PART NUMBER	DESCRIPTION	HOLE SIZE
C1	1010264-	CAPACITOR	.193 $^{+.003}_{-.001}$ DIA.
C2	1010264-		.193 $^{+.003}_{-.001}$ DIA.
C3	1010264-		.193 $^{+.003}_{-.001}$ DIA.
C4	1010320 -		.331 $^{+.005}_{-.002}$ DIA
C5	1010279 -		.177 $^{+.003}_{-.001}$ DIA.
C6	1010279 -		.177 $^{+.003}_{-.001}$ DIA.
C7	1010320 -		.331 $^{+.005}_{-.002}$ DIA
C8	1010279 -		.177 $^{+.003}_{-.001}$ DIA.
CR1	1010392	DIODE	.128 $^{+.003}_{-.001}$ DIA.
CR2	1010392		.128
CR3	1010392		.128
CR4	1010392		.128
CR5	1010372 15		.154
CR6	1010372 -15		.154
CR7	1010286		.154
R1	1006750- 73	RESISTOR	.101 $^{+.003}_{-.001}$ DIA
R2	1006750 - 73		.101
R3	1006750 - 73		.101
R4	1006750 - 80		.101
R5	1006750 - 48		.101
R6	1010364 - 443		.147
R7	1010364 - 443		.147
R8	1010364 - 443		.147
R9	1010364 - 443		.147
R10	1006750 - 73		.101
R11	1010364 - 635		.147
R12	1010364 - 465		.147
R13	1010364 - 719		.147
R14	1006750 - 60		.101
R15	1006750 - 76		.101
R16	1006750 - 51		.101
R17	1006750 - 80		.101
R18	1006750 - 70		.101
R19	1006750 - 76		.101
R20	1006750 - 51		.101
R21	1006760 - 36		.166
R22	1006750 - 53		.101
R23	1006750 - 40		.101
R24	1010389-		.228
R25	1010389-		.228
R26	1010389-		.228
R27	1010389-		.228
R28	1010389-		.228
R29	1010389-		.228
R30	1006750 - 73		.101
R31	1010364 - 43		.147
R32	1010377 - 66		.185
R33	1010377 - 66		.185
Q1	1010252	TRANSISTOR 2N2642	SEE SECTION C-C
Q2	1010396	2N1259	B-B
Q3	1010270	2N1613	B-B
Q4	1010269	2N2151	D-D
Q5	1010272	7P9511	D-D
Q6	1010271	5506	
Q7	1010273	2N1724	
L1	1010277-009	REACTOR	SEE SECTION A-A
L2	1010277-008	REACTOR	SEE SECTION A-A
T1	1010328	TRANSFORMER	.347 $^{+.005}_{-.002}$ DIA.
T2	1010327	TRANSFORMER	SEE SECTION A-A


32
SEE NOTE 11
.550 ±.010
ENCAPSULATE PER NOTE 3
.300 REF.
CEMENT IN PLACE- SEE NOTE 5
.010 THICK MYLAR INSULATORS TO SHOW RIBBON PATHS. HOLES FOR COMPONENT LEADS TO BE .045 TO .055 DIA. UNLESS OTHER SHOWN. REF. DESIGNATIONS TO BE SHOWN 1/32 HIGH
FINAL ASS'Y PART NO & T
SHOWN ON MYLAR INS
A
GIMBAL SERVO AMPL
1007040
.154 MAX
.124 / .114
(UPPER LEVEL)
SEE NOTE 11
1010332
(7925656-001)
1/2
Q1
WELD TAB TO BE TRIMMED
L2
L1
T1
1/8 STRIP LEAD 5-PLACES
T2
1006776-21 (AS REQ'D)
1006757-1 AS REQ'D
SEE NOTE 11 22-REQ'D .059 +.003 -.001 HOLE
(REED THRU INSULATION)
1006787-2 22-REQ'D.
DO NOT ENCAPSULATE THIS AREA
.150
ENCAPSULATE SEE NOTE 3
.000 TO .015
.047 / .037
.077 MAX (LOWER LEVEL)
.204 23-PLACES
PARTIAL SECTION A-A
1006776-21 AS REQ'D
.200 / .190
.230 MAX.
.190 DIA. / .210
PARTIAL SECTION C-C
MYLAR INSULATOR DWG. NO. IN SPACE SHOWN
.325 2-PLACES
.488
Q2
Q8
.187 (2-PLACES)
.062 R. (2-PLACES
.380 / .386 DIA (2-PLACES
.156 (2-PLACES) +.031 -.000
.190 / .210 DIA
.403 / .409 DIA.
PARTIAL SECTION B-B
.443 / .449 DIA.
.181
.090 R.
.200 +.031 -.000
1008025-2 (1-REQD.)
.625 DIA 2-PLACES
.576
.441
.550 DIA 2-PLACES
PARTIAL SECTION D-D
008030-1

1010200

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00 410 DATE 2-18-63

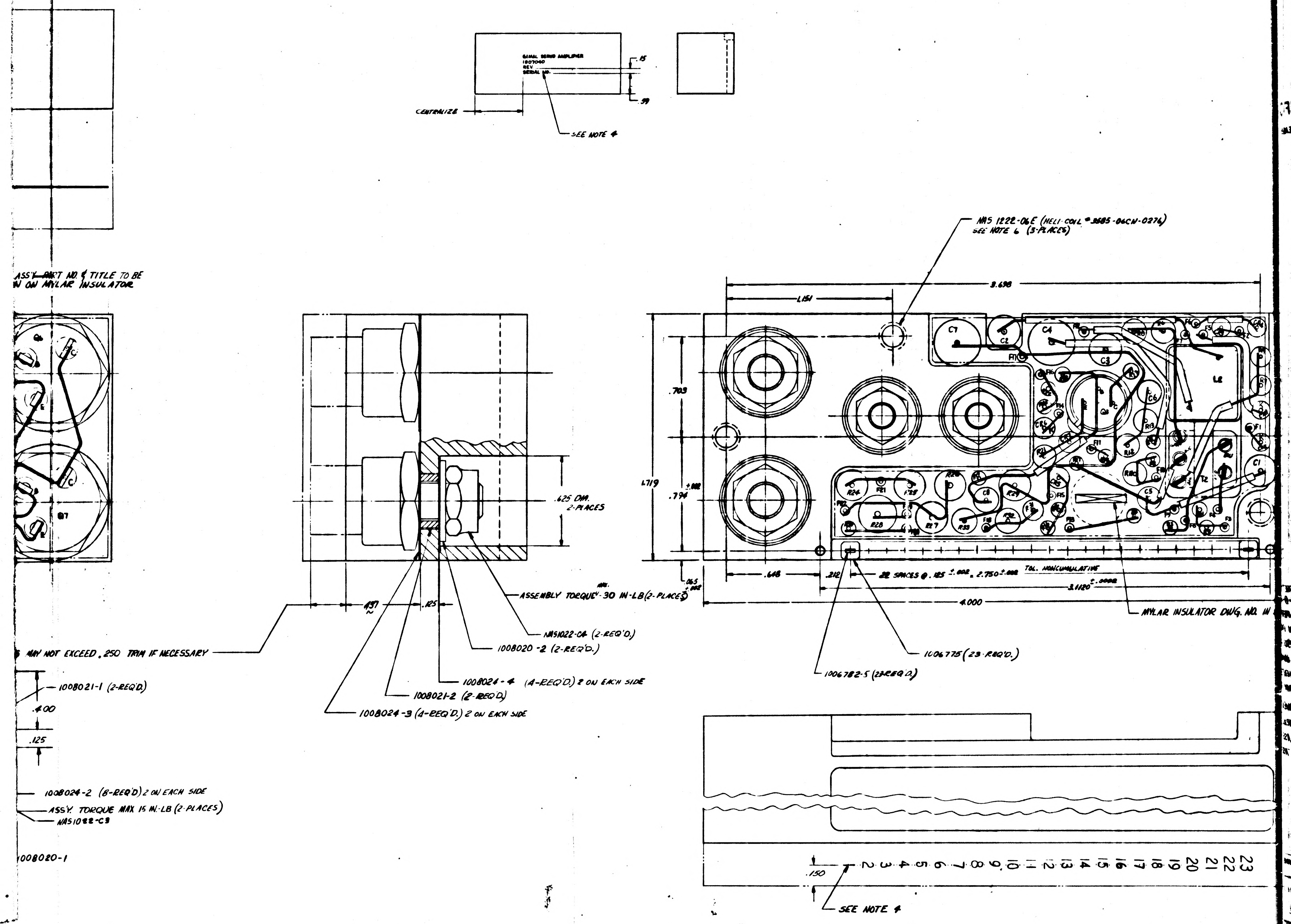


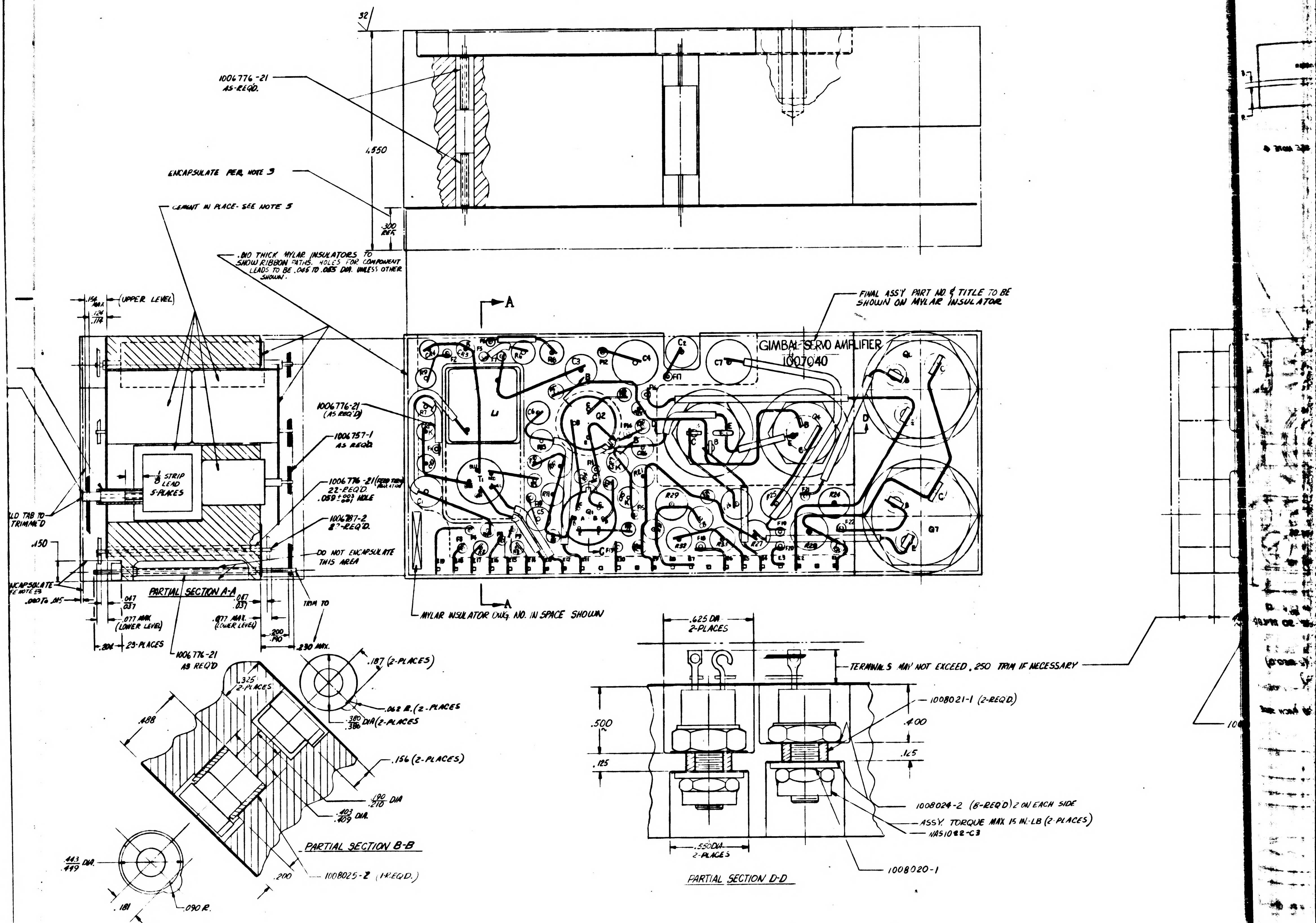
NAS 1222-06E (HELI-COIL # 3585-06CN-0276) SEE NOTE 6 (3-PLACES)
3.698
1.151
C7
C2
C4
C3
L2
Q8
C6
R13
R12
C5
T2
C1
R24
R25
R28
R27
R26
C8
R29
R32
R33
CR6
CR5
R21
R1
.537
SEE NOTE 6
.212
22 SPACES @ .125 ±.002 = 2.750 ±.002
TOL. NONCUMULATIVE
3.1120 ±.0002
.084
4.000
MYLAR INSULATOR DWG. NO. IN SPACE SHOWN
1006775 (23-REQ'D.)
1006782-5 (23-REQ'D.)
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
.150
SEE NOTE 4

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

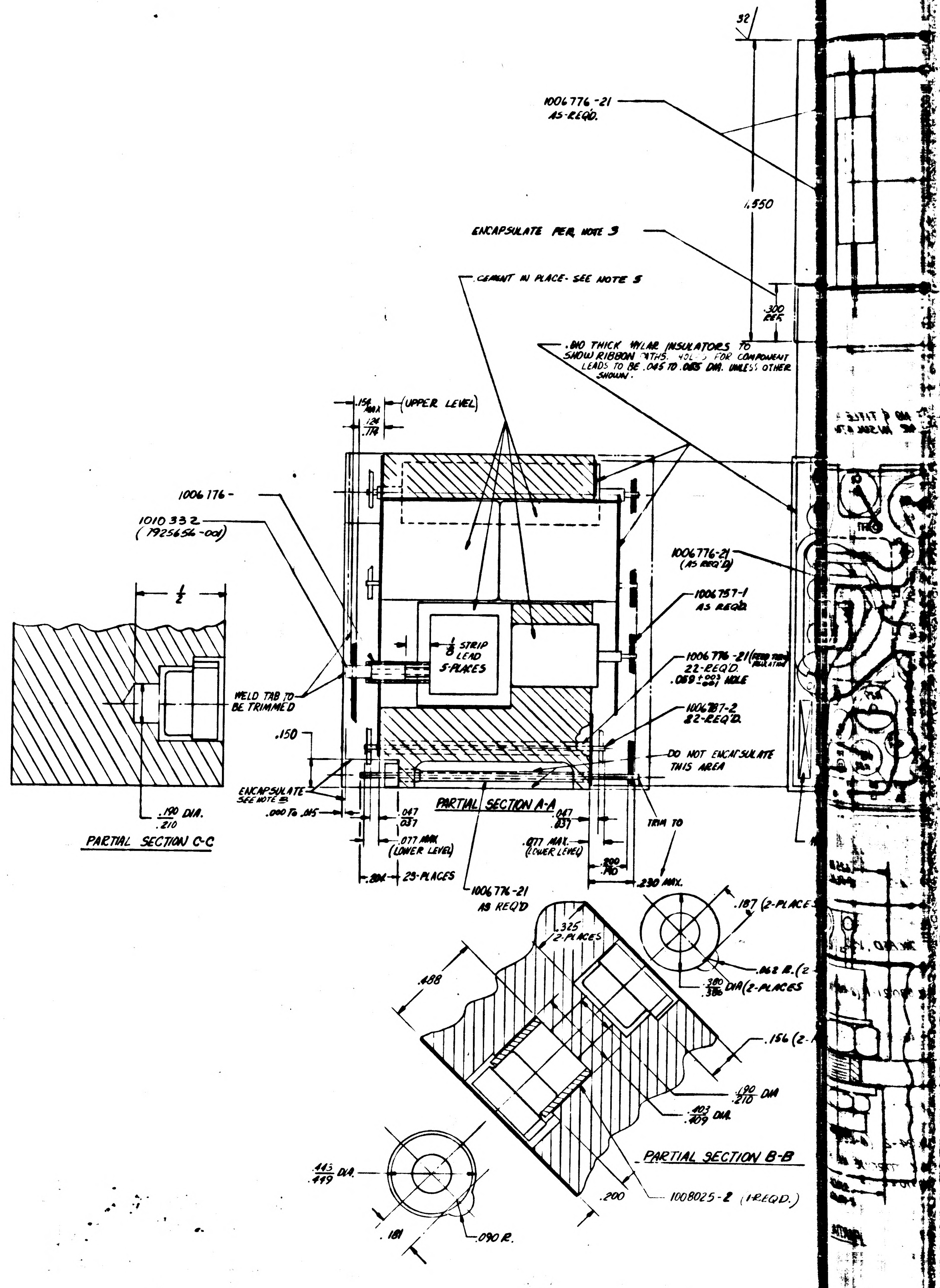
1. WELD PER ND1002005 & ND1002003.
2. RIBBON PATHS SHOWN DARK ARE UPPER LEVEL PER DIMENSION SHOWN.
3. ENCAPSULATE MODULE PER ND1002002 (BLACK POLYURETHANE FOAM).
4. MARK NUMBERS .080 HIGH, WHITE PER ND1002019.
5. COMPONENTS TO BE CEMENTED IN PLACE PER ND 1002004.
6. HEATSINK TO BE PER DRAWING D-1068208 UNLESS OTHERWISE SHOWN.
7. COMPONENTS ARE LOCATED ON .025 GRID.
8. SEE WIRING SCHEMATIC 1010024.
9. FINAL ASS'Y. DRAWING TITLE: GIMBAL SERVO AMPLIFIER MODULE ASS'Y.
10. FINAL ASS'Y. PART NO.: 1007040

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS		
DRAWN DATE 1-30-63 CHECKED APPROVAL 2/18/63 APPROVAL	DESIGN LAYOUT GIMBAL SERVO AMP.		
NASA APPROVAL 2/18/63	CODE IDENT NO.	SIZE	NASA DRAWING NO 1010200
MIT APPROVAL E.J. Nielson	SCALE 4:1	WT	SHEET 1 OF 1

GIMBAL SERVO AMPLIFIER
1007040
REV.
SERIAL NO.
.15
.59
CENTRALIZE
SEE NOTE 4
ASS'Y ~~PART~~ NO. & TITLE TO BE
N ON MYLAR INSULATOR
Q6
C
E
C
Q7
E
MAY NOT EXCEED .250 TRIM IF NECESSARY
1008021-1 (2-REQ'D.)
.400
.125
1008024-2 (8-REQ'D) 2 ON EACH SIDE
ASS'Y. TORQUE MAX 15 IN.-LB (2-PLACES)
NAS1022-C3
1008020-1
.437
.125
.625 DIA.
2-PLACES
ASSEMBLY TORQUE MAX. 30 IN-LB (2-PLACES)
NAS1022-C4 (2-REQ'D.)
1008020-2 (2-REQ'D.)
1008024-4 (4-REQ'D.) 2 ON EACH SIDE
1008021-2 (2-REQ'D.)
1008024-3 (4-REQ'D.) 2 ON EACH SIDE
NAS 1222-06E (HELI-COIL #3585-06CN-0276)
SEE NOTE 6 (3-PLACES)
3.698
1.151
.703
1.719
.794 ±.002
.065 ±.002
.648
.212
22 SPACES @ .125 ±.002 = 2.750 ±.002 TOL. NONCUMULATIVE
3.1120 ±.0002
4.000
MYLAR INSULATOR DWG. NO. IN
1006775 (23-REQ'D.)
1006782-5 (23-REQ'D.)
C7
C2
C4
C3
C1
C5
C6
C8
L2
T2
Q8
R24
R21
R25
R26
R22
R28
R27
R29
R33
R32
R31
R18
R13
R12
F3
F4
F8
.150
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
SEE NOTE 4


.32
1006776-21
AS REQD.
4.550
ENCAPSULATE PER NOTE 3
.300
REF.
CEMENT IN PLACE- SEE NOTE 5
.010 THICK MYLAR INSULATORS TO SHOW RIBBON PATHS. HOLES FOR COMPONENT LEADS TO BE .045 TO .055 DIA. UNLESS OTHER SHOWN.
FINAL ASS'Y PART NO. & TITLE TO BE SHOWN ON MYLAR INSULATOR
GIMBAL SERVO AMPLIFIER
1007040
A
A
D
D
.154 MAX
(UPPER LEVEL)
.124
.114
1006776-21
(AS REQ'D)
1006757-1
AS REQ'D
1/8 STRIP LEAD 5-PLACES
1006776-21 (FEED THRU INSULATION)
22-REQ'D.
.059 +.003 -.001 HOLE
1006787-2
8?-REQ'D.
DO NOT ENCAPSULATE THIS AREA
LD TAB TO TRIMMED
.150
ENCAPSULATE SEE NOTE 3
.020 TO .015
PARTIAL SECTION A-A
.047
.037
.077 MAX (LOWER LEVEL)
.047
.037
.077 MAX. (LOWER LEVEL)
.200
.190
TRIM TO
.230 MAX.
.204
23-PLACES
1006776-21
AS REQ'D
MYLAR INSULATOR DWG. NO. IN SPACE SHOWN
.187 (2-PLACES)
.325
2-PLACES
.488
.062 R. (2-PLACES
.380
.386 DIA (2-PLACES
.156 (2-PLACES)
.190
.210 DIA
.403
.409 DIA.
PARTIAL SECTION B-B
.200
1008025-2 (1-REQD.)
.443
.449 DIA.
.181
.090 R.
.625 DIA
2-PLACES
TERMINALS MAY NOT EXCEED .250 TRIM IF NECESSARY
1008021-1 (2-REQD.)
.500
.400
.125
.125
1008024-2 (8-REQ'D) 2 ON EACH SIDE
ASS'Y. TORQUE MAX 15 IN.-LB (2 PLACES)
NAS1022-C3
.550 DIA
2-PLACES
1008020-1
PARTIAL SECTION D-D

REF. DESIG.	PART NUMBER	DESCRIPTION	HOLE SIZE
C1	1010264-	CAPACITOR	.230 $^{+.003}_{-.001}$ DIA.
C2	1010264-		.230 $^{+.003}_{-.001}$ DIA.
C3	1010264-		.230 $^{+.003}_{-.001}$ DIA.
C4	1010320-		.330 $^{+.003}_{-.001}$ DIA
C5	1010279-		.177 $^{+.003}_{-.001}$ DIA.
C6	1010279-		.177 $^{+.003}_{-.001}$ DIA.
C7	1010320-		.330 $^{+.003}_{-.001}$ DIA
C8	1010279-		.177 $^{+.003}_{-.001}$ DIA.
CR1	1010392	DIODE	.128 $^{+.003}_{-.001}$ DIA.
CR2	1010392		.128
CR3	1010392		.128
CR4	1010392		.128
CR5	1010372 15		.154
CR6	1010372-15		.154
CR7	1010286		.154
R1	1006750-73	RESISTOR	.101 $^{+.003}_{-.001}$ DIA
R2	1006750-73		.101
R3	1006750-73		.101
R4	1006750-80		.101
R5	1006750-48		.101
R6	1010364-443		.147
R7	1010364-443		.147
R8	1010364-443		.147
R9	1010364-443		.147
R10	1006750-73		.101
R11	1010364-635		.147
R12	1010364-465		.147
R13	1010364-719		.147
R14	1006750-60		.101
R15	1006750-76		.101
R16	1006750-51		.101
R17	1006750-80		.101
R18	1006750-70		.101
R19	1006750-76		.101
R[illegible]	1006750-51		.101
R2[illegible]	1006760-36		.166
R22	1006750-53		.101
R23	1006150-40		.101
R24	1010278-		.218
R25	1010389-		.228
R26	1010389-		.228
R27	1010278-		.218
R28	1010389-		.228
R29	1010389-		.228
R30	1006750-73		.101
R31	1010364-43		.147
R32	1010377-66		.185
R33	1010377-66		.185
Q1	1010252	TRANSISTOR 2N2642	SEE SECTION
Q2	1010396	2N1259	
Q3	1010270	2N1613	
Q4	1010269	2N2151	
Q5	1010272	7P4511	
Q6	1010271	5506	
Q7	1010273	2N1724	
L1	1010277-009	REACTOR	SEE SECTION
L2	1010277-009	REACTOR	SEE SECTION
T1	1010328	TRANSFORMER	SEE SECTION
T2	1010327	TRANSFORMER	SEE SECTION

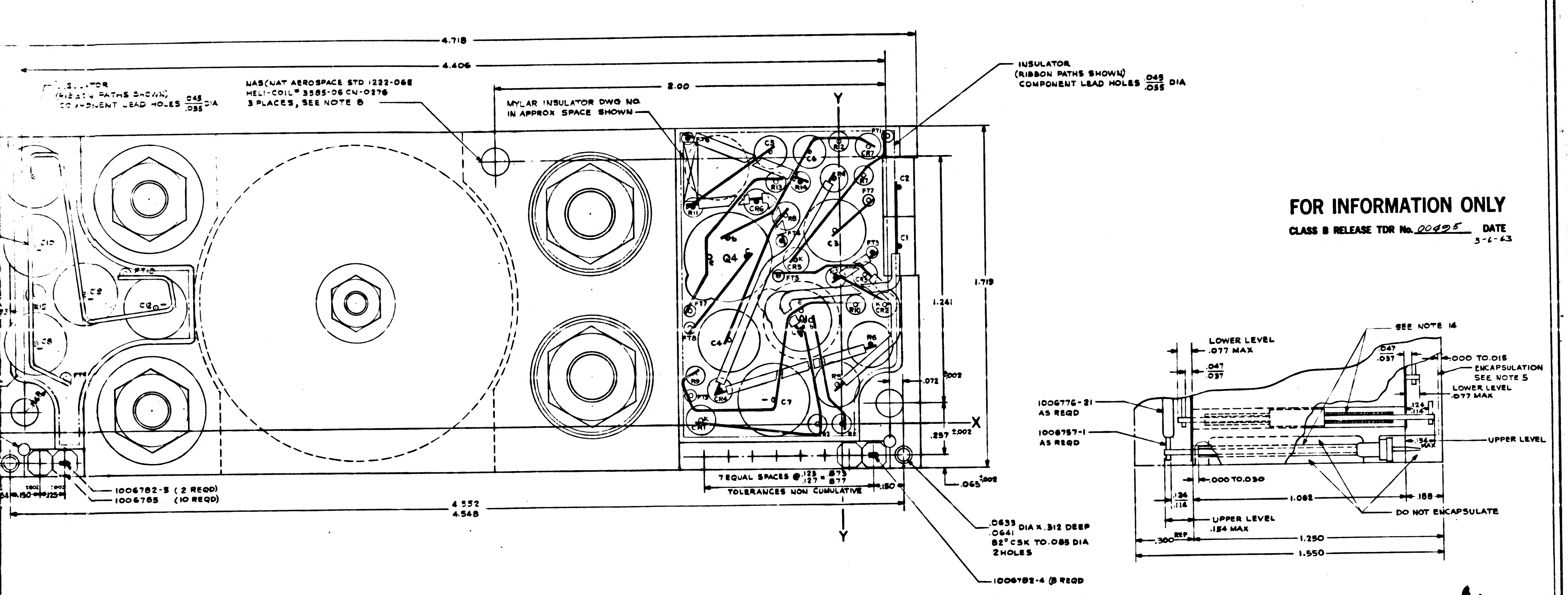

32
1006776-21
AS REQ'D.
1.550
ENCAPSULATE PER NOTE 3
.300
REF.
CEMENT IN PLACE - SEE NOTE 5
.010 THICK MYLAR INSULATORS TO SHOW RIBBON PATHS. HOLES FOR COMPONENT LEADS TO BE .045 TO .055 DIA. UNLESS OTHER SHOWN.
.154 MAX
(UPPER LEVEL)
.124
.114
1006176-
1010332
(7925656-001)
1/8 STRIP LEAD 5-PLACES
1006776-21
(AS REQ'D)
1006757-1
AS REQ'D
1006776-21
22-REQ'D.
.059 +.003 -.001 HOLE
1006787-2
82-REQ'D.
WELD TAB TO BE TRIMMED
.150
DO NOT ENCAPSULATE THIS AREA
ENCAPSULATE SEE NOTE
.000 TO .015
.047
.037
.077 MAX
(LOWER LEVEL)
.077 MAX.
(LOWER LEVEL)
TRIM TO
.200
.190
.230 MAX.
23-PLACES
1006776-21
AS REQ'D
1/2
.190 DIA.
.210
.325
2-PLACES
.187 (2-PLACES
.062 R. (2
.380
.386 DIA (2-PLACES
.488
.156 (2-
.190
.210 DIA
.403
.409 DIA.
.443
.449 DIA.
.200
1008025-2 (1-REQD.)
.181
.090 R.

PARTIAL SECTION A-A

PARTIAL SECTION B-B

PARTIAL SECTION C-C

1010200

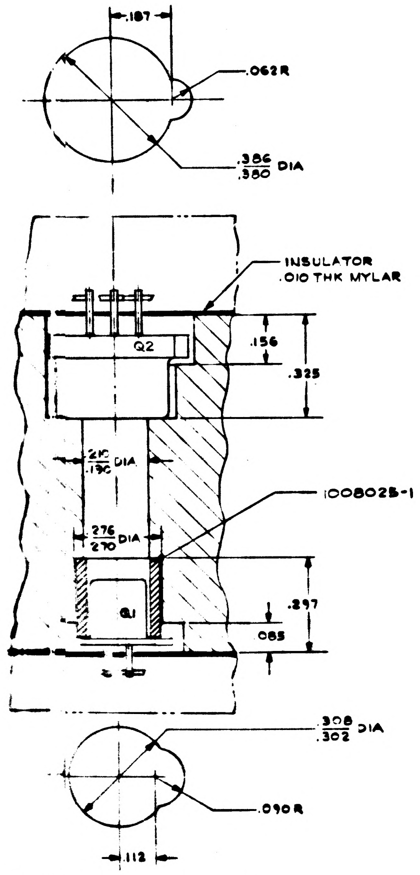

INSULATOR
(RIBBON PATHS SHOWN)
COMPONENT LEAD HOLES .045/.035 DIA
NAS(NAT AEROSPACE STD 1222-06E
HELI-COIL # 3585-06 CN-0276
3 PLACES, SEE NOTE 8
MYLAR INSULATOR DWG NO.
IN APPROX SPACE SHOWN
4.718
4.406
2.00
INSULATOR
(RIBBON PATHS SHOWN)
COMPONENT LEAD HOLES .045/.035 DIA
Y
X
Q4
C4
C7
C3
C5
C6
C2
C1
1.719
1.241
.072
.257 ±.002
.065 ±.002
7 EQUAL SPACES @ .125/.127 = .873/.877
TOLERANCES NON CUMULATIVE
.150
4.552
4.548
1006782-5 (2 REQD)
1006785 (10 REQD)
.0633/.0641 DIA x .312 DEEP
82° CSK TO .085 DIA
2 HOLES
1006782-4 (8 REQD)
SEE NOTE 14
LOWER LEVEL
.077 MAX
.047/.037
.000 TO .015
ENCAPSULATION
SEE NOTE 5
LOWER LEVEL
.077 MAX
1006776-21
AS REQD
1006757-1
AS REQD
.124/.114
.154 MAX
UPPER LEVEL
.000 TO .030
1.062
.188
DO NOT ENCAPSULATE
UPPER LEVEL
.154 MAX
.300 REF
1.250
1.550

FOR INFORMATION ONLY

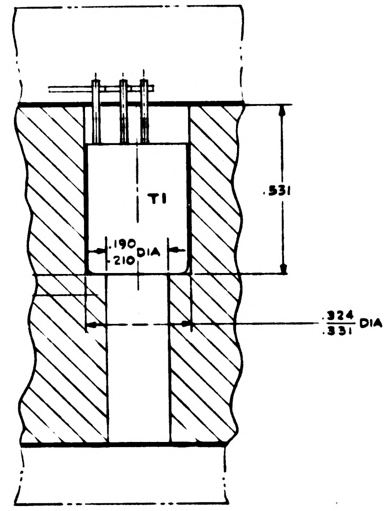
CLASS B RELEASE TDR No. 00495 **DATE** 3-6-63

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. WELD PER ND 1002003 & ND 1002005
3. BLACK DOT ● INDICATES LEAD TO BE CUT FOR UPPER LEVEL WIRING
4. WHITE DOT ○ INDICATES LEAD TO BE CUT FOR LOWER LEVEL WIRING
5. ENCAPSULATE MODULE PER ND 1002002 (BLACK POLYURETHANE FOAM
6. COMPONENTS TO BE CEMENTED IN PLACE PER ND 1002009
7. RIBBON PATHS SHOWN DARK ARE UPPER LEVEL PER DIMENSIONS SHOWN
8. HEATSINK TO BE PER DWG. M.I.T. # D-106828-B UNLESS OTHERWISE SHOWN
9. DIODES SHOWN WITH "K" DENOTES CATHODE END
10. COMPONENTS ARE LOCATED ON .025 GRID UNLESS OTHERWISE NOTED
11. MARK NUMBERS .080 HIGH, WHITE PER ND 1002019 APPROX WHERE SHOWN
12. FINAL ASSY DRAWING TITLE: POWER SUPPLY -28V DC MODULE ASSEMBLY
13. FINAL ASSY PART NO. 1007042
14. SLEEVING PER MIL-I-18057
15. SOLDER PER MIL-S-6872


.187
.062R
.386/.380 DIA
INSULATOR
.010 THK MYLAR
Q2
.156
.325
.210/.190 DIA
.276/.270 DIA
1008025-1
Q1
.297
.085
.308/.302 DIA
.090R
.112

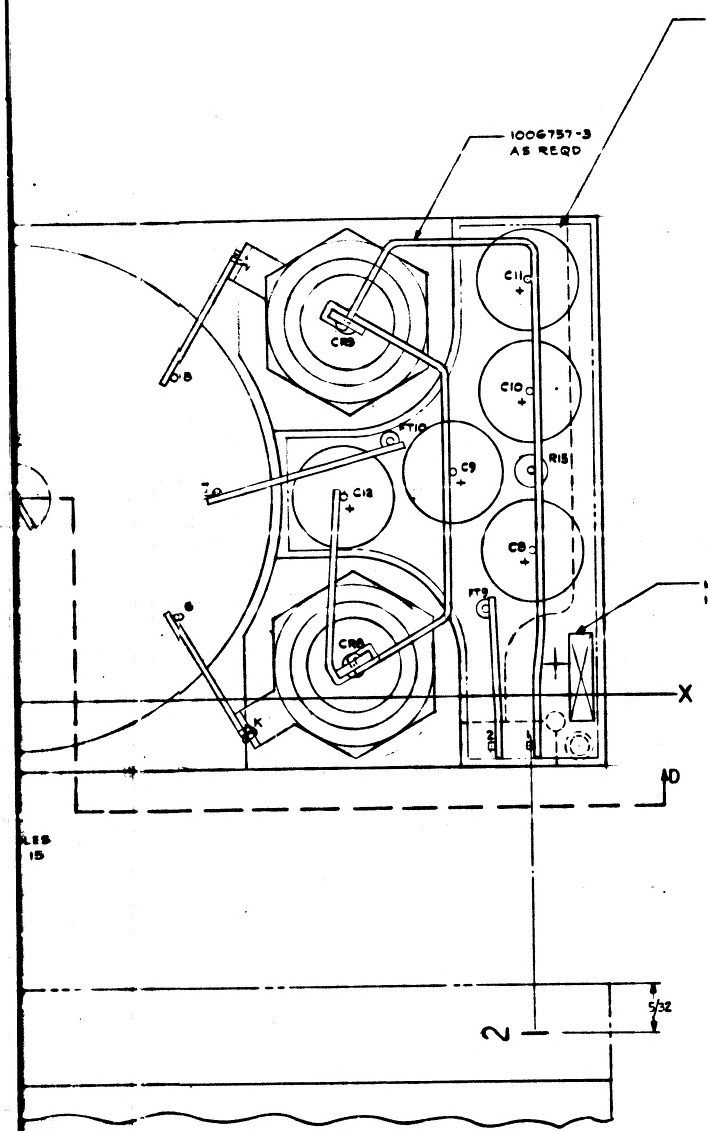
PARTIAL SECTION B-B

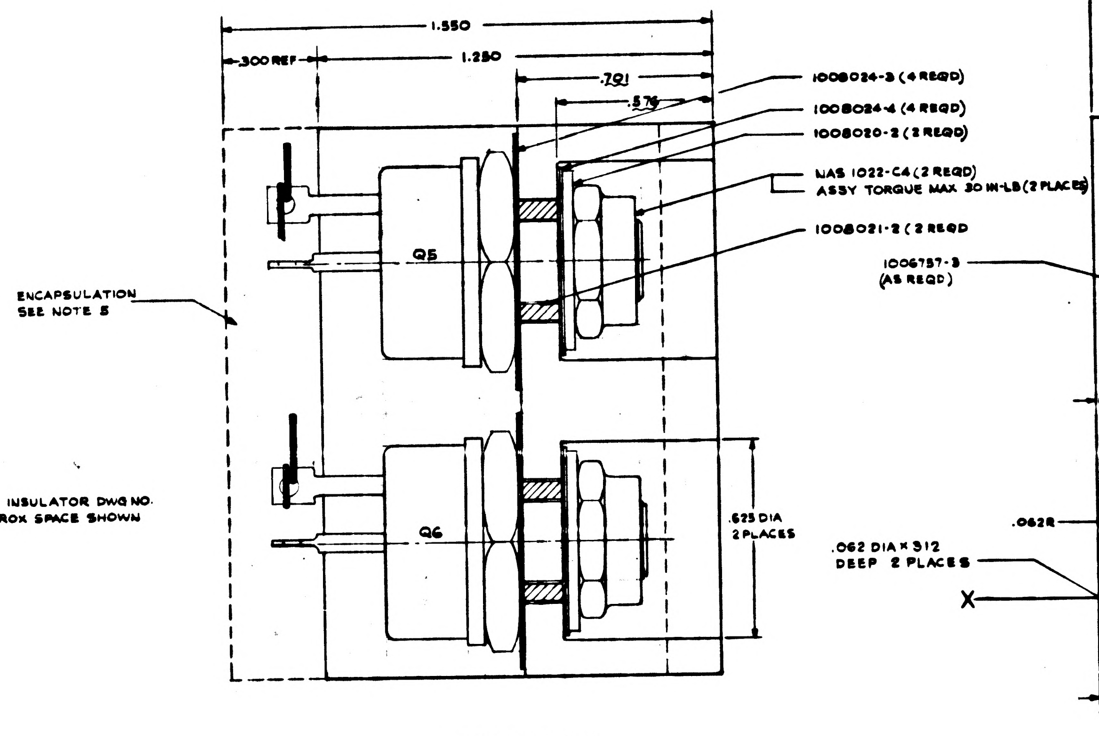

T1
.531
.190/.210 DIA
.324/.331 DIA

PARTIAL SECTION C-C

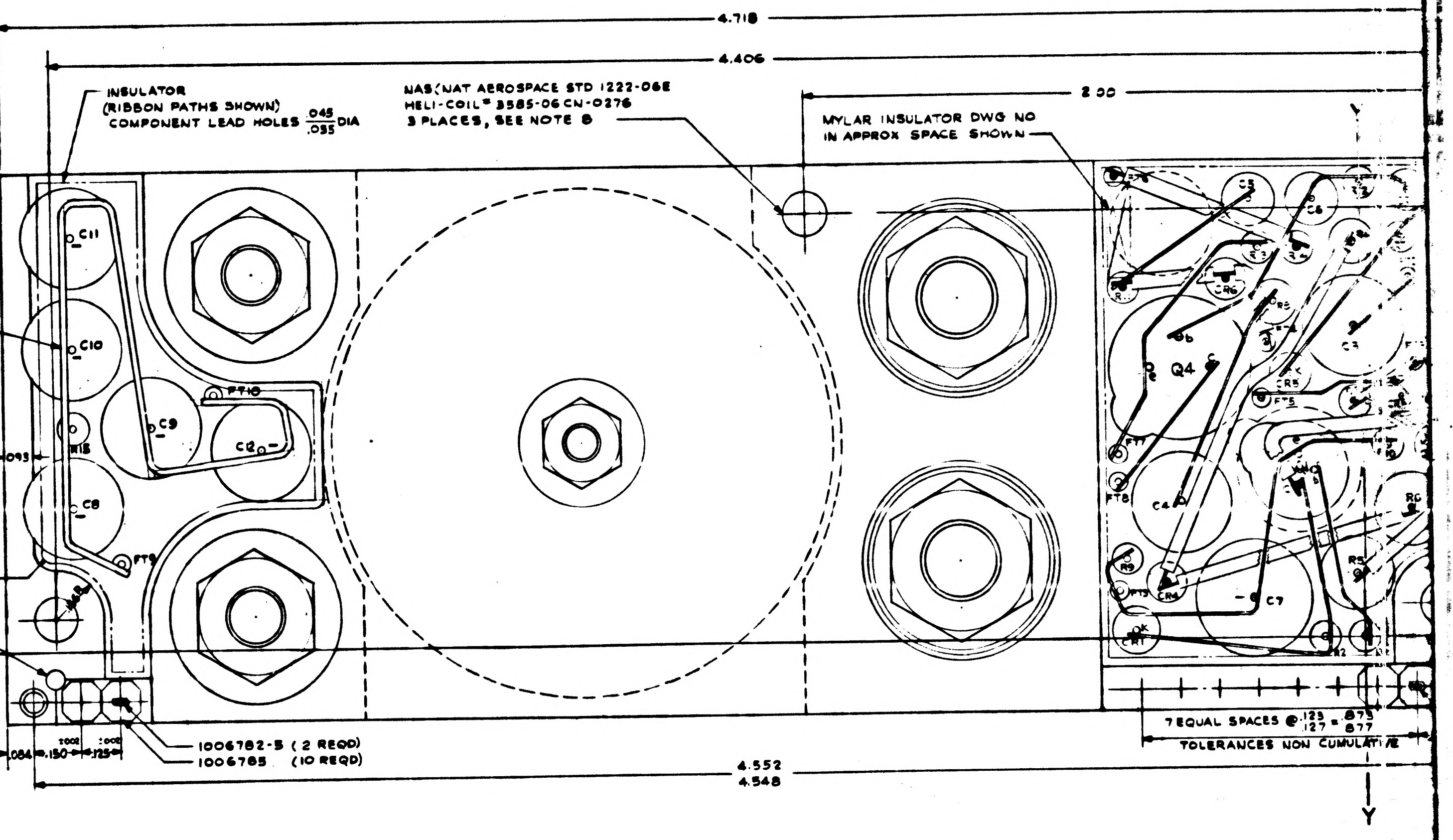
DRAWINGS FOR REFERENCE
SCHEMATIC, POWER SUPPLY -28V DC
DWG NO. 1010023

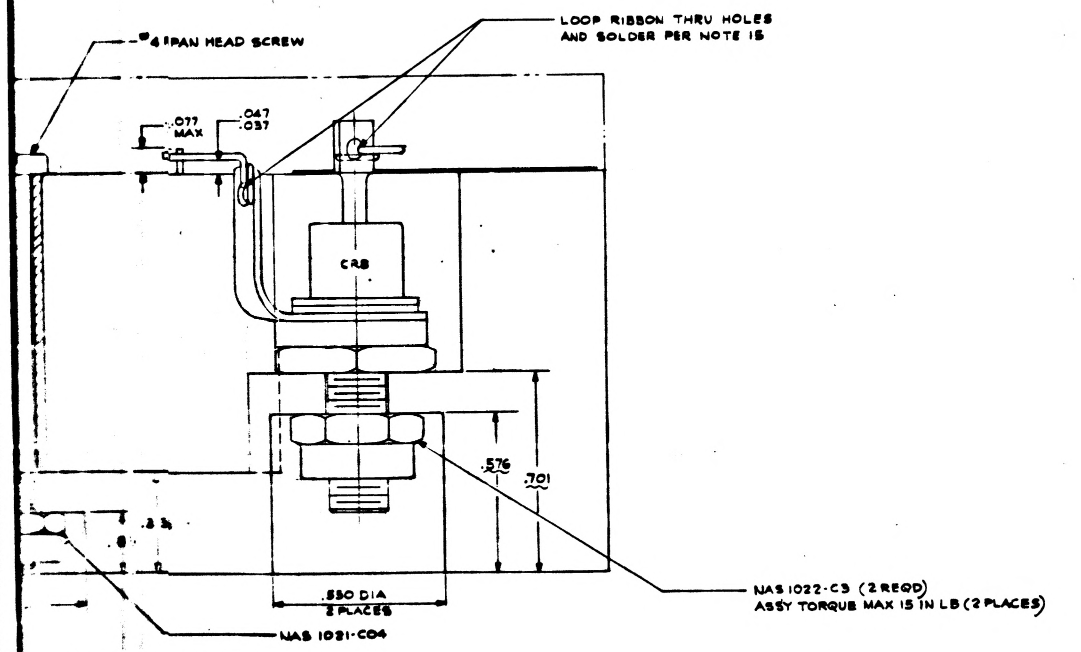
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± DECIMALS ±.005 ANGLES ±1° DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL	DRAWN S Bonano DATE 2/9/63 CHECKED 3/6/63 APPROVAL APPROVAL 2-6-63	DESIGN LAYOUT POWER SUPPLY, -28V DC
HEAT TREATMENT	NASA APPROVAL 3/6/63	CODE IDENT NO. · SIZE J · NASA DRAWING NO. 1010202
FINAL FINISH	MIT APPROVAL 3/6/63	SCALE 5:1 · WT ~ · SHEET 1 OF 1


INSULATOR
RIBBON PATHS SHOWN
COMPONENT LEAD HOLES .045/.055 DIA
1006757-3
AS REQD
C11
C10
C9
C12
C8
CR9
CR8
R15
FT10
FT9
MYLAR INSULATOR DWG NO.
IN APPROX SPACE SHOWN
X
D
2
5/32

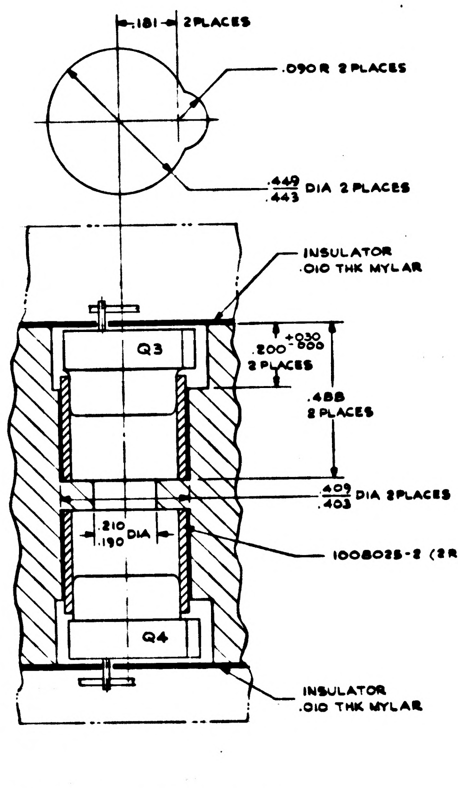

1.550
.300 REF
1.250
.701
.576
1008024-3 (4 REQD)
1008024-4 (4 REQD)
1008020-2 (2 REQD)
NAS 1022-C4 (2 REQD)
ASSY TORQUE MAX 30 IN-LB (2 PLACES)
1008021-2 (2 REQD
ENCAPSULATION
SEE NOTE 5
Q5
Q6
.625 DIA
2 PLACES

SECTION E-E

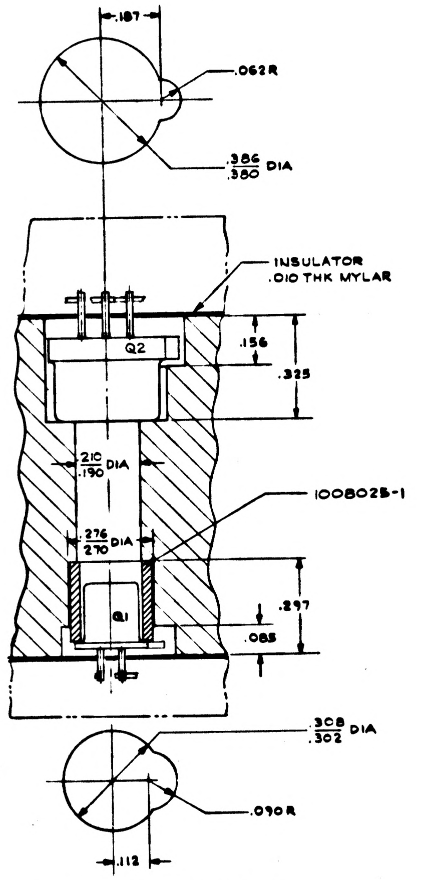

4.718
4.406
2.00
INSULATOR
(RIBBON PATHS SHOWN)
COMPONENT LEAD HOLES .045/.055 DIA
NAS (NAT AEROSPACE STD 1222-06E
HELI-COIL® 3585-06 CN-0276
3 PLACES, SEE NOTE 8
MYLAR INSULATOR DWG NO
IN APPROX SPACE SHOWN
1006757-3
(AS REQD)
.093
.062R
.062 DIA × .312
DEEP 2 PLACES
X
Y
C11
C10
C9
C12
C8
R15
FT10
FT9
Q4
C4
C7
CR4
1006782-5 (2 REQD)
1006785 (10 REQD)
.084
.150
.125
7 EQUAL SPACES @ .123/.127 = .873/.877
TOLERANCES NON CUMULATIVE
4.552
4.548


#4 PAN HEAD SCREW
LOOP RIBBON THRU HOLES
AND SOLDER PER NOTE 15
.077
MAX
.047
.037
CR8
.576
.701
.550 DIA
2 PLACES
NAS 1022-C3 (2 REQD)
ASSY TORQUE MAX 15 IN LB (2 PLACES)
NAS 1021-C04

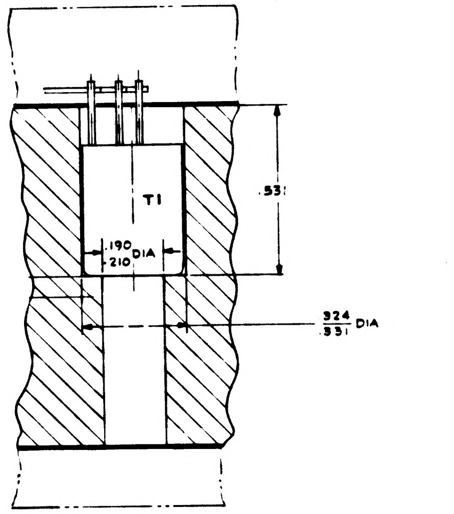
PART AL SECTION D-D


.181
2 PLACES
.090R 2 PLACES
.449/.443 DIA 2 PLACES
INSULATOR
.010 THK MYLAR
Q3
.200 +.030/-.000
2 PLACES
.488
2 PLACES
.405/.403 DIA 2 PLACES
.210/.190 DIA
1008025-2 (2 REQD)
Q4
INSULATOR
.010 THK MYLAR

PARTIAL SECTION A-A

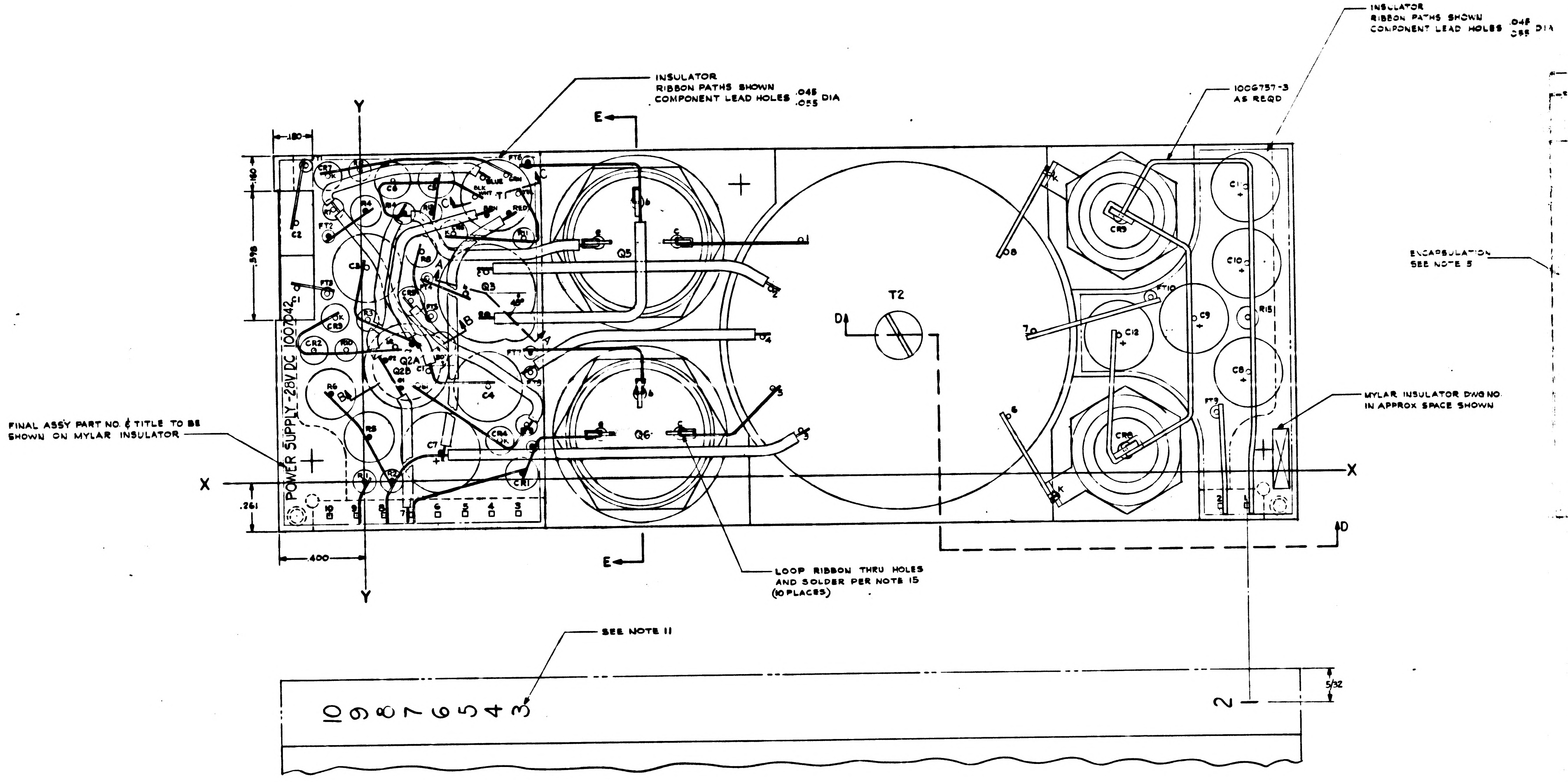

.187
.062R
.386/.380 DIA
INSULATOR
.010 THK MYLAR
Q2
.156
.325
.210/.190 DIA
1008025-1
.276/.270 DIA
Q1
.297
.085
.308/.302 DIA
.090R
.112

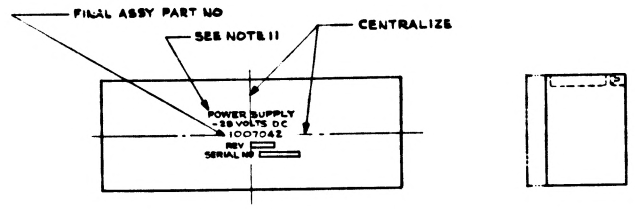
PARTIAL SECTION B-B


T1
.190/.210 DIA
.53
.324/.331 DIA

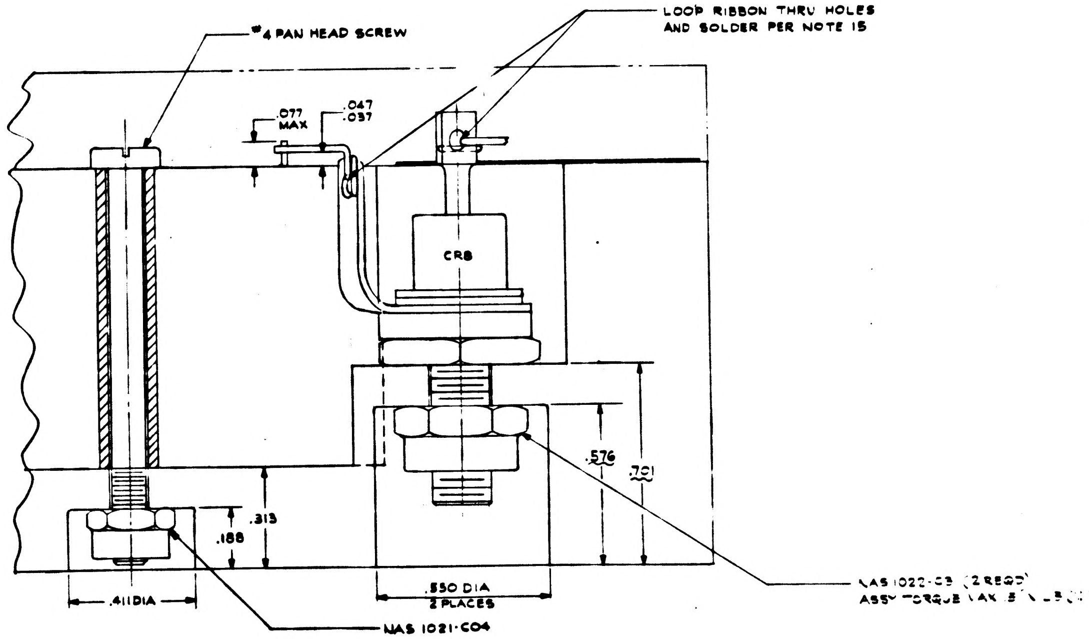
PARTIAL SECTION C-C

REF DESIG	"X" BASIC DIMENSION	"Y" BASIC DIMENSION	HOLE DIA THRU +003 -.001	PART NUMBER
R1	.000	.000	.101	1006750-56
R2	.125	.000		1006750-49
R3	.025	.791	↓	1006750-74
R4	.025	1.291	.147	1010364-381
R5	.025	.200	.228	1010363-557
R6	-.150	.400	.228	1010363-557
R7	-.125	1.250	.101	1006750-56
R8	.275	1.050	.147	1010364-381
R9	.750	.250	.101	1006750-56
R10	-.075	.600		1006750-56
R11	.750	1.100		1006750-19
R12	.000	1.425		1006750-19
R13	.325	1.225		1010368-1
R14	.200	1.225		1010368-1
R15	4.100	.700	↓	1006750-66
C1	DIMENSIONALLY LOCATED ON DWG			CYFR 15-681-G
C2	↓	↓	↓	CYFR-15-681-G
C3	.025	.975	.316	1010316-
C4	.575	.425	↓	1010316-
C5	.350	1.375	.162	1006777-30
C6	.150	1.375	↓	1006777-30
C7	.350	.125	.370	1006755-89
C8	4.100	.450	.315	
C9	3.850	.700		
C10	4.100	.950		
C11	4.100	1.225		
C12	3.500	.625	↓	
CR1	.725	.025	.152	1010372-22
CR2	-.225	.600	.128	
CR3	-.125	.750		
CR4	.625	.175		
CR5	.225	.825		
CR6	.425	1.125		
CR7	-.150	1.250	↓	
CR8	3.525	.100	SEE PARTIAL SECTION D-D	1010322
CR9	3.525	1.175	↓	1010322
Q1	.200	.525	SEE PARTIAL SECTION B-B	1006752 FCH 2N914 (HOT CASE)
Q2	.200	.525	SEE PARTIAL SECTION B-B	1010376 FCH 2N2060
Q3	.575	.850	SEE PARTIAL SECTION A-A	1010398 GE 2N2193 (HOT CASE)
Q4	.575	.850	SEE PARTIAL SECTION A-A	1010398 GE 2N2193 (HOT CASE)
Q5	1.275	.200	SEE PARTIAL SECTION E-E	1010319 PSI 2N1904 1/16 STUD
Q6	1.275	1.075	SEE PARTIAL SECTION E-E	1010319 PSI 2N1904 1/16 STUD
T1	.625	1.300	SEE PARTIAL SECTION C-C	1010323
T2	2.475	.637	SEE PARTIAL SECTION D-D	
FT1	-.250	1.450	.039	FEED THRUS WIRE, ELECT PART Nº 1006787-2 INSULATION, SLEEVING ELECT PART NO. 1006776-21
FT2	-.150	1.125		
FT3	-.162	.862		
FT4	.300	.825		
FT5	.315	.750		
FT6	.775	1.450		
FT7	.775	.575		
FT8	.775	.487		
FT9	.775	.275		
FT10	3.650	.800	↓	


INSULATOR
RIBBON PATHS SHOWN
COMPONENT LEAD HOLES .045 .035 DIA
E
Y
.180
.160
.598
.261
.400
X
POWER SUPPLY -28V DC 1007042
FINAL ASSY PART NO. & TITLE TO BE SHOWN ON MYLAR INSULATOR
Q5
Q6
Q3
Q2A
Q2B
T1
T2
D
CR9
CR8
C12
C9
C10
C11
C8
R15
FT10
INSULATOR
RIBBON PATHS SHOWN
COMPONENT LEAD HOLES .045 .035 DIA
1006757-3
AS REQD
ENCAPSULATION
SEE NOTE 5
MYLAR INSULATOR DWG NO. IN APPROX SPACE SHOWN
LOOP RIBBON THRU HOLES AND SOLDER PER NOTE 15 (10 PLACES)
SEE NOTE 11
10 9 8 7 6 5 4 3
2
5/32


FINAL ASSY PART NO
SEE NOTE 11
CENTRALIZE
POWER SUPPLY
-28 VOLTS DC
1007042
REV
SERIAL NO

TOP VIEW
SHOWING NAMEPLATE
SCALE FULL SIZE

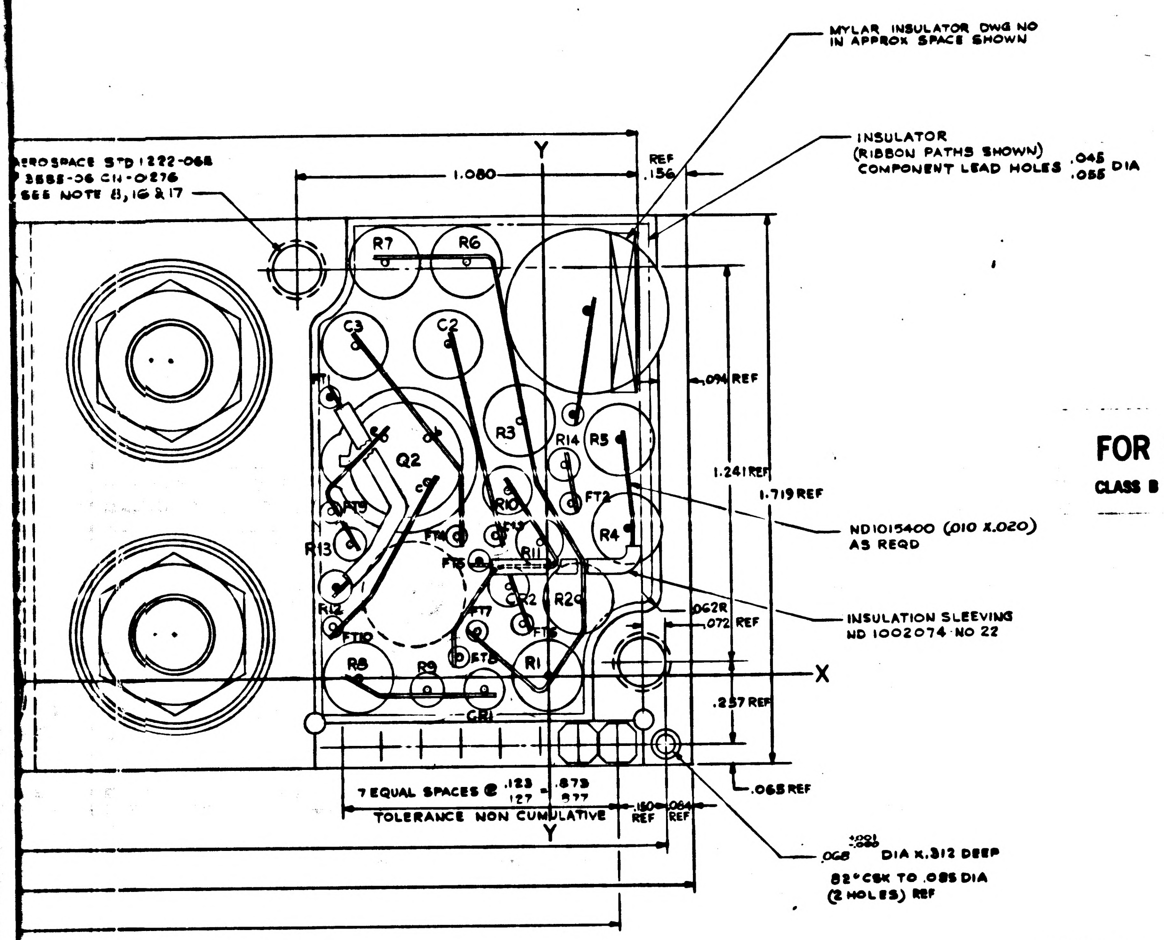

#4 PAN HEAD SCREW
LOOP RIBBON THRU HOLES AND SOLDER PER NOTE 15
.077 MAX
.047 .037
CR8
.576
.701
.313
.188
.411 DIA
.550 DIA 2 PLACES
NAS 1021-C04
NAS 1022-C3 (2 REQD)
ASSY TORQUE MAX

PARTIAL SECTION D-D

1010205 A

SYM	DESCRIPTION	DATE	APPROVAL
A	REDRAWN AND REPLACED WITH CHANGES BY REV B	4/29/63	WK.

TDCC 00977


MYLAR INSULATOR DWG NO
IN APPROX SPACE SHOWN
INSULATOR
(RIBBON PATHS SHOWN)
COMPONENT LEAD HOLES .045 .055 DIA
AEROSPACE STD 1222-06E
3585-06 CN-0276
SEE NOTE 8, 16 & 17
1.080
REF .156
Y
R7
R6
C3
C2
Q2
R3
R14
R5
FT1
FT2
FT5
FT7
FT8
FT9
FT10
FT14
FT15
FT16
R13
R12
R10
R11
R4
CR2
R2
R8
R9
R1
CR1
.094 REF
1.241 REF
1.719 REF
ND1015400 (.010 X.020)
AS REQD
INSULATION SLEEVING
ND 1002074 NO 22
.062R
.072 REF
X
.257 REF
.065 REF
7 EQUAL SPACES @ .123 .127 = .873 .877
TOLERANCE NON CUMULATIVE
.150 REF
.064 REF
Y
.068 +.001 -.000 DIA X.312 DEEP
82° CSK TO .085 DIA
(2 HOLES) REF

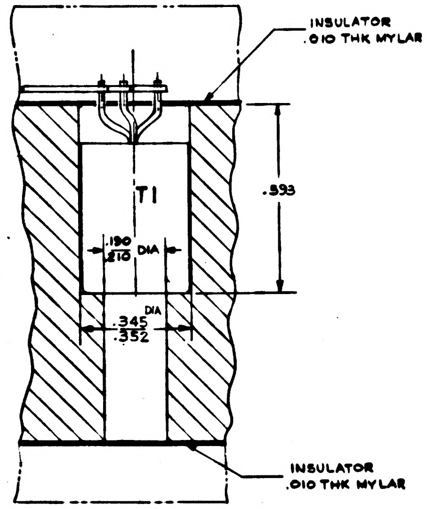
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00710 DATE 4-3-63

Replaced by Revision B

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. WELD PER ND 1002003 & WIRE ND 1002005
3. BLACK DOT ● INDICATED LEADS TO BE CUT FOR UPPER LEVEL WIRING
4. WHITE DOT ○ INDICATES LEADS TO BE CUT FOR LOWER LEVEL WIRING
5. ENCAPSULATE MODULE PER ND 1002002 BLACK POLYURETHANE FOAM
6. COMPONENTS TO BE CEMENTED IN PLACE PER ND 1002009
7. RIBBON PATHS SHOWN SHADED ARE UPPER LEVEL PER DIMENSIONS SHOWN
8. HEATSINK TO BE PER M.I.T. DWG NO D-106828C PART I
9. DIODES SHOWN WITH 'K' DENOTES CATHODE END
10. COMPONENTS ARE LOCATED ON .020 GRID
11. MARK NUMBERS $\frac{.100}{.060}$ HIGH, WHITE PER ND 1002019 APPROX WHERE SHOWN
12. FINAL ASS'Y DRAWING TITLE : AMPLIFIER 5% 800 CPS MODULE ASS'Y
13. FINAL ASS'Y PART NO 1007042
14. 'X' AND 'Y' DIM ⌖ .006 DIA
15. SOLDER PER ND 1002071
16. COAT THREADS AND INSERT (NAS 1222-06E) WITH WET ZINC CHROMATE PRIMER MIL-P-8585
17. ANODIZE PER MIL-A-8625 DYED BLACK, PLUG INSERT HOLES
18. WIRE SIZE .032 DIA PER PS 1015400 AS REQD (GOLD PLATED PER MIL-G-45204 TYPE I CLASS I 50 TO 150 MICROINCHES


INSULATOR
.010 THK MYLAR
T1
.393
.190 .210 DIA
.345 .352 DIA
INSULATOR
.010 THK MYLAR

PARTIAL SECTION C-C

REFERENCE DRAWINGS :-
SCHEMATIC 800 CPS 5% AMPLIFIER - DWG NO 1010046

REV A - REPLACED BY REV B WITH CHANGES

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ±~ DECIMALS ±.005 ANGLES ±~
DO NOT SCALE THIS DRAWING
MATERIAL ~
HEAT TREATMENT ~
FINAL FINISH ~

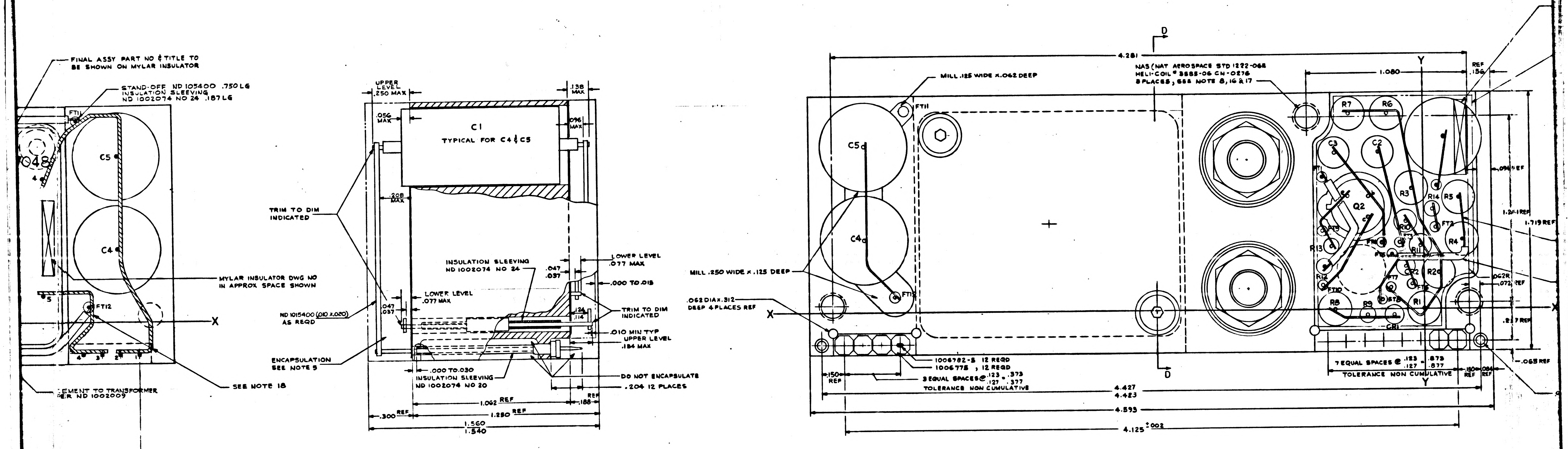
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DRAWN B. Bramsey DATE 3/14/63
CHECKED
APPROVAL D. Nott 4-3-63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 3 Apr 63

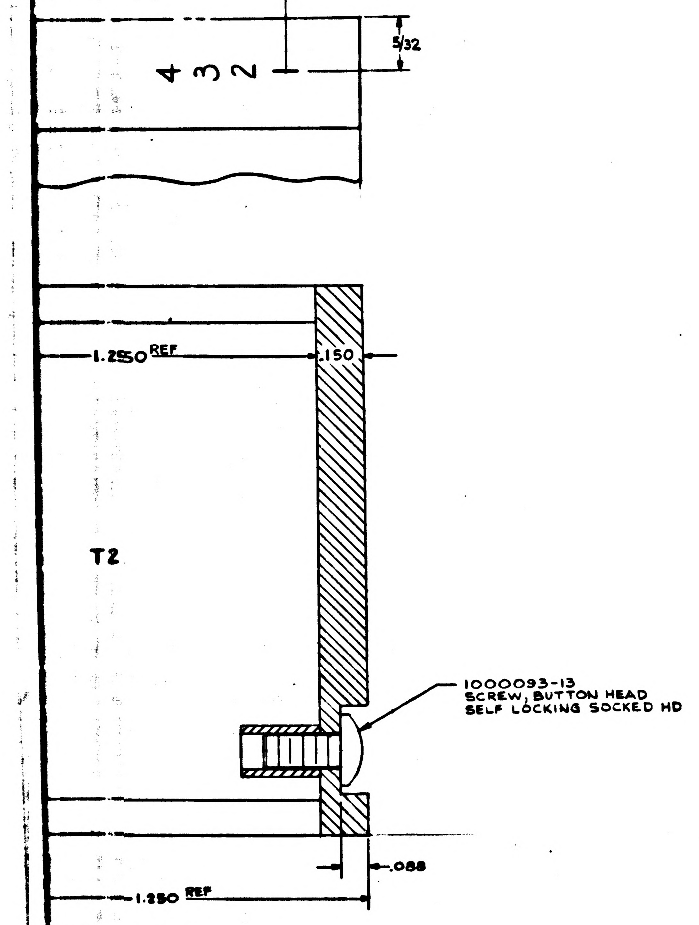
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DESIGN LAYOUT
AMPLIFIER 5% 800 CPS

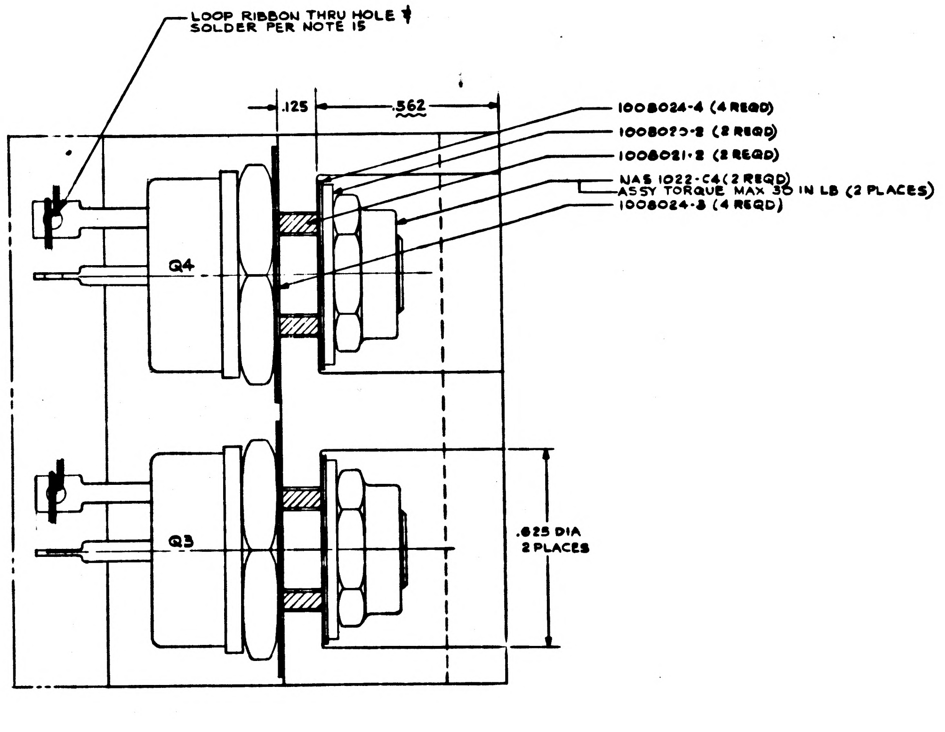
CODE IDENT NO.
SIZE J
NASA DRAWING NO. 1010205
SCALE 5:1
WT ~
SHEET 1 OF 1

PHOTOGRAPHIC SCALE ONLY

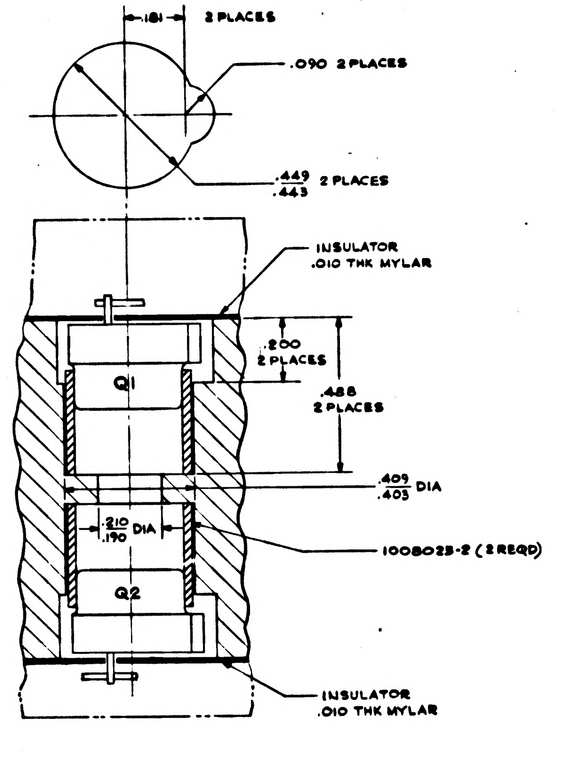

FINAL ASSY PART NO & TITLE TO BE SHOWN ON MYLAR INSULATOR
STAND-OFF ND 105400 .750 LG INSULATION SLEEVING ND 1002074 NO 24 .187 LG
FT11
048
4
C5
C4
MYLAR INSULATOR DWG NO IN APPROX SPACE SHOWN
5
FT12
X
4 3 2 1
EMENT TO TRANSFORMER PER ND 1002009
SEE NOTE 18
UPPER LEVEL .250 MAX
.138 MAX
.056 MAX
.096 MAX
C1
TYPICAL FOR C4 & C5
.208 MAX
TRIM TO DIM INDICATED
INSULATION SLEEVING ND 1002074 NO 24
.047 .037
LOWER LEVEL .077 MAX
.000 TO .015
LOWER LEVEL .077 MAX
ND 1015400 (.010 x .020) AS REQD
.047 .037
.124 .114
TRIM TO DIM INDICATED
.010 MIN TYP
UPPER LEVEL .134 MAX
ENCAPSULATION SEE NOTE 5
.000 TO .030
INSULATION SLEEVING ND 1002074 NO 20
DO NOT ENCAPSULATE
.204 12 PLACES
1.062 REF
.188 REF
.300 REF
1.250 REF
1.560 1.540
D
4.281
MILL .125 WIDE x .062 DEEP
NAS (NAT AEROSPACE STD 1222-065
HELI-COIL® 3585-06 CN-0276
8 PLACES, SEE NOTE 8, 16 & 17
Y
1.080
REF .156
FT11
C5
C4
MILL .250 WIDE x .125 DEEP
FT12
.062 DIA x .312 DEEP 4 PLACES REF
X
R7 R6 C3 C2 FT1 Q2 R3 R14 R5 FT9 R10 FT2 R13 FT4 FT3 R11 R4 FT5 R12 CR2 R20 FT10 FT7 FT6 R8 R9 FT8 R1 CR1
.094 REF
1.241 REF
1.719 REF
.062R
.072 REF
.237 REF
.065 REF
1006782-3 12 REQD
1006775, 12 REQD
.150 REF
3 EQUAL SPACES @ .123/.127 = .373/.377
TOLERANCE NON CUMULATIVE
7 EQUAL SPACES @ .123/.127 = .873/.877
TOLERANCE NON CUMULATIVE
.150 REF
.084 REF
4.427 4.423
4.593
4.125 ±.002


5/32
4 3 2
1.250 REF
.150
T2
1000093-13
SCREW, BUTTON HEAD
SELF LOCKING SOCKED HD
.088
1.250 REF

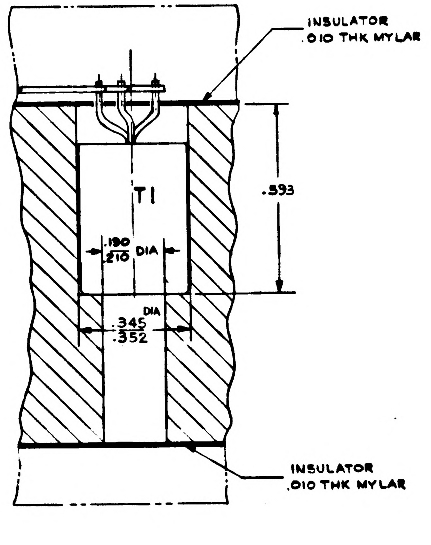
ECTION D-D


LOOP RIBBON THRU HOLE & SOLDER PER NOTE 15
.125
.562
1008024-4 (4 REQD)
1008020-2 (2 REQD)
1008021-2 (2 REQD)
NAS 1022-C4 (2 REQD)
ASSY TORQUE MAX 30 IN LB (2 PLACES)
1008024-3 (4 REQD)
Q4
Q3
.625 DIA 2 PLACES

SECTION A-A


.181 2 PLACES
.090 2 PLACES
.449/.443 2 PLACES
INSULATOR .010 THK MYLAR
.200 2 PLACES
.488 2 PLACES
Q1
.409/.403 DIA
.210/.190 DIA
1008023-2 (2 REQD)
Q2
INSULATOR .010 THK MYLAR

PARTIAL SECTION B-B

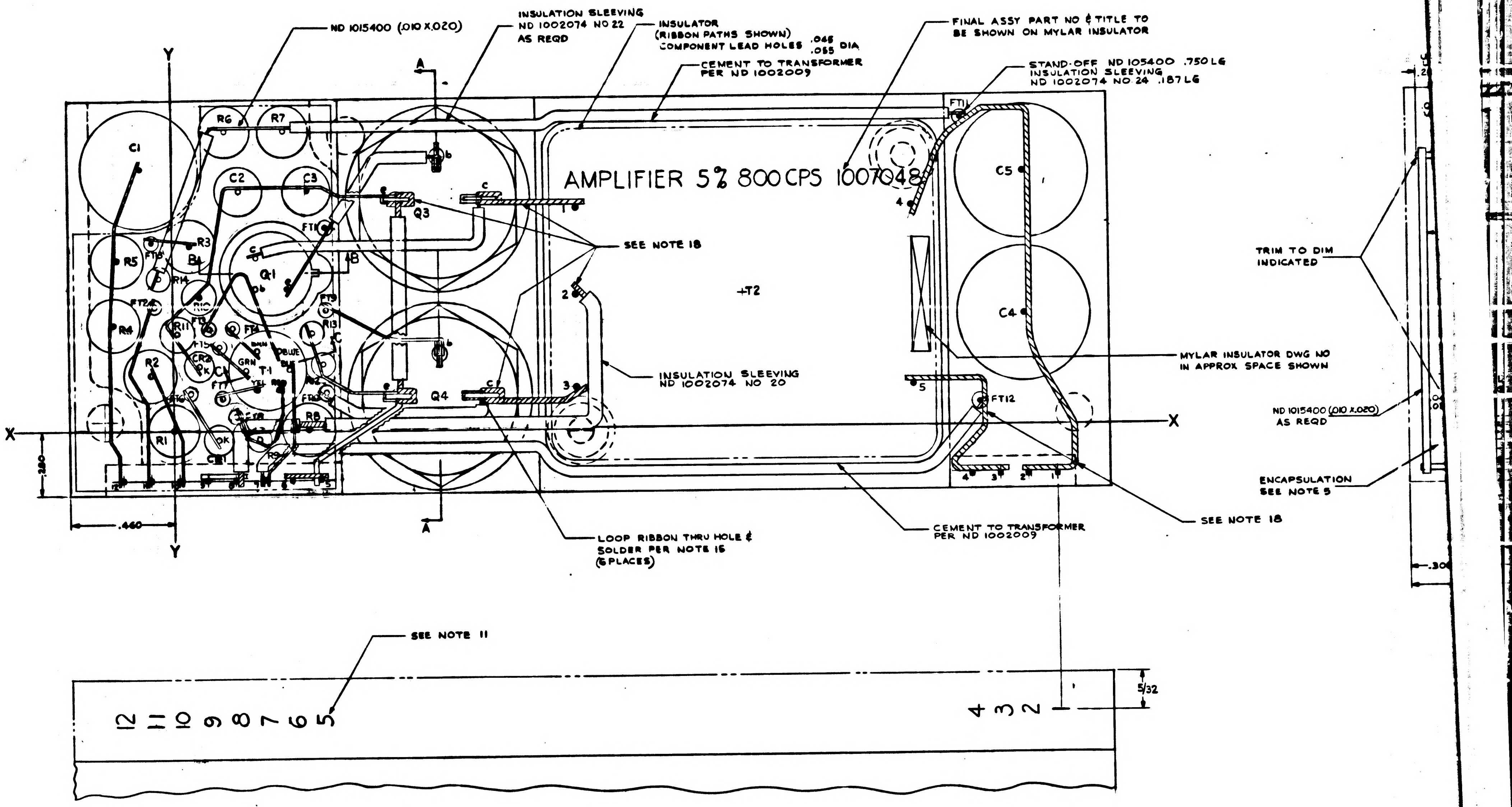

INSULATOR .010 THK MYLAR
T1
.593
.190/.210 DIA
DIA .345/.352
INSULATOR .010 THK MYLAR

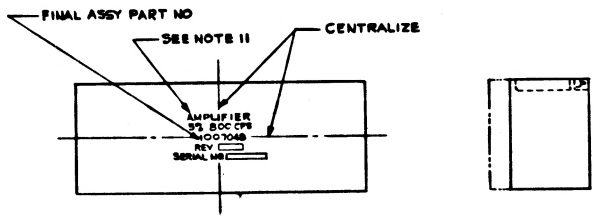
PARTIAL SECTION C-C

INCHES
PHOTOGRAPHIC SCALE ONLY

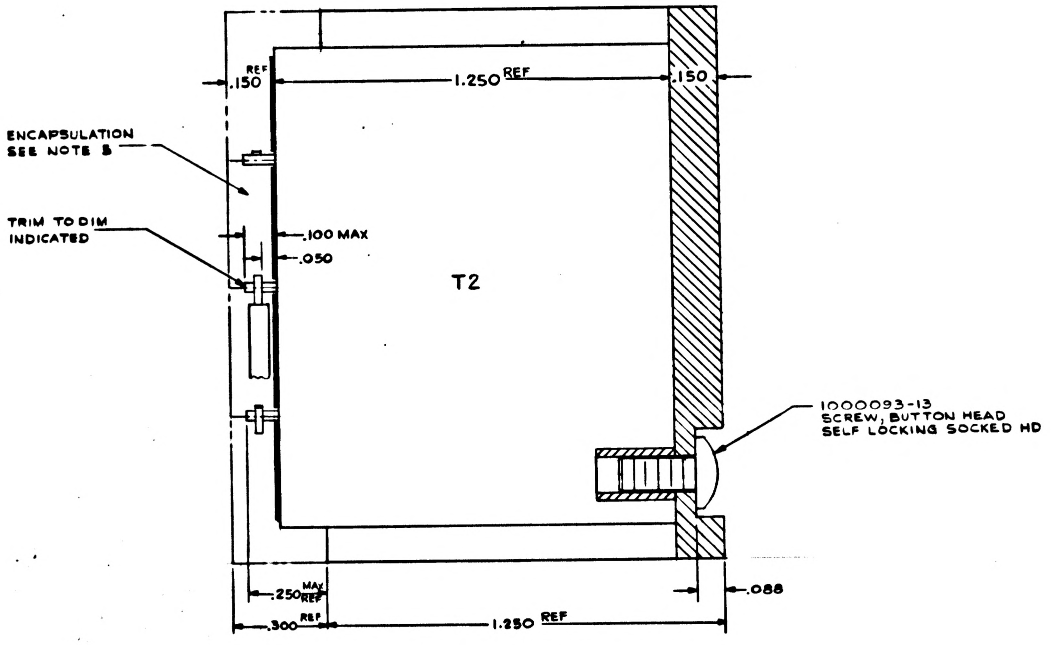
REF DESIG	"X" BASIC DIMENSION	"Y" BASIC DIMENSION	HOLE DIA THRU TOL *	PART NUMBER
R1	.000	.000	.228	1010389-53
R2	-.100	.240		1010389-NE
R3	.080	.800		1010389-43
R4	-.260	.460		1010389-53
R5	-.240	.740		1010389-NE
R6	.240	1.300		1010389-56
R7	.500	1.300		1010389-NE
R8	.600	.000		1010389-65
R9	.380	-.040	.101	1010369-140
R10	.120	.580	.147	1010364-251
R11	.020	.420	.147	1010364-NE
R12	.670	.280	.101	1006750-20
R13	.620	.420		1006750-20
R14	-.060	.660		1006750-73
C1	-.140	1.140	.519	1010264-35
C2	.300	1.040	.193	1010264-1
C3	.600	1.040	.193	1010264-1
C4	3.760	.480	.581	1010264-37
C5	3.760	1.100	.581	1010264-37
CR1	.200	-.040	.128	1010385
CR2	.120	.280	.128	1010385
Q1	.440	.680	SEE PARTIAL SECTION B-B	1010398 G.E. 2N2193 (HOT CASE)
Q2	.440	.680	SEE PARTIAL SECTION B-B	1010398
Q3	1.180	1.000	SEE PARTIAL SECTION A-A	1010273 T.I. 2N1724
Q4	1.180	.140	SEE PARTIAL SECTION A-A	1010273
FT1	.680	.880	.059	FEED THRUS WIRE, ELECTRICAL ND 1015400 .020DIA INSULATION, SLEEVING ELECTRICAL ND 1002074 NO 24
FT2	-.080	.540		
FT3	.160	.440		
FT4	.270	.440		
FT5	.210	.360		
FT6	.080	.160		
FT7	.220	.140		
FT8	.280	.060		
FT9	.680	.520		
FT10	.680	.160		
FT11	3.480	1.340		
FT12	3.560	.100		
FT13	-.090	.820		
T1	.420	.260	.345/352	1010407
T2	2.520 ℄	.580		1010308

* HOLE DIA THRU TOL
UNDER 1/4 DIA $^{+.003}_{-.001}$
OVER 1/4 DIA $^{+.005}_{-.002}$


ND 1015400 (.010 X.020)
INSULATION SLEEVING ND 1002074 NO 22 AS REQD
INSULATOR (RIBBON PATHS SHOWN) COMPONENT LEAD HOLES .045 .055 DIA
CEMENT TO TRANSFORMER PER ND 1002009
FINAL ASSY PART NO & TITLE TO BE SHOWN ON MYLAR INSULATOR
STAND-OFF ND 105400 .750 LG INSULATION SLEEVING ND 1002074 NO 24 .187 LG
AMPLIFIER 5% 800 CPS 1007048
SEE NOTE 18
TRIM TO DIM INDICATED
+T2
INSULATION SLEEVING ND 1002074 NO 20
MYLAR INSULATOR DWG NO IN APPROX SPACE SHOWN
ND 1015400 (.010 X.020) AS REQD
ENCAPSULATION SEE NOTE 5
SEE NOTE 18
LOOP RIBBON THRU HOLE & SOLDER PER NOTE 15 (6 PLACES)
CEMENT TO TRANSFORMER PER ND 1002009
A
A
X
X
Y
Y
.280
.440
C1
C2
C3
C4
C5
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R13
R14
Q1
Q3
Q4
T1
CR2
FT1
FT11
FT12
GRN
YEL
BLUE
1
2
3
4
5
SEE NOTE 11
12 11 10 9 8 7 6 5
4 3 2
5/32


FINAL ASSY PART NO
SEE NOTE 11
CENTRALIZE
AMPLIFIER
5% 800 CPS
1007048
REV
SERIAL NO
.125

TOP VIEW
SHOWING NAMEPLATE
SCALE FULL SIZE

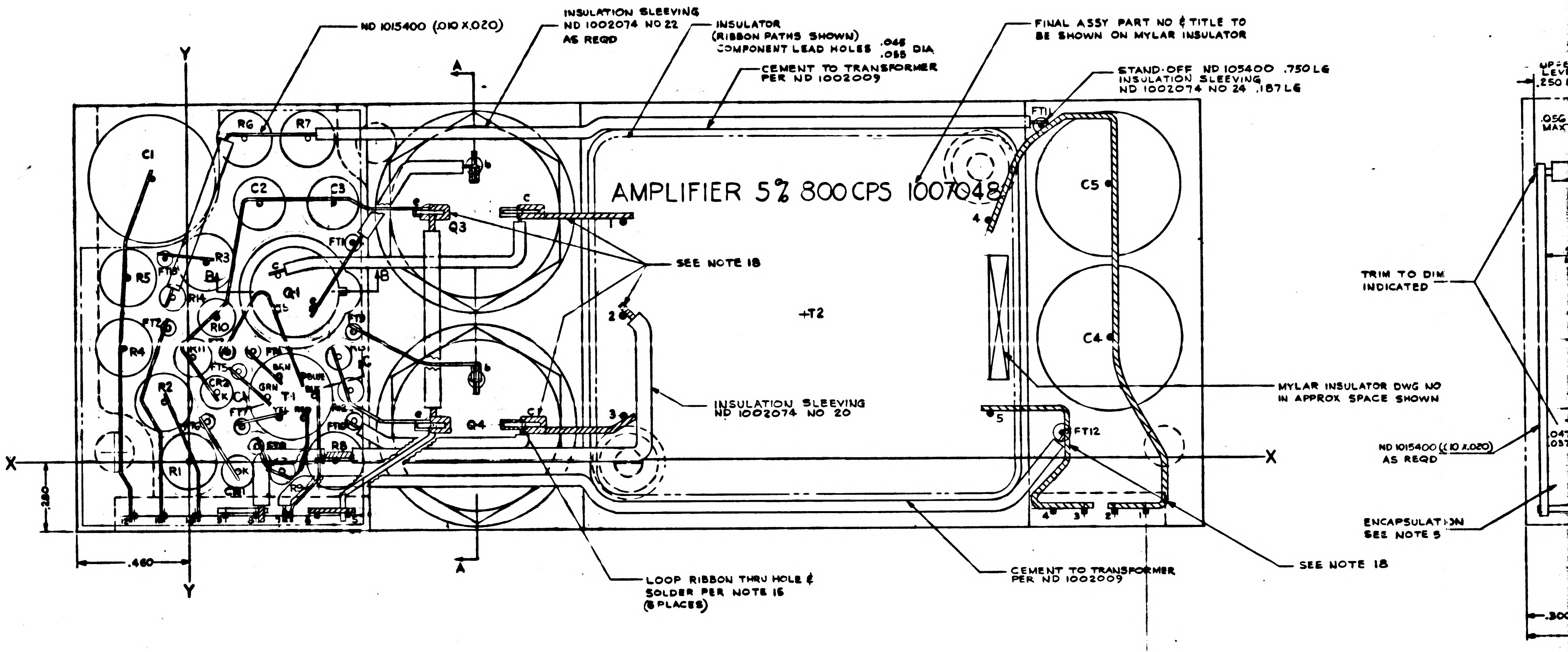

ENCAPSULATION SEE NOTE 5
TRIM TO DIM INDICATED
.150 REF
1.250 REF
.150
.100 MAX
.050
T2
1000093-13 SCREW, BUTTON HEAD SELF LOCKING SOCKED HD
.250 MAX REF
.300 REF
1.250 REF
.088

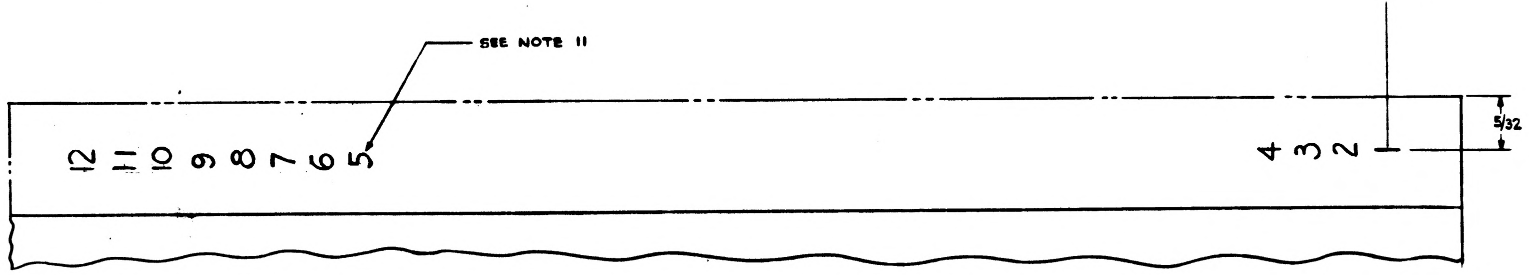
SECTION D-D

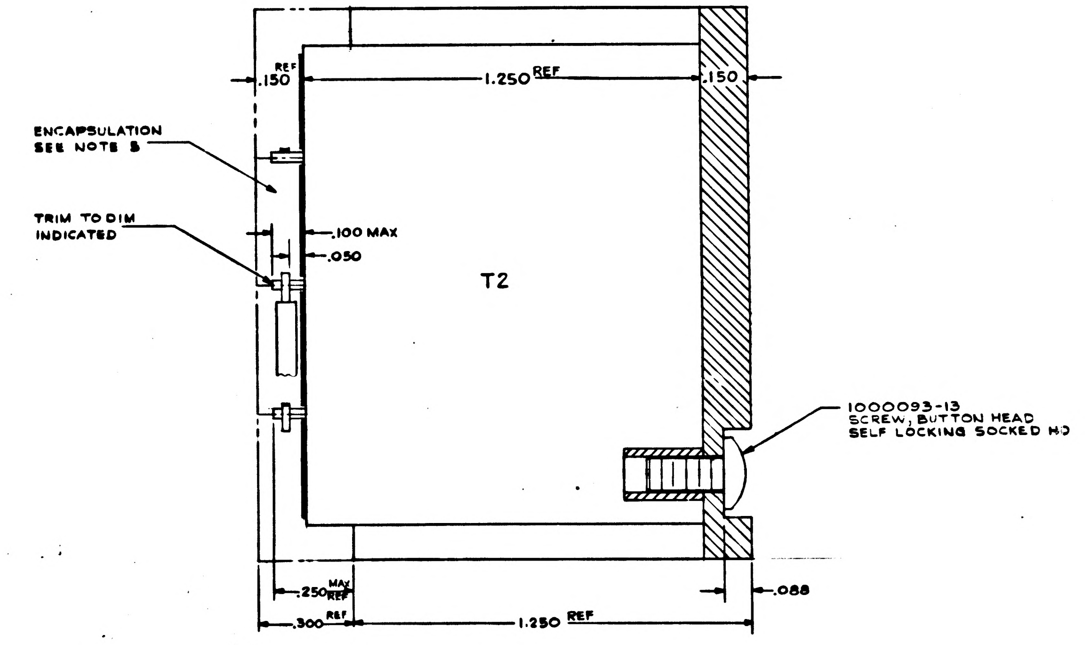
INCHES
PHOTOGRAPHIC SCALE ONLY

REF DESIG	"X" BASIC DIMENSION	"Y" BASIC DIMENSION	HOLE DIA THRU TOL #	PART NUMBER
R1	.000	.000	.228	1010389-53
R2	-.100	.240		1010389-NE
R3	.080	.800		1010389-43
R4	-.260	.460		1010389-53
R5	-.240	.740		1010389-NE
R6	.240	1.300		1010389-56
R7	.500	1.300		1010389-NE
R8	.600	.000		1010389-65
R9	.380	-.040	.101	1010369-140
R10	.120	.580	.147	1010364-251
R11	.020	.420	.147	1010364-NE
R12	.670	.280	.101	1006750-20
R13	.620	.420		1006750-20
R14	-.060	.660		1006750-73
C1	-.140	1.140	.519	1010264-35
C2	.300	1.040	.193	1010264-1
C3	.600	1.040	.193	1010264-1
C4	3.760	.480	.581	1010264-37
C5	3.760	1.100	.581	1010264-37
CR1	.200	-.040	.128	1010385
CR2	.120	.280	.128	1010385
Q1	.440	.680	SEE PARTIAL SECTION B-B	1010398 GE 2N2193 (NOT CASE)
Q2	.440	.680	SEE PARTIAL SECTION B-B	1010398
Q3	1.180	1.000	SEE PARTIAL SECTION A-A	1010273 TI 2N1724
Q4	1.180	.140	SEE PARTIAL SECTION A-A	1010273
FT1	.680	.880	.059	FEED THRUS WIRE, ELECTRICAL ND 1015400 .020DIA INSULATION, SLEEVING ELECTRICAL ND 1002074 NO 24
FT2	-.080	.540		
FT3	.160	.440		
FT4	.270	.440		
FT5	.210	.360		
FT6	.080	.160		
FT7	.220	.140		
FT8	.280	.060		
FT9	.680	.520		
FT10	.680	.160		
FT11	3.480	1.340		
FT12	3.560	.100		
FT13	-.090	.820		
T1	.420	.260	.345/352	1010407
T2	2.520 ℄	.580		1010308

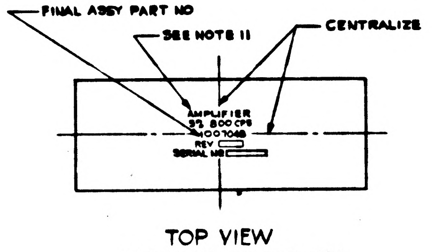
HOLE DIA THRU TOL
UNDER 1/4 DIA +.003 -.001
OVER 1/4 DIA +.005 -.002


ND 1015400 (.010 X.020)
INSULATION SLEEVING ND 1002074 NO 22 AS REQD
INSULATOR (RIBBON PATHS SHOWN) COMPONENT LEAD HOLES .045 .055 DIA
CEMENT TO TRANSFORMER PER ND 1002009
FINAL ASSY PART NO ℄ TITLE TO BE SHOWN ON MYLAR INSULATOR
STAND-OFF ND 105400 .750 LG INSULATION SLEEVING ND 1002074 NO 24 .187 LG
AMPLIFIER 5% 800 CPS 1007048
Y
A
X
R6
R7
C1
C2
C3
R3
R5
R4
R14
R10
R11
R2
R1
CR1
CR2
Q1
Q2
Q3
Q4
T-1
+T2
R8
R9
FT1
FT12
C5
C4
SEE NOTE 18
INSULATION SLEEVING ND 1002074 NO 20
MYLAR INSULATOR DWG NO IN APPROX SPACE SHOWN
LOOP RIBBON THRU HOLE ℄ SOLDER PER NOTE 15 (8 PLACES)
CEMENT TO TRANSFORMER PER ND 1002009
SEE NOTE 18
.460
.280
TRIM TO DIM INDICATED
ND 1015400 (.010 X.020) AS REQD
ENCAPSULATION SEE NOTE 5
UP-E LEVE .250
.056 MAX
.300

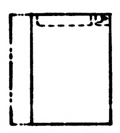

SEE NOTE 11
12 11 10 9 8 7 6 5
4 3 2
5/32


.150 REF
1.250 REF
.150
ENCAPSULATION SEE NOTE 5
TRIM TO DIM INDICATED
.100 MAX
.050
T2
1000093-13 SCREW, BUTTON HEAD SELF LOCKING SOCKED HD
.250 MAX REF
.300 REF
1.250 REF
.088

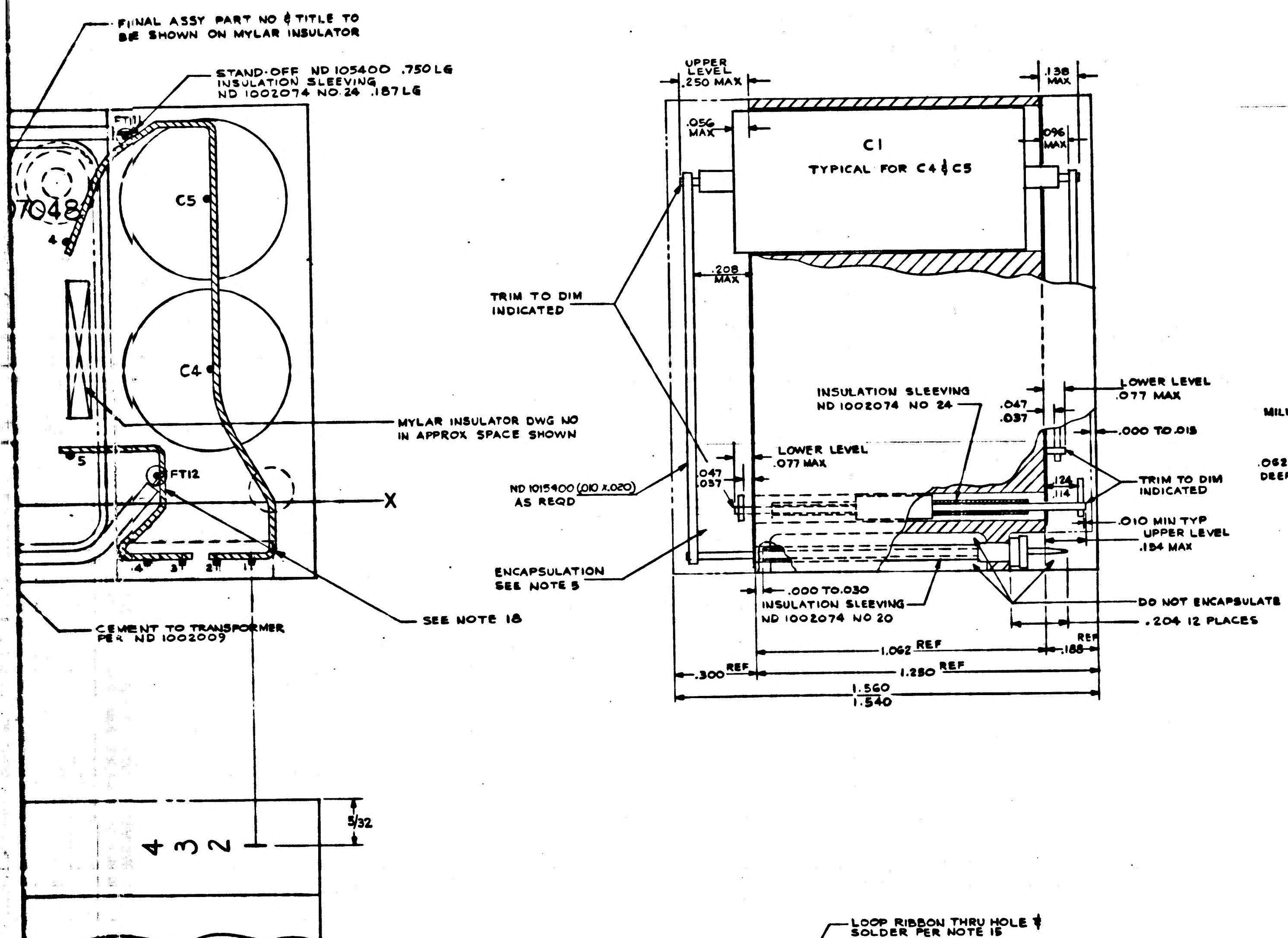
SECTION D-D

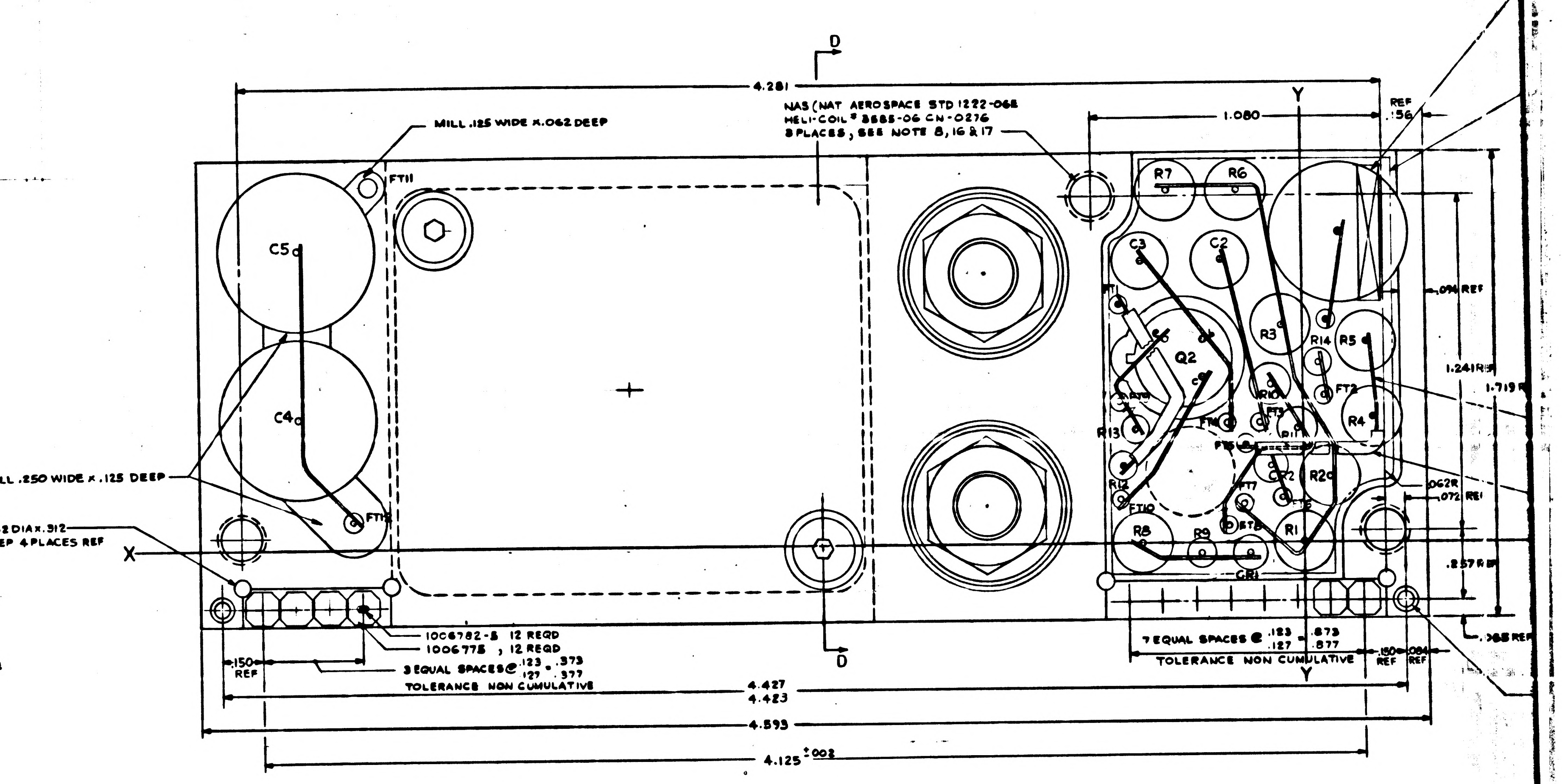

FINAL ASSY PART NO
SEE NOTE 11
CENTRALIZE
AMPLIFIER 5% 800 CPS 1007048
REV
SERIAL NO

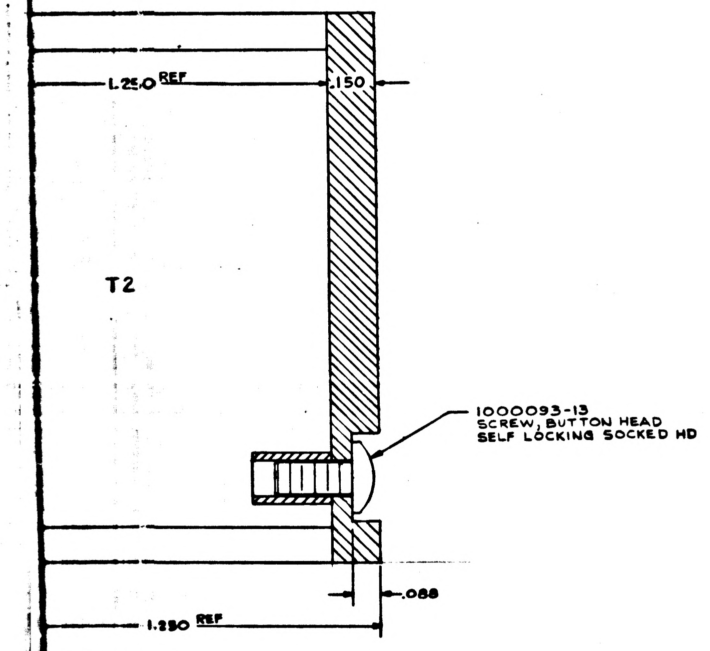
TOP VIEW
SHOWING NAMEPLATE
SCALE FULL SIZE



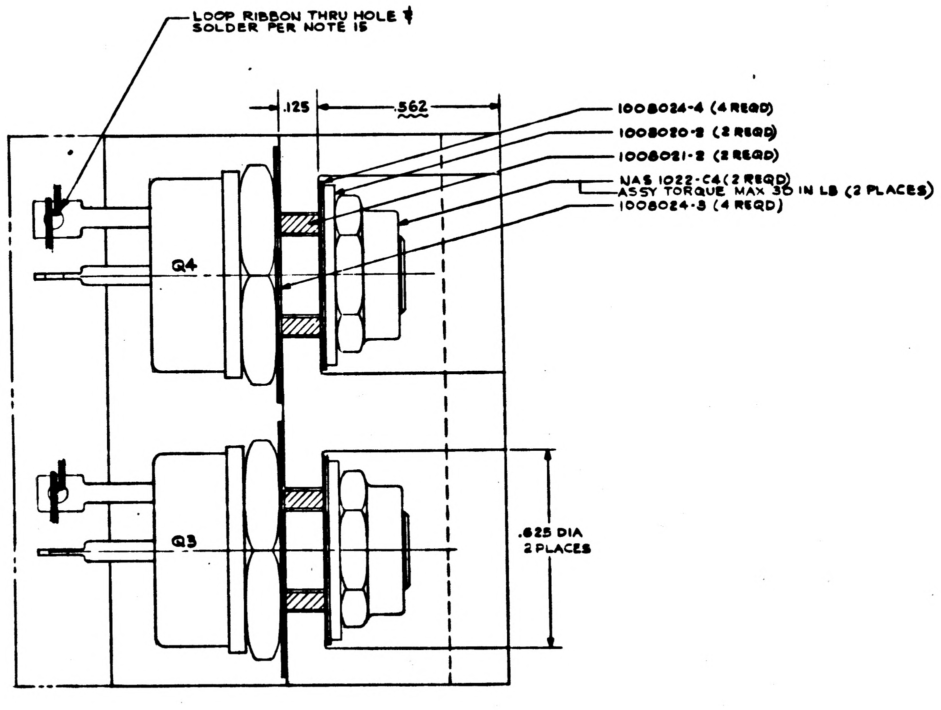
INCHES
PHOTOGRAPHIC SCALE ONLY


FINAL ASSY PART NO & TITLE TO BE SHOWN ON MYLAR INSULATOR
STAND-OFF ND 105400 .750 LG INSULATION SLEEVING ND 1002074 NO 24 .187 LG
FT11
7048
4
C5
C4
MYLAR INSULATOR DWG NO IN APPROX SPACE SHOWN
5
FT12
X
4 3 2 1
CEMENT TO TRANSFORMER PER ND 1002009
SEE NOTE 18
4 3 2
5/32
UPPER LEVEL .250 MAX
.138 MAX
.056 MAX
.096 MAX
C1
TYPICAL FOR C4 & C5
.208 MAX
TRIM TO DIM INDICATED
INSULATION SLEEVING ND 1002074 NO 24
.047
.037
LOWER LEVEL .077 MAX
.000 TO .015
LOWER LEVEL .077 MAX
ND 1015400 (.010 X .020) AS REQD
.047
.037
.124
.114
TRIM TO DIM INDICATED
.010 MIN TYP
UPPER LEVEL .154 MAX
ENCAPSULATION SEE NOTE 5
.000 TO .030
INSULATION SLEEVING ND 1002074 NO 20
DO NOT ENCAPSULATE
.204 12 PLACES
1.062 REF
.188 REF
.300 REF
1.250 REF
1.560
1.540

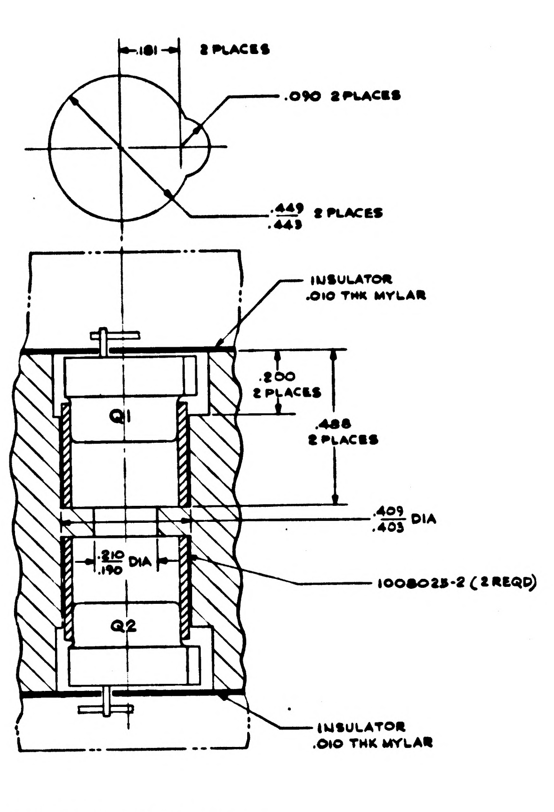

D
4.281
NAS (NAT AEROSPACE STD 1222-06E HELI-COIL® 3585-06 CN-0276 3 PLACES, SEE NOTE 8, 16 & 17
MILL .125 WIDE X .062 DEEP
FT11
C5
C4
MILL .250 WIDE X .125 DEEP
FT12
.062 DIA X .312 DEEP 4 PLACES REF
X
1006782-5 12 REQD
1006775, 12 REQD
.150 REF
3 EQUAL SPACES @ .123/.127 = .373/.377
TOLERANCE NON CUMULATIVE
D
Y
1.080
REF .56
R7
R6
C3
C2
FT1
Q2
R3
R14
R5
FT2
R13
R4
FT4
FT3
R11
FT5
R12
CR2
R20
FT10
FT7
FT6
FT8
R8
R9
R1
CR1
.094 REF
1.241 REF
1.719 REF
.062R
.072 REF
.257 REF
.365 REF
7 EQUAL SPACES @ .123/.127 = .873/.877
TOLERANCE NON CUMULATIVE
.150 REF
.084 REF
Y
4.427
4.423
4.593
4.125 ±.002


1.250 REF
.150
T2
1000093-13 SCREW, BUTTON HEAD SELF LOCKING SOCKED HD
.088
1.250 REF

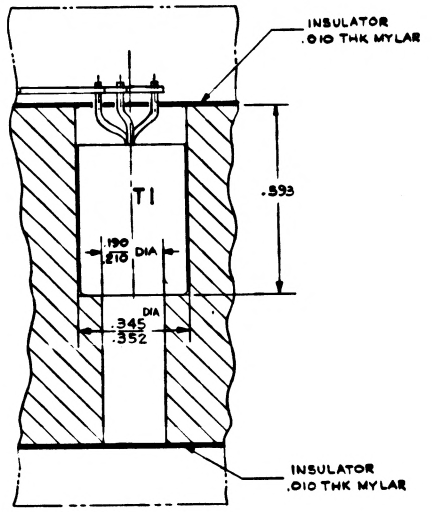
SECTION D-D


LOOP RIBBON THRU HOLE & SOLDER PER NOTE 15
.125
.562
1008024-4 (4 REQD)
1008020-2 (2 REQD)
1008021-2 (2 REQD)
NAS 1022-C4 (2 REQD)
ASSY TORQUE MAX 30 IN LB (2 PLACES)
1008024-3 (4 REQD)
Q4
Q3
.625 DIA 2 PLACES

SECTION A-A

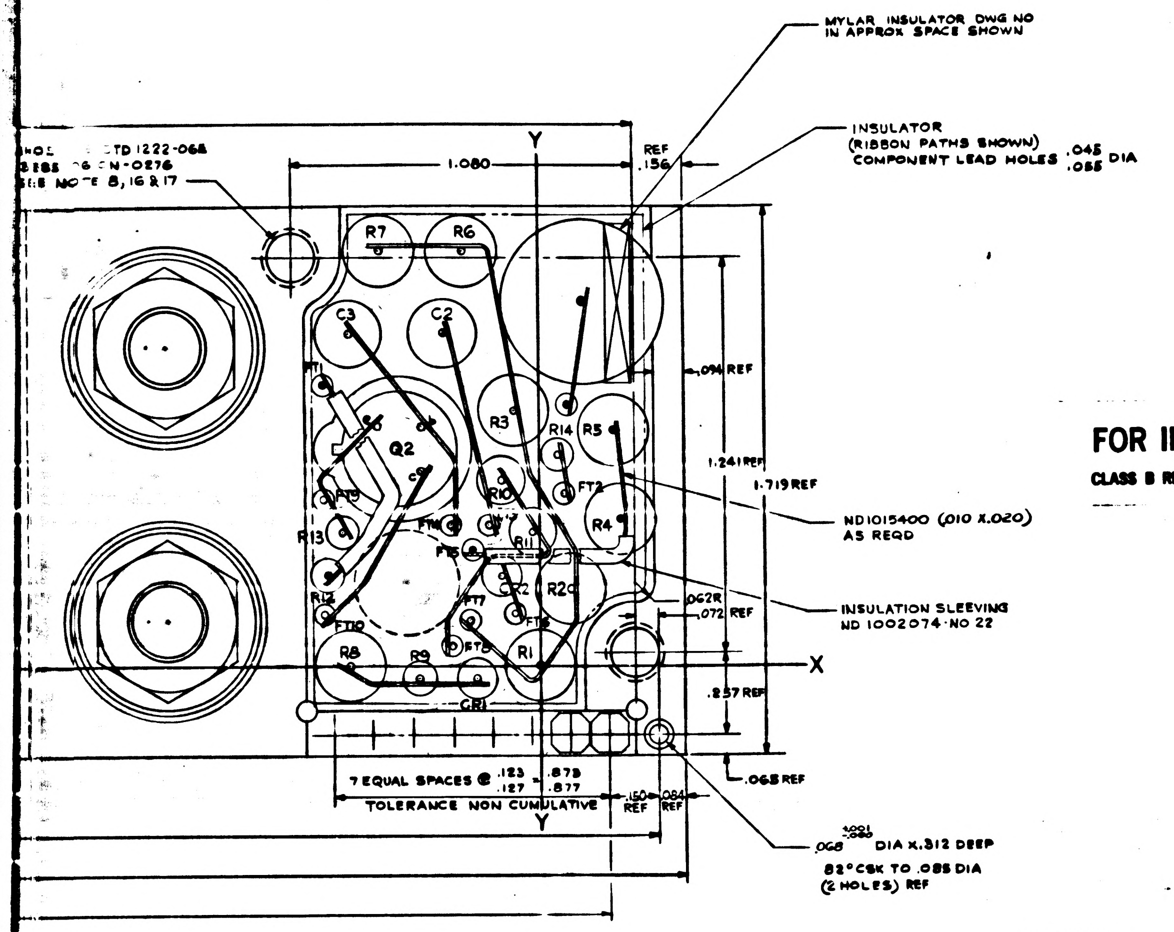

.181 2 PLACES
.090 2 PLACES
.449/.443 2 PLACES
INSULATOR .010 THK MYLAR
.200 2 PLACES
.488 2 PLACES
Q1
.409/.403 DIA
.210/.190 DIA
1008023-2 (2 REQD)
Q2
INSULATOR .010 THK MYLAR

PARTIAL SECTION B-B


INSULATOR .010 THK MYLAR
.593
T1
.190/.210 DIA
DIA .345/.352
INSULATOR .010 THK MYLAR

PARTIAL SECTION C-C

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY


HOLE ... STD 1222-06E
SEES ... 6 ... N-0276
SEE NOTE 8, 16 & 17
1.080
Y
REF .156
MYLAR INSULATOR DWG NO
IN APPROX SPACE SHOWN
INSULATOR
(RIBBON PATHS SHOWN)
COMPONENT LEAD HOLES .045/.055 DIA
R7
R6
C3
C2
FT1
Q2
R3
R14
R5
FT2
R10
R11
R4
FT9
FT14
R13
FT15
CR2
R2
R12
FT10
FT7
FT6
FT8
R8
R9
R1
CR1
X
.094 REF
1.241 REF
1.719 REF
ND1015400 (.010 X.020)
AS REQD
.062R
.072 REF
INSULATION SLEEVING
ND 1002074-NO 22
.257 REF
.065 REF
7 EQUAL SPACES @ .123/.127 = .873/.877
TOLERANCE NON CUMULATIVE
.150 REF
.084 REF
.068 +.001/-.000 DIA X.312 DEEP
82° CSK TO .085 DIA
(2 HOLES) REF

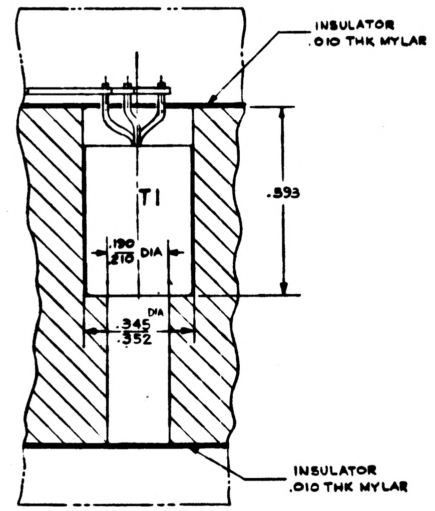
FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00710 DATE 4-3-63

NOTES:-

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. WELD PER ND 1002003 & WIRE ND 1002005
3. BLACK DOT ● INDICATED LEADS TO BE CUT FOR UPPER LEVEL WIRING
4. WHITE DOT ○ INDICATES LEADS TO BE CUT FOR LOWER LEVEL WIRING
5. ENCAPSULATE MODULE PER ND 1002002 BLACK POLYURETHANE FOAM
6. COMPONENTS TO BE CEMENTED IN PLACE PER ND 1002009
7. RIBBON PATHS SHOWN SHADED ARE UPPER LEVEL PER DIMENSIONS SHOWN
8. HEATSINK TO BE PER M.I.T. DWG NO D-106828C PART I
9. DIODES SHOWN WITH 'K' DENOTES CATHODE END
10. COMPONENTS ARE LOCATED ON .020 GRID
11. MARK NUMBERS .100/.060 HIGH, WHITE PER ND 1002019 APPROX WHERE SHOWN
12. FINAL ASSY DRAWING TITLE : AMPLIFIER 5% 800 CPS MODULE ASSY
13. FINAL ASSY PART NO 1007042
14. 'X' AND 'Y' DIM ⌖ .006 DIA
15. SOLDER PER ND 1002071
16. COAT THREADS AND INSERT (NAS 1222-06E) WITH WET ZINC CHROMATE PRIMER MIL-P-8585
17. ANODIZE PER MIL-A-8625 DYED BLACK, PLUG INSERT HOLES
18. WIRE SIZE .032 DIA PER PS 1015400 AS REQD (GOLD PLATED PER MIL-G-45204 TYPE I CLASS I 50 TO 150 MICROINCHES

REFERENCE DRAWINGS :-
SCHEMATIC 800 CPS 5% AMPLIFIER-DWG NO 1010046

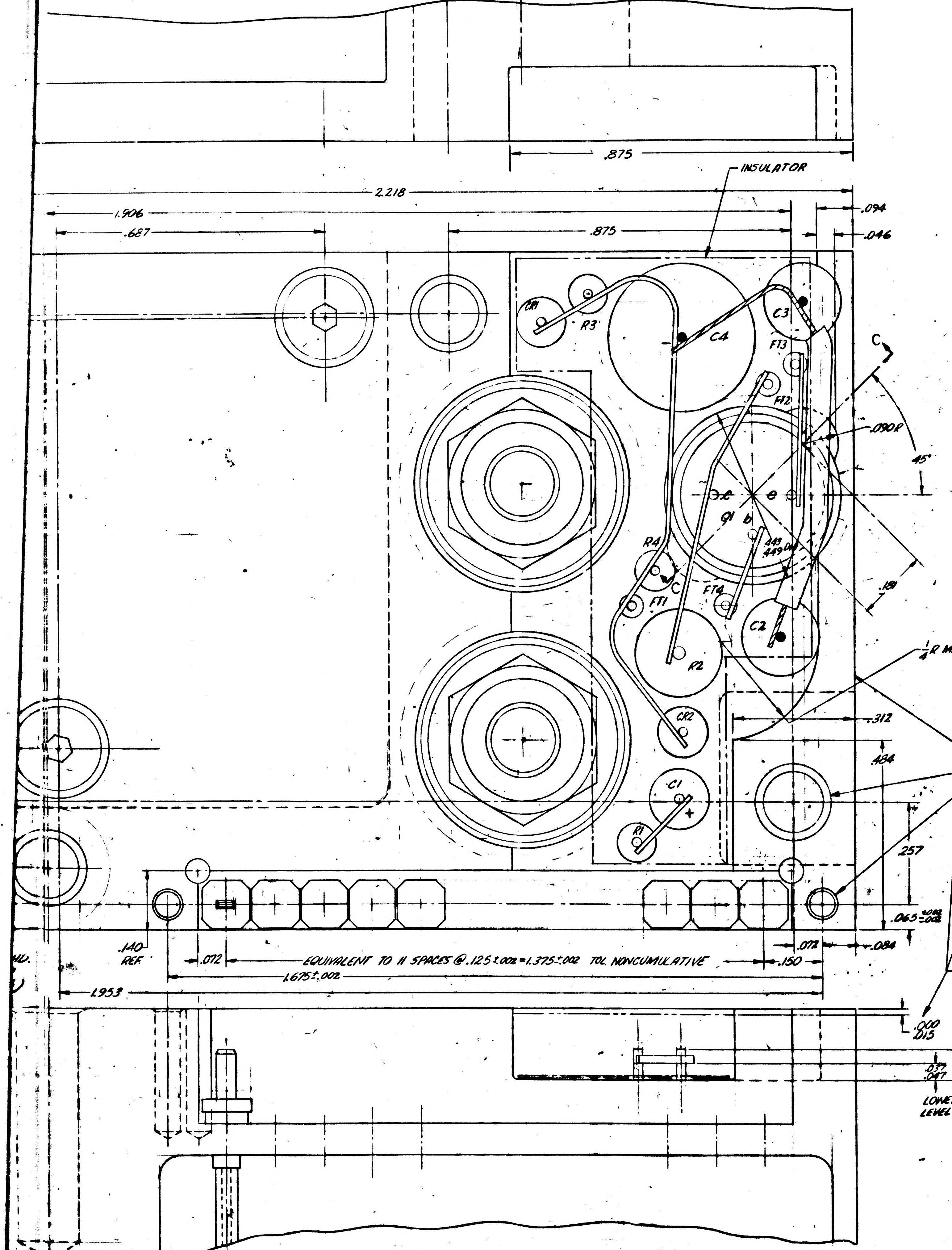

INSULATOR
.010 THK MYLAR
T1
.593
.190/.210 DIA
.545/.552 DIA
INSULATOR
.010 THK MYLAR

PARTIAL SECTION C-C

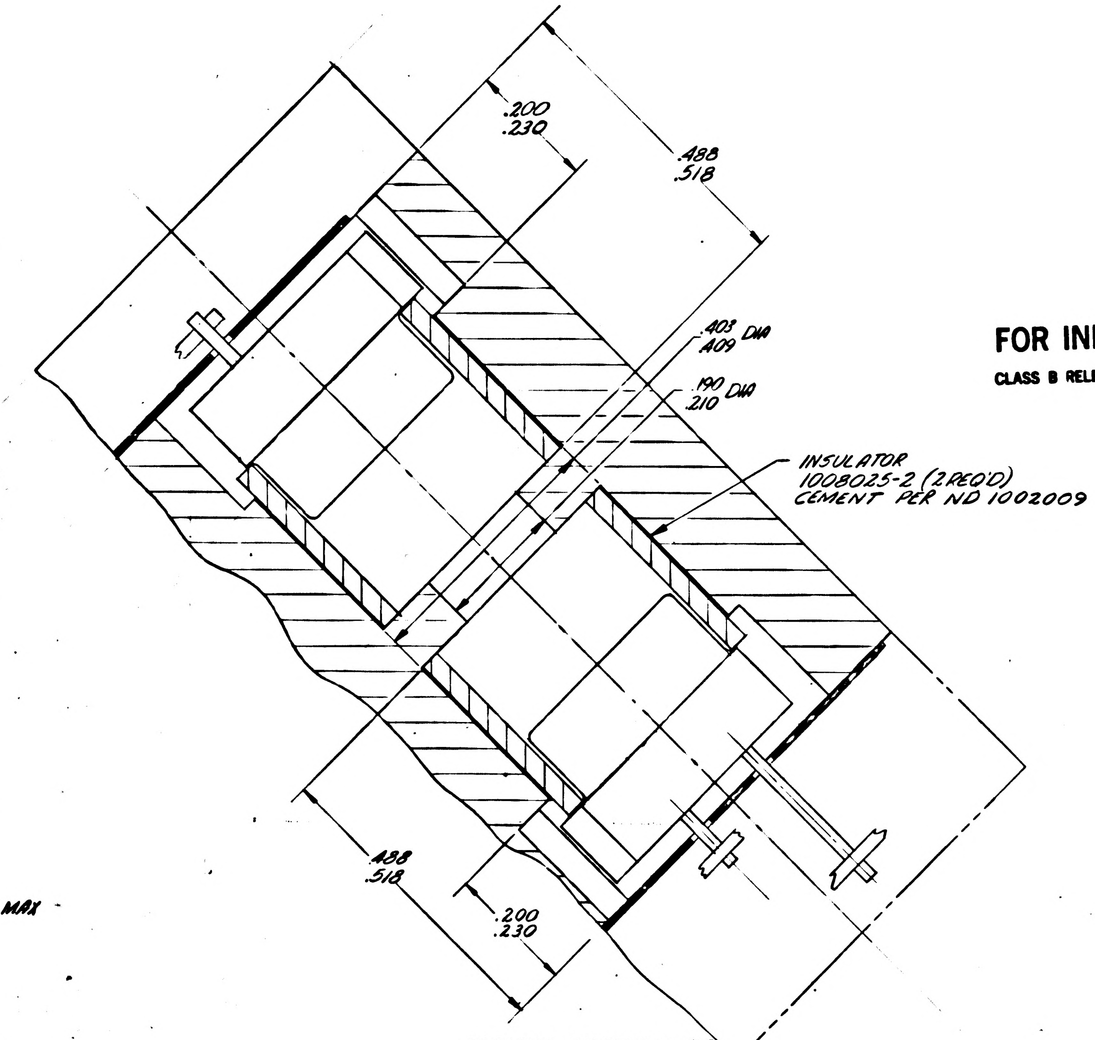
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ±~ DECIMALS ±.005 ANGLES ±~ DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS DRAWN S Bonanno DATE 3/14/63 CHECKED APPROVAL D. ... 4-3-63 APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS DESIGN LAYOUT AMPLIFIER 5% 800 CPS
MATERIAL ~ HEAT TREATMENT ~ FINAL FINISH ~	NASA APPROVAL Jack ... MIT APPROVAL ... 3 Apr 63	CODE IDENT NO. SIZE J NASA DRAWING NO. 1010205 SCALE 5:1 WT ~ SHEET 1 OF 1

PHOTOGRAPHIC SCALE ONLY

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL

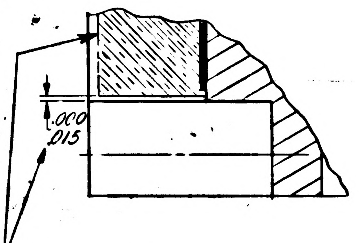


.875
INSULATOR
2.218
1.906
.687
.875
.094
.046
CR1
R3
C4
C3
FT3
FT2
C
.090R
45°
Q1
c
b
e
.443
.449 DIA
R4
FT4
FT1
.181
C2
R2
1/4 R MAX
CR2
.312
.484
SEE NOTE 10b
C1
R1
.257
.065 +.005 -.002
.140 REF.
.072
EQUIVALENT TO 11 SPACES @ .125±.002 = 1.375±.002 TOL NONCUMULATIVE
1.675±.002
.072
.084
.150
1.953
SEE NOTE 7
.000 .015
.037 .047
LOWER LEVEL
.077 MAX. SEE NOTE 9



.200
.230
.488
.518
.403 DIA
.409
.190 DIA
.210
INSULATOR
1008025-2 (2 REQ'D)
CEMENT PER ND 1002009
.488
.518
.200
.230

PARTIAL SECTION C-C



FOR INFORMATION ONLY

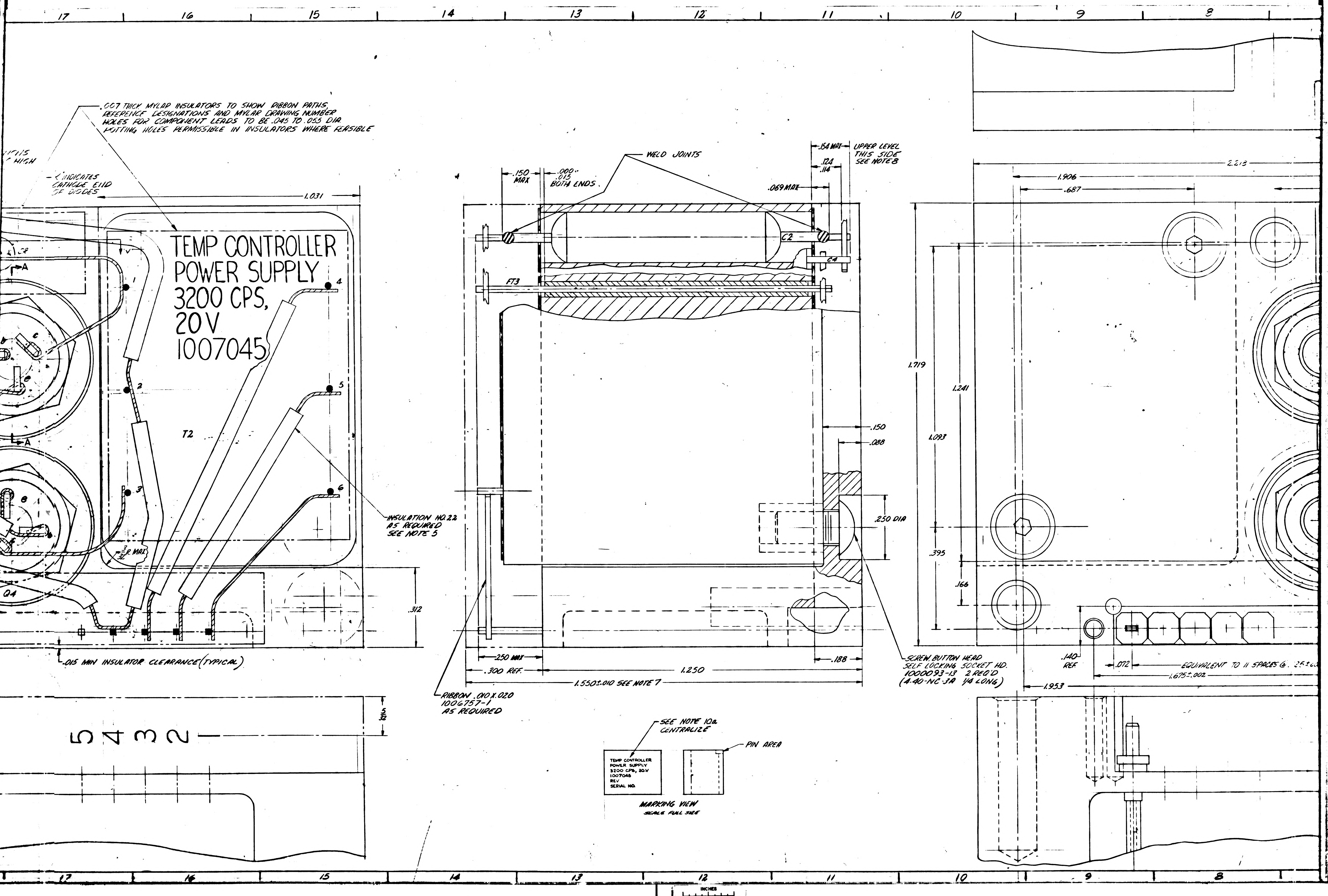
CLASS B RELEASE TDR No. 00710 DATE 4-3-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. WIRE PER ND1002003
3. WELD PER ND1002005
4. SOLDER PER ND 1002071 USING ND 1002075
5. SLEEVING PER ND1002074
6. COMPONENTS TO BE CEMENTED IN PLACE PER ND 1002009
7. ENCAPSULATE MODULE PER ND 1002002 (BLACK POLYURETHANE FOAM)
8. BLACK DOT ● INDICATES LEADS TO BE CUT AFTER UPPER LEVEL WELDING. CROSS HATCHED RIBBONS INDICATE UPPER LEVEL.
9. WHITE DOT ○ INDICATES LEADS TO BE CUT AFTER LOWER LEVEL WELDING.
10. UNLESS OTHERWISE SPECIFIED:
    a. MARK CHARACTERS .060 TO .100 HIGH, WHITE PER ND 1002019
    b. HEATSINK TO BE PER DRAWING D-106828 REV C
    c. TOLERANCE: DEC ±.005 ; FRAC. ± 1/64 ANG. ±2°
    d. ALL CORNERS TO BE .015 MAX RADIUS OR CHAMFER.
11. FINAL ASSEMBLY DRAWING TITLE: TEMP CONTROLLER, POWER SUPPLY 3200 CPS, 20 V MODULE ASSY
12. FINAL ASSEMBLY PART NUMBER: 1007045
13. DRAWINGS FOR REFERENCE:
    SCHEMATIC 1010049
14. "X" AND "Y" DIMENSION IN HOLE CHART TO BE ⌖.006 DIA
15. COAT THREADS AND INSERTS WITH MIL-P-8585 WET ZINC CHROMATE PRIMER.
16. INSTALL INSERTS PER MS-33537 (EXCEPT DIM F TO BE .594) BREAK OFF DRIVING TANG.
17. FINISH: ANODIZE PER MIL-A-8625 DYED BLACK, PLUG INSERT HOLES

MIT INSTRUMENTATION LAB CAMBRIDGE, MASS	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
DWG NO. CONTRACT DRAWN R. Tetreault DATE CHECKED APPROVAL D. R. Test 4-3-63 APPROVAL	DESIGN LAYOUT TEMP. CONTROLLER POWER SUPPLY 3200 CPS, 20 V.
NASA APPROVAL Jack Barnes	CODE IDENT NO. / SIZE / NASA DRAWING NO. 1010206
MIT APPROVAL	SCALE 10:1 / WT / SHEET 1 OF 1

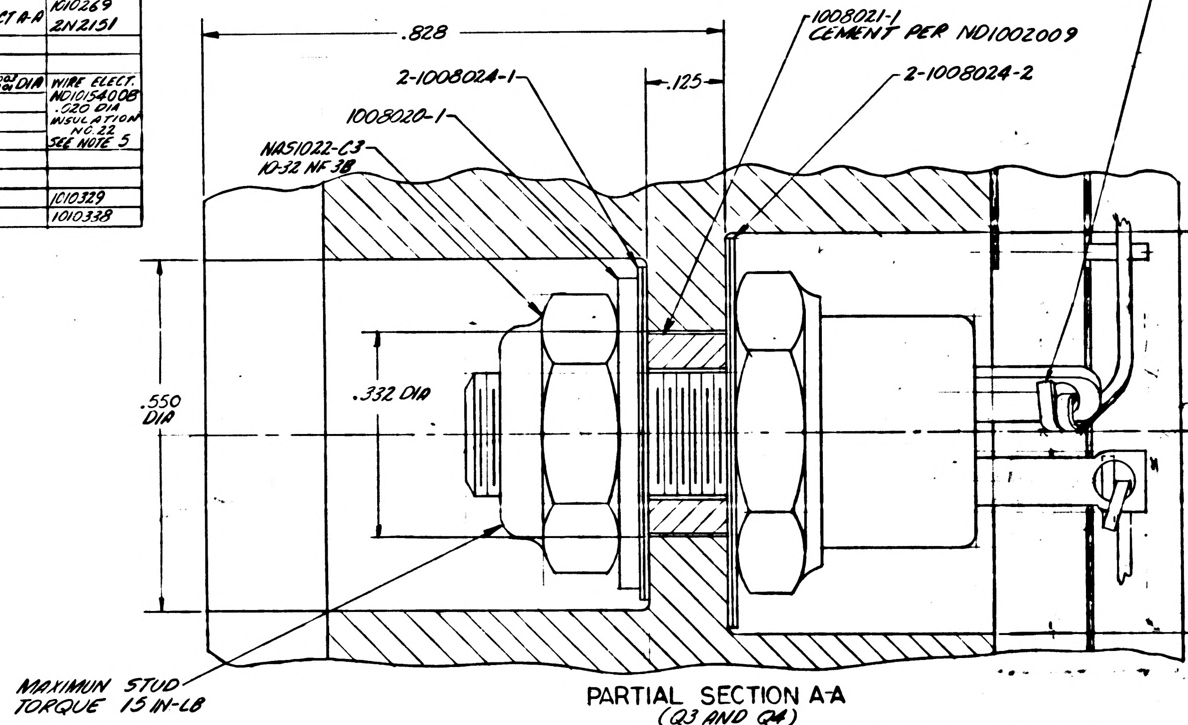
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY


17
16
15
14
13
12
11
10
9
8
.007 THICK MYLAR INSULATORS TO SHOW RIBBON PATHS, REFERENCE DESIGNATIONS AND MYLAR DRAWING NUMBER HOLES FOR COMPONENT LEADS TO BE .045 TO .055 DIA POTTING HOLES PERMISSIBLE IN INSULATORS WHERE FEASIBLE
HIGH
INDICATES CATHODE END OF DIODES
1.031
A
A
TEMP CONTROLLER
POWER SUPPLY
3200 CPS,
20 V
1007045
1
2
3
4
5
6
T2
Q4
3/32 R. MAX
.312
.015 MIN INSULATOR CLEARANCE (TYPICAL)
INSULATION NO. 22 AS REQUIRED SEE NOTE 5
5 4 3 2
5/32
WELD JOINTS
.150 MAX
.000 .015 BOTH ENDS
.154 MAX
UPPER LEVEL THIS SIDE SEE NOTE 8
.124 .114
.069 MAX
C2
C4
FT3
.150
.088
.250 DIA
.250 MAX
.300 REF.
1.250
.188
1.550±.010 SEE NOTE 7
RIBBON .010 X .020 1006757-1 AS REQUIRED
SCREW, BUTTON HEAD SELF LOCKING SOCKET HD. 1000093-13 2 REQ'D (4-40-NC-3A 1/4 LONG)
SEE NOTE 10a CENTRALIZE
TEMP CONTROLLER
POWER SUPPLY
3200 CPS, 20V
1007045
REV
SERIAL NO.
PIN AREA
MARKING VIEW
SCALE FULL SIZE
2.213
1.906
.687
1.719
1.241
1.093
.395
.166
.140 REF
.072
EQUIVALENT TO 11 SPACES @ .25±.0
1.675±.002
1.953

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

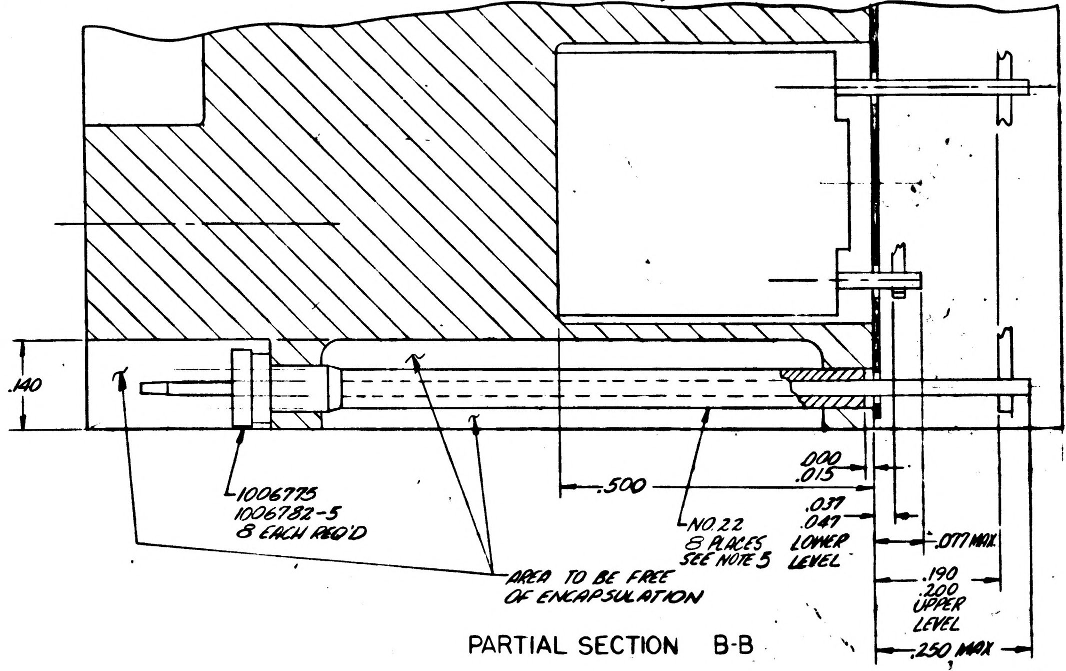
HOLE CHART FOR REFERENCE ONLY

REF DESIG	"X" DIM	"Y" DIM.	HOLE DESCRIPTION	PART NUMBER
C1	.320	1.260	$.154^{+.003}_{-.001}$ DIA	1006755-65
C2	.060	.850	$.196^{+.003}_{-.001}$ DIA	1010264-1
C3	0	0	$.196^{+.003}_{-.001}$ DIA	1010264-1
C4	.310	.090	$.370^{+.005}_{-.002}$ DIA	
CR1	.670	.050	$.128^{+.003}_{-.001}$ DIA	IN914B
CR2	.310	1.090	$.128^{+.003}_{-.001}$ DIA	IN914B
R1	.430	-1.370	$.101^{+.003}_{-.001}$ DIA	1006750-51
R2	.320	.890	$.221^{+.003}_{-.001}$ DIA	1010312-029
R3	.550	-.020	$.101^{+.003}_{-.001}$ DIA	1006750-24
R4	.380	.680	$.101^{+.003}_{-.001}$ DIA	1006750-24
Q1 Q2	.130	.490	PART. SECT C-C	1010398 2N2193
Q3	.720	.460	PART SECT A-A	1010269 2N2151
Q4	.720	1.110		
FT1	.440	.770	$.059^{+.003}_{-.001}$ DIA	WIRE ELECT. ND1015400B .020 DIA INSULATION NO. 22 SEE NOTE 5
FT2	.090	.210		
FT3	.020	.160		
FT4	.200	.770		
T1	AS NOTED			1010329
T2	AS NOTED			1010338



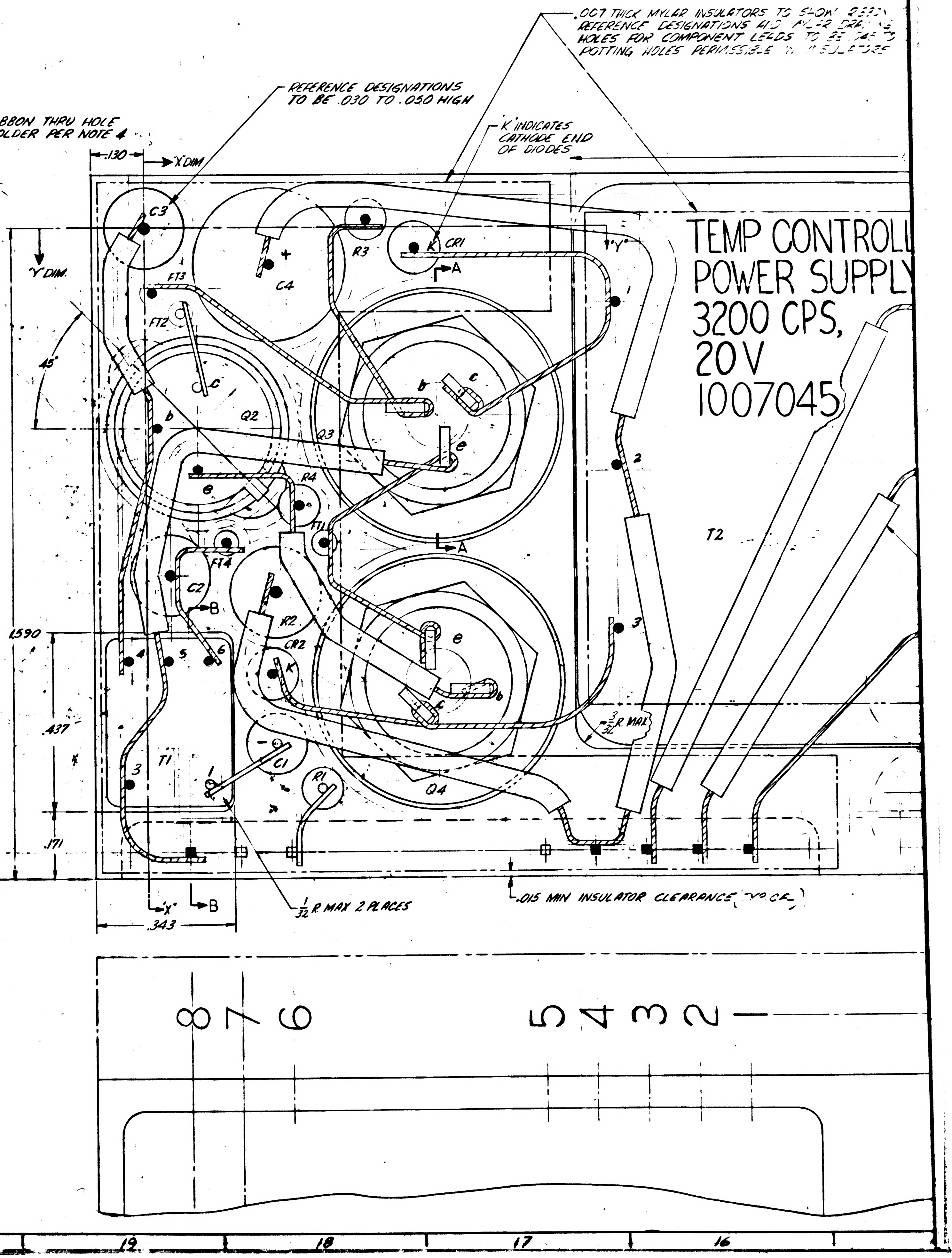
2-1008024-1
1008021-1
CEMENT PER ND1002009
2-1008024-2
LOOP RIBBON THRU HOLE AND SOLDER PER NOTE 4
1008020-1
NAS1022-C3
10-32 NF-3B
.828
.125
.550 DIA
.332 DIA
.625 DIA
MAXIMUN STUD TORQUE 15 IN-LB

PARTIAL SECTION A-A
(Q3 AND Q4)



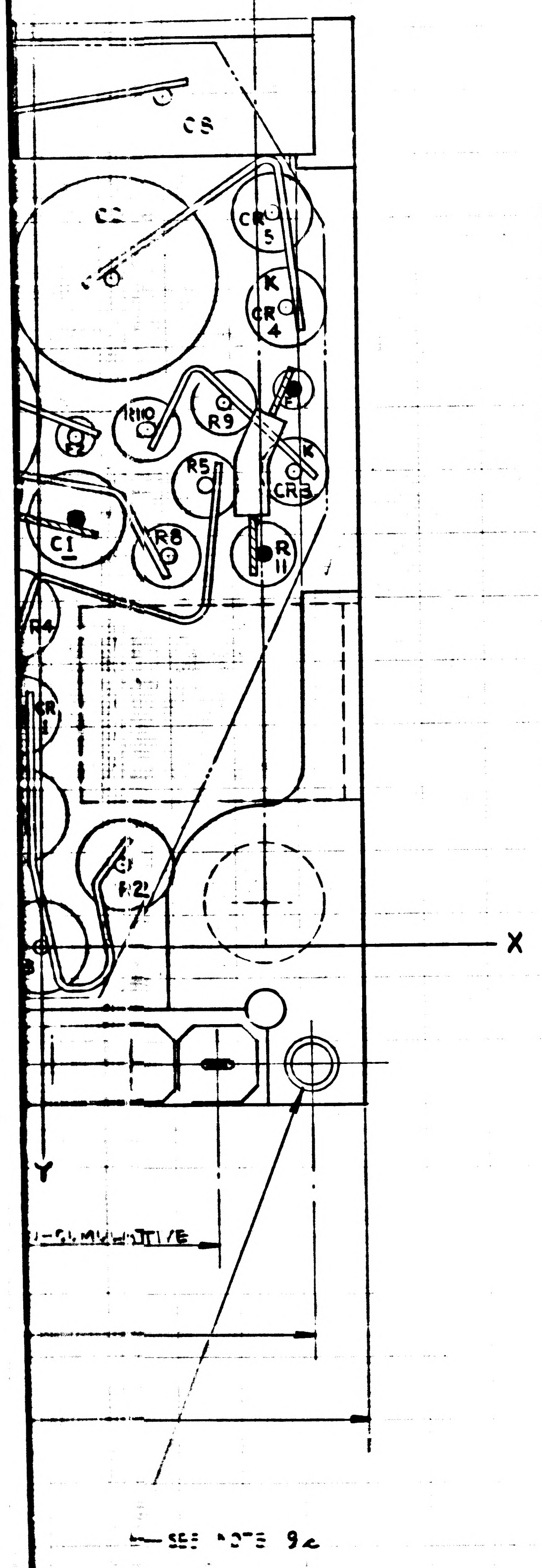
.140
.500
1006775
1006782-5
8 EACH REQ'D
AREA TO BE FREE OF ENCAPSULATION
NO. 22
8 PLACES
SEE NOTE 5
.000
.015
.037
.047
LOWER LEVEL
.077 MAX
.190
.200
UPPER LEVEL
.250 MAX

PARTIAL SECTION B-B



.007 THICK MYLAR INSULATORS TO SHOW REFERENCE DESIGNATIONS AND MYLAR DRA HOLES FOR COMPONENT LEADS TO BE POTTING HOLES PERMISSIBLE IN INSULATORS
REFERENCE DESIGNATIONS TO BE .030 TO .050 HIGH
'K' INDICATES CATHODE END OF DIODES
.130
'X' DIM
'Y' DIM.
'Y'
45°
C3
C4
R3
CR1
K
A
FT3
FT2
Q2
Q3
b
c
e
R4
T1
FT4
C2
B
R2
CR2
K
C1
R1
Q4
T1
T2
1
2
3
4
5
6
$\frac{3}{32}$ R MAX
1.590
.437
.171
.343
'X'
$\frac{1}{32}$ R MAX 2 PLACES
.015 MIN INSULATOR CLEARANCE
TEMP CONTROL
POWER SUPPLY
3200 CPS,
20V
1007045
8 7 6
5 4 3 2

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL



FOR INFORMATION ONLY

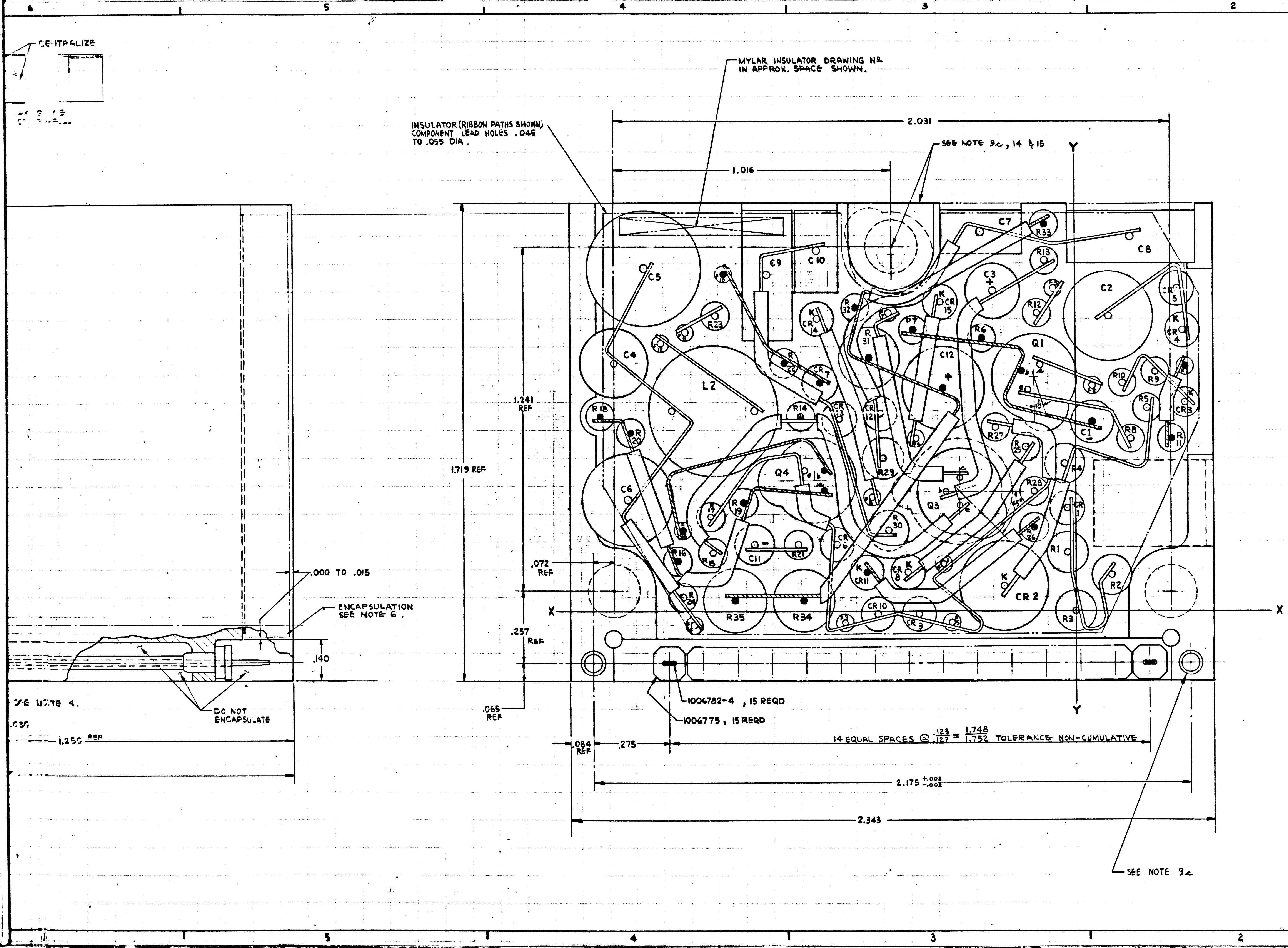
CLASS B RELEASE TDR No. 00974 DATE 4-24-63

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. WIRE PER ND 1002003
3. WELD PER ND 1002005
4. SLEEVING PER ND 1002074
5. CEMENT PER ND 1002009
6. ENCAPSULATE MODULE PER ND 1002002 (BLACK POLYURETHANE FOAM)
7. ● INDICATES LEADS TO BE CUT AFTER UPPER LEVEL WELDING. CROSS HATCHED RIBBONS INDICATE UPPER LEVEL.
8. ○ INDICATES LEADS TO BE CUT AFTER LOWER LEVEL WELDING.
9. UNLESS OTHERWISE SPECIFIED:
   a - MARK CHARACTERS .060 TO .100 HIGH, WHITE PER ND 1002019.
   b - ALL CORNERS TO BE .015 MAX RADIUS OR CHAMFER.
   c - HEAT SINK TO BE PER DRAWING D-106828 REV. C.
   d - .010 X .020 RIBBON, ND 1015400.
10. DRAWINGS FOR REFERENCE:
    SCHEMATIC - 1010047
11. FINAL ASSEMBLY PART NUMBER - 1007043
12. FINAL ASSEMBLY DRAWING TITLE - "AAC FILTER AND MULTIVIBRATOR 3200 CPS".
13. FINISH: ANODIZE PER MIL-A-8625 DYED BLACK, TYPE II, PLUG INSERT HOLES.
14. COAT THREADS AND INSERTS WITH MIL-P-8585 WET ZINC CHROMATE PRIMER.
15. INSTALL INSERTS PER MS-33537 (EXCEPT DIM. F TO BE .594) BREAK OFF DRIVING TANG.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS $\pm\frac{1}{64}$ DECIMALS ±.005 ANGLES ±2° DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
MATERIAL —	DRAWN L. G. DeLalio DATE 4/9/63 CHECKED APPROVAL Don Tast / J. J. M. APPROVAL	DESIGN LAYOUT AAC FILTER AND MULTI-VIBRATOR 3200 CPS
HEAT TREATMENT —	NASA APPROVAL 4/16/63	CODE IDENT NO. SIZE J NASA DRAWING NO. 1010210
FINAL FINISH SEE NOTE 13.	MIT APPROVAL W. ... 24 Apr 63	SCALE FULL (AS NOTED) WT SHEET 1 OF 1

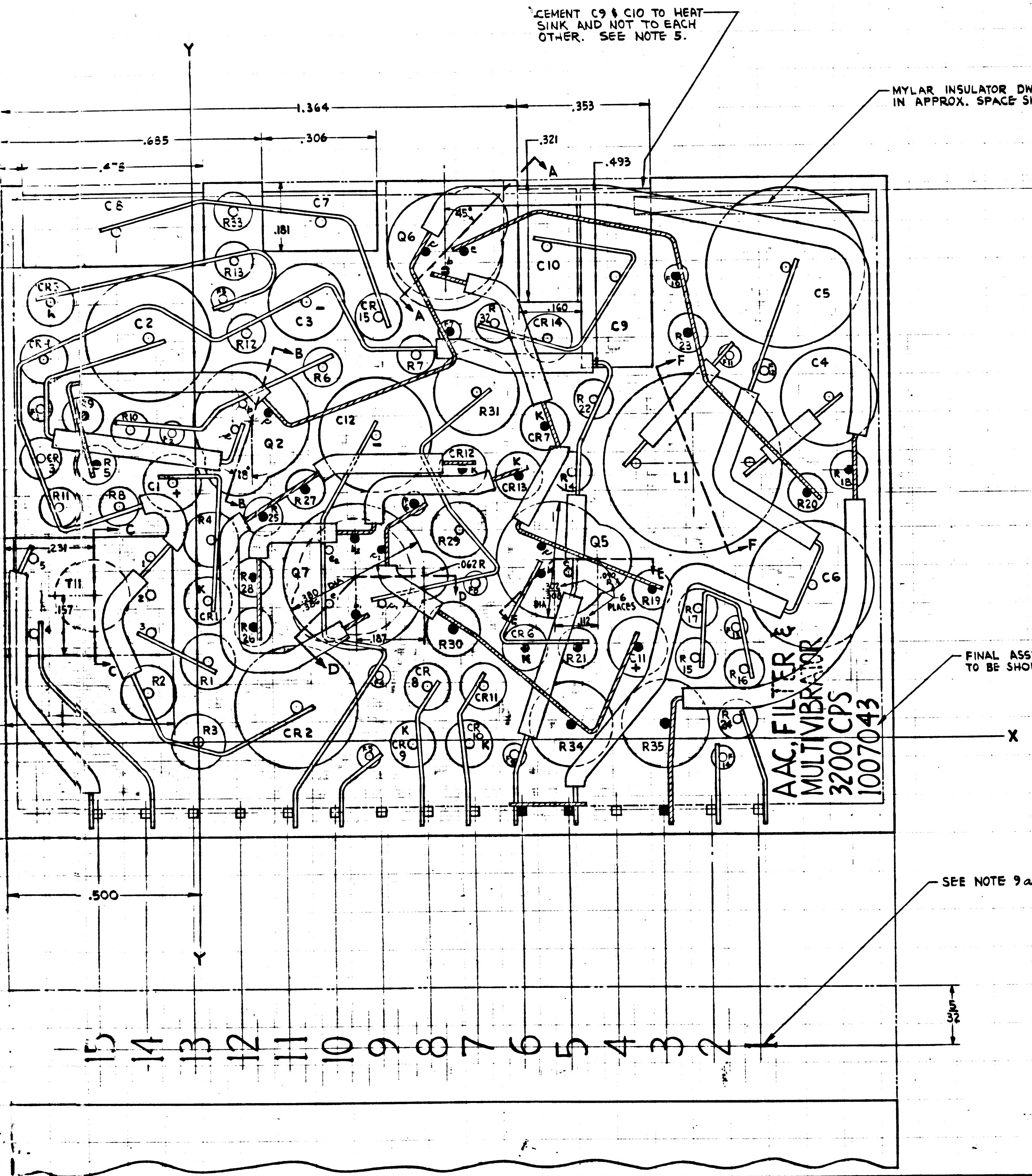
INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY


6
5
4
3
2
CENTRALIZE
MYLAR INSULATOR DRAWING No
IN APPROX. SPACE SHOWN.
INSULATOR (RIBBON PATHS SHOWN)
COMPONENT LEAD HOLES .045
TO .055 DIA.
2.031
SEE NOTE 9c, 14 & 15
1.016
Y
C5
C4
L2
C9
C10
C7
R33
C8
R13
C3
C2
CR 5
CR 4
R12
R6
CR 15
CR 14
R 32
R 31
R23
R 22
CR 7
C12
Q1
R10
R9
R5
CR3
R11
R8
C1
R27
R 25
R4
R28
R 26
CR 1
R1
R2
R3
CR 2
Q3
R 30
R29
CR 12
CR 13
R14
Q4
R18
R 20
C6
R 19
R17
R16
R15
R 24
C11
R21
CR 6
CR 11
CR 8
CR 10
CR 9
R35
R34
1.241 REF
1.719 REF
.072 REF
.257 REF
.065 REF
X
X
.000 TO .015
ENCAPSULATION
SEE NOTE 6.
.140
SEE NOTE 4.
.030
DO NOT
ENCAPSULATE
1.250 REF
1006782-4, 15 REQD
1006775, 15 REQD
14 EQUAL SPACES @ .123/.127 = 1.748/1.752 TOLERANCE NON-CUMULATIVE
.084 REF
.275
2.175 +.002 -.002
2.343
SEE NOTE 9c
Y
45°

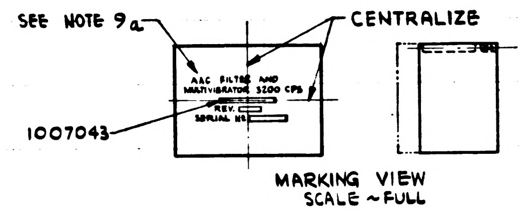
NOTES:

1. INTERPRET DRAWING I
   BY MIL-D-70327.
2. WIRE PER ND 1002003
3. WELD PER ND 1002005
4. SLEEVING PER ND 100207
5. CEMENT PER ND100200
6. ENCAPSULATE MODULE F
7. ● INDICATES LEADS TO B
   HATCHED RIBBONS INDIC
8. ○ INDICATES LEADS TO
9. UNLESS OTHERWISE SP
   a - MARK CHARACTERS
   b - ALL CORNERS TO BE
   c - HEAT SINK TO BE F
   d - .010 X .020 RIBBON
10. DRAWINGS FOR REFEREN
11. FINAL ASSEMBLY PART N
12. FINAL ASSEMBLY DRAWING
    3200 CPS".
13. FINISH: ANODIZE PER MIL
14. COAT THREADS AND INSERT
15. INSTALL INSERTS PER MS
    OFF DRIVING TANG.

INCHES
PHOTOGRAPHIC SCALE ONLY

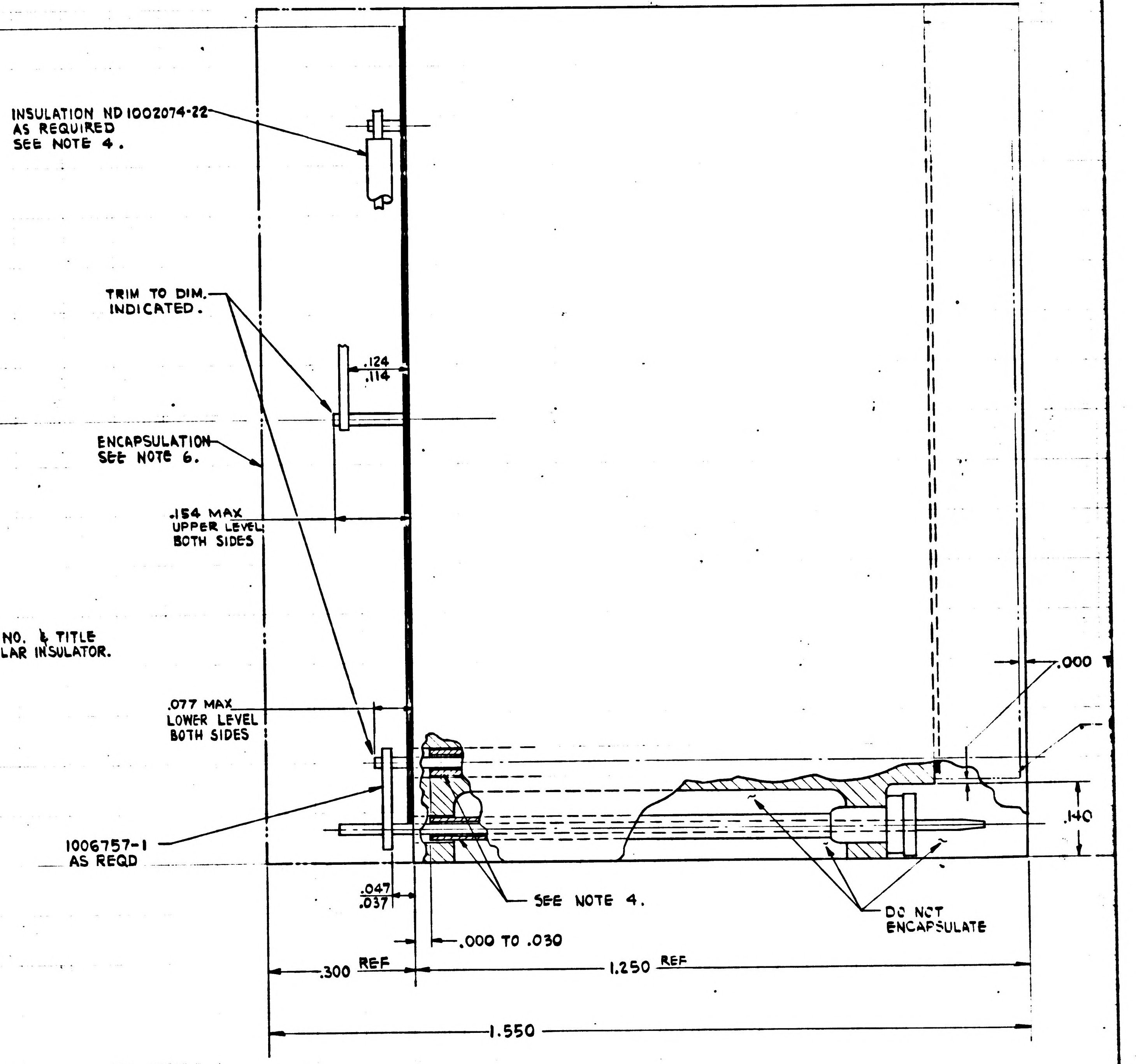


CEMENT C9 & C10 TO HEAT SINK AND NOT TO EACH OTHER. SEE NOTE 5.
MYLAR INSULATOR DWG NO. IN APPROX. SPACE SHOWN.
FINAL ASSY PART NO. & TITLE TO BE SHOWN ON MYLAR INSULATOR.
SEE NOTE 9a
AAC, FILTER
MULTIVIBRATOR
3200 CPS
1007043
1.364
.685
.306
.475
.353
.321
.493
.181
.160
.231
.157
.062 R
.187
.500
$\frac{3}{32}$
X
Y
A
B
C
D
E
F
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
CR1
CR2
CR3
CR4
CR5
CR6
CR7
CR8
CR9
CR10
CR11
CR12
CR13
CR14
CR15
Q2
Q5
Q6
Q7
L1
T1
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
45°
6 PLACES
15
14
13
12
11
10
9
8
7
6
5
4
3
2



SEE NOTE 9a
CENTRALIZE
1007043
AAC FILTER AND MULTIVIBRATOR 3200 CPS
REV.
SERIAL NO.

MARKING VIEW
SCALE ~ FULL



INSULATION ND 1002074-22 AS REQUIRED SEE NOTE 4.
TRIM TO DIM. INDICATED.
.124
.114
ENCAPSULATION SEE NOTE 6.
.154 MAX UPPER LEVEL BOTH SIDES
.077 MAX LOWER LEVEL BOTH SIDES
1006757-1 AS REQD
.047
.037
SEE NOTE 4.
.000 TO .030
DO NOT ENCAPSULATE
.000
.140
.300 REF
1.250 REF
1.550

INCHES
PHOTOGRAPHIC SCALE ONLY

1010310

REF DESIG	X BASIC DIMENSION	Y BASIC DIMENSION	HOLE DIA THRU, TOL*	PART NUMBER
C	-.060	.680	.154	1006755-69
C2	-.120	1.060	.332	1010264-21
C3	.300	1.150	.203	1006755-31
C4	.680	.890	.254	1010264-17
C5	.570	1.230	.421	1010264-29
C6	.630	.400	.332	1010264 NOM
C7	SEE	DRAWING		1010410 NOM
C8				1006793-007
C9				1006793-007
C10				1010410 NOM
C11	1.170	.240	.154	1006755-64
C12	.450	.800	.308	1006755-81
CR1	.030	.370	.128	1010385 IN 660
CR2	.260	.090	.328	1010346-11 FS 1584
CR3	-.400	.750	.106	1010286 IN 967B
CR4	-.390	1.010	.128	1010385 IN 660
CR5	-.370	1.160		
CR6	.870	.240		
CR7	.930	.820		
CR8	.610	.140		
CR9	.570	-.010		
CR10	.720	-.010		
CR11	.760	.140		
CR12	.710	.710		
CR13	.860	.690		
CR14	.940	1.050		
CR15	.490	1.110		
F1	-.400	.880	.059	WIRE, ELECTRICAL .020 DIA ND 1015400 INSULATION Nº24 SEE NOTE 4.
F2	-.060	.810		
F3	.080	1.160		
F4	.480	.170		
F5	.450	-.040		
F6	.580	.620		
F7	.680	1.070		
F8	.740	.410		
F9	.840	-.040		
F10	1.280	1.210		
F11	1.420	1.000		
F12	1.510	.960		
F13	1.430	.290		
F14	1.390	-.050		
L1	1.320	.72	SEE PARTIAL SECT. F-F	1010426 180 MH
L2	1.320	.72	SEE PARTIAL SECT. F-F	1010424 8 MH
R1	.030	.210	.147	1010364-143
R2	-.130	.130	.147	-365
R3	.000	.000	.147	NOM
R4	.040	.530	.147	-403
R5	-.260	.730	.101	1006750-42
R6	.340	.980		1010369-95
R7	.590	1.010		1006750-60
R8	-.200	.620		1010369-140
R9	-.290	.860		1006750-42
R10	-.170	.820		1006750-52

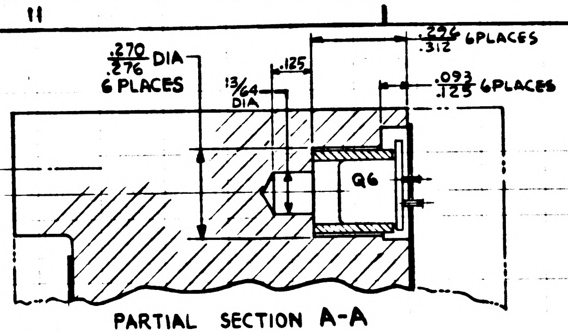
REF DESIG	X BASIC DIMENSION	Y BASIC DIMENSION	HOLE DIA THRU TOL *	PART NUMBER
R11	-.350	.620	.101	1006750-40
R12	.140	1.070		1010369-88
R13	.110	1.260		1010369-95
R14	1.000	.700		1006750-72
R15	1.320	.21		-56
R16	1.450	.180		-62
R17	1.330	.340		-32
R18	1.730	.700		-52
R19	1.210	.390		-44
R20	1.620	.640		-48
R21	1.010	.240		-60
R22	1.060	.890		-48
R23	1.310	1.060		-19
R24	1.430	.050		-73
R25	.180	.590		-56
R26	.150	.300		-56
R27	.290	.660		-72
R28	.150	.430		-72
R29	.700	.550	.147	1010364-693
R30	.680	.290	.147	1010364-693
R31	.750	.910	.228	1010363-351
R32	.800	1.090	.101	1006750-76
R33	.110	1.390	.101	1006750-76
R34	.990	.040	.228	1010363-351
R35	1.240	.040	.238	1010278-56
T1	DIMENSIONALLY LOCATED ON DWG. SEE PARTIAL SECTION C-C.			1010291-2 SP 44
Q1	.150	.840	SEE PARTIAL SECT. B-B	1010397 2N930
Q2	.150	.840	SEE PARTIAL SECT. B-B	
Q3	.420	.430	SEE PARTIAL SECT. D-D	
Q4	.950	.470	SEE PARTIAL SECT. E-E	
Q5	.950	.470	SEE PARTIAL SECT. E-E	
Q6	.670	1.280	SEE PARTIAL SECT. A-A	
Q7	.420	.430	SEE PARTIAL SECT. D-D	1010431 SP 8414A

"X" & "Y" DIMENSIONS TO BE $\boxed{\oplus .006\ \text{DIA}}$

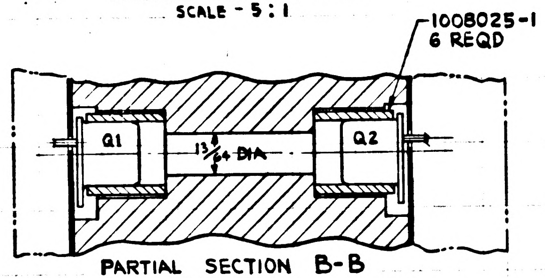
* HOLE DIA THRU TOLERANCE :

UNDER $\frac{1}{4}$ DIA - $^{+.003}_{-.001}$

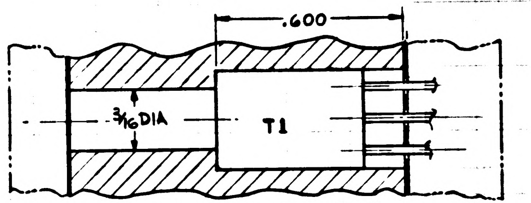
OVER $\frac{1}{4}$ DIA - $^{+.005}_{-.002}$


.270/.276 DIA
6 PLACES
13/64 DIA
.125
.296/.312 6PLACES
.093/.125 6PLACES
Q6

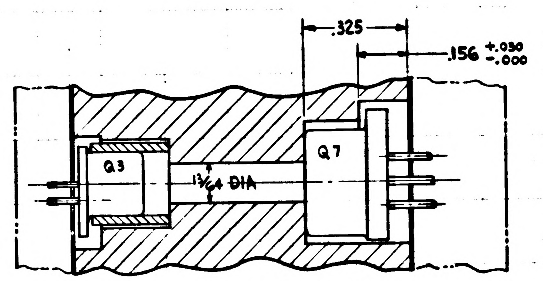
PARTIAL SECTION A-A
SCALE - 5 : 1


1008025-1
6 REQD
Q1
Q2
13/64 DIA

PARTIAL SECTION B-B
SCALE 5:1

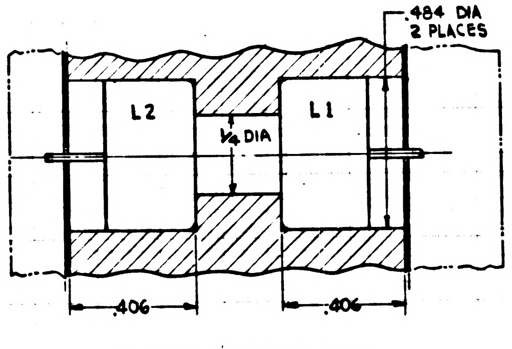

.600
3/16 DIA
T1

PARTIAL SECTION C-C
SCALE - 5 :1

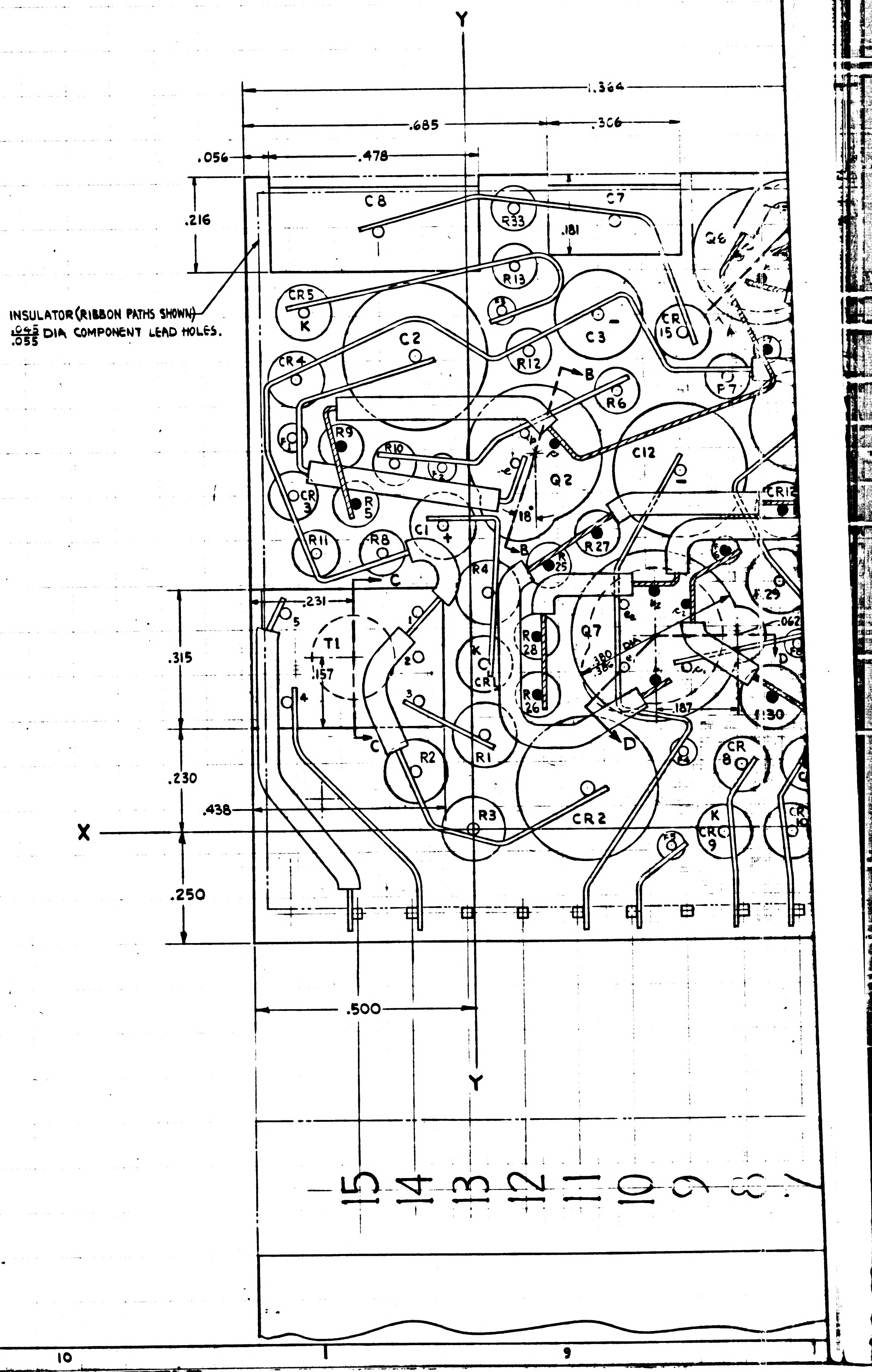

.325
.156 +.030 -.000
Q3
Q7
13/64 DIA

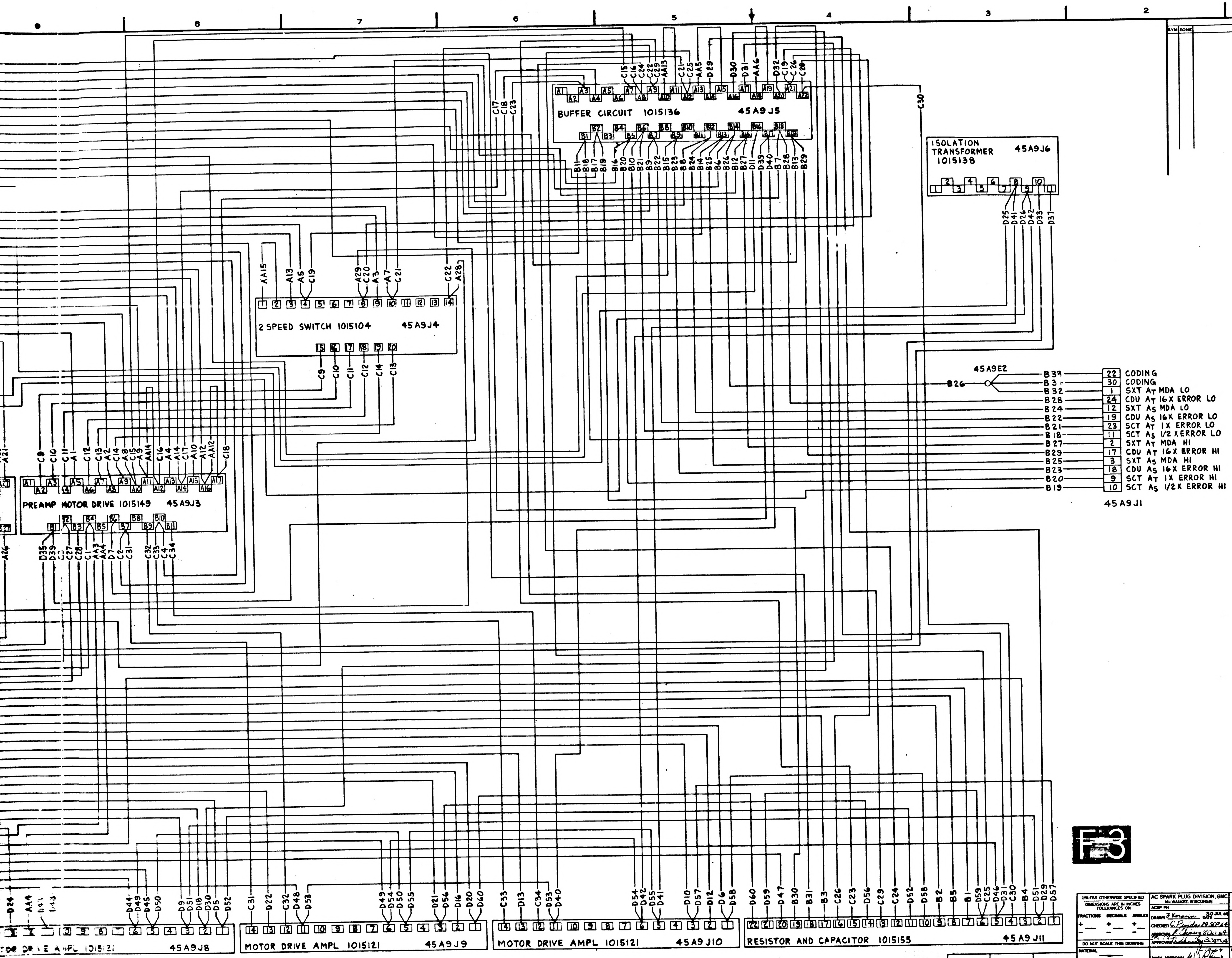
PARTIAL SECTION D-D
SCALE 5 :1

PARTIAL SECTION E-E (TRANSISTORS Q4 & Q5) SAME AS PARTIAL SECTION B-B.


.484 DIA
2 PLACES
L2
L1
1/8 DIA
.406
.406

PARTIAL SECTION F-F
SCALE - 5 :1


INSULATOR (RIBBON PATHS SHOWN)
.045/.055 DIA COMPONENT LEAD HOLES.
Y
X
1.364
.685
.306
.056
.478
.216
.181
.315
.230
.250
.438
.231
.157
.500
.062
.187
18°
C8
C7
R33
R13
CR5
K
C2
C3
CR 15
R12
CR4
B
R6
F7
Q6
R9
R10
C12
Q2
CR 3
R5
R11
R8
C1
R4
R27
R25
CR12
T1
Q7
R28
R26
CR1
C
D
R2
R1
R3
CR2
CR 8
CRC 9
CR 10
R30
F29
15 14 13 12 11 10 9 8


BUFFER CIRCUIT 1015136 45A9J5
ISOLATION TRANSFORMER 1015138 45A9J6
2 SPEED SWITCH 1015104 45A9J4
PREAMP MOTOR DRIVE 1015149 45A9J3
45A9E2
B26
B37 22 CODING
B3r 30 CODING
B32 1 SXT AT MDA LO
B28 24 CDU AT 16X ERROR LO
B24 12 SXT AS MDA LO
B22 19 CDU AS 16X ERROR LO
B21 23 SCT AT 1X ERROR LO
B18 11 SCT AS 1/2 X ERROR LO
B27 2 SXT AT MDA HI
B29 17 CDU AT 16X ERROR HI
B25 3 SXT AS MDA HI
B23 18 CDU AS 16X ERROR HI
B20 9 SCT AT 1X ERROR HI
B19 10 SCT AS 1/2X ERROR HI
45A9J1
MOTOR DRIVE AMPL 1015121 45A9J8
MOTOR DRIVE AMPL 1015121 45A9J9
MOTOR DRIVE AMPL 1015121 45A9J10
RESISTOR AND CAPACITOR 1015155 45A9J11
F3

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD

1010231

NEXT ASSY | USED ON | APPLICABLE DASH NO.
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN F Korazin DATE 30 JUL 64
CHECKED C. Pujidas 29 SEP 64
APPROVAL R Okiyama 8 Oct 64
APPROVAL 8 OCT 64
NASA APPROVAL 11-17-64
MIT APPROVAL 17 Nov 64

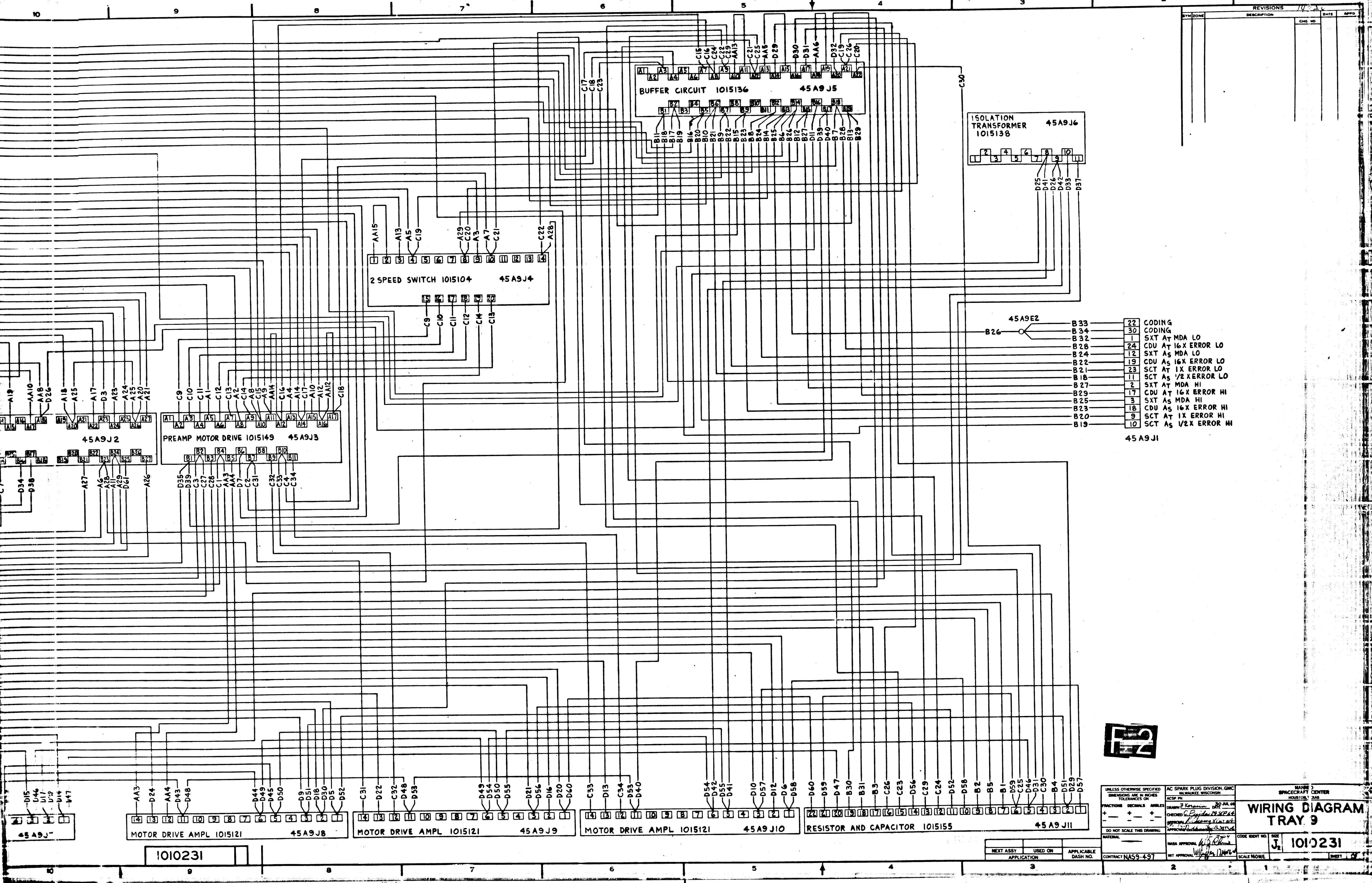
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

WIRING DIAGRAM TRAY 9

CODE IDENT NO. | SIZE J2 | 1010231
SCALE NONE | SHEET 1 OF 1

3.14

1010231


REVISIONS
SYM
ZONE
DESCRIPTION
DATE
APPD
CHG NO
BUFFER CIRCUIT 1015136
45A9J5
ISOLATION TRANSFORMER 1015138
45A9J6
2 SPEED SWITCH 1015104
45A9J4
45A9E2
B26
B33
B34
B32
B28
B24
B22
B21
B18
B27
B29
B25
B23
B20
B19
22 CODING
30 CODING
1 SXT AT MDA LO
24 CDU AT 16X ERROR LO
12 SXT AS MDA LO
19 CDU AS 16X ERROR LO
23 SCT AT 1X ERROR LO
11 SCT AS 1/2 X ERROR LO
2 SXT AT MDA HI
17 CDU AT 16X ERROR HI
3 SXT AS MDA HI
18 CDU AS 16X ERROR HI
9 SCT AT 1X ERROR HI
10 SCT AS 1/2X ERROR HI
45A9J1
45A9J2
PREAMP MOTOR DRIVE 1015149
45A9J3
45A9J7
MOTOR DRIVE AMPL 1015121
45A9J8
MOTOR DRIVE AMPL 1015121
45A9J9
MOTOR DRIVE AMPL 1015121
45A9J10
RESISTOR AND CAPACITOR 1015155
45A9J11
F-2
1010231

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN F Korasin DATE 30 JUL 64
CHECKED C. Pyida 29 SEP 64
APPROVAL K Devney 8 Oct 64
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

**WIRING DIAGRAM
TRAY 9**

CODE IDENT NO.
SIZE J2
1010231
SCALE NONE
SHEET

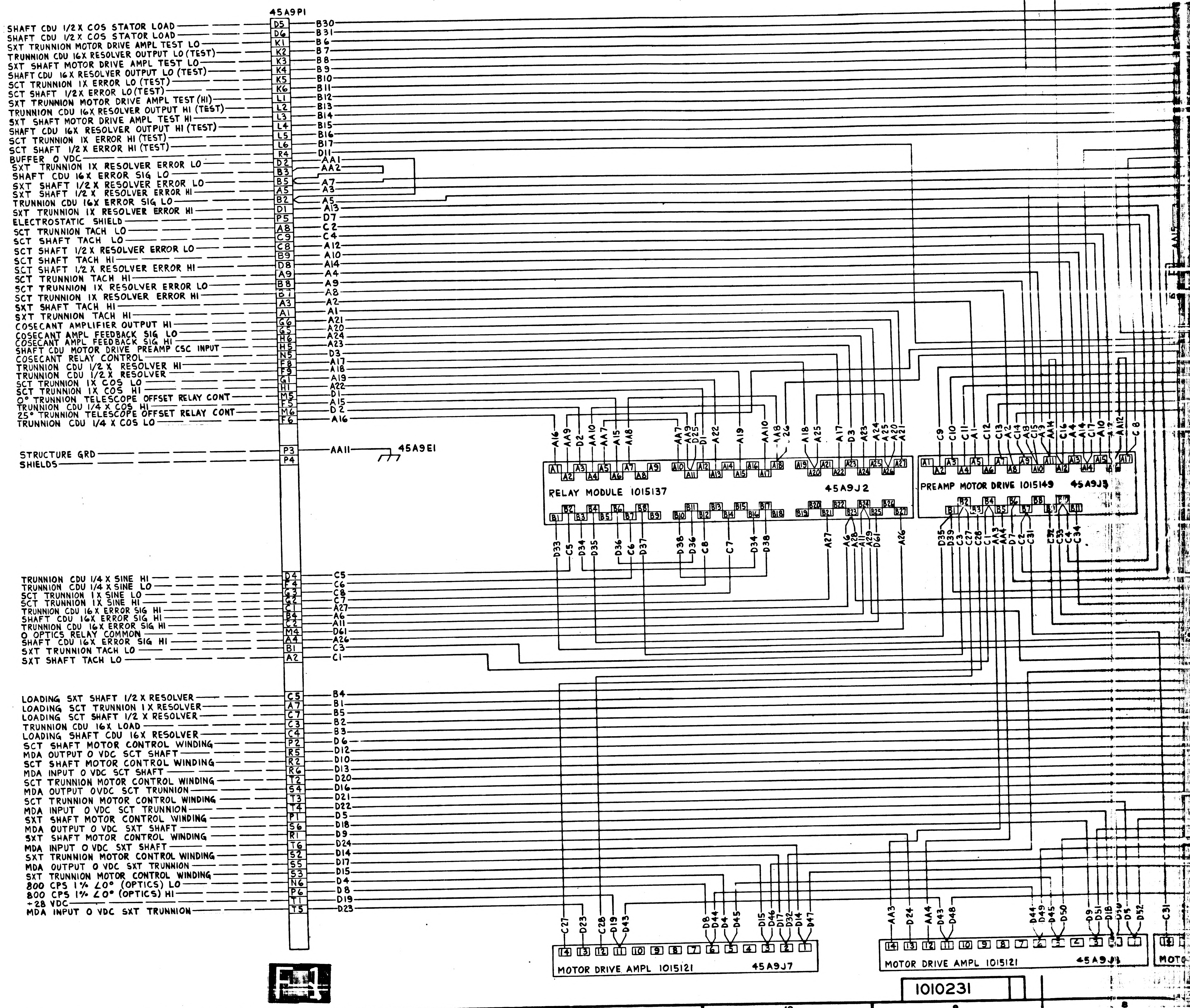
NEXT ASSY | USED ON | APPLICABLE DASH NO.
APPLICATION

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

2. ——— INDICATES NO. 24 GAGE WIRE PER 1010639-2

3. SCHEMATIC REF:

1015137	RELAY MODULE
1015121	MOTOR DRIVE AMPL
1015149	PREAMP MOTOR DRIVE
1015104	2 SPEED SWITCH
1015136	BUFFER CIRCUIT
1015155	RESISTOR AND CAPACITOR
1015138	ISOLATION TRANSFORMER


45A9P1
SHAFT CDU 1/2X COS STATOR LOAD — D5 — B30
SHAFT CDU 1/2X COS STATOR LOAD — D6 — B31
SXT TRUNNION MOTOR DRIVE AMPL TEST LO — K1 — B6
TRUNNION CDU 16X RESOLVER OUTPUT LO (TEST) — K2 — B7
SXT SHAFT MOTOR DRIVE AMPL TEST LO — K3 — B8
SHAFT CDU 16X RESOLVER OUTPUT LO (TEST) — K4 — B9
SCT TRUNNION 1X ERROR LO (TEST) — K5 — B10
SCT SHAFT 1/2X ERROR LO (TEST) — K6 — B11
SXT TRUNNION MOTOR DRIVE AMPL TEST (HI) — L1 — B12
TRUNNION CDU 16X RESOLVER OUTPUT HI (TEST) — L2 — B13
SXT SHAFT MOTOR DRIVE AMPL TEST HI — L3 — B14
SHAFT CDU 16X RESOLVER OUTPUT HI (TEST) — L4 — B15
SCT TRUNNION 1X ERROR HI (TEST) — L5 — B16
SCT SHAFT 1/2X ERROR HI (TEST) — L6 — B17
BUFFER 0 VDC — R4 — D11
SXT TRUNNION 1X RESOLVER ERROR LO — D2 — AA1
SHAFT CDU 16X ERROR SIG LO — B3 — AA2
SXT SHAFT 1/2X RESOLVER ERROR LO — B5 — A7
SXT SHAFT 1/2X RESOLVER ERROR HI — A5 — A3
TRUNNION CDU 16X ERROR SIG LO — B2 — A5
SXT TRUNNION 1X RESOLVER ERROR HI — D1 — A13
ELECTROSTATIC SHIELD — P5 — D7
SCT TRUNNION TACH LO — A8 — C2
SCT SHAFT TACH LO — C9 — C4
SCT SHAFT 1/2X RESOLVER ERROR LO — C8 — A12
SCT SHAFT TACH HI — B9 — A10
SCT SHAFT 1/2X RESOLVER ERROR HI — D8 — A14
SCT TRUNNION TACH HI — A9 — A4
SCT TRUNNION 1X RESOLVER ERROR LO — B8 — A9
SCT TRUNNION 1X RESOLVER ERROR HI — B7 — A8
SXT SHAFT TACH HI — A3 — A2
SXT TRUNNION TACH HI — A1 — A1
COSECANT AMPLIFIER OUTPUT HI — G6 — A21
COSECANT AMPL FEEDBACK SIG LO — G5 — A20
COSECANT AMPL FEEDBACK SIG HI — H6 — A24
SHAFT CDU MOTOR DRIVE PREAMP CSC INPUT — H5 — A23
COSECANT RELAY CONTROL — N5 — D3
TRUNNION CDU 1/2X RESOLVER HI — F8 — A17
TRUNNION CDU 1/2X RESOLVER — F9 — A18
SCT TRUNNION 1X COS LO — G1 — A19
SCT TRUNNION 1X COS HI — H1 — A22
0° TRUNNION TELESCOPE OFFSET RELAY CONT — M5 — D1
TRUNNION CDU 1/4X COS HI — F5 — A15
25° TRUNNION TELESCOPE OFFSET RELAY CONT — M6 — D2
TRUNNION CDU 1/4X COS LO — F6 — A16
STRUCTURE GRD — P3 — AA11
SHIELDS — P4
45A9E1
TRUNNION CDU 1/4X SINE HI — D4 — C5
TRUNNION CDU 1/4X SINE LO — F4 — C6
SCT TRUNNION 1X SINE LO — G3 — C8
SCT TRUNNION 1X SINE HI — G2 — C7
TRUNNION CDU 16X ERROR SIG HI — C1 — A27
SHAFT CDU 16X ERROR SIG HI — B4 — A6
TRUNNION CDU 16X ERROR SIG HI — C2 — A11
0 OPTICS RELAY COMMON — M4 — D61
SHAFT CDU 16X ERROR SIG HI — A4 — A26
SXT TRUNNION TACH LO — B1 — C3
SXT SHAFT TACH LO — A2 — C1
LOADING SXT SHAFT 1/2X RESOLVER — C5 — B4
LOADING SCT TRUNNION 1X RESOLVER — A7 — B1
LOADING SCT SHAFT 1/2X RESOLVER — C7 — B5
TRUNNION CDU 16X LOAD — C3 — B2
LOADING SHAFT CDU 16X RESOLVER — C4 — B3
SCT SHAFT MOTOR CONTROL WINDING — P2 — D6
MDA OUTPUT 0 VDC SCT SHAFT — R5 — D12
SCT SHAFT MOTOR CONTROL WINDING — R2 — D10
MDA INPUT 0 VDC SCT SHAFT — R6 — D13
SCT TRUNNION MOTOR CONTROL WINDING — T2 — D20
MDA OUTPUT 0VDC SCT TRUNNION — S4 — D16
SCT TRUNNION MOTOR CONTROL WINDING — T3 — D21
MDA INPUT 0 VDC SCT TRUNNION — T4 — D22
SXT SHAFT MOTOR CONTROL WINDING — P1 — D5
MDA OUTPUT 0 VDC SXT SHAFT — S6 — D18
SXT SHAFT MOTOR CONTROL WINDING — R1 — D9
MDA INPUT 0 VDC SXT SHAFT — T6 — D24
SXT TRUNNION MOTOR CONTROL WINDING — S2 — D14
MDA OUTPUT 0 VDC SXT TRUNNION — S5 — D17
SXT TRUNNION MOTOR CONTROL WINDING — S3 — D15
800 CPS 1% ∠0° (OPTICS) LO — N6 — D4
800 CPS 1% ∠0° (OPTICS) HI — P6 — D8
+28 VDC — T1 — D19
MDA INPUT 0 VDC SXT TRUNNION — T5 — D23
RELAY MODULE 1015137
45A9J2
PREAMP MOTOR DRIVE 1015149
45A9J3
MOTOR DRIVE AMPL 1015121
45A9J7
MOTOR DRIVE AMPL 1015121
45A9J8
1010231

NOTES:

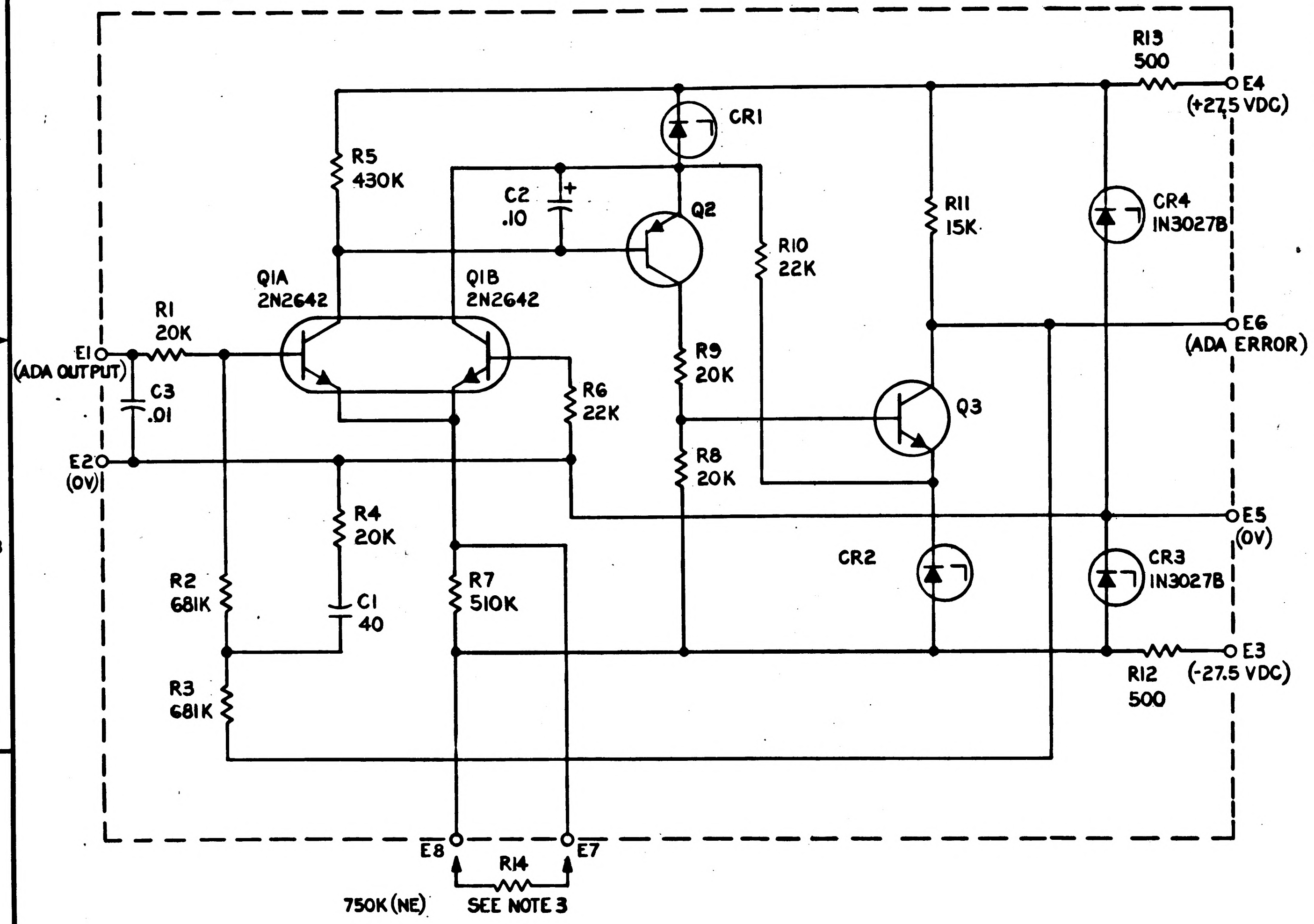
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED VALUES ARE IN OHMS & MICROFARADS.
3. RANGE & INCREMENTAL VALUES OF R14 TO BE SELECTED FROM CHART.

R14	
1010885- 1	360K
↑ - 2	390K
- 3	430K
- 4	470K
- 5	510K
- 6	560K
- 7	620K
- 8	680K
- 9	750K
- 10	820K
- 11	910K
- 12	1000K
- 13	1100K
- 14	1200K
↓ - 15	1300K
1010885- 16	1500K

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOL & RATING
C1	1010320-13	CAPACITOR	40, ±20%, 15 VNP
C2	1006755-57	CAPACITOR	.10, ±10%, 35 V
C3	1010359-29	CAPACITOR	.01, ±10%, 200 V
CR1	1010372-20	DIODE	±5%, 200 MW
CR2	1010372-1	↑	↑ , 200 MW
CR3	1010265-12	↓ EIA	↓ , 1W
CR4	1010265-12	DIODE EIA	±5%, 1W
Q1	1010252-001	TRANSISTOR	
Q2	1010345-1	TRANSISTOR	
Q3	1010397-001	TRANSISTOR	
R1	1010364-501	RESISTOR	20K, ±1%, 1/8 W
R2	1010321-398	↑	681K, ↑ , 1/4 W
R3	1010321-398		681K, ↓ , 1/4 W
R4	1010364-501		20K, ±1%, 1/8 W
R5	1010369-96		430K, ±5%, 1/4 W
R6	1006750-64		22K, ±2%, ↑
R7	1010369-98		510K, ±5%,
R8	1006750-63		20K, ±2%,
R9	↑ -63		20K, ↑
R10	↓ -64		22K, ↓ ↓
R11	1006750-60		15K, ±2%, 1/4 W
R12	1010312-030		500, ±5%, 2 W
R13	1010312-030	↓	500, ±5%, 2 W
R14	1010885	RESISTOR	SEE NOTE 3, ±5%, 1/4 W

REVISIONS 16401

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
A		Incorporate Authorizing Signature		29 Mar 65	W.K.



R13
500
E4
(+27.5 VDC)
CR1
R5
430K
C2
.10
Q2
R11
15K
CR4
1N3027B
R10
22K
Q1A
2N2642
Q1B
2N2642
R1
20K
E1
(ADA OUTPUT)
E6
(ADA ERROR)
C3
.01
R9
20K
R6
22K
Q3
E2
(0V)
R8
20K
R4
20K
E5
(0V)
CR2
CR3
1N3027B
R2
681K
C1
40
R7
510K
E3
(-27.5 VDC)
R12
500
R3
681K
E8
R14
E7
750K (NE)
SEE NOTE 3

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN 28 JAN 65 DATE
CHECKED 1 FEB 65
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 2/17/65
MIT APPROVAL W. Kupfer 17 Feb 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM, ELECTRICAL
ADA PRE-AMPLIFIER

CODE IDENT NO. SIZE D 1010234
SCALE — SHEET 1 OF 1

B | 1010234

NOTES:

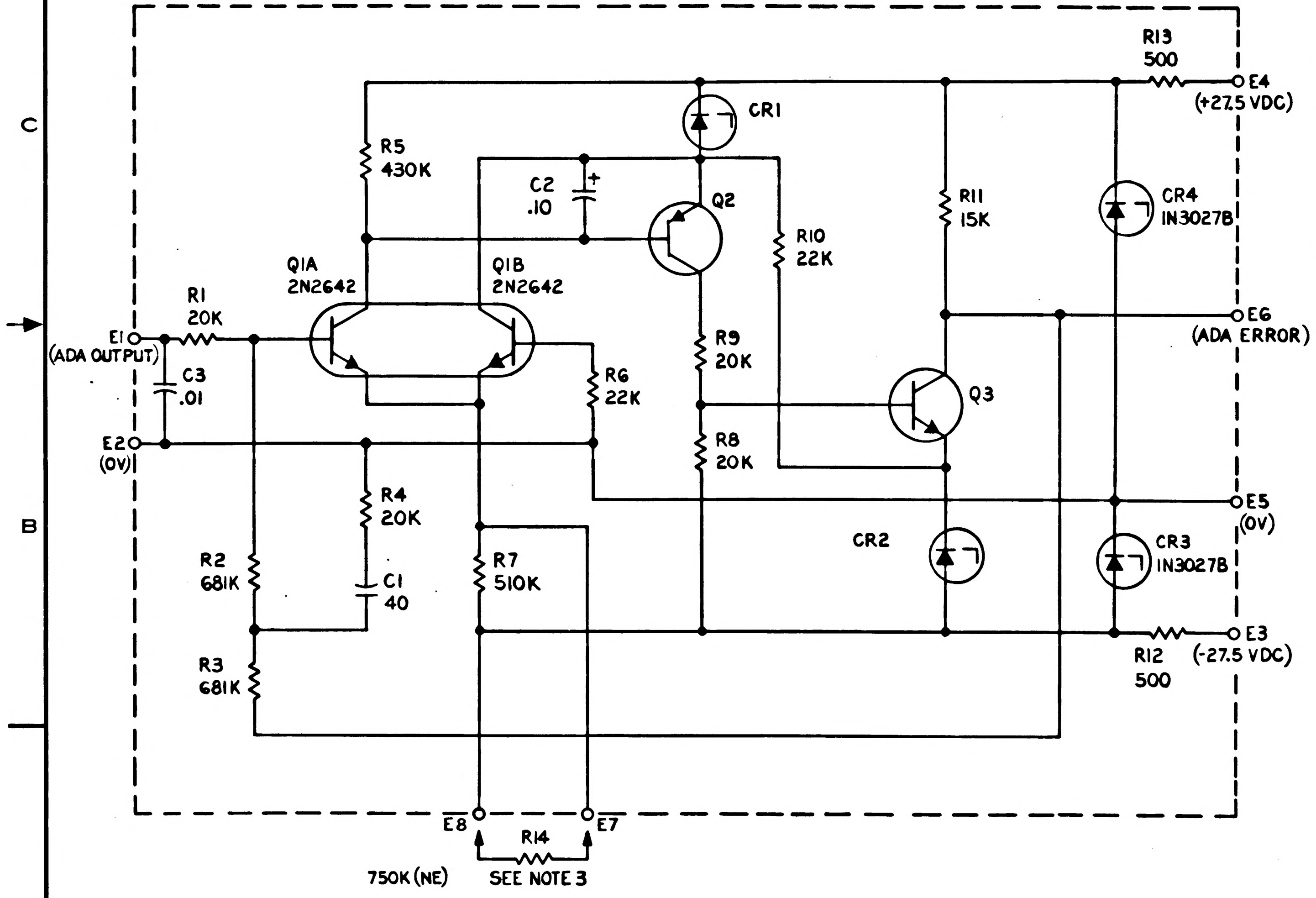
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED VALUES ARE IN OHMS & MICROFARADS.
3. RANGE & INCREMENTAL VALUES OF R14 TO BE SELECTED FROM CHART.

R14	
1010885- 1	360K
↑ - 2	390K
- 3	430K
- 4	470K
- 5	510K
- 6	560K
- 7	620K
- 8	680K
- 9	750K
- 10	820K
- 11	910K
- 12	1000K
- 13	1100K
- 14	1200K
↓ - 15	1300K
1010885- 16	1500K

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOL & RATING
C1	1010320-13	CAPACITOR	40, ±20%, 15 VNP
C2	1006755-57	CAPACITOR	.10, ±10%, 35 V
C3	1010359-29	CAPACITOR	.01, ±10%, 200 V
CR1	1010372-20	DIODE	±5%, 200 MW
CR2	1010372-1	↑	↑ , 200 MW
CR3	1010829-012	↓ EIA	↓ , 1W
CR4	1010829-012	DIODE EIA	±5%, 1W
Q1	1010252-001	TRANSISTOR	
Q2	1010345-1	TRANSISTOR	
Q3	1010397-001	TRANSISTOR	
R1	1010364-501	RESISTOR	20K, ±1%, 1/8 W
R2	1010321-398	↑	681K, ↑ , 1/4 W
R3	1010321-398		681K, ↓ , 1/4 W
R4	1010364-501		20K, ±1%, 1/8 W
R5	1010369-96		430K, ±5%, 1/4 W
R6	1006750-64		22K, ±2%, ↑
R7	1010369-98		510K, ±5%,
R8	1006750-63		20K, ±2%,
R9	↑ -63		20K, ↑
R10	↓ -64		22K, ↓ ↓
R11	1006750-60		15K, ±2%, 1/4 W
R12	1010312-030		500, ±5%, 2 W
R13	1010312-030	↓	500, ±5%, 2 W
R14	1010885	RESISTOR	SEE NOTE 3, ±5%, 1/4 W

REVISIONS 16407

SYM	ZONE	DESCRIPTION	CHG NO	DATE	APPD
A		Incorporate Authorizing Signature		29 Mar 65	WK
B		REVISED PER TORR 18107		3 APR 65	HTD / MEM



R13
500
E4
(+27.5 VDC)
CR1
R5
430K
C2
.10
Q2
R11
15K
CR4
1N3027B
R10
22K
Q1A
2N2642
Q1B
2N2642
E6
(ADA ERROR)
E1
(ADA OUTPUT)
R1
20K
C3
.01
R6
22K
R9
20K
Q3
E2
(0V)
R8
20K
R4
20K
E5
(0V)
CR2
CR3
1N3027B
R2
681K
C1
40
R7
510K
R12
500
E3
(-27.5 VDC)
R3
681K
E8
E7
R14
750K (NE)
SEE NOTE 3

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
+ — + — + —
— — — — — —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN DATE 28 Jan 65
CHECKED 1 FEB 65
APPROVAL Manuel Kramer
APPROVAL
NASA APPROVAL 2/17/65
MIT APPROVAL

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC DIAGRAM, ELECTRICAL
ADA PRE-AMPLIFIER

CODE IDENT NO. | SIZE D | 1010234
SCALE — | SHEET 1 OF 1

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
2. UNLESS OTHERWISE SPECIFIED VALUES ARE IN OHMS & MICROFARADS.
3. RANGE & INCREMENTAL VALUES OF R14 TO BE SELECTED FROM CHART.

R14	
1010885- 1	360K
- 2	390K
- 3	430K
- 4	470K
- 5	510K
- 6	560K
- 7	620K
- 8	680K
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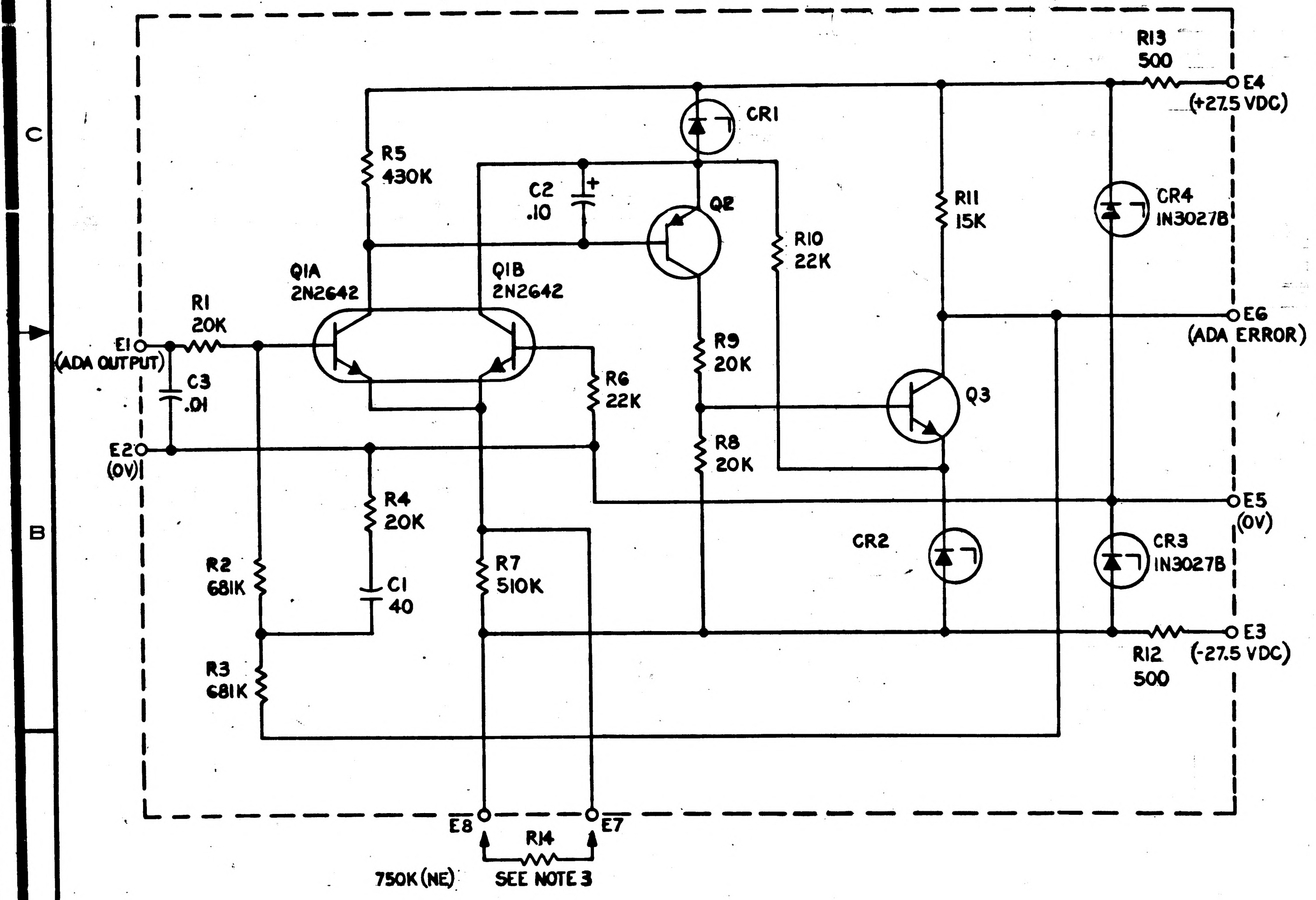
- 10	820K
- 11	910K
- 12	1000K
- 13	1100K
- 14	1200K
- 15	1300K
1010885- 16	1500K

REF DES	PART NO.	DESCRIPTION	SCHEMATIC DIAGRAM OR VALUE, TOL & RATING
C1	1010320-13	CAPACITOR	40, ±20%, 15 VNP
C2	1006755-57	CAPACITOR	.10, ±10%, 35 V
C3	1010359-29	CAPACITOR	.01, ±10%, 200V
CR1	1010372-20	DIODE	±5%, 200 MW
CR2	1010372-1	↕	↕ , 200 MW
CR3	1010265-12	↕ EIA	↕ , 1W
CR4	1010265-12	DIODE EIA	±5%, 1W
Q1	1010252-001	TRANSISTOR	
Q2	1010345-1	TRANSISTOR	
Q3	1010397-001	TRANSISTOR	
R1	1010364-501	RESISTOR	20K, ±1%, 1/8 W
R2	1010321-398	↕	681K, ↕ , 1/4 W
R3	1010321-398		681K, ↕ , 1/4 W
R4	1010364-501		20K, ±1%, 1/8 W
R5	1010369-96		430K, ±5%, 1/4W
R6	1006750-64		22K, ±2%, ↕
R7	1010369-98		510K, ±5%,
R8	1006750-63		20K, ±2%,
R9	↕ -63		20K, ↕
R10	↕ -64		22K, ↕ ↕
R11	1006750-60		15K, ±2%, 1/4W
R12	1010312-030		500, ±5%, 2W
R13	1010312-030	↕	500, ±5%, 2W
R14	1010885	RESISTOR	SEE NOTE 3, ±5%, 1/4W

1010234

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
		REVISIONS 16401			


R13
500
E4
(+27.5 VDC)
CR1
R5
430K
C2
.10
Q2
R10
22K
R11
15K
CR4
1N3027B
Q1A
2N2642
Q1B
2N2642
R1
20K
E1
(ADA OUTPUT)
C3
.01
R9
20K
R6
22K
E6
(ADA ERROR)
Q3
R8
20K
E2
(0V)
R4
20K
E5
(0V)
CR2
CR3
1N3027B
R2
681K
C1
40
R7
510K
R3
681K
R12
500
E3
(-27.5 VDC)
E8
E7
R14
750K (NE)
SEE NOTE 3

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
CONTRACT NAS 9-497

AC SPARK PLUG DIVISION, GMC
MILWAUKEE, WISCONSIN
ACSP PN
DRAWN 28 JAN 65 DATE
CHECKED 1 FEB 65
APPROVAL 2 FEB 65
APPROVAL 2 FEB 65
NASA APPROVAL 2/17/65
MIT APPROVAL 17 FEB 65

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

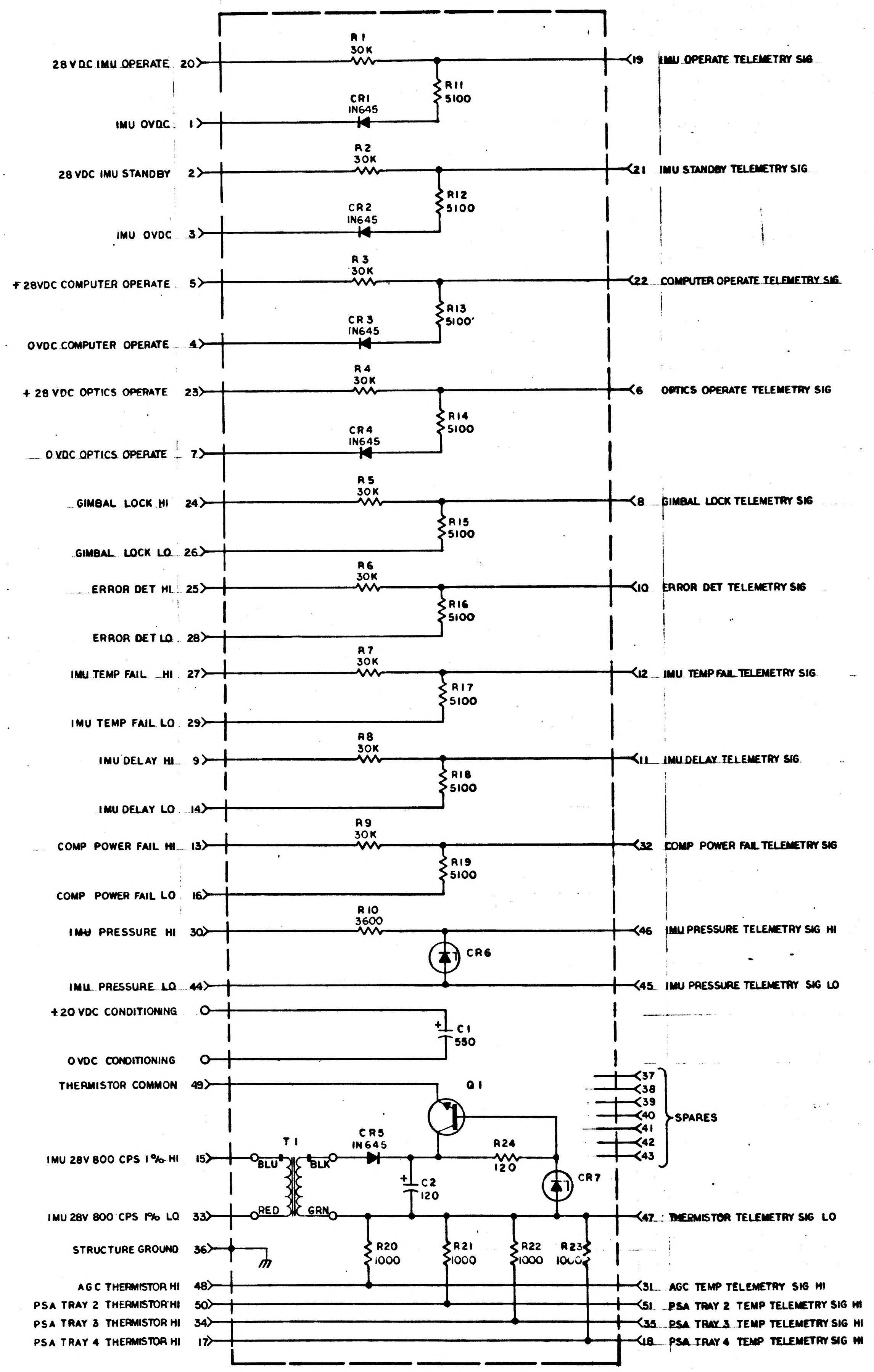
SCHEMATIC DIAGRAM, ELECTRICAL
ADA PRE-AMPLIFIER

CODE IDENT NO.
SIZE D
1010234
SCALE —
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 21110

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22185			7 Sept 65	


28 VDC IMU OPERATE 20
IMU OVDC 1
28 VDC IMU STANDBY 2
IMU OVDC 3
+ 28VDC COMPUTER OPERATE 5
OVDC COMPUTER OPERATE 4
+ 28 VDC OPTICS OPERATE 23
0 VDC OPTICS OPERATE 7
GIMBAL LOCK HI 24
GIMBAL LOCK LO 26
ERROR DET HI 25
ERROR DET LO 28
IMU TEMP FAIL HI 27
IMU TEMP FAIL LO 29
IMU DELAY HI 9
IMU DELAY LO 14
COMP POWER FAIL HI 13
COMP POWER FAIL LO 16
IMU PRESSURE HI 30
IMU PRESSURE LO 44
+20 VDC CONDITIONING
0 VDC CONDITIONING
THERMISTOR COMMON 49
IMU 28V 800 CPS 1% HI 15
IMU 28V 800 CPS 1% LO 33
STRUCTURE GROUND 36
AGC THERMISTOR HI 48
PSA TRAY 2 THERMISTOR HI 50
PSA TRAY 3 THERMISTOR HI 34
PSA TRAY 4 THERMISTOR HI 17
R1 30K
R2 30K
R3 30K
R4 30K
R5 30K
R6 30K
R7 30K
R8 30K
R9 30K
R10 3600
R11 5100
R12 5100
R13 5100
R14 5100
R15 5100
R16 5100
R17 5100
R18 5100
R19 5100
CR1 IN645
CR2 IN645
CR3 IN645
CR4 IN645
CR5 IN645
CR6
CR7
C1 550
C2 120
Q1
T1
BLU
BLK
RED
GRN
R24 120
R20 1000
R21 1000
R22 1000
R23 1000
19 IMU OPERATE TELEMETRY SIG
21 IMU STANDBY TELEMETRY SIG
22 COMPUTER OPERATE TELEMETRY SIG
6 OPTICS OPERATE TELEMETRY SIG
8 GIMBAL LOCK TELEMETRY SIG
10 ERROR DET TELEMETRY SIG
12 IMU TEMP FAIL TELEMETRY SIG
11 IMU DELAY TELEMETRY SIG
32 COMP POWER FAIL TELEMETRY SIG
46 IMU PRESSURE TELEMETRY SIG HI
45 IMU PRESSURE TELEMETRY SIG LO
37
38
39
40
41
42
43
SPARES
47 THERMISTOR TELEMETRY SIG LO
31 AGC TEMP TELEMETRY SIG HI
51 PSA TRAY 2 TEMP TELEMETRY SIG HI
35 PSA TRAY 3 TEMP TELEMETRY SIG HI
18 PSA TRAY 4 TEMP TELEMETRY SIG HI

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -67	RESISTOR	30 K	± 2%	1/4 W
R2	-67		30 K		
R3	-67		30 K		
R4	-67		30 K		
R5	-67		30 K		
R6	-67		30 K		
R7	-67		30 K		
R8	-67		30 K		
R9	-67		30 K		
R10	-45		3600		
R11	-49		5100		
R12	-49		5100		
R13	-49		5100		
R14	-49		5100		
R15	-49		5100		
R16	-49		5100		
R17	-49		5100		
R18	-49		5100		
R19	1006750 -49		5100	± 2%	1/4 W
R20	1010364 -251		1000	± 1%	1/8 W
R21	1010364 -251		1000	± 1%	1/8 W
R22	1010364 -251		1000	± 1%	1/8 W
R23	1010364 -251		1000	± 1%	1/8 W
R24	1006750 -10	RESISTOR	120	± 2%	1/4 W
C1	1010637 - 1	CAPACITOR	550	±75%	30VDC
C2	1006755 - 15	CAPACITOR	120	±10%	10VDC
CR1	1010837 -001	DIODE	IN645		
CR2	-001				
CR3	-001				
CR4	-001				
CR5	1010837 -001		IN645		
CR6	1010372 - 20				
CR7	1010259	DIODE	IN825		
Q1	1010357 - 1	TRANSISTOR	2N720A		
T1	1010466	TRANSFORMER			

REF DWG:
SIGNAL CONDITIONER ASSY SCALER
DWG NO. 1007663

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN A. D. Leo 14 JUN 65
CHECKED
APPROVED
APPROVED 12 July
APPROVED MIT W Kupfer
APPROVED MSC 7/21/65
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

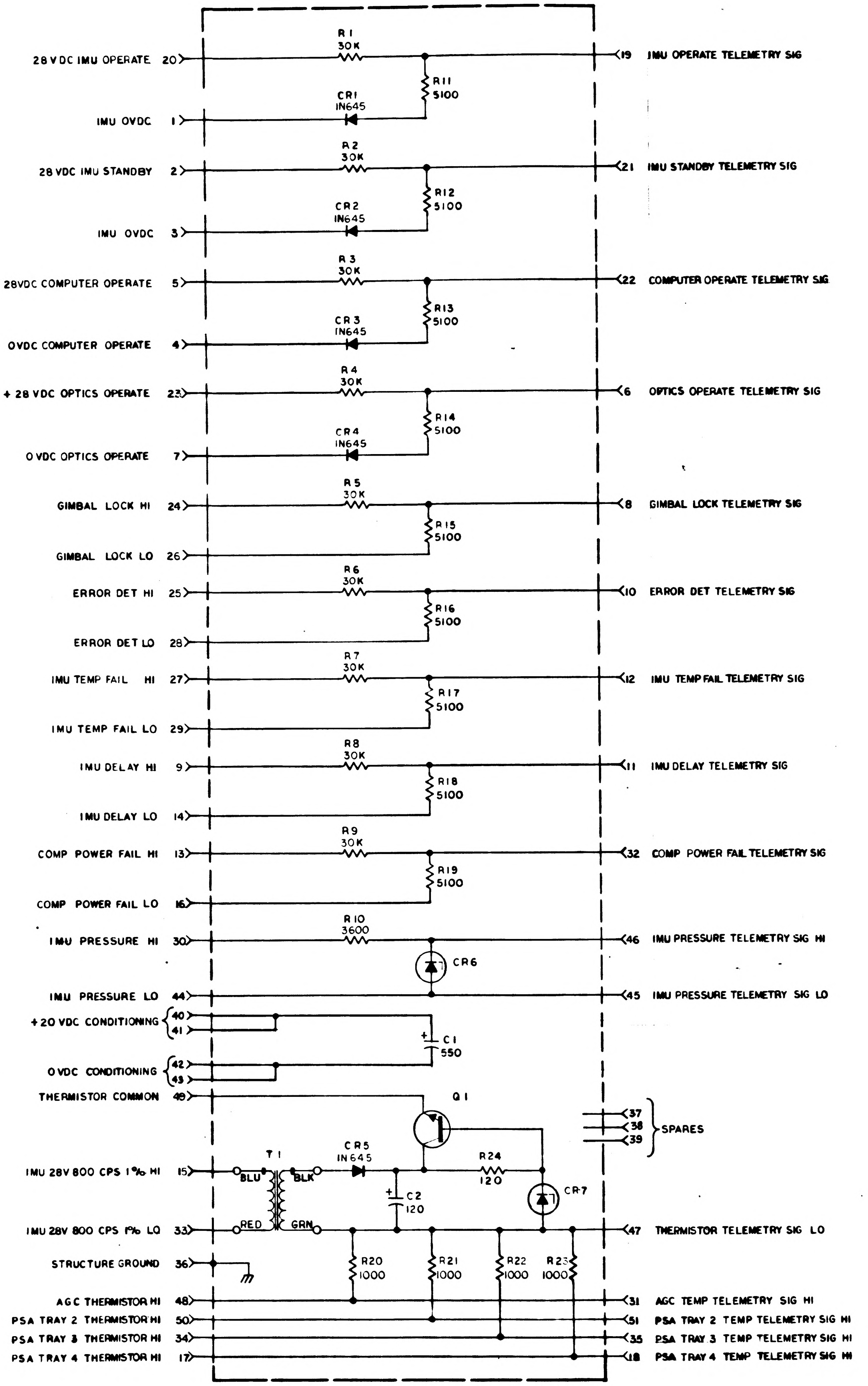
SCHEMATIC,
SIGNAL CONDITIONER SCALER

CODE IDENT NO. 80230
SIZE E
DRAWING NO. 1010240
SCALE —
SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS 21110

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22185				
B		REVISED PER TDRR 23208			18 OCT 65	


28 VDC IMU OPERATE 20
IMU OVDC 1
28 VDC IMU STANDBY 2
IMU OVDC 3
+ 28VDC COMPUTER OPERATE 5
OVDC COMPUTER OPERATE 4
+ 28 VDC OPTICS OPERATE 23
O VDC OPTICS OPERATE 7
GIMBAL LOCK HI 24
GIMBAL LOCK LO 26
ERROR DET HI 25
ERROR DET LO 28
IMU TEMP FAIL HI 27
IMU TEMP FAIL LO 29
IMU DELAY HI 9
IMU DELAY LO 14
COMP POWER FAIL HI 13
COMP POWER FAIL LO 16
IMU PRESSURE HI 30
IMU PRESSURE LO 44
+20 VDC CONDITIONING 40 41
O VDC CONDITIONING 42 43
THERMISTOR COMMON 49
IMU 28V 800 CPS 1% HI 15
IMU 28V 800 CPS 1% LO 33
STRUCTURE GROUND 36
AGC THERMISTOR HI 48
PSA TRAY 2 THERMISTOR HI 50
PSA TRAY 3 THERMISTOR HI 34
PSA TRAY 4 THERMISTOR HI 17
R1 30K
R11 5100
CR1 IN645
R2 30K
R12 5100
CR2 IN645
R3 30K
R13 5100
CR3 IN645
R4 30K
R14 5100
CR4 IN645
R5 30K
R15 5100
R6 30K
R16 5100
R7 30K
R17 5100
R8 30K
R18 5100
R9 30K
R19 5100
R10 3600
CR6
C1 550
Q1
T1
BLU
BLK
RED
GRN
CR5 IN645
C2 120
R24 120
CR7
R20 1000
R21 1000
R22 1000
R23 1000
19 IMU OPERATE TELEMETRY SIG
21 IMU STANDBY TELEMETRY SIG
22 COMPUTER OPERATE TELEMETRY SIG
6 OPTICS OPERATE TELEMETRY SIG
8 GIMBAL LOCK TELEMETRY SIG
10 ERROR DET TELEMETRY SIG
12 IMU TEMP FAIL TELEMETRY SIG
11 IMU DELAY TELEMETRY SIG
32 COMP POWER FAIL TELEMETRY SIG
46 IMU PRESSURE TELEMETRY SIG HI
45 IMU PRESSURE TELEMETRY SIG LO
37 38 39 SPARES
47 THERMISTOR TELEMETRY SIG LO
31 AGC TEMP TELEMETRY SIG HI
51 PSA TRAY 2 TEMP TELEMETRY SIG HI
35 PSA TRAY 3 TEMP TELEMETRY SIG HI
18 PSA TRAY 4 TEMP TELEMETRY SIG HI

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -67	RESISTOR	30 K	± 2%	1/4 W
R2	-67		30 K		
R3	-67		30 K		
R4	-67		30 K		
R5	-67		30 K		
R6	-67		30 K		
R7	-67		30 K		
R8	-67		30 K		
R9	-67		30 K		
R10	-45		3600		
R11	-49		5100		
R12	-49		5100		
R13	-49		5100		
R14	-49		5100		
R15	-49		5100		
R16	-49		5100		
R17	-49		5100		
R18	-49		5100		
R19	1006750 - 49		5100	± 2%	1/4 W
R20	1010364 - 251		1000	± 1%	1/8 W
R21	1010364 - 251		1000	± 1%	1/8 W
R22	1010364 - 251		1000	± 1%	1/8 W
R23	1010364 - 251		1000	± 1%	1/8 W
R24	1006750 - 10	RESISTOR	120	± 2%	1/4 W
C1	1010637 - 1	CAPACITOR	550	±75 %	30VDC
C2	1006755 - 15	CAPACITOR	120	±10%	10VDC
CR1	1010837 - 001	DIODE	IN645		
CR2	-001				
CR3	-001				
CR4	-001				
CR5	1010837 - 001		IN645		
CR6	1010372 - 20				
CR7	1010259	DIODE	IN825		
Q1	1010357 - 1	TRANSISTOR	2N720A		
T1	1010466	TRANSFORMER			

REF DWG:
SIGNAL CONDITIONER ASSY SCALER
DWG NO. 1007663

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

		DATE
DRAWN	a. D. Lee	14 JUN 65
CHECKED		
APPROVED		
APPROVED		12 Jul
APPROVED MIT		
APPROVED MSC		7/2/65

SCHEMATIC,
SIGNAL CONDITIONER SCALER

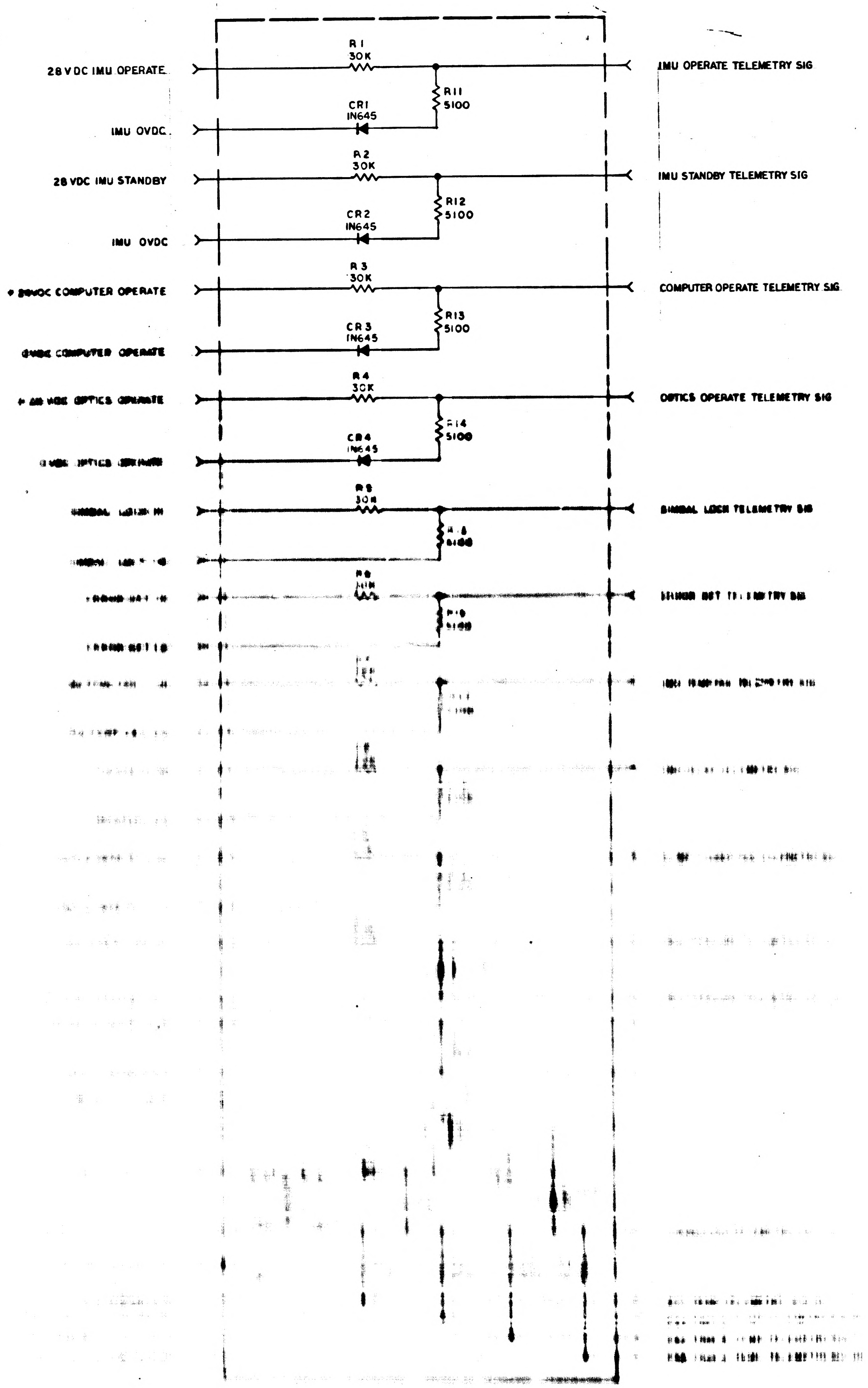
CODE IDENT NO.	SIZE	DRAWING NO.
80230	E	1010240

SCALE — SHEET 1 OF 1

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

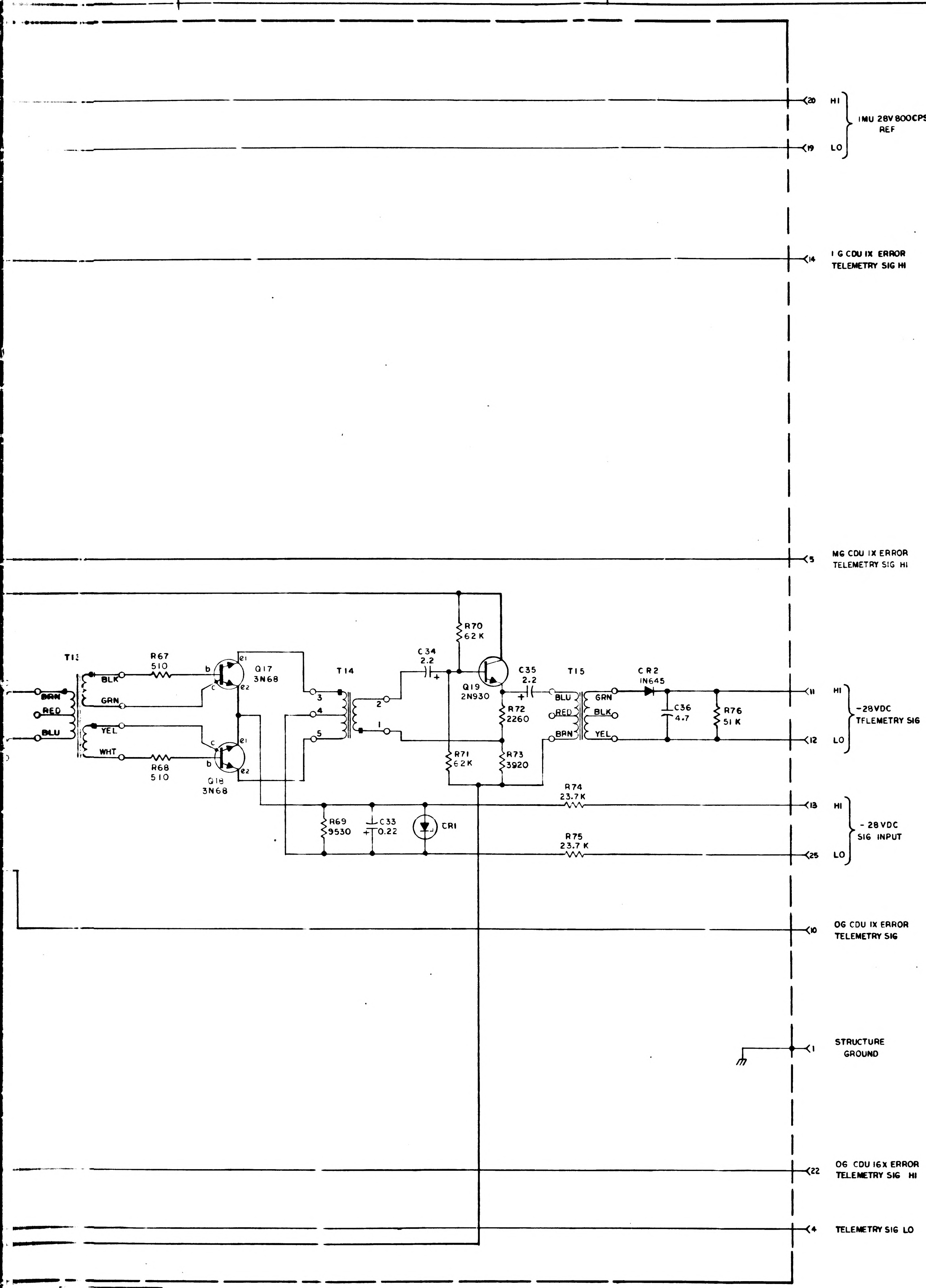
REVISIONS

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED


28 VDC IMU OPERATE
R1
30K
R11
5100
CR1
1N645
IMU OVDC
IMU OPERATE TELEMETRY SIG
28 VDC IMU STANDBY
R2
30K
R12
5100
CR2
1N645
IMU OVDC
IMU STANDBY TELEMETRY SIG
+ 28VDC COMPUTER OPERATE
R3
30K
R13
5100
CR3
1N645
0VDC COMPUTER OPERATE
COMPUTER OPERATE TELEMETRY SIG
+ 28 VDC OPTICS OPERATE
R4
30K
R14
5100
CR4
1N645
0 VDC OPTICS OPERATE
OPTICS OPERATE TELEMETRY SIG
R5
30K
GIMBAL LOCK TELEMETRY SIG

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750 -67	RESISTOR	30 K	± 2%	1/4 W
R2	-67		30 K		
R3	-67		30 K		
R4	-67		30 K		
R5	-67		30 K		
R6	-67		30 K		
R7	-67		30 K		
R8	-67		30 K		
R9	-67		30 K		
R10	-45		3600		
R11	-49		5100		
R12	-49		5100		
R13	-49		5100		
R14	-49		5100		
R15	-49		5100		
R16	-49		5100		
R17	-49		5100		
R18	-49		5100		
R19	1006750 -49		5100	± 2%	1/4 W
R20	1010364 -251		1000	± 1%	1/8 W
R21	1010364 -251		1000	± 1%	1/8 W
R22	1010364 -251		1000	± 1%	1/8 W
R23	1010364 -251		1000	± 1%	1/8 W
R24	1006750 -10	RESISTOR	120	± 2%	1/4 W
C1	[illegible]	CAPACITOR	550	[illegible]	30VDC
C2	[illegible]	CAPACITOR	120	± 10%	[illegible]
CR1	[illegible]	DIODE	1N645		

REVISIONS 21110						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22848	JW		30 OCT 65	
B		REVISED PER TDRR 25541			4 FEB	



HI
LO
IMU 28V 800CPS 1%
REF
20
19
1 G CDU IX ERROR
TELEMETRY SIG HI
14
MG CDU IX ERROR
TELEMETRY SIG HI
5
T13
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67
510
R68
510
Q17
3N68
Q18
3N68
b
c
e1
e2
T14
3
4
5
2
1
C34
2.2
R70
62 K
Q19
2N930
R72
2260
R71
62 K
R73
3920
C35
2.2
T15
BLU
RED
BRN
GRN
BLK
YEL
CR2
1N645
C36
4.7
R76
51 K
11
12
HI
LO
-28VDC
TELEMETRY SIG
R74
23.7K
R75
23.7 K
R69
9530
C33
0.22
CR1
13
25
HI
LO
- 28VDC
SIG INPUT
OG CDU IX ERROR
TELEMETRY SIG
10
STRUCTURE
GROUND
1
OG CDU 16X ERROR
TELEMETRY SIG HI
22
TELEMETRY SIG LO
4

R37, R38, R39, R40	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C5, C6, C7, C8			
PART NO.	VALUE	TOL	RATING
1010410 - 1	220 UUF	± 2%	500VDC
- 2	240		
- 3	270		
- 4	300		
- 5	330		
- 6	360		
- 7	390		
- 8	430		
- 9	470		
- 10	510		500
- 11	560		300
- 12	620		
- 13	680		
- 14	750		
- 15	820		
- 16	910		
- 17	1000		
- 18	1100		
1010410 - 19	1200	± 2%	300VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364 - 653	RESISTOR	124K	± 1 %	1/8 W
R 2	- 653		124K		
R 3	- 653		124K		
R 4	- 653		124K		
R 5	- 653		124K		
R 6	- 653		124K		
R 7	- 653		124K		
R 8	1010364 - 653		124K		1/8 W
R 9	1010311 - 291		52.3K		1/10W
R 10	1010311 - 291		52.3K		1/10W
R 11	1010311 - 291		52.3K		1/10W
R 12	1010311 - 291		52.3K		1/10W
R 13	1010364 - 769		499K		1/8 W
R 14	1010364 - 769		499K		1/8 W
R 15	1010364 - 769		499K		1/8 W
R 16	1010364 - 769		499K	± 1 %	1/8 W
R 17	1006750 - 68		33 K	± 2 %	1/4 W
R 18	1006750 - 65		24 K	± 2 %	1/4 W
R 19	1010311 - 126		1000	± 1 %	1/10W
R 20	1006750 - 68		33K	± 2 %	1/4 W
R 21	1006750 - 65		24K	± 2 %	1/4 W
R 22	1010311 - 126		1000	± 1 %	1/10W
R 23	1006750 - 68		33K	± 2 %	1/4 W
R 24	1006750 - 65		24 K	± 2 %	1/4 W
R 25	1010311 - 126		1000	± 1 %	1/10 W
R 26	1006750 - 68		33K	± 2 %	1/4 W
R 27	1006750 - 65		24K	± 2 %	1/4 W
R 28	1010311 - 126		1000	± 1 %	1/10 W
R 29	1010364 - 707		237K		1/8 W
R 30	1010364 - 707		237K		1/8 W
R 31	1010364 - 707		237K		1/8 W
R 32	1010364 - 707		237K	± 1 %	1/8 W
R 33	1006750 - 56		10 K	± 2 %	1/4 W
R 34	1006750 - 56		10 K	± 2 %	1/4 W
R 35	1006750 - 56		10 K	± 2 %	1/4 W
R 36	1006750 - 56		10 K	± 2 %	1/4 W
R 37	SEE NOTE 2		NOM	± 1 %	1/10 W
R 38	SEE NOTE 2		NOM	± 1 %	1/10 W
R 39	SEE NOTE 2		NOM	± 1 %	1/10 W
R 40	SEE NOTE 2		NOM	± 1 %	1/10 W
R 41	1006750 - 36		1500	± 2 %	1/4 W
R 42	- 36		1500		
R 43	- 36		1500		
R 44	- 36		1500		
R 45	- 36		1500		
R 46	- 36		1500		
R 47	- 36		1500		
R 48	1006750 - 36		1500	± 2 %	1/4 W
R 49	1010311 - 126		1000	± 1 %	1/10 W
R 50	- 126		1000		
R 51	- 126		1000		
R 52	- 126		1000		
R 53	- 126		1000		
R 54	- 126		1000		
R 55	- 126		1000		
R 56	1010311 - 126		1000	± 1 %	1/10 W
R 57	1006750 - 39		2000	± 2 %	1/4 W
R 58	- 39		2000		
R 59	- 39		2000		
R 60	- 39		2000		
R 61	- 39		2000		
R 62	- 39		2000		
R 63	- 39		2000		
R 64	- 39		2000		
R 65	- 48		4700		
R 66	- 48		4700		
P 67	- 25		510		
R 68	1006750 - 25		510	± 2 %	1/4 W
R 69	1010364 - 439		9530	± 1 %	1/8 W
R 70	1006750 - 75		62K	± 2 %	1/4 W
R 71	1006750 - 75		62 K	± 2 %	1/4 W
R 72	1010364 - 319		2260	± 1 %	1/8 W
R 73	1010364 - 365		3920	± 1 %	1/8 W
R 74	1010364 - 515		23.7K	± 1 %	1/8 W
R 75	1010364 - 515		23.7K	± 1 %	1/8 W
R 76	1006750 - 73	RESISTOR	51 K	± 2 %	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010410 - 9	CAPACITOR	470 UUF	± 2 %	500VDC
C 2	1010410 - 9		470		500
C 3	1010410 - 9		470		500
C 4	1010410 - 9		470		500
C 5	SEE NOTE 2		NOM		—
C 6	SEE NOTE 2		NOM		—
C 7	SEE NOTE 2		NOM		—
C 8	SEE NOTE 2		NOM	± 2 %	—
C 9	1006755 - 31		10	± 10 %	20
C 10	- 31		10		
C 11	- 31		10		
C 12	- 31		10		
C 13	- 34		33		
C 14	- 34		33		
C 15	- 34		33		
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	- 34		33		20
C 19	- 69		1.0		35
C 20	- 34		33		20
C 21	- 69		1.0		35
C 22	- 34		33		20
C 23	- 69		1.0		35
C 24	1006755 - 34		33		20
C 25	1010279 - 16		1.9		6
C 26	- 16		1.9		
C 27	- 16		1.9		
C 28	- 16		1.9		
C 29	- 16		1.9		
C 30	- 16		1.9		
C 31	- 16		1.9		
C 32	1010279 - 16		1.9		6
C 33	1010393 - 021		0.22		50
C 34	1010393 - 033		2.2		50
C 35	1010393 - 033		2.2		50
C 36	1010393 - 037	CAPACITOR	4.7	± 10%	50 VDC
CR1	1010372 - 13	DIODE			
CR2	1010362 - 001	DIODE	1N645		
Q1	1010397 - 1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8	1010397 - 1		2N930		
Q9	1010367		3N68		
Q10					
Q11					
Q12					
Q13					
Q14					
Q15					
Q16					
Q17					
Q18	1010367		3N68		
Q19	1010397 - 1	TRANSISTOR	2N930		
T1	1008832	TRANSFORMER			
T2	1008832				
T3	1008832				
T4	1008832				
T5	1010324				
T6	1010324				
T7	1010324				
T8	1010324				
T9	1010323				
T10					
T11					
T12					
T13	1010323				
T14	1010710				
T15	1010324	TRANSFORMER			

REF DWG:

SIGNAL CONDITIONER ASSY
CDU RESOLVER

DWG NO. 1007660

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

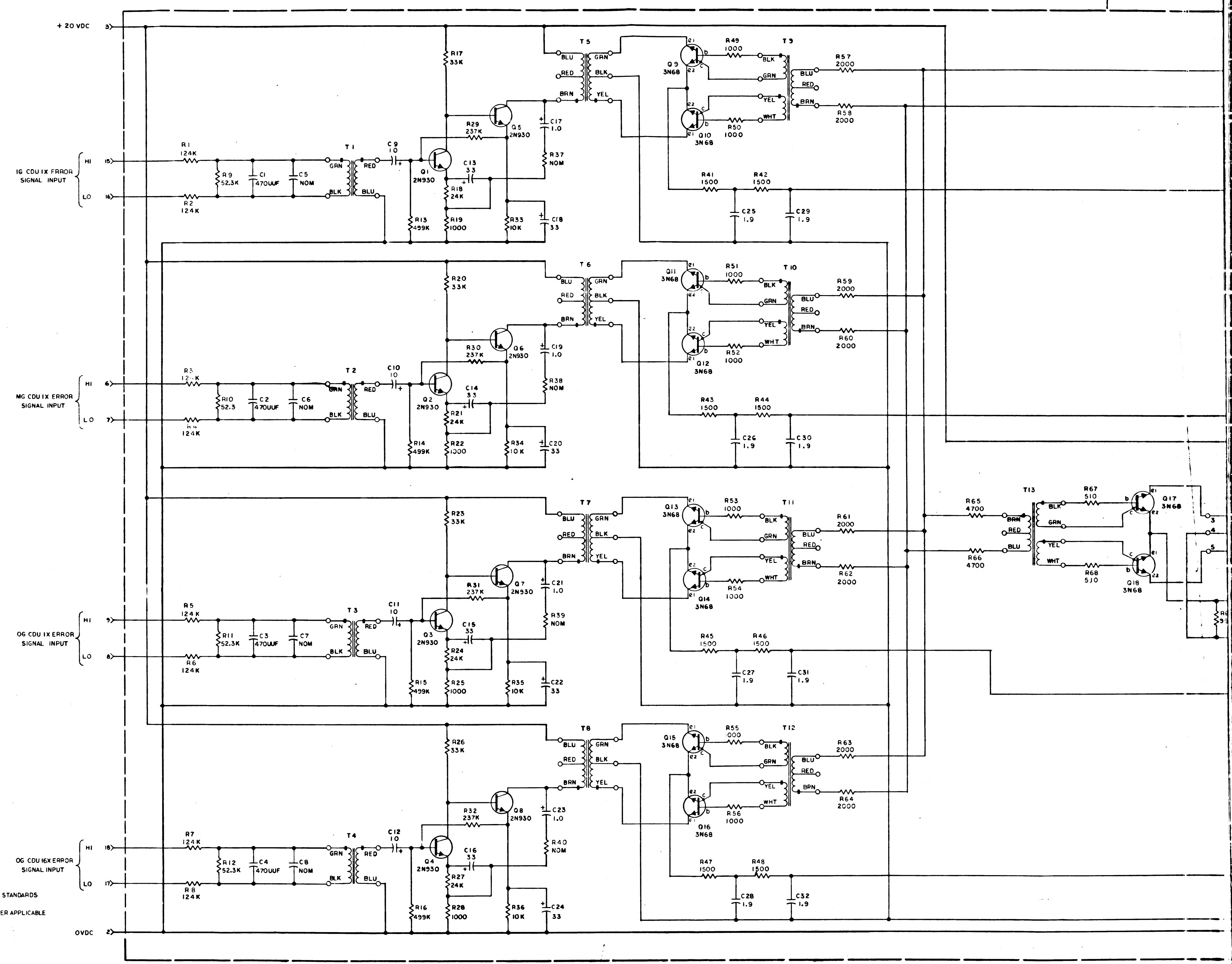
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN a. Di Leo 22 JUNE 65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC SIGNAL CONDITIONER, CDU RESOLVER

CODE IDENT NO 80230
SIZE J
DRAWING NO. 1010241
SCALE —
SHEET 1 OF 1

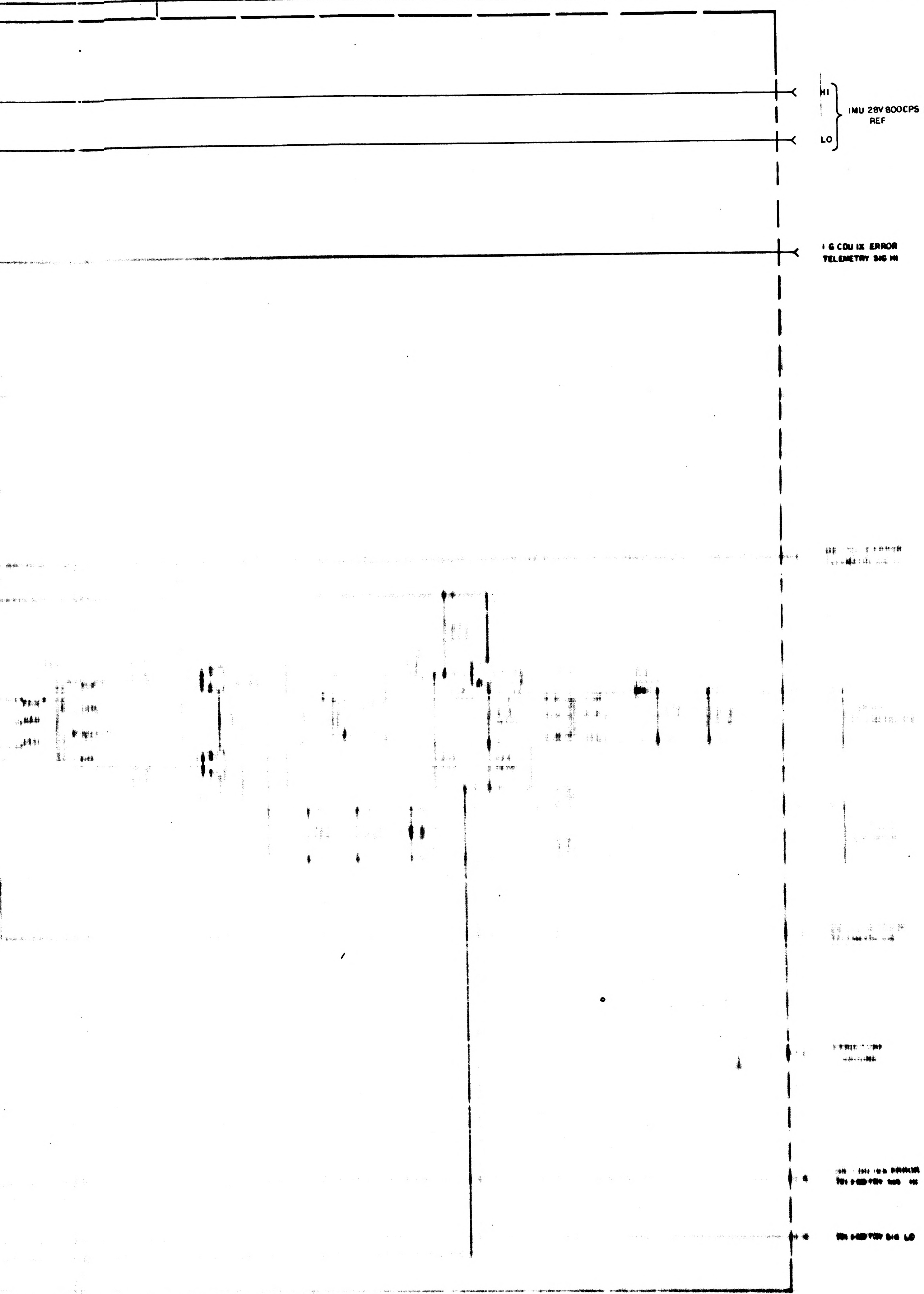

8
7
6
5
D
C
B
A
+20 VDC
3
1G CDU 1X ERROR SIGNAL INPUT
HI 15
LO 16
MG CDU 1X ERROR SIGNAL INPUT
HI 6
LO 7
OG CDU 1X ERROR SIGNAL INPUT
HI 9
LO 8
OG CDU 16X ERROR SIGNAL INPUT
HI 18
LO 17
OVDC 2
R1 124K
R2 124K
R9 52.3K
C1 470UUF
C5 NOM
T1
GRN
BLK
RED
BLU
C9 10
Q1 2N930
R17 33K
R29 237K
Q5 2N930
C13 33
R18 24K
R13 499K
R19 1000
R33 10K
C17 1.0
R37 NOM
C18 33
T5
BLU
RED
BRN
GRN
BLK
YEL
Q9 3N68
Q10 3N68
R49 1000
R50 1000
T9
BLK
GRN
YEL
WHT
BLU
RED
BRN
R57 2000
R58 2000
R41 1500
R42 1500
C25 1.9
C29 1.9
R3 124K
R4 124K
R10 52.3
C2 470UUF
C6 NOM
T2
C10 10
Q2 2N930
R20 33K
R30 237K
Q6 2N930
C14 33
R21 24K
R14 499K
R22 1000
R34 10K
C19 1.0
R38 NOM
C20 33
T6
Q11 3N68
Q12 3N68
R51 1000
R52 1000
T10
R59 2000
R60 2000
R43 1500
R44 1500
C26 1.9
C30 1.9
R5 124K
R6 124K
R11 52.3K
C3 470UUF
C7 NOM
T3
C11 10
Q3 2N930
R23 33K
R31 237K
Q7 2N930
C15 33
R24 24K
R15 499K
R25 1000
R35 10K
C21 1.0
R39 NOM
C22 33
T7
Q13 3N68
Q14 3N68
R53 1000
R54 1000
T11
R61 2000
R62 2000
R45 1500
R46 1500
C27 1.9
C31 1.9
R7 124K
R8 124K
R12 52.3K
C4 470UUF
C8 NOM
T4
C12 10
Q4 2N930
R26 33K
R32 237K
Q8 2N930
C16 33
R27 24K
R16 499K
R28 1000
R36 10K
C23 1.0
R40 NOM
C24 33
T8
Q15 3N68
Q16 3N68
R55 1000
R56 1000
T12
R63 2000
R64 2000
R47 1500
R48 1500
C28 1.9
C32 1.9
R65 4700
R66 4700
T13
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67 510
R68 510
Q17 3N68
Q18 3N68
e1
e2
b
c
3
4
5

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R37, R38 R39, R40, C5, C C7, C8 PER APPLICABLE PS FROM APPROPRIATE CHART

1010241 B

1/1010241



R37, R38, R39, R40	
PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

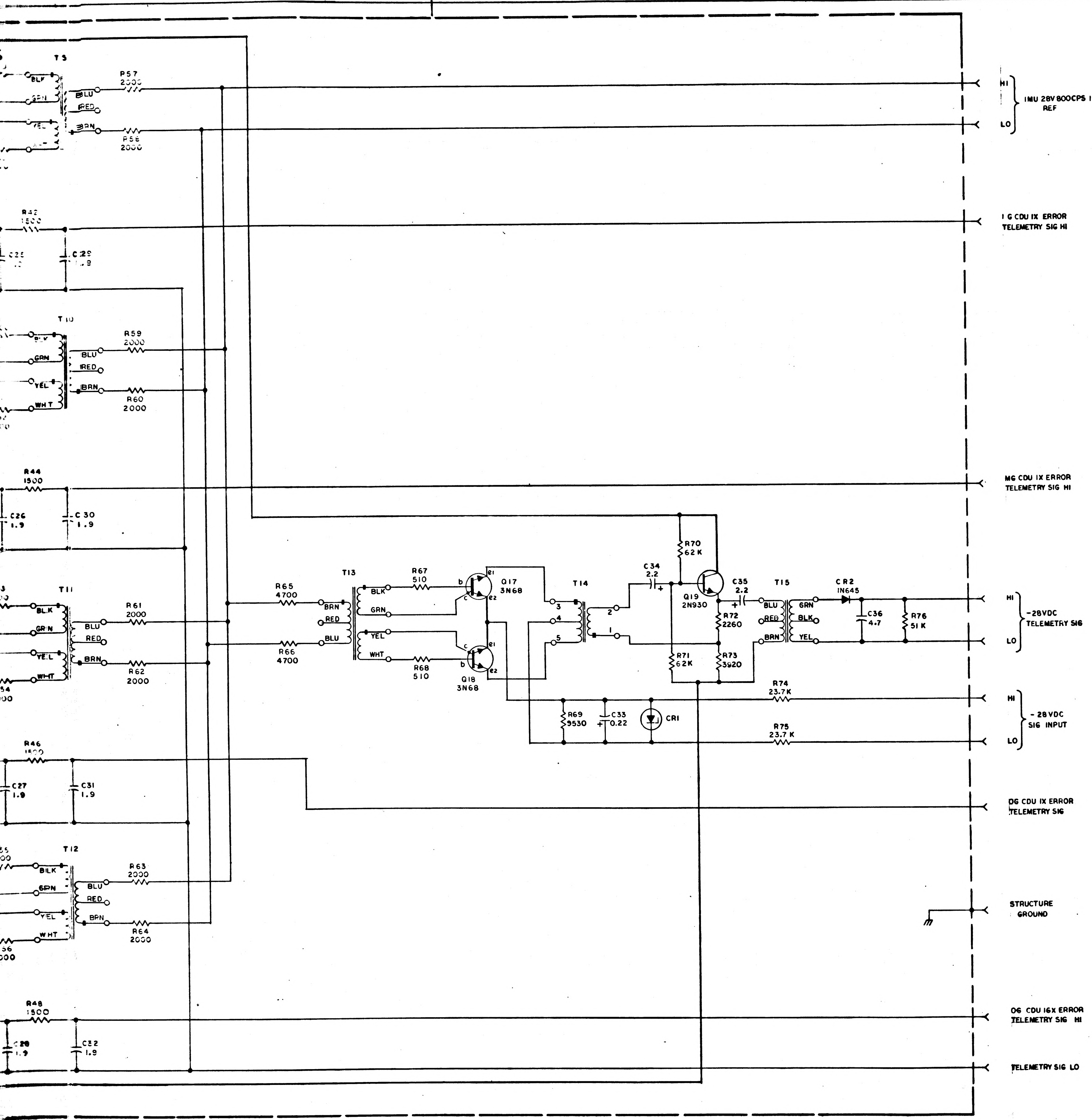
C5, C6, C7, C8			
PART NO.	VALUE	TOL	RATING
1010410-1	220 UUF	± 2%	500VDC
-2	240		
-3	270		
-4	300		
-5	330		
-6	360		
-7	390		
-8	430		
-9	470		
-10	510		500
-11	560		300
-12	620		
-13	680		
-14	750		
-15	820		
-16	910		
-17	1000		
-18	1100		
1010410-19	1200	± 2%	300VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-653	RESISTOR	124K	± 1%	1/8 W
R2	-653		124K		
R3	-653		124K		
R4	-653		124K		
R5	-653		124K		
R6	-653		124K		
R7	-653		124K		
R8	1010364-[illegible]		[illegible]		1/8 W
R9	1010311-291		52.3K		1/10W
R10	1010311-291		52.3K		1/10W
R11	1010311-291		52.3K		1/10W
R12	1010311-291		52.3K		1/10W
R13	1010364-[illegible]		[illegible]		1/8 W
R14	1010364-[illegible]		[illegible]		1/8 W
R15	1010364-[illegible]		[illegible]		1/8 W
R16	1010364-[illegible]		[illegible]	± 1%	1/8 W
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]

REF DES	PART NO.	DESCRIPTION	VALUE	[illegible]	[illegible]
C1	1010410-9	CAPACITOR	[illegible]		
C2	1010410-9		[illegible]		
C3	1010410-9		[illegible]		
C4	1010410-9		[illegible]		
C5	SEE NOTE 2		[illegible]		
C6	SEE NOTE 2		[illegible]		
C7	SEE NOTE 2		[illegible]		
C8	SEE NOTE 2		[illegible]		
C9	1006755-31		[illegible]		
C10	-31		[illegible]		
C11	-31		[illegible]		
C12	-31		[illegible]		
[illegible]	[illegible]		[illegible]		

REVISIONS						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED

F-3


T9
P57 2000
P58 2000
BLK
GRN
YEL
BLU
RED
BRN
R42 1500
C25
C29
T10
R59 2000
R60 2000
WHT
R44 1500
C26 1.9
C30 1.9
T11
R61 2000
R62 2000
R46 1500
C27 1.9
C31 1.9
T12
R63 2000
R64 2000
R48 1500
C28 1.9
C32 1.9
T13
R65 4700
R66 4700
R67 510
R68 510
Q17 3N68
Q18 3N68
T14
C34 2.2
R70 62K
Q19 2N930
C35 2.2
R72 2260
R71 62K
R73 3920
T15
CR2 1N645
C36 4.7
R76 51K
R74 23.7K
R75 23.7K
R69 9530
C33 0.22
CR1
HI
LO
IMU 28V 800CPS 1% REF
I G CDU IX ERROR TELEMETRY SIG HI
MG CDU IX ERROR TELEMETRY SIG HI
-28VDC TELEMETRY SIG
-28VDC SIG INPUT
OG CDU IX ERROR TELEMETRY SIG
STRUCTURE GROUND
OG CDU 16X ERROR TELEMETRY SIG HI
TELEMETRY SIG LO
1010241

R37, R38, R39, R40	
PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

C5, C6, C7, C8			
PART NO.	VALUE	TOL	RATING
1010410-1	220 UUF	± 2%	500VDC
-2	240		
-3	270		
-4	300		
-5	330		
-6	360		
-7	390		
-8	430		
-9	470		
-10	510		500
-11	560		300
-12	620		
-13	680		
-14	750		
-15	820		
-16	910		
-17	1000		
-18	1100		
1010410-19	1200	± 2%	300VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364-653	RESISTOR	124K	± 1%	1/8 W
R 2	-653		124K		
R 3	-653		124K		
R 4	-653		124K		
R 5	-653		124K		
R 6	-653		124K		
R 7	-653		124K		
R 8	1010364-653		124K		1/8 W
R 9	1010311-291		52.3K		1/10W
R 10	1010311-291		52.3K		1/10W
R 11	1010311-291		52.3K		1/10W
R 12	1010311-291		52.3K		1/10W
R 13	1010364-769		499K		1/8 W
R 14	1010364-769		499K		1/8 W
R 15	1010364-769		499K		1/8 W
R 16	1010364-769		499K	± 1%	1/8 W
R 17	1006750-68		33K	± 2%	1/4 W
R 18	1006750-65		24K	± 2%	1/4 W
R 19	1010311-126		1000	± 1%	1/10W
R 20	1006750-68		33K	± 2%	1/4 W
R 21	1006750-65		24K	± 2%	1/4 W
R 22	1010311-126		1000	± 1%	1/10W
R 23	1006750-68		33K	± 2%	1/4 W
R 24	1006750-65		24K	± 2%	1/4 W
R 25	1010311-126		1000	± 1%	1/10 W
R 26	1006750-68		33K	± 2%	1/4 W
R 27	1006750-65		24K	± 2%	1/4 W
R 28	1010311-126		1000	± 1%	1/10 W
R 29	1010364-707		237K		1/8 W
R 30	1010364-707		237K		1/8 W
R 31	1010364-707		237K		1/8 W
R 32	1010364-707		237K	± 1%	1/8 W
R 33	1006750-56		10K	± 2%	1/4 W
R 34	1006750-56		10K	± 2%	1/4 W
R 35	1006750-56		10K	± 2%	1/4 W
R 36	1006750-56		10K	± 2%	1/4 W
R 37	SEE NOTE 2		NOM	± 1%	1/10 W
R 38	SEE NOTE 2		NOM	± 1%	1/10 W
R 39	SEE NOTE 2		NOM	± 1%	1/10 W
R 40	SEE NOTE 2		NOM	± 1%	1/10 W
R 41	1006750-36		1500	± 2%	1/4 W
R 42	-36		1500		
R 43	-36		1500		
R 44	-36		1500		
R 45	-36		1500		
R 46	-36		1500		
R 47	-36		1500		
R 48	1006750-36		1500	± 2%	1/4 W
R 49	1010311-126		1000	± 1%	1/10 W
R 50	-126		1000		
R 51	-126		1000		
R 52	-126		1000		
R 53	-126		1000		
R 54	-126		1000		
R 55	-126		1000		
R 56	1010311-126		1000	± 1%	1/10W
R 57	1006750-39		2000	± 2%	1/4 W
R 58	-39		2000		
R 59	-39		2000		
R 60	-39		2000		
R 61	-39		2000		
R 62	-39		2000		
R 63	-39		2000		
R 64	-39		2000		
R 65	-48		4700		
R 66	-48		4700		
P 67	-25		510		
R 68	1006750-25		510	± 2%	1/4 W
R 69	1010364-439		9530	± 1%	1/8 W
R 70	1006750-75		62K	± 2%	1/4 W
R 71	1006750-75		62K	± 2%	1/4 W
R 72	1010364-319		2260	± 1%	1/8 W
R 73	1010364-365		3920	± 1%	1/8 W
R 74	1010364-515		23.7K	± 1%	1/8 W
R 75	1010364-515		23.7K	± 1%	1/8 W
R 76	1006750-73	RESISTOR	51K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	
C 1	1010410-9	CAPACITOR	[illegible]
C 2	1010410-9		470
C 3	1010410-9		470
C 4	1010410-9		470
C 5	SEE NOTE 2		NOM
C 6	SEE NOTE 2		NOM
C 7	SEE NOTE 2		NOM
C 8	SEE NOTE 2		NOM
C 9	1006755-31		10
C 10	-31		10
C 11	-31		10
C 12	-31		10
C 13	-34		33
C 14	-34		33
C 15	-34		33
C 16	-34		33
C 17	-69		1.0
C 18	-34		33
C 19	-69		1.0
C 20	-34		33
C 21	-69		1.0
C 22	-34		33
C 23	-69		1.0
C 24	1006755-34		33
C 25	1010279-16		1.9
C 26	-16		1.9
C 27	-16		1.9
C 28	-16		1.9
C 29	-16		1.9
C 30	-16		1.9
C 31	-16		1.9
C 32	1010279-16		1.9
C 33	1010393-021		0.22
C 34	1010393-033		2.2
C 35	1010393-033		2.2
C 36	1010393-037	CAPACITOR	4.7
CR1	1010372-13	DIODE	
CR2	1010362-001	DIODE	1N645
Q1	1010397-1	TRANSISTOR	2N930
Q2			
Q3			
Q4			
Q5			
Q6			
Q7			
Q8	1010397-1		2N930
Q9	1010367		3N68
Q10			
Q11			
Q12			
Q13			
Q14			
Q15			
Q16			
Q17			
Q18	1010367		3N68
Q19	1010397-1	TRANSISTOR	2N930
T1	1010712	TRANSFORMER	
T2	1010712		
T3	1010712		
T4	1010712		
T5	1010324		
T6	1010324		
T7	1010324		
T8	1010324		
T9	1010323		
T10			
T11			
T12			
T13	1010323		
T14	1010710		
T15	1010324	TRANSFORMER	

REF DWG:
SIGNAL CONDITIONER ASSY
CDU RESOLVER
DWG NO. 1007660

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES

LIST OF MATERIAL

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. Di Leo
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE
SC
SIGNAL
CDU
CODE IDENT NO
80230
SCALE

F-2

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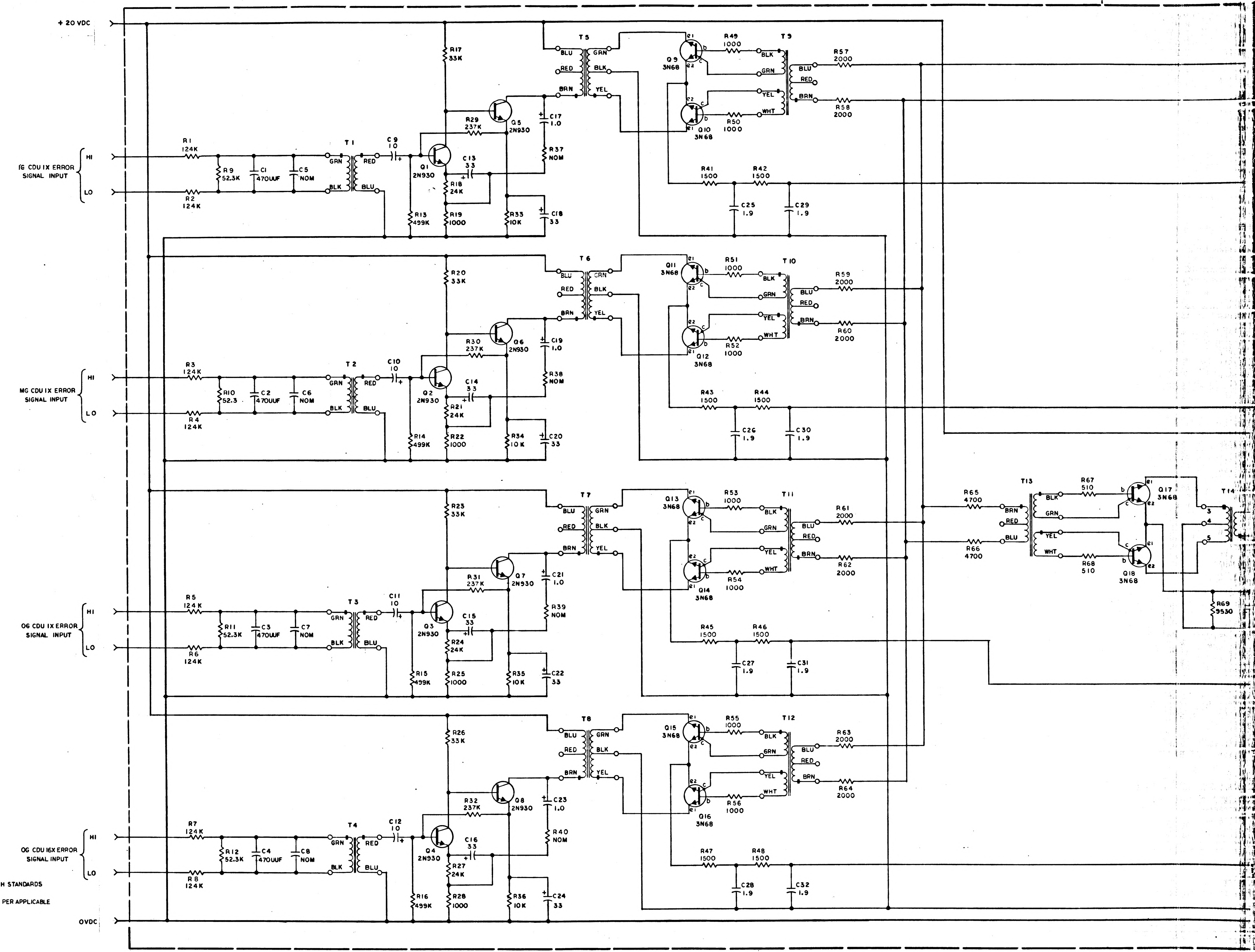
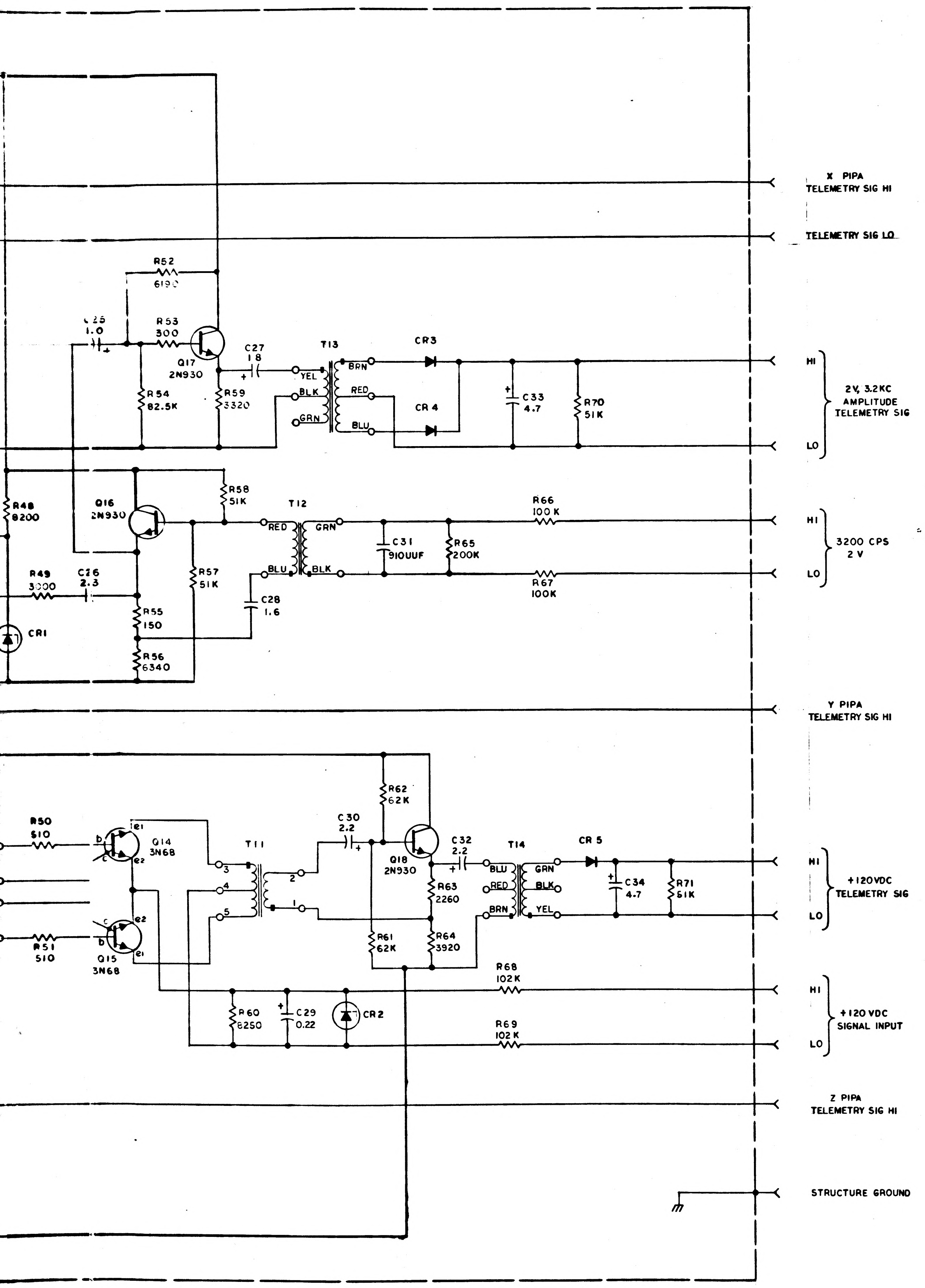


+ 20 VDC
IG CDU 1X ERROR SIGNAL INPUT
MG CDU 1X ERROR SIGNAL INPUT
OG CDU 1X ERROR SIGNAL INPUT
OG CDU 16X ERROR SIGNAL INPUT
HI
LO
OVDC
R1 124K
R2 124K
R3 124K
R4 124K
R5 124K
R6 124K
R7 124K
R8 124K
R9 52.3K
R10 52.3
R11 52.3K
R12 52.3K
C1 470UUF
C2 470UUF
C3 470UUF
C4 470UUF
C5 NOM
C6 NOM
C7 NOM
C8 NOM
T1
T2
T3
T4
GRN
BLK
RED
BLU
C9 10
C10 10
C11 10
C12 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
R13 499K
R14 499K
R15 499K
R16 499K
R17 33K
R20 33K
R23 33K
R26 33K
R18 24K
R21 24K
R24 24K
R27 24K
R19 1000
R22 1000
R25 1000
R28 1000
C13 33
C14 33
C15 33
C16 33
R29 237K
R30 237K
R31 237K
R32 237K
Q5 2N930
Q6 2N930
Q7 2N930
Q8 2N930
C17 1.0
C19 1.0
C21 1.0
C23 1.0
R37 NOM
R38 NOM
R39 NOM
R40 NOM
R33 10K
R34 10K
R35 10K
R36 10K
C18 33
C20 33
C22 33
C24 33
T5
T6
T7
T8
BRN
GRN
YEL
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
Q13 3N68
Q14 3N68
Q15 3N68
Q16 3N68
e1
e2
b
c
R49 1000
R50 1000
R51 1000
R52 1000
R53 1000
R54 1000
R55 1000
R56 1000
T9
T10
T11
T12
WHT
R41 1500
R42 1500
R43 1500
R44 1500
R45 1500
R46 1500
R47 1500
R48 1500
C25 1.9
C26 1.9
C27 1.9
C28 1.9
C29 1.9
C30 1.9
C31 1.9
C32 1.9
R57 2000
R58 2000
R59 2000
R60 2000
R61 2000
R62 2000
R63 2000
R64 2000
R65 4700
R66 4700
T13
R67 510
R68 510
Q17 3N68
Q18 3N68
T14
3
4
5
R69 9530
8
7
6
5
D
C
B
A

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R37, R38 R39, R40, C5, C6, C7, C8 PER APPLICABLE PS FROM APPROPRIATE CHART

REVISIONS 21110						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 21739				WK.



X PIPA
TELEMETRY SIG HI
TELEMETRY SIG LO
R52
6190
C25
1.0
R53
300
Q17
2N930
R54
82.5K
R59
3320
C27
18
T13
YEL
BLK
GRN
BRN
RED
BLU
CR3
CR 4
C33
4.7
R70
51K
HI
LO
2V, 3.2KC
AMPLITUDE
TELEMETRY SIG
R48
8200
Q16
2N930
R58
51K
T12
RED
GRN
BLU
BLK
C31
910UUF
R65
200K
R66
100 K
R67
100K
3200 CPS
2 V
R49
3000
C26
2.3
R57
51K
C28
1.6
R55
150
CR1
R56
6340
Y PIPA
TELEMETRY SIG HI
R50
510
Q14
3N68
R51
510
Q15
3N68
b
c
e1
e2
T11
3
4
5
2
1
C30
2.2
R62
62K
Q18
2N930
C32
2.2
T14
BLU
RED
BRN
GRN
BLK
YEL
CR 5
C34
4.7
R71
51K
R63
2260
R61
62K
R64
3920
+120VDC
TELEMETRY SIG
R68
102K
R69
102 K
R60
8250
C29
0.22
CR2
+120 VDC
SIGNAL INPUT
Z PIPA
TELEMETRY SIG HI
STRUCTURE GROUND

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010311 - 315	RESISTOR	93.1 K	± 1%	1/10W
R 2	- 315		93.1 K		
R 3	- 315		93.1 K		
R 4	- 315		93.1 K		
R 5	- 315		93.1 K		
R 6	- 315		93.1 K		
R 7	- 291		52.3K		
R 8	- 291		52.3K		
R 9	1010311 - 291		52.3K		1/10 W
R10	1010364 - 769		499 K		1/8 W
R11	1010364 - 769		499 K		1/8 W
R12	1010364 - 769		499 K	± 1%	1/8 W
R13	1006750 - 68		33K	± 2%	1/4 W
R14	1006750 - 65		24K	± 2%	1/4 W
R15	1010311 - 126		1000	± 1%	1/10 W
R16	1006750 - 68		33K	± 2%	1/4 W
R17	1006750 - 65		24K	± 2%	1/4 W
R18	1010311 - 126		1000	± 1%	1/10 W
R19	1006750 - 68		33K	± 2%	1/4 W
R20	1006750 - 65		24K	± 2%	1/4 W
R21	1010311 - 126		1000	± 1%	1/10 W
R22	1010364 - 707		237K	± 1%	1/8 W
R23	1010364 - 707		237K	± 1%	1/8 W
R24	1010364 - 707		237K	± 1%	1/8 W
R25	1006750 - 56		10 K	± 2%	1/4 W
R26	1006750 - 56		10 K	± 2%	1/4 W
R27	1006750 - 56		10 K	± 2%	1/4 W
R28	SEE NOTE 2		NOM	± 1%	1/10 W
R29	SEE NOTE 2		NOM	± 1%	1/10 W
R30	SEE NOTE 2		NOM	± 1%	1/10 W
R31	1006750 - 36		1500	± 2%	1/4 W
R32	- 36		1500		
R33	- 36		1500		
R34	- 25		510		
R35	- 25		510		
R36	- 25		510		
R37	- 25		510		
R38	- 25		510		
R39	- 25		510		
R40	- 36		1500		
R41	- 36		1500		
R42	1006750 - 36		1500	± 2%	1/4 W
R43	1010311 - 126		1000	± 1%	1/10 W
R44	1006750 - 48		4700	± 2%	1/4 W
R45	1006750 - 48		4700	± 2%	1/4 W
R46	1006750 - 20		330	± 2%	1/4 W
R47	1010311 - 126		1000	± 1%	1/10 W
R48	1006750 - 54		8200	± 2%	1/4 W
R49	1006750 - 43		3000	± 2%	1/4 W
R50	1006750 - 25		510	± 2%	1/4 W
R51	1006750 - 25		510	± 2%	1/4 W
R52	1010364 - 403		6190	± 1%	1/8 W
R53	1006750 - 19		300	± 2%	1/4 W
R54	1010364 - 619		82.5K	± 1%	1/8 W
R55	1006750 - 12		150	± 2%	1/4 W
R56	1010311 - 203		6340	± 1%	1/10 W
R57	1006750 - 73		51 K	± 2%	1/4 W
R58	1006750 - 73		51 K	± 2%	1/4 W
R59	1010267 - 205		3320	± 1%	1/2 W
R60	1010364 - 427		8250	± 1%	1/8 W
R61	1006750 - 75		62 K	± 2%	1/4 W
R62	1006750 - 75		62 K	± 2%	1/4 W
R63	1010364 - 319		2260	± 1%	1/8 W
R64	1010364 - 365		3920	± 1%	1/8 W
R65	1010364 - 693		200K	± 1%	1/8 W
R66	1006750 - 80		100 K	± 2%	1/4 W
R67	1006750 - 80		100 K	± 2%	1/4 W
R68	1010364 - 637		102 K	± 1%	1/8 W
R69	1010364 - 637		102 K	± 1%	1/8 W
R70	1006750 - 73		51 K	± 2%	1/4 W
R71	1006750 - 73	RESISTOR	51 K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010409 - 12	CAPACITOR	30 UUF	± 2%	500VDC
C 2	1010409 - 12		30 UUF	2%	500
C 3	1010409 - 12		30 UUF	2%	500
C 4	SEE NOTE 2		NOM	—	—
C 5	SEE NOTE 2		NOM	—	—
C 6	SEE NOTE 2		NOM	—	—
C 7	1006755 - 31		10	10%	20
C 8	- 31		10		
C 9	- 31		10		
C 10	- 34		33		
C 11	- 34		33		
C 12	- 34		33		20
C 13	- 69		1.0		35
C 14	- 34		33		20
C 15	- 69		1.0		35
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	1006755 - 34		33		20
C 19	1010279 - 7		0.34		6
C 20	- 7		0.34		
C 21	- 7		0.34		
C 22	- 5		0.23		
C 23	- 5		0.23		
C 24	1010279 - 5		0.23		6
C 25	1010393 - 029		1.0		50
C 26	1010279 - 236		2.3		35
C 27	1010393 - 044		18		50
C 28	1010279 - 114		1.6		15
C 29	1010393 - 021		0.22		50
C 30	1010393 - 033		2.2	±10%	50
C 31	1010410 - 16		910 UUF	± 2%	300
C 32	1010393 - 033		2.2	±10%	50
C 33	1010393 - 037		4.7	±10%	50
C 34	1010393 - 037	CAPACITOR	4.7	±10%	50 VDC
CR1	1010372 - 4	DIODE, ZENER			
CR2	1010372 - 13	ZENER			
CR3	1010362 - 001		IN645		
CR4	1010362 - 001		IN645		
CR5	1010362 - 001	DIODE	IN645		
Q 1	1010397 - 1	TRANSISTOR	2N930		
Q 2					
Q 3					
Q 4					
Q 5					
Q 6	1010397 - 1		2N930		
Q 7	1010367		3N68		
Q 8					
Q 9					
Q 10					
Q 11					
Q 12	1010367		3N68		
Q 13	1010376 - 3				
Q 14	1010367		3N68		
Q 15	1010367		3N68		
Q 16	1010397 - 1		2N930		
Q 17	1010397 - 1		2N930		
Q 18	1010397 - 1	TRANSISTOR	2N930		
T 1	1010712	TRANSFORMER			
T 2	1010712				
T 3	1010712				
T 4	1010324				
T 5	1010324				
T 6	1010324				
T 7	1010315 - 1				
T 8.	1010315 - 1				
T 9	1010315 - 1				
T 10	1010323				
T 11	1010710				
T 12	1010712				
T 13	1010328				
T 14	1010324	TRANSFORMER			

R28, R29 & R30	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C4, C5 & C6			
PART NO.	VALUE	TOL	RATING
1010409 - 1	10 UUF	± 2%	500VDC
- 8	20		
- 12	30		
- 16	43		
- 19	56		
- 21	68		
- 23	82		
- 24	91		
- 25	100		
- 26	110		
- 27	120		
- 28	130		
- 29	150		500
- 30	160		300
- 31	180		
- 32	200		
- 33	220		
1010409 - 34	240 UUF	± 2%	300VDC

REF DWG:
SIGNAL CONDITIONER ASSY, PIPA
DWG NO. 1007661

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS				

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL

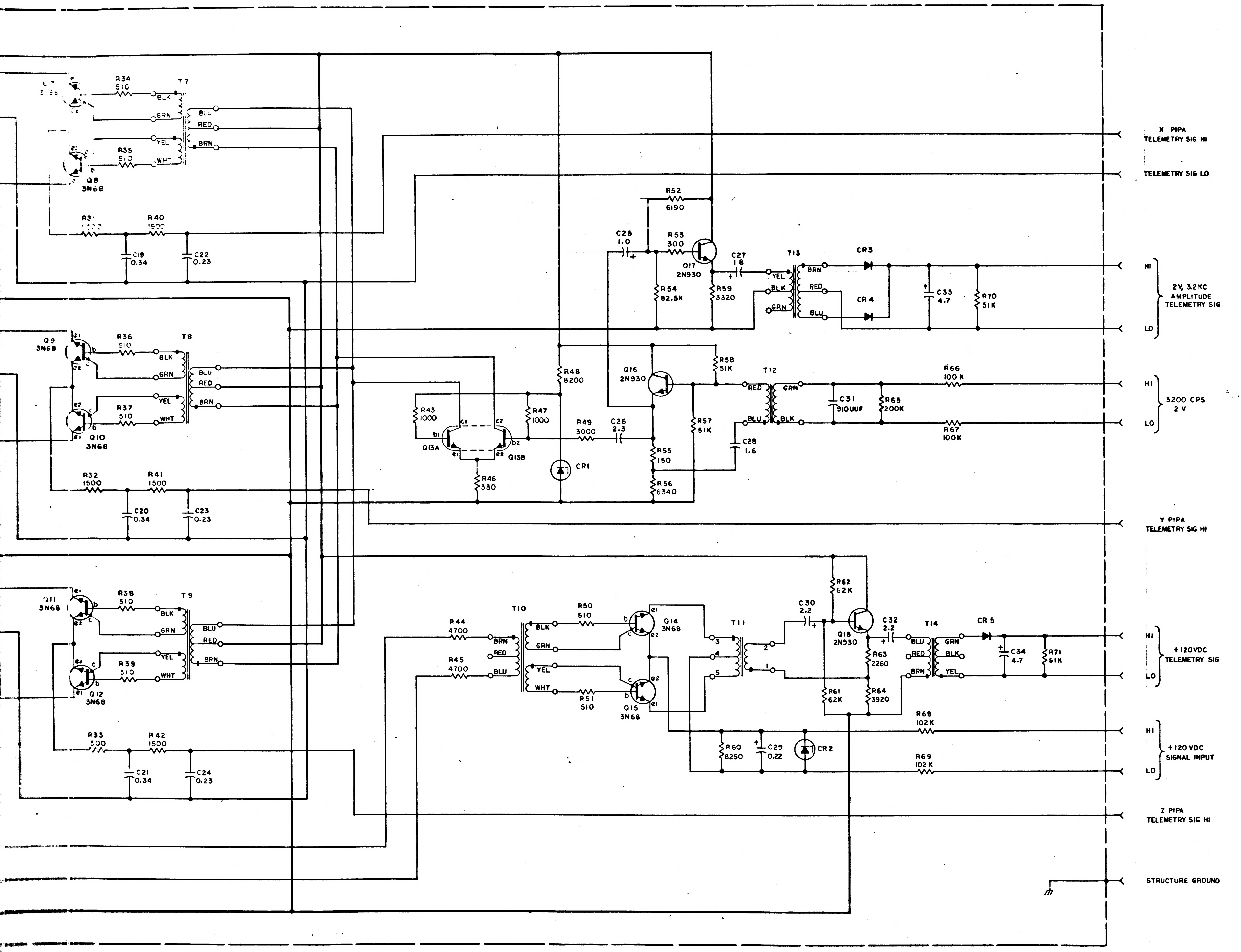
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN a. Di Leo 9 JULY 65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER, PIPA

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010242
SCALE —
SHEET 1 OF 1



R34 510
R35 510
T7
BLK
GRN
YEL
WHT
BLU
RED
BRN
Q8 3N68
R31 1500
R40 1500
C19 0.34
C22 0.23
X PIPA TELEMETRY SIG HI
TELEMETRY SIG LO
R52 6190
C25 1.0
R53 300
Q17 2N930
C27 18
T13
CR3
CR4
R54 82.5K
R59 3320
C33 4.7
R70 51K
HI
LO
2V, 3.2KC AMPLITUDE TELEMETRY SIG
Q9 3N68
R36 510
T8
R37 510
Q10 3N68
R48 8200
Q16 2N930
R58 51K
T12
R66 100K
C31 910UUF
R65 200K
R67 100K
3200 CPS 2 V
R43 1000
R47 1000
Q13A
Q13B
R49 3000
C26 2.3
R57 51K
C28 1.6
R55 150
CR1
R46 330
R56 6340
R32 1500
R41 1500
C20 0.34
C23 0.23
Y PIPA TELEMETRY SIG HI
Q11 3N68
R38 510
T9
R39 510
Q12 3N68
R44 4700
R45 4700
T10
R50 510
R51 510
Q14 3N68
Q15 3N68
T11
R62 62K
C30 2.2
Q18 2N930
C32 2.2
T14
CR5
C34 4.7
R71 51K
R63 2260
R61 62K
R64 3920
+120VDC TELEMETRY SIG
R68 102K
R60 8250
C29 0.22
CR2
R69 102K
+120 VDC SIGNAL INPUT
R33 1500
R42 1500
C21 0.34
C24 0.23
Z PIPA TELEMETRY SIG HI
STRUCTURE GROUND

REF DES	PART NO.	DESCRIPTION
R1	10103 - 3 5	RESISTOR
R2	- 3 5	
R3	- 3 5	
R4	- 3 5	
R5		
R6	- 3 5	
R7	- 2 1	
R8	2 1	
R9	1010311 - 2 1	
R10	1010364 - 7 9	
R11	1010364 - 7 9	
R12	1010364 - 7 9	
R13	1006750 - 6	
R14	1006750 - 6	
R15	1010311 - 1 6	
R16	1006750 - 6	
R17	1006750 - 6	
R18	1010311 - 1 6	
R19	1006750 - 6	
R20	1006750 - 6	
R21	1010311 - 1 6	
R22	1010364 - 7 7	
R23	1010364 - 7 7	
R24	1010364 - 7 7	
R25	1006750 - 5	
R26	1006750 - 5	
R27	1006750 - 5	
R28	SEE NOTE 2	
R29	SEE NOTE 2	
R30	SEE NOTE 2	
R31	1006750 - 3	
R32	- 3	
R33	- 3	
R34	- 2	
R35	- 2	
R36	- 2	
R37	- 2	
R38	- 2	
R39	- 2	
R40	- 3	
R41	- 3	
R42	1006750 - 3 6	
R43	1010311 - 1 6	
R44	1006750 - 4 8	
R45	1006750 - 4 8	
R46	1006750 - 2 0	
R47	1010311 - 1 6	
R48	1006750 - 5 4	
R49	1006750 - 4 3	
R50	1006750 - 2 5	
R51	1006750 - 2 5	
R52	1010364 - 403	
R53	1006750 - 1	
R54	1010364 - 6 9	
R55	1006750 - 1 2	
R56	1010311 - 203	
R57	1006750 - 7 3	
R58	1006750 - 7 3	
R59	1010267 - 205	
R60	1010364 - 427	
R61	1006750 - 7 5	
R62	1006750 - 7 5	
R63	1010364 - 3 9	
R64	1010364 - 365	
R65	1010364 - 693	
R66	1006750 - 8 0	
R67	1006750 - 8 0	
R68	1010364 - 637	
R69	1010364 - 637	
R70	1006750 - 7 3	
R71	1006750 - 7 3	RESISTOR

REF DWG:
SIGNAL
DWG NO

R28, R29 & R30	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C4, C5 & C6			
PART NO.	VALUE	TOL	RATING
1010409 - 1	10 UUF	± 2%	500VDC
- 8	20		
- 12	30		
- 16	43		
- 19	56		
- 21	68		
- 23	82		
- 24	91		
- 25	100		
- 26	110		
- 27	120		
- 28	130		
- 29	150		500
- 30	160		300
- 31	180		
- 32	200		
- 33	220		
1010409 - 34	240 UUF	± 2%	300VDC

MASTER

9 8 7 6

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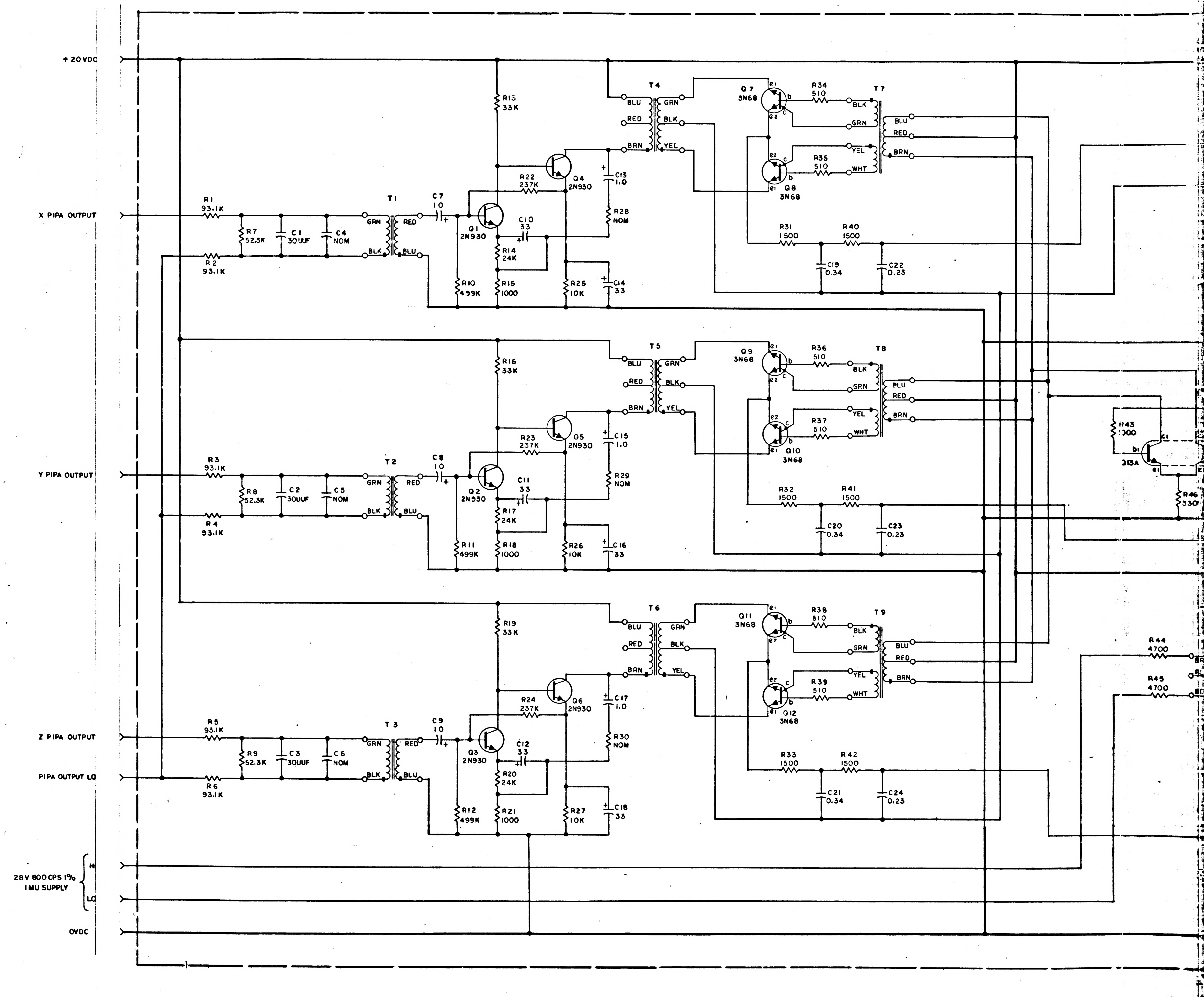
D

C

B

A


+20VDC
X PIPA OUTPUT
Y PIPA OUTPUT
Z PIPA OUTPUT
PIPA OUTPUT LO
28V 800CPS 1%
IMU SUPPLY
HI
LO
OVDC
R1 93.1K
R2 93.1K
R3 93.1K
R4 93.1K
R5 93.1K
R6 93.1K
R7 52.3K
R8 52.3K
R9 52.3K
C1 300UF
C2 300UF
C3 300UF
C4 NOM
C5 NOM
C6 NOM
T1
T2
T3
GRN
RED
BLK
BLU
C7 10
C8 10
C9 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
C10 33
C11 33
C12 33
R10 499K
R11 499K
R12 499K
R13 33K
R16 33K
R19 33K
R14 24K
R17 24K
R20 24K
R15 1000
R18 1000
R21 1000
R22 237K
R23 237K
R24 237K
R25 10K
R26 10K
R27 10K
C13 1.0
C15 1.0
C17 1.0
C14 33
C16 33
C18 33
R28 NOM
R29 NOM
R30 NOM
T4
T5
T6
BLU
RED
BRN
GRN
BLK
YEL
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
e1
e2
b
c
R34 510
R35 510
R36 510
R37 510
R38 510
R39 510
T7
T8
T9
BLK
GRN
YEL
WHT
BLU
RED
BRN
R31 1500
R32 1500
R33 1500
R40 1500
R41 1500
R42 1500
C19 0.34
C20 0.34
C21 0.34
C22 0.23
C23 0.23
C24 0.23
R43 1000
913A
b1
c1
e1
R46 330
R44 4700
R45 4700

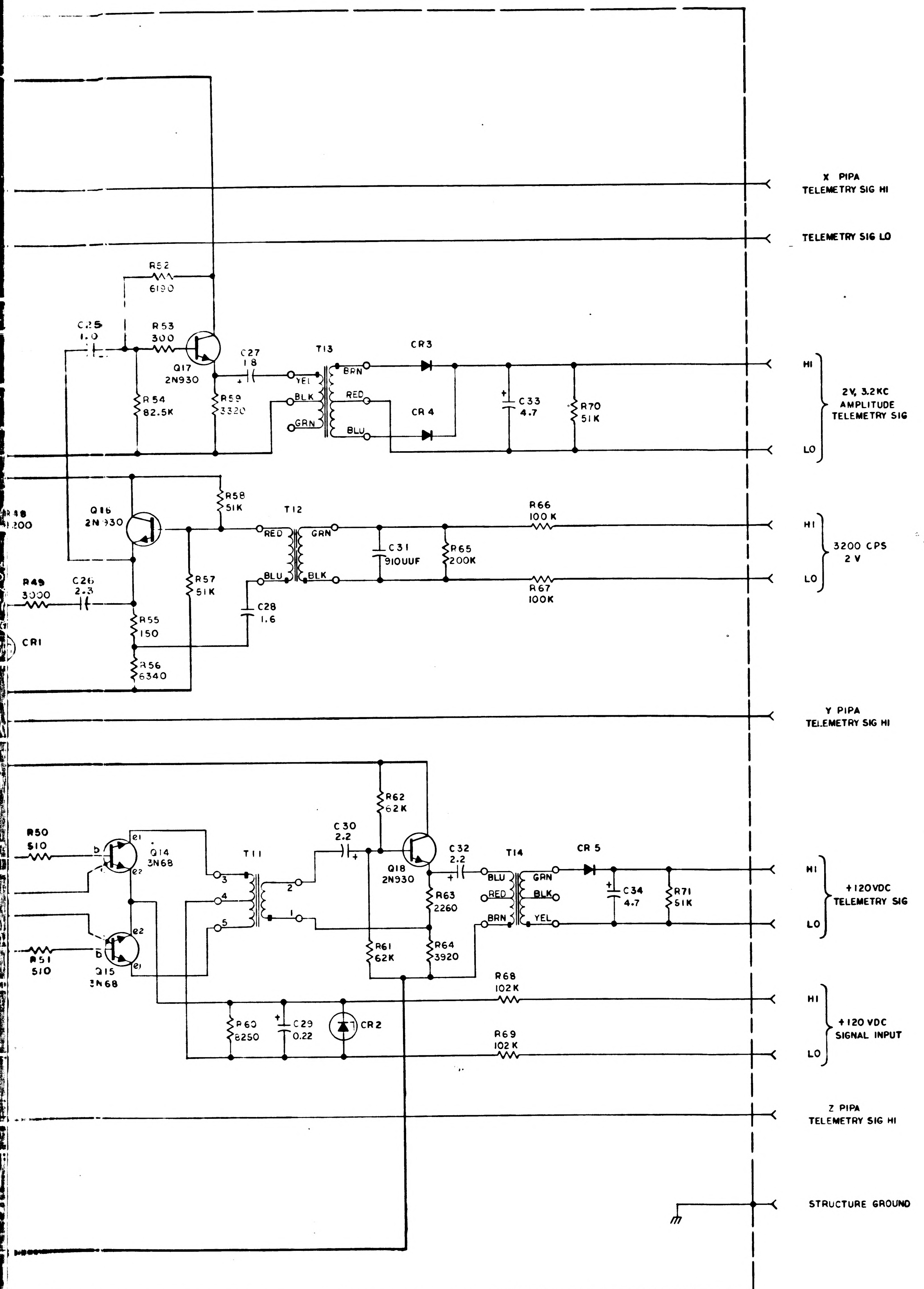
NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R28, R29, R30, C4, C5, & C6 PER APPLICABLE PS FROM APPROPRIATE CHART

3H

1010242 A

9 8 7 6

REVISIONS 2 1/10						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 21739			August	WK.
B		REVISED PER TDRR 22852		EF	11 OCT [illegible]	



X PIPA TELEMETRY SIG HI
TELEMETRY SIG LO
R52 6190
C25 1.0
R53 300
Q17 2N930
C27 18
T13
YEL
BLK
GRN
BRN
RED
BLU
CR3
CR4
C33 4.7
R70 51K
R54 82.5K
R59 3320
HI
LO
2V, 3.2KC AMPLITUDE TELEMETRY SIG
R58 51K
R48 1200
Q16 2N930
T12
RED
GRN
BLU
BLK
C31 910UUF
R65 200K
R66 100K
R67 100K
HI
LO
3200 CPS 2 V
R49 3000
C26 2.3
R57 51K
C28 1.6
R55 150
CR1
R56 6340
Y PIPA TELEMETRY SIG HI
R62 62K
R50 510
Q14 3N68
b
e1
e2
T11
3
4
5
2
1
C30 2.2
Q18 2N930
C32 2.2
T14
BLU
RED
BRN
GRN
BLK
YEL
CR5
C34 4.7
R71 51K
HI
LO
+120VDC TELEMETRY SIG
R63 2260
R51 510
Q15 3N68
R61 62K
R64 3920
R68 102K
R69 102K
HI
LO
+120 VDC SIGNAL INPUT
R60 8250
C29 0.22
CR2
Z PIPA TELEMETRY SIG HI
STRUCTURE GROUND

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311 - 315	RESISTOR	93.1 K	±1%	1/10W
R2	- 315		93.1K		
R3	- 315		93.1K		
R4	- 315		93.1K		
R5	- 315		93.1K		
R6	- 315		93.1K		
R7	- 291		52.3K		
R8	- 291		52.3K		
R9	1010311 - 291		52.3K		1/10 W
R10	1010364 - 769		499 K		1/8 W
R11	1010364 - 769		499 K		1/8 W
R12	1010364 - 769		499 K	±1%	1/8 W
R13	1006750 - 68		33K	±2%	1/4 W
R14	1006750 - 65		24K	±2%	1/4 W
R15	1010311 - 126		1000	±1%	1/10W
R16	1006750 - 68		33K	±2%	1/4 W
R17	1006750 - 65		24K	±2%	1/4 W
R18	1010311 - 126		1000	±1%	1/10 W
R19	1006750 - 68		33K	±2%	1/4 W
R20	1006750 - 65		24K	±2%	1/4 W
R21	1010311 - 126		1000	±1%	1/10 W
R22	1010364 - 707		237K	±1%	1/8 W
R23	1010364 - 707		237K	±1%	1/8 W
R24	1010364 - 707		237K	±1%	1/8 W
R25	1006750 - 56		10 K	±2%	1/4 W
R26	1006750 - 56		10 K	±2%	1/4 W
R27	1006750 - 56		10 K	±2%	1/4 W
R28	SEE NOTE 2		NOM	±1%	1/10 W
R29	SEE NOTE 2		NOM	±1%	1/10 W
R30	SEE NOTE 2		NOM	±1%	1/10 W
R31	1006750 - 36		1500	±2%	1/4 W
R32	- 36		1500		
R33	- 36		1500		
R34	- 25		510		
R35	- 25		510		
R36	- 25		510		
R37	- 25		510		
R38	- 25		510		
R39	- 25		510		
R40	- 36		1500		
R41	- 36		1500		
R42	1006750 - 36		1500	±2%	1/4 W
R43	1010311 - 126		1000	±1%	1/10 W
R44	1006750 - 48		4700	±2%	1/4 W
R45	1006750 - 48		4700	±2%	1/4 W
R46	1006750 - 20		330	±2%	1/4 W
R47	1010311 - 126		1000	±1%	1/10 W
R48	1006750 - 54		8200	±2%	1/4 W
R49	1006750 - 43		3000	±2%	1/4 W
R50	1006750 - 25		510	±2%	1/4 W
R51	1006750 - 25		510	±2%	1/4 W
R52	1010364 - 403		6190	±1%	1/8 W
R53	1006750 - 19		300	±2%	1/4 W
R54	1010364 - 619		82.5K	±1%	1/8 W
R55	1006750 - 12		150	±2%	1/4 W
R56	1010311 - 203		6340	±1%	1/10 W
R57	1006750 - 73		51 K	±2%	1/4 W
R58	1006750 - 73		51 K	±2%	1/4 W
R59	1010267 - 205		3320	±1%	1/2 W
R60	1010364 - 427		8250	±1%	1/8 W
R61	1006750 - 75		62 K	±2%	1/4 W
R62	1006750 - 75		62 K	±2%	1/4 W
R63	1010364 - 319		2260	±1%	1/8 W
R64	1010364 - 365		3920	±1%	1/8 W
R65	1010364 - 693		200K	±1%	1/8 W
R66	1006750 - 80		100 K	±2%	1/4 W
R67	1006750 - 80		100 K	±2%	1/4 W
R68	1010364 - 637		102 K	±1%	1/8 W
R69	1010364 - 637		102 K	±1%	1/8 W
R70	1006750 - 73		51 K	±2%	1/4 W
R71	1006750 - 73	RESISTOR	51 K	±2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010409 - 12	CAPACITOR	30 UUF	± 2%	500VDC
C2	1010409 - 12		30 UUF	2%	500
C3	1010409 - 12		30 UUF	2%	500
C4	SEE NOTE 2		NOM	—	—
C5	SEE NOTE 2		NOM	—	—
C6	SEE NOTE 2		NOM	—	—
C7	1006755 - 31		10	10%	20
C8	- 31		10		
C9	- 31		10		
C10	- 34		33		
C11	- 34		33		
C12	- 34		33		20
C13	- 69		1.0		35
C14	- 34		33		20
C15	- 69		1.0		35
C16	- 34		33		20
C17	- 69		1.0		35
C18	1006755 - 34		33		20
C19	1010279 - 7		0.34		6
C20	- 7		0.34		
C21	- 7		0.34		
C22	- 5		0.23		
C23	- 5		0.23		
C24	1010279 - 5		0.23		6
C25	1010393 - 029		1.0		50
C26	1010279 - 236		2.3		35
C27	1010393 - 044		18		50
C28	1010279 - 114		1.6		15
C29	1010393 - 021		0.22		50
C30	1010393 - 033		2.2	±10%	50
C31	1010410 - 16		910 UUF	± 2%	300
C32	1010393 - 033		2.2	±10%	50
C33	1010393 - 037		4.7	±10%	50
C34	1010393 - 037	CAPACITOR	4.7	±10%	50 VDC
CR1	1010372 - 4	DIODE, ZENER			
CR2	1010372 - 13	ZENER			
CR3	1010362 - 001		IN645		
CR4	1010362 - 001		IN645		
CR5	1010362 - 001	DIODE	IN645		
Q1	1010397 - 1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6	1010397 - 1		2N930		
Q7	1010367		3N68		
Q8					
Q9					
Q10					
Q11					
Q12	1010367		3N68		
Q13	1010376 - 3				
Q14	1010367		3N68		
Q15	1010367		3N68		
Q16	1010397 - 1		2N930		
Q17	1010397 - 1		2N930		
Q18	1010397 - 1	TRANSISTOR	2N930		
T1	1008832	TRANSFORMER			
T2	1008832				
T3	1008832				
T4	1010324				
T5	1010324				
T6	1010324				
T7	1010315 - 1				
T8	1010315 - 1				
T9	1010315 - 1				
T10	1010323				
T11	1010710				
T12	1008832				
T13	1010328				
T14	1010324	TRANSFORMER			

R28, R29 & R30	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C4, C5 & C6			
PART NO.	VALUE	TOL	RATING
1010409 - 1	10 UUF	± 2%	500VDC
- 8	20		
- 12	30		
- 16	43		
- 19	56		
- 21	68		
- 23	82		
- 24	91		
- 25	100		
- 26	110		
- 27	120		
- 28	130		
- 29	150		500
- 30	160		300
- 31	180		
- 32	200		
- 33	220		
1010409 - 34	240 UUF	± 2%	300VDC

REF DWG:
SIGNAL CONDITIONER ASSY, PIPA
DWG NO. 1007661

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL
—

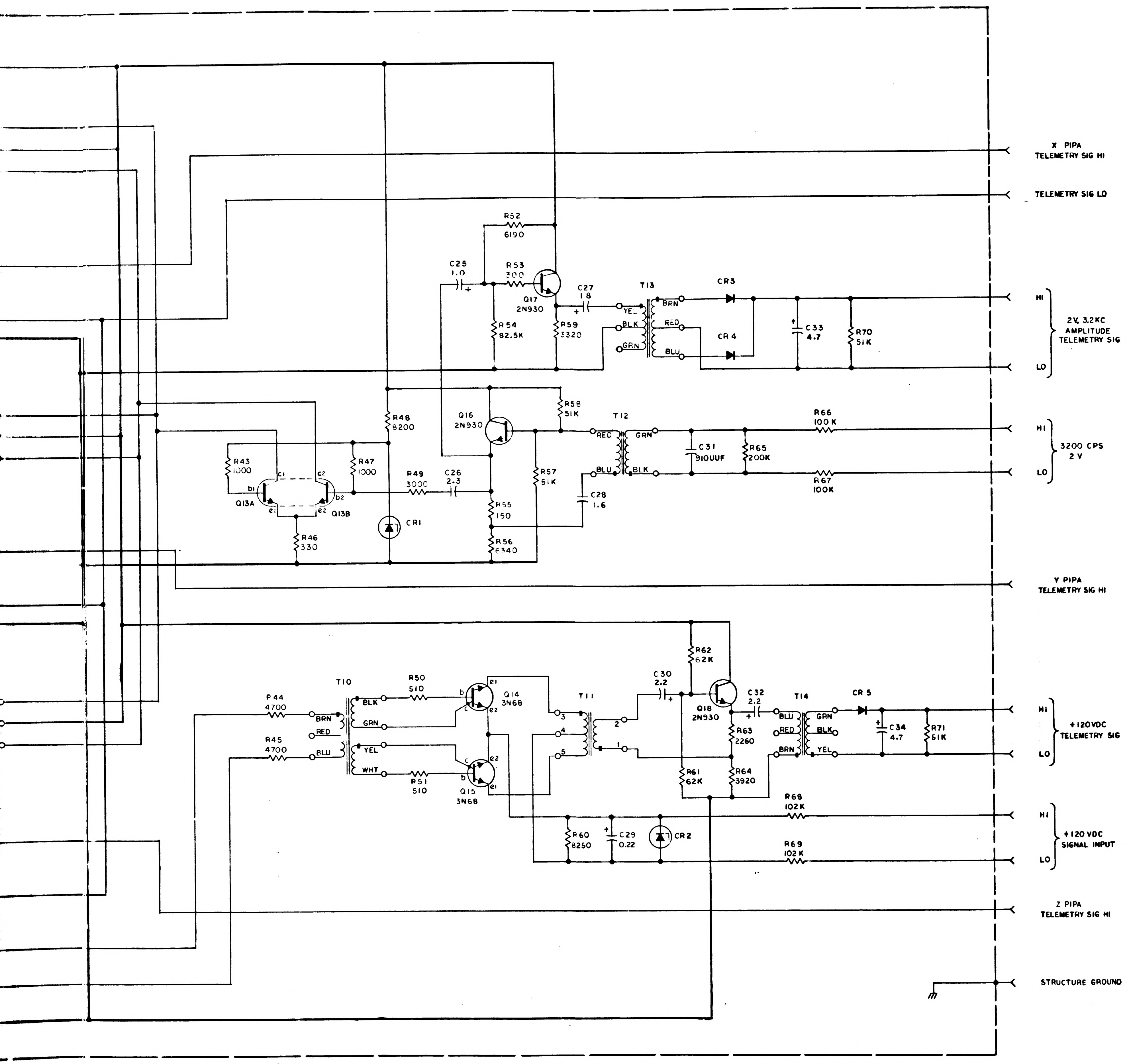
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. DiLeo 7 JULY 65
CHECKED
APPROVED [illegible]
APPROVED E.W. Olsen [illegible]
APPROVED MIT W. Kupfer [illegible]
APPROVED MSC [illegible] 7/2?/65
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER,
PIPA

CODE IDENT NO 80230 | SIZE J | DRAWING NO. 1010242
SCALE — | SHEET 1 OF 1


R52
6190
C25
1.0
R53
300
Q17
2N930
C27
1.8
T13
YEL
BLK
GRN
BRN
RED
BLU
CR3
CR4
C33
4.7
R70
51K
R54
82.5K
R59
3320
R48
8200
Q16
2N930
R58
51K
T12
RED
GRN
BLU
BLK
C31
910UUF
R65
200K
R66
100K
R67
100K
R43
1000
R47
1000
c1
c2
b1
b2
e1
e2
Q13A
Q13B
R49
3000
C26
2.3
R57
51K
C28
1.6
R55
150
R56
6340
R46
330
CR1
X PIPA
TELEMETRY SIG HI
TELEMETRY SIG LO
HI
LO
2V, 3.2KC
AMPLITUDE
TELEMETRY SIG
HI
LO
3200 CPS
2 V
Y PIPA
TELEMETRY SIG HI
R62
62K
T10
R50
510
R44
4700
R45
4700
BRN
RED
BLU
BLK
GRN
YEL
WHT
R51
510
Q14
3N68
Q15
3N68
T11
C30
2.2
Q18
2N930
C32
2.2
T14
BLU
RED
BRN
GRN
BLK
YEL
CR 5
C34
4.7
R71
51K
R63
2260
R61
62K
R64
3920
HI
LO
+120VDC
TELEMETRY SIG
R68
102K
R60
8250
C29
0.22
CR2
R69
102K
HI
LO
+120 VDC
SIGNAL INPUT
Z PIPA
TELEMETRY SIG HI
STRUCTURE GROUND

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311 - 315	RESISTOR	93.1 K	± 1 %	1/10 W
R2	- 315		93.1 K		
R3	- 315		93.1 K		
R4	- 315		93.1 K		
R5	- 315		93.1 K		
R6	- 315		93.1 K		
R7	- 291		52.3K		
R8	- 291		52.3K		
R9	1010311 - 291		52.3K		1/10 W
R10	1010364 - 769		499 K		1/8 W
R11	1010364 - 769		499 K		1/8 W
R12	1010364 - 769		499 K	± 1 %	1/8 W
R13	1006750 - 68		33 K	± 2 %	1/4 W
R14	1006750 - 65		24 K	± 2 %	1/4 W
R15	1010311 - 126		1000	± 1 %	1/10 W
R16	1006750 - 68		33 K	± 2 %	1/4 W
R17	1006750 - 65		24 K	± 2 %	1/4 W
R18	1010311 - 126		1000	± 1 %	1/10 W
R19	1006750 - 68		33 K	± 2 %	1/4 W
R20	1006750 - 65		24 K	± 2 %	1/4 W
R21	1010311 - 126		1000	± 1 %	1/10 W
R22	1010364 - 707		237 K	± 1 %	1/8 W
R23	1010364 - 707		237 K	± 1 %	1/8 W
R24	1010364 - 707		237 K	± 1 %	1/8 W
R25	1006750 - 56		10 K	± 2 %	1/4 W
R26	1006750 - 56		10 K	± 2 %	1/4 W
R27	1006750 - 56		10 K	± 2 %	1/4 W
R28	SEE NOTE 2		NOM	± 1 %	1/10 W
R29	SEE NOTE 2		NOM	± 1 %	1/10 W
R30	SEE NOTE 2		NOM	± 1 %	1/10 W
R31	1006750 - 36		1500	± 2 %	1/4 W
R32	- 36		1500		
R33	- 36		1500		
R34	- 25		510		
R35	- 25		510		
R36	- 25		510		
R37	- 25		510		
R38	- 25		510		
R39	- 25		510		
R40	- 36		1500		
R41	- 36		1500		
R42	1006750 - 36		1500	± 2 %	1/4 W
R43	1010311 - 126		1000	± 1 %	1/10 W
R44	1006750 - 48		4700	± 2 %	1/4 W
R45	1006750 - 48		4700	± 2 %	1/4 W
R46	1006750 - 20		330	± 2 %	1/4 W
R47	1010311 - 126		1000	± 1 %	1/10 W
R48	1006750 - 54		8200	± 2 %	1/4 W
R49	1006750 - 43		3000	± 2 %	1/4 W
R50	1006750 - 25		510	± 2 %	1/4 W
R51	1006750 - 25		510	± 2 %	1/4 W
R52	1010364 - 403		6190	± 1 %	1/8 W
R53	1006750 - 19		300	± 2 %	1/4 W
R54	1010364 - 619		82.5K	± 1 %	1/8 W
R55	1006750 - 12		150	± 2 %	1/4 W
R56	1010311 - 203		6340	± 1 %	1/10 W
R57	1006750 - 73		51 K	± 2 %	1/4 W
R58	1006750 - 73		51 K	± 2 %	1/4 W
R59	1010267 - 205		3320	± 1 %	1/2 W
R60	1010364 - 427		8250	± 1 %	1/8 W
R61	1006750 - 75		62 K	± 2 %	1/4 W
R62	1006750 - 75		62 K	± 2 %	1/4 W
R63	1010364 - 319		2260	± 1 %	1/8 W
R64	1010364 - 365		3920	± 1 %	1/8 W
R65	1010364 - 693		200K	± 1 %	1/8 W
R66	1006750 - 80		100 K	± 2 %	1/4 W
R67	1006750 - 80		100 K	± 2 %	1/4 W
R68	1010364 - 637		102 K	± 1 %	1/8 W
R69	1010364 - 637		102 K	± 1 %	1/8 W
R70	1006750 - 73		51 K	± 2 %	1/4 W
R71	1006750 - 73	RESISTOR	51 K	± 2 %	1/4 W

REF DES	PART
C1	101040
C2	101040
C3	101040
C4	SEE NO
C5	SEE NO
C6	SEE NOT
C7	100675
C8	
C9	
C10	
C11	
C12	
C13	
C14	
C15	
C16	
C17	
C18	100675
C19	101027
C20	
C21	
C22	
C23	
C24	10102
C25	10103
C26	10102
C27	10103
C28	10103
C29	[illegible]
C30	10103
C31	10104
C32	10103
C33	10103
C34	10103
CR1	101037
CR2	101037
CR3	101036
CR4	101036
CR5	10103
Q1	10103
Q2	
Q3	
Q4	
Q5	
Q6	10103
Q7	101036
Q8	
Q9	
Q10	
Q11	
Q12	101036
Q13	10103
Q14	101036
Q15	101036
Q16	10103
Q17	10103
Q18	10103
T1	10088
T2	10088
T3	10088
T4	10103
T5	10103
T6	10103
T7	10103
T8.	10103
T9	10103
T10	[illegible]
T11	10107
T12	10088
T13	10103
T14	10103

R28, R29 & R30	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C4, C5 & C6			
PART NO.	VALUE	TOL	RATING
1010409 - 1	10 UUF	± 2 %	500VDC
- 8	20		
- 12	30		
- 16	43		
- 19	56		
- 21	68		
- 23	82		
- 24	91		
- 25	100		
- 26	110		
- 27	120		
- 28	130		
- 29	150		500
- 30	160		300
- 31	180		
- 32	200		
- 33	220		
1010409 - 34	240 UUF	± 2 %	300VDC

REF DWG:
SIGNAL CONDITIONER ASSY, PIPA
DWG NO. 1007661

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES CAPACITOR VALUES ARE IN µf RESISTOR VALUES ARE IN OHMS TOLERANCES ON FRACTIONS DECIMALS ANGLES ± —— ± —— ± —— DO NOT SCALE THIS DRAWING
		MATERIAL
NEXT ASSY	USED ON	
APPLICATION		

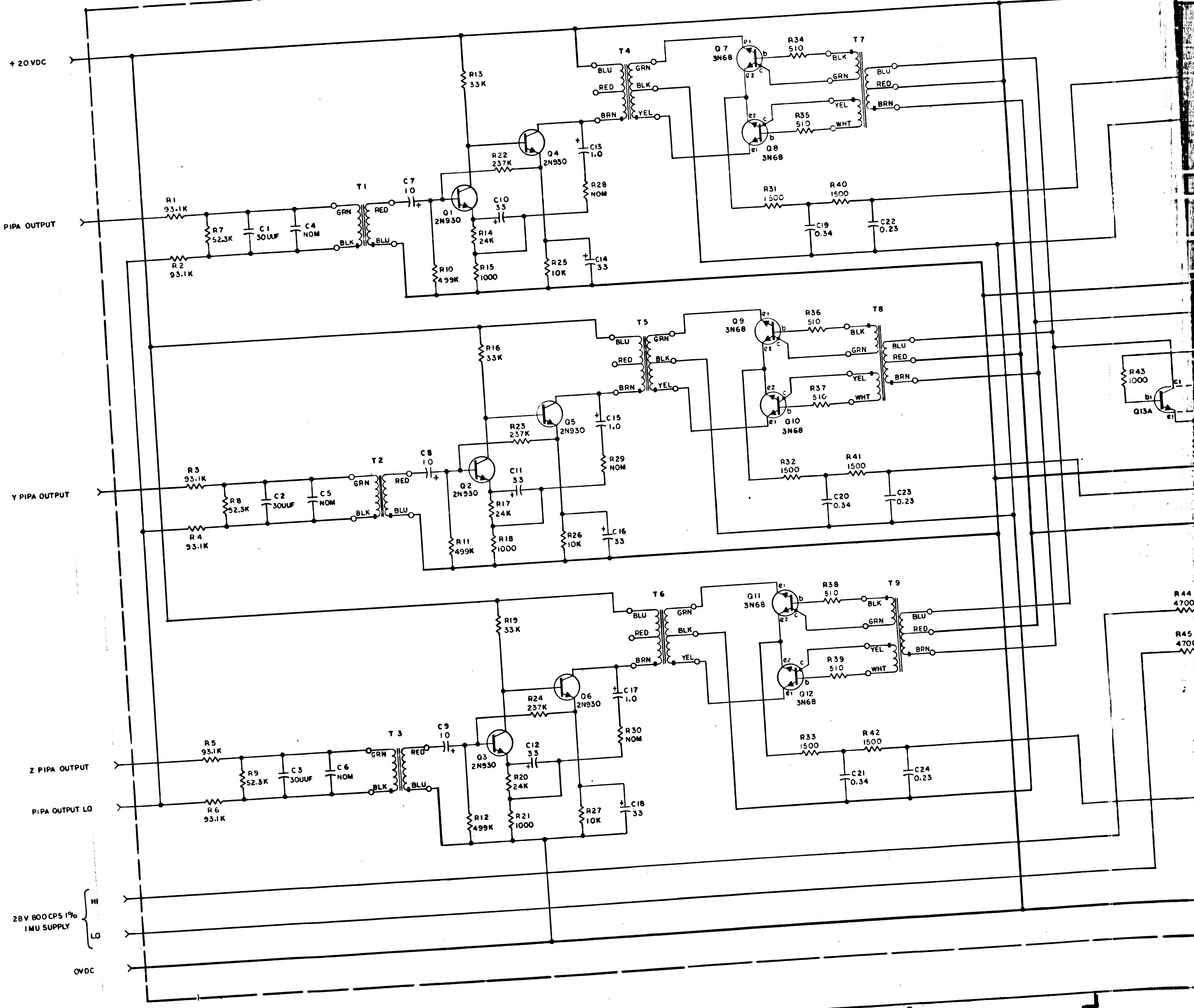
KODAK SAFETY FILM

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

9 8 7 6

C

B

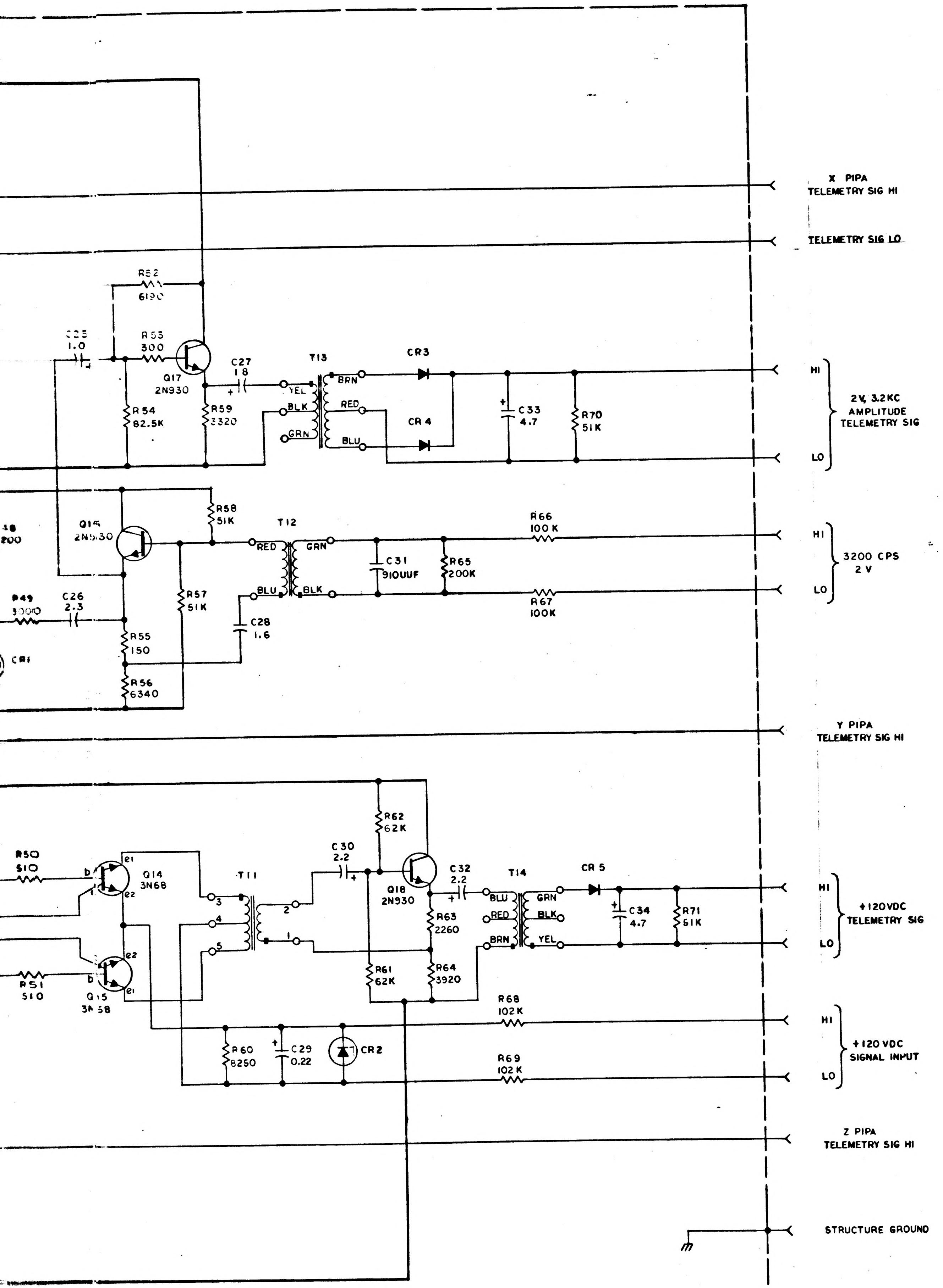

+20 VDC
X PIPA OUTPUT
Y PIPA OUTPUT
Z PIPA OUTPUT
PIPA OUTPUT LO
28V 800CPS 1% IMU SUPPLY
HI
LO
0VDC
R1 93.1K
R2 93.1K
R3 93.1K
R4 93.1K
R5 93.1K
R6 93.1K
R7 52.3K
R8 52.3K
R9 52.3K
C1 30UUF
C2 30UUF
C3 30UUF
C4 NOM
C5 NOM
C6 NOM
T1
T2
T3
T4
T5
T6
T7
T8
T9
GRN
BLK
RED
BLU
YEL
BRN
WHT
C7 10
C8 10
C9 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
R10 499K
R11 499K
R12 499K
R13 33K
R16 33K
R19 33K
R14 24K
R17 24K
R20 24K
R15 1000
R18 1000
R21 1000
C10 33
C11 33
C12 33
R22 237K
R23 237K
R24 237K
C13 1.0
C15 1.0
C17 1.0
R28 NOM
R29 NOM
R30 NOM
R25 10K
R26 10K
R27 10K
C14 33
C16 33
C18 33
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
e1
e2
b
c
R34 510
R35 510
R36 510
R37 510
R38 510
R39 510
R31 1500
R32 1500
R33 1500
R40 1500
R41 1500
R42 1500
C19 0.34
C20 0.34
C21 0.34
C22 0.23
C23 0.23
C24 0.23
R43 1000
Q13A
b1
c1
R44 4700
R45 470

3H

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R28, R29, R30, C4, C5, & C6 PER APPLICABLE PS FROM APPROPRIATE CHART

7 6


X PIPA TELEMETRY SIG HI
TELEMETRY SIG LO
R52 6190
C25 1.0
R53 300
Q17 2N930
C27 18
T13
YEL
BLK
GRN
BRN
RED
BLU
CR3
CR4
C33 4.7
R70 51K
R54 82.5K
R59 3320
HI
LO
2V, 3.2KC AMPLITUDE TELEMETRY SIG
R58 51K
Q16 2N930
T12
RED
GRN
BLU
BLK
C31 910UUF
R65 200K
R66 100K
R67 100K
3200 CPS 2 V
R48 200
R49 3000
C26 2.3
R57 51K
C28 1.6
R55 150
R56 6340
CR1
Y PIPA TELEMETRY SIG HI
R62 62K
C30 2.2
Q18 2N930
C32 2.2
T14
CR 5
R50 510
Q14 3N68
T11
R63 2260
BLU
RED
BRN
GRN
BLK
YEL
C34 4.7
R71 51K
+120VDC TELEMETRY SIG
R51 510
Q15 3N68
R61 62K
R64 3920
R68 102K
R60 8250
C29 0.22
CR2
R69 102K
+120 VDC SIGNAL INPUT
Z PIPA TELEMETRY SIG HI
STRUCTURE GROUND

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010311 - 315	RESISTOR	93.1 K	± 1 %	1/10W
R 2	- 315		93.1 K		
R 3	- 315		93.1 K		
R 4	- 315		93.1 K		
R 5	- 315		93.1 K		
R 6	- 315		93.1 K		
R 7	- 291		52.3K		
R 8	- 291		52.3K		
R 9	1010311 - 291		52.3K		1/10 W
R 10	1010364 - 769		499 K		1/8 W
R 11	1010364 - 769		499 K		1/8 W
R 12	1010364 - 769		499 K	± 1 %	1/8 W
R 13	1006750 - 68		33K	± 2 %	1/4 W
R 14	1006750 - 65		24K	± 2 %	1/4 W
R 15	1010311 - 126		1000	± 1 %	1/10 W
R 16	1006750 - 68		33K	± 2 %	1/4 W
R 17	1006750 - 65		24K	± 2 %	1/4 W
R 18	1010311 - 126		1000	± 1 %	1/10 W
R 19	1006750 - 68		33K	± 2 %	1/4 W
R 20	1006750 - 65		24K	± 2 %	1/4 W
R 21	1010311 - 126		1000	± 1 %	1/10 W
R 22	1010364 - 707		237K	± 1 %	1/8 W
R 23	1010364 - 707		237K	± 1 %	1/8 W
R 24	1010364 - 707		237K	± 1 %	1/8 W
R 25	1006750 - 56		10 K	± 2 %	1/4 W
R 26	1006750 - 56		10 K	± 2 %	1/4 W
R 27	1006750 - 56		10 K	± 2 %	1/4 W
R 28	SEE NOTE 2		NOM	± 1 %	1/10 W
R 29	SEE NOTE 2		NOM	± 1 %	1/10 W
R 30	SEE NOTE 2		NOM	± 1 %	1/10 W
R 31	1006750 - 36		1500	± 2 %	1/4 W
R 32	- 36		1500		
R 33	- 36		1500		
R 34	- 25		510		
R 35	- 25		510		
R 36	- 25		510		
R 37	- 25		510		
R 38	- 25		510		
R 39	- 25		510		
R 40	- 36		1500		
R 41	- 36		1500		
R 42	1006750 - 36		1500	± 2 %	1/4 W
R 43	1010311 - 126		1000	± 1 %	1/10 W
R 44	1006750 - 48		4700	± 2 %	1/4 W
R 45	1006750 - 48		4700	± 2 %	1/4 W
R 46	1006750 - 20		330	± 2 %	1/4 W
R 47	1010311 - 126		1000	± 1 %	1/10 W
R 48	1006750 - 54		8200	± 2 %	1/4 W
R 49	1006750 - 43		3000	± 2 %	1/4 W
R 50	1006750 - 25		510	± 2 %	1/4 W
R 51	1006750 - 25		510	± 2 %	1/4 W
R 52	1010364 - 403		6190	± 1 %	1/8 W
R 53	1006750 - 19		300	± 2 %	1/4 W
R 54	1010364 - 619		82.5K	± 1 %	1/8 W
R 55	1006750 - 12		150	± 2 %	1/4 W
R 56	1010311 - 203		6340	± 1 %	1/10 W
R 57	1006750 - 73		51 K	± 2 %	1/4 W
R 58	1006750 - 73		51 K	± 2 %	1/4 W
R 59	1010267 - 205		3320	± 1 %	1/2 W
R 60	1010364 - 427		8250	± 1 %	1/8 W
R 61	1006750 - 75		62 K	± 2 %	1/4 W
R 62	1006750 - 75		62 K	± 2 %	1/4 W
R 63	1010364 - 319		2260	± 1 %	1/8 W
R 64	1010364 - 365		3920	± 1 %	1/8 W
R 65	1010364 - 693		200K	± 1 %	1/8 W
R 66	1006750 - 80		100 K	± 2 %	1/4 W
R 67	1006750 - 80		100 K	± 2 %	1/4 W
R 68	1010364 - 637		102 K	± 1 %	1/8 W
R 69	1010364 - 637		102 K	± 1 %	1/8 W
R 70	1006750 - 73		51 K	± 2 %	1/4 W
R 71	1006750 - 73	RESISTOR	51 K	± 2 %	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010409 - 203	CAPACITOR	30 UUF	± 2 %	500VDC
C 2	1010409 - 203		30 UUF	2 %	500
C 3	1010409 - 203		30 UUF	2 %	500
C 4	SEE NOTE 2		NOM	—	—
C 5	SEE NOTE 2		NOM	—	—
C 6	SEE NOTE 2		NOM	—	—
C 7	1006755 - 31		10	10 %	20
C 8	- 31		10		
C 9	- 31		10		
C 10	- 34		33		
C 11	- 34		33		
C 12	- 34		33		20
C 13	- 69		1.0		35
C 14	- 34		33		20
C 15	- 69		1.0		35
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	1006755 - 34		33		20
C 19	1010279 - 7		0.34		6
C 20	- 7		0.34		
C 21	- 7		0.34		
C 22	- 5		0.23		
C 23	- 5		0.23		
C 24	1010279 - 5		0.23		6
C 25	1010393 - 029		1.0		50
C 26	1010279 - 236		2.3		35
C 27	1010393 - 044		18		50
C 28	1010279 - 114		1.6		15
C 29	1010393 - 021		0.22		50
C 30	1010393 - 033		2.2	±10 %	50
C 31	1010410 - 16		910 UUF	± 2 %	300
C 32	1010393 - 033		2.2	±10 %	50
C 33	1010393 - 037		4.7	±10 %	50
C 34	1010393 - 037	CAPACITOR	4.7	±10 %	50 VDC
CR 1	1010372 - 4	DIODE, ZENER			
CR 2	1010372 - 13	ZENER			
CR 3	1010362 - 001		IN645		
CR 4	1010362 - 001		IN645		
CR 5	1010362 - 001	DIODE	IN645		
Q 1	1010397 - 1	TRANSISTOR	2N930		
Q 2					
Q 3					
Q 4					
Q 5					
Q 6	1010397 - 1		2N930		
Q 7	1010367		3N68		
Q 8					
Q 9					
Q 10					
Q 11					
Q 12	1010367		3N68		
Q 13	1010376 - 3				
Q 14	1010367		3N68		
Q 15	1010367		3N68		
Q 16	1010397 - 1		2N930		
Q 17	1010397 - 1		2N930		
Q 18	1010397 - 1	TRANSISTOR	2N930		
T 1	1010712	TRANSFORMER			
T 2	1010712				
T 3	1010712				
T 4	1010324				
T 5	1010324				
T 6	1010324				
T 7	1010315 - 1				
T 8.	1010315 - 1				
T 9	1010315 - 1				
T 10	1010323				
T 11	1010710				
T 12	1010712				
T 13	1010328				
T 14	1010324	TRANSFORMER			

R28, R29 & R30	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C4, C5 & C6			
PART NO.	VALUE	TOL	RATING
1010409 - 1	10 UUF	± 2 %	500VDC
- 8	20		
- 12	30		
- 16	43		
- 19	56		
- 21	68		
- 23	82		
- 24	91		
- 25	100		
- 26	110		
- 27	120		
- 28	130		
- 29	150		500
- 30	160		300
- 31	180		
- 32	200		
- 33	220		
1010409 - 34	240 UUF	± 2 %	300VDC

REF DWG:
SIGNAL CONDITIONER ASSY, PIPA
DWG NO. 1007661

SYM	ZONE	REVISIONS DESCRIPTION	DR	CHK	DATE	APPROVED

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY | USED ON
APPLICATION

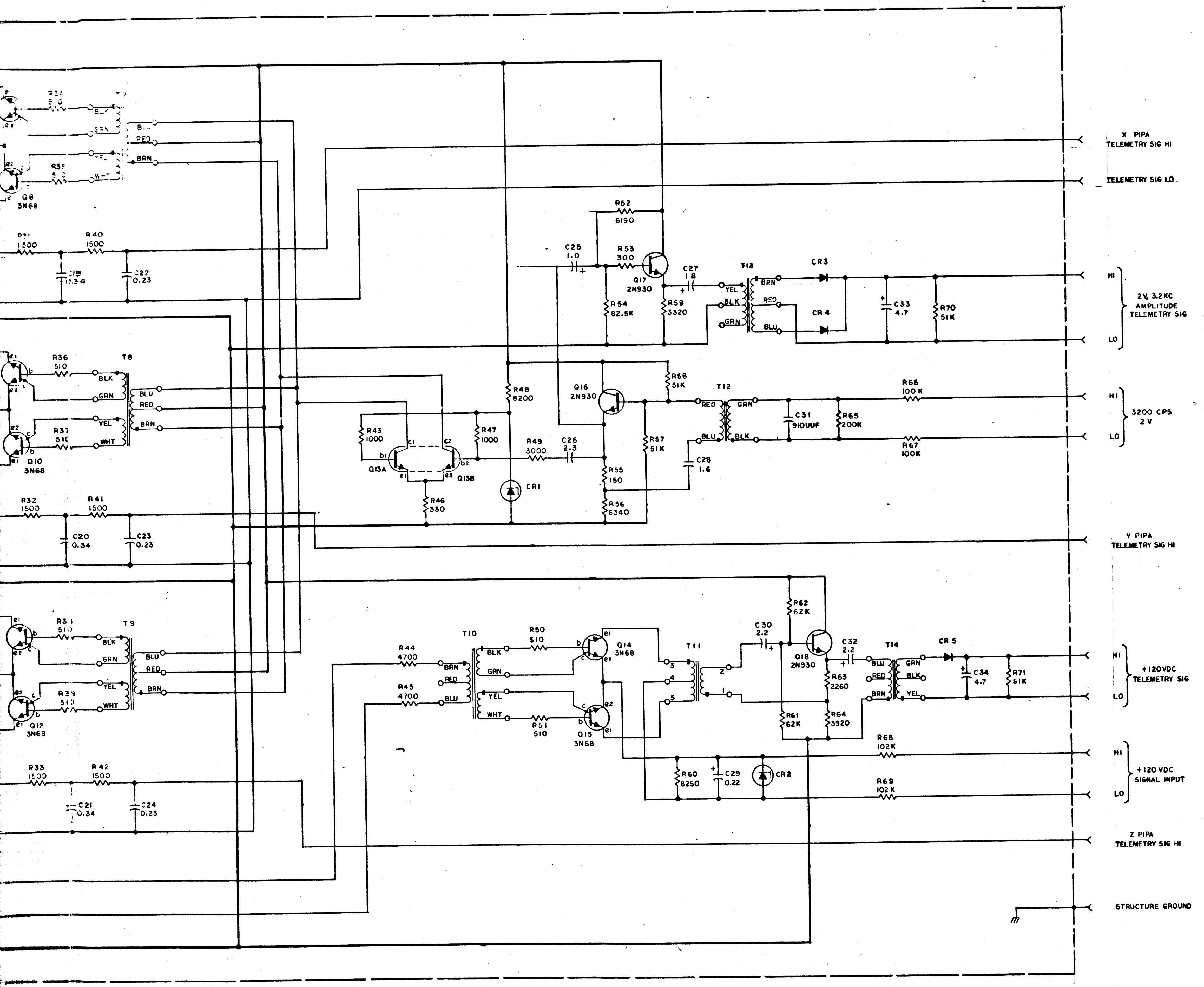
MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. DiLeo
CHECKED
APPROVED
APPROVED E.H. Olsen
APPROVED MIT
APPROVED MSC 7/2/65
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER, PIPA

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010242
SCALE —
SHEET 1 OF 1


R34 510
R35 510
Q8 3N68
BLK
GRN
BLU
RED
YEL
BRN
R31 1500
R40 1500
C19 0.34
C22 0.23
R36 510
R37 510
T8
WHT
Q10 3N68
R32 1500
R41 1500
C20 0.34
C23 0.23
R38 510
R39 510
T9
Q12 3N68
R33 1500
R42 1500
C21 0.34
C24 0.23
R52 6190
C25 1.0
R53 300
Q17 2N930
R54 82.5K
R59 3320
C27 18
T13
CR3
CR4
C33 4.7
R70 51K
R48 8200
R58 51K
Q16 2N930
T12
C31 910UUF
R65 200K
R66 100K
R67 100K
R43 1000
R47 1000
Q13A
Q13B
R49 3000
C26 2.3
R57 51K
C28 1.6
R55 150
R56 6340
R46 330
CR1
R62 62K
C30 2.2
Q18 2N930
C32 2.2
T14
CR5
C34 4.7
R71 51K
R44 4700
R45 4700
T10
R50 510
R51 510
Q14 3N68
Q15 3N68
T11
R63 2260
R61 62K
R64 3920
R68 102K
R69 102K
R60 8250
C29 0.22
CR2
X PIPA TELEMETRY SIG HI
TELEMETRY SIG LO
HI
LO
2V, 3.2KC AMPLITUDE TELEMETRY SIG
3200 CPS 2 V
Y PIPA TELEMETRY SIG HI
+120VDC TELEMETRY SIG
+120 VDC SIGNAL INPUT
Z PIPA TELEMETRY SIG HI
STRUCTURE GROUND

REF DES	PART NO.	DESCRIPTION	VALUE	TOL
R1	1010311 - 315	RESISTOR	93.1 K	± 1%
R2	- 316		93.1 K	
R3	- 315		93.1 K	
R4	- 315		93.1 K	
R5	- 315		93.1 K	
R6	- 315		93.1 K	
R7	- 291		52.3K	
R8	- 291		52.3K	
R9	1010311 - 291		52.3K	
R10	1010364 - 769		499 K	
R11	1010364 - 769		499 K	
R12	1010364 - 769		499 K	± 1%
R13	1006750 - 68		33K	± 2%
R14	1006750 - 65		24K	± 2%
R15	1010311 - 126		1000	± 1%
R16	1006750 - 68		33K	± 2%
R17	1006750 - 65		24K	± 2%
R18	1010311 - 126		1000	± 1%
R19	1006750 - 68		33K	± 2%
R20	1006750 - 65		24K	± 2%
R21	1010311 - 126		1000	± 1%
R22	1010364 - 707		237K	± 1%
R23	1010364 - 707		237K	± 1%
R24	1010364 - 707		237 K	± 1%
R25	1006750 - 56		10 K	± 2%
R26	1006750 - 56		10 K	± 2%
R27	1006750 - 56		10 K	± 2%
R28	SEE NOTE 2		NOM	± 1%
R29	SEE NOTE 2		NOM	± 1%
R30	SEE NOTE 2		NOM	± 1%
R31	1006750 - 36		1500	± 2%
R32	- 36		1500	
R33	- 36		1500	
R34	- 25		510	
R35	- 25		510	
R36	- 25		510	
R37	- 25		510	
R38	- 25		510	
R39	- 25		510	
R40	- 36		1500	
R41	- 36		1500	
R42	1006750 - 36		1500	± 2%
R43	1010311 - 126		1000	± 1%
R44	1006750 - 48		4700	± 2%
R45	1006750 - 48		4700	± 2%
R46	1006750 - 20		330	± 2%
R47	1010311 - 126		1000	± 1%
R48	1006750 - 54		8200	± 2%
R49	1006750 - 43		3000	± 2%
R50	1006750 - 25		510	± 2%
R51	1006750 - 25		510	± 2%
R52	1010364 - 403		6190	± 1%
R53	1006750 - 19		300	± 2%
R54	1010364 - 619		82.5K	± 1%
R55	1006750 - 12		150	± 2%
R56	1010311 - 203		6340	± 1%
R57	1006750 - 73		51 K	± 2%
R58	1006750 - 73		51 K	± 2%
R59	1010267 - 205		3320	± 1%
R60	1010364 - 427		8250	± 1%
R61	1006750 - 75		62 K	± 2%
R62	1006750 - 75		62 K	± 2%
R63	1010364 - 319		2260	± 1%
R64	1010364 - 365		3920	± 1%
R65	1010364 - 693		200K	± 1%
R66	1006750 - 80		100 K	± 2%
R67	1006750 - 80		100 K	± 2%
R68	1010364 - 637		102 K	± 1%
R69	1010364 - 637		102 K	± 1%
R70	1006750 - 73		51 K	± 2%
R71	1006750 - 73	RESISTOR	51 K	± 2%

R28, R29 & R30	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C4, C5 & C6			
PART NO.	VALUE	TOL	RATING
1010409 - 1	10 UUF	± 2%	500VDC
- 8	20		
- 12	30		
- 16	43		
- 19	56		
- 21	68		
- 23	82		
- 24	91		
- 25	100		
- 26	110		
- 27	120		
- 28	130		
- 29	150		500
- 30	160		300
- 31	180		
- 32	200		
- 33	220		
1010409 - 34	240 UUF	± 2%	300VDC

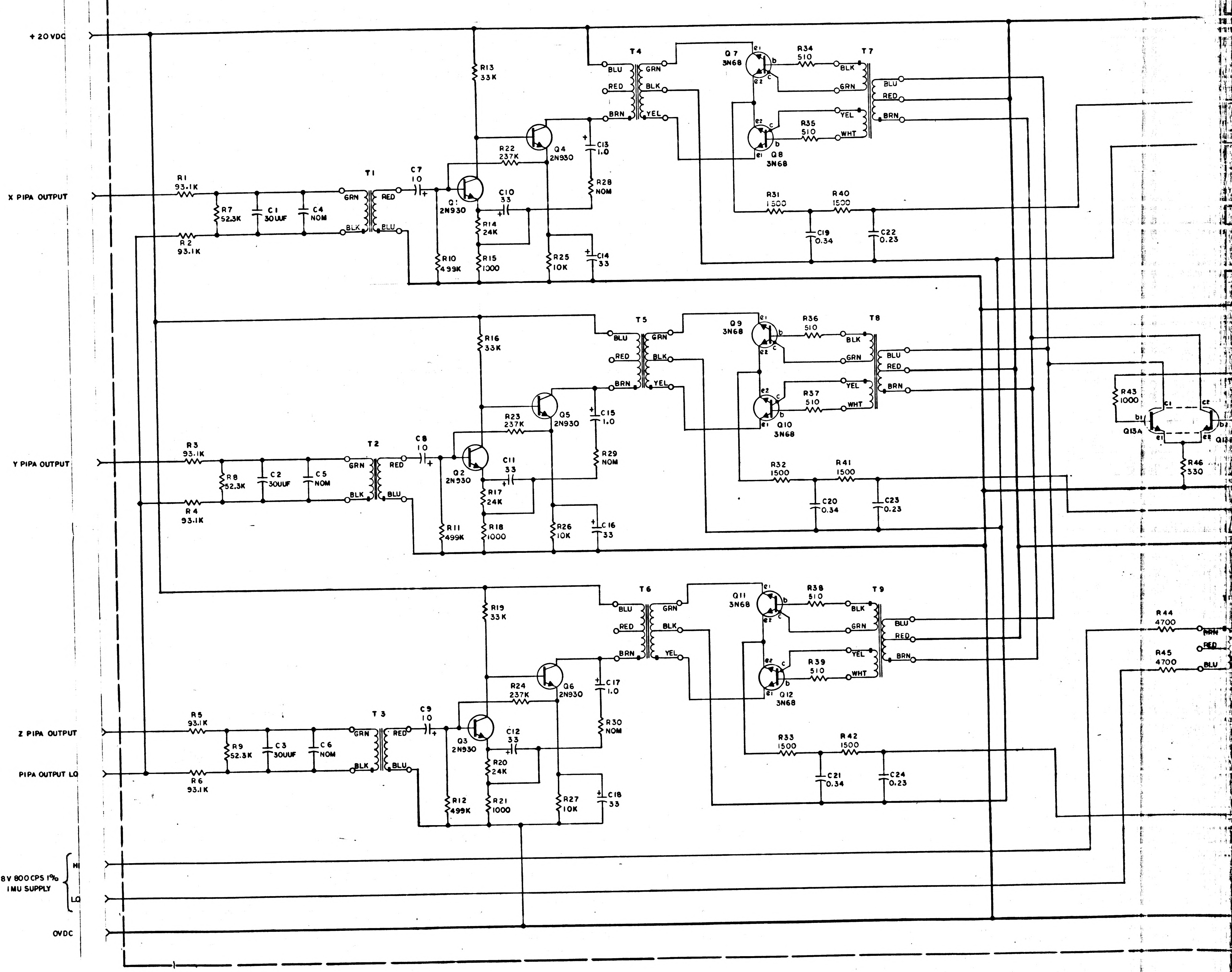
REF DWG:
SIGNAL CONDITIONER ASS
DWG NO. 1007661

MASTER

NEXT ASSY | USED ON
APPLICATION

F-2

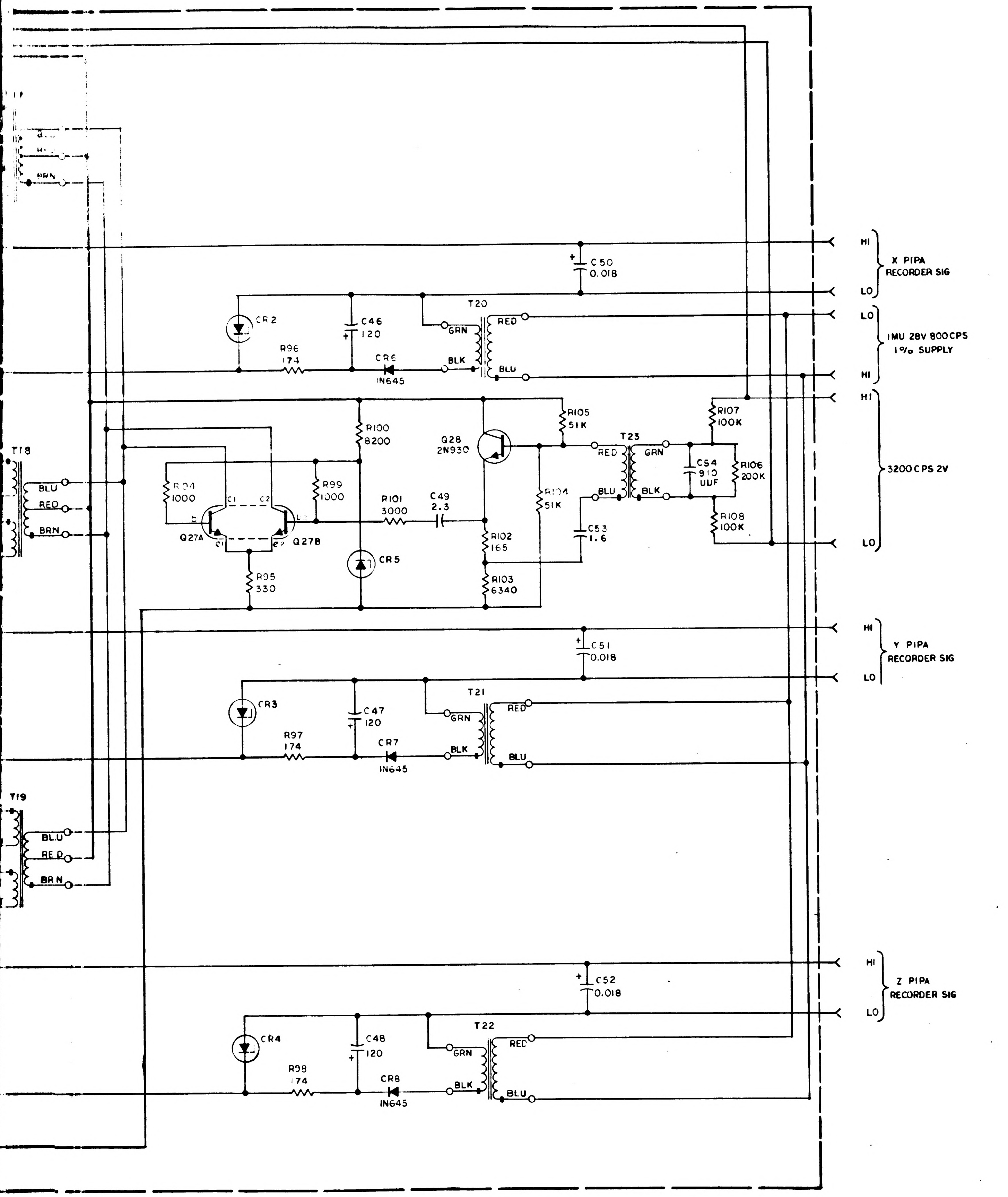
NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


+20 VDC
X PIPA OUTPUT
Y PIPA OUTPUT
Z PIPA OUTPUT
PIPA OUTPUT LO
28V 800CPS 1%
IMU SUPPLY
HI
LO
0VDC
R1 93.1K
R2 93.1K
R3 93.1K
R4 93.1K
R5 93.1K
R6 93.1K
R7 52.3K
R8 52.3K
R9 52.3K
C1 30UUF
C2 30UUF
C3 30UUF
C4 NOM
C5 NOM
C6 NOM
T1
T2
T3
GRN
RED
BLK
BLU
C7 10
C8 10
C9 10
Q1 2N930
Q2 2N930
Q3 2N930
R10 499K
R11 499K
R12 499K
R13 33K
R16 33K
R19 33K
R14 24K
R17 24K
R20 24K
R15 1000
R18 1000
R21 1000
C10 33
C11 33
C12 33
R22 237K
R23 237K
R24 237K
Q4 2N930
Q5 2N930
Q6 2N930
C13 1.0
C15 1.0
C17 1.0
R28 NOM
R29 NOM
R30 NOM
R25 10K
R26 10K
R27 10K
C14 33
C16 33
C18 33
T4
T5
T6
BLU
RED
BRN
GRN
BLK
YEL
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
e1
e2
b
c
R34 510
R35 510
R36 510
R37 510
R38 510
R39 510
T7
T8
T9
BLK
GRN
YEL
WHT
BLU
RED
BRN
R31 1500
R32 1500
R33 1500
R40 1500
R41 1500
R42 1500
C19 0.34
C20 0.34
C21 0.34
C22 0.23
C23 0.23
C24 0.23
R43 1000
Q13A
Q13
b1
b2
c1
c2
e1
e2
R46 330
R44 4700
R45 4700
BRN
RED
BLU

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R28, R29, R30, C4, C5, & C6 PER APPLICABLE PS FROM APPROPRIATE CHART

3H

1010242



REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311 -315	RESISTOR	93.1K	± 1%	1/10 W
R2	-315		93.1K		
R3	-315		93.1K		
R4	-315		93.1K		
R5	-315		93.1K		
R6	-315		93.1K		
R7	-291		52.3K		
R8	-291		52.3K		
R9	1010311 -291		52.3K		1/10 W
R10	1010364-769		499K		1/8 W
R11	1010364-769		499K		1/8 W
R12	1010364-769		499K	± 1%	1/8 W
R13	1006750-68		33K	± 2%	1/4 W
R14	1006750-65		24K	± 2%	1/4 W
R15	1010311 -126		1000	± 1%	1/10 W
R16	1006750-68		33K	± 2%	1/4 W
R17	1006750-65		24K	± 2%	1/4 W
R18	1010311 -126		1000	± 1%	1/10 W
R19	1006750-68		33K	± 2%	1/4 W
R20	1006750-65		24K	± 2%	1/4 W
R21	1010311 -126		1000	± 1%	1/10 W
R22	1010364-707		237K	± 1%	1/8 W
R23	1010364-707		237K	± 1%	1/8 W
R24	1010364-707		237K	± 1%	1/8 W
R25	1006750-56		10K	± 2%	1/4 W
R26	1006750-56		10K	± 2%	1/4 W
R27	1006750-56		10K	± 2%	1/4 W
R28	SEE NOTE 2		NOM	± 1%	1/10 W
R29	SEE NOTE 2		NOM	± 1%	1/10 W
R30	SEE NOTE 2		NOM	± 1%	1/10 W
R31	1006750-36		1500	± 2%	1/4 W
R32	-36		1500		
R33	-36		1500		
R34	-25		510		
R35	-25		510		
R36	-25		510		
R37	-25		510		
R38	-25		510		
R39	-25		510		
R40	-36		1500		
R41	-36		1500		
R42	1006750-36		1500	± 2%	1/4 W
R43	1010311 -126		1000	± 1%	1/10 W
R44	1006750-20		330	± 2%	1/4 W
R45	1010311 -126		1000	± 1%	1/10 W
R46	1006750-54		8200	± 2%	1/4 W
R47	1006750-43		3000	± 2%	1/4 W
R48	1010311 -80		332	± 1%	1/10 W
R49	1010311 -203		6340	± 1%	1/10 W
R50	1006750-73		51K	± 2%	1/4 W
R51	1006750-73		51K	± 2%	1/4 W
R52	1010364-693		200K	± 1%	1/8 W
R53	1006750-80		100K	± 2%	1/4 W
R54	1006750-80		100K	± 2%	1/4 W
R55	1010311 -315		93.1K	± 1%	1/10 W
R56	-315		93.1K		
R57	-315		93.1K		
R58	-315		93.1K		
R59	-315		93.1K		
R60	-315		93.1K		
R61	-291		52.3K		
R62	-291		52.3K		
R63	1010311 -291		52.3K		1/10 W
R64	1010364-769		499K		1/8 W
R65	1010364-769		499K		1/8 W
R66	1010364-769		499K	± 1%	1/8 W
R67	1006750-68		33K	± 2%	1/4 W
R68	1006750-65		24K	± 2%	1/4 W
R69	1010311 -126		1000	± 1%	1/10 W
R70	1006750-68		33K	± 2%	1/4 W
R71	1006750-65		24K	± 2%	1/4 W
R72	1010311 -126		1000	± 1%	1/10 W
R73	1006750-68		33K	± 2%	1/4 W
R74	1006750-65		24K	± 2%	1/4 W
R75	1010311 -126		1000	± 1%	1/10 W
R76	1010364-707		237K	± 1%	1/8 W
R77	1010364-707		237K	± 1%	1/8 W
R78	1010364-707		237K	± 1%	1/8 W
R79	1006750-56		10K	± 2%	1/4 W
R80	1006750-56		10K	± 2%	1/4 W
R81	1006750-56		10K	± 2%	1/4 W
R82	SEE NOTE 2		NOM	± 1%	1/10 W
R83	SEE NOTE 2		NOM	± 1%	1/10 W
R84	SEE NOTE 2		NOM	± 1%	1/10 W
R85	1006750-43		3000	± 2%	1/4 W
R86	-43		3000		
R87	-43		3000		
R88	-25		510		
R89	-25		510		
R90	-25		510		
R91	-25		510		
R92	-25		510		
R93	1006750-25		510	± 2%	1/4 W
R94	1010311 -126		1000	± 1%	1/10 W
R95	1006750-20		330	± 2%	1/4 W
R96	1010267 -82		174	± 1%	1/2 W
R97	1010267 -82		174	± 1%	1/2 W
R98	1010267 -82		174	± 1%	1/2 W
R99	1010311 -126		1000	± 1%	1/10 W
R100	1006750-54		8200	± 2%	1/4 W
R101	1006750-43		3000	± 2%	1/4 W
R102	1010311 -51		165	± 1%	1/10 W
R103	1010311 -203		6340	± 1%	1/10 W
R104	1006750 -73		51K	± 2%	1/4 W
R105	1006750 -73		51K	± 2%	1/4 W
R106	1010364-693		200K	± 1%	1/8 W
R107	1006750-80		100K	± 2%	1/4 W
R108	1006750-80	RESISTOR	100K	± 2%	1/4 W
C1	1010409-12	CAPACITOR	30 UUF	± 2%	500 VDC
C2	1010409-12		30 UUF	± 2%	500
C3	1010409-12		30 UUF	± 2%	500
C4	SEE NOTE 2		NOM	—	—
C5	SEE NOTE 2		NOM	—	—
C6	SEE NOTE 2		NOM	—	—
C7	1006755-31		10	±10%	20
C8	-31		10		
C9	-31		10		
C10	-34		33		
C11	-34		33		
C12	-34		33		20
C13	-69		1.0		35
C14	-34		33		20
C15	1006755-69	CAPACITOR	1.0	±10%	35VDC
C16	1006755-34	CAPACITOR	33	±10%	20 VDC
C17	1006755-69		1.0		35
C18	1006755-34		33		20
C19	1010279-7		0.34		6
C20	-7		0.34		
C21	-7		0.34		
C22	-5		0.23		
C23	-5		0.23		
C24	-5		0.23		6
C25	-236		2.3		35
C26	1010279-114		1.6	±10%	15
C27	1010409-25		100 UUF	± 2%	500
C28	1010409-12		30 UUF	± 2%	500
C29	1010409-12		30 UUF	± 2%	500
C30	1010409-12		30 UUF	± 2%	500
C31	SEE NOTE 2		NOM	—	—
C32	SEE NOTE 2		NOM	—	—
C33	SEE NOTE 2		NOM	—	—
C34	1006755-31		10	±10%	20
C35	-31		10		
C36	-31		10		
C37	-34		33		
C38	-34		33		
C39	-34		33		20
C40	-69		1.0		35
C41	-34		33		20
C42	-69		1.0		35
C43	-34		33		20
C44	-69		1.0		35
C45	-34		33		20
C46	-15		120		10
C47	-15		120		10
C48	1006755-15		120		10
C49	1010279-236		2.3		35
C50	1010393-008		0.018		50
C51	1010393-008		0.018		50
C52	1010393-008		0.018		50
C53	1010279-114		1.6	±10%	15
C54	1010410-16	CAPACITOR	910 UUF	± 2%	300VDC
CR1	1010372-4	DIODE, ZENER			
CR2	3				
CR3	3				
CR4	3				
CR5	1010372 4	ZENER			
CR6	1010837-001		IN645		
CR7	1010837-001		IN645		
CR8	1010837-001	DIODE	IN645		
Q1	1010397-1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6	1010397-1		2N930		
Q7	1010367		3N68		
Q8					
Q9					
Q10					
Q11					
Q12	1010367		3N68		
Q13	1010376-3				
Q14	1010397-1		2N930		
Q15					
Q16					
Q17					
Q18					
Q19	1010397-1		2N930		
Q20	1010367		3N68		
Q21					
Q22					
Q23					
Q24					
Q25					
Q26	1010367		3N68		
Q27	1010376-3				
Q28	1010397	TRANSISTOR	2N930		
T1	1008832	TRANSFORMER			
T2	1008832				
T3	1008832				
T4	1010324				
T5	1010324				
T6	1010324				
T7	1010315-1				
T8	1010315-1				
T9	1010315-1				
T10	1008832				
T11					
T12					
T13	1008832				
T14	1010324				
T15	1010324				
T16	1010324				
T17	1010315-1				
T18	1010315-1				
T19	1010315-1				
T20	1010466				
T21	1010466				
T22	1010466				
T23	1008832	TRANSFORMER			

R28, R29, R30, R82, R83, R84	
PART NO.	VALUE
1010311-296	59.0K
-297	60.4K
-298	61.9K
-299	63.4K
-300	64.9K
-301	66.5K
-302	68.1K
-303	69.8K
-304	71.5K
-305	73.2K
-306	75.0K
-307	76.8K
-308	78.7K
-309	80.6K
-310	82.5K
-311	84.5K
-312	86.6K
-313	88.7K
1010311-314	90.9K

C4, C5, C6, C31, C32, & C33			
PART NO.	VALUE	TOL	RATING
1010409-1	10 UUF	±0.25UUF	500VDC
-8	20	± 2%	
-12	30		
-16	43		
-19	56		
-21	68		
-23	82		
-24	91		
-25	100		
-26	110		
-27	120		
-28	130		
-29	150		500
-30	160		300
-31	180		
-32	200		
-33	220		
1010409-34	240 UUF	± 2%	300VDC

REF DWG:
SIGNAL CONDITIONER IRIG & PIPA ASSY
DWG NO. 1007662

REVISIONS 21744						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22851				

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —— DECIMALS ± —— ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN Q. Di Lao 21 July 65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER
IRIG & PIPA

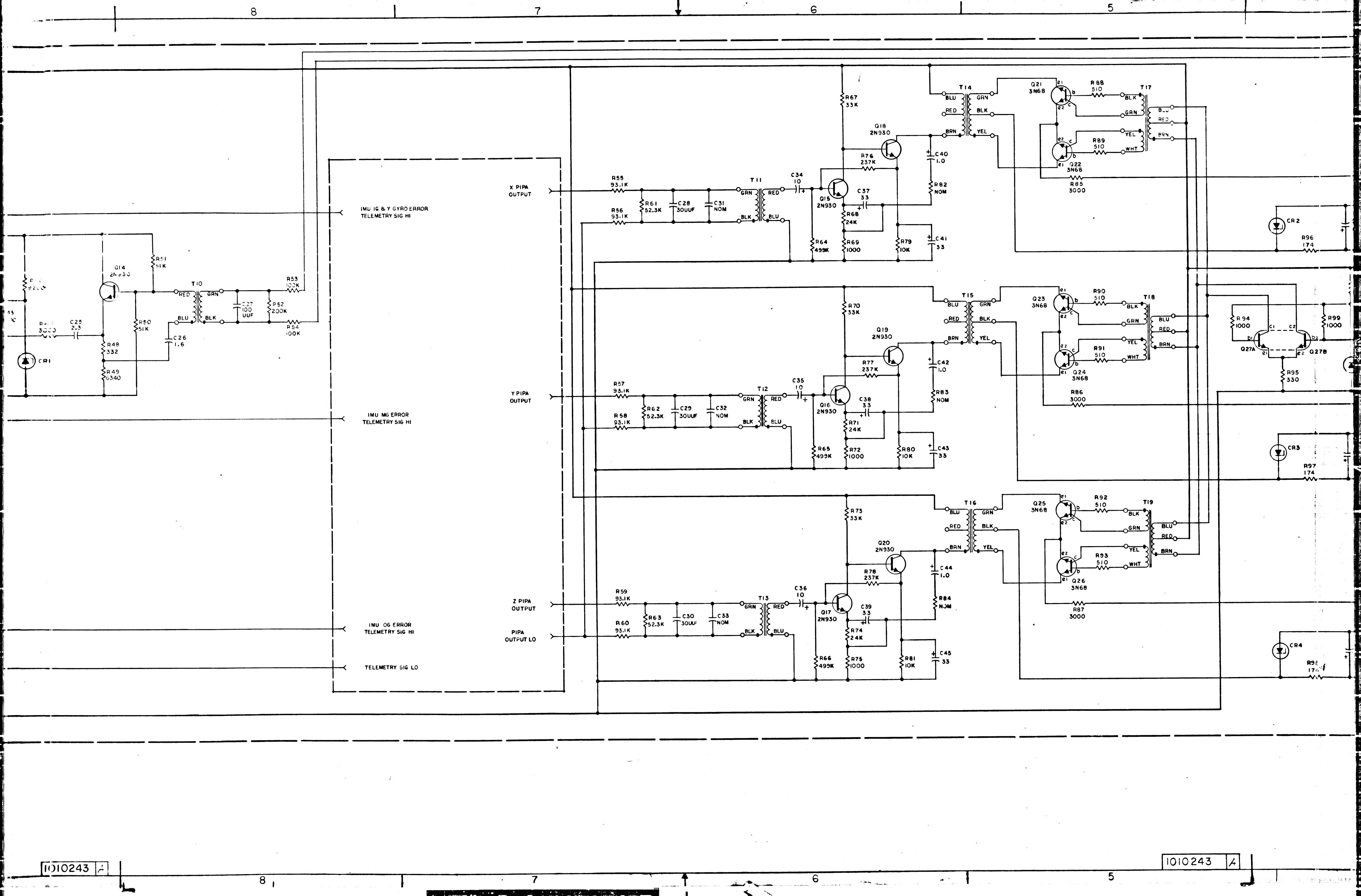
CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010243
SCALE ——
SHEET 1 OF 1

1010243 A

44

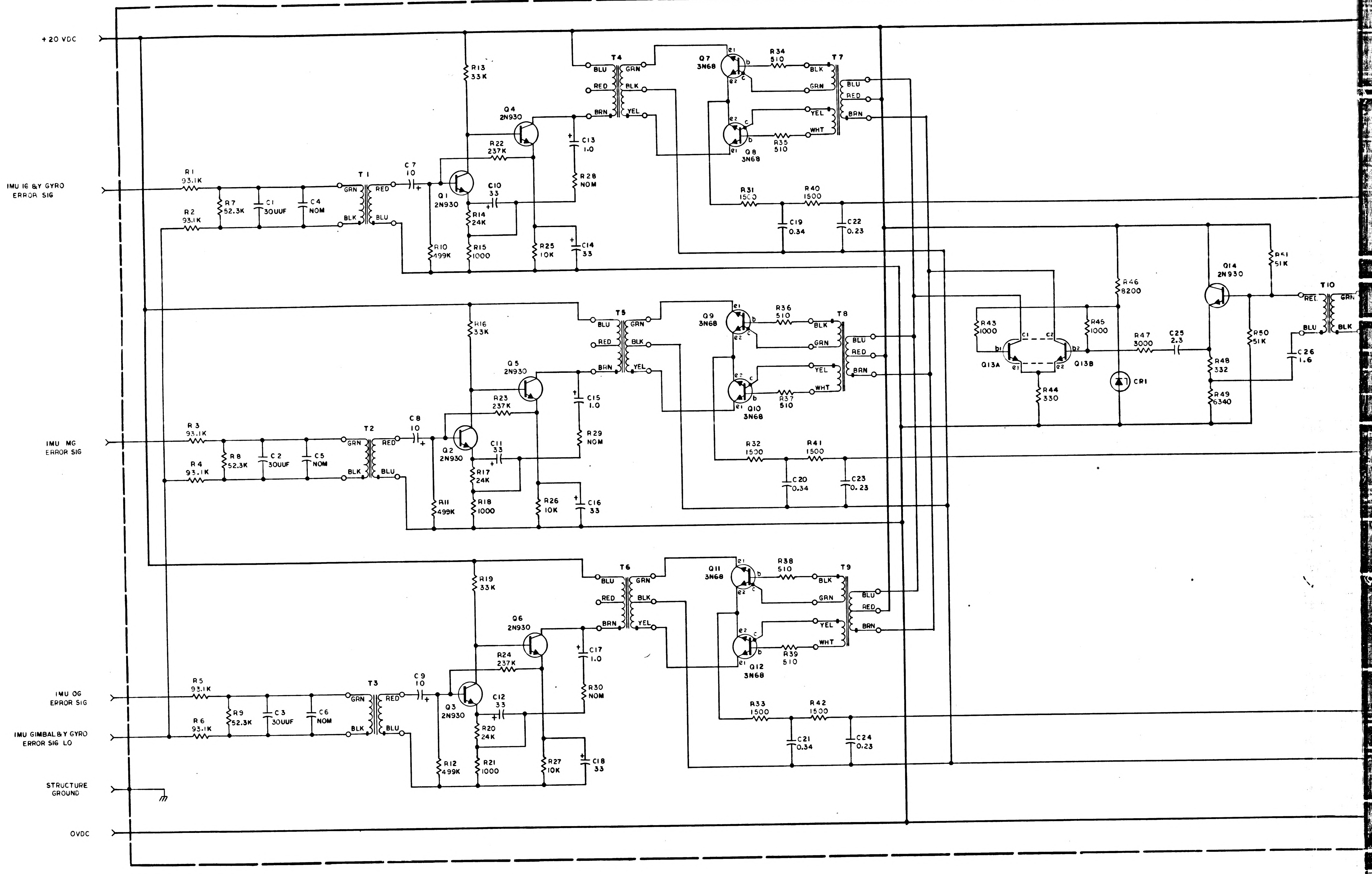
1010243 A

3/1010243



8
7
6
5
X PIPA OUTPUT
Y PIPA OUTPUT
Z PIPA OUTPUT
PIPA OUTPUT LO
IMU IG & Y GYRO ERROR TELEMETRY SIG HI
IMU MG ERROR TELEMETRY SIG HI
IMU OG ERROR TELEMETRY SIG HI
TELEMETRY SIG LO
Q14 2N930
R51 51K
R50 51K
R48 332
R49 6340
R47 3000
C25 2.3
C26 1.6
CR1
T10
RED
GRN
BLU
BLK
C27 100 UUF
R52 200K
R53 100K
R54 100K
R55 93.1K
R56 93.1K
R61 52.3K
C28 30UUF
C31 NOM
T11
C34 10
Q15 2N930
C37 33
R68 24K
R64 499K
R69 1000
R76 237K
Q18 2N930
R67 33K
C40 1.0
R82 NOM
R79 10K
C41 33
T14
Q21 3N68
R88 510
R89 510
Q22 3N68
R85 3000
T17
R57 93.1K
R58 93.1K
R62 52.3K
C29 30UUF
C32 NOM
T12
C35 10
Q16 2N930
C38 33
R71 24K
R65 499K
R72 1000
R77 237K
Q19 2N930
R70 33K
C42 1.0
R83 NOM
R80 10K
C43 33
T15
Q23 3N68
R90 510
R91 510
Q24 3N68
R86 3000
T18
R59 93.1K
R60 93.1K
R63 52.3K
C30 30UUF
C33 NOM
T13
C36 10
Q17 2N930
C39 33
R74 24K
R66 499K
R75 1000
R78 237K
Q20 2N930
R73 33K
C44 1.0
R84 NOM
R81 10K
C45 33
T16
Q25 3N68
R92 510
R93 510
Q26 3N68
R87 3000
T19
YEL
WHT
BRN
CR2
R96 174
CR3
R97 174
CR4
R98 174
R94 1000
R99 1000
R95 330
Q27A
Q27B
1010243 A
1010243 A

2/1010243

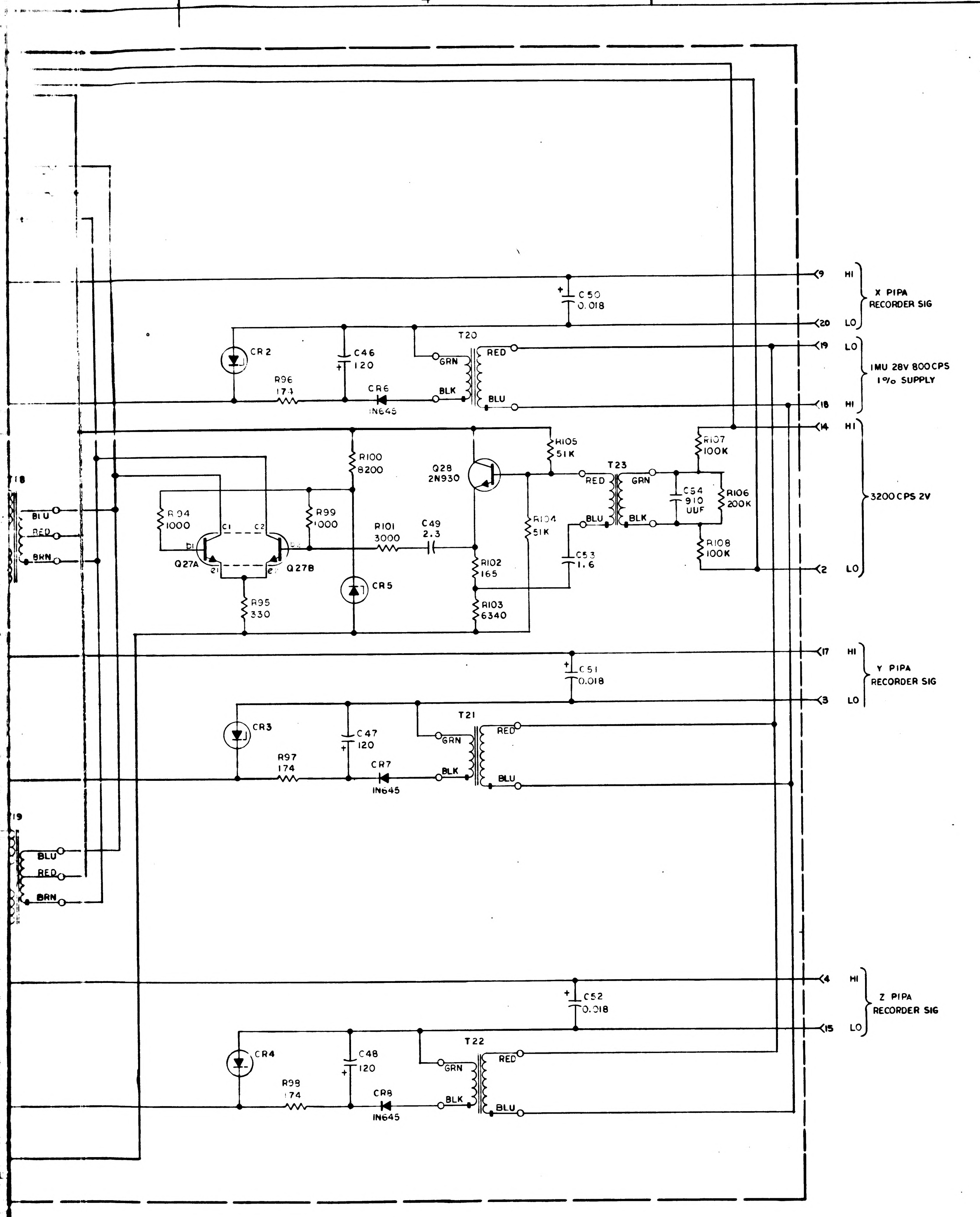

+20 VDC
IMU IG & Y GYRO ERROR SIG
IMU MG ERROR SIG
IMU OG ERROR SIG
IMU GIMBAL & Y GYRO ERROR SIG LO
STRUCTURE GROUND
OVDC
R1 93.1K
R2 93.1K
R3 93.1K
R4 93.1K
R5 93.1K
R6 93.1K
R7 52.3K
R8 52.3K
R9 52.3K
C1 30UUF
C2 30UUF
C3 30UUF
C4 NOM
C5 NOM
C6 NOM
T1
T2
T3
GRN
BLK
RED
BLU
C7 10
C8 10
C9 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
R10 499K
R11 499K
R12 499K
R13 33K
R16 33K
R19 33K
R14 24K
R17 24K
R20 24K
R15 1000
R18 1000
R21 1000
R22 237K
R23 237K
R24 237K
C10 33
C11 33
C12 33
R25 10K
R26 10K
R27 10K
C13 1.0
C15 1.0
C17 1.0
R28 NOM
R29 NOM
R30 NOM
C14 33
C16 33
C18 33
T4
T5
T6
YEL
BRN
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
e1
e2
b
c
R34 510
R35 510
R36 510
R37 510
R38 510
R39 510
T7
T8
T9
WHT
R31 1500
R32 1500
R33 1500
R40 1500
R41 1500
R42 1500
C19 0.34
C20 0.34
C21 0.34
C22 0.23
C23 0.23
C24 0.23
R43 1000
Q13A
Q13B
b1
b2
c1
c2
R44 330
R45 1000
R46 8200
CR1
R47 3000
C25 2.3
Q14 2N930
R48 332
R49 6340
R50 51K
R51 51K
C26 1.6
T10

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R28, R29, R30, R82, R83, R84, C4, C5, C6, C31, C32 & C33 PER APPLICABLE PS FROM APPROPRIATE CHART

1010243 A

1/1010243



REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311 -315	RESISTOR	93.1K	± 1%	1/10 W
R2	-315		93.1K		
R3	-315		93.1K		
R4	-315		93.1K		
R5	-315		93.1K		
R6	-315		93.1K		
R7	-291		52.3K		
R8	-291		52.3K		
R9	1010311 -291		52.3K		1/10 W
R10	1010364 -769		499K		1/8 W
R11	1010364 -769		499K		1/8 W
R12	1010364 -769		499K	± 1%	1/8 W
R13	1006750 -68		33K	± 2%	1/4 W
R14	1006750 -65		24K	± 2%	1/4 W
R15	1010311 -126		1000	± 1%	1/10 W
R16	1006750 -68		33K	± 2%	1/4 W
R17	1006750 -65		24K	± 2%	1/4 W
R18	1010311 -126		1000	± 1%	1/10 W
R19	1006750 -68		33K	± 2%	1/4 W
R20	1006750 -65		24K	± 2%	1/4 W
R21	1010311 -126		1000	± 1%	1/10 W
R22	1010364 -707		237K	± 1%	1/8 W
R23	1010364 -707		237K	± 1%	1/8 W
R24	1010364 -707		237K	± 1%	1/8 W
R25	1006750 -56		10K	± 2%	1/4 W
R26	1006750 -56		10K	± 2%	1/4 W
R27	1006750 -56		10K	± 2%	1/4 W
R28	SEE NOTE 2		NOM	± 1%	1/10 W
R29	SEE NOTE 2		NOM	± 1%	1/10 W
R30	SEE NOTE 2		NOM	± 1%	1/10 W
R31	1006750 -36		1500	± 2%	1/4 W
R32	-36		1500		
R33	-36		1500		
R34	-25		510		
R35	-25		510		
R36	-25		510		
R37	-25		510		
R38	-25		510		
R39	-25		510		
R40	-36		1500		
R41	-36		1500		
R42	1006750 -36		1500	± 2%	1/4 W
R43	1010311 -126		1000	± 1%	1/10 W
R44	1006750 -20		330	± 2%	1/4 W
R45	1010311 -126		1000	± 1%	1/10 W
R46	1006750 -54		8200	± 2%	1/4 W
R47	1006750 -43		3000	± 2%	1/4 W
R48	1010311 -80		332	± 1%	1/10 W
R49	1010311 -203		6340	± 1%	1/10 W
R50	1006750 -73		51K	± 2%	1/4 W
R51	1006750 -73		51K	± 2%	1/4 W
R52	1010364 -693		200K	± 1%	1/8 W
R53	1006750 -80		100K	± 2%	1/4 W
R54	1006750 -80		100K	± 2%	1/4 W
R55	1010311 -315		93.1K	± 1%	1/10 W
R56	-315		93.1K		
R57	-315		93.1K		
R58	-315		93.1K		
R59	-315		93.1K		
R60	-315		93.1K		
R61	-291		52.3K		
R62	-291		52.3K		
R63	1010311 -291		52.3K		1/10 W
R64	1010364 -769		499K		1/8 W
R65	1010364 -769		499K		1/8 W
R66	1010364 -769		499K	± 1%	1/8 W
R67	1006750 -68		33K	± 2%	1/4 W
R68	1006750 -65		24K	± 2%	1/4 W
R69	1010311 -126		1000	± 1%	1/10 W
R70	1006750 -68		33K	± 2%	1/4 W
R71	1006750 -65		24K	± 2%	1/4 W
R72	1010311 -126		1000	± 1%	1/10 W
R73	1006750 -68		33K	± 2%	1/4 W
R74	1006750 -65		24K	± 2%	1/4 W
R75	1010311 -126		1000	± 1%	1/10 W
R76	1010364 -707		237K	± 1%	1/8 W
R77	1010364 -707		237K	± 1%	1/8 W
R78	1010364 -707		237K	± 1%	1/8 W
R79	1006750 -56		10K	± 2%	1/4 W
R80	1006750 -56		10K	± 2%	1/4 W
R81	1006750 -56		10K	± 2%	1/4 W
R82	SEE NOTE 2		NOM	± 1%	1/10 W
R83	SEE NOTE 2		NOM	± 1%	1/10 W
R84	SEE NOTE 2		NOM	± 1%	1/10 W
R85	1006750 -43		3000	± 2%	1/4 W
R86	-43		3000		
R87	-43		3000		
R88	-25		510		
R89	-25		510		
R90	-25		510		
R91	-25		510		
R92	-25		510		
R93	1006750 -25		510	± 2%	1/4 W
R94	1010311 -126		1000	± 1%	1/10 W
R95	1006750 -20		330	± 2%	1/4 W
R96	1010267 -82		174	± 1%	1/2 W
R97	1010267 -82		174	± 1%	1/2 W
R98	1010267 -82		174	± 1%	1/2 W
R99	1010311 -126		1000	± 1%	1/10 W
R100	1006750 -54		8200	± 2%	1/4 W
R101	1006750 -43		3000	± 2%	1/4 W
R102	1010311 -51		165	± 1%	1/10 W
R103	1010311 -203		6340	± 1%	1/10 W
R104	1006750 -73		51K	± 2%	1/4 W
R105	1006750 -73		51K	± 2%	1/4 W
R106	1010364 -693		200K	± 1%	1/8 W
R107	1006750 -80		100K	± 2%	1/4 W
R108	1006750 -80	RESISTOR	100K	± 2%	1/4 W
C1	1010409 -12	CAPACITOR	30 UUF	± 2%	500 VDC
C2	1010409 -12		30 UUF	± 2%	500
C3	1010409 -12		30 UUF	± 2%	500
C4	SEE NOTE 2		NOM	—	—
C5	SEE NOTE 2		NOM	—	—
C6	SEE NOTE 2		NOM	—	—
C7	1006755 -31		10	±10%	20
C8	-31		10		
C9	-31		10		
C10	-34		33		
C11	-34		33		
C12	-34		33		20
C13	-69		1.0		35
C14	-34		33		20
C15	1006755 -69	CAPACITOR	1.0	±10%	35 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C16	1006755 -34	CAPACITOR	33	±10%	20 VDC
C17	1006755 -69		1.0		35
C18	1006755 -34		33		20
C19	1010279 -7		0.34		6
C20	-7		0.34		
C21	-7		0.34		
C22	-5		0.23		
C23	-5		0.23		
C24	-5		0.23		6
C25	-236		2.3		35
C26	1010279 -114		1.6	±10%	15
C27	1010409 -25		100 UUF	± 2%	500
C28	1010409 -12		30 UUF	± 2%	500
C29	1010409 -12		30 UUF	± 2%	500
C30	1010409 -12		30 UUF	± 2%	500
C31	SEE NOTE 2		NOM	—	—
C32	SEE NOTE 2		NOM	—	—
C33	SEE NOTE 2		NOM	—	—
C34	1006755 -31		10	±10%	20
C35	-31		10		
C36	-31		10		
C37	-34		33		
C38	-34		33		
C39	-34		33		20
C40	-69		1.0		35
C41	-34		33		20
C42	-69		1.0		35
C43	-34		33		20
C44	-69		1.0		35
C45	-34		33		20
C46	-15		120		10
C47	-15		120		10
C48	1006755 -15		120		10
C49	1010279 -236		2.3		35
C50	1010393 -008		0.018		50
C51	1010393 -008		0.018		50
C52	1010393 -008		0.018		50
C53	1010279 -114		1.6	±10%	15
C54	1010410 -16	CAPACITOR	910 UUF	± 2%	300 VDC
CR1	1010372 -4	DIODE, ZENER			
CR2	3				
CR3	3				
CR4	3				
CR5	1010372 4	ZENER			
CR6	1010837 -001		IN645		
CR7	1010837 -001		IN645		
CR8	1010837 -001	DIODE	IN645		
Q1	1010397 -1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6	1010397 -1		2N930		
Q7	1010367		3N68		
Q8					
Q9					
Q10					
Q11					
Q12	1010367		3N68		
Q13	1010376 -3				
Q14	1010397 -1		2N930		
Q15					
Q16					
Q17					
Q18					
Q19	1010397 -1		2N930		
Q20	1010367		3N68		
Q21					
Q22					
Q23					
Q24					
Q25					
Q26	1010367		3N68		
Q27	1010376 -3				
Q28	1010397	TRANSISTOR	2N930		
T1	1008832	TRANSFORMER			
T2	1008832				
T3	1008832				
T4	1010324				
T5	1010324				
T6	1010324				
T7	1010315 -1				
T8	1010315 -1				
T9	1010315 -1				
T10	1008832				
T11					
T12					
T13	1008832				
T14	1010324				
T15	1010324				
T16	1010324				
T17	1010315 -1				
T18	1010315 -1				
T19	1010315 -1				
T20	1010466				
T21	1010466				
T22	1010466				
T23	1008832	TRANSFORMER			

REVISIONS 21744

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22851	[illegible]	EF	[illegible]	
B		REVISED PER TDRR 25543	[illegible]	RWH	3 FEB [illegible]	

R28, R29, R30, R82, R83, R84	
PART NO.	VALUE
1010311 -296	59.0K
-297	60.4K
-298	61.9K
-299	63.4K
-300	64.9K
-301	66.5K
-302	68.1K
-303	69.8K
-304	71.5K
-305	73.2K
-306	75.0K
-307	76.8K
-308	78.7K
-309	80.6K
-310	82.5K
-311	84.5K
-312	86.6K
-313	88.7K
1010311 -314	90.9K

C4, C5, C6, C31, C32, & C33			
PART NO.	VALUE	TOL	RATING
1010409 -1	10 UUF	±0.25 UUF	500 VDC
-8	20	± 2%	
-12	30		
-16	43		
-19	56		
-21	68		
-23	82		
-24	91		
-25	100		
-26	110		
-27	120		
-28	130		
-29	150		500
-30	160		300
-31	180		
-32	200		
-33	220		
1010409 -34	240 UUF	± 2%	300 VDC

REF DWG:
SIGNAL CONDITIONER IRIG & PIPA ASSY
DWG NO. 1007662

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN A. Di Leo 21 JULY 65
CHECKED [illegible]
APPROVED [illegible]
APPROVED
APPROVED MIT [illegible]
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER IRIG & PIPA

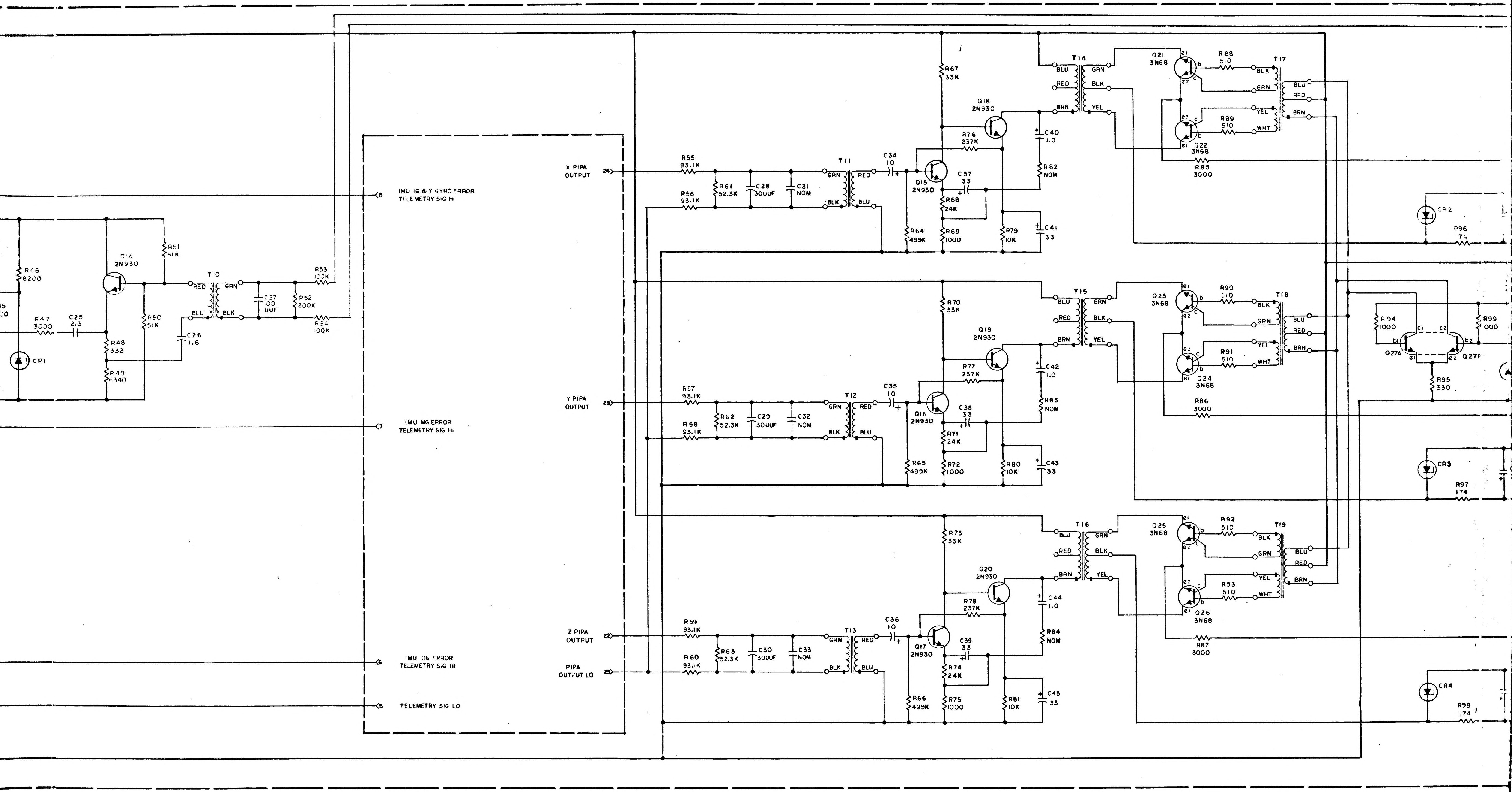
CODE IDENT NO 80230
SIZE J
DRAWING NO. 1010243
SCALE —
SHEET 1 OF 1

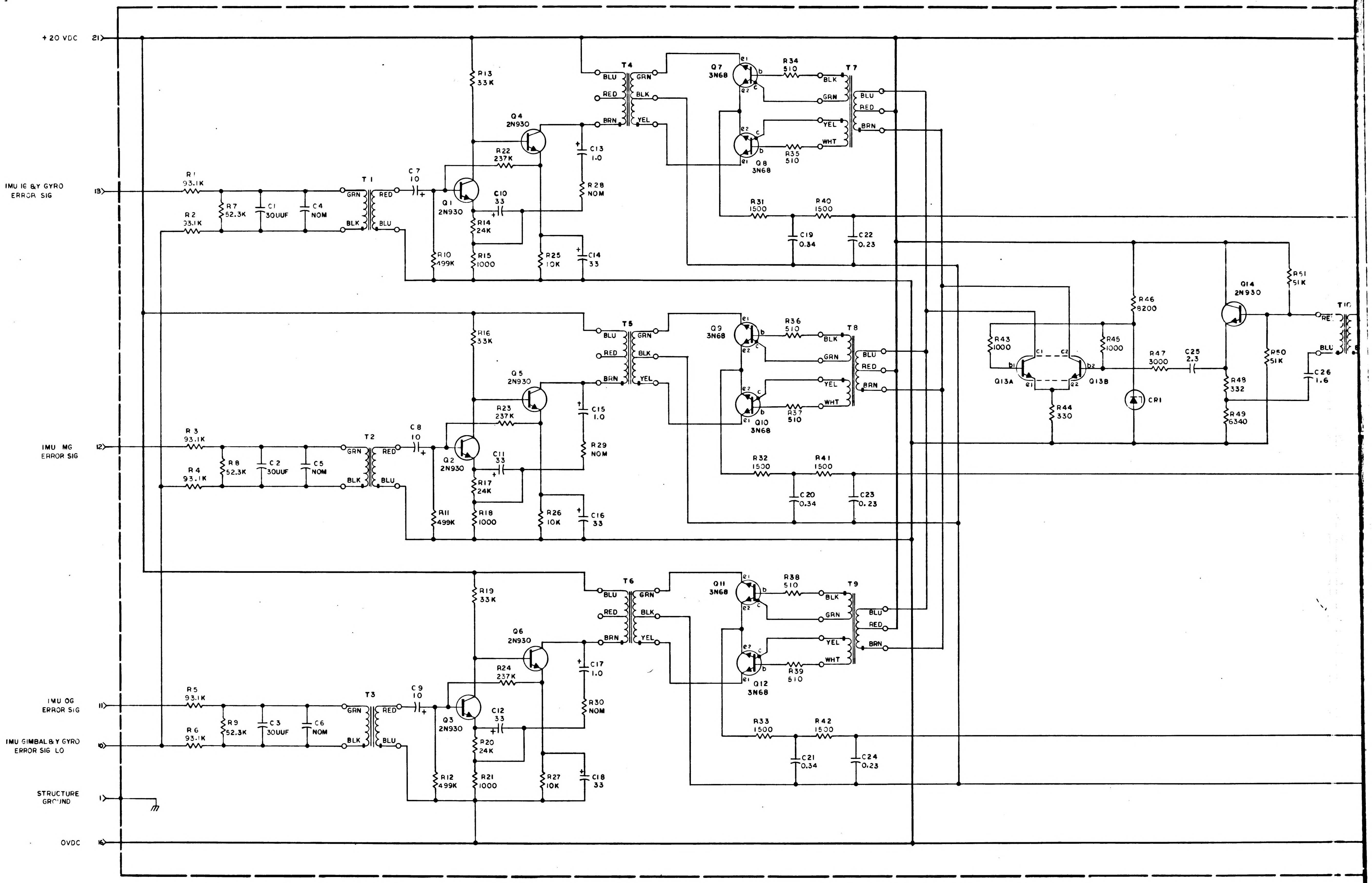
1010243 B

44

243 B

3/1010243

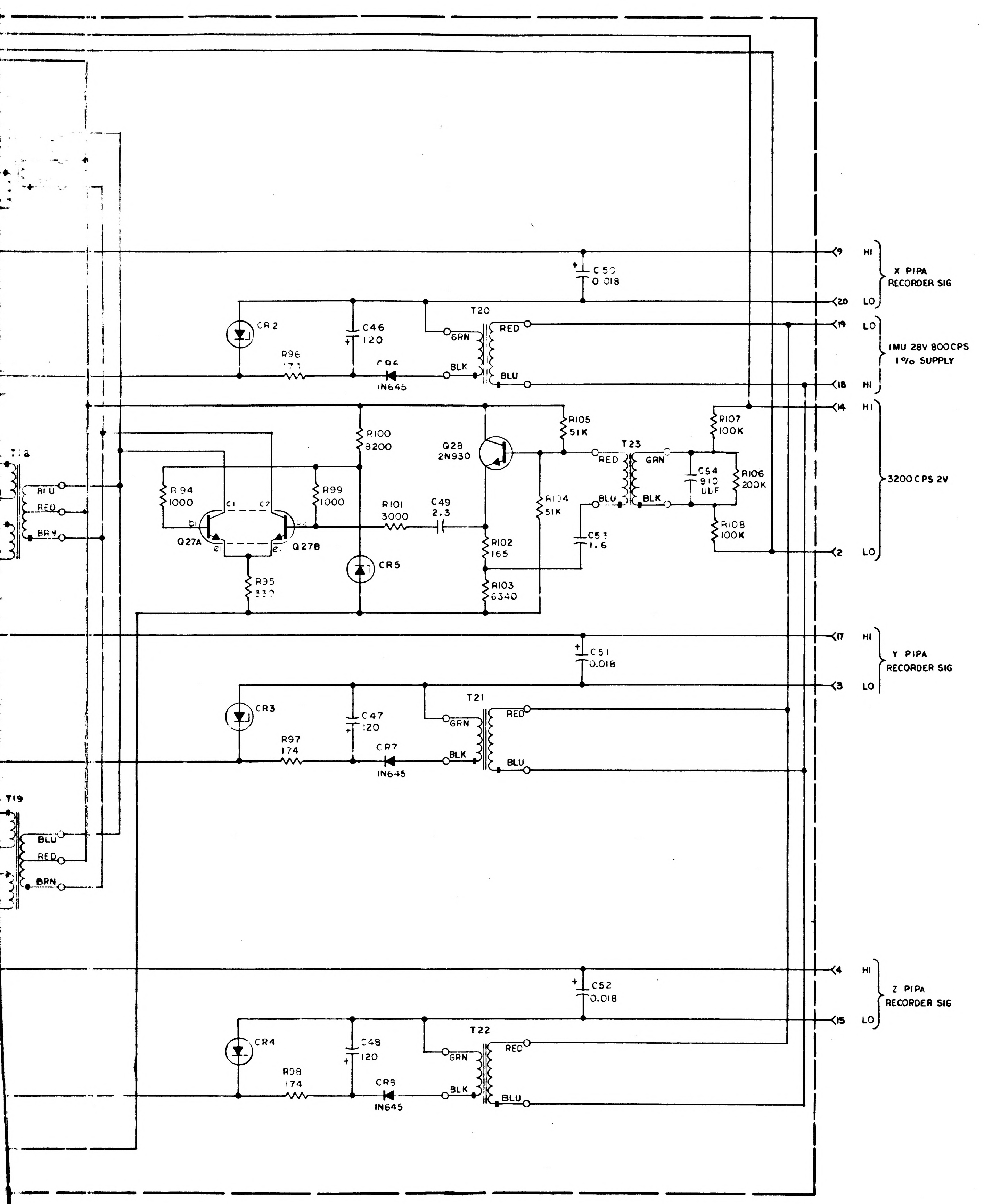

IMU IG & Y GYRO ERROR TELEMETRY SIG HI
8
IMU MG ERROR TELEMETRY SIG HI
7
IMU OG ERROR TELEMETRY SIG HI
6
TELEMETRY SIG LO
5
X PIPA OUTPUT
24
Y PIPA OUTPUT
23
Z PIPA OUTPUT
22
PIPA OUTPUT LO
25
R46 8200
R47 3000
C25 2.2
CR1
Q14 2N930
R51 41K
R48 332
R49 6340
R50 51K
C26 1.6
T10
RED
GRN
BLU
BLK
C27 100 UUF
R52 200K
R53 100K
R54 100K
R55 93.1K
R56 93.1K
R61 52.3K
C28 300UF
C31 NOM
T11
GRN
RED
BLK
BLU
C34 10
Q15 2N930
C37 33
R68 24K
R64 499K
R69 1000
R67 33K
Q18 2N930
R76 237K
R79 10K
C40 1.0
R82 NOM
C41 33
T14
BLU
RED
BRN
GRN
BLK
YEL
Q21 3N68
R88 510
R89 510
Q22 3N68
R85 3000
T17
BLK
GRN
YEL
WHT
BLU
RED
BRN
CR2
R96 174
R57 93.1K
R58 93.1K
R62 52.3K
C29 300UF
C32 NOM
T12
C35 10
Q16 2N930
C38 33
R71 24K
R65 499K
R72 1000
R70 33K
Q19 2N930
R77 237K
R80 10K
C42 1.0
R83 NOM
C43 33
T15
Q23 3N68
R90 510
R91 510
Q24 3N68
R86 3000
T18
R94 1000
Q27A
Q27B
R99 000
R95 330
CR3
R97 174
R59 93.1K
R60 93.1K
R63 52.3K
C30 300UF
C33 NOM
T13
C36 10
Q17 2N930
C39 33
R74 24K
R66 499K
R75 1000
R73 33K
Q20 2N930
R78 237K
R81 10K
C44 1.0
R84 NOM
C45 33
T16
Q25 3N68
R92 510
R93 510
Q26 3N68
R87 3000
T19
CR4
R98 174


12
11
10
9
D
C
B
A
+20 VDC
21
IMU IE & Y GYRO ERROR SIG
13
IMU MG ERROR SIG
12
IMU OG ERROR SIG
11
IMU GIMBAL & Y GYRO ERROR SIG LO
10
STRUCTURE GROUND
1
OVDC
16
R1 93.1K
R2 93.1K
R7 52.3K
C1 30UUF
C4 NOM
T1
GRN
BLK
RED
BLU
C7 10
Q1 2N930
R10 499K
R13 33K
R14 24K
R15 1000
R22 237K
C10 33
Q4 2N930
R25 10K
C14 33
C13 1.0
R28 NOM
T4
BLU
RED
BRN
GRN
BLK
YEL
Q7 3N68
Q8 3N68
e1
e2
b
c
R34 510
R35 510
T7
BLK
GRN
YEL
WHT
BLU
RED
BRN
R31 1500
R40 1500
C19 0.34
C22 0.23
R3 93.1K
R4 93.1K
R8 52.3K
C2 30UUF
C5 NOM
T2
C8 10
Q2 2N930
R11 499K
R16 33K
R17 24K
R18 1000
R23 237K
C11 33
Q5 2N930
R26 10K
C16 33
C15 1.0
R29 NOM
T5
Q9 3N68
Q10 3N68
R36 510
R37 510
T8
R32 1500
R41 1500
C20 0.34
C23 0.23
R5 93.1K
R6 93.1K
R9 52.3K
C3 30UUF
C6 NOM
T3
C9 10
Q3 2N930
R12 499K
R19 33K
R20 24K
R21 1000
R24 237K
C12 33
Q6 2N930
R27 10K
C18 33
C17 1.0
R30 NOM
T6
Q11 3N68
Q12 3N68
R38 510
R39 510
T9
R33 1500
R42 1500
C21 0.34
C24 0.23
R43 1000
Q13A
Q13B
b1
b2
c1
c2
e1
e2
R44 330
R45 1000
R46 8200
CR1
R47 3000
C25 2.3
Q14 2N930
R48 332
R49 6340
R50 51K
R51 51K
C26 1.6
T10
RED
BLU

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R28, R29, R30, R82, R83, R84, C4. C5, C6, C31, C32 & C33 PER APPLICABLE PS FROM APPROPRIATE CHART

1010243 3



REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311 -315	RESISTOR	93.1K	± 1%	1/10 W
R2	-315		93.1K		
R3	-315		93.1K		
R4	-315		93.1K		
R5	-315		93.1K		
R6	-315		93.1K		
R7	-291		52.3K		
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R9	1010311 -291		52.3K		1/10 W
R10	1010364 -769		499K		1/8 W
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R23	1010364 -707		237K	± 1%	1/8 W
R24	1010364 -707		237K	± 1%	1/8 W
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R27	1006750-56		10K	± 2%	1/4 W
R28	SEE NOTE 2		NOM	± 1%	1/10W
R29	SEE NOTE 2		NOM	± 1%	1/10W
R30	SEE NOTE 2		NOM	± 1%	1/10W
R31	1006750 -36		1500	± 2%	1/4 W
R32	-36		1500		
R33	-36		1500		
R34	-25		510		
R35	-25		510		
R36	-25		510		
R37	-25		510		
R38	-25		510		
R39	-25		510		
R40	-36		1500		
R41	-36		1500		
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R47	1006750-43		3000	± 2%	1/4 W
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R49	1010311 -203		6340	± 1%	1/10 W
R50	1006750-73		51K	± 2%	1/4 W
R51	1006750-73		51K	± 2%	1/4 W
R52	1010364-693		200K	± 1%	1/8 W
R53	1006750-80		100K	± 2%	1/4 W
R54	1006750-80		100K	± 2%	1/4 W
R55	1010311 -315		93.1K	± 1%	1/10 W
R56	-315		93.1K		
R57	-315		93.1K		
R58	-315		93.1K		
R59	-315		93.1K		
R60	-315		93.1K		
R61	-291		52.3K		
R62	-291		52.3K		
R63	1010311 -291		52.3K		1/10 W
R64	1010364-769		499 K		1/8 W
R65	1010364-769		499 K		1/8 W
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R75	1010311 -126		1000	± 1%	1/10 W
R76	1010364-707		237K	± 1%	1/8 W
R77	1010364-707		237K	± 1%	1/8 W
R78	1010364-707		237K	± 1%	1/8 W
R79	1006750-56		10K	± 2%	1/4 W
R80	1006750-56		10K	± 2%	1/4 W
R81	1006750-56		10K	± 2%	1/4 W
R82	SEE NOTE 2		NOM	± 1%	1/10 W
R83	SEE NOTE 2		NOM	± 1%	1/10 W
R84	SEE NOTE 2		NOM	± 1%	1/10 W
R85	1006750-43		3000	± 2%	1/4 W
R86	-43		3000		
R87	-43		3000		
R88	-25		510		
R89	-25		510		
R90	-25		510		
R91	-25		510		
R92	-25		510		
R93	1006750-25		510	± 2%	1/4 W
R94	1010311 -126		1000	± 1%	1/10 W
R95	1006750-20		330	± 2%	1/4 W
R96	1010267 -82		174	± 1%	1/2 W
R97	1010267 -82		174	± 1%	1/2 W
R98	1010267 -82		174	± 1%	1/2 W
R99	1010311 -126		1000	± 1%	1/10 W
R100	1006750-54		8200	± 2%	1/4 W
R101	1006750-43		3000	± 2%	1/4 W
R102	1010311 -51		165	± 1%	1/10 W
R103	1010311 -203		6340	± 1%	1/10 W
R104	1006750 -73		51K	± 2%	1/4 W
R105	1006750 -73		51K	± 2%	1/4 W
R106	1010364-693		200K	± 1%	1/8 W
R107	1006750-80		100K	± 2%	1/4 W
R108	1006750-80	RESISTOR	100K	± 2%	1/4 W
C1	1010409-12	CAPACITOR	30UUF	± 2%	500 VDC
C2	1010409-12		30UUF	± 2%	500
C3	1010409-12		30UUF	± 2%	500
C4	SEE NOTE 2		NOM	—	—
C5	SEE NOTE 2		NOM	—	—
C6	SEE NOTE 2		NOM	—	—
C7	1006755-31		10	±10%	20
C8	-31		10		
C9	-31		10		
C10	-34		33		
C11	-34		33		
C12	-34		33		20
C13	-69		1.0		35
C14	-34		33		20
C15	1006755-69	CAPACITOR	1.0	±10%	35VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C16	1006755-34	CAPACITOR	33	±10%	20 VDC
C17	1006755-69		1.0		35
C18	1006755-34		33		20
C19	1010279-7		0.34		6
C20	-7		0.34		
C21	-7		0.34		
C22	-5		0.23		
C23	-5		0.23		
C24	-5		0.23		6
C25	-236		2.3		35
C26	1010279-114		1.6	±10%	15
C27	1010409-25		100 UUF	± 2%	500
C28	1010409-12		30 UUF	± 2%	500
C29	1010409-12		30 UUF	± 2%	500
C30	1010409-12		30 UUF	± 2%	500
C31	SEE NOTE 2		NOM	—	—
C32	SEE NOTE 2		NOM	—	—
C33	SEE NOTE 2		NOM	—	—
C34	1006755-31		10	±10%	20
C35	-31		10		
C36	-31		10		
C37	-34		33		
C38	-34		33		
C39	-34		33		20
C40	-69		1.0		35
C41	-34		33		20
C42	-69		1.0		35
C43	-34		33		20
C44	-69		1.0		35
C45	-34		33		20
C46	-15		120		10
C47	-15		120		10
C48	1006755-15		120		10
C49	1010279-236		2.3		35
C50	1010393-008		0.018		50
C51	1010393-008		0.018		50
C52	1010393-008		0.018		50
C53	1010279-114		1.6	±10%	15
C54	1010410-16	CAPACITOR	910UUF	± 2%	300VDC
CR1	1010372-4	DIODE, ZENER			
CR2	3				
CR3	3				
CR4	3				
CR5	1010372 4	ZENER			
CR6	1010837-001		IN645		
CR7	1010837-001		IN645		
CR8	1010837-001	DIODE	IN645		
Q1	1010397-1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6	1010397-1		2N930		
Q7	1010367		3N68		
Q8					
Q9					
Q10					
Q11					
Q12	1010367		3N68		
Q13	1010376-3				
Q14	1010397-1		2N930		
Q15					
Q16					
Q17					
Q18					
Q19	1010397-1		2N930		
Q20	1010397-1		2N930		
Q21			3N68		
Q22					
Q23					
Q24					
Q25					
Q26	1010367		3N68		
Q27	1010376-3				
Q28	1010397-1	TRANSISTOR	2N930		
T1	1008832	TRANSFORMER			
T2	1008832				
T3	1008832				
T4	1010324				
T5	1010324				
T6	1010324				
T7	1010315-1				
T8	1010315-1				
T9	1010315-1				
T10	1008832				
T11					
T12					
T13	1008832				
T14	1010324				
T15	1010324				
T16	1010324				
T17	1010315-1				
T18	1010315-1				
T19	1010315-1				
T20	1010466				
T21	1010466				
T22	1010466				
T23	1008832	TRANSFORMER			

REVISIONS 21744

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22851		EF	19OCT65	
B		REVISED PER TDRR 25543		RWH	3 FEB 66	
C		REVISED PER TDRR 27488	JJJ		1 APR 66	

R28, R29, R30, R82, R83, R84	
PART NO.	VALUE
1010311-296	59.0K
-297	60.4K
-298	61.9K
-299	63.4K
-300	64.9K
-301	66.5K
-302	68.1K
-303	69.8K
-304	71.5K
-305	73.2K
-306	75.0K
-307	76.8K
-308	78.7K
-309	80.6K
-310	82.5K
-311	84.5K
-312	86.6K
-313	88.7K
1010311-314	90.9K

C4, C5, C6, C31, C32, & C33			
PART NO.	VALUE	TOL	RATING
1010409-1	10 UUF	±0.25UUF	500VDC
-8	20	± 2%	
-12	30		
-16	43		
-19	56		
-21	68		
-23	82		
-24	91		
-25	100		
-26	110		
-27	120		
-28	130		
-29	150		500
-30	160		300
-31	180		
-32	200		
-33	220		
1010409-34	240 UUF	± 2%	300VDC

REF DWG:
SIGNAL CONDITIONER IRIG & PIPA ASSY
DWG NO. 1007662

44

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± —— DECIMALS ± —— ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN A. Di Leo 21 JULY 65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

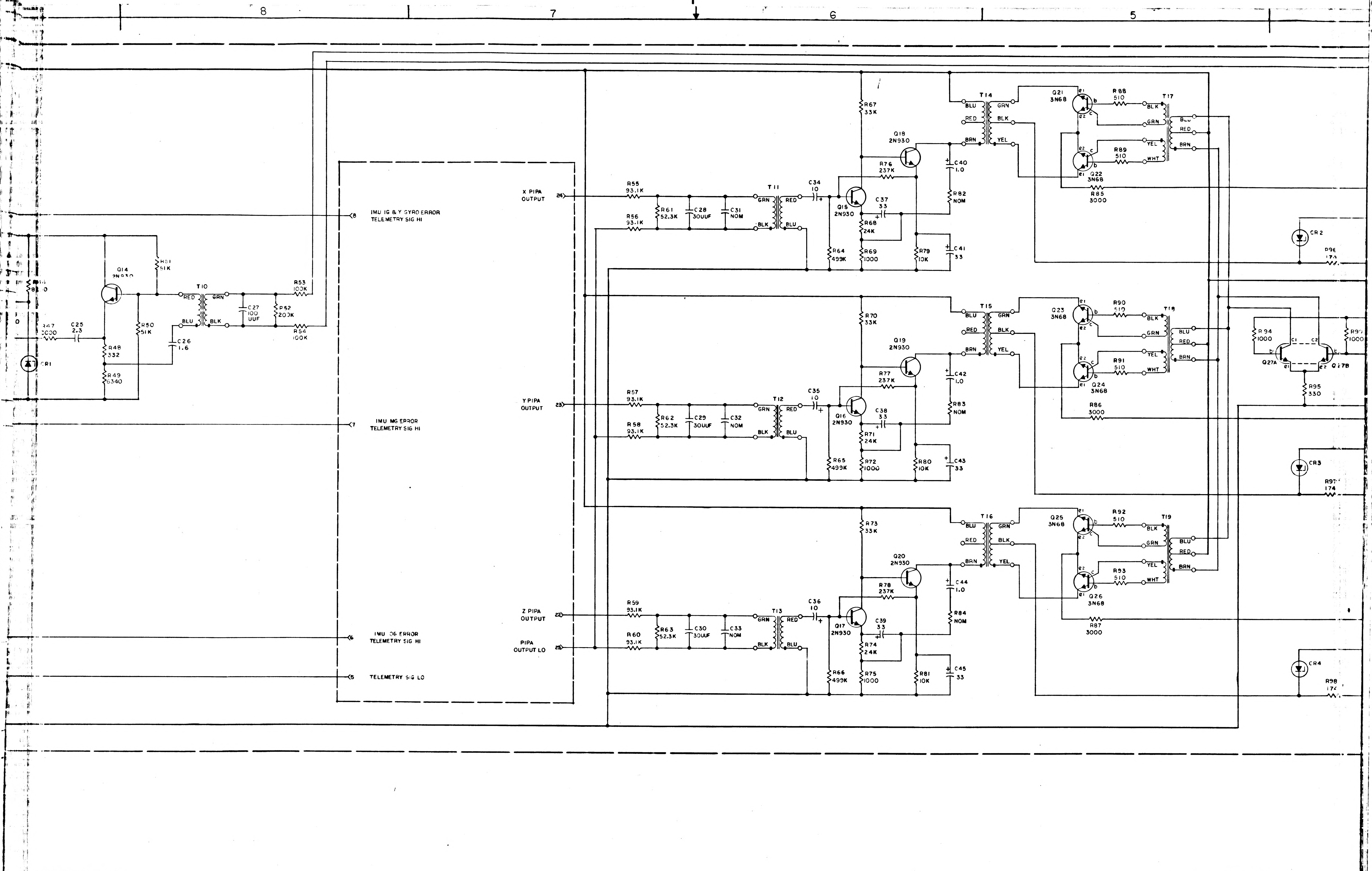
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER
IRIG & PIPA

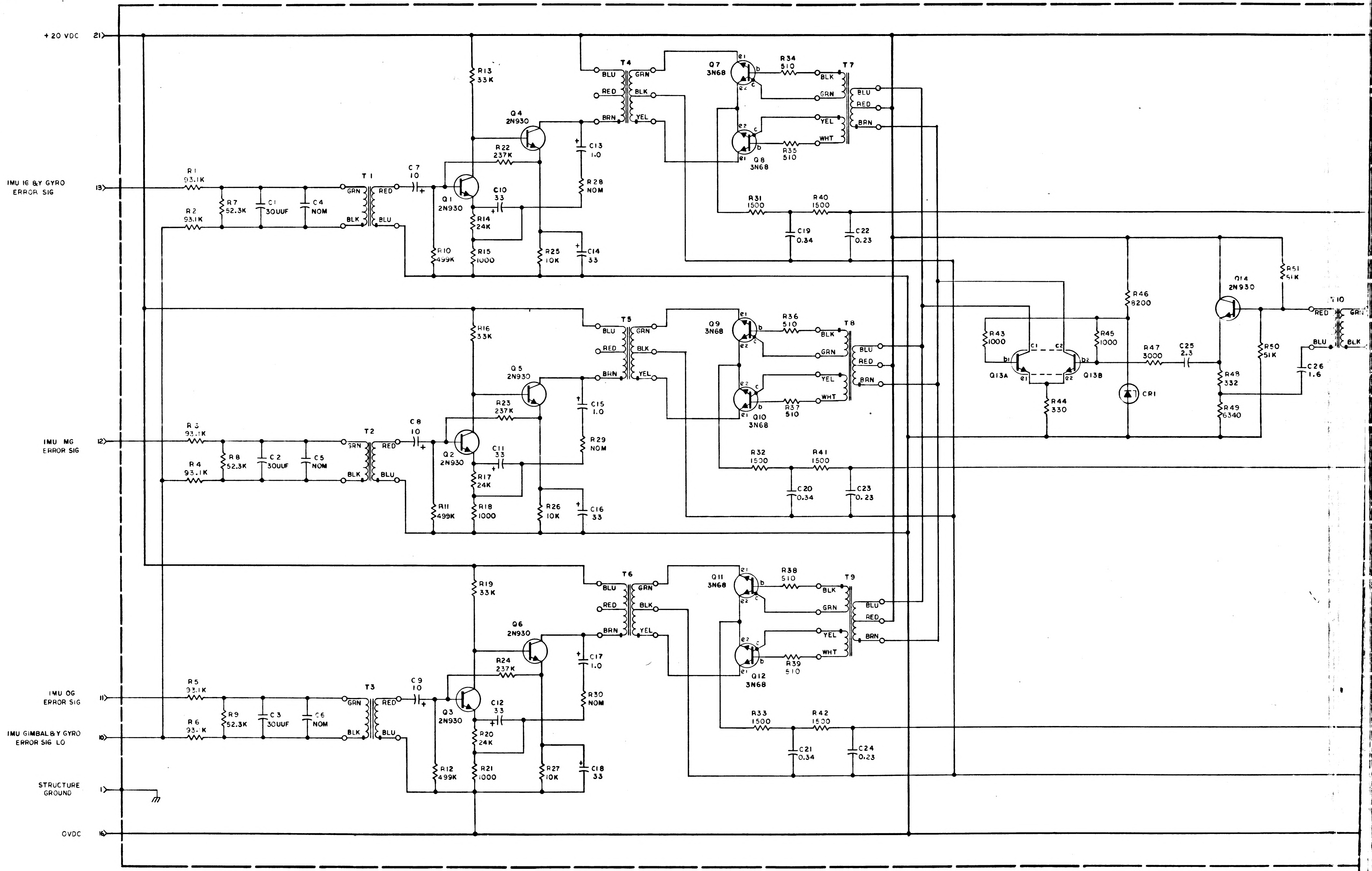
CODE IDENT NO 80230
SIZE J
DRAWING NO. 1010243
SCALE ——
SHEET 1 OF 1

1010243 C

3/1010243

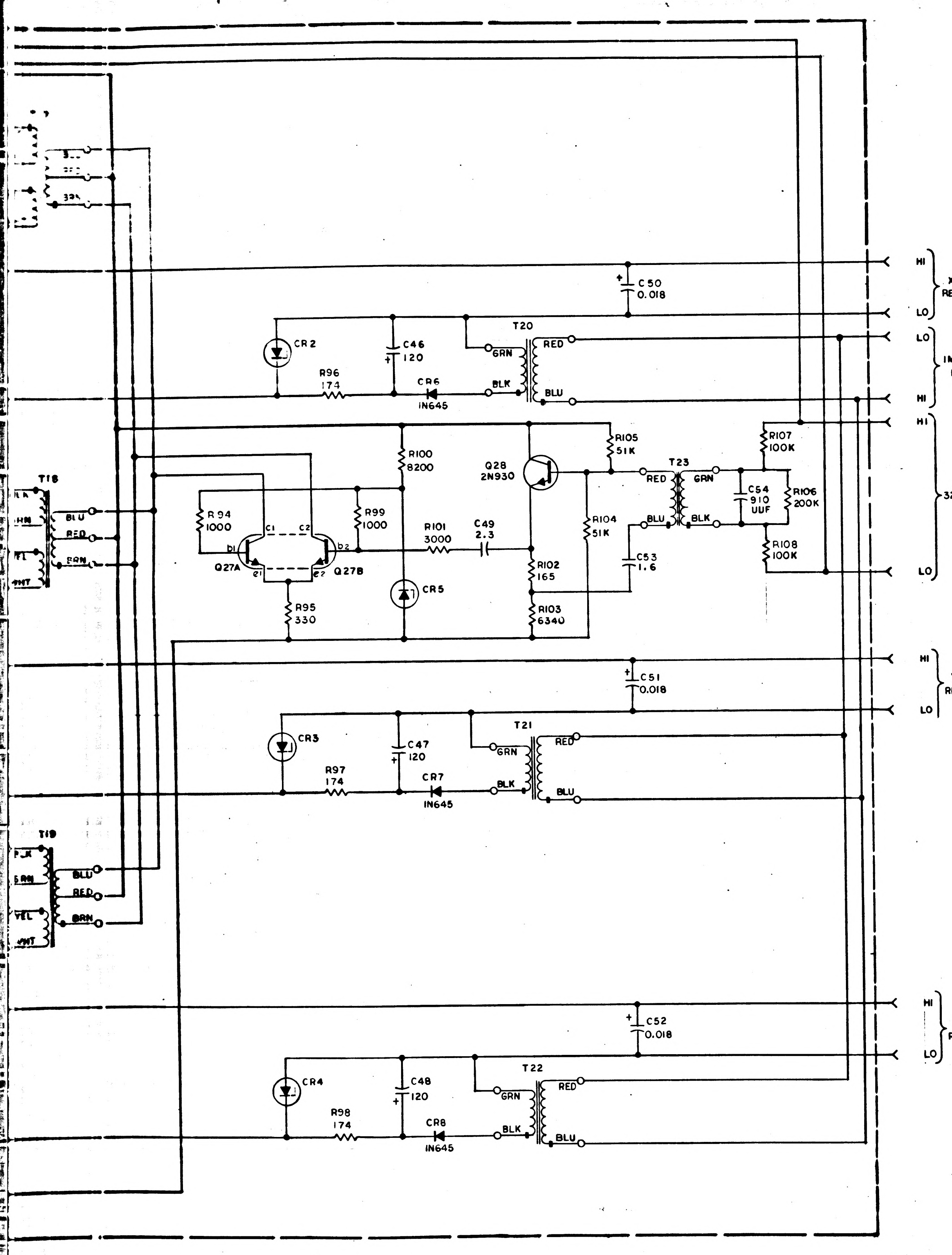

8
7
6
5
IMU IG & Y GYRO ERROR TELEMETRY SIG HI
IMU MG ERROR TELEMETRY SIG HI
IMU OG ERROR TELEMETRY SIG HI
TELEMETRY SIG LO
X PIPA OUTPUT
Y PIPA OUTPUT
Z PIPA OUTPUT
PIPA OUTPUT LO
24
23
22
25
8
7
6
5
Q14 2N930
R51 51K
R47 2000
C25 2.3
R48 332
R49 6340
R50 51K
C26 1.6
CR1
T10
RED
GRN
BLU
BLK
C27 100 UUF
R52 200K
R53 100K
R54 100K
R55 93.1K
R56 93.1K
R61 52.3K
C28 30UUF
C31 NOM
T11
C34 10
Q15 2N930
C37 33
R68 24K
R64 499K
R69 1000
R67 33K
R76 237K
Q18 2N930
C40 1.0
R82 NOM
R79 10K
C41 33
T14
BLU
RED
BRN
GRN
BLK
YEL
Q21 3N68
R88 510
R89 510
Q22 3N68
R85 3000
T17
WHT
CR2
R96 174
R57 93.1K
R58 93.1K
R62 52.3K
C29 30UUF
C32 NOM
T12
C35 10
Q16 2N930
C38 33
R71 24K
R65 499K
R72 1000
R70 33K
R77 237K
Q19 2N930
C42 1.0
R83 NOM
R80 10K
C43 33
T15
Q23 3N68
R90 510
R91 510
Q24 3N68
R86 3000
T18
R94 1000
R99 1000
Q27A
Q27B
R95 330
CR3
R97 174
R59 93.1K
R60 93.1K
R63 52.3K
C30 30UUF
C33 NOM
T13
C36 10
Q17 2N930
C39 33
R74 24K
R66 499K
R75 1000
R73 33K
R78 237K
Q20 2N930
C44 1.0
R84 NOM
R81 10K
C45 33
T16
Q25 3N68
R92 510
R93 510
Q26 3N68
R87 3000
T19
CR4
R98 174

2/1010243


+20 VDC 21
IMU IE & Y GYRO ERROR SIG 13
IMU MG ERROR SIG 12
IMU OG ERROR SIG 11
IMU GIMBAL & Y GYRO ERROR SIG LO 10
STRUCTURE GROUND 1
OVDC 16
R1 93.1K
R2 93.1K
R3 93.1K
R4 93.1K
R5 93.1K
R6 93.1K
R7 52.3K
R8 52.3K
R9 52.3K
C1 30UUF
C2 30UUF
C3 30UUF
C4 NOM
C5 NOM
C6 NOM
T1
T2
T3
GRN
BLK
RED
BLU
C7 10
C8 10
C9 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
R10 499K
R11 499K
R12 499K
R13 33K
R16 33K
R19 33K
R14 24K
R17 24K
R20 24K
R15 1000
R18 1000
R21 1000
R22 237K
R23 237K
R24 237K
C10 33
C11 33
C12 33
R25 10K
R26 10K
R27 10K
C13 1.0
C15 1.0
C17 1.0
C14 33
C16 33
C18 33
R28 NOM
R29 NOM
R30 NOM
T4
T5
T6
BLU
RED
BRN
GRN
BLK
YEL
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
e1
e2
b
c
R34 510
R35 510
R36 510
R37 510
R38 510
R39 510
T7
T8
T9
BLK
GRN
YEL
WHT
BLU
RED
BRN
R31 1500
R32 1500
R33 1500
R40 1500
R41 1500
R42 1500
C19 0.34
C20 0.34
C21 0.34
C22 0.23
C23 0.23
C24 0.23
R43 1000
Q13A
Q13B
b1
c1
e1
c2
b2
e2
R44 330
R45 1000
R46 8200
CR1
R47 3000
C25 2.3
Q14 2N930
R48 332
R49 6340
R50 51K
R51 51K
C26 1.6
T10
RED
GRN
BLU
BLK

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R28,R29,R30,R82,R83,R84,C4,C5,C6,C31,C32 & C33 PER APPLICABLE PS FROM APPROPRIATE CHART



REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311 -315	RESISTOR	93.1K	± 1%	1/10 W
R2	-315		93.1K		
R3	-315		93.1K		
R4	-315		93.1K		
R5	-315		93.1K		
R6	-315		93.1K		
R7	-291		52.3K		
R8	-291		52.3K		
R9	1010311 -291		52.3K		1/10 W
R10	1010364 -769		499K		1/8 W
R11	1010364 -769		499K		1/8 W
R12	1010364 -769		499K	± 1%	1/8 W
R13	1006750-68		33K	± 2%	1/4 W
R14	1006750-65		24K	± 2%	1/4 W
R15	1010311 -126		1000	± 1%	1/10W
R16	1006750-68		33K	± 2%	1/4 W
R17	1006750-65		24K	± 2%	1/4 W
R18	1010311 -126		1000	± 1%	1/10W
R19	1006750-68		33K	± 2%	1/4 W
R20	1006750-65		24K	± 2%	1/4 W
R21	1010311 -126		1000	± 1%	1/10W
R22	1010364 -707		237K	± 1%	1/8 W
R23	1010364 -707		237K	± 1%	1/8 W
R24	1010364 -707		237K	± 1%	1/8 W
R25	1006750-56		10K	± 2%	1/4 W
R26	1006750-56		10K	± 2%	1/4 W
R27	1006750-56		10K	± 2%	1/4 W
R28	SEE NOTE 2		NOM	± 1%	1/10W
R29	SEE NOTE 2		NOM	± 1%	1/10W
R30	SEE NOTE 2		NOM	± 1%	1/10W
R31	1006750 -36		1500	± 2%	1/4 W
R32	-36		1500		
R33	-36		1500		
R34	-25		510		
R35	-25		510		
R36	-25		510		
R37	-25		510		
R38	-25		510		
R39	-25		510		
R40	-36		1500		
R41	-36		1500		
R42	1006750 -36		1500	± 2%	1/4 W
R43	1010311 -126		1000	± 1%	1/10 W
R44	1006750-20		330	± 2%	1/4 W
R45	1010311 -126		1000	± 1%	1/10 W
R46	1006750-54		8200	± 2%	1/4 W
R47	1006750-43		3000	± 2%	1/4 W
R48	1010311 -80		332	± 1%	1/10 W
R49	1010311 -203		6340	± 1%	1/10 W
R50	1006750 -73		51K	± 2%	1/4 W
R51	1006750 -73		51K	± 2%	1/4 W
R52	1010364 -693		200K	± 1%	1/8 W
R53	1006750 -80		100K	± 2%	1/4 W
R54	1006750 -80		100K	± 2%	1/4 W
R55	1010311 -315		93.1K	± 1%	1/10 W
R56	-315		93.1K		
R57	-315		93.1K		
R58	-315		93.1K		
R59	-315		93.1K		
R60	-315		93.1K		
R61	-291		52.3K		
R62	-291		52.3K		
R63	1010311 -291		52.3K		1/10 W
R64	1010364 -769		499K		1/8 W
R65	1010364 -769		499K		1/8 W
R66	1010364 -769		499K	± 1%	1/8 W
R67	1006750-68		33K	± 2%	1/4 W
R68	1006750-65		24K	± 2%	1/4 W
R69	1010311 -126		1000	± 1%	1/10W
R70	1006750-68		33K	± 2%	1/4 W
R71	1006750-65		24K	± 2%	1/4 W
R72	1010311 -126		1000	± 1%	1/10W
R73	1006750-68		33K	± 2%	1/4 W
R74	1006750-65		24K	± 2%	1/4 W
R75	1010311 -126		1000	± 1%	1/10 W
R76	1010364-707		237K	± 1%	1/8 W
R77	1010364-707		237K	± 1%	1/8 W
R78	1010364-707		237K	± 1%	1/8 W
R79	1006750-56		10K	± 2%	1/4 W
R80	1006750-56		10K	± 2%	1/4 W
R81	1006750-56		10K	± 2%	1/4 W
R82	SEE NOTE 2		NOM	± 1%	1/10 W
R83	SEE NOTE 2		NOM	± 1%	1/10 W
R84	SEE NOTE 2		NOM	± 1%	1/10 W
R85	1006750-43		3000	± 2%	1/4 W
R86	-43		3000		
R87	-43		3000		
R88	-25		510		
R89	-25		510		
R90	-25		510		
R91	-25		510		
R92	-25		510		
R93	1006750-25		510	± 2%	1/4 W
R94	1010311 -126		1000	± 1%	1/10 W
R95	1006750-20		330	± 2%	1/4 W
R96	1010267 -82		174	± 1%	1/2 W
R97	1010267 -82		174	± 1%	1/2 W
R98	1010267 -82		174	± 1%	1/2 W
R99	1010311 -126		1000	± 1%	1/10 W
R100	1006750-54		8200	± 2%	1/4 W
R101	1006750-43		3000	± 2%	1/4 W
R102	1010311 -51		165	± 1%	1/10 W
R103	1010311 -203		6340	± 1%	1/10 W
R104	1006750 -73		51K	± 2%	1/4 W
R105	1006750 -73		51K	± 2%	1/4 W
R106	1010364 -693		200K	± 1%	1/8 W
R107	1006750-80		100K	± 2%	1/4 W
R108	1006750-80	RESISTOR	100K	± 2%	1/4 W
C1	1010409 -12	CAPACITOR	30UUF	± 2%	500 VDC
C2	1010409 -12		30UUF	± 2%	500
C3	1010409 -12		30UUF	± 2%	500
C4	SEE NOTE 2		NOM	—	—
C5	SEE NOTE 2		NOM	—	—
C6	SEE NOTE 2		NOM	—	—
C7	1006755-31		10	±10%	20
C8	-31		10		
C9	-31		10		
C10	-34		33		
C11	-34		33		
C12	-34		33		20
C13	-69		1.0		35
C14	-34		33		20
C15	1006755-69	CAPACITOR	1.0	±10%	35VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C16	1006755-34	CAPACITOR	33	±10%	20 VDC
C17	1006755-69		1.0		35
C18	1006755-34		33		20
C19	1010279-7		0.34		6
C20	-7		0.34		
C21	-7		0.34		
C22	-5		0.23		
C23	-5		0.23		
C24	-5		0.23		6
C25	-236		2.3		35
C26	1010279-114		1.6	±10%	15
C27	1010409-25		100UUF	± 2%	500
C28	1010409-12		30 UUF	± 2%	500
C29	1010409-12		30 UUF	± 2%	500
C30	1010409-12		30 UUF	± 2%	500
C31	SEE NOTE 2		NOM	—	—
C32	SEE NOTE 2		NOM	—	—
C33	SEE NOTE 2		NOM	—	—
C34	1006755-31		10	±10%	20
C35	-31		10		
C36	-31		10		
C37	-34		33		
C38	-34		33		
C39	-34		33		20
C40	-69		1.0		35
C41	-34		33		20
C42	-69		1.0		35
C43	-34		33		20
C44	-69		1.0		35
C45	-34		33		20
C46	-15		120		10
C47	-15		120		10
C48	1006755-15		120		10
C49	1010279-236		2.3		35
C50	1010393-008		0.018		50
C51	1010393-008		0.018		50
C52	1010393-008		0.018		50
C53	1010279-114		1.6	±10%	15
C54	1010410-16	CAPACITOR	910UUF	± 2%	300VDC
CR1	1010372-4	DIODE, ZENER			
CR2	3				
CR3	3				
CR4	3				
CR5	1010372 4	ZENER			
CR6	1010837-001		IN645		
CR7	1010837-001		IN645		
CR8	1010837-001	DIODE	IN645		
Q1	1010397-1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6	1010397-1		2N930		
Q7	1010367		3N68		
Q8					
Q9					
Q10					
Q11					
Q12	1010367		3N68		
Q13	1010376-3				
Q14	1010397-1		2N930		
Q15					
Q16					
Q17					
Q18					
Q19	1010397-1		2N930		
Q20	1010367		3N68		
Q21					
Q22					
Q23					
Q24					
Q25					
Q26	1010367		3N68		
Q27	1010376-3				
Q28	1010397	TRANSISTOR	2N930		
T1	1010712	TRANSFORMER			
T2	1010712				
T3	1010712				
T4	1010324				
T5	1010324				
T6	1010324				
T7	1010315-1				
T8	1010315-1				
T9	1010315-1				
T10	1010712				
T11	1010712				
T12	1010712				
T13	1010712				
T14	1010324				
T15	1010324				
T16	1010324				
T17	1010315-1				
T18	1010315-1				
T19	1010315-1				
T20	1010466				
T21	1010466				
T22	1010466				
T23	1010712	TRANSFORMER			

R28,R29,R30,R82,R83,R84	
PART NO.	VALUE
1010311-296	59.0K
-297	60.4K
-298	61.9K
-299	63.4K
-300	64.9K
-301	66.5K
-302	68.1K
-303	69.8K
-304	71.5K
-305	73.2K
-306	75.0K
-307	76.8K
-308	78.7K
-309	80.6K
-310	82.5K
-311	84.5K
-312	86.6K
-313	88.7K
1010311-314	90.9K

C4, C5, C6, C31, C32, & C33			
PART NO.	VALUE	TOL	RATING
1010409-1	10 UUF	±0.25UUF	500VDC
-8	20	± 2%	
-12	30		
-16	43		
-19	56		
-21	68		
-23	82		
-24	91		
-25	100		
-26	110		
-27	120		
-28	130		
-29	150		500
-30	160		300
-31	180		
-32	200		
-33	220		
1010409 - 34	240 UUF	± 2%	300VDC

REF DWG:
SIGNAL CONDITIONER IRIG & PIPA ASSY
DWG NO. 1007662

REVISIONS 21744						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED

MASTER

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± —— ± —— ± ——
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

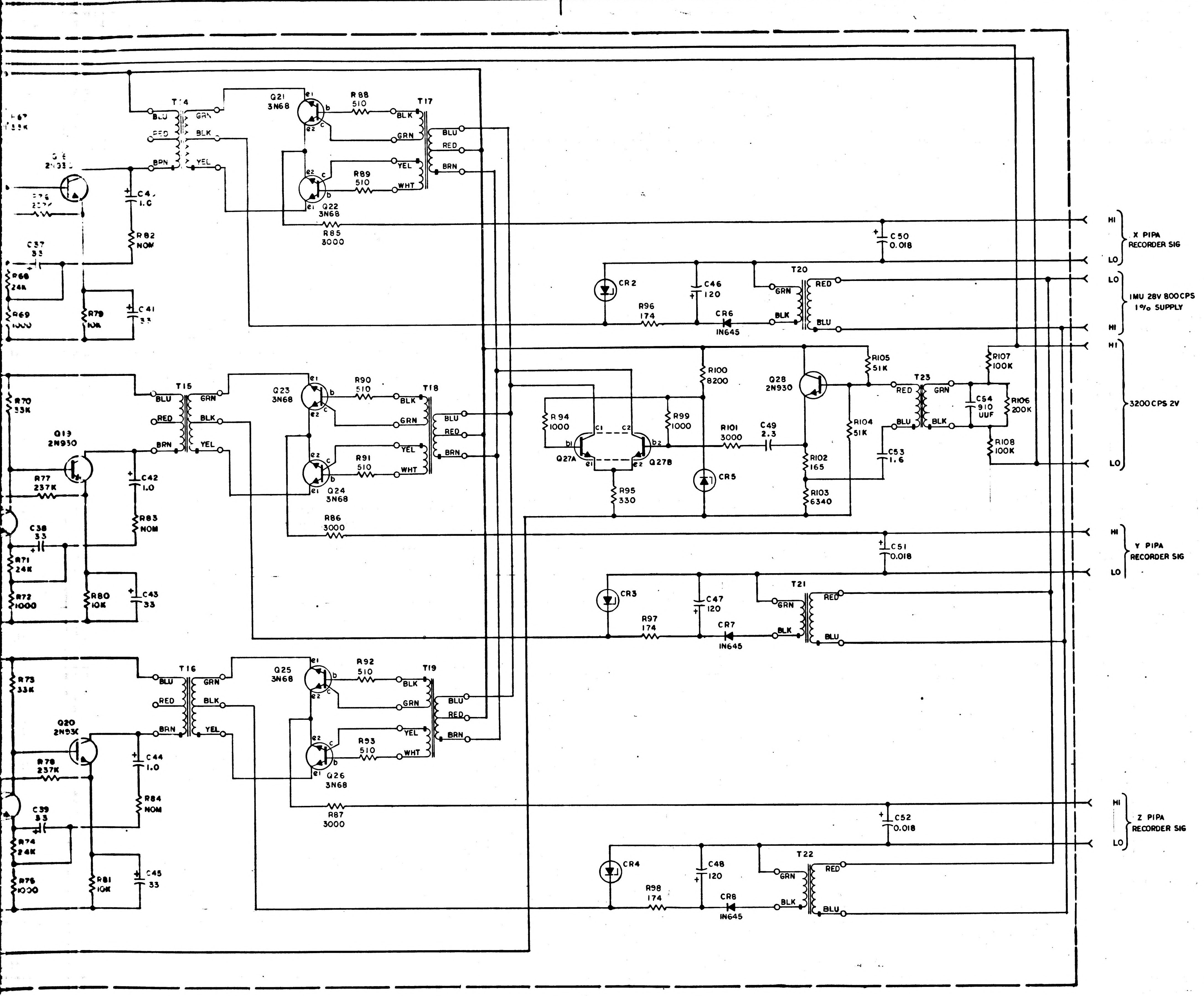
DRAWN A. Di Leo 21 JULY 65
CHECKED
APPROVED
APPROVED
APPROVED MIT
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER IRIG & PIPA

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010243
SCALE ——
SHEET 1 OF 1

1010243


T14
BLU
RED
BRN
GRN
BLK
YEL
Q21
3N68
R88
510
T17
Q18
2N930
R76
237K
C41
1.0
R82
NOM
C37
33
R68
24K
R69
1000
R79
10K
C41
33
Q22
3N68
R89
510
R85
3000
HI
LO
X PIPA RECORDER SIG
C50
0.018
CR2
C46
120
T20
R96
174
CR6
IN645
IMU 28V 800CPS
1% SUPPLY
T15
R70
33K
Q13
2N930
R77
237K
C42
1.0
R83
NOM
C38
33
R71
24K
R72
1000
R80
10K
C43
33
Q23
3N68
R90
510
T18
Q24
3N68
R91
510
R86
3000
R94
1000
Q27A
Q27B
R95
330
R99
1000
R100
8200
CR5
R101
3000
C49
2.3
R102
165
R103
6340
Q28
2N930
R105
51K
R104
51K
C53
1.6
T23
C54
910
UUF
R107
100K
R106
200K
R108
100K
3200CPS 2V
Y PIPA RECORDER SIG
C51
0.018
CR3
C47
120
T21
R97
174
CR7
IN645
T16
R73
33K
Q20
2N930
R78
237K
C44
1.0
R84
NOM
C39
33
R74
24K
R75
1000
R81
10K
C45
33
Q25
3N68
R92
510
T19
Q26
3N68
R93
510
R87
3000
Z PIPA RECORDER SIG
C52
0.018
CR4
C48
120
T22
R98
174
CR8
IN645

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010311 -315	RESISTOR	93.1K	± 1%	1/10 W
R2	-315		93.1K		
R3	-315		93.1K		
R4	-315		93.1K		
R5	-315		93.1K		
R6	-315		93.1K		
R7	-291		52.3K		
R8	-291		52.3K		
R9	1010311 -291		52.3K		1/10 W
R10	1010364 -769		499 K		1/8 W
R11	1010364 -769		499 K		1/8 W
R12	1010364 -769		499 K	± 1%	1/8 W
R13	1006750-68		33K	± 2%	1/4 W
R14	1006750-65		24K	± 2%	1/4 W
R15	1010311 -126		1000	± 1%	1/10 W
R16	1006750-68		33K	± 2%	1/4 W
R17	1006750-65		24K	± 2%	1/4 W
R18	1010311 -126		1000	± 1%	1/10W
R19	1006750-68		33K	± 2%	1/4 W
R20	1006750-65		24K	± 2%	1/4 W
R21	1010311 -126		1000	± 1%	1/10W
R22	1010364 -707		237K	± 1%	1/8 W
R23	1010364 -707		237K	± 1%	1/8 W
R24	1010364 -707		237K	± 1%	1/8 W
R25	1006750-56		10K	± 2%	1/4 W
R26	1006750-56		10K	± 2%	1/4 W
R27	1006750-56		10K	± 2%	1/4 W
R28	SEE NOTE 2		NOM	± 1%	1/10W
R29	SEE NOTE 2		NOM	± 1%	1/10W
R30	SEE NOTE 2		NOM	± 1%	1/10W
R31	1006750 -36		1500	± 2%	1/4 W
R32	-36		1500		
R33	-36		1500		
R34	-25		510		
R35	-25		510		
R36	-25		510		
R37	-25		510		
R38	-25		510		
R39	-25		510		
R40	-36		1500		
R41	-36		1500		
R42	1006750 -36		1500	± 2%	1/4 W
R43	1010311 -126		1000	± 1%	1/10 W
R44	1006750-20		330	± 2%	1/4 W
R45	1010311 -126		1000	± 1%	1/10 W
R46	1006750-54		8200	± 2%	1/4 W
R47	1006750-43		3000	± 2%	1/4 W
R48	1010311 -80		332	± 1%	1/10 W
R49	1010311 -203		6340	± 1%	1/10 W
R50	1006750-73		51K	± 2%	1/4 W
R51	1006750-73		51K	± 2%	1/4 W
R52	1010364-693		200K	± 1%	1/8 W
R53	1006750-80		100K	± 2%	1/4 W
R54	1006750-80		100K	± 2%	1/4 W
R55	1010311 -315		93.1K	± 1%	1/10 W
R56	-315		93.1K		
R57	-315		93.1K		
R58	-315		93.1K		
R59	-315		93.1K		
R60	-315		93.1K		
R61	-291		52.3K		
R62	-291		52.3K		
R63	1010311 -291		52.3K		1/10 W
R64	1010364-769		499 K		1/8 W
R65	1010364-769		499 K		1/8 W
R66	1010364-769		499 K	± 1%	1/8 W
R67	1006750-68		33K	± 2%	1/4 W
R68	1006750-65		24K	± 2%	1/4 W
R69	1010311 -126		1000	± 1%	1/10 W
R70	1006750-68		33K	± 2%	1/4 W
R71	1006750-65		24K	± 2%	1/4 W
R72	1010311 -126		1000	± 1%	1/10 W
R73	1006750-68		33K	± 2%	1/4 W
R74	1006750-65		24K	± 2%	1/4 W
R75	1010311 -126		1000	± 1%	1/10 W
R76	1010364-707		237K	± 1%	1/8 W
R77	1010364-707		237K	± 1%	1/8 W
R78	1010364-707		237K	± 1%	1/8 W
R79	1006750-56		10K	± 2%	1/4 W
R80	1006750-56		10K	± 2%	1/4 W
R81	1006750-56		10K	± 2%	1/4 W
R82	SEE NOTE 2		NOM	± 1%	1/10 W
R83	SEE NOTE 2		NOM	± 1%	1/10 W
R84	SEE NOTE 2		NOM	± 1%	1/10 W
R85	1006750-43		3000	± 2%	1/4 W
R86	-43		3000		
R87	-43		3000		
R88	-25		510		
R89	-25		510		
R90	-25		510		
R91	-25		510		
R92	-25		510		
R93	1006750-25		510	± 2%	1/4 W
R94	1010311 -126		1000	± 1%	1/10 W
R95	1006750-20		330	± 2%	1/4 W
R96	1010267 -82		174	± 1%	1/2 W
R97	1010267 -82		174	± 1%	1/2 W
R98	1010267 -82		174	± 1%	1/2 W
R99	1010311 -126		1000	± 1%	1/10 W
R100	1006750-54		8200	± 2%	1/4 W
R101	1006750-43		3000	± 2%	1/4 W
R102	1010311 -51		165	± 1%	1/10 W
R103	1010311 -203		6340	± 1%	1/10 W
R104	1006750 -73		51K	± 2%	1/4 W
R105	1006750 -73		51K	± 2%	1/4 W
R106	1010364 -693		200K	± 1%	1/8 W
R107	1006750-80		100K	± 2%	1/4 W
R108	1006750-80	RESISTOR	100K	± 2%	1/4 W
C1	1010409 -12	CAPACITOR	30UUF	± 2%	500 VDC
C2	1010409 -12		30UUF	± 2%	500
C3	1010409 -12		30UUF	± 2%	500
C4	SEE NOTE 2		NOM	—	—
C5	SEE NOTE 2		NOM	—	—
C6	SEE NOTE 2		NOM	—	—
C7	1006755-31		10	±10%	20
C8	-31		10		
C9	-31		10		
C10	-34		33		
C11	-34		33		
C12	-34		33		20
C13	-69		1.0		35
C14	-34		33		20
C15	1006755-69	CAPACITOR	1.0	±10%	35VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C16	1006755-34	CAPACITOR	33	±10%	20 VDC
C17	1006755-69		1.0		35
C18	1006755-34		33		20
C19	1010279-7		0.34		6
C20	-7		0.34		
C21	-7		0.34		
C22	-5		0.23		
C23	-5		0.23		
C24	-5		0.23		6
C25	-236		2.3		35
C26	1010279-114		1.6	±10%	15
C27	1010409-25		30UUF	± 2%	500
C28	1010409-12		30UUF	± 2%	500
C29	1010409-12		30UUF	± 2%	500
C30	1010409-12		30UUF	± 2%	500
C31	SEE NOTE 2		NOM	—	—
C32	SEE NOTE 2		NOM	—	—
C33	SEE NOTE 2		NOM	—	—
C34	1006755-31		[illegible]	±10%	20
C35	-31		[illegible]		
C36	-31		[illegible]		
C37	-34		33		
C38	-34		33		
C39	-34		33		20
C40	-69		[illegible]		35
C41	-34		33		20
C42	-69		[illegible]		35
C43	-34		33		20
C44	-69		1.0		35
C45	-34		33		20
C46	-15		120		10
C47	-15		120		10
C48	1006755-15		120		10
C49	1010279-236		2.3		35
C50	1010393-008		0.018		50
C51	1010393-008		0.018		50
C52	1010393-008		0.018		50
C53	1010279-114		1.6	±10%	15
C54	1010410-16	CAPACITOR	910UUF	± 2%	300VDC
CR1	1010372-4	DIODE, ZENER			
CR2	3				
CR3	3				
CR4	3				
CR5	1010372 4	ZENER			
CR6	1010837-001		IN645		
CR7	1010837-001		IN645		
CR8	1010837-001	DIODE	IN645		
Q1	1010397-1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6	1010397-1		2N930		
Q7	1010367		3N68		
Q8					
Q9					
Q10					
Q11					
Q12	1010367		3N68		
Q13	1010376-3				
Q14	1010397-1		2N930		
Q15					
Q16					
Q17					
Q18					
Q19	1010397-1		2N930		
Q20	1010367		3N68		
Q21					
Q22					
Q23					
Q24					
Q25					
Q26	1010367		3N68		
Q27	1010376-3				
Q28	1010397	TRANSISTOR	2N930		
T1	1010712	TRANSFORMER			
T2	1010712				
T3	1010712				
T4	1010324				
T5	1010324				
T6	1010324				
T7	1010315-1				
T8	1010315-1				
T9	1010315-1				
T10	1010712				
T11	1010712				
T12	1010712				
T13	1010712				
T14	1010324				
T15	1010324				
T16	1010324				
T17	1010315-1				
T18	1010315-1				
T19	1010315-1				
T20	1010466				
T21	1010466				
T22	1010466				
T23	1010712	TRANSFORMER			

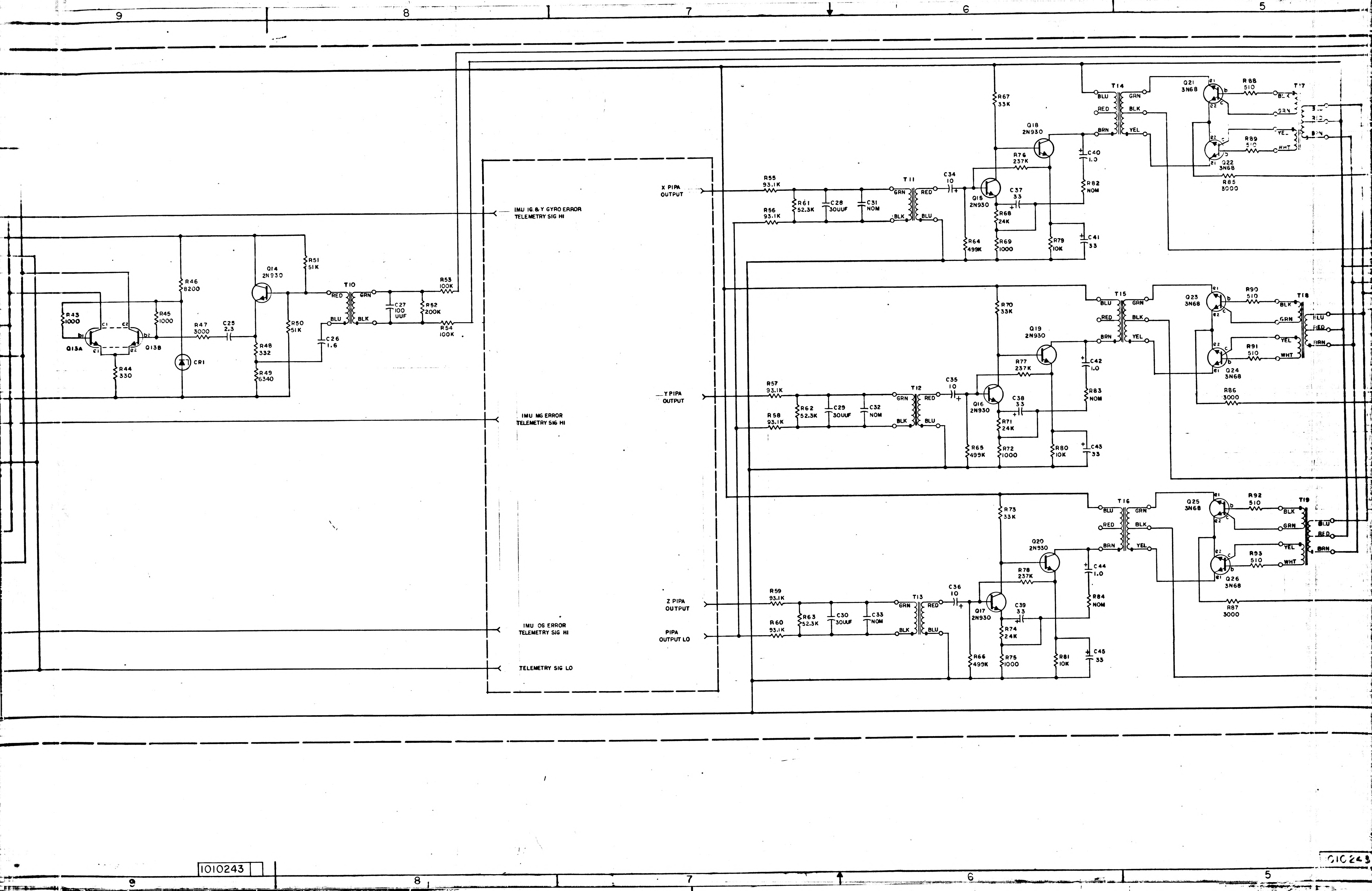
MASTER

QTY REQD

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ___ ± ___ ± ___
DO NOT SCALE THIS DRAWING
MATERIAL

1010243


9
8
7
6
5
R43
1000
Q13A
Q13B
R44
330
R45
1000
R46
8200
R47
3000
C25
2.3
CR1
Q14
2N930
R48
332
R49
6340
R50
51K
R51
51K
C26
1.6
T10
RED
GRN
BLU
BLK
C27
100
UUF
R52
200K
R53
100K
R54
100K
IMU IG & Y GYRO ERROR
TELEMETRY SIG HI
IMU MG ERROR
TELEMETRY SIG HI
IMU OG ERROR
TELEMETRY SIG HI
TELEMETRY SIG LO
X PIPA
OUTPUT
Y PIPA
OUTPUT
Z PIPA
OUTPUT
PIPA
OUTPUT LO
R55
93.1K
R56
93.1K
R61
52.3K
C28
30UUF
C31
NOM
T11
C34
10
Q15
2N930
C37
33
R64
499K
R68
24K
R69
1000
R67
33K
Q18
2N930
R76
237K
R79
10K
R82
NOM
C40
1.0
C41
33
T14
Q21
3N68
Q22
3N68
R88
510
R89
510
R85
3000
T17
R57
93.1K
R58
93.1K
R62
52.3K
C29
30UUF
C32
NOM
T12
C35
10
Q16
2N930
C38
33
R65
499K
R71
24K
R72
1000
R70
33K
Q19
2N930
R77
237K
R80
10K
R83
NOM
C42
1.0
C43
33
T15
Q23
3N68
Q24
3N68
R90
510
R91
510
R86
3000
T18
R59
93.1K
R60
93.1K
R63
52.3K
C30
30UUF
C33
NOM
T13
C36
10
Q17
2N930
C39
33
R66
499K
R74
24K
R75
1000
R73
33K
Q20
2N930
R78
237K
R81
10K
R84
NOM
C44
1.0
C45
33
T16
Q25
3N68
Q26
3N68
R92
510
R93
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R87
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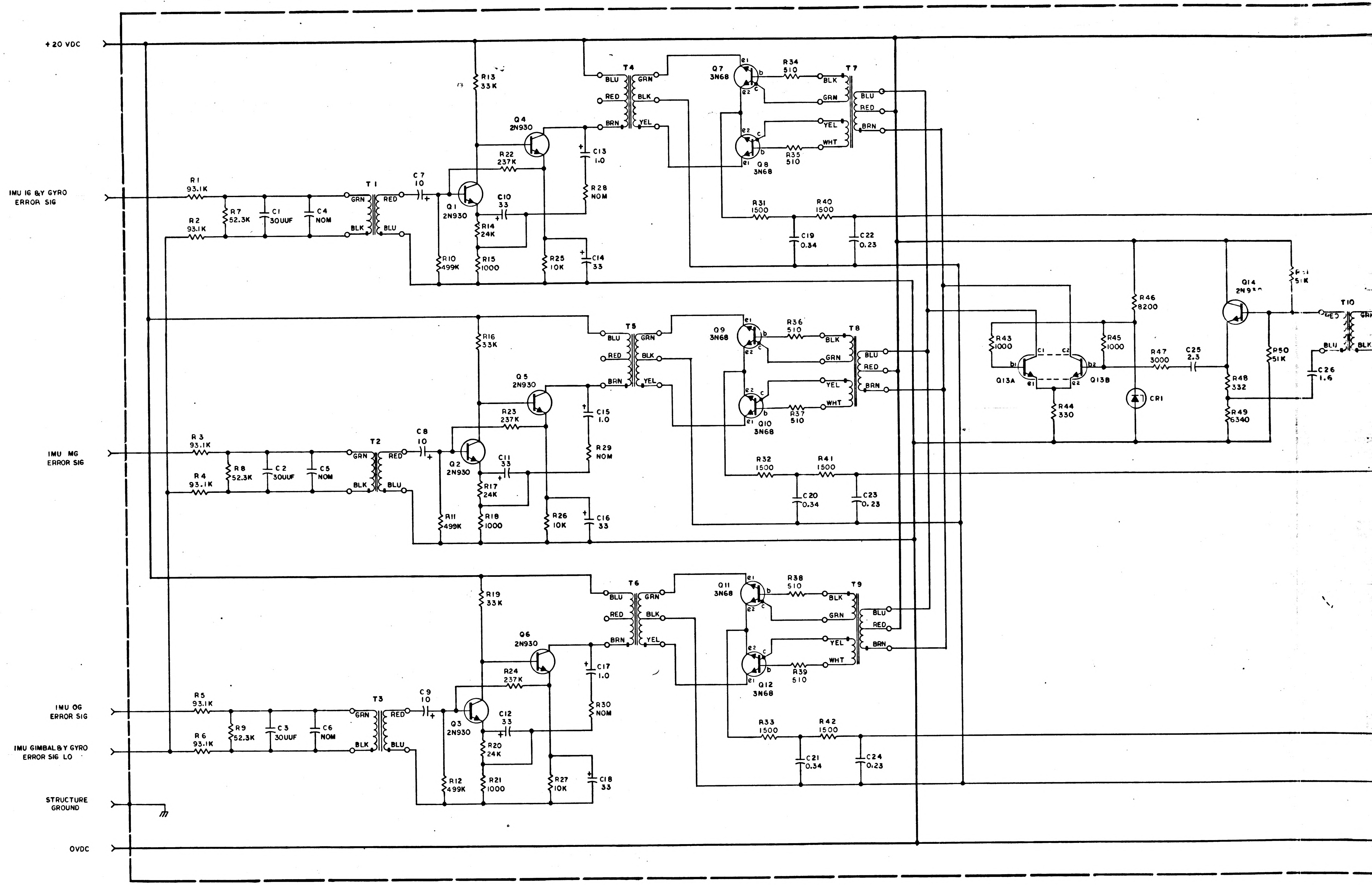

+20 VDC
IMU IG &Y GYRO ERROR SIG
IMU MG ERROR SIG
IMU OG ERROR SIG
IMU GIMBAL &Y GYRO ERROR SIG LO
STRUCTURE GROUND
OVDC
R1 93.1K
R2 93.1K
R3 93.1K
R4 93.1K
R5 93.1K
R6 93.1K
R7 52.3K
R8 52.3K
R9 52.3K
C1 30UUF
C2 30UUF
C3 30UUF
C4 NOM
C5 NOM
C6 NOM
T1
T2
T3
GRN
RED
BLK
BLU
C7 10
C8 10
C9 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
R10 499K
R11 499K
R12 499K
R13 33K
R16 33K
R19 33K
R14 24K
R17 24K
R20 24K
R15 1000
R18 1000
R21 1000
R22 237K
R23 237K
R24 237K
C10 33
C11 33
C12 33
R25 10K
R26 10K
R27 10K
C13 1.0
C15 1.0
C17 1.0
C14 33
C16 33
C18 33
R28 NOM
R29 NOM
R30 NOM
T4
T5
T6
BRN
YEL
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
e1
e2
b
c
R34 510
R35 510
R36 510
R37 510
R38 510
R39 510
T7
T8
T9
WHT
R31 1500
R32 1500
R33 1500
R40 1500
R41 1500
R42 1500
C19 0.34
C20 0.34
C21 0.34
C22 0.23
C23 0.23
C24 0.23
R43 1000
R44 330
R45 1000
Q13A
Q13B
c1
c2
b1
b2
R46 8200
CR1
R47 3000
C25 2.3
Q14 2N9
R48 332
R49 6340
R50 51K
R51 51K
C26 1.6
T10
12
11
10
9
D
C
B
A

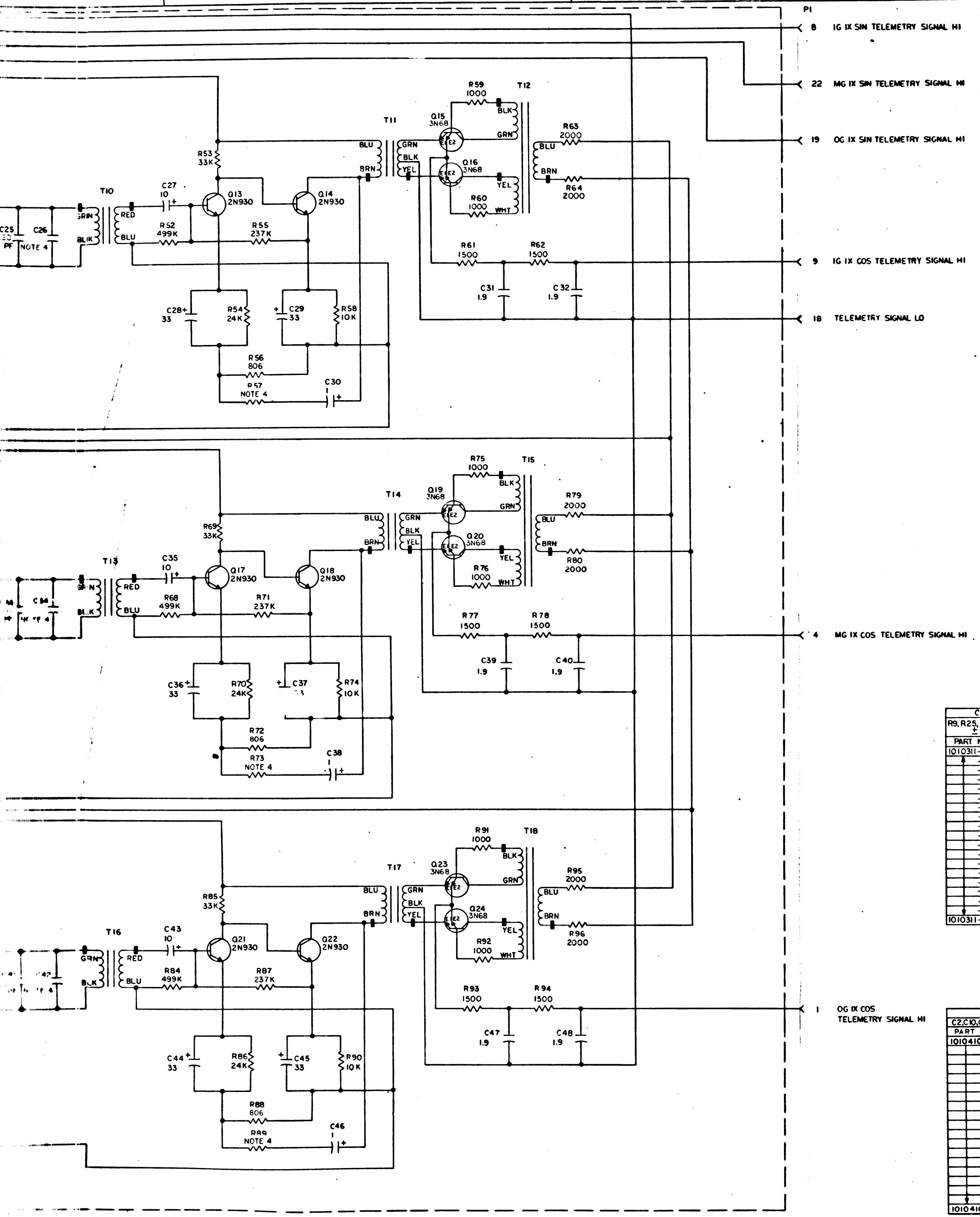
NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R28, R29, R30, R82, R83, R84, C4, C5, C6, C31, C32 & C33 PER APPLICABLE PS FROM APPROPRIATE CHART

1010243

1010244 | A

REVISIONS 21744		
SYM	DESCRIPTION	
A	REVISED PER TDRR 22507	5 Aug 65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22 MG IX SIN TELEMETRY SIGNAL HI
19 OG IX SIN TELEMETRY SIGNAL HI
9 IG IX COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG IX COS TELEMETRY SIGNAL HI
1 OG IX COS TELEMETRY SIGNAL HI
T10
T11
T12
T13
T14
T15
T16
T17
T18
Q13 2N930
Q14 2N930
Q15 3N68
Q16 3N68
Q17 2N930
Q18 2N930
Q19 3N68
Q20 3N68
Q21 2N930
Q22 2N930
Q23 3N68
Q24 3N68
C25
C26 NOTE 4
C27 10
C28 33
C29 33
C30
C31 1.9
C32 1.9
C34
C35 10
C36 33
C37
C38
C39 1.9
C40 1.9
C42
C43 10
C44 33
C45 33
C46
C47 1.9
C48 1.9
R52 499K
R53 33K
R54 24K
R55 237K
R56 806
R57 NOTE 4
R58 10K
R59 1000
R60 1000
R61 1500
R62 1500
R63 2000
R64 2000
R68 499K
R69 33K
R70 24K
R71 237K
R72 806
R73 NOTE 4
R74 10K
R75 1000
R76 1000
R77 1500
R78 1500
R79 2000
R80 2000
R84 499K
R85 33K
R86 24K
R87 237K
R88 806
R89 NOTE 4
R90 10K
R91 1000
R92 1000
R93 1500
R94 1500
R95 2000
R96 2000
RED
BLU
GRN
BLK
YEL
BRN
WHT
E1
E2

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
R3	1010311-291		52.3 K	±1%	1/10 W
R4	1010364-769		499 K	±1%	1/8 W
R5	1006750-68		33 K	±2%	1/4 W
R6	1006750-65		24 K	±2%	1/4 W
R7	1010364-707		237 K	±1%	1/8 W
R8	1010311-117		806	±1%	1/10 W
R9	SEE NOTE 4			±1%	1/10 W
R10	1006750-56		10 K	±2%	1/4 W
R11	1010311-126		1000	±1%	1/10 W
R12	1010311-126		1000	±1%	1/10 W
R13	1006750-36		1500	±2%	1/4 W
R14	1006750-36		1500	±2%	1/4 W
R15	1006750-39		2000	±2%	1/4 W
R16	1006750-39		2000	±2%	1/4 W
R17	1010364-769		499 K	±1%	1/8 W
R18	1010364-769		499 K	±1%	1/8 W
R19	1010311-291		52.3 K	±1%	1/10 W
R20	1010364-769		499 K	±1%	1/8 W
R21	1006750-68		33 K	±2%	1/4 W
R22	1006750-65		24 K	±2%	1/4 W
R23	1010364-707		237 K	±1%	1/8 W
R24	1010311-117		806	±1%	1/10 W
R25	SEE NOTE 4			±1%	1/10 W
R26	1006750-56		10 K	±2%	1/4 W
R27	1010311-126		1000	±1%	1/10 W
R28	1010311-126		1000	±1%	1/10 W
R29	1006750-36		1500	±2%	1/4 W
R30	1006750-36		1500	±2%	1/4 W
R31	1006750-39		2000	±2%	1/4 W
R32	1006750-39		2000	±2%	1/4 W
R33	1010364-769		499 K	±1%	1/8 W
R34	1010364-769		499 K	±1%	1/8 W
R35	1010311-291		52.3 K	±1%	1/10 W
R36	1010364-769		499 K	±1%	1/8 W
R37	1006750-68		33 K	±2%	1/4 W
R38	1006750-65		24 K	±2%	1/4 W
R39	1010364-707		237 K	±1%	1/8 W
R40	1010311-117		806	±1%	1/10 W
R41	SEE NOTE 4			±1%	1/10 W
R42	1006750-56		10 K	±2%	1/4 W
R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-117		806	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-117		806	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-117		806	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-1	CAPACITOR	220 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006755-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C4	1006755-34	CAPACITOR	33	±10%	20 VDC
C5	1006755-34		33	±10%	20 VDC
C6	1006755-69		1	±10%	35 VDC
C7	1010279-16		1.9	±10%	6 VDC
C8	1010279-16		1.9	±10%	6 VDC
C9	1010410-1		220 PF	±2%	500 VDC
C10	SEE NOTE 4			±2%	
C11	1006755-31		10	±10%	20 VDC
C12	1006755-34		33	±10%	20 VDC
C13	1006755-34		33	±10%	20 VDC
C14	1006755-69		1	±10%	35 VDC
C15	1010279-16		1.9	±10%	6 VDC
C16	1010279-16		1.9	±10%	6 VDC
C17	1010410-1		220 PF	±2%	500 VDC
C18	SEE NOTE 4			±2%	
C19	1006755-31		10	±10%	20 VDC
C20	1006755-34		33	±10%	20 VDC
C21	1006755-34		33	±10%	20 VDC
C22	1006755-69		1	±10%	35 VDC
C23	1010279-16		1.9	±10%	6 VDC
C24	1010279-16		1.9	±10%	6 VDC
C25	1010410-1		220 PF	±2%	500 VDC
C26	SEE NOTE 4			±2%	
C27	1006755-31		10	±10%	20 VDC
C28	1006755-34		33	±10%	20 VDC
C29	1006755-34		33	±10%	20 VDC
C30	1006755-69		1	±10%	35 VDC
C31	1010279-16		1.9	±10%	6 VDC
C32	1010279-16		1.9	±10%	6 VDC
C33	1010410-1		220 PF	±2%	500 VDC
C34	SEE NOTE 4			±2%	
C35	1006755-31		10	±10%	20 VDC
C36	1006755-34		33	±10%	20 VDC
C37	1006755-34		33	±10%	20 VDC
C38	1006755-69		1	±10%	35 VDC
C39	1010279-16		1.9	±10%	6 VDC
C40	1010279-16		1.9	±10%	6 VDC
C41	1010410-1		220 PF	±2%	500 VDC
C42	SEE NOTE 4			±2%	
C43	1006755-31		10	±10%	20 VDC
C44	1006755-34		33	±10%	20 VDC
C45	1006755-34		33	±10%	20 VDC
C46	1006755-69		1	±10%	35 VDC
C47	1010279-16		1.9	±10%	6 VDC
C48	1010279-16	CAPACITOR	1.9	±10%	6 VDC
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010712				
T5	1010324				
T6	1010323				
T7	1010712				
T8	1010324				
T9	1010323				
T10	1010712				
T11	1010324				
T12	1010323				
T13	1010712				
T14	1010324				
T15	1010323				
T16	1010712				
T17	1010324				
T18	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010397-1	TRANSISTOR	2N930		
Q15	1010367	CHOPPER	3N68		
Q16	1010367	CHOPPER	3N68		
Q17	1010397-1	TRANSISTOR	2N930		
Q18	1010397-1	TRANSISTOR	2N930		
Q19	1010367	CHOPPER	3N68		
Q20	1010367	CHOPPER	3N68		
Q21	1010397-1	TRANSISTOR	2N930		
Q22	1010397-1	TRANSISTOR	2N930		
Q23	1010367	CHOPPER	3N68		
Q24	1010367	CHOPPER	3N68		

CHART B

R9, R25, R41, R57, R73 & R89 ±1%, 1/10W

PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A

C2, C10, C18, C26, C34 & C42

PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

REF DWG:
SIGNAL CONDITIONER ASSEMBLY
GIMBAL RESOLVER
DWG NO. 1007664

3H

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

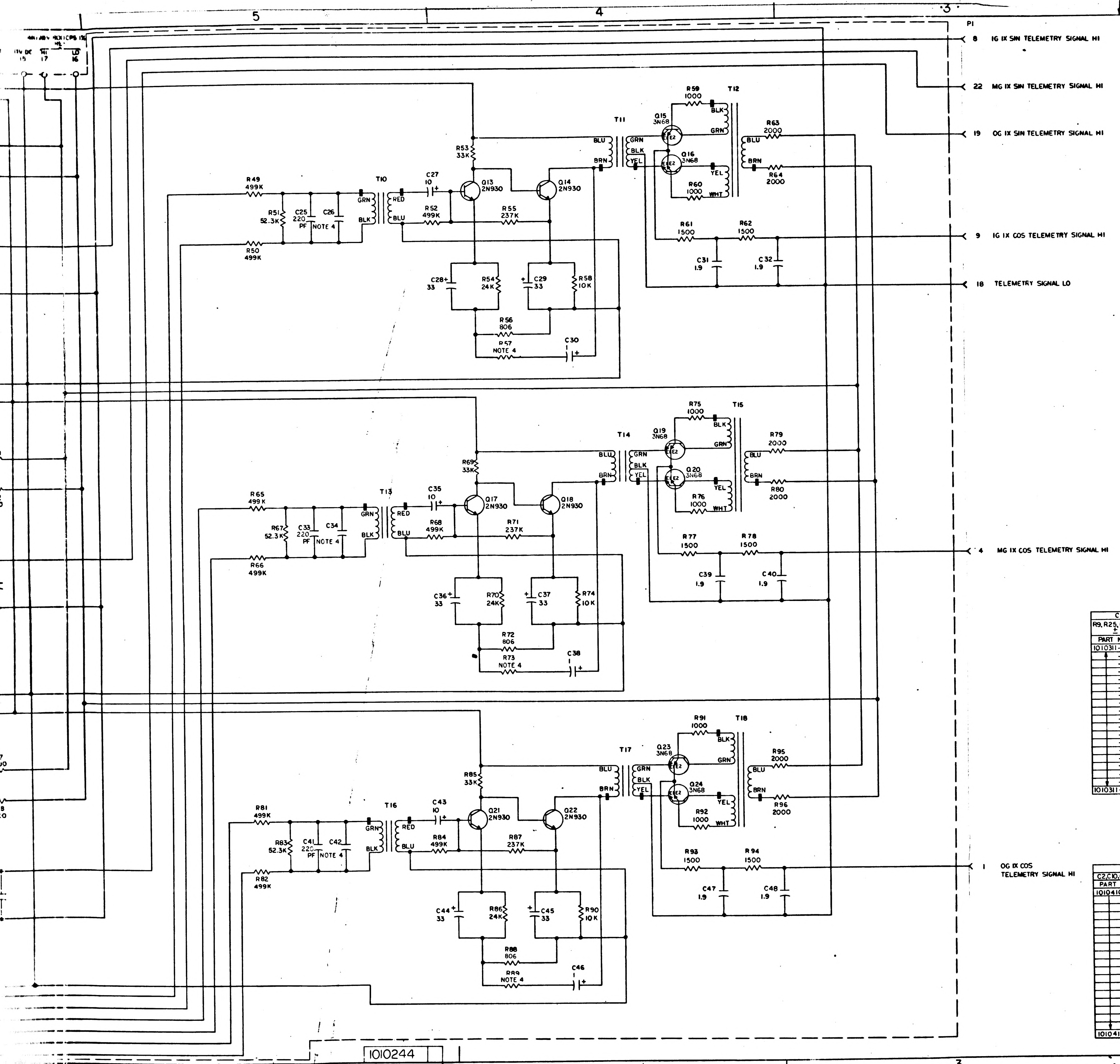
MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN DATE 5 Aug 65
CHECKED 5 Aug 65
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

SCHEMATIC,
SIGNAL CONDITIONER,
GIMBAL RESOLVER

CODE IDENT NO 80230 | SIZE J | NASA DRAWING NO 1010244
SCALE — | WT — | SHEET 1 OF 1

1010244


P1
8 IG IX SIN TELEMETRY SIGNAL HI
22 MG IX SIN TELEMETRY SIGNAL HI
19 OG IX SIN TELEMETRY SIGNAL HI
9 IG IX COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG IX COS TELEMETRY SIGNAL HI
1 OG IX COS TELEMETRY SIGNAL HI
T10
T11
T12
T13
T14
T15
T16
T17
T18
Q13 2N930
Q14 2N930
Q15 3N68
Q16 3N68
Q17 2N930
Q18 2N930
Q19 3N68
Q20 3N68
Q21 2N930
Q22 2N930
Q23 3N68
Q24 3N68
R49 499K
R50 499K
R51 52.3K
C25 220 PF
C26 NOTE 4
C27 10
R52 499K
R53 33K
R54 24K
R55 237K
R56 806
R57 NOTE 4
R58 10K
C28 33
C29 33
C30
R59 1000
R60 1000
R61 1500
R62 1500
R63 2000
R64 2000
C31 1.9
C32 1.9
R65 499K
R66 499K
R67 52.3K
C33 220 PF
C34 NOTE 4
C35 10
R68 499K
R69 33K
R70 24K
R71 237K
R72 806
R73 NOTE 4
R74 10K
C36 33
C37 33
C38
R75 1000
R76 1000
R77 1500
R78 1500
R79 2000
R80 2000
C39 1.9
C40 1.9
R81 499K
R82 499K
R83 52.3K
C41 220 PF
C42 NOTE 4
C43 10
R84 499K
R85 33K
R86 24K
R87 237K
R88 806
R89 NOTE 4
R90 10K
C44 33
C45 33
C46
R91 1000
R92 1000
R93 1500
R94 1500
R95 2000
R96 2000
C47 1.9
C48 1.9
GRN
BLK
RED
BLU
BRN
YEL
WHT
E2
1010244

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
R3	1010311-291		52.3 K	±1%	1/10 W
R4	1010364-769		499 K	±1%	1/8 W
R5	1006750-68		33 K	±2%	1/4 W
R6	1006750-65		24 K	±2%	1/4 W
R7	1010364-707		237 K	±1%	1/8 W
R8	1010311-117		806	±1%	1/10 W
R9	SEE NOTE 4			±1%	1/10 W
R10	1006750-56		10 K	±2%	1/4 W
R11	1010311-126		1000	±1%	1/10 W
R12	1010311-126		1000	±1%	1/10 W
R13	1006750-36		1500	±2%	1/4 W
R14	1006750-36		1500	±2%	1/4 W
R15	1006750-39		2000	±2%	1/4 W
R16	1006750-39		2000	±2%	1/4 W
R17	1010364-769		499 K	±1%	1/8 W
R18	1010364-769		499 K	±1%	1/8 W
R19	1010311-291		52.3 K	±1%	1/10 W
R20	1010364-769		499 K	±1%	1/8 W
R21	1006750-68		33 K	±2%	1/4 W
R22	1006750-65		24 K	±2%	1/4 W
R23	1010364-707		237 K	±1%	1/8 W
R24	1010311-117		806	±1%	1/10 W
R25	SEE NOTE 4			±1%	1/10 W
R26	1006750-56		10 K	±2%	1/4 W
R27	1010311-126		1000	±1%	1/10 W
R28	1010311-126		1000	±1%	1/10 W
R29	1006750-36		1500	±2%	1/4 W
R30	1006750-36		1500	±2%	1/4 W
R31	1006750-39		2000	±2%	1/4 W
R32	1006750-39		2000	±2%	1/4 W
R33	1010364-769		499 K	±1%	1/8 W
R34	1010364-769		499 K	±1%	1/8 W
R35	1010311-291		52.3 K	±1%	1/10 W
R36	1010364-769		499 K	±1%	1/8 W
R37	1006750-68		33 K	±2%	1/4 W
R38	1006750-65		24 K	±2%	1/4 W
R39	1010364-707		237 K	±1%	1/8 W
R40	1010311-117		806	±1%	1/10 W
R41	SEE NOTE 4			±1%	1/10 W
R42	1006750-56		10 K	±2%	1/4 W
R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-117		806	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-117		806	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-117		806	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-1	CAPACITOR	220 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006755-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C4	1006755-34	CAPACITOR	33	±10%	20 VDC
C5	1006755-34		33	±10%	20 VDC
C6	1006755-69		1	±10%	35 VDC
C7	1010279-16		1.9	±10%	6 VDC
C8	1010279-16		1.9	±10%	6 VDC
C9	1010410-1		220 PF	±2%	500 VDC
C10	SEE NOTE 4			±2%	
C11	1006755-31		10	±10%	20 VDC
C12	1006755-34		33	±10%	20 VDC
C13	1006755-34		33	±10%	20 VDC
C14	1006755-69		1	±10%	35 VDC
C15	1010279-16		1.9	±10%	6 VDC
C16	1010279-16		1.9	±10%	6 VDC
C17	1010410-		220 PF	±2%	500 VDC
C18	SEE NOTE 4			±2%	
C19	1006755-31		10	±10%	20 VDC
C20	1006755-34		33	±10%	20 VDC
C21	1006755-34		33	±10%	20 VDC
C22	1006755-69		1	±10%	35 VDC
C23	1010279-16		1.9	±10%	6 VDC
C24	1010279-16		1.9	±10%	6 VDC
C25	1010410-		220 PF	±2%	500 VDC
C26	SEE NOTE 4			±2%	
C27	1006755-31		10	±10%	20 VDC
C28	1006755-34		33	±10%	20 VDC
C29	1006755-34		33	±10%	20 VDC
C30	1006755-69		1	±10%	35 VDC
C31	1010279-16		1.9	±10%	6 VDC
C32	1010279-16		1.9	±10%	6 VDC
C33	1010410-1		220 PF	±2%	500 VDC
C34	SEE NOTE 4			±2%	
C35	1006755-31		10	±10%	20 VDC
C36	1006755-34		33	±10%	20 VDC
C37	1006755-34		33	±10%	20 VDC
C38	1006755-69		1	±10%	35 VDC
C39	1010279-16		1.9	±10%	6 VDC
C40	1010279-16		1.9	±10%	6 VDC
C41	1010410-1		220 PF	±2%	500 VDC
C42	SEE NOTE 4			±2%	
C43	1006755-31		10	±10%	20 VDC
C44	1006755-34		33	±10%	20 VDC
C45	1006755-34		33	±10%	20 VDC
C46	1006755-69		1	±10%	35 VDC
C47	1010279-16		1.9	±10%	6 VDC
C48	1010279-16	CAPACITOR	1.9	±10%	6 VDC
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010712				
T5	1010324				
T6	1010323				
T7	1010712				
T8	1010324				
T9	1010323				
T10	1010712				
T11	1010324				
T12	1010323				
T13	1010712				
T14	1010324				
T15	1010323				
T16	1010712				
T17	1010324				
T18	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010397-1	TRANSISTOR	2N930		
Q15	1010367	CHOPPER	3N68		
Q16	1010367	CHOPPER	3N68		
Q17	1010397-1	TRANSISTOR	2N930		
Q18	1010397-1	TRANSISTOR	2N930		
Q19	1010367	CHOPPER	3N68		
Q20	1010367	CHOPPER	3N68		
Q21	1010397-1	TRANSISTOR	2N930		
Q22	1010397-1	TRANSISTOR	2N930		
Q23	1010367	CHOPPER	3N68		
Q24	1010367	CHOPPER	3N68		

CHART B R9, R25, R41, R57, R73 & R89 ±1%, 1/10W	
PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A C2, C10, C18, C26, C34 & C42		
PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

QTY REQD	PART OR IDENTIFYING NO

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

M I T
INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT
DRAWN DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

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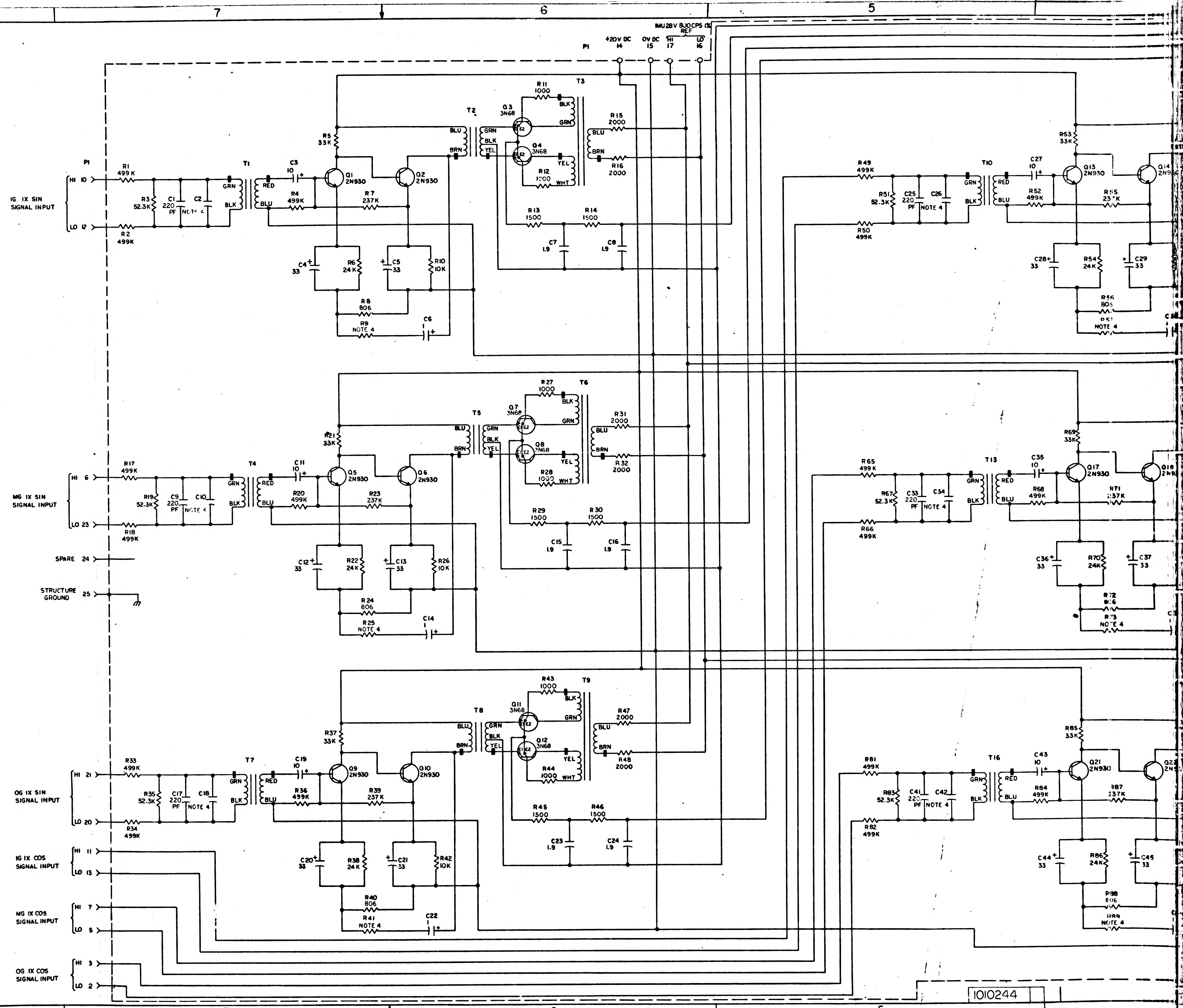
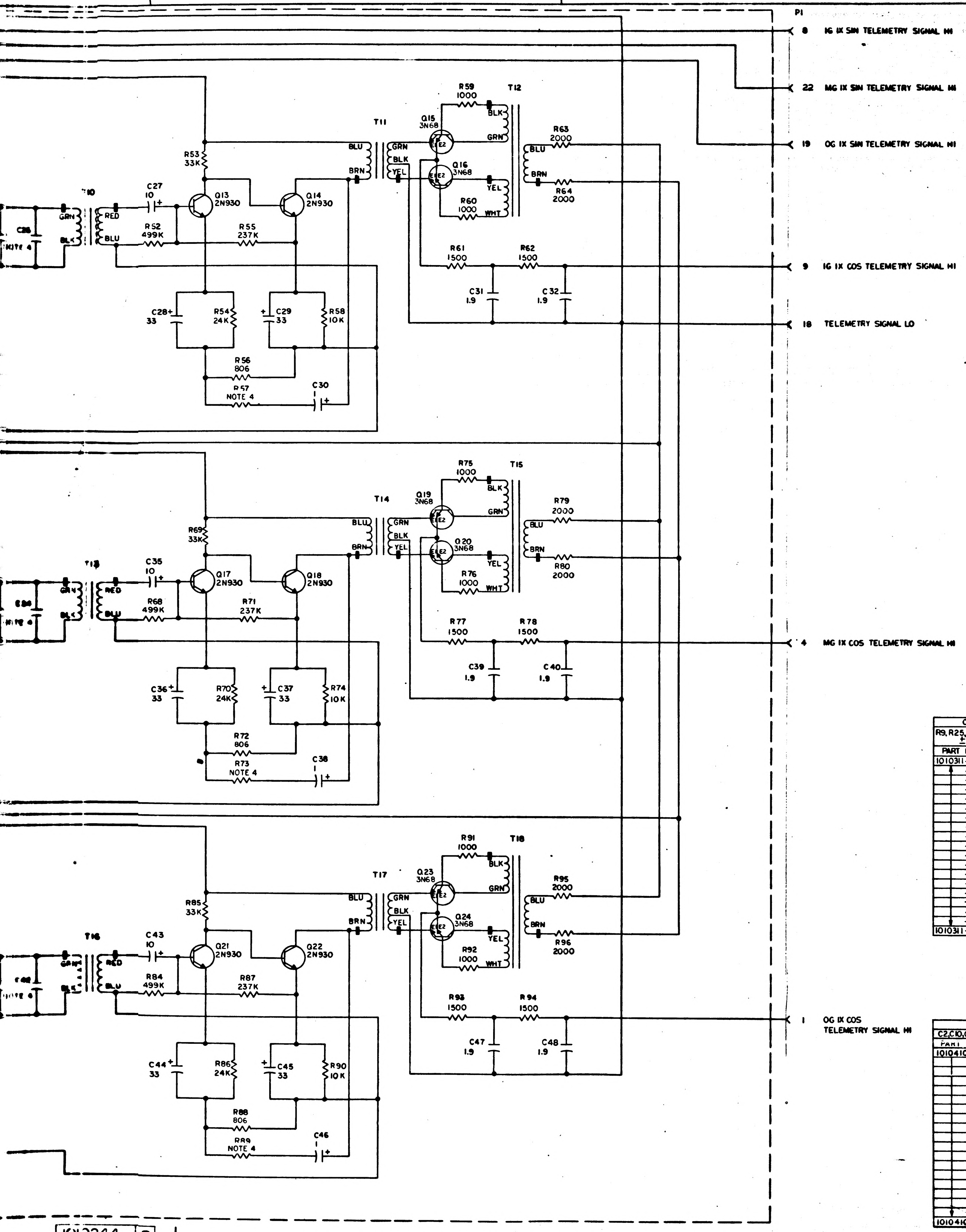

8
7
6
5
D
C
B
A
IMU 28V 800CPS 1%
REF
P1
+20V DC 14
0V DC 15
HI 17
LO 16
IG IX SIN SIGNAL INPUT
HI 10
LO 12
R1 499K
R2 499K
R3 52.3K
C1 220 PF
C2 NOTE 4
T1
GRN
BLK
RED
BLU
C3 10
R4 499K
Q1 2N930
Q2 2N930
R5 33K
R7 237K
C4 33
R6 24K
C5 33
R10 10K
R8 806
R9 NOTE 4
C6
T2
BLU
BRN
GRN
BLK
YEL
Q3 3N68
Q4 3N68
R11 1000
R12 1000
T3
BLK
GRN
YEL
WHT
R15 2000
R16 2000
R13 1500
R14 1500
C7 1.9
C8 1.9
MG IX SIN SIGNAL INPUT
HI 6
LO 23
R17 499K
R18 499K
R19 52.3K
C9 220 PF
C10 NOTE 4
T4
C11 10
R20 499K
Q5 2N930
Q6 2N930
R21 33K
R23 237K
C12 33
R22 24K
C13 33
R26 10K
R24 806
R25 NOTE 4
C14
T5
Q7 3N68
Q8 3N68
R27 1000
R28 1000
T6
R31 2000
R32 2000
R29 1500
R30 1500
C15 1.9
C16 1.9
SPARE 24
STRUCTURE GROUND 25
OG IX SIN SIGNAL INPUT
HI 21
LO 20
R33 499K
R34 499K
R35 52.3K
C17 220 PF
C18 NOTE 4
T7
C19 10
R36 499K
Q9 2N930
Q10 2N930
R37 33K
R39 237K
C20 33
R38 24K
C21 33
R42 10K
R40 806
R41 NOTE 4
C22
T8
Q11 3N68
Q12 3N68
R43 1000
R44 1000
T9
R47 2000
R48 2000
R45 1500
R46 1500
C23 1.9
C24 1.9
IG IX COS SIGNAL INPUT
HI 11
LO 13
MG IX COS SIGNAL INPUT
HI 7
LO 5
OG IX COS SIGNAL INPUT
HI 3
LO 2
R49 499K
R50 499K
R51 52.3K
C25 220 PF
C26 NOTE 4
T10
C27 10
R52 499K
Q13 2N930
Q14
R53 33K
R55 237K
C28 33
R54 24K
C29 33
R56 806
R57 NOTE 4
R65 499K
R66 499K
R67 52.3K
C33 220 PF
C34 NOTE 4
T13
C35 10
R68 499K
Q17 2N930
Q18
R69 33K
R71 237K
C36 33
R70 24K
C37 33
R72 806
R73 NOTE 4
R81 499K
R82 499K
R83 52.3K
C41 220 PF
C42 NOTE 4
T16
C43 10
R84 499K
Q21 2N930
Q22
R85 33K
R87 237K
C44 33
R86 24K
C45 33
R88 806
R89 NOTE 4

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST FROM CHARTS A AND B

1010244


P1
8 IG IX SIN TELEMETRY SIGNAL HI
22 MG IX SIN TELEMETRY SIGNAL HI
19 OG IX SIN TELEMETRY SIGNAL HI
9 IG IX COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG IX COS TELEMETRY SIGNAL HI
1 OG IX COS TELEMETRY SIGNAL HI
T10
T11
T12
T13
T14
T15
T16
T17
T18
Q13 2N930
Q14 2N930
Q15 3N68
Q16 3N68
Q17 2N930
Q18 2N930
Q19 3N68
Q20 3N68
Q21 2N930
Q22 2N930
Q23 3N68
Q24 3N68
R52 499K
R53 33K
R54 24K
R55 237K
R56 806
R57 NOTE 4
R58 10K
R59 1000
R60 1000
R61 1500
R62 1500
R63 2000
R64 2000
R68 499K
R69 33K
R70 24K
R71 237K
R72 806
R73 NOTE 4
R74 10K
R75 1000
R76 1000
R77 1500
R78 1500
R79 2000
R80 2000
R84 499K
R85 33K
R86 24K
R87 237K
R88 806
R89 NOTE 4
R90 10K
R91 1000
R92 1000
R93 1500
R94 1500
R95 2000
R96 2000
C27 10
C28 33
C29 33
C30
C31 1.9
C32 1.9
C35 10
C36 33
C37 33
C38
C39 1.9
C40 1.9
C43 10
C44 33
C45 33
C46
C47 1.9
C48 1.9
GRN
BLK
RED
BLU
BRN
YEL
WHT
NOTE 4

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
R3	1010311-291		52.3 K	±1%	1/10 W
R4	1010364-769		499 K	±1%	1/8 W
R5	1006750-68		33 K	±2%	1/4 W
R6	1006750-65		24 K	±2%	1/4 W
R7	1010364-707		237 K	±1%	1/8 W
R8	1010311-117		806	±1%	1/10 W
R9	SEE NOTE 4			±1%	1/10 W
R10	1006750-56		10 K	±2%	1/4 W
R11	1010311-126		1000	±1%	1/10 W
R12	1010311-126		1000	±1%	1/10 W
R13	1006750-36		1500	±2%	1/4 W
R14	1006750-36		1500	±2%	1/4 W
R15	1006750-39		2000	±2%	1/4 W
R16	1006750-39		2000	±2%	1/4 W
R17	1010364-769		499 K	±1%	1/8 W
R18	1010364-769		499 K	±1%	1/8 W
R19	1010311-291		52.3 K	±1%	1/10 W
R20	1010364-769		499 K	±1%	1/8 W
R21	1006750-68		33 K	±2%	1/4 W
R22	1006750-65		24 K	±2%	1/4 W
R23	1010364-707		237 K	±1%	1/8 W
R24	1010311-117		806	±1%	1/10 W
R25	SEE NOTE 4			±1%	1/10 W
R26	1006750-56		10 K	±2%	1/4 W
R27	1010311-126		1000	±1%	1/10 W
R28	1010311-126		1000	±1%	1/10 W
R29	1006750-36		1500	±2%	1/4 W
R30	1006750-36		1500	±2%	1/4 W
R31	1006750-39		2000	±2%	1/4 W
R32	1006750-39		2000	±2%	1/4 W
R33	1010364-769		499 K	±1%	1/8 W
R34	1010364-769		499 K	±1%	1/8 W
R35	1010311-291		52.3 K	±1%	1/10 W
R36	1010364-769		499 K	±1%	1/8 W
R37	1006750-68		33 K	±2%	1/4 W
R38	1006750-65		24 K	±2%	1/4 W
R39	1010364-707		237 K	±1%	1/8 W
R40	1010311-117		806	±1%	1/10 W
R41	SEE NOTE 4			±1%	1/10 W
R42	1006750-56		10 K	±2%	1/4 W
R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-117		806	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-117		806	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-117		806	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-1	CAPACITOR	220 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006755-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C4	1006755-34	CAPACITOR	33	±10%	20 VDC
C5	1006755-34		33	±10%	20 VDC
C6	1006755-69		1	±10%	35 VDC
C7	1010279-16		1.9	±10%	6 VDC
C8	1010279-16		1.9	±10%	6 VDC
C9	1010410-1		220 PF	±2%	500 VDC
C10	SEE NOTE 4			±2%	
C11	1006755-31		10	±10%	20 VDC
C12	1006755-34		33	±10%	20 VDC
C13	1006755-34		33	±10%	20 VDC
C14	1006755-69		1	±10%	35 VDC
C15	1010279-16		1.9	±10%	6 VDC
C16	1010279-16		1.9	±10%	6 VDC
C17	1010410-1		220 PF	±2%	500 VDC
C18	SEE NOTE 4			±2%	
C19	1006755-31		10	±10%	20 VDC
C20	1006755-34		33	±10%	20 VDC
C21	1006755-34		33	±10%	20 VDC
C22	1006755-69		1	±10%	35 VDC
C23	1010279-16		1.9	±10%	6 VDC
C24	1010279-16		1.9	±10%	6 VDC
C25	1010410-1		220 PF	±2%	500 VDC
C26	SEE NOTE 4			±2%	
C27	1006755-31		10	±10%	20 VDC
C28	1006755-34		33	±10%	20 VDC
C29	1006755-34		33	±10%	20 VDC
C30	1006755-69		1	±10%	35 VDC
C31	1010279-16		1.9	±10%	6 VDC
C32	1010279-16		1.9	±10%	6 VDC
C33	1010410-1		220 PF	±2%	500 VDC
C34	SEE NOTE 4			±2%	
C35	1006755-31		10	±10%	20 VDC
C36	1006755-34		33	±10%	20 VDC
C37	1006755-34		33	±10%	20 VDC
C38	1006755-69		1	±10%	35 VDC
C39	1010279-16		1.9	±10%	6 VDC
C40	1010279-16		1.9	±10%	6 VDC
C41	1010410-1		220 PF	±2%	500 VDC
C42	SEE NOTE 4			±2%	
C43	1006755-31		10	±10%	20 VDC
C44	1006755-34		33	±10%	20 VDC
C45	1006755-34		33	±10%	20 VDC
C46	1006755-69		1	±10%	35 VDC
C47	1010279-16		1.9	±10%	6 VDC
C48	1010279-16	CAPACITOR	1.9	±10%	6 VDC
T1	1008832	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1008832				
T5	1010324				
T6	1010323				
T7	1008832				
T8	1010324				
T9	1010323				
T10	1008832				
T11	1010324				
T12	1010323				
T13	1008832				
T14	1010324				
T15	1010323				
T16	1008832				
T17	1010324				
T18	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010397-1	TRANSISTOR	2N930		
Q15	1010367	CHOPPER	3N68		
Q16	1010367	CHOPPER	3N68		
Q17	1010397-1	TRANSISTOR	2N930		
Q18	1010397-1	TRANSISTOR	2N930		
Q19	1010367	CHOPPER	3N68		
Q20	1010367	CHOPPER	3N68		
Q21	1010397-1	TRANSISTOR	2N930		
Q22	1010397-1	TRANSISTOR	2N930		
Q23	1010367	CHOPPER	3N68		
Q24	1010367	CHOPPER	3N68		

CHART B	
R9, R25, R41, R57, R73 & R89 ± 1%, 1/10W	
PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A		
C2, C10, C18, C26, C34 & C42		
PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

REVISIONS 2/144			
SYM	DESCRIPTION		
A	REVISED PER TDRR 22507		
B	REVISED PER TDRR 22850		

REF DWG:
SIGNAL CONDITIONER ASSEMBLY
GIMBAL RESOLVER
DWG NO. 1007664

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

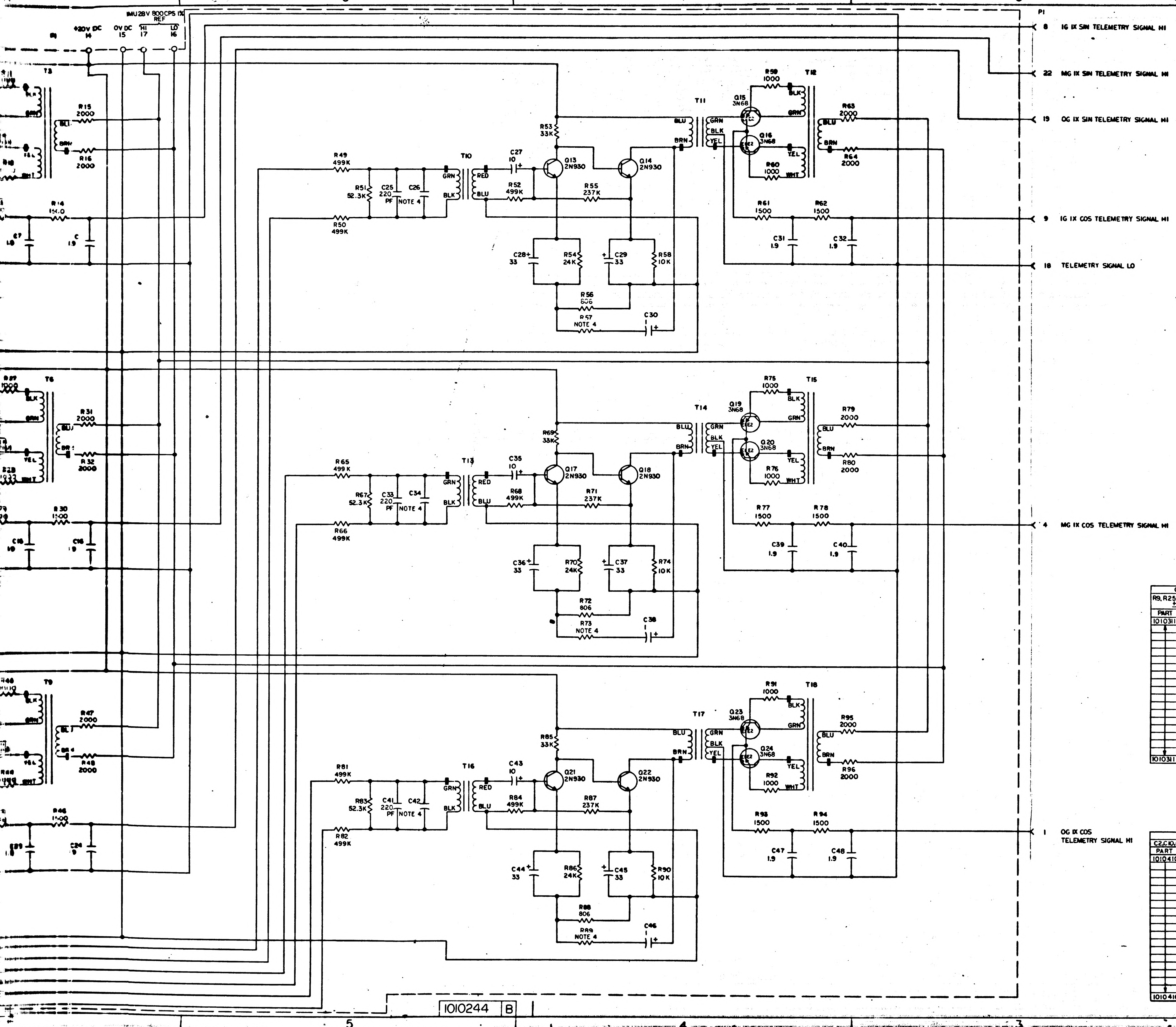
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN R. Ramey DATE
CHECKED
APPROVAL
APPROVAL
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

SCHEMATIC,
SIGNAL CONDITIONER,
GIMBAL RESOLVER

CODE IDENT NO 80230
SIZE J
NASA DRAWING NO. 1010244
SCALE — WT — SHEET 1 OF 1


IMU 28V 800 CPS 1% REF
+20V DC 14
0V DC 15
HI 17
LO 16
P1
8 IG IX SIN TELEMETRY SIGNAL HI
22 MG IX SIN TELEMETRY SIGNAL HI
19 OG IX SIN TELEMETRY SIGNAL HI
9 IG IX COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG IX COS TELEMETRY SIGNAL HI
1 OG IX COS TELEMETRY SIGNAL HI
T3 T6 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18
R15 2000
R16 2000
R31 2000
R32 2000
R47 2000
R48 2000
R49 499K
R50 499K
R51 52.3K
C25 220 PF
C26 NOTE 4
C27 10
R52 499K
R53 33K
Q13 2N930
Q14 2N930
R55 237K
C28 33
R54 24K
C29 33
R58 10K
R56 806
R57 NOTE 4
C30
R59 1000
Q15 3N68
Q16 3N68
R60 1000
R63 2000
R64 2000
R61 1500
R62 1500
C31 1.9
C32 1.9
R65 499K
R66 499K
R67 52.3K
C33 220 PF
C34 NOTE 4
C35 10
R68 499K
R69 33K
Q17 2N930
Q18 2N930
R71 237K
C36 33
R70 24K
C37 33
R74 10K
R72 806
R73 NOTE 4
C38
R75 1000
Q19 3N68
Q20 3N68
R76 1000
R79 2000
R80 2000
R77 1500
R78 1500
C39 1.9
C40 1.9
R81 499K
R82 499K
R83 52.3K
C41 220 PF
C42 NOTE 4
C43 10
R84 499K
R85 33K
Q21 2N930
Q22 2N930
R87 237K
C44 33
R86 24K
C45 33
R90 10K
R88 806
R89 NOTE 4
C46
R91 1000
Q23 3N68
Q24 3N68
R92 1000
R95 2000
R96 2000
R93 1500
R94 1500
C47 1.9
C48 1.9
GRN BLK RED BLU BRN YEL WHT

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
R3	1010311-291		52.3 K	±1%	1/10 W
R4	1010364-769		499 K	±1%	1/8 W
R5	1006750-68		33 K	±2%	1/4 W
R6	1006750-65		24 K	±2%	1/4 W
R7	1010364-707		237 K	±1%	1/8 W
R8	1010311-117		806	±1%	1/10 W
R9	SEE NOTE 4			±1%	1/10 W
R10	1006750-56		10 K	±2%	1/4 W
R11	1010311-126		1000	±1%	1/10 W
R12	1010311-126		1000	±1%	1/10 W
R13	1006750-36		1500	±2%	1/4 W
R14	1006750-36		1500	±2%	1/4 W
R15	1006750-39		2000	±2%	1/4 W
R16	1006750-39		2000	±2%	1/4 W
R17	1010364-769		499 K	±1%	1/8 W
R18	1010364-769		499 K	±1%	1/8 W
R19	1010311-291		52.3 K	±1%	1/10 W
R20	1010364-769		499 K	±1%	1/8 W
R21	1006750-68		33 K	±2%	1/4 W
R22	1006750-65		24 K	±2%	1/4 W
R23	1010364-707		237 K	±1%	1/8 W
R24	1010311-117		806	±1%	1/10 W
R25	SEE NOTE 4			±1%	1/10 W
R26	1006750-56		10 K	±2%	1/4 W
R27	1010311-126		1000	±1%	1/10 W
R28	1010311-126		1000	±1%	1/10 W
R29	1006750-36		1500	±2%	1/4 W
R30	1006750-36		1500	±2%	1/4 W
R31	1006750-39		2000	±2%	1/4 W
R32	1006750-39		2000	±2%	1/4 W
R33	1010364-769		499 K	±1%	1/8 W
R34	1010364-769		499 K	±1%	1/8 W
R35	1010311-291		52.3 K	±1%	1/10 W
R36	1010364-769		499 K	±1%	1/8 W
R37	1006750-68		33 K	±2%	1/4 W
R38	1006750-65		24 K	±2%	1/4 W
R39	1010364-707		237 K	±1%	1/8 W
R40	1010311-117		806	±1%	1/10 W
R41	SEE NOTE 4			±1%	1/10 W
R42	1006750-56		10 K	±2%	1/4 W
R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-117		806	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-117		806	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-117		806	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-1	CAPACITOR	220 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006755-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE
C4	1006755-34	CAPACITOR	33
C5	1006755-34		33
C6	1006755-69		1
C7	1010279-16		1.9
C8	1010279-16		1.9
C9	1010410-1		220 PF
C10	SEE NOTE 4		
C11	1006755-31		10
C12	1006755-34		33
C13	1006755-34		33
C14	1006755-69		1
C15	1010279-16		1.9
C16	1010279-16		1.9
C17	1010410-		220 PF
C18	SEE NOTE 4		
C19	1006755-31		10
C20	1006755-34		33
C21	1006755-34		33
C22	1006755-69		1
C23	1010279-16		1.9
C24	1010279-16		1.9
C25	1010410-		220 PF
C26	SEE NOTE 4		
C27	1006755-31		10
C28	1006755-34		33
C29	1006755-34		33
C30	1006755-69		1
C31	1010279-16		1.9
C32	1010279-16		1.9
C33	1010410-1		220 PF
C34	SEE NOTE 4		
C35	1006755-31		[illegible]
C36	1006755-34		33
C37	1006755-34		33
C38	1006755-69		1
C39	1010279-16		1.9
C40	1010279-16		1.9
C41	1010410-1		220 PF
C42	SEE NOTE 4		
C43	1006755-31		10
C44	1006755-34		33
C45	1006755-34		33
C46	1006755-69		1
C47	1010279-16		1.9
C48	1010279-16	CAPACITOR	1.9
T1	1008832	TRANSFORMER	
T2	1010324		
T3	1010323		
T4	1008832		
T5	1010324		
T6	1010323		
T7	1008832		
T8	1010324		
T9	1010323		
T10	1008832		
T11	1010324		
T12	1010323		
T13	1008832		
T14	1010324		
T15	1010323		
T16	1008832		
T17	1010324		
T18	1010323	TRANSFORMER	
Q1	1010397-1	TRANSISTOR	2N930
Q2	1010397-1	TRANSISTOR	2N930
Q3	1010367	CHOPPER	3N68
Q4	1010367	CHOPPER	3N68
Q5	1010397-1	TRANSISTOR	2N930
Q6	1010397-1	TRANSISTOR	2N930
Q7	1010367	CHOPPER	3N68
Q8	1010367	CHOPPER	3N68
Q9	1010397-1	TRANSISTOR	2N930
Q10	1010397-1	TRANSISTOR	2N930
Q11	1010367	CHOPPER	3N68
Q12	1010367	CHOPPER	3N68
Q13	1010397-1	TRANSISTOR	2N930
Q14	1010397-1	TRANSISTOR	2N930
Q15	1010367	CHOPPER	3N68
Q16	1010367	CHOPPER	3N68
Q17	1010397-1	TRANSISTOR	2N930
Q18	1010397-1	TRANSISTOR	2N930
Q19	1010367	CHOPPER	3N68
Q20	1010367	CHOPPER	3N68
Q21	1010397-1	TRANSISTOR	2N930
Q22	1010397-1	TRANSISTOR	2N930
Q23	1010367	CHOPPER	3N68
Q24	1010367	CHOPPER	3N68

CHART B

R9, R25, R41, R57, R73 & R89 ±1%, 1/10W

PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A

C2, C10, C18, C26, C34 & C42

PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

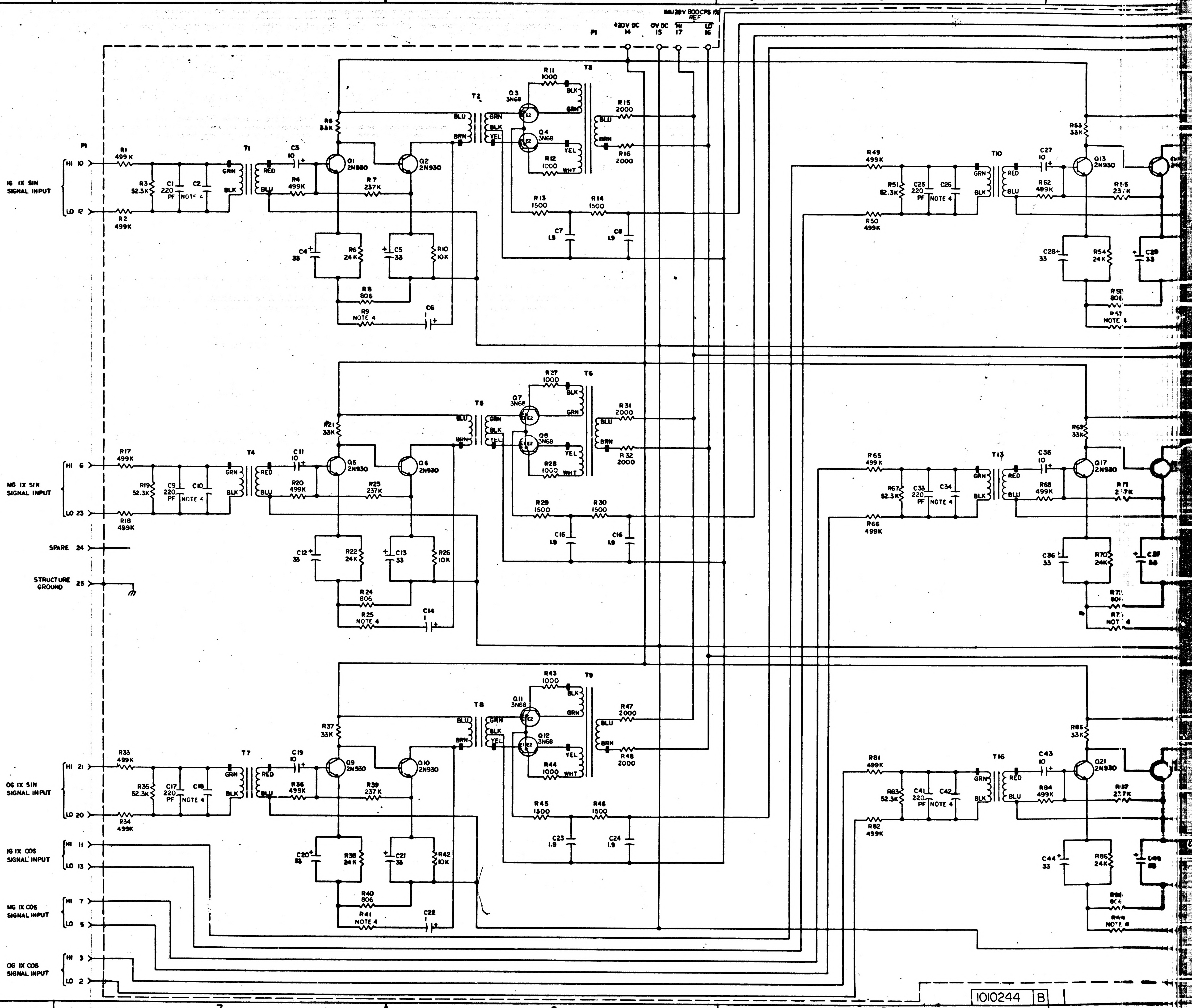
MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL
HEAT TREATMENT
FINAL FINISH

1010244 B

NOTICE: WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

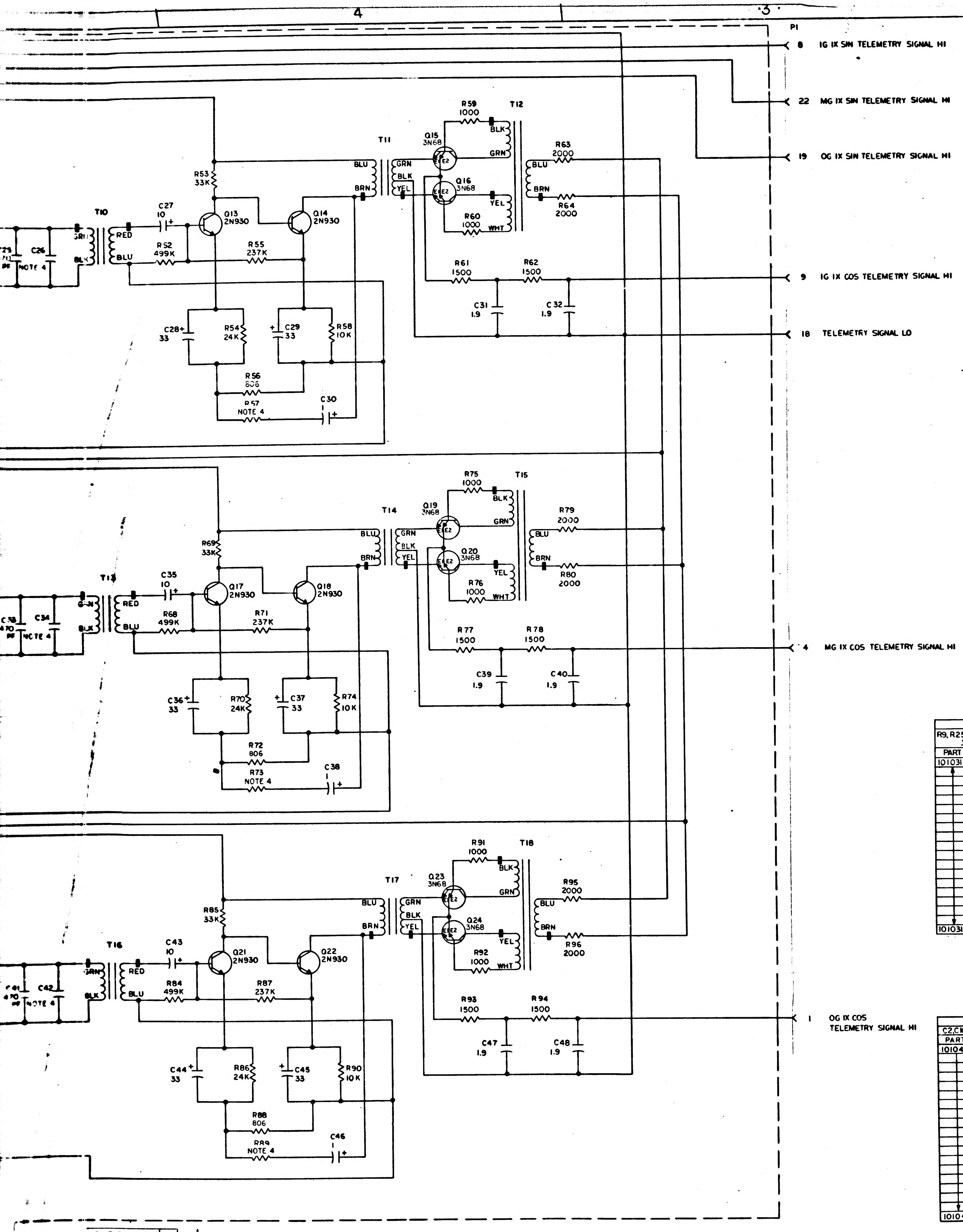

P1
+20V DC 14
0V DC 15
IMU 28V 800CPS 1Ø REF
HI 17
LO 16
16 1X SIN SIGNAL INPUT
HI 10
LO 12
R1 499K
R2 499K
R3 52.3K
C1 220 PF
C2 NOTE 4
T1
GRN
BLK
RED
BLU
C3 10
R4 499K
Q1 2N930
Q2 2N930
R5 33K
R7 237K
C4 33
R6 24K
C5 33
R10 10K
R8 806
R9 NOTE 4
C6
T2
BLU
BRN
GRN
BLK
YEL
Q3 3N68
Q4 3N68
R11 1000
R12 1000
T3
BLK
GRN
YEL
WHT
R15 2000
R16 2000
R13 1500
R14 1500
C7 1.9
C8 1.9
MG 1X SIN SIGNAL INPUT
HI 6
LO 23
R17 499K
R18 499K
R19 52.3K
C9 220 PF
C10 NOTE 4
T4
C11 10
R20 499K
Q5 2N930
Q6 2N930
R21 33K
R23 237K
C12 33
R22 24K
C13 33
R26 10K
R24 806
R25 NOTE 4
C14
T5
Q7 3N68
Q8 3N68
R27 1000
R28 1000
T6
R31 2000
R32 2000
R29 1500
R30 1500
C15 1.9
C16 1.9
SPARE 24
STRUCTURE GROUND 25
OG 1X SIN SIGNAL INPUT
HI 21
LO 20
R33 499K
R34 499K
R35 52.3K
C17 220 PF
C18 NOTE 4
T7
C19 10
R36 499K
Q9 2N930
Q10 2N930
R37 33K
R39 237K
C20 33
R38 24K
C21 33
R42 10K
R40 806
R41 NOTE 4
C22
T8
Q11 3N68
Q12 3N68
R43 1000
R44 1000
T9
R47 2000
R48 2000
R45 1500
R46 1500
C23 1.9
C24 1.9
16 1X COS SIGNAL INPUT
HI 11
LO 13
MG 1X COS SIGNAL INPUT
HI 7
LO 5
OG 1X COS SIGNAL INPUT
HI 3
LO 2
R49 499K
R50 499K
R51 52.3K
C25 220 PF
C26 NOTE 4
T10
C27 10
R52 499K
Q13 2N930
R53 33K
R55 237K
C28 33
R54 24K
C29 33
R56 806
R57 NOTE 4
R65 499K
R66 499K
R67 52.3K
C33 220 PF
C34 NOTE 4
T13
C35 10
R68 499K
Q17 2N930
R69 33K
R71 237K
C36 33
R70 24K
C37 33
R81 499K
R82 499K
R83 52.3K
C41 220 PF
C42 NOTE 4
T16
C43 10
R84 499K
Q21 2N930
R85 33K
R87 237K
C44 33
R86 24K
C45 33
R88 806
R89 NOTE 4

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST FROM CHARTS A AND B

1010244

REVISIONS Z1744

SYM	DESCRIPTION


P1
8 IG IX SIN TELEMETRY SIGNAL HI
22 MG IX SIN TELEMETRY SIGNAL HI
19 OG IX SIN TELEMETRY SIGNAL HI
9 IG IX COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG IX COS TELEMETRY SIGNAL HI
1 OG IX COS TELEMETRY SIGNAL HI
T10
T11
T12
T13
T14
T15
T16
T17
T18
Q13 2N930
Q14 2N930
Q15 3N68
Q16 3N68
Q17 2N930
Q18 2N930
Q19 3N68
Q20 3N68
Q21 2N930
Q22 2N930
Q23 3N68
Q24 3N68
R53 33K
R52 499K
R55 237K
R54 24K
R58 10K
R56 806
R57 NOTE 4
R59 1000
R60 1000
R61 1500
R62 1500
R63 2000
R64 2000
C27 10
C28 33
C29 33
C30 1
C31 1.9
C32 1.9
C26 NOTE 4
R69 33K
R68 499K
R71 237K
R70 24K
R74 10K
R72 806
R73 NOTE 4
R75 1000
R76 1000
R77 1500
R78 1500
R79 2000
R80 2000
C35 10
C36 33
C37 33
C38 1
C39 1.9
C40 1.9
C34 NOTE 4
R85 33K
R84 499K
R87 237K
R86 24K
R90 10K
R88 806
R89 NOTE 4
R91 1000
R92 1000
R93 1500
R94 1500
R95 2000
R96 2000
C43 10
C44 33
C45 33
C46 1
C47 1.9
C48 1.9
C41 470 PF
C42 NOTE 4
RED
BLU
BLK
GRN
BRN
YEL
WHT
E2

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
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R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-117		806	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-117		806	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-117		806	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-9	CAPACITOR	470 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006755-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C4	1006755-34	CAPACITOR	33	±10%	20 VDC
C5	1006755-34		33	±10%	20 VDC
C6	1006755-69		1	±10%	35 VDC
C7	1010279-16		1.9	±10%	6 VDC
C8	1010279-16		1.9	±10%	6 VDC
C9	1010410-9		470 PF	±2%	500 VDC
C10	SEE NOTE 4			±2%	
C11	1006755-31		10	±10%	20 VDC
C12	1006755-34		33	±10%	20 VDC
C13	1006755-34		33	±10%	20 VDC
C14	1006755-69		1	±10%	35 VDC
C15	1010279-16		1.9	±10%	6 VDC
C16	1010279-16		1.9	±10%	6 VDC
C17	1010410-9		470 PF	±2%	500 VDC
C18	SEE NOTE 4			±2%	
C19	1006755-31		10	±10%	20 VDC
C20	1006755-34		33	±10%	20 VDC
C21	1006755-34		33	±10%	20 VDC
C22	1006755-69		1	±10%	35 VDC
C23	1010279-16		1.9	±10%	6 VDC
C24	1010279-16		1.9	±10%	6 VDC
C25	1010410-9		470 PF	±2%	500 VDC
C26	SEE NOTE 4			±2%	
C27	1006755-31		10	±10%	20 VDC
C28	1006755-34		33	±10%	20 VDC
C29	1006755-34		33	±10%	20 VDC
C30	1006755-69		1	±10%	35 VDC
C31	1010279-16		1.9	±10%	6 VDC
C32	1010279-16		1.9	±10%	6 VDC
C33	1010410-9		470 PF	±2%	500 VDC
C34	SEE NOTE 4			±2%	
C35	1006755-31		10	±10%	20 VDC
C36	1006755-34		33	±10%	20 VDC
C37	1006755-34		33	±10%	20 VDC
C38	1006755-69		1	±10%	35 VDC
C39	1010279-16		1.9	±10%	6 VDC
C40	1010279-16		1.9	±10%	6 VDC
C41	1010410-9		470 PF	±2%	500 VDC
C42	SEE NOTE 4			±2%	
C43	1006755-31		10	±10%	20 VDC
C44	1006755-34		33	±10%	20 VDC
C45	1006755-34		33	±10%	20 VDC
C46	1006755-69		1	±10%	35 VDC
C47	1010279-16		1.9	±10%	6 VDC
C48	1010279-16	CAPACITOR	1.9	±10%	6 VDC
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010712				
T5	1010324				
T6	1010323				
T7	1010712				
T8	1010324				
T9	1010323				
T10	1010712				
T11	1010324				
T12	1010323				
T13	1010712				
T14	1010324				
T15	1010323				
T16	1010712				
T17	1010324				
T18	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010397-1	TRANSISTOR	2N930		
Q15	1010367	CHOPPER	3N68		
Q16	1010367	CHOPPER	3N68		
Q17	1010397-1	TRANSISTOR	2N930		
Q18	1010397-1	TRANSISTOR	2N930		
Q19	1010367	CHOPPER	3N68		
Q20	1010367	CHOPPER	3N68		
Q21	1010397-1	TRANSISTOR	2N930		
Q22	1010397-1	TRANSISTOR	2N930		
Q23	1010367	CHOPPER	3N68		
Q24	1010367	CHOPPER	3N68		

CHART B

R9, R25, R41, R57, R73 & R89 ±1%, 1/10W

PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A

C2, C10, C18, C26, C34 & C42

PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

3 H

REF DWG:
SIGNAL CONDITIONER ASSEMBLY
GIMBAL RESOLVER
DWG NO. 1007664

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT
DRAWN R. Lemay DATE 5 Aug 65
CHECKED R. P. Kungelman 5 Aug 65
APPROVAL Bruce L. Hicks 8-6-65
APPROVAL Smith 23 Aug 65
NASA APPROVAL
MIT APPROVAL W Kupfer 2 Sept

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

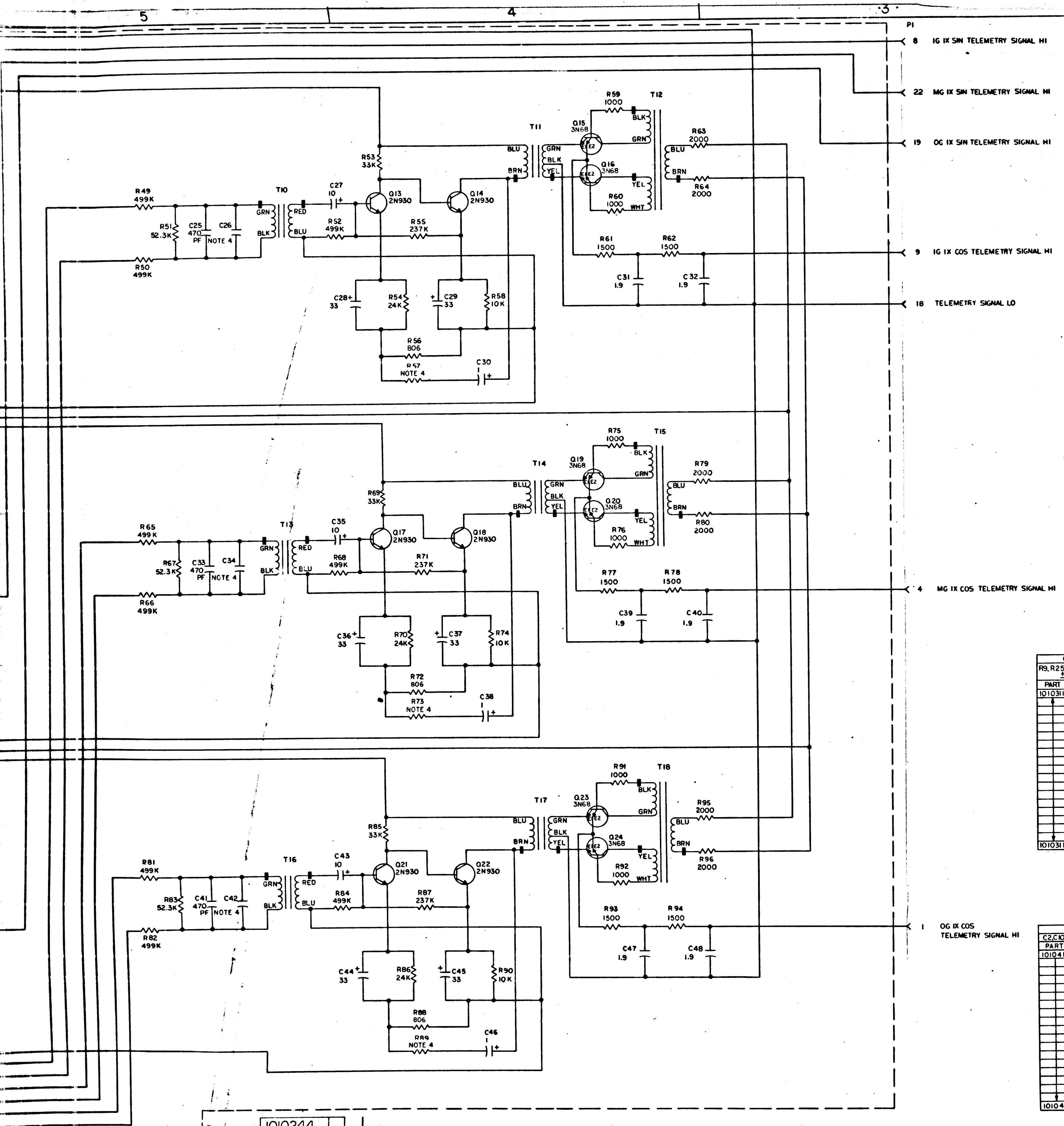
SCHEMATIC, SIGNAL CONDITIONER, GIMBAL RESOLVER

CODE IDENT NO —
SIZE J
NASA DRAWING NO 1010244
SCALE —
WT —
SHEET 1 OF 1

1010244

REVISIONS

SYM | DESCRIPTION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8 IG 1X SIN TELEMETRY SIGNAL HI
22 MG 1X SIN TELEMETRY SIGNAL HI
19 OG 1X SIN TELEMETRY SIGNAL HI
9 IG 1X COS TELEMETRY SIGNAL HI
18 TELEMETRY SIGNAL LO
4 MG 1X COS TELEMETRY SIGNAL HI
1 OG 1X COS TELEMETRY SIGNAL HI
R49 499K
R50 499K
R51 52.3K
C25 470 PF
C26 NOTE 4
T10
GRN
BLK
RED
BLU
C27 10
R52 499K
R53 33K
Q13 2N930
Q14 2N930
R55 237K
C28 33
R54 24K
C29 33
R58 10K
R56 806
R57 NOTE 4
C30
T11
BRN
YEL
Q15 3N68
Q16 3N68
R59 1000
R60 1000
T12
WHT
R63 2000
R64 2000
R61 1500
R62 1500
C31 1.9
C32 1.9
R65 499K
R66 499K
R67 52.3K
C33 470 PF
C34 NOTE 4
T13
C35 10
R68 499K
R69 33K
Q17 2N930
Q18 2N930
R71 237K
C36 33
R70 24K
C37 33
R74 10K
R72 806
R73 NOTE 4
C38
T14
Q19 3N68
Q20 3N68
R75 1000
R76 1000
T15
R79 2000
R80 2000
R77 1500
R78 1500
C39 1.9
C40 1.9
R81 499K
R82 499K
R83 52.3K
C41 470 PF
C42 NOTE 4
T16
C43 10
R84 499K
R85 33K
Q21 2N930
Q22 2N930
R87 237K
C44 33
R86 24K
C45 33
R90 10K
R88 806
R89 NOTE 4
C46
T17
Q23 3N68
Q24 3N68
R91 1000
R92 1000
T18
R95 2000
R96 2000
R93 1500
R94 1500
C47 1.9
C48 1.9
E1
E2
5
4
3
1010244

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1010364-769	RESISTOR	499 K	±1%	1/8 W
R2	1010364-769		499 K	±1%	1/8 W
R3	1010311-291		52.3 K	±1%	1/10 W
R4	1010364-769		499 K	±1%	1/8 W
R5	1006750-68		33 K	±2%	1/4 W
R6	1006750-65		24 K	±2%	1/4 W
R7	1010364-707		237 K	±1%	1/8 W
R8	1010311-117		806	±1%	1/10 W
R9	SEE NOTE 4			±1%	1/10 W
R10	1006750-56		10 K	±2%	1/4 W
R11	1010311-126		1000	±1%	1/10 W
R12	1010311-126		1000	±1%	1/10 W
R13	1006750-36		1500	±2%	1/4 W
R14	1006750-36		1500	±2%	1/4 W
R15	1006750-39		2000	±2%	1/4 W
R16	1006750-39		2000	±2%	1/4 W
R17	1010364-769		499 K	±1%	1/8 W
R18	1010364-769		499 K	±1%	1/8 W
R19	1010311-291		52.3 K	±1%	1/10 W
R20	1010364-769		499 K	±1%	1/8 W
R21	1006750-68		33 K	±2%	1/4 W
R22	1006750-65		24 K	±2%	1/4 W
R23	1010364-707		237 K	±1%	1/8 W
R24	1010311-117		806	±1%	1/10 W
R25	SEE NOTE 4			±1%	1/10 W
R26	1006750-56		10 K	±2%	1/4 W
R27	1010311-126		1000	±1%	1/10 W
R28	1010311-126		1000	±1%	1/10 W
R29	1006750-36		1500	±2%	1/4 W
R30	1006750-36		1500	±2%	1/4 W
R31	1006750-39		2000	±2%	1/4 W
R32	1006750-39		2000	±2%	1/4 W
R33	1010364-769		499 K	±1%	1/8 W
R34	1010364-769		499 K	±1%	1/8 W
R35	1010311-291		52.3 K	±1%	1/10 W
R36	1010364-769		499 K	±1%	1/8 W
R37	1006750-68		33 K	±2%	1/4 W
R38	1006750-65		24 K	±2%	1/4 W
R39	1010364-707		237 K	±1%	1/8 W
R40	1010311-117		806	±1%	1/10 W
R41	SEE NOTE 4			±1%	1/10 W
R42	1006750-56		10 K	±2%	1/4 W
R43	1010311-126		1000	±1%	1/10 W
R44	1010311-126		1000	±1%	1/10 W
R45	1006750-36		1500	±2%	1/4 W
R46	1006750-36		1500	±2%	1/4 W
R47	1006750-39		2000	±2%	1/4 W
R48	1006750-39		2000	±2%	1/4 W
R49	1010364-769		499 K	±1%	1/8 W
R50	1010364-769		499 K	±1%	1/8 W
R51	1010311-291		52.3 K	±1%	1/10 W
R52	1010364-769		499 K	±1%	1/8 W
R53	1006750-68		33 K	±2%	1/4 W
R54	1006750-65		24 K	±2%	1/4 W
R55	1010364-707		237 K	±1%	1/8 W
R56	1010311-117		806	±1%	1/10 W
R57	SEE NOTE 4			±1%	1/10 W
R58	1006750-56		10 K	±2%	1/4 W
R59	1010311-126		1000	±1%	1/10 W
R60	1010311-126		1000	±1%	1/10 W
R61	1006750-36		1500	±2%	1/4 W
R62	1006750-36		1500	±2%	1/4 W
R63	1006750-39		2000	±2%	1/4 W
R64	1006750-39		2000	±2%	1/4 W
R65	1010364-769		499 K	±1%	1/8 W
R66	1010364-769		499 K	±1%	1/8 W
R67	1010311-291		52.3 K	±1%	1/10 W
R68	1010364-769		499 K	±1%	1/8 W
R69	1006750-68		33 K	±2%	1/4 W
R70	1006750-65		24 K	±2%	1/4 W
R71	1010364-707		237 K	±1%	1/8 W
R72	1010311-117		806	±1%	1/10 W
R73	SEE NOTE 4			±1%	1/10 W
R74	1006750-56		10 K	±2%	1/4 W
R75	1010311-126		1000	±1%	1/10 W
R76	1010311-126		1000	±1%	1/10 W
R77	1006750-36		1500	±2%	1/4 W
R78	1006750-36		1500	±2%	1/4 W
R79	1006750-39		2000	±2%	1/4 W
R80	1006750-39		2000	±2%	1/4 W
R81	1010364-769		499 K	±1%	1/8 W
R82	1010364-769		499 K	±1%	1/8 W
R83	1010311-291		52.3 K	±1%	1/10 W
R84	1010364-769		499 K	±1%	1/8 W
R85	1006750-68		33 K	±2%	1/4 W
R86	1006750-65		24 K	±2%	1/4 W
R87	1010364-707		237 K	±1%	1/8 W
R88	1010311-117		806	±1%	1/10 W
R89	SEE NOTE 4			±1%	1/10 W
R90	1006750-56		10 K	±2%	1/4 W
R91	1010311-126		1000	±1%	1/10 W
R92	1010311-126		1000	±1%	1/10 W
R93	1006750-36		1500	±2%	1/4 W
R94	1006750-36		1500	±2%	1/4 W
R95	1006750-39		2000	±2%	1/4 W
R96	1006750-39	RESISTOR	2000	±2%	1/4 W
C1	1010410-9	CAPACITOR	470 PF	±2%	500 VDC
C2	SEE NOTE 4			±2%	
C3	1006755-31		10 UF	±10%	20 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C4	1006755-34	CAPACITOR	33	±10%	20 VDC
C5	1006755-34		33	±10%	20 VDC
C6	1006755-69		1	±10%	35 VDC
C7	1010279-16		1.9	±10%	6 VDC
C8	1010279-16		1.9	±10%	6 VDC
C9	1010410-9		470 PF	± 2%	500 VDC
C10	SEE NOTE 4			± 2%	
C11	1006755-31		10	±10%	20 VDC
C12	1006755-34		33	±10%	20 VDC
C13	1006755-34		33	±10%	20 VDC
C14	1006755-69		1	±10%	35 VDC
C15	1010279-16		1.9	±10%	6 VDC
C16	1010279-16		1.9	±10%	6 VDC
C17	1010410-9		470 PF	± 2%	500 VDC
C18	SEE NOTE 4			± 2%	
C19	1006755-31		10	±10%	20 VDC
C20	1006755-34		33	±10%	20 VDC
C21	1006755-34		33	±10%	20 VDC
C22	1006755-69		1	±10%	35 VDC
C23	1010279-16		1.9	±10%	6 VDC
C24	1010279-16		1.9	±10%	6 VDC
C25	1010410-9		470 PF	± 2%	500 VDC
C26	SEE NOTE 4			± 2%	
C27	1006755-31		10	±10%	20 VDC
C28	1006755-34		33	±10%	20 VDC
C29	1006755-34		33	±10%	20 VDC
C30	1006755-69		1	±10%	35 VDC
C31	1010279-16		1.9	±10%	6 VDC
C32	1010279-16		1.9	±10%	6 VDC
C33	1010410-9		470 PF	± 2%	500 VDC
C34	SEE NOTE 4			± 2%	
C35	1006755-31		10	±10%	20 VDC
C36	1006755-34		33	±10%	20 VDC
C37	1006755-34		33	±10%	20 VDC
C38	1006755-69		1	±10%	35 VDC
C39	1010279-16		1.9	±10%	6 VDC
C40	1010279-16		1.9	±10%	6 VDC
C41	1010410-9		470 PF	± 2%	500 VDC
C42	SEE NOTE 4			± 2%	
C43	1006755-31		10	±10%	20 VDC
C44	1006755-34		33	±10%	20 VDC
C45	1006755-34		33	±10%	20 VDC
C46	1006755-69		1	±10%	35 VDC
C47	1010279-16		1.9	±10%	6 VDC
C48	1010279-16	CAPACITOR	1.9	±10%	6 VDC
T1	1010712	TRANSFORMER			
T2	1010324				
T3	1010323				
T4	1010712				
T5	1010324				
T6	1010323				
T7	1010712				
T8	1010324				
T9	1010323				
T10	1010712				
T11	1010324				
T12	1010323				
T13	1010712				
T14	1010324				
T15	1010323				
T16	1010712				
T17	1010324				
T18	1010323	TRANSFORMER			
Q1	1010397-1	TRANSISTOR	2N930		
Q2	1010397-1	TRANSISTOR	2N930		
Q3	1010367	CHOPPER	3N68		
Q4	1010367	CHOPPER	3N68		
Q5	1010397-1	TRANSISTOR	2N930		
Q6	1010397-1	TRANSISTOR	2N930		
Q7	1010367	CHOPPER	3N68		
Q8	1010367	CHOPPER	3N68		
Q9	1010397-1	TRANSISTOR	2N930		
Q10	1010397-1	TRANSISTOR	2N930		
Q11	1010367	CHOPPER	3N68		
Q12	1010367	CHOPPER	3N68		
Q13	1010397-1	TRANSISTOR	2N930		
Q14	1010397-1	TRANSISTOR	2N930		
Q15	1010367	CHOPPER	3N68		
Q16	1010367	CHOPPER	3N68		
Q17	1010397-1	TRANSISTOR	2N930		
Q18	1010397-1	TRANSISTOR	2N930		
Q19	1010367	CHOPPER	3N68		
Q20	1010367	CHOPPER	3N68		
Q21	1010397-1	TRANSISTOR	2N930		
Q22	1010397-1	TRANSISTOR	2N930		
Q23	1010367	CHOPPER	3N68		
Q24	1010367	CHOPPER	3N68		

CHART B

R9, R25, R41, R57, R73 & R89 ±1%, 1/10W

PART NO.	VALUE
1010311-296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311-314	90.9 K

CHART A

C2, C10, C18, C26, C34 & C42

PART NO.	VALUE	±2%
1010410-1	220 PF	500 VDC
-2	240	
-3	270	
-4	300	
-5	330	
-6	360	
-7	390	
-8	430	
-9	470	
-10	510	
-11	560	300 VDC
-12	620	
-13	680	
-14	750	
-15	820	
-16	910	
-17	1000	
-18	1100	
1010410-19	1200 PF	

REF DWG:
SIGNAL CONDITIONER
GIMBAL RESOLVER
DWG NO. 1007664

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

LIST OF MATERIALS

NEXT ASSY | USED ON

APPLICATION

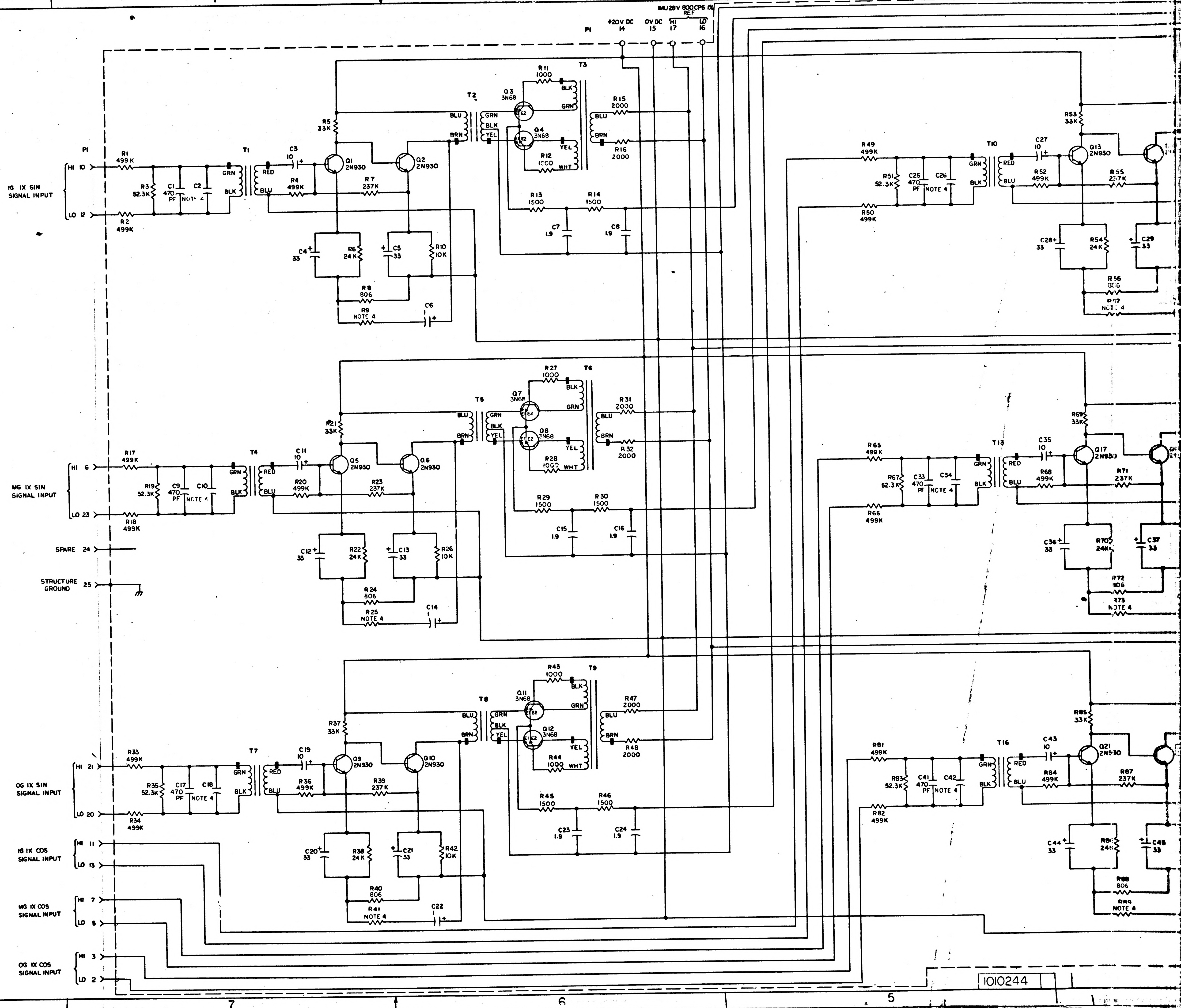
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL —
HEAT TREATMENT —
FINAL FINISH —

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS
CONTRACT
DRAWN L. Penney DATE 5 Aug 65
CHECKED C.P. Kingsbury 5 Aug 65
APPROVAL Bruce 8-6-65
APPROVAL 23 Aug
NASA APPROVAL
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON TEXAS

SCHEMATIC,
SIGNAL CONDITIONER
GIMBAL RESOLVER

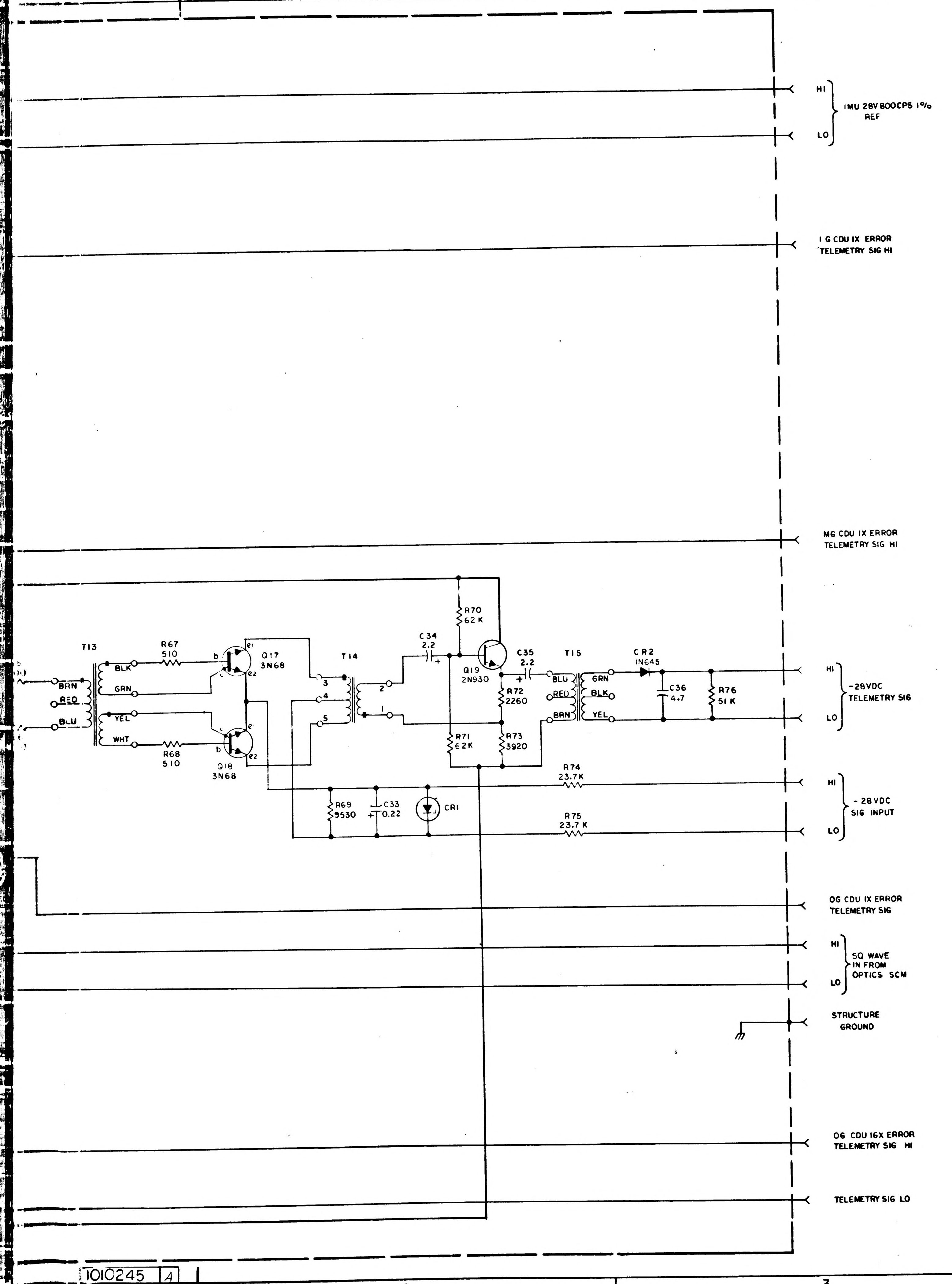
CODE IDENT NO —
SIZE J
1010244
SCALE —
WT —


IMU 28V 800CPS 1Ø
REF
+20V DC 14
0V DC 15
HI 17
LO 16
P1
IG IX SIN SIGNAL INPUT
HI 10
LO 12
MG IX SIN SIGNAL INPUT
HI 6
LO 23
SPARE 24
STRUCTURE GROUND 25
OG IX SIN SIGNAL INPUT
HI 21
LO 20
IG IX COS SIGNAL INPUT
HI 11
LO 13
MG IX COS SIGNAL INPUT
HI 7
LO 5
OG IX COS SIGNAL INPUT
HI 3
LO 2
R1 499K
R2 499K
R3 52.3K
C1 470 PF
C2 NOTE 4
T1
GRN
BLK
RED
BLU
C3 10
R4 499K
Q1 2N930
Q2 2N930
R5 33K
R7 237K
C4 33
R6 24K
C5 33
R10 10K
R8 806
R9 NOTE 4
C6
T2
Q3 3N68
Q4 3N68
R11 1000
R12 1000
T3
R15 2000
R16 2000
R13 1500
R14 1500
C7 1.9
C8 1.9
YEL
WHT
BRN
R17 499K
R18 499K
R19 52.3K
C9 470 PF
C10 NOTE 4
T4
C11 10
R20 499K
Q5 2N930
Q6 2N930
R21 33K
R23 237K
C12 33
R22 24K
C13 33
R26 10K
R24 806
R25 NOTE 4
C14
T5
Q7 3N68
Q8 3N68
R27 1000
R28 1000
T6
R31 2000
R32 2000
R29 1500
R30 1500
C15 1.9
C16 1.9
R33 499K
R34 499K
R35 52.3K
C17 470 PF
C18 NOTE 4
T7
C19 10
R36 499K
Q9 2N930
Q10 2N930
R37 33K
R39 237K
C20 33
R38 24K
C21 33
R42 10K
R40 806
R41 NOTE 4
C22
T8
Q11 3N68
Q12 3N68
R43 1000
R44 1000
T9
R47 2000
R48 2000
R45 1500
R46 1500
C23 1.9
C24 1.9
R49 499K
R50 499K
R51 52.3K
C25 470 PF
C26 NOTE 4
T10
C27 10
R52 499K
Q13 2N930
R53 33K
R55 237K
C28 33
R54 24K
C29 33
R56 806
R57 NOTE 4
R65 499K
R66 499K
R67 52.3K
C33 470 PF
C34 NOTE 4
T13
C35 10
R68 499K
Q17 2N930
R69 33K
R71 237K
C36 33
R70 24K
C37 33
R72 806
R73 NOTE 4
R81 499K
R82 499K
R83 52.3K
C41 470 PF
C42 NOTE 4
T16
C43 10
R84 499K
Q21 2N930
R85 33K
R87 237K
C44 33
R86 24K
C45 33
R88 806
R89 NOTE 4
1010244

NOTES:
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. RESISTOR VALUES ARE EXPRESSED IN OHMS UNLESS OTHERWISE SPECIFIED
3. CAPACITOR VALUES ARE EXPRESSED IN MICROFARADS UNLESS OTHERWISE SPECIFIED
4. VALUE TO BE DETERMINED BY ELECTRICAL TEST FROM CHARTS A AND B

F1

REVISIONS 22267						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22849				



HI
LO
IMU 28V 800CPS 1%
REF
I G CDU IX ERROR
TELEMETRY SIG HI
MG CDU IX ERROR
TELEMETRY SIG HI
T13
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67
510
R68
510
b
e1
e2
Q17
3N68
Q18
3N68
T14
3
4
5
2
1
C34
2.2
R70
62 K
Q19
2N930
R71
62K
R72
2260
R73
3920
C35
2.2
T15
BLU
RED
BRN
GRN
BLK
YEL
CR2
IN645
C36
4.7
R76
51 K
HI
LO
-28VDC
TELEMETRY SIG
R74
23.7K
R75
23.7 K
R69
9530
C33
0.22
CR1
HI
LO
- 28 VDC
SIG INPUT
OG CDU IX ERROR
TELEMETRY SIG
HI
LO
SQ WAVE
IN FROM
OPTICS SCM
STRUCTURE
GROUND
OG CDU 16X ERROR
TELEMETRY SIG HI
TELEMETRY SIG LO

R37, R38, R39	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C5, C6, C7			
PART NO.	VALUE	TOL	RATING
1010410 - 1	220 UUF	± 2%	500 VDC
- 2	240		
- 3	270		
- 4	300		
- 5	330		
- 6	360		
- 7	390		
- 8	430		
- 9	470		
- 10	510		500
- 11	560		300
- 12	620		
- 13	680		
- 14	750		
- 15	820		
- 16	910		
- 17	1000		
- 18	1100		
1010410 - 19	1200	± 2%	300 VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364 - 653	RESISTOR	124K	± 1%	1/8 W
R 2	- 653		124K		
R 3	- 653		124K		
R 4	- 653		124K		
R 5	- 653		124K		
R 6	1010364 - 653		124K	± 1%	1/8 W
R 7	1006750 - 109		535	± 2%	1/4 W
R 8	1012078 - 15		10	± 5%	1/2 W
R 9	1010311 - 291		52.3K	± 1%	1/10W
R 10	1010311 - 291		52.3K	± 1%	1/10W
R 11	1010311 - 291	RESISTOR	52.3K	± 1%	1/10W
R 13	1010364 - 769	RESISTOR	499K	± 1%	1/8 W
R 14	1010364 - 769		499K	± 1%	1/8 W
R 15	1010364 - 769		499K	± 1%	1/8 W
R 16	1010364 - 769		499K	± 1%	1/8 W
R 17	1006750 - 68		33K	± 2%	1/4 W
R 18	1006750 - 65		24K	± 2%	1/4 W
R 19	1010311 - 126		1000	± 1%	1/10W
R 20	1006750 - 68		33K	± 2%	1/4 W
R 21	1006750 - 65		24K	± 2%	1/4 W
R 22	1010311 - 126		1000	± 1%	1/10W
R 23	1006750 - 68		33K	± 2%	1/4 W
R 24	1006750 - 65		24K	± 2%	1/4 W
R 25	1010311 - 126		1000	± 1%	1/10 W
R 26	1006750 - 72		47K	± 2%	1/4 W
R 27	1006750 - 65		24K	± 2%	1/4 W
R 28	1010311 - 118		825	± 1%	1/10 W
R 29	1010364 - 707		237K		1/8 W
R 30	1010364 - 707		237K		1/8 W
R 31	1010364 - 707		237K		1/8 W
R 32	1010364 - 707		237K	± 1%	1/8 W
R 33	1006750 - 56		10K	± 2%	1/4 W
R 34	1006750 - 56		10K	± 2%	1/4 W
R 35	1006750 - 56		10K	± 2%	1/4 W
R 36	1006750 - 56		10K	± 2%	1/4 W
R 37	SEE NOTE 2		NOM	± 1%	1/10 W
R 38	SEE NOTE 2		NOM	± 1%	1/10 W
R 39	SEE NOTE 2		NOM	± 1%	1/10 W
R 40	1010311 - 315		93.1K	± 1%	1/10 W
R 41	1006750 - 36		1500	± 2%	1/4 W
R 42	- 36		1500		
R 43	- 36		1500		
R 44	- 36		1500		
R 45	- 36		1500		
R 46	- 36		1500		
R 47	- 36		1500		
R 48	1006750 - 36		1500	± 2%	1/4 W
R 49	1010311 - 126		1000	± 1%	1/10 W
R 50	- 126		1000		
R 51	- 126		1000		
R 52	- 126		1000		
R 53	- 126		1000		
R 54	- 126		1000		
R 55	- 1		49.9		
R 56	1010311 - 1		49.9	± 1%	1/10 W
R 57	1006750 - 39		2000	± 2%	1/4 W
R 58	- 39		2000		
R 59	- 39		2000		
R 60	- 39		2000		
R 61	- 39		2000		
R 62	- 39		2000		
R 63	- 39		2000		
R 64	- 39		2000		
R 65	- 48		4700		
R 66	- 48		4700		
R 67	- 25		510		
R 68	1006750 - 25		510	± 2%	1/4 W
R 69	1010364 - 439		9530	± 1%	1/8 W
R 70	1006750 - 75		62K	± 2%	1/4 W
R 71	1006750 - 75		62K	± 2%	1/4 W
R 72	1010364 - 319		2260	± 1%	1/8 W
R 73	1010364 - 365		3920	± 1%	1/8 W
R 74	1010364 - 515		23.7K	± 1%	1/8 W
R 75	1010364 - 515		23.7K	± 1%	1/8 W
R 76	1006750 - 73	RESISTOR	51K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010410 - 9	CAPACITOR	470 UUF	± 2%	500VDC
C 2	1010410 - 9		470 UUF	± 2%	500
C 3	1010410 - 9		470 UUF	± 2%	500
C 4	1006755 - 133		18	± 10%	50
C 5	SEE NOTE 2		NOM	± 2 %	—
C 6	SEE NOTE 2		NOM		—
C 7	SEE NOTE 2		NOM		—
C 8	1010410 - 5		330 UUF	± 2%	500
C 9	1006755 - 31		10	± 10%	20
C 10	- 31		10		
C 11	- 31		10		
C 12	- 31		10		
C 13	- 34		33		
C 14	- 34		33		
C 15	- 34		33		
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	- 34		33		20
C 19	- 69		1.0		35
C 20	- 34		33		20
C 21	- 69		1.0		35
C 22	- 34		33		20
C 23	- 69		1.0		35
C 24	1006755 - 34		33		20
C 25	1010279 - 16		1.9		6
C 26	- 16		1.9		
C 27	- 16		1.9		
C 28	- 16		1.9		
C 29	- 16		1.9		
C 30	- 16		1.9		
C 31	- 16		1.9		
C 32	1010279 - 16		1.9		6
C 33	1010393 - 021		0.22		50
C 34	1010393 - 033		2.2		50
C 35	1010393 - 033		2.2		50
C 36	1010393 - 037	CAPACITOR	4.7	± 10%	50 VDC
CR1	1010372 - 13	DIODE			
CR2	1010362 - 001	DIODE	IN645		
CR3	1010362 - 001	DIODE	IN645		
CR4	1010362 - 001	DIODE	IN645		
Q1	1010397 - 1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8	1010397 - 1		2N930		
Q9	1010367		3N68		
Q10					
Q11					
Q12					
Q13					
Q14					
Q15					
Q16					
Q17					
Q18	1010367		3N68		
Q19	1010397 - 1	TRANSISTOR	2N930		
T1	1008832	TRANSFORMER			
T2	1008832				
T3	1008832				
T4	1008832				
T5	1010324				
T6	1010324				
T7	1010324				
T8	1010324				
T9	1010323				
T10					
T11					
T12					
T13	1010323				
T14	1010710				
T15	1010324	TRANSFORMER			

REF DWG:
SIGNAL CONDITIONER ASSY
RESOLVER CDU
DWG NO. 1007665

3H

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL —

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
APPROVED MSC
DATE

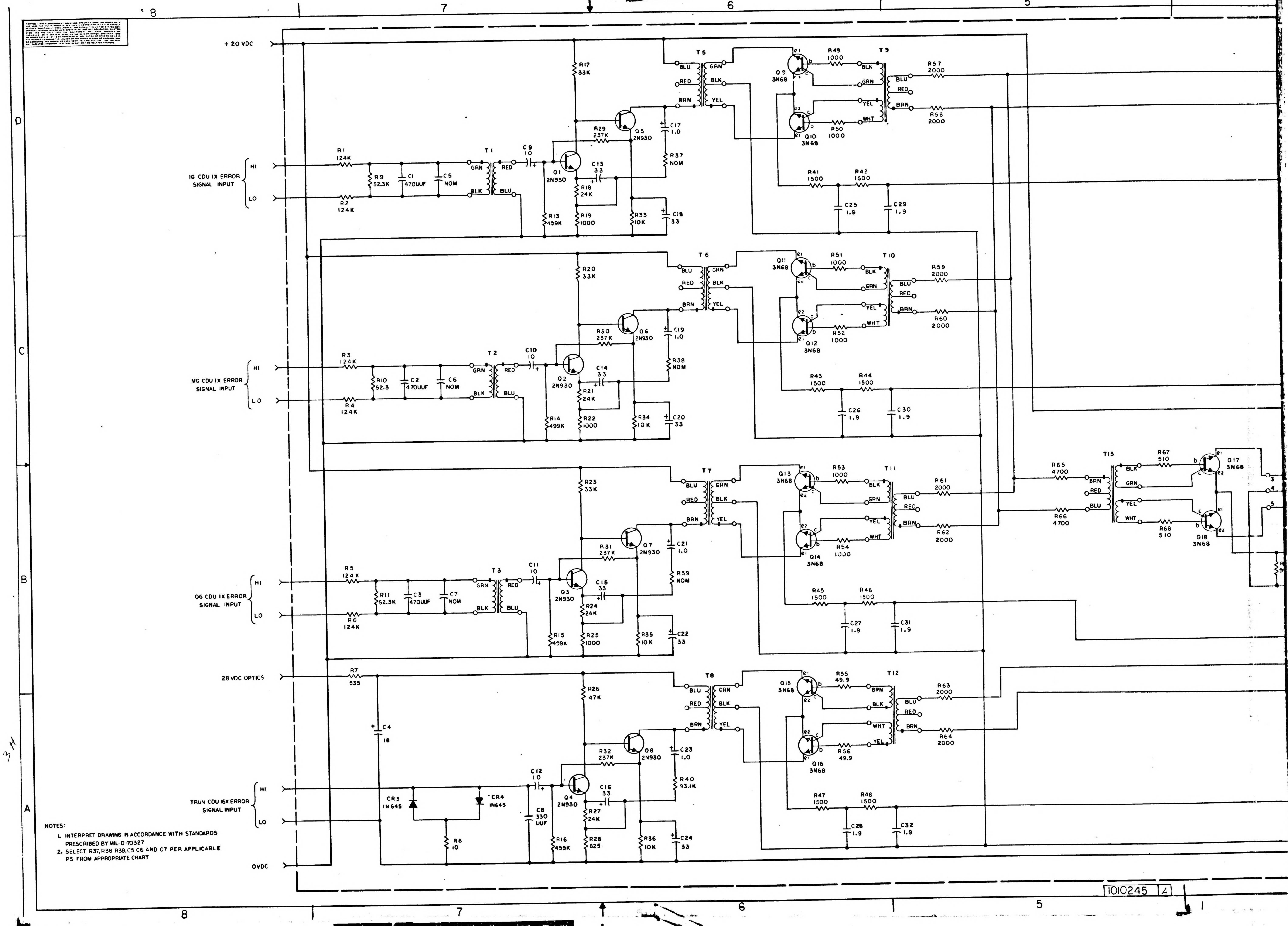
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER, RESOLVER CDU

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010245
SCALE —
SHEET 1 OF 1

1010245 A

2/1010245


8
7
6
5
D
C
B
A
+ 20 VDC
IG CDU 1X ERROR SIGNAL INPUT
HI
LO
R1 124K
R2 124K
R9 52.3K
C1 470UUF
C5 NOM
T1
GRN
BLK
RED
BLU
C9 10
Q1 2N930
R13 499K
R17 33K
R18 24K
R19 1000
R29 237K
C13 33
Q5 2N930
C17 1.0
R37 NOM
R33 10K
C18 33
T5
Q9 3N68
Q10 3N68
R49 1000
R50 1000
T9
R57 2000
R58 2000
R41 1500
R42 1500
C25 1.9
C29 1.9
MG CDU 1X ERROR SIGNAL INPUT
R3 124K
R4 124K
R10 52.3
C2 470UUF
C6 NOM
T2
C10 10
Q2 2N930
R14 499K
R20 33K
R21 24K
R22 1000
R30 237K
C14 33
Q6 2N930
C19 1.0
R38 NOM
R34 10K
C20 33
T6
Q11 3N68
Q12 3N68
R51 1000
R52 1000
T10
R59 2000
R60 2000
R43 1500
R44 1500
C26 1.9
C30 1.9
OG CDU 1X ERROR SIGNAL INPUT
R5 124K
R6 124K
R11 52.3K
C3 470UUF
C7 NOM
T3
C11 10
Q3 2N930
R15 499K
R23 33K
R24 24K
R25 1000
R31 237K
C15 33
Q7 2N930
C21 1.0
R39 NOM
R35 10K
C22 33
T7
Q13 3N68
Q14 3N68
R53 1000
R54 1000
T11
R61 2000
R62 2000
R45 1500
R46 1500
C27 1.9
C31 1.9
T13
R65 4700
R66 4700
R67 510
R68 510
Q17 3N68
Q18 3N68
28 VDC OPTICS
R7 535
C4 18
TRUN CDU 16X ERROR SIGNAL INPUT
CR3 IN645
CR4 IN645
R8 10
C8 330 UUF
C12 10
Q4 2N930
R16 499K
R26 47K
R27 24K
R28 825
R32 237K
C16 33
Q8 2N930
C23 1.0
R40 93.1K
R36 10K
C24 33
T8
Q15 3N68
Q16 3N68
R55 49.9
R56 49.9
T12
R63 2000
R64 2000
R47 1500
R48 1500
C28 1.9
C32 1.9
OVDC
3
4
5

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS, OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R37, R38 R39, C5 C6 AND C7 PER APPLICABLE PS FROM APPROPRIATE CHART

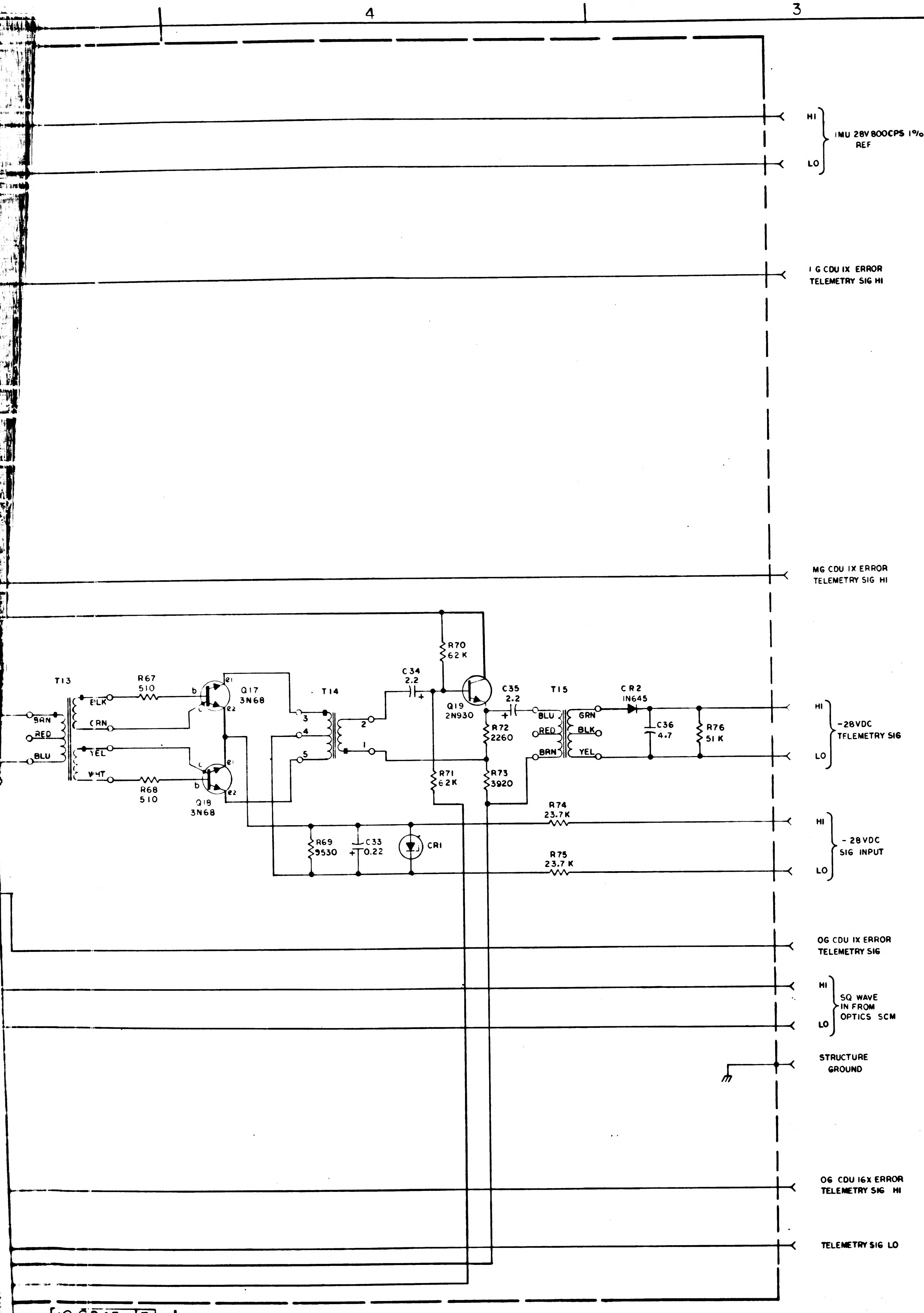
3H

1010245 A

1/1010245

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22849				
B		REVISED PER TDRR 23209				

REVISIONS 22207



HI
LO
IMU 28V 800CPS 1%
REF
I G CDU 1X ERROR
TELEMETRY SIG HI
MG CDU 1X ERROR
TELEMETRY SIG HI
T13
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67
510
R68
510
Q17
3N68
Q18
3N68
b
c
e1
e2
T14
3
4
5
2
1
C34
2.2
R70
62 K
Q19
2N930
C35
2.2
R72
2260
R71
62K
R73
3920
T15
BLU
RED
BRN
GRN
BLK
YEL
CR2
1N645
C36
4.7
R76
51 K
HI
LO
-28VDC
TELEMETRY SIG
R69
9530
C33
0.22
CR1
R74
23.7K
R75
23.7 K
HI
LO
- 28VDC
SIG INPUT
OG CDU 1X ERROR
TELEMETRY SIG
HI
LO
SQ WAVE
IN FROM
OPTICS SCM
STRUCTURE
GROUND
OG CDU 16X ERROR
TELEMETRY SIG HI
TELEMETRY SIG LO

R37, R38, R39	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	6..9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C5, C6, C7			
PART NO.	VALUE	TOL	RATING
1010410 - 1	220 UUF	± 2%	500VDC
- 2	240		
- 3	270		
- 4	300		
- 5	330		
- 6	360		
- 7	390		
- 8	430		
- 9	470		
- 10	510		500
- 11	560		300
- 12	620		
- 13	680		
- 14	750		
- 15	820		
- 16	910		
- 17	1000		
- 18	1100		
1010410 - 19	1200	± 2%	300VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364 - 653	RESISTOR	124K	± 1%	1/8 W
R 2	- 653		124K		
R 3	- 653		124K		
R 4	- 653		124K		
R 5	- 653		124K		
R 6	1010364 - 653		124K	± 1%	1/8 W
R 7	1006750 - 109		535	± 2%	1/4 W
R 8	1010278 - 15		10	± 5%	1/2 W
R 9	1010311 - 291		52.3K	± 1%	1/10W
R 10	1010311 - 291		52.3K	± 1%	1/10W
R 11	1010311 - 291	RESISTOR	52.3K	± 1%	1/10W
R 13	1010364 - 769	RESISTOR	499K	± 1%	1/8 W
R 14	1010364 - 769		499K	± 1%	1/8 W
R 15	1010364 - 769		499K	± 1%	1/8 W
R 16	1010364 - 769		499K	± 1%	1/8 W
R 17	1006750 - 68		33K	± 2%	1/4 W
R 18	1006750 - 65		24K	± 2%	1/4 W
R 19	1010311 - 126		1000	± 1%	1/10W
R 20	1006750 - 68		33K	± 2%	1/4 W
R 21	1006750 - 65		24K	± 2%	1/4 W
R 22	1010311 - 126		1000	± 1%	1/10W
R 23	1006750 - 68		33K	± 2%	1/4 W
R 24	1006750 - 65		24K	± 2%	1/4 W
R 25	1010311 - 126		1000	± 1%	1/10 W
R 26	1006750 - 72		47K	± 2%	1/4 W
R 27	1006750 - 65		24K	± 2%	1/4 W
R 28	1010311 - 118		825	± 1%	1/10 W
R 29	1010364 - 707		237K		1/8 W
R 30	1010364 - 707		237K		1/8 W
R 31	1010364 - 707		237K		1/8 W
R 32	1010364 - 707		237K	± 1%	1/8 W
R 33	1006750 - 56		10K	± 2%	1/4 W
R 34	1006750 - 56		10K	± 2%	1/4 W
R 35	1006750 - 56		10K	± 2%	1/4 W
R 36	1006750 - 56		10K	± 2%	1/4 W
R 37	SEE NOTE 2		NOM	± 1%	1/10 W
R 38	SEE NOTE 2		NOM	± 1%	1/10 W
R 39	SEE NOTE 2		NOM	± 1%	1/10 W
R 40	1010311 - 315		93.1K	± 1%	1/10 W
R 41	1006750 - 36		1500	± 2%	1/4 W
R 42	- 36		1500		
R 43	- 36		1500		
R 44	- 36		1500		
R 45	- 36		1500		
R 46	- 36		1500		
R 47	- 36		1500		
R 48	1006750 - 36		1500	± 2%	1/4 W
R 49	1010311 - 126		1000	± 1%	1/10 W
R 50	- 126		1000		
R 51	- 126		1000		
R 52	- 126		1000		
R 53	- 126		1000		
R 54	- 126		1000		
R 55	- 1		49.9		
R 56	1010311 - 1		49.9	± 1%	1/10 W
R 57	1006750 - 39		2000	± 2%	1/4 W
R 58	- 39		2000		
R 59	- 39		2000		
R 60	- 39		2000		
R 61	- 39		2000		
R 62	- 39		2000		
R 63	- 39		2000		
R 64	- 39		2000		
R 65	- 48		4700		
R 66	- 48		4700		
R 67	- 25		510		
R 68	1006750 - 25		510	± 2%	1/4 W
R 69	1010364 - 439		9530	± 1%	1/8 W
R 70	1006750 - 75		62K	± 2%	1/4 W
R 71	1006750 - 75		62K	± 2%	1/4 W
R 72	1010364 - 319		2260	± 1%	1/8 W
R 73	1010364 - 365		3920	± 1%	1/8 W
R 74	1010364 - 515		23.7K	± 1%	1/8 W
R 75	1010364 - 515		23.7K	± 1%	1/8 W
R 76	1006750 - 73	RESISTOR	51K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010410 - 9	CAPACITOR	470 UUF	± 2%	500VDC
C 2	1010410 - 9		470 UUF	± 2%	500
C 3	1010410 - 9		470 UUF	± 2%	500
C 4	1006755 - 133		18	± 10%	50
C 5	SEE NOTE 2		NOM	± 2%	—
C 6	SEE NOTE 2		NOM		—
C 7	SEE NOTE 2		NOM		—
C 8	1010410 - 5		330 UUF	± 2%	500
C 9	1006755 - 31		10	± 10%	20
C 10	- 31		10		
C 11	- 31		10		
C 12	- 31		10		
C 13	- 34		33		
C 14	- 34		33		
C 15	- 34		33		
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	- 34		33		20
C 19	- 69		1.0		35
C 20	- 34		33		20
C 21	- 69		1.0		35
C 22	- 34		33		20
C 23	- 69		1.0		35
C 24	1006755 - 34		33		20
C 25	1010279 - 16		1.9		6
C 26	- 16		1.9		
C 27	- 16		1.9		
C 28	- 16		1.9		
C 29	- 16		1.9		
C 30	- 16		1.9		
C 31	- 16		1.9		
C 32	1010279 - 16		1.9		6
C 33	1010393 - 021		0.22		50
C 34	1010393 - 033		2.2		50
C 35	1010393 - 033		2.2		50
C 36	1010393 - 037	CAPACITOR	4.7	± 10%	50 VDC
CR1	1010372 - 13	DIODE			
CR2	1010362 - 001	DIODE	1N645		
CR3	1010362 - 001	DIODE	1N645		
CR4	1010362 - 001	DIODE	1N645		
Q1	1010397 - 1	TRANSISTOR	2N930		
Q2					
Q3					
Q4					
Q5					
Q6					
Q7					
Q8	1010397 - 1		2N930		
Q9	1010367		3N68		
Q10					
Q11					
Q12					
Q13					
Q14					
Q15					
Q16					
Q17					
Q18	1010367		3N68		
Q19	1010397 - 1	TRANSISTOR	2N930		
T1	1008832	TRANSFORMER			
T2	1008832				
T3	1008832				
T4	1008832				
T5	1010324				
T6	1010324				
T7	1010324				
T8	1010324				
T9	1010323				
T10					
T11					
T12					
T13	1010323				
T14	1010710				
T15	1010324	TRANSFORMER			

REF DWG:
SIGNAL CONDITIONER ASSY
RESOLVER CDU
DWG NO. 1007665

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY. USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT M G Murly
NOT REQUIRED PER LETTER
DATE

SCHEMATIC
SIGNAL CONDITIONER, RESOLVER CDU

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010245
SCALE —
SHEET 1 OF 1

1010245 B

10C245 B

27 1010245

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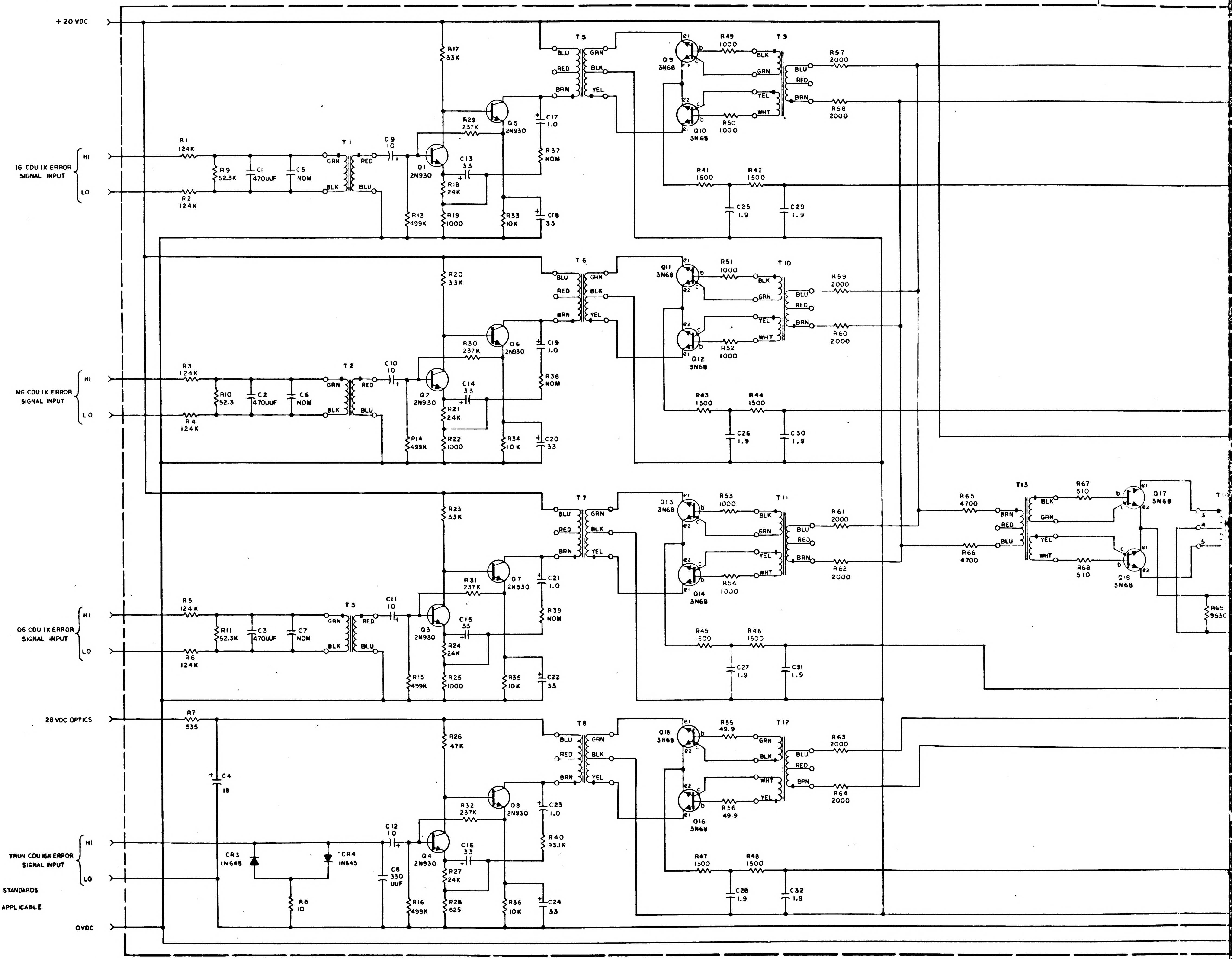

8
7
6
5
D
C
B
A
+ 20 VDC
IG CDU IX ERROR SIGNAL INPUT
HI
LO
MG CDU IX ERROR SIGNAL INPUT
OG CDU IX ERROR SIGNAL INPUT
28 VDC OPTICS
TRUN CDU 16X ERROR SIGNAL INPUT
OVDC
R1 124K
R2 124K
R3 124K
R4 124K
R5 124K
R6 124K
R7 535
R8 10
R9 52.3K
R10 52.3
R11 52.3K
C1 470UUF
C2 470UUF
C3 470UUF
C4 18
C5 NOM
C6 NOM
C7 NOM
C8 330 UUF
CR3 IN645
CR4 IN645
T1
T2
T3
T5
T6
T7
T8
T9
T10
T11
T12
T13
GRN
BLK
RED
BLU
BRN
YEL
WHT
C9 10
C10 10
C11 10
C12 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
Q7 2N930
Q8 2N930
R13 499K
R14 499K
R15 499K
R16 499K
R17 33K
R18 24K
R19 1000
R20 33K
R21 24K
R22 1000
R23 33K
R24 24K
R25 1000
R26 47K
R27 24K
R28 825
R29 237K
R30 237K
R31 237K
R32 237K
R33 10K
R34 10K
R35 10K
R36 10K
R37 NOM
R38 NOM
R39 NOM
R40 93.1K
C13 33
C14 33
C15 33
C16 33
C17 1.0
C18 33
C19 1.0
C20 33
C21 1.0
C22 33
C23 1.0
C24 33
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
Q13 3N68
Q14 3N68
Q15 3N68
Q16 3N68
Q17 3N68
Q18 3N68
e1
e2
b
c
R41 1500
R42 1500
R43 1500
R44 1500
R45 1500
R46 1500
R47 1500
R48 1500
R49 1000
R50 1000
R51 1000
R52 1000
R53 1000
R54 1000
R55 49.9
R56 49.9
R57 2000
R58 2000
R59 2000
R60 2000
R61 2000
R62 2000
R63 2000
R64 2000
R65 4700
R66 4700
R67 510
R68 510
R69 953
C25 1.9
C26 1.9
C27 1.9
C28 1.9
C29 1.9
C30 1.9
C31 1.9
C32 1.9
3
4
5

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R37, R38 R39, C5 C6 AND C7 PER APPLICABLE PS FROM APPROPRIATE CHART

3H

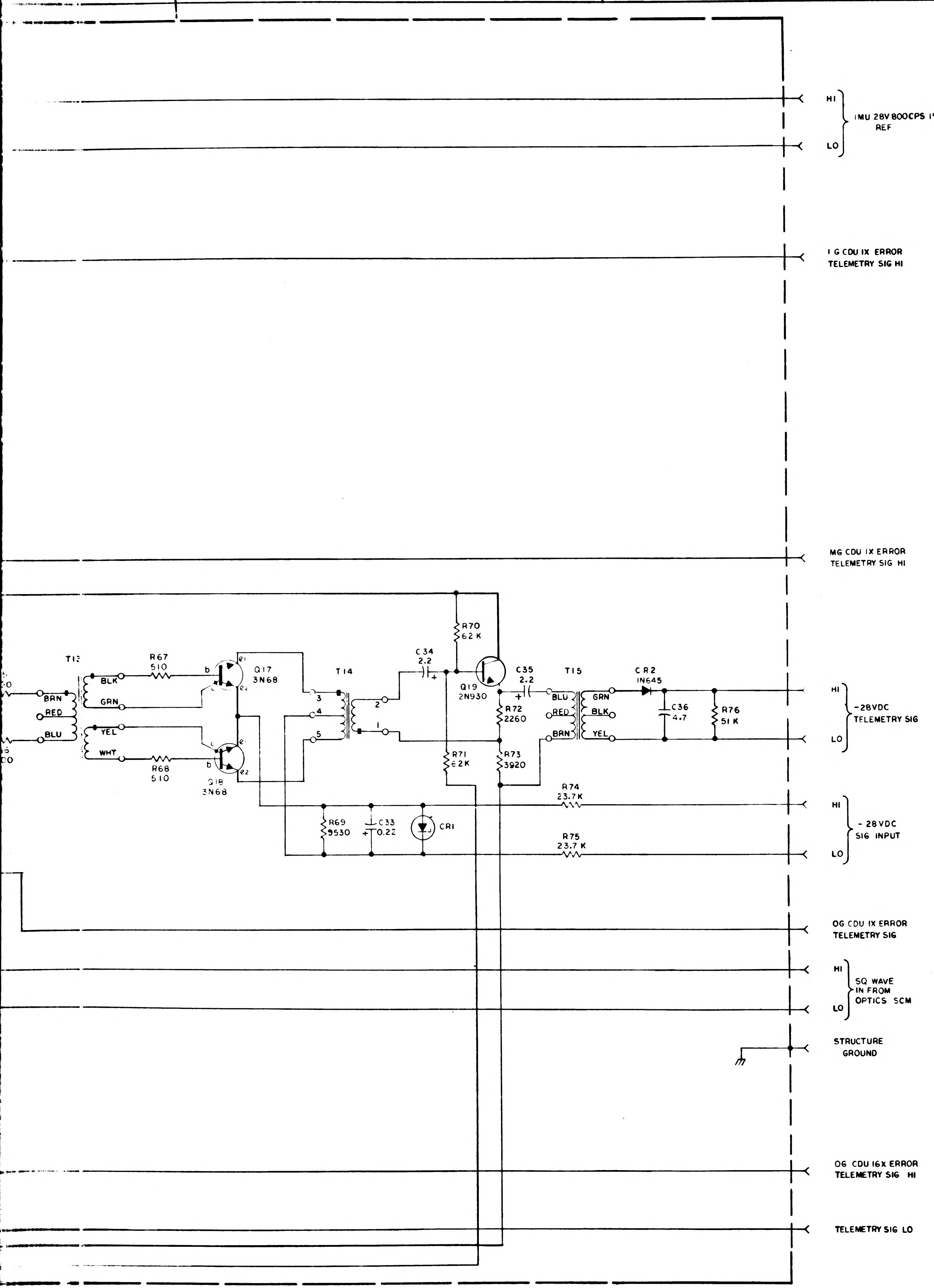
1010245 B

1/1010245

REVISIONS 22267						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 22849		C	11OCT65	
B		REVISED PER TDRR 23209			8OCT65	PTD
C		REVISED PER TDRR 23943	JWP		16 NOV 65	

R37, R38, R39	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C5, C6, C7			
PART NO.	VALUE	TOL	RATING
1010410 - 1	220 UUF	± 2%	500VDC
- 2	240		
- 3	270		
- 4	300		
- 5	330		
- 6	360		
- 7	390		
- 8	430		
- 9	470		
- 10	510		500
- 11	560		300
- 12	620		
- 13	680		
- 14	750		
- 15	820		
- 16	910		
- 17	1000		
- 18	1100		
1010410 - 19	1200	± 2%	300VDC


HI
IMU 28V 800CPS 1%
REF
LO
I G CDU IX ERROR
TELEMETRY SIG HI
MG CDU IX ERROR
TELEMETRY SIG HI
T13
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67
510
R68
510
b
e1
e2
Q17
3N68
Q18
3N68
T14
3
4
5
2
1
C34
2.2
R70
62 K
Q19
2N930
R71
62K
C35
2.2
R72
2260
R73
3920
T15
BLU
RED
BRN
GRN
BLK
YEL
CR2
IN645
C36
4.7
R76
51 K
HI
-28VDC
TELEMETRY SIG
LO
R74
23.7K
R75
23.7 K
R69
9530
C33
0.22
CR1
HI
-28VDC
SIG INPUT
LO
OG CDU IX ERROR
TELEMETRY SIG
HI
SQ WAVE
IN FROM
OPTICS SCM
LO
STRUCTURE
GROUND
OG CDU 16X ERROR
TELEMETRY SIG HI
TELEMETRY SIG LO

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364 - 653	RESISTOR	124K	± 1 %	1/8 W
R 2	- 653		124K		
R 3	- 653		124K		
R 4	- 653		124K		
R 5	- 653		124K		
R 6	1010364 - 653		124K	± 1 %	1/8 W
R 7	1006750 - 109		535	± 2 %	1/4 W
R 8	1010278 - 15		10	± 5 %	1/2 W
R 9	1010311 - 291		52.3K	± 1 %	1/10W
R 10	1010311 - 291		52.3K	± 1 %	1/10W
R 11	1010311 - 291	RESISTOR	52.3K	± 1 %	1/10W
R 13	1010364 - 769	RESISTOR	499K	± 1 %	1/8 W
R 14	1010364 - 769		499K	± 1 %	1/8 W
R 15	1010364 - 769		499K	± 1 %	1/8 W
R 16	1010364 - 769		499K	± 1 %	1/8 W
R 17	1006750 - 68		33K	± 2 %	1/4 W
R 18	1006750 - 65		24K	± 2 %	1/4 W
R 19	1010311 - 126		1000	± 1 %	1/10 W
R 20	1006750 - 68		33K	± 2 %	1/4 W
R 21	1006750 - 65		24K	± 2 %	1/4 W
R 22	1010311 - 126		1000	± 1 %	1/10W
R 23	1006750 - 68		33K	± 2 %	1/4 W
R 24	1006750 - 65		24K	± 2 %	1/4 W
R 25	1010311 - 126		1000	± 1 %	1/10 W
R 26	1006750 - 72		47K	± 2 %	1/4 W
R 27	1006750 - 65		24K	± 2 %	1/4 W
R 28	1010311 - 118		825	± 1 %	1/10 W
R 29	1010364 - 707		237K		1/8 W
R 30	1010364 - 707		237K		1/8 W
R 31	1010364 - 707		237K		1/8 W
R 32	1010364 - 707		237K	± 1 %	1/8 W
R 33	1006750 - 56		10K	± 2 %	1/4 W
R 34	1006750 - 56		10K	± 2 %	1/4 W
R 35	1006750 - 56		10K	± 2 %	1/4 W
R 36	1006750 - 56		10K	± 2 %	1/4 W
R 37	SEE NOTE 2		NOM	± 1 %	1/10 W
R 38	SEE NOTE 2		NOM	± 1 %	1/10 W
R 39	SEE NOTE 2		NOM	± 1 %	1/10 W
R 40	1010311 - 315		93.1K	± 1 %	1/10 W
R 41	1006750 - 36		1500	± 2 %	1/4 W
R 42	- 36		1500		
R 43	- 36		1500		
R 44	- 36		1500		
R 45	- 36		1500		
R 46	- 36		1500		
R 47	- 36		1500		
R 48	1006750 - 36		1500	± 2 %	1/4 W
R 49	1010311 - 126		1000	± 1 %	1/10 W
R 50	- 126		1000		
R 51	- 126		1000		
R 52	- 126		1000		
R 53	- 126		1000		
R 54	- 126		1000		
R 55	- 1		49.9		
R 56	1010311 - 1		49.9	± 1 %	1/10W
R 57	1006750 - 39		2000	± 2 %	1/4 W
R 58	- 39		2000		
R 59	- 39		2000		
R 60	- 39		2000		
R 61	- 39		2000		
R 62	- 39		2000		
R 63	- 39		2000		
R 64	- 39		2000		
R 65	- 48		4700		
R 66	- 48		4700		
P 67	- 25		510		
R 68	1006750 - 25		510	± 2 %	1/4 W
R 69	1010364 - 439		9530	± 1 %	1/8 W
R 70	1006750 - 75		62K	± 2 %	1/4 W
R 71	1006750 - 75		62K	± 2 %	1/4 W
R 72	1010364 - 319		2260	± 1 %	1/8 W
R 73	1010364 - 365		3920	± 1 %	1/8 W
R 74	1010364 - 515		23.7K	± 1 %	1/8 W
R 75	1010364 - 515		23.7K	± 1 %	1/8 W
R 76	1006750 - 73	RESISTOR	51K	± 2 %	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010410 - 9	CAPACITOR	470 UUF	± 2 %	500VDC
C 2	1010410 - 9		470 UUF	± 2 %	500
C 3	1010410 - 9		470 UUF	± 2 %	500
C 4	1006755 - 133		10	± 10 %	50
C 5	SEE NOTE 2		NOM	± 2 %	—
C 6	SEE NOTE 2		NOM		—
C 7	SEE NOTE 2		NOM		—
C 8	1010410 - 5		330 UUF	± 2 %	500
C 9	1006755 - 31		10	± 10 %	20
C 10	- 31		10		
C 11	- 31		10		
C 12	- 31		10		
C 13	- 34		33		
C 14	- 34		33		
C 15	- 34		33		
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	- 34		33		20
C 19	- 69		1.0		35
C 20	- 34		33		20
C 21	- 69		1.0		35
C 22	- 34		33		20
C 23	- 69		1.0		35
C 24	1006755 - 34		33		20
C 25	1010279 - 16		1.9		6
C 26	- 16		1.9		
C 27	- 16		1.9		
C 28	- 16		1.9		
C 29	- 16		1.9		
C 30	- 16		1.9		
C 31	- 16		1.9		
C 32	1010279 - 16		1.9		6
C 33	1010393 - 021		0.22		50
C 34	1010393 - 033		2.2		50
C 35	1010393 - 033		2.2		50
C 36	1010393 - 037	CAPACITOR	4.7	± 10%	50 VDC
CR 1	1010372 - 13	DIODE			
CR 2	1010362 - 001	DIODE	IN645		
CR 3	1010362 - 001	DIODE	IN645		
CR 4	1010362 - 001	DIODE	IN645		
Q 1	1010397 - 1	TRANSISTOR	2N930		
Q 2					
Q 3					
Q 4					
Q 5					
Q 6					
Q 7					
Q 8	1010397 - 1		2N930		
Q 9	1010367		3N68		
Q 10					
Q 11					
Q 12					
Q 13					
Q 14					
Q 15					
Q 16					
Q 17					
Q 18	1010367		3N68		
Q 19	1010397 - 1	TRANSISTOR	2N930		
T 1	1008832	TRANSFORMER			
T 2	1008832				
T 3	1008832				
T 5	1010324				
T 6	1010324				
T 7	1010324				
T 8	1010324				
T 9	1010323				
T 10					
T 11					
T 12					
T 13	1010323				
T 14	1010710				
T 15	1010324	TRANSFORMER			

REF DWG:
SIGNAL CONDITIONER ASSY
RESOLVER CDU
DWG NO. 1007665

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY.	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN 24-5-65
CHECKED 24-5-65
APPROVED 7-5-65
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
DATE

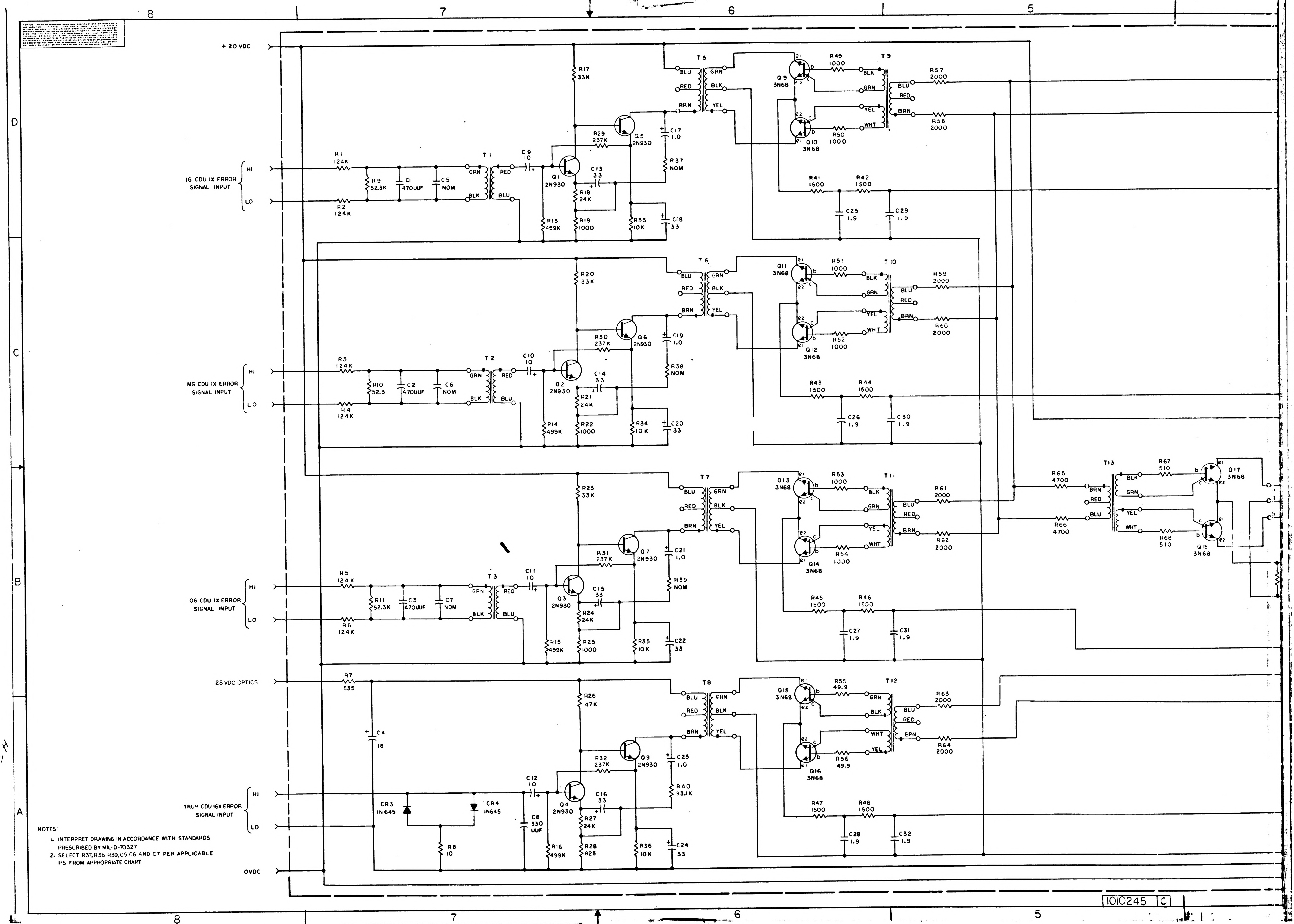
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER, RESOLVER CDU

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010245
SCALE —
SHEET 1 OF 1

1010245 C

34



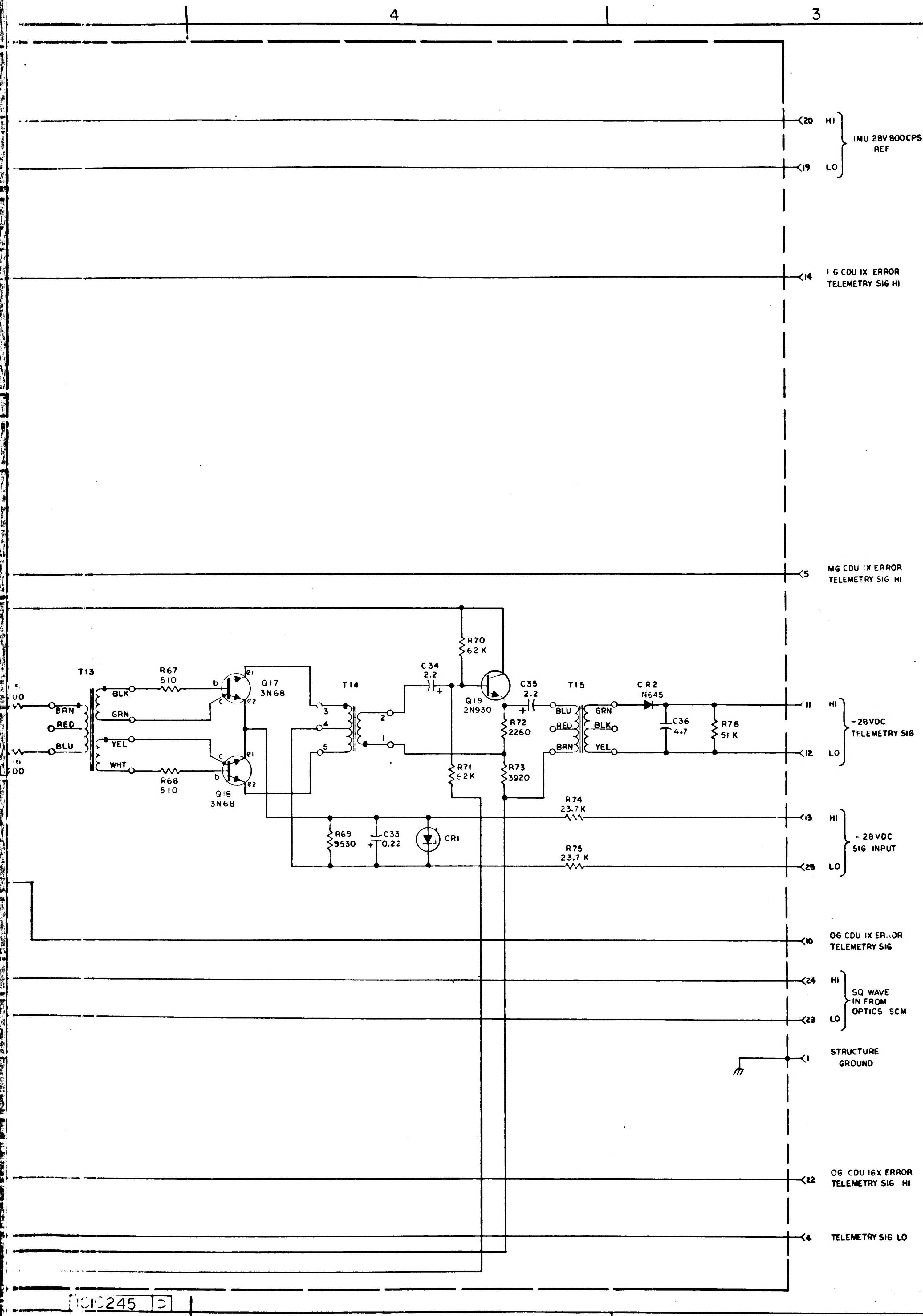
8
7
6
5
D
C
B
A
+ 20 VDC
1G CDU 1X ERROR SIGNAL INPUT
HI
LO
MG CDU 1X ERROR SIGNAL INPUT
OG CDU 1X ERROR SIGNAL INPUT
28 VDC OPTICS
TRUN CDU 16X ERROR SIGNAL INPUT
OVDC
R1 124K
R2 124K
R3 124K
R4 124K
R5 124K
R6 124K
R7 535
R8 10
R9 52.3K
R10 52.3
R11 52.3K
C1 470UUF
C2 470UUF
C3 470UUF
C4 18
C5 NOM
C6 NOM
C7 NOM
C8 330 UUF
CR3 1N645
CR4 1N645
T1
T2
T3
T4
C9 10
C10 10
C11 10
C12 10
GRN
RED
BLK
BLU
BRN
YEL
WHT
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
Q7 2N930
Q8 2N930
R13 499K
R14 499K
R15 499K
R16 499K
R17 33K
R20 33K
R23 33K
R26 47K
R18 24K
R21 24K
R24 24K
R27 24K
R19 1000
R22 1000
R25 1000
R28 825
R29 237K
R30 237K
R31 237K
R32 237K
C13 33
C14 33
C15 33
C16 33
R33 10K
R34 10K
R35 10K
R36 10K
C17 1.0
C19 1.0
C21 1.0
C23 1.0
C18 33
C20 33
C22 33
C24 33
R37 NOM
R38 NOM
R39 NOM
R40 93.1K
T5
T6
T7
T8
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
Q13 3N68
Q14 3N68
Q15 3N68
Q16 3N68
Q17 3N68
Q18 3N68
R49 1000
R50 1000
R51 1000
R52 1000
R53 1000
R54 1000
R55 49.9
R56 49.9
T9
T10
T11
T12
T13
R57 2000
R58 2000
R59 2000
R60 2000
R61 2000
R62 2000
R63 2000
R64 2000
R41 1500
R42 1500
R43 1500
R44 1500
R45 1500
R46 1500
R47 1500
R48 1500
C25 1.9
C26 1.9
C27 1.9
C28 1.9
C29 1.9
C30 1.9
C31 1.9
C32 1.9
R65 4700
R66 4700
R67 510
R68 510
e1
e2
b
c
3
4
5

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R37, R38 R39, C5 C6 AND C7 PER APPLICABLE PS FROM APPROPRIATE CHART

1010245 C

1-41010245


4
3
20
HI
19
LO
IMU 28V 800CPS 1%
REF
14
I G CDU IX ERROR
TELEMETRY SIG HI
5
MG CDU IX ERROR
TELEMETRY SIG HI
T13
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67
510
R68
510
b
c
e1
e2
Q17
3N68
Q18
3N68
T14
3
4
5
2
1
C34
2.2
R70
62 K
Q19
2N930
R71
62 K
R72
2260
R73
3920
C35
2.2
T15
BLU
RED
BRN
GRN
BLK
YEL
CR2
1N645
C36
4.7
R76
51 K
11
HI
12
LO
-28VDC
TELEMETRY SIG
R74
23.7 K
R75
23.7 K
R69
9530
C33
0.22
CR1
13
HI
25
LO
- 28VDC
SIG INPUT
10
OG CDU IX ERROR
TELEMETRY SIG
24
HI
23
LO
SQ WAVE
IN FROM
OPTICS SCM
1
STRUCTURE
GROUND
22
OG CDU 16X ERROR
TELEMETRY SIG HI
4
TELEMETRY SIG LO

2

1

R37, R38, R39	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C5, C6, C7			
PART NO.	VALUE	TOL	RATING
1010410 - 1	220 UUF	± 2%	500 VDC
- 2	240		
- 3	270		
- 4	300		
- 5	330		
- 6	360		
- 7	390		
- 8	430		
- 9	470		
- 10	510		500
- 11	560		300
- 12	620		
- 13	680		
- 14	750		
- 15	820		
- 16	910		
- 17	1000		
- 18	1100		
1010410 - 19	1200	± 2%	300 VDC

REVISIONS 22267

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
Ⓜ A		REVISED PER TDRR 22849			OCT 65	
Ⓜ B		REVISED PER TDRR 23209			OCT 65	RTD
● C		REVISED PER TDRR 23943	JWP		NOV 65	
D		REVISED PER TDRR 25542		RWH	4 FEB	

D

C

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364 - 653	RESISTOR	124K	± 1%	1/8 W
R 2	- 653		124K		
R 3	- 653		124K		
R 4	- 653		124K		
R 5	- 653		124K		
R 6	1010364 - 653		124K	± 1%	1/8 W
R 7	1006750 - 109		535	± 2%	1/4 W
R 8	1010278 - 15		10	± 5%	1/2 W
R 9	1010311 - 291		52.3K	± 1%	1/10W
R 10	1010311 - 291		52.3K	± 1%	1/10W
R 11	1010311 - 291	RESISTOR	52.3K	± 1%	1/10W
R 13	1010364 - 769	RESISTOR	499K	± 1%	1/8 W
R 14	1010364 - 769		499K	± 1%	1/8 W
R 15	1010364 - 769		499K	± 1%	1/8 W
R 16	1010364 - 769		499K	± 1%	1/8 W
R 17	1006750 - 68		33 K	± 2%	1/4 W
R 18	1006750 - 65		24 K	± 2%	1/4 W
R 19	1010311 - 126		1000	± 1%	1/10 W
R 20	1006750 - 68		33 K	± 2%	1/4 W
R 21	1006750 - 65		24 K	± 2%	1/4 W
R 22	1010311 - 126		1000	± 1%	1/10W
R 23	1006750 - 68		33 K	± 2%	1/4 W
R 24	1006750 - 65		24 K	± 2%	1/4 W
R 25	1010311 - 126		1000	± 1%	1/10 W
R 26	1006750 - 72		47 K	± 2%	1/4 W
R 27	1006750 - 65		24 K	± 2%	1/4 W
R 28	1010311 - 118		825	± 1%	1/10 W
R 29	1010364 - 707		237K		1/8 W
R 30	1010364 - 707		237K		1/8 W
R 31	1010364 - 707		237K		1/8 W
R 32	1010364 - 707		237K	± 1%	1/8 W
R 33	1006750 - 56		10 K	± 2%	1/4 W
R 34	1006750 - 56		10 K	± 2%	1/4 W
R 35	1006750 - 56		10 K	± 2%	1/4 W
R 36	1006750 - 56		10 K	± 2%	1/4 W
R 37	SEE NOTE 2		NOM	± 1%	1/10 W
R 38	SEE NOTE 2		NOM	± 1%	1/10 W
R 39	SEE NOTE 2		NOM	± 1%	1/10 W
R 40	1010311 - 315		93.1K	± 1%	1/10 W
R 41	1006750 - 36		1500	± 2%	1/4 W
R 42	- 36		1500		
R 43	- 36		1500		
R 44	- 36		1500		
R 45	- 36		1500		
R 46	- 36		1500		
R 47	- 36		1500		
R 48	1006750 - 36		1500	± 2%	1/4 W
R 49	1010311 - 126		1000	± 1%	1/10 W
R 50	- 126		1000		
R 51	- 126		1000		
R 52	- 126		1000		
R 53	- 126		1000		
R 54	- 126		1000		
R 55	- 1		49.9		
R 56	1010311 - 1		49.9	± 1%	1/10W
R 57	1006750 - 39		2000	± 2%	1/4 W
R 58	- 39		2000		
R 59	- 39		2000		
R 60	- 39		2000		
R 61	- 39		2000		
R 62	- 39		2000		
R 63	- 39		2000		
R 64	- 39		2000		
R 65	- 48		4700		
R 66	- 48		4700		
P 67	- 25		510		
R 68	1006750 - 25		510	± 2%	1/4 W
R 69	1010364 - 439		9530	± 1%	1/8 W
R 70	1006750 - 75		62K	± 2%	1/4 W
R 71	1006750 - 75		62K	± 2%	1/4 W
R 72	1010364 - 319		2260	± 1%	1/8 W
R 73	1010364 - 365		3920	± 1%	1/8 W
R 74	1010364 - 515		23.7K	± 1%	1/8 W
R 75	1010364 - 515		23.7K	± 1%	1/8 W
R 76	1006750 - 73	RESISTOR	51 K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010410 - 9	CAPACITOR	470 UUF	± 2%	500VDC
C 2	1010410 - 9		470 UUF	± 2%	500
C 3	1010410 - 9		470 UUF	± 2%	500
C 4	1006755 - 133		18	± 10%	50
C 5	SEE NOTE 2		NOM	± 2%	—
C 6	SEE NOTE 2		NOM		—
C 7	SEE NOTE 2		NOM		—
C 8	1010410 - 5		330 UUF	± 2%	500
C 9	1006755 - 31		10	± 10%	20
C 10	- 31		10		
C 11	- 31		10		
C 12	- 31		10		
C 13	- 34		33		
C 14	- 34		33		
C 15	- 34		33		
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	- 34		33		20
C 19	- 69		1.0		35
C 20	- 34		33		20
C 21	- 69		1.0		35
C 22	- 34		33		20
C 23	- 69		1.0		35
C 24	1006755 - 34		33		20
C 25	1010279 - 16		1.9		6
C 26	- 16		1.9		
C 27	- 16		1.9		
C 28	- 16		1.9		
C 29	- 16		1.9		
C 30	- 16		1.9		
C 31	- 16		1.9		
C 32	1010279 - 16		1.9		6
C 33	1010393 - 021		0.22		50
C 34	1010393 - 033		2.2		50
C 35	1010393 - 033		2.2		50
C 36	1010393 - 037	CAPACITOR	4.7	± 10%	50 VDC
CR 1	1010372 - 13	DIODE			
CR 2	1010362 - 001	DIODE	1N645		
CR 3	1010362 - 001	DIODE	1N645		
CR 4	1010362 - 001	DIODE	1N645		
Q 1	1010397 - 1	TRANSISTOR	2N930		
Q 2					
Q 3					
Q 4					
Q 5					
Q 6					
Q 7					
Q 8	1010397 - 1		2N930		
Q 9	1010367		3N68		
Q 10					
Q 11					
Q 12					
Q 13					
Q 14					
Q 15					
Q 16					
Q 17					
Q 18	1010367		3N68		
Q 19	1010397 - 1	TRANSISTOR	2N930		
T 1	1008832	TRANSFORMER			
T 2	1008832				
T 3	1008832				
T 5	1010324				
T 6	1010324				
T 7	1010324				
T 8	1010324				
T 9	1010323				
T 10					
T 11					
T 12					
T 13	1010323				
T 14	1010710				
T 15	1010324	TRANSFORMER			

B

3H

REF DWG:
SIGNAL CONDITIONER ASSY
RESOLVER CDU
DWG NO. 1007665

D
1010245

A

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
APPROVED MSC
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER, RESOLVER CDU

CODE IDENT NO.	SIZE	DRAWING NO.
80230	J	1010245

SCALE — SHEET 1 OF 1

4 3 2 1

1010245 D

271010245

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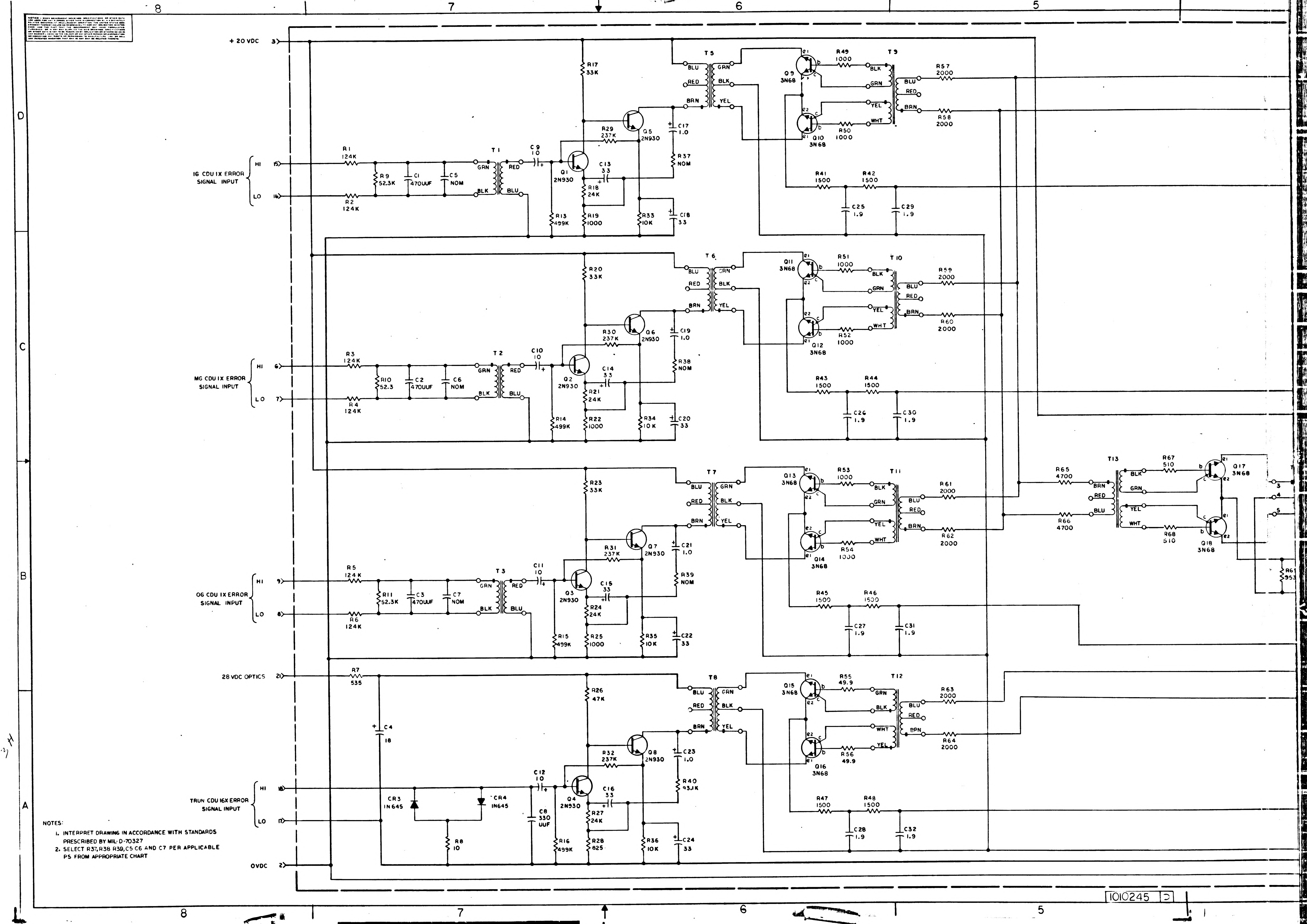
8
7
6
5
D
C
B
A
+20 VDC 3
16 CDU 1X ERROR SIGNAL INPUT
HI 15
LO 16
MG CDU 1X ERROR SIGNAL INPUT
HI 6
LO 7
OG CDU 1X ERROR SIGNAL INPUT
HI 9
LO 8
28 VDC OPTICS 21
TRUN CDU 16X ERROR SIGNAL INPUT
HI 18
LO 17
OVDC 2
R1 124K
R2 124K
R3 124K
R4 124K
R5 124K
R6 124K
R7 535
R8 10
R9 52.3K
R10 52.3
R11 52.3K
C1 470UUF
C2 470UUF
C3 470UUF
C4 18
C5 NOM
C6 NOM
C7 NOM
C8 330 UUF
C9 10
C10 10
C11 10
C12 10
CR3 1N645
CR4 1N645
T1
T2
T3
GRN
RED
BLK
BLU
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
Q7 2N930
Q8 2N930
R13 499K
R14 499K
R15 499K
R16 499K
R17 33K
R18 24K
R19 1000
R20 33K
R21 24K
R22 1000
R23 33K
R24 24K
R25 1000
R26 47K
R27 24K
R28 825
R29 237K
R30 237K
R31 237K
R32 237K
R33 10K
R34 10K
R35 10K
R36 10K
R37 NOM
R38 NOM
R39 NOM
R40 93.1K
C13 33
C14 33
C15 33
C16 33
C17 1.0
C18 33
C19 1.0
C20 33
C21 1.0
C22 33
C23 1.0
C24 33
T5
T6
T7
T8
BLU
RED
BRN
GRN
BLK
YEL
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
Q13 3N68
Q14 3N68
Q15 3N68
Q16 3N68
e1
e2
b
c
R41 1500
R42 1500
R43 1500
R44 1500
R45 1500
R46 1500
R47 1500
R48 1500
C25 1.9
C26 1.9
C27 1.9
C28 1.9
C29 1.9
C30 1.9
C31 1.9
C32 1.9
R49 1000
R50 1000
R51 1000
R52 1000
R53 1000
R54 1000
R55 49.9
R56 49.9
T9
T10
T11
T12
BLK
GRN
YEL
WHT
BLU
RED
BRN
R57 2000
R58 2000
R59 2000
R60 2000
R61 2000
R62 2000
R63 2000
R64 2000
R65 4700
R66 4700
T13
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67 510
R68 510
Q17 3N68
Q18 3N68
R61
953
3
4
5

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R37, R38 R39, C5 C6 AND C7 PER APPLICABLE PS FROM APPROPRIATE CHART

1010245 D

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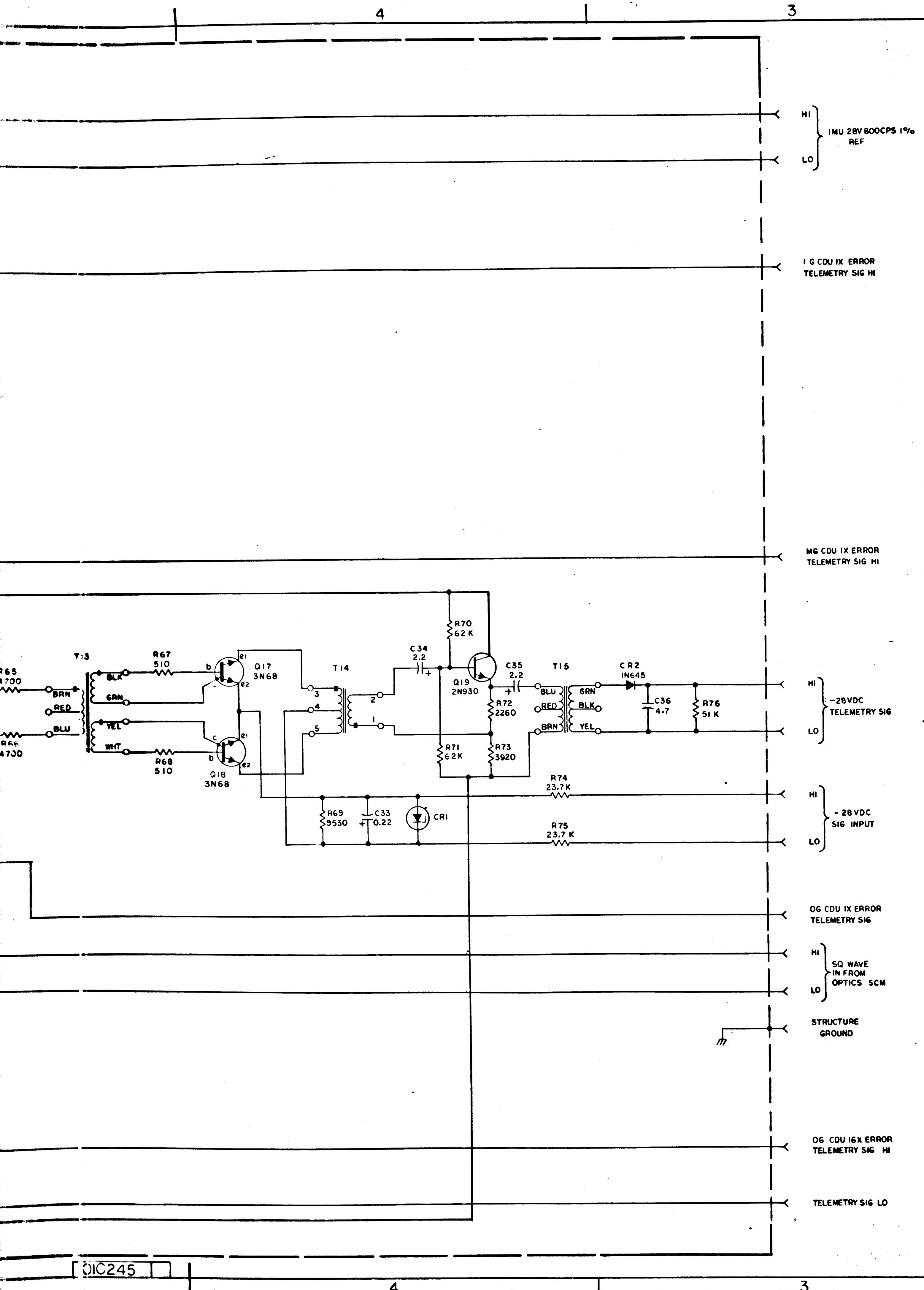
REVISIONS 22269						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED



IMU 28V 800CPS 1% REF
HI
LO
I G CDU IX ERROR TELEMETRY SIG HI
MG CDU IX ERROR TELEMETRY SIG HI
T13
R65 4700
R66 4700
BRN
RED
BLU
BLK
GRN
YEL
WHT
R67 510
R68 510
Q17 3N68
Q18 3N68
b
c
e1
e2
T14
3
4
5
2
1
C34 2.2
R70 62K
Q19 2N930
C35 2.2
R72 2260
R71 62K
R73 3920
T15
BLU
RED
BRN
GRN
BLK
YEL
CR2 1N645
C36 4.7
R76 51K
-28VDC TELEMETRY SIG
R74 23.7K
R75 23.7K
R69 9530
C33 0.22
CR1
- 28VDC SIG INPUT
OG CDU IX ERROR TELEMETRY SIG
SQ WAVE IN FROM OPTICS SCM
STRUCTURE GROUND
OG CDU 16X ERROR TELEMETRY SIG HI
TELEMETRY SIG LO

R37, R38, R39	
PART NO.	VALUE
1010311 - 296	59.0 K
-297	60.4 K
-298	61.9 K
-299	63.4 K
-300	64.9 K
-301	66.5 K
-302	68.1 K
-303	69.8 K
-304	71.5 K
-305	73.2 K
-306	75.0 K
-307	76.8 K
-308	78.7 K
-309	80.6 K
-310	82.5 K
-311	84.5 K
-312	86.6 K
-313	88.7 K
1010311 - 314	90.9 K

C5, C6, C7			
PART NO.	VALUE	TOL	RATING
1010410 - 1	220 UUF	± 2%	500 VDC
-2	240		
-3	270		
-4	300		
-5	330		
-6	360		
-7	390		
-8	430		
-9	470		
-10	510		500
-11	560		300
-12	620		
-13	680		
-14	750		
-15	820		
-16	910		
-17	1000		
-18	1100		
1010410 - 19	1200	± 2%	300VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364 - 653	RESISTOR	124K	± 1%	1/8 W
R 2	- 653		124K		
R 3	- 653		124K		
R 4	- 653		124K		
R 5	- 653		124K		
R 6	1010364 - 653		124K	± 1%	1/8 W
R 7	1006750 - 109		535	± 2%	1/4 W
R 8	1012078 - 15		10	± 5%	1/2 W
R 9	1010311 - 291		52.3K	± 1%	1/10W
R 10	1010311 - 291		52.3K	± 1%	1/10W
R 11	1010311 - 291	RESISTOR	52.3K	± 1%	1/10W
R 13	1010364 - 769	RESISTOR	499K	± 1%	1/8 W
R 14	1010364 - 769		499K	± 1%	1/8 W
R 15	1010364 - 769		499K	± 1%	1/8 W
R 16	1010364 - 769		499K	± 1%	1/8 W
R 17	1006750 - 68		33K	± 2%	1/4 W
R 18	1006750 - 65		24K	± 2%	1/4 W
R 19	1010311 - 126		1000	± 1%	1/10 W
R 20	1006750 - 68		33K	± 2%	1/4 W
R 21	1006750 - 65		24K	± 2%	1/4 W
R 22	1010311 - 126		1000	± 1%	1/10W
R 23	1006750 - 68		33K	± 2%	1/4 W
R 24	1006750 - 65		24K	± 2%	1/4 W
R 25	1010311 - 126		1000	± 1%	1/10 W
R 26	1006750 - 72		47K	± 2%	1/4 W
R 27	1006750 - 65		24K	± 2%	1/4 W
R 28	1010311 - 118		825	± 1%	1/10 W
R 29	1010364 - 707		237K		1/8 W
R 30	1010364 - 707		237K		1/8 W
R 31	1010364 - 707		237K		1/8 W
R 32	1010364 - 707		237K	± 1%	1/8 W
R 33	1006750 - 56		10K	± 2%	1/4 W
R 34	1006750 - 56		10K	± 2%	1/4 W
R 35	1006750 - 56		10K	± 2%	1/4 W
R 36	1006750 - 56		10K	± 2%	1/4 W
R 37	SEE NOTE 2		NOM	± 1%	1/10 W
R 38	SEE NOTE 2		NOM	± 1%	1/10 W
R 39	SEE NOTE 2		NOM	± 1%	1/10 W
R 40	1010311 - 315		93.1K	± 1%	1/10 W
R 41	1006750 - 36		1500	± 2%	1/4 W
R 42	- 36		1500		
R 43	- 36		1500		
R 44	- 36		1500		
R 45	- 36		1500		
R 46	- 36		1500		
R 47	- 36		1500		
R 48	1006750 - 36		1500	± 2%	1/4 W
R 49	1010311 - 126		1000	± 1%	1/10 W
R 50	- 126		1000		
R 51	- 126		1000		
R 52	- 126		1000		
R 53	- 126		1000		
R 54	- 126		1000		
R 55	- 1		49.9		
R 56	1010311 - 1		49.9	± 1%	1/10 W
R 57	1006750 - 39		2000	± 2%	1/4 W
R 58	- 39		2000		
R 59	- 39		2000		
R 60	- 39		2000		
R 61	- 39		2000		
R 62	- 39		2000		
R 63	- 39		2000		
R 64	- 39		2000		
R 65	- 48		4700		
R 66	- 48		4700		
P 67	- 25		510		
R 68	1006750 - 25		510	± 2%	1/4 W
R 69	1010364 - 439		9530	± 1%	1/8 W
R 70	1006750 - 75		62K	± 2%	1/4 W
R 71	1006750 - 75		62K	± 2%	1/4 W
R 72	1010364 - 319		2260	± 1%	1/8 W
R 73	1010364 - 365		3920	± 1%	1/8 W
R 74	1010364 - 515		23.7K	± 1%	1/8 W
R 75	1010364 - 515		23.7K	± 1%	1/8 W
R 76	1006750 - 73	RESISTOR	51K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C 1	1010410 - 9	CAPACITOR	470 UUF	± 2%	500VDC
C 2	1010410 - 9		470 UUF	± 2%	500
C 3	1010410 - 9		470 UUF	± 2%	500
C 4	1006755 - 133		18	± 10%	50
C 5	SEE NOTE 2		NOM	± 2 %	—
C 6	SEE NOTE 2		NOM		—
C 7	SEE NOTE 2		NOM		—
C 8	1010410 - 5		330 UUF	± 2%	500
C 9	1006755 - 31		10	± 10%	20
C 10	- 31		10		
C 11	- 31		10		
C 12	- 31		10		
C 13	- 34		33		
C 14	- 34		33		
C 15	- 34		33		
C 16	- 34		33		20
C 17	- 69		1.0		35
C 18	- 34		33		20
C 19	- 69		1.0		35
C 20	- 34		33		20
C 21	- 69		1.0		35
C 22	- 34		33		20
C 23	- 69		1.0		35
C 24	1006755 - 34		33		20
C 25	1010279 - 16		1.9		6
C 26	- 16		1.9		
C 27	- 16		1.9		
C 28	- 16		1.9		
C 29	- 16		1.9		
C 30	- 16		1.9		
C 31	- 16		1.9		
C 32	1010279 - 16		1.9		6
C 33	1010393 - 021		0.22		50
C 34	1010393 - 033		2.2		50
C 35	1010393 - 033		2.2		50
C 36	1010393 - 037	CAPACITOR	4.7	± 10%	50 VDC
CR 1	1010372 - 13	DIODE			
CR 2	1010362 - 001	DIODE	1N645		
CR 3	1010362 - 001	DIODE	1N645		
CR 4	1010362 - 001	DIODE	1N645		
Q 1	1010397 - 1	TRANSISTOR	2N930		
Q 2					
Q 3					
Q 4					
Q 5					
Q 6					
Q 7					
Q 8	1010397 - 1		2N930		
Q 9	1010367		3N68		
Q 10					
Q 11					
Q 12					
Q 13					
Q 14					
Q 15					
Q 16					
Q 17					
Q 18	1010367		3N68		
Q 19	1010397 - 1	TRANSISTOR	2N930		
T 1	1010712	TRANSFORMER			
T 2	1010712				
T 3	1010712				
T 4	1010712				
T 5	1010324				
T 6	1010324				
T 7	1010324				
T 8	1010324				
T 9	1010323				
T 10					
T 11					
T 12					
T 13	1010323				
T 14	1010710				
T 15	1010324	TRANSFORMER			

REF DWG:
SIGNAL CONDITIONER ASSY
RESOLVER CDU
DWG NO. 1007665

3H

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL

NEXT ASSY. USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

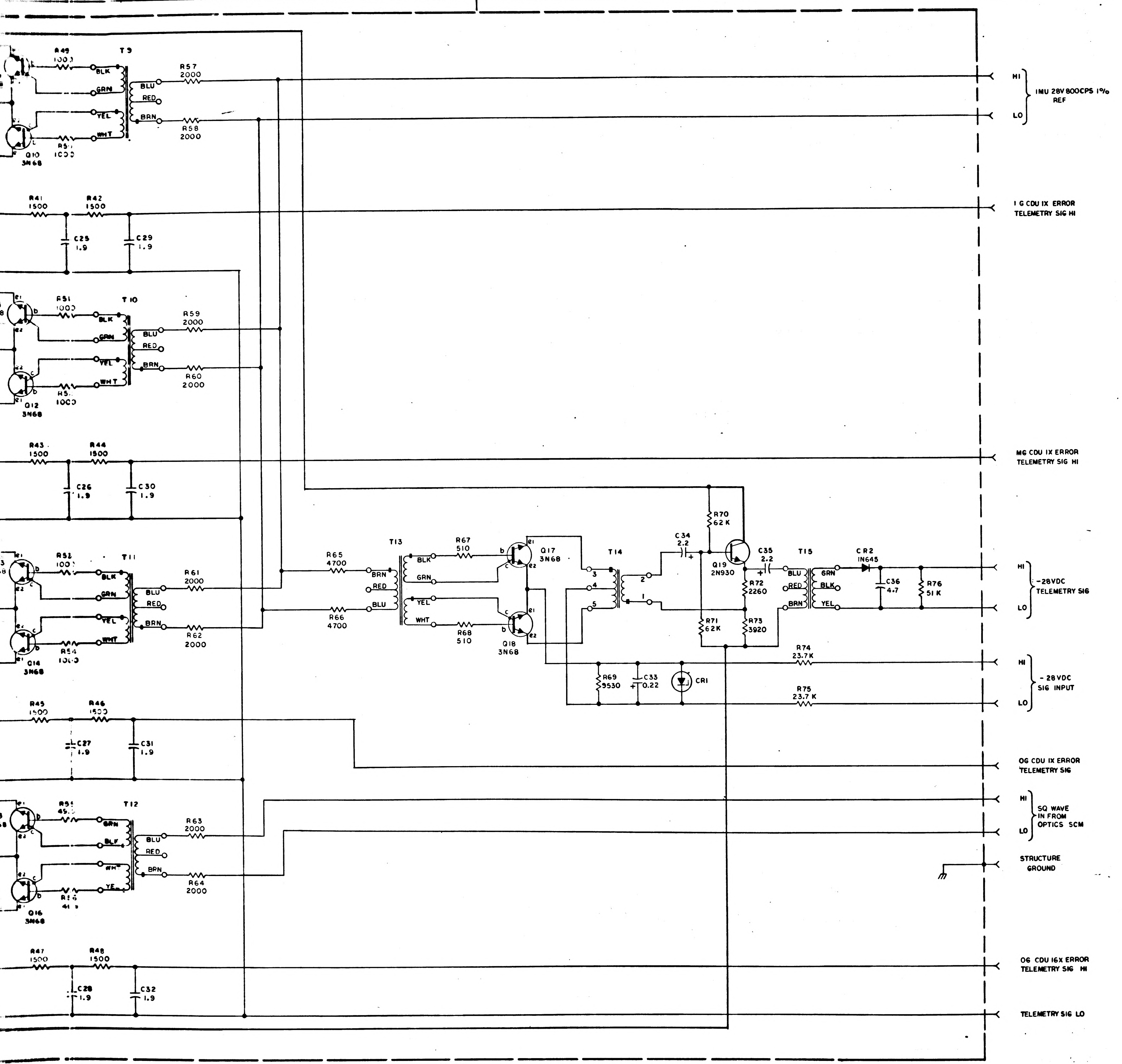
DRAWN 2Av165
CHECKED 2Au165
APPROVED
APPROVED
APPROVED MIT 8 Sept 65
NASA
NOT REQUIRED PER LETTER PP7-65-812
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
SIGNAL CONDITIONER, RESOLVER CDU

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010245
SCALE —
SHEET 1 OF 1

MASTER



5
4
3
R49
1003
T9
BLK
GRN
YEL
WHT
BLU
RED
BRN
R57
2000
R58
2000
R50
1000
Q10
3N68
R41
1500
R42
1500
C25
1.9
C29
1.9
R51
1000
T10
R59
2000
R60
2000
R52
1000
Q12
3N68
R43
1500
R44
1500
C26
1.9
C30
1.9
R53
1000
T11
R61
2000
R62
2000
R54
1000
Q14
3N68
R45
1500
R46
1500
C27
1.9
C31
1.9
R55
49.9
T12
R63
2000
R64
2000
R56
49.9
Q16
3N68
R47
1500
R48
1500
C28
1.9
C32
1.9
R65
4700
R66
4700
T13
R67
510
R68
510
Q17
3N68
Q18
3N68
b
c
e1
e2
T14
1
2
3
4
5
C34
2.2
R70
62 K
Q19
2N930
C35
2.2
R72
2260
R71
62K
R73
3920
T15
CR2
1N645
C36
4.7
R76
51 K
R74
23.7 K
R75
23.7 K
R69
9530
C33
0.22
CR1
HI
LO
IMU 28V 800CPS 1%
REF
I G CDU IX ERROR
TELEMETRY SIG HI
MG CDU IX ERROR
TELEMETRY SIG HI
-28VDC
TELEMETRY SIG
- 28 VDC
SIG INPUT
OG CDU IX ERROR
TELEMETRY SIG
SQ WAVE
IN FROM
OPTICS SCM
STRUCTURE
GROUND
OG CDU 16X ERROR
TELEMETRY SIG HI
TELEMETRY SIG LO
1010245

R37, R38, R39	
PART NO.	VALUE
1010311 - 296	59.0 K
- 297	60.4 K
- 298	61.9 K
- 299	63.4 K
- 300	64.9 K
- 301	66.5 K
- 302	68.1 K
- 303	69.8 K
- 304	71.5 K
- 305	73.2 K
- 306	75.0 K
- 307	76.8 K
- 308	78.7 K
- 309	80.6 K
- 310	82.5 K
- 311	84.5 K
- 312	86.6 K
- 313	88.7 K
1010311 - 314	90.9 K

C5, C6, C7			
PART NO.	VALUE	TOL	RATING
1010410 - 1	220 UUF	± 2%	500VDC
- 2	240		
- 3	270		
- 4	300		
- 5	330		
- 6	360		
- 7	390		
- 8	430		
- 9	470		
- 10	510		500
- 11	560		300
- 12	620		
- 13	680		
- 14	750		
- 15	820		
- 16	910		
- 17	1000		
- 18	1100		
1010410 - 19	1200	± 2%	300VDC

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R 1	1010364 - 653	RESISTOR	124K	± 1%	1/8 W
R 2	- 653		124K		
R 3	- 653		124K		
R 4	- 653		124K		
R 5	- 653		124K		
R 6	1010364 - 653		124K	± 1%	1/8 W
R 7	1006750 - 109		535	± 2%	1/4 W
R 8	1012078 - 15		10	± 5%	1/2 W
R 9	1010311 - 291		52.3K	± 1%	1/10W
R 10	1010311 - 291		52.3K	± 1%	1/10W
R 11	1010311 - 291	RESISTOR	52.3K	± 1%	1/10W
R 13	1010364 - 769	RESISTOR	499K	± 1%	1/8 W
R 14	1010364 - 769		499K	± 1%	1/8 W
R 15	1010364 - 769		499K	± 1%	1/8 W
R 16	1010364 - 769		499K	± 1%	1/8 W
R 17	1006750 - 68		33 K	± 2%	1/4 W
R 18	1006750 - 65		24 K	± 2%	1/4 W
R 19	1010311 - 126		1000	± 1%	1/10 W
R 20	1006750 - 68		33K	± 2%	1/4 W
R 21	1006750 - 65		24K	± 2%	1/4 W
R 22	1010311 - 126		1000	± 1%	1/10W
R 23	1006750 - 68		33 K	± 2%	1/4 W
R 24	1006750 - 65		24 K	± 2%	1/4 W
R 25	1010311 - 126		1000	± 1%	1/10 W
R 26	1006750 - 72		47 K	± 2%	1/4 W
R 27	1006750 - 65		24 K	± 2%	1/4 W
R 28	1010311 - 118		825	± 1%	1/10 W
R 29	1010364 - 707		237K		1/8 W
R 30	1010364 - 707		237K		1/8 W
R 31	1010364 - 707		237K		1/8 W
R 32	1010364 - 707		237K	± 1%	1/8 W
R 33	1006750 - 56		10 K	± 2%	1/4 W
R 34	1006750 - 56		10 K	± 2%	1/4 W
R 35	1006750 - 56		10 K	± 2%	1/4 W
R 36	1006750 - 56		10 K	± 2%	1/4 W
R 37	SEE NOTE 2		NOM	± 1%	1/10 W
R 38	SEE NOTE 2		NOM	± 1%	1/10 W
R 39	SEE NOTE 2		NOM	± 1%	1/10 W
R 40	1010311 - 315		93.1K	± 1%	1/10 W
R 41	1006750 - 36		1500	± 2%	1/4 W
R 42	- 36		1500		
R 43	- 36		1500		
R 44	- 36		1500		
R 45	- 36		1500		
R 46	- 36		1500		
R 47	- 36		1500		
R 48	1006750 - 36		1500	± 2%	1/4 W
R 49	1010311 - 126		1000	± 1%	1/10 W
R 50	- 126		1000		
R 51	- 126		1000		
R 52	- 126		1000		
R 53	- 126		1000		
R 54	- 126		1000		
R 55	- 1		49.9		
R 56	1010311 - 1		49.9	± 1%	1/10W
R 57	1006750 - 39		2000	± 2%	1/4 W
R 58	- 39		2000		
R 59	- 39		2000		
R 60	- 39		2000		
R 61	- 39		2000		
R 62	- 39		2000		
R 63	- 39		2000		
R 64	- 39		2000		
R 65	- 48		4700		
R 66	- 48		4700		
P 67	- 25		510		
R 68	1006750 - 25		510	± 2%	1/4 W
R 69	1010364 - 439		9530	± 1%	1/8 W
R 70	1006750 - 75		62K	± 2%	1/4 W
R 71	1006750 - 75		62K	± 2%	1/4 W
R 72	1010364 - 319		2260	± 1%	1/8 W
R 73	1010364 - 365		3920	± 1%	1/8 W
R 74	1010364 - 515		23.7K	± 1%	1/8 W
R 75	1010364 - 515		23.7K	± 1%	1/8 W
R 76	1006750 - 73	RESISTOR	51 K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION
C 1	1010410 - 9	CAPACITOR
C 2	1010410 - 9	
C 3	1010410 - 9	
C 4	1006755 - 13	
C 5	SEE NOTE 2	
C 6	SEE NOTE 2	
C 7	SEE NOTE 2	
C 8	1010410 - 5	
C 9	1006755 - 3	
C 10	- 3	
C 11	- 3	
C 12	- 3	
C 13	- 33	
C 14	- 33	
C 15	- 33	
C 16	- 33	
C 17	- 69	
C 18	- 34	
C 19	- 69	
C 20	- 34	
C 21	- 69	
C 22	- 34	
C 23	- 69	
C 24	1006755 - 34	
C 25	1010279 - 6	
C 26	- 6	
C 27	- 6	
C 28	- 6	
C 29	- 6	
C 30	- 6	
C 31	- 6	
C 32	1010279 - 6	
C 33	1010393 - 021	
C 34	1010393 - 033	
C 35	1010393 - 033	
C 36	1010393 - 037	CAPACITOR
CR1	1010372 - 15	DIODE
CR2	1010362 - 001	DIODE
CR3	1010362 - 001	DIODE
CR4	1010362 - 001	DIODE
Q 1	1010397 -	TRANSISTOR
Q 2		
Q 3		
Q 4		
Q 5		
Q 6		
Q 7		
Q 8	1010397 -	
Q 9	1010367	
Q 10		
Q 11		
Q 12		
Q 13		
Q 14		
Q 15		
Q 16		
Q 17		
Q 18	1010367	
Q 19	1010397 -	TRANSISTOR
T 1	1010712	TRANSFORMER
T 2	1010712	
T 3	1010712	
T 4	1010712	
T 5	1010324	
T 6	1010324	
T 7	1010324	
T 8	1010324	
T 9	1010323	
T 10		
T 11		
T 12		
T 13	1010323	
T 14	1010710	
T 15	1010324	TRANSFORMER

REF DWG:
SIGNAL CONDITIONER ASSY
RESOLVER CDU
DWG NO. 1007665

QTY REQD	PART OR IDENTIFYING NO.

NEXT ASSY.	USED ON
APPLICATION	

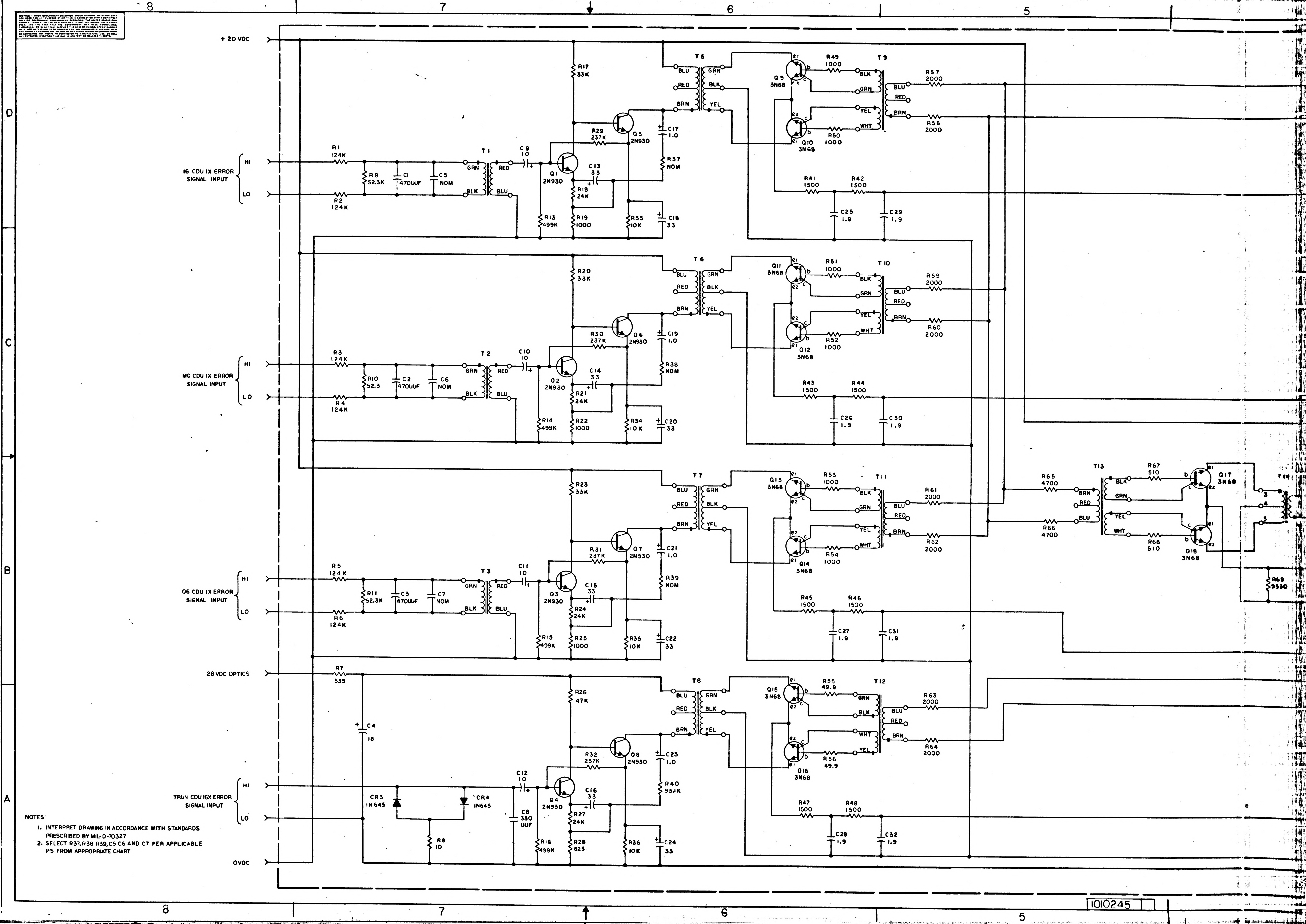
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN μf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± — ± — ± —
DO NOT SCALE THIS DRAWING

MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN
CHECKED
APPROVED
APPROVED
APPROVED MIT
NOT TO BE USED UNLESS APPROVED

MASTER



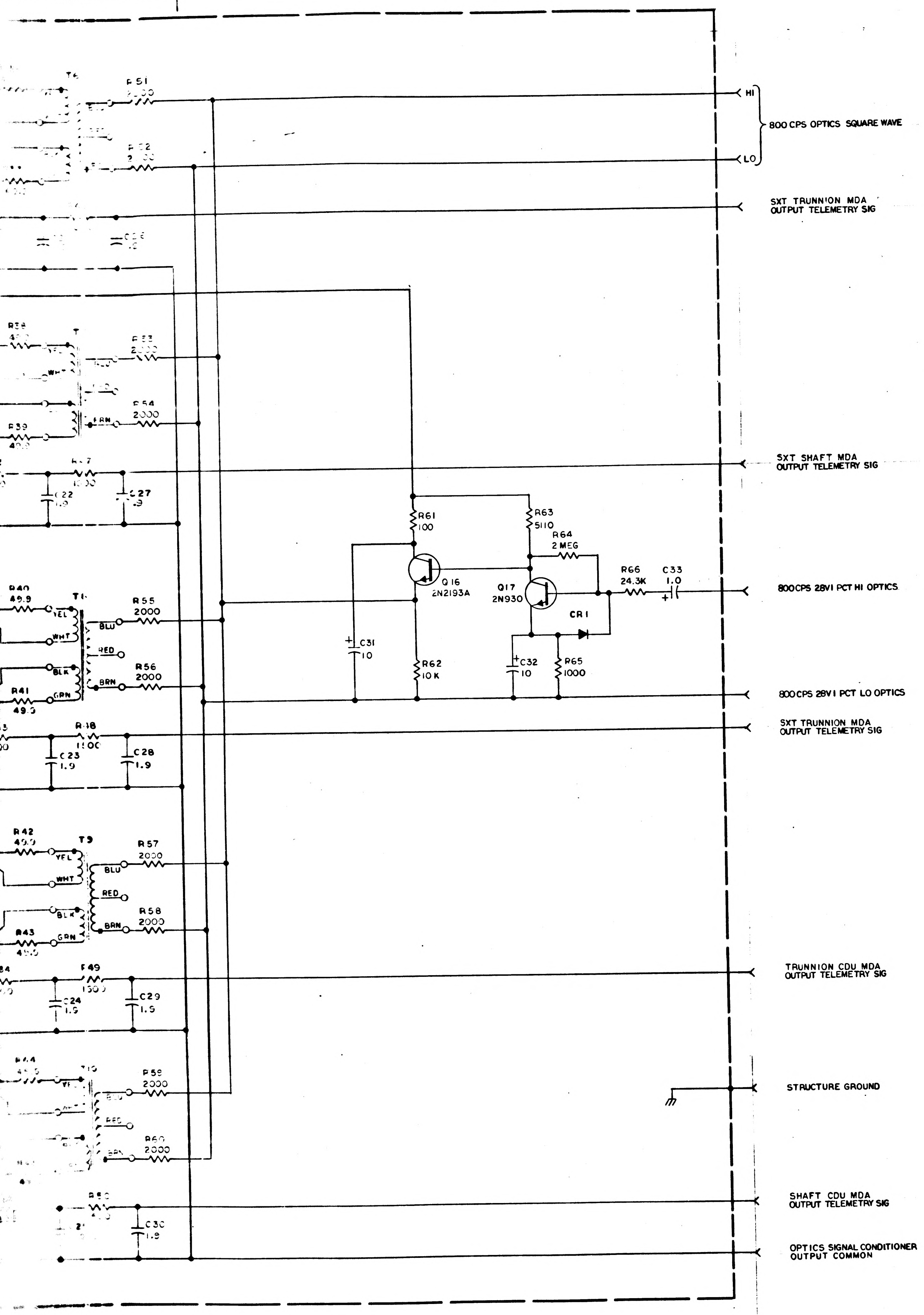
8
7
6
5
D
C
B
A
+20 VDC
16 CDU 1X ERROR SIGNAL INPUT
HI
LO
MG CDU 1X ERROR SIGNAL INPUT
OG CDU 1X ERROR SIGNAL INPUT
28 VDC OPTICS
TRUN CDU 16X ERROR SIGNAL INPUT
OVDC
R1 124K
R2 124K
R3 124K
R4 124K
R5 124K
R6 124K
R7 535
R8 10
R9 52.3K
R10 52.3
R11 52.3K
C1 470UUF
C2 470UUF
C3 470UUF
C4 18
C5 NOM
C6 NOM
C7 NOM
C8 330 UUF
CR3 1N645
CR4 1N645
T1
T2
T3
T4
GRN
RED
BLK
BLU
C9 10
C10 10
C11 10
C12 10
Q1 2N930
Q2 2N930
Q3 2N930
Q4 2N930
Q5 2N930
Q6 2N930
Q7 2N930
Q8 2N930
R13 499K
R14 499K
R15 499K
R16 499K
R17 33K
R20 33K
R23 33K
R26 47K
R18 24K
R21 24K
R24 24K
R27 24K
R19 1000
R22 1000
R25 1000
R28 825
R29 237K
R30 237K
R31 237K
R32 237K
C13 33
C14 33
C15 33
C16 33
R33 10K
R34 10K
R35 10K
R36 10K
C17 1.0
C19 1.0
C21 1.0
C23 1.0
C18 33
C20 33
C22 33
C24 33
R37 NOM
R38 NOM
R39 NOM
R40 93.1K
T5
T6
T7
T8
BRN
GRN
YEL
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
Q13 3N68
Q14 3N68
Q15 3N68
Q16 3N68
e1
e2
b
c
R49 1000
R50 1000
R51 1000
R52 1000
R53 1000
R54 1000
R55 49.9
R56 49.9
T9
T10
T11
T12
WHT
R41 1500
R42 1500
R43 1500
R44 1500
R45 1500
R46 1500
R47 1500
R48 1500
C25 1.9
C26 1.9
C27 1.9
C28 1.9
C29 1.9
C30 1.9
C31 1.9
C32 1.9
R57 2000
R58 2000
R59 2000
R60 2000
R61 2000
R62 2000
R63 2000
R64 2000
R65 4700
R66 4700
T13
R67 510
R68 510
Q17 3N68
Q18 3N68
T14
3
4
5
R69 9530
3H

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327
2. SELECT R37, R38 R39, C5 C6 AND C7 PER APPLICABLE PS FROM APPROPRIATE CHART

1010245

REVISIONS 22267



R51 2000
R52 2000
HI
LO
800 CPS OPTICS SQUARE WAVE
SXT TRUNNION MDA OUTPUT TELEMETRY SIG
R53 2000
R54 2000
YEL
WHT
BRN
SXT SHAFT MDA OUTPUT TELEMETRY SIG
C22 1.9
C27 1.9
R61 100
R63 5110
R64 2 MEG
Q16 2N2193A
Q17 2N930
R66 24.3K
C33 1.0
CR1
C31 10
R62 10K
C32 10
R65 1000
800CPS 28V1 PCT HI OPTICS
800CPS 28V1 PCT LO OPTICS
R40 49.9
T1
R55 2000
BLU
RED
R56 2000
BLK
BRN
R41 49.9
GRN
SXT TRUNNION MDA OUTPUT TELEMETRY SIG
R48 1500
C23 1.9
C28 1.9
R42 49.9
T3
R57 2000
YEL
BLU
WHT
RED
BLK
R58 2000
BRN
R43 49.9
GRN
R49 1500
C24 1.9
C29 1.9
TRUNNION CDU MDA OUTPUT TELEMETRY SIG
R44 49.9
T10
R59 2000
R60 2000
STRUCTURE GROUND
R50
C30 1.9
SHAFT CDU MDA OUTPUT TELEMETRY SIG
OPTICS SIGNAL CONDITIONER OUTPUT COMMON

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-109	RESISTOR	535	± 2%	1/4 W
R2	-109		535		
R3	-109		535		
R4	-109		535		
R5	1006750-109		535	± 2%	1/4 W
R6	1010374 -1		511 K	± 1%	1/8 W
R7	-1		511 K		
R8	-1		511 K		
R9	-1		511 K		
R10	1010374-1		511 K		
R11	1010364-719		274 K		
R12	1010374-5		562 K		
R13	1010364-719		274 K		
R14	1010374-5		562 K		
R15	1010364-719		274 K		
R16	1010374-5		562 K		
R17	1010364-719		274 K		
R18	1010374-5		562 K		
R19	1010364-719		274 K		
R20	1010374-5		562 K		
R21	1010364-719		274 K		
R22	-719		274 K		
R23	-719		274 K		
R24	-719		274 K		
R25	1010364-719		274 K	± 1%	1/8 W
R26	1006750-51		6200	± 2%	1/4 W
R27	-51		6200		
R28	-51		6200		
R29	-51		6200		
R30	-51		6200		
R31	-36		1500		
R32	-36		1500		
R33	-36		1500		
R34	-36		1500		
R35	1006750-36		1500	± 2%	1/4 W
R36	1010311 -1		49.9	± 1%	1/10 W
R37	-1		49.9		
R38	-1		49.9		
R39	-1		49.9		
R40	-1		49.9		
R41	-1		49.9		
R42	-1		49.9		
R43	-1		49.9		
R44	-1		49.9		
R45	1010311 -1		49.9	± 1%	1/10 W
R46	1006750-36		1500	± 2%	1/4 W
R47	-36		1500		
R48	-36		1500		
R49	-36		1500		
R50	-36		1500		
R51	-39		2000		
R52	-39		2000		
R53	-39		2000		
R54	-39		2000		
R55	-39		2000		
R56	-39		2000		
R57	-39		2000		
R58	-39		2000		
R59	-39		2000		
R60	-39		2000		
R61	-8		100		
R62	1006750-56		10K	± 2%	1/4 W
R63	1010321-194		5110	± 1%	1/4 W
R64	1010768-58		2 MEG	± 1%	1/8 W
R65	1010311-126		1000	± 1%	1/10 W
R66	1010311-259	RESISTOR	24.3K	± 1%	1/10 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010359 -29	CAPACITOR	0.01	± 10%	200 VDC
C2	-29		0.01		
C3	-29		0.01		
C4	-29		0.01		
C5	1010359 -29		0.01		200
C6	1006755 -133		18		50
C7	-133		18		
C8	-133		18		
C9	-133		18		
C10	-133		18		50
C11	-69		1.0		35
C12	-69		1.0		
C13	-69		1.0		
C14	-69		1.0		
C15	-69		1.0		
C16	-69		1.0		
C17	-69		1.0		
C18	-69		1.0		
C19	-69		1.0		
C20	1006755 -69		1.0		35
C21	1010279 -16		1.9		6
C22	-16		1.9		
C23	-16		1.9		
C24	-16		1.9		
C25	-16		1.9		
C26	-16		1.9		
C27	-16		1.9		
C28	-16		1.9		
C29	-16		1.9		
C30	1010279 -16		1.9		6
C31	1006755 -130		10		50
C32	1006755 -31		10		20
C33	1006755 -69	CAPACITOR	1.0	±10%	35 VDC
CR1	1010384	DIODE			
Q1	1010342	TRANSISTOR	2N998		
Q2					
Q3					
Q4					
Q5	1010342		2N998		
Q6	1010367		3N68		
Q7					
Q8					
Q9					
Q10					
Q11					
Q12					
Q13					
Q14					
Q15	1010367		3N68		
Q16	1010398 -1		2N2193A		
Q17	1010397 -1	TRANSISTOR	2N930		
T1	1010324	TRANSFORMER			
T2					
T3					
T4					
T5	1010324				
T6	1010323				
T7					
T8					
T9					
T10	1010323	TRANSFORMER			

2H

REF DWG:
OPTICS SIGNAL CONDITIONER ASSY
DWG NO. 1007667

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

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DO NOT SCALE THIS DRAWING
MATERIAL

NEXT ASSY | USED ON
APPLICATION

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. Di Leo 31 AUG 65
CHECKED
APPROVED 7 SEPT 65
APPROVED
APPROVED MIT W. G. Wheeler
NOT REQUIRED PER LETTER NASA PP7-65-612
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
OPTICS SIGNAL CONDITIONER

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010247
SCALE
SHEET 1 OF 1

1010247

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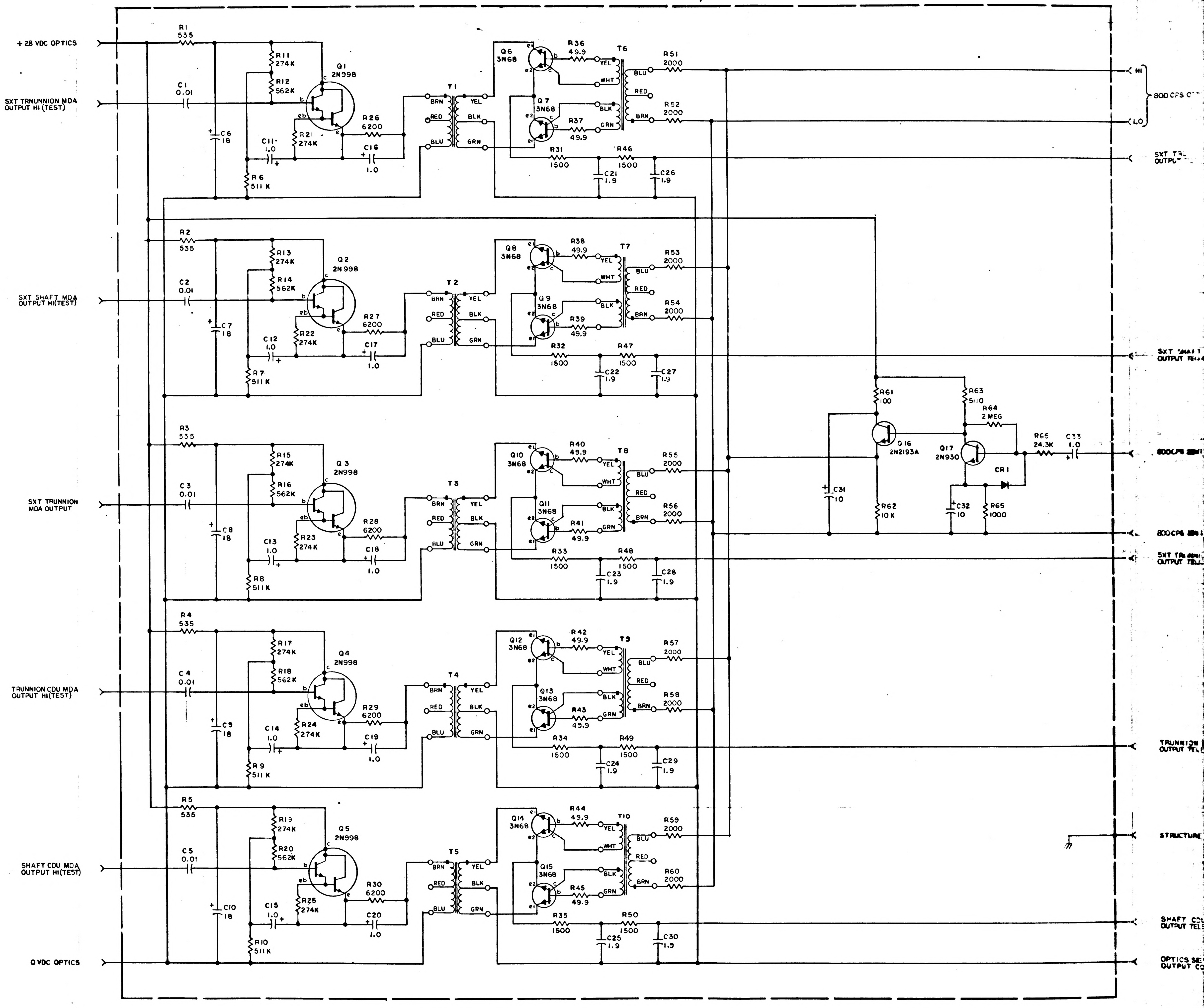
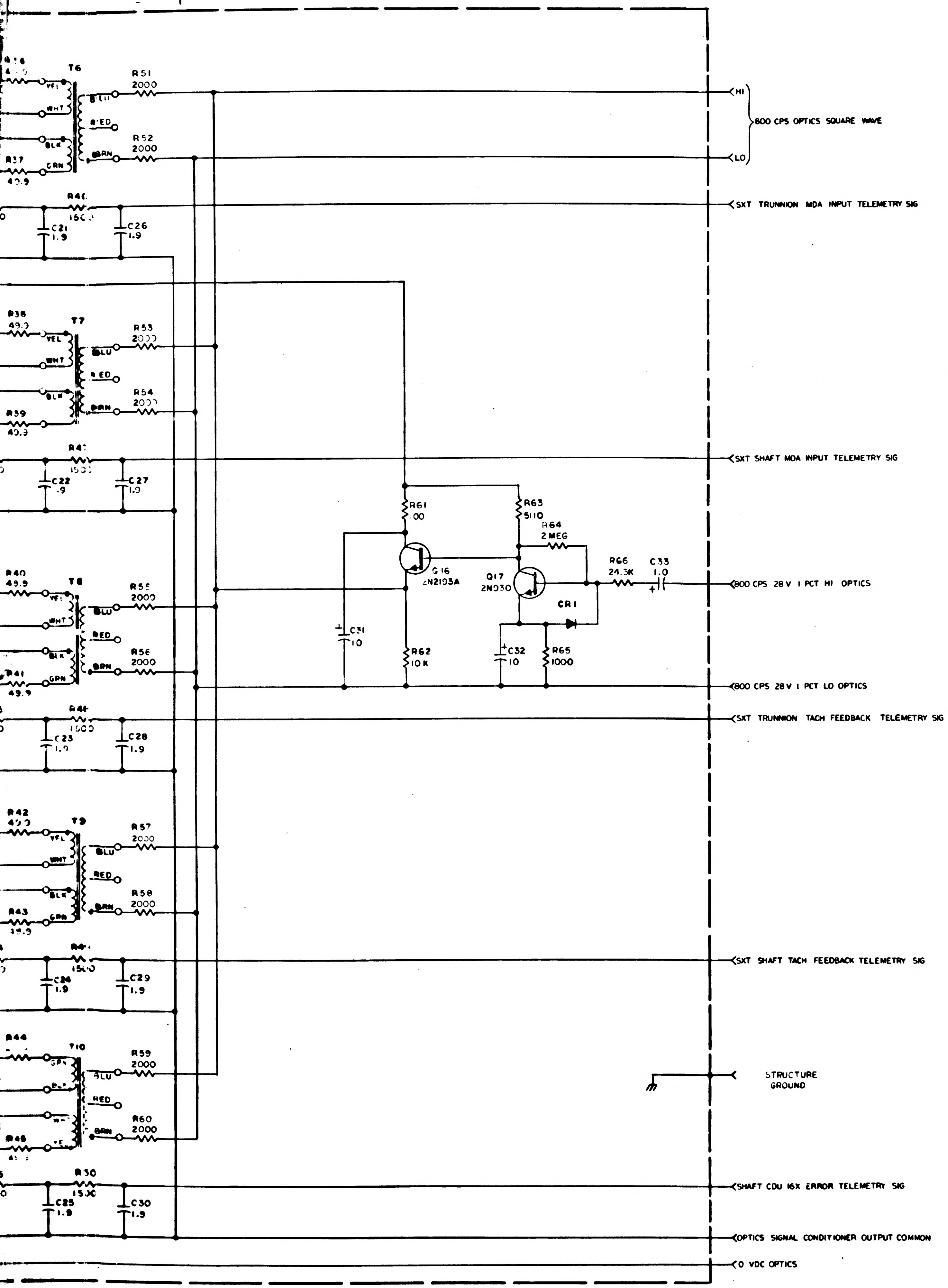

+28 VDC OPTICS
SXT TRNUNNION MDA OUTPUT HI (TEST)
SXT SHAFT MDA OUTPUT HI(TEST)
SXT TRUNNION MDA OUTPUT
TRUNNION CDU MDA OUTPUT HI(TEST)
SHAFT CDU MDA OUTPUT HI(TEST)
0 VDC OPTICS
R1 535
R2 535
R3 535
R4 535
R5 535
C1 0.01
C2 0.01
C3 0.01
C4 0.01
C5 0.01
C6 18
C7 18
C8 18
C9 18
C10 18
R6 511K
R7 511K
R8 511K
R9 511K
R10 511K
R11 274K
R12 562K
R13 274K
R14 562K
R15 274K
R16 562K
R17 274K
R18 562K
R19 274K
R20 562K
R21 274K
R22 274K
R23 274K
R24 274K
R25 274K
C11 1.0
C12 1.0
C13 1.0
C14 1.0
C15 1.0
Q1 2N998
Q2 2N998
Q3 2N998
Q4 2N998
Q5 2N998
b
c
e
eb
R26 6200
R27 6200
R28 6200
R29 6200
R30 6200
C16 1.0
C17 1.0
C18 1.0
C19 1.0
C20 1.0
T1
T2
T3
T4
T5
BRN
RED
BLU
YEL
BLK
GRN
Q6 3N68
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
Q13 3N68
Q14 3N68
Q15 3N68
e1
e2
R36 49.9
R37 49.9
R38 49.9
R39 49.9
R40 49.9
R41 49.9
R42 49.9
R43 49.9
R44 49.9
R45 49.9
T6
T7
T8
T9
T10
WHT
R31 1500
R32 1500
R33 1500
R34 1500
R35 1500
R46 1500
R47 1500
R48 1500
R49 1500
R50 1500
C21 1.9
C22 1.9
C23 1.9
C24 1.9
C25 1.9
C26 1.9
C27 1.9
C28 1.9
C29 1.9
C30 1.9
R51 2000
R52 2000
R53 2000
R54 2000
R55 2000
R56 2000
R57 2000
R58 2000
R59 2000
R60 2000
R61 100
R62 10K
Q16 2N2193A
C31 10
R63 5110
R64 2 MEG
Q17 2N930
CR1
C32 10
R65 1000
R66 24.3K
C33 1.0
HI
LO
800 CPS O
SXT TR
OUTPU
SXT SHAFT
OUTPUT TEL
800CPS
800CPS
SXT TRUNNI
OUTPUT TEL
TRUNNION
OUTPUT TEL
STRUCTURE
SHAFT CDU
OUTPUT TEL
OPTICS SE
OUTPUT CO

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

1010247

REVISIONS 22267						
SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED
A		REVISED PER TDRR 23165			18 OCT 65	



T6
R51 2000
R52 2000
R37 49.9
BLU
RED
BRN
YEL
WHT
BLK
GRN
R46 1500
C21 1.9
C26 1.9
R38 49.9
T7
R53 2000
R54 2000
R39 49.9
R47 1500
C22 1.9
C27 1.9
R40 49.9
T8
R55 2000
R56 2000
R41 49.9
R48 1500
C23 1.9
C28 1.9
R42 49.9
T9
R57 2000
R58 2000
R43 49.9
R49 1500
C24 1.9
C29 1.9
R44
T10
R59 2000
R60 2000
R45
R30 1500
C25 1.9
C30 1.9
R61 100
R62 10K
Q16 2N2193A
C31 10
R63 5110
R64 2 MEG
Q17 2N930
CR1
C32 10
R65 1000
R66 24.3K
C33 1.0
HI
LO
800 CPS OPTICS SQUARE WAVE
SXT TRUNNION MDA INPUT TELEMETRY SIG
SXT SHAFT MDA INPUT TELEMETRY SIG
800 CPS 28 V 1 PCT HI OPTICS
800 CPS 28 V 1 PCT LO OPTICS
SXT TRUNNION TACH FEEDBACK TELEMETRY SIG
SXT SHAFT TACH FEEDBACK TELEMETRY SIG
STRUCTURE GROUND
SHAFT CDU 16X ERROR TELEMETRY SIG
OPTICS SIGNAL CONDITIONER OUTPUT COMMON
0 VDC OPTICS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-109	RESISTOR	535	± 2%	1/4 W
R2	-109		535		
R3	-109		535		
R4	-109		535		
R5	1006750-109		535	± 2%	1/4 W
R6	1010374-1		511K	± 1%	1/8 W
R7	-1		511K		
R8	-1		511K		
R9	-1		511K		
R10	1010364-769		499K		
R11	1010364-719		274K		
R12	1010374-5		562K		
R13	1010364-719		274K		
R14	1010374-5		562K		
R15	1010364-719		274K		
R16	1010374-5		562K		
R17	1010364-719		274K		
R18	1010374-5		562K	± 1%	1/8 W
R19	1006750-72		47 K	± 2%	1/4 W
R20	1010278-15		10	± 5%	1/2 W
R21	1010364-719		274K	± 1%	1/8 W
R22	-719		274K	± 1%	1/8 W
R23	-719		274K	± 1%	1/8 W
R24	1010364-719		274K	± 1%	1/8 W
R25	1006750-65		24 K	± 2%	1/4 W
R26	1006750-51		6200	± 2%	1/4 W
R27	-51		6200		
R28	-51		6200		
R29	1006750-51		6200	± 2%	1/4 W
R30	1010311-315		93.1K	± 1%	1/10 W
R31	1006750-36		1500	± 2%	1/4 W
R32	-36		1500		
R33	-36		1500		
R34	-36		1500		
R35	1006750-36		1500	± 2%	1/4 W
R36	1010311-1		49.9	± 1%	1/10 W
R37	-1		49.9		
R38	-1		49.9		
R39	-1		49.9		
R40	-1		49.9		
R41	-1		49.9		
R42	-1		49.9		
R43	-1		49.9		
R44	-1		49.9		
R45	1010311-1		49.9	± 1%	1/10 W
R46	1006750-36		1500	± 2%	1/4 W
R47	-36		1500		
R48	-36		1500		
R49	-36		1500		
R50	-36		1500		
R51	-39		2000		
R52	-39		2000		
R53	-39		2000		
R54	-39		2000		
R55	-39		2000		
R56	-39		2000		
R57	-39		2000		
R58	-39		2000		
R59	-39		2000		
R60	-39		2000		
R61	-8		100		
R62	1006750-56		10K	± 2%	1/4 W
R63	1010321-194		5110	± 1%	1/4 W
R64	1010768-58		2 MEG	± 1%	1/8 W
R65	1010311-126		1000	± 1%	1/10 W
R66	1010311-259		24.3K	± 1%	1/10 W
R67	1010311-118		825	± 1%	1/10 W
R68	1010364-707		237K	± 1%	1/8 W
R69	1006750-56	RESISTOR	10K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010359-29	CAPACITOR	0.01	± 10%	200VDC
C2	-29		0.01		
C3	-29		0.01		
C4	-29		0.01		
C5	1006755-31		10		20
C6	1006755-133		18		50
C7	-133		18		
C8	-133		18		
C9	-133		18		
C10	-133		18		50
C11	-69		1.0		35
C12	-69		1.0		
C13	-69		1.0		
C14	1006755-69		1.0	± 10%	
C15	1010410-5		330UUF	± 2%	500
C16	1006755-69		1.0	± 10%	35
C17	-69		1.0		
C18	-69		1.0		
C19	-69		1.0		
C20	1006755-69		1.0		35
C21	1010279-16		1.9		6
C22	-16		1.9		
C23	-16		1.9		
C24	-16		1.9		
C25	-16		1.9		
C26	-16		1.9		
C27	-16		1.9		
C28	-16		1.9		
C29	-16		1.9		
C30	1010279-16		1.9		6
C31	1006755-130		10		50
C32	-31		10		20
C33	-69		1.0		35 VDC
C34	-34		33		20 VDC
C35	1006755-34	CAPACITOR	33	± 10%	20 VDC
CR1	1010384	DIODE			
CR2	1010362-001	DIODE	1N645		
CR3	1010362-001	DIODE	1N645		
Q1	1010342	TRANSISTOR	2N998		
Q2					
Q3					
Q4	1010342		2N998		
Q5	1010397-1		2N930		
Q6	1010367		3N68		
Q7					
Q8					
Q9					
Q10					
Q11					
Q12					
Q13					
Q14					
Q15	1010367		3N68		
Q16	1010398-1		2N2193A		
Q17	1010397-1		2N930		
Q18	1010397-1	TRANSISTOR	2N930		
T1	1010324	TRANSFORMER			
T2					
T3					
T4					
T5	1010324				
T6	1010323				
T7					
T8					
T9					
T10	1010323	TRANSFORMER			

2H

REF DWG:
OPTICS SIGNAL CONDITIONER ASSY
DWG NO. 1007668

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE MASS

DRAWN A. Di Leo 31 AUG 65
CHECKED
APPROVED 7 SEPT 65
APPROVED
APPROVED MIT
NOT REQUIRED PER LETTER
APPROVED MSC PP7-65-612
DATE

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

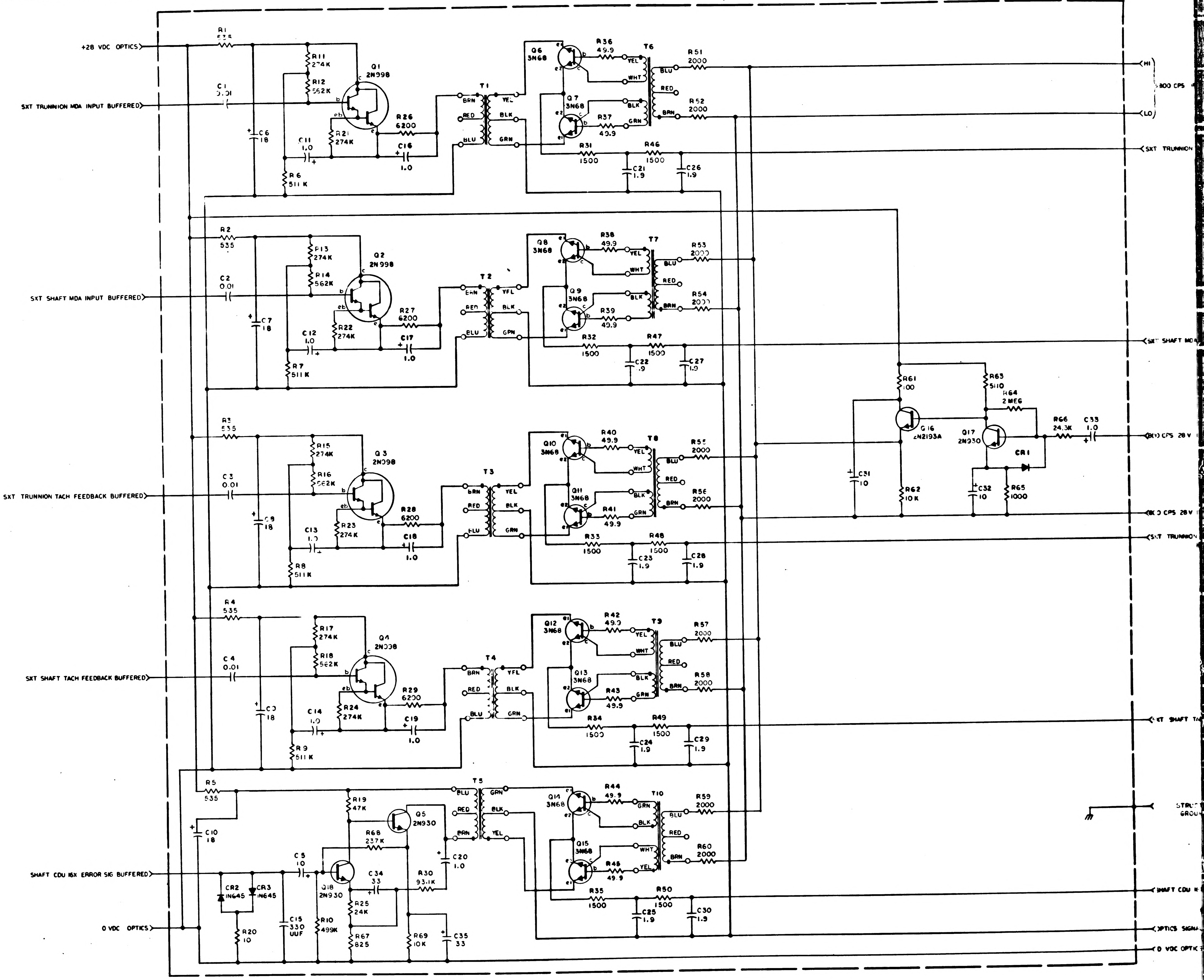
SCHEMATIC
OPTICS SIGNAL CONDITIONER

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010248
SCALE
SHEET 1 OF 1

1010248 A

1010248 A

27 1010248



+28 VDC OPTICS
SXT TRUNNION MDA INPUT BUFFERED
SXT SHAFT MDA INPUT BUFFERED
SXT TRUNNION TACH FEEDBACK BUFFERED
SXT SHAFT TACH FEEDBACK BUFFERED
SHAFT CDU 16X ERROR SIG BUFFERED
0 VDC OPTICS
R1 535
R2 535
R3 535
R4 535
R5 535
C1 0.01
C2 0.01
C3 0.01
C4 0.01
C6 18
C7 18
C8 18
C9 18
C10 18
R11 274K
R12 562K
R13 274K
R14 562K
R15 274K
R16 562K
R17 274K
R18 562K
Q1 2N998
Q2 2N998
Q3 2N998
Q4 2N998
R21 274K
R22 274K
R23 274K
R24 274K
C11 1.0
C12 1.0
C13 1.0
C14 1.0
R6 511K
R7 511K
R8 511K
R9 511K
R26 6200
R27 6200
R28 6200
R29 6200
C16 1.0
C17 1.0
C18 1.0
C19 1.0
T1
T2
T3
T4
T5
BRN
RED
BLU
YEL
BLK
GRN
WHT
Q6 3N68
Q7 3N68
Q8 3N68
Q9 3N68
Q10 3N68
Q11 3N68
Q12 3N68
Q13 3N68
Q14 3N68
Q15 3N68
R36 49.9
R37 49.9
R38 49.9
R39 49.9
R40 49.9
R41 49.9
R42 49.9
R43 49.9
R44 49.9
R45 49.9
T6
T7
T8
T9
T10
R51 2000
R52 2000
R53 2000
R54 2000
R55 2000
R56 2000
R57 2000
R58 2000
R59 2000
R60 2000
R31 1500
R32 1500
R33 1500
R34 1500
R35 1500
R46 1500
R47 1500
R48 1500
R49 1500
R50 1500
C21 1.9
C22 1.9
C23 1.9
C24 1.9
C25 1.9
C26 1.9
C27 1.9
C28 1.9
C29 1.9
C30 1.9
R19 47K
Q5 2N930
R68 237K
C5 10
Q18 2N930
C34 33
R30 93.1K
C20 1.0
CR2 1N645
CR3 1N645
R20 10
C15 330 UUF
R10 499K
R25 24K
R67 825
R69 10K
C35 33
R61 100
Q16 2N2193A
R62 10K
C31 10
R63 5110
R64 2 MEG
Q17 2N930
CR1
C32 10
R65 1000
R66 24.3K
C33 1.0
(HI)
(LO)
800 CPS
SXT TRUNNION
SXT SHAFT MDA
800 CPS 28 V
800 CPS 28 V
SXT TRUNNION
SXT SHAFT TA
STRU GROU
SHAFT CDU
OPTICS SIGNA
0 VDC OPTIC

NOTES:

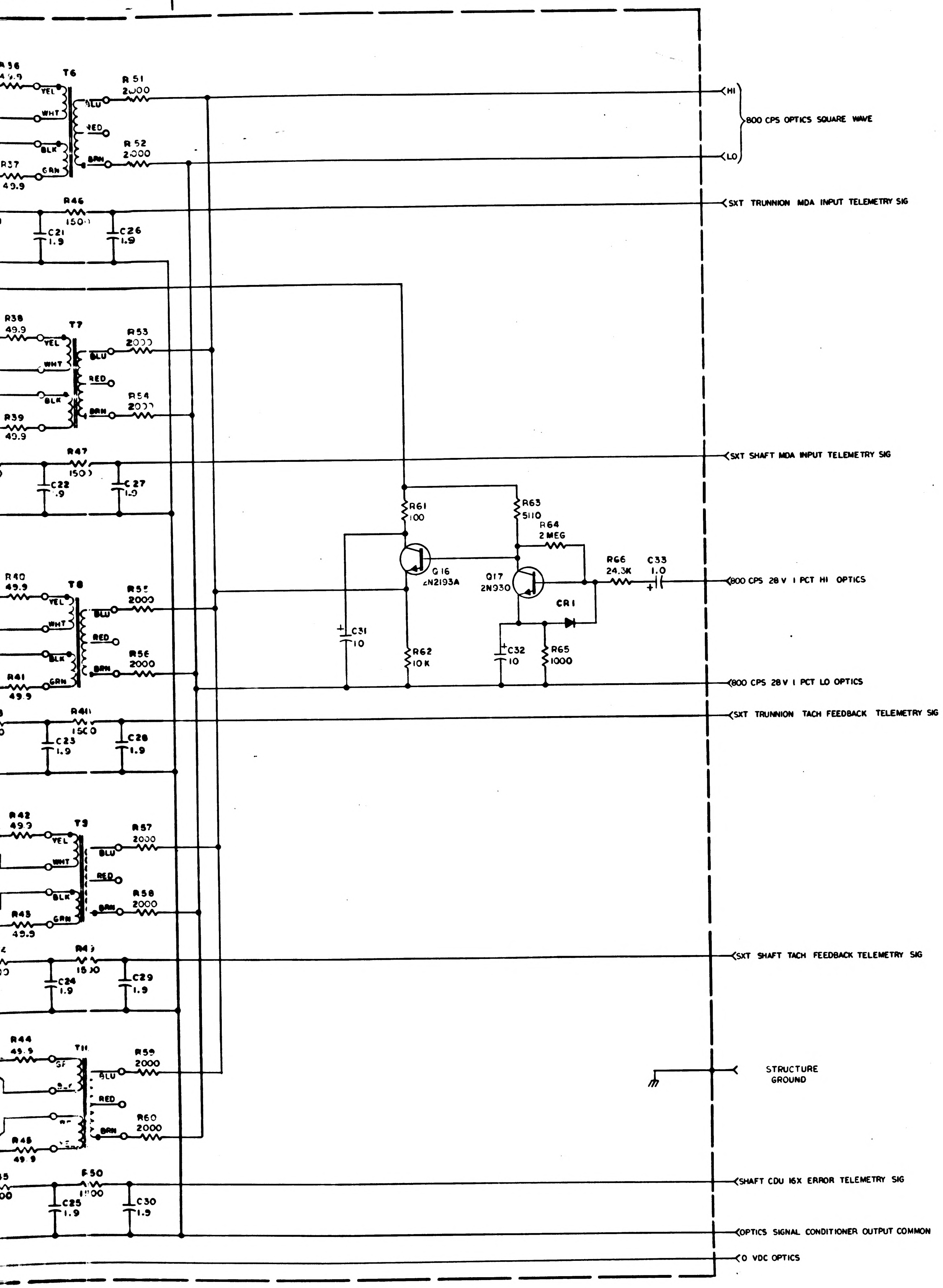
1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

1010248 A

1/1010248

SYM	ZONE	DESCRIPTION	DR	CHK	DATE	APPROVED

REVISIONS 22267


R36
49.9
T6
YEL
WHT
BLK
GRN
BLU
RED
BRN
R51
2000
R52
2000
R37
49.9
800 CPS OPTICS SQUARE WAVE
HI
LO
R46
1500
C21
1.9
C26
1.9
SXT TRUNNION MDA INPUT TELEMETRY SIG
R38
49.9
T7
R53
2000
R54
2000
R39
49.9
R47
1500
C22
1.9
C27
1.9
SXT SHAFT MDA INPUT TELEMETRY SIG
R61
100
R63
5110
R64
2 MEG
Q16
2N2193A
Q17
2N930
R66
24.3K
C33
1.0
CR1
C31
10
R62
10K
C32
10
R65
1000
800 CPS 28 V 1 PCT HI OPTICS
800 CPS 28 V 1 PCT LO OPTICS
R40
49.9
T8
R55
2000
R56
2000
R41
49.9
R48
1500
C23
1.9
C28
1.9
SXT TRUNNION TACH FEEDBACK TELEMETRY SIG
R42
49.9
T9
R57
2000
R58
2000
R43
49.9
R49
1500
C24
1.9
C29
1.9
SXT SHAFT TACH FEEDBACK TELEMETRY SIG
R44
49.9
T11
R59
2000
R60
2000
R45
49.9
R50
1500
C25
1.9
C30
1.9
STRUCTURE GROUND
SHAFT CDU 16X ERROR TELEMETRY SIG
OPTICS SIGNAL CONDITIONER OUTPUT COMMON
0 VDC OPTICS

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
R1	1006750-109	RESISTOR	535	± 2%	1/4 W
R2	-109		535		
R3	-109		535		
R4	↓ -109		535	↓	↓
R5	1006750-109		535	± 2%	1/4 W
R6	1010374 -1		511K	± 1%	1/8 W
R7	-1		511K		
R8	-1		511K		
R9	↓ -1		511K		
R10	1010364-769		499K		
R11	1010364-719		274K		
R12	1010374-5		562K		
R13	1010364-719		274K		
R14	1010374-5		562K		
R15	1010364-719		274K		
R16	1010374-5		562K		
R17	1010364-719		274K	↓	↓
R18	1010374-5		562K	± 1%	1/8 W
R19	1006750-72		47K	± 2%	1/4 W
R20	1012078-15		10	± 5%	1/2 W
R21	1010364-719		274K	± 1%	1/8 W
R22	-719		274K	± 1%	1/8 W
R23	↓ -719		274K	± 1%	1/8 W
R24	1010364-719		274K	± 1%	1/8 W
R25	1006750-65		24K	± 2%	1/4 W
R26	1006750-51		6200	± 2%	1/4 W
R27	-51		6200		
R28	↓ -51		6200	↓	↓
R29	1006750-51		6200	± 2%	1/4 W
R30	1010311 -315		93.1K	± 1%	1/10 W
R31	1006750-36		1500	± 2%	1/4 W
R32	-36		1500		
R33	-36		1500		
R34	↓ -36		1500	↓	↓
R35	1006750-36		1500	± 2%	1/4 W
R36	1010311 -1		49.9	± 1%	1/10 W
R37	-1		49.9		
R38	-1		49.9		
R39	-1		49.9		
R40	-1		49.9		
R41	-1		49.9		
R42	-1		49.9		
R43	-1		49.9		
R44	↓ -1		49.9	↓	↓
R45	1010311 -1		49.9	± 1%	1/10 W
R46	1006750-36		1500	± 2%	1/4 W
R47	-36		1500		
R48	-36		1500		
R49	-36		1500		
R50	-36		1500		
R51	-39		2000		
R52	-39		2000		
R53	-39		2000		
R54	-39		2000		
R55	-39		2000		
R56	-39		2000		
R57	-39		2000		
R58	-39		2000		
R59	-39		2000		
R60	-39		2000		
R61	↓ -8		100	↓	↓
R62	1006750-56		10K	± 2%	1/4 W
R63	1010321-194		5110	± 1%	1/4 W
R64	1010768-58		2 MEG	± 1%	1/8 W
R65	1010311-126		1000	± 1%	1/10 W
R66	1010311-259		24.3K	± 1%	1/10 W
R67	1010311-118		825	± 1%	1/10 W
R68	1010364-707	↓	237K	± 1%	1/8 W
R69	1006750-56	RESISTOR	10K	± 2%	1/4 W

REF DES	PART NO.	DESCRIPTION	VALUE	TOL	RATING
C1	1010359 -29	CAPACITOR	0.01	± 10%	200VDC
C2	-29		0.01		
C3	-29		0.01		
C4	↓ -29		0.01		↓
C5	1006755 -31		10		20
C6	1006755 -133		18		50
C7	-133		18		
C8	-133		18		
C9	-133		18		↓
C10	-133		18		50
C11	-69		1.0		35
C12	-69		1.0		
C13	↓ -69		1.0	↓	
C14	1006755 -69		1.0	± 10%	↓
C15	1010410 -5		330UUF	± 2%	500
C16	1006755 -69		1.0	± 10%	35
C17	-69		1.0		
C18	-69		1.0		
C19	↓ -69		1.0		↓
C20	1006755 -69		1.0		35
C21	1010279 -16		1.9		6
C22	-16		1.9		
C23	-16		1.9		
C24	-16		1.9		
C25	-16		1.9		
C26	-16		1.9		
C27	-16		1.9		
C28	-16		1.9		
C29	↓ -16		1.9		↓
C30	1010279 -16		1.9		6
C31	1006755 -130		10		50
C32	-31		10		20 ↓
C33	-69		1.0		35 VDC
C34	↓ -34	↓	33	↓	20 VDC
C35	1006755 -34	CAPACITOR	33	± 10%	20 VDC
CR1	1010384	DIODE			
CR2	1010362-001	DIODE	IN645		
CR3	1010362-001	DIODE	IN645		
Q1	1010342	TRANSISTOR	2N998		
Q2					
Q3	↓		↓		
Q4	1010342		2N998		
Q5	1010397-1		2N930		
Q6	1010367		3N68		
Q7					
Q8					
Q9					
Q10					
Q11					
Q12					
Q13					
Q14	↓		↓		
Q15	1010367		3N68		
Q16	1010398 -1		2N2193A		
Q17	1010397 -1	↓	2N930		
Q18	1010397 -1	TRANSISTOR	2N930		
T1	1010324	TRANSFORMER			
T2					
T3					
T4	↓				
T5	1010324				
T6	1010323				
T7					
T8					
T9	↓	↓			
T10	1010323	TRANSFORMER			

REF DWG:
OPTICS SIGNAL CONDITIONER ASSY
DWG NO. 1007868

QTY REQD	PART OR IDENTIFYING NO.	MATERIAL OR NOTES	NOMENCLATURE OR DESCRIPTION	FIND NO

LIST OF MATERIALS

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
CAPACITOR VALUES ARE IN µf
RESISTOR VALUES ARE IN OHMS
TOLERANCES ON
FRACTIONS DECIMALS ANGLES
± ± ±
DO NOT SCALE THIS DRAWING
MATERIAL

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN A. Di Leo 31 AUG 65
CHECKED
APPROVED 7 SEP 65
APPROVED
APPROVED MIT 8 Sep 65
NOT REQUIRED PER LETTER
APPROVED MSC PP7-65-612
DATE

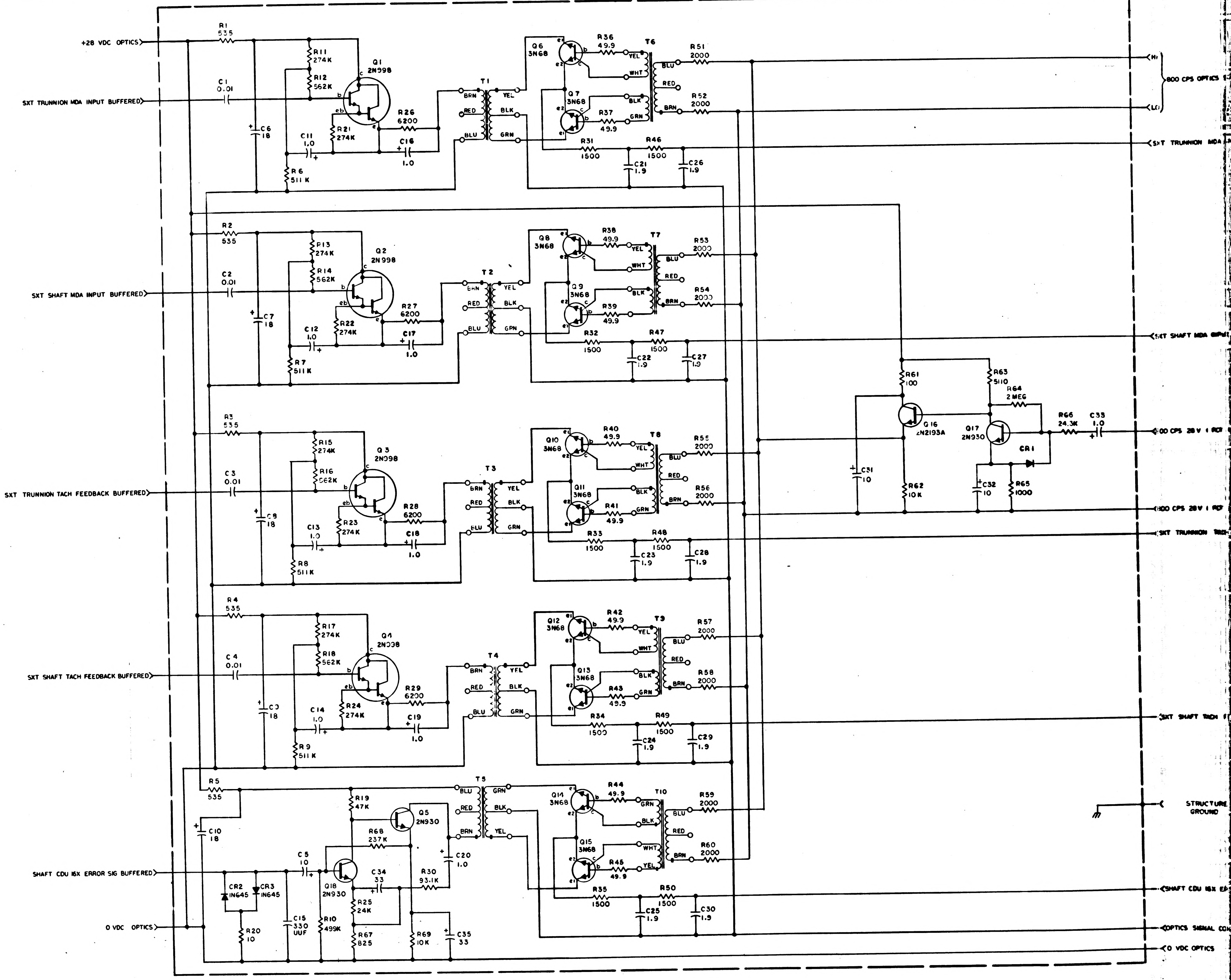
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SCHEMATIC
OPTICS SIGNAL CONDITIONER

CODE IDENT NO. 80230
SIZE J
DRAWING NO. 1010248
SCALE
SHEET 1 OF 1

1010248

NOTICE – WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.


+28 VDC OPTICS
SXT TRUNNION MDA INPUT BUFFERED
SXT SHAFT MDA INPUT BUFFERED
SXT TRUNNION TACH FEEDBACK BUFFERED
SXT SHAFT TACH FEEDBACK BUFFERED
SHAFT CDU 16X ERROR SIG BUFFERED
0 VDC OPTICS
R1 535
C1 0.01
R11 274K
R12 562K
Q1 2N998
R21 274K
C6 18
C11 1.0
R6 511K
R26 6200
C16 1.0
T1
BRN
RED
BLU
YEL
BLK
GRN
Q6 3N68
Q7 3N68
R36 49.9
R37 49.9
T6
WHT
R51 2000
R52 2000
R31 1500
R46 1500
C21 1.9
C26 1.9
R2 535
C2 0.01
R13 274K
R14 562K
Q2 2N998
R22 274K
C7 18
C12 1.0
R7 511K
R27 6200
C17 1.0
T2
Q8 3N68
Q9 3N68
R38 49.9
R39 49.9
T7
R53 2000
R54 2000
R32 1500
R47 1500
C22 1.9
C27 1.9
R3 535
C3 0.01
R15 274K
R16 562K
Q3 2N998
R23 274K
C8 18
C13 1.0
R8 511K
R28 6200
C18 1.0
T3
Q10 3N68
Q11 3N68
R40 49.9
R41 49.9
T8
R55 2000
R56 2000
R33 1500
R48 1500
C23 1.9
C28 1.9
R4 535
C4 0.01
R17 274K
R18 562K
Q4 2N998
R24 274K
C9 18
C14 1.0
R9 511K
R29 6200
C19 1.0
T4
Q12 3N68
Q13 3N68
R42 49.9
R43 49.9
T9
R57 2000
R58 2000
R34 1500
R49 1500
C24 1.9
C29 1.9
R5 535
C10 18
R19 47K
Q5 2N930
R68 237K
C5 10
Q18 2N930
C34 33
R30 93.1K
C20 1.0
CR2 1N645
CR3 1N645
R20 10
C15 330 UUF
R10 499K
R25 24K
R67 825
R69 10K
C35 33
T5
Q14 3N68
Q15 3N68
R44 49.9
R45 49.9
T10
R59 2000
R60 2000
R35 1500
R50 1500
C25 1.9
C30 1.9
R61 100
R63 5110
R64 2 MEG
Q16 2N2193A
Q17 2N930
R66 24.3K
C33 1.0
CR1
C31 10
R62 10K
C32 10
R65 1000
HI
LO
800 CPS OPTICS
SXT TRUNNION MDA
SXT SHAFT MDA INPUT
800 CPS 28 V 1 PCT
800 CPS 28 V 1 PCT
SXT TRUNNION TACH
SXT SHAFT TACH
STRUCTURE GROUND
SHAFT CDU 16X ER
OPTICS SIGNAL COM
0 VDC OPTICS
6
5
4
D
C
B
A

NOTES:

1. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327

1010248

1010250

SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318836		
A	ADDED PROCUREMENT NOTE 3 PER TDRR 00433	2-20-63	WJB WK

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

DASH NO.	RESISTANCE VALUE OHMS	TOL ±_%
-1	680	1.0

NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.
   - B. EXCEPTIONS:
     - (1) POWER RATING: .70 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
     - (2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.
     - (3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.
     - (4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.
     - (5) QUALIFICATION APPROVAL: NOT REQUIRED.
   - C. ADDITIONS:
     - (1) MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 600 VDC MAX.
     - (2) STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER.
     - (3) LEAD MATERIAL: WELDABLE, GRADE A NICKEL (ALLOY 200) IN ACCORDANCE WITH ND PS 1015400. MATERIAL SHALL BE CERTIFIED WITH EACH SHIPMENT.
     - (4) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
     - (5) QUALITY ASSURANCE: VENDOR SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS II AND MIL-R-93.
     - (6) BURN-IN: 100 HOURS AT 125°C AND RATED WATTAGE. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.5%.

2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

3. A WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPEC. & PHYSICAL DIMENSIONS.

   B UPON SPECIFIC INSTRUCTION BY (TD) TECHNICAL DIRECTIVE PROCURE THIS PART AS CHANGE LETTER A BY ODERING TO VENDOR CATALOG NO. & SPECIFICATIONS. REFERENCE ND 1002034.

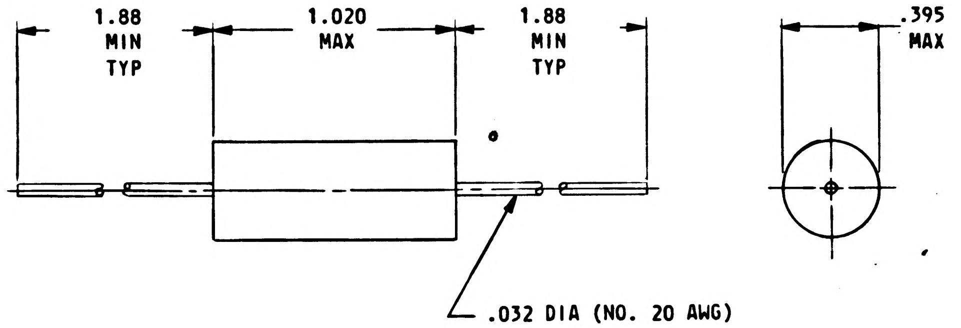
   C DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION LETTER A.

ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 310A

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Ray Wheeler DATE 21 Dec 62
CHECKED D. M. Sleeper 10 Jan 63
APPROVAL John S. Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J Rhine 2-22-63
MIT APPROVAL W Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010250
SCALE NONE WT SHEET 1 OF 1

1010250

B	1010250

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
(M) -	TAKEN FROM BUWEPS SCD 2318836		
(M) A	ADDED PROCUREMENT NOTE 3 PER TDRR 00433	2-20-63	W/B WK
B	REPLACED WITH CHANGES BY REV C PER TDRR 00513	—	WK

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

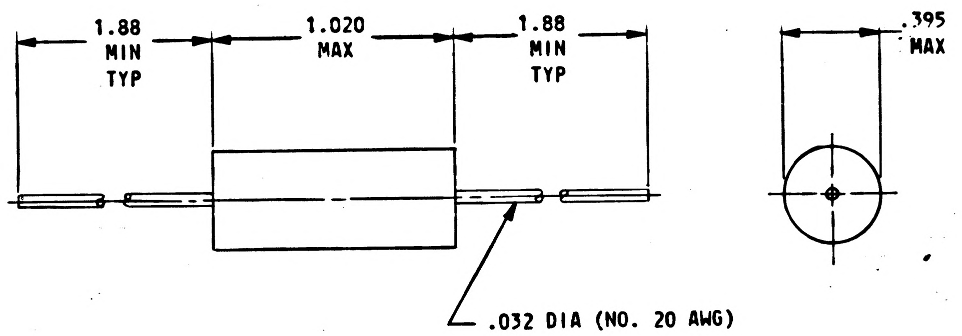
NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.
   - B. EXCEPTIONS:
     - (1) POWER RATING: .70 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
     - (2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.
     - (3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.
     - (4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.
     - (5) QUALIFICATION APPROVAL: NOT REQUIRED.
   - C. ADDITIONS:
     - (1) MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 600 VDC MAX.
     - (2) STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER.
     - (3) LEAD MATERIAL: WELDABLE, GRADE A NICKEL (ALLOY 200) IN ACCORDANCE WITH ND PS 1015400. MATERIAL SHALL BE CERTIFIED WITH EACH SHIPMENT.
     - (4) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
     - (5) QUALITY ASSURANCE: VENDOR SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS II AND MIL-R-93.
     - (6) BURN-IN: 100 HOURS AT 125°C AND RATED WATTAGE. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.5%.
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE VALUE OHMS	TOL ± %
-1	680	1.0

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 29 Jan 1963



(B) REPLACED WITH CHANGE BY REV C

[redacted]

ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 310A

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Ray Wheeler DATE 21 Dec 62
CHECKED D. M. Sleeper 10 Jan 63
APPROVAL John E. Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J [illegible] 2-2-63
MIT APPROVAL W. A. [illegible] 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1010250 C

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGE PER TDRR 00513	—	WR

NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.
   - B. EXCEPTIONS:
     - (1) POWER RATING: .70 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
     - (2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.
     - (3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.
     - (4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.
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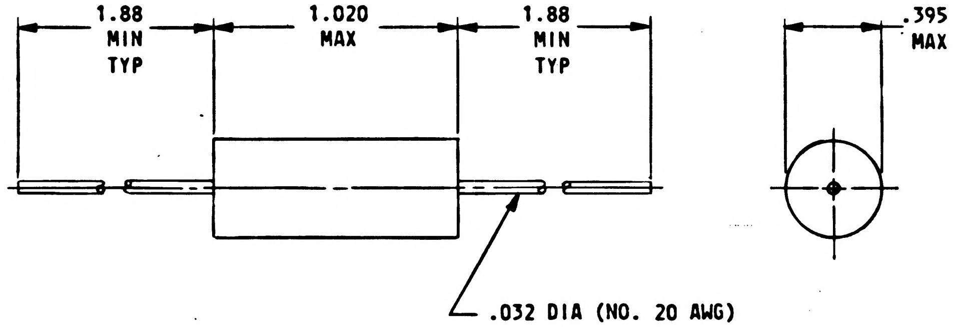
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE VALUE OHMS	TOL ± %
-1	680	1.0

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 25 Jan 1963



Ⓒ REPLACES REV B WITH CHANGE

MASTER

ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 310A

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN Ray Wheeler DATE 21 Dec 62
CHECKED D. M. Sleeper 10 Jan 63
APPROVAL John E. Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W A Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

1010250 D

SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV B WITH CHANGE PER TDRR 00513	—	WK
D	REPLACED BY REV E WITH CHANGES PER TDRR 01893	9-2-63	JJM

M

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NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.
   - B. EXCEPTIONS:
     - (1) POWER RATING: .70 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
     - (2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.
     - (3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.
     - (4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.
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   - C. ADDITIONS:
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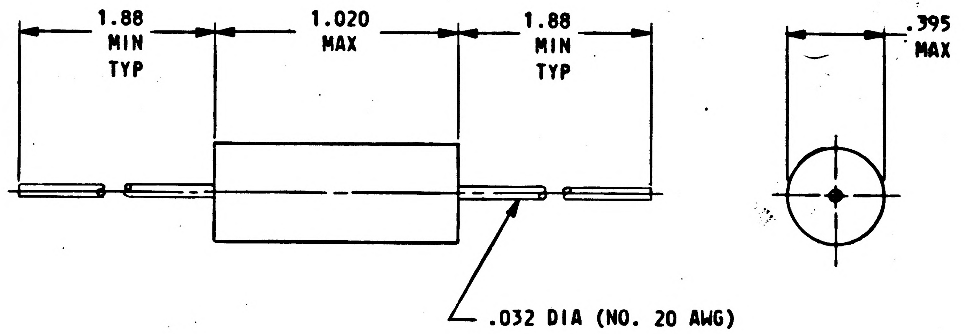
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE VALUE OHMS	TOL ± %
-1	680	1.0

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 29 Jan 1963



Ⓒ REPLACES REV B WITH CHANGE
Ⓓ REPLACED BY REV E WITH CHANGES

MASTER

ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 310A

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN Gary Wheeler DATE 21 Dec 62
CHECKED D. M. Sleeper 10 Jan 63
APPROVAL John E. Miller 23 Jan 63
APPROVAL
NASA APPROVAL W. J. Rhine 2-2-63
MIT APPROVAL 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1010250 E

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
E	REPLACES REV D WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 01893	7-2-63	JJM WK

REQUIREMENTS:

GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.

SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

PACKAGING PER MIL-R-93, LEVEL A

UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, EXCEPT AS MODIFIED HERE-IN.

INSPECTION AND ACCEPTANCE:

MECHANICAL REQUIREMENTS:

LEAD MATERIAL: WELDABLE, GRADE A NICKEL IN ACCORDANCE WITH ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

MARKING: (PER MIL-STD-130) EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER AND REVISION LETTER.

ELECTRICAL REQUIREMENTS:

TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C, 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.

RESISTANCE AND TOLERANCE @ 25°C; PER TABLE

DESIGN REQUIREMENTS:

PER MIL-R-93/10, CHARACTERISTIC C, MODIFIED PER THIS DRAWING

LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

POWER RATING: 0.7 WATT AT 125°C DERATED TO 0 WATT AT 145°C.

OPERATING TEMPERATURE RANGE: -65°C TO +125°C

MAXIMUM VOLTAGE RATING: $E = \sqrt{PR}$ UP TO A 600 VDC MAX

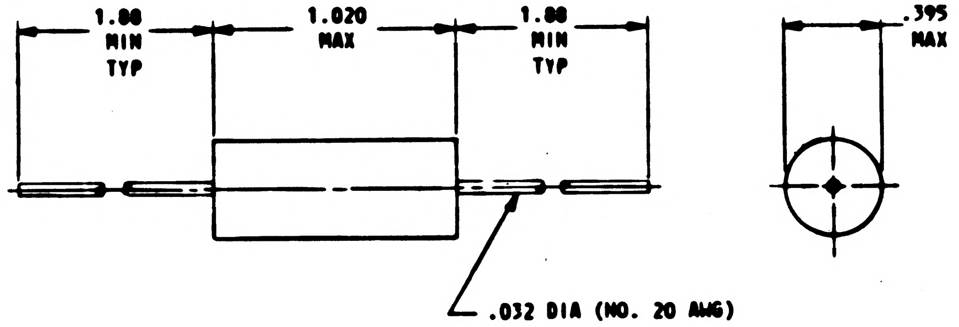
STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

SPECIAL CONDITIONING BY SUPPLIER:

BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE AC OR DC. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	680	1.0



THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

MASTER

Ⓔ REPLACES REV(D) WITH CHANGE

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT NAS9-497
DRAWN Foro DATE 10 JUN 63
CHECKED Bitman - 12 JUNE 63
APPROVAL D. A. Test 28 JUN 63
APPROVAL
NASA APPROVAL W. S. Sweger 7/1/63
MIT APPROVAL W Kupfer 2 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010250

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO

1010250 F

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
E	REPLACES REV D WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 01893	7-2-63	J.J.M. WK
F	REVISED PER TDRR 03700	8 Oct 63	WK

REQUIREMENTS:

GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.

SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

PACKAGING PER MIL-R-93, LEVEL A

UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, EXCEPT AS MODIFIED HERE-IN.

INSPECTION AND ACCEPTANCE:

MECHANICAL REQUIREMENTS:

LEAD MATERIAL: WELDABLE GOLD PLATED GRADE A NICKEL, PER ND PS 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.

MARKING: (PER MIL-STD-130) EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER AND REVISION LETTER.

ELECTRICAL REQUIREMENTS:

TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C, 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.

RESISTANCE AND TOLERANCE @ 25°C; PER TABLE

DESIGN REQUIREMENTS:

PER MIL-R-93/10, CHARACTERISTIC C, MODIFIED PER THIS DRAWING

LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

POWER RATING: 0.7 WATT AT 125°C DERATED TO 0 WATT AT 145°C.

OPERATING TEMPERATURE RANGE: -65°C TO +125°C

MAXIMUM VOLTAGE RATING: $E = \sqrt{PR}$ UP TO A 600 VDC MAX

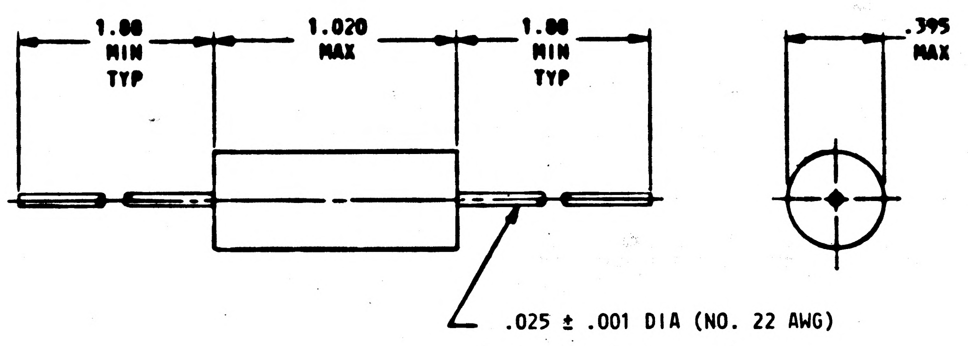
STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

SPECIAL CONDITIONING BY SUPPLIER:

BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE AC OR DC. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	.680	1.0



THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓔ REPLACES REV(D) WITH CHANGE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO CONTRACT NAS9-497
DRAWN Foro DATE 10 JUN 63
CHECKED D. Sturgeon 18 June 63
APPROVAL D. G. Test 28 JUN 63
APPROVAL
NASA APPROVAL W. S. Swingle 7/1/63
MIT APPROVAL W. Kupfer 2 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
E	REPLACES REV D WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 01893	7.2.63	JJM WK
F	REVISED PER TDRR 03700	8 Oct 63	WK
G	REVISED PER TDRR 07103	21 Jan 64	WK

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING PER MIL-R-93, LEVEL A
     UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, EXCEPT AS MODIFIED HERE-IN.

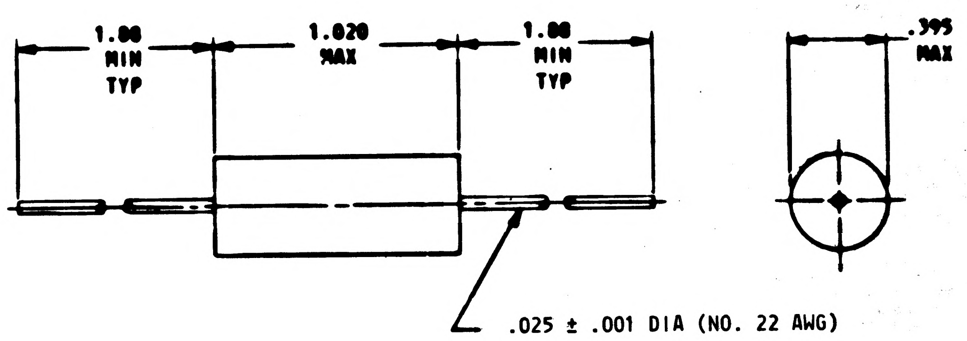
2. **INSPECTION AND ACCEPTANCE:**
   - A. **MECHANICAL REQUIREMENTS:**
     1. **LEAD MATERIAL:** WELDABLE GOLD PLATED GRADE A NICKEL, PER ND PS 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.
     2. **MARKING:** (PER ND 1002019 EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER AND REVISION LETTER.
   - B. ELECTRICAL REQUIREMENTS:
     1. TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C, 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.
     2. RESISTANCE AND TOLERANCE @ 25°C; PER TABLE

3. **DESIGN REQUIREMENTS:**
   - A. PER MIL-R-93/10, CHARACTERISTIC C, MODIFIED PER THIS DRAWING
   - B. **LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.**
   - C. POWER RATING: 0.7 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
   - D. OPERATING TEMPERATURE RANGE: -65°C TO +125°C
   - E. MAXIMUM VOLTAGE RATING: $E = \sqrt{PR}$ UP TO A 600 VDC MAX
   - F. STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE AC OR DC. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	680	1.0
-2	712	1.0



THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓔ REPLACES REV(D)WITH CHANGE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS9-497
DRAWN Foro DATE 10 JUN 63
CHECKED Peterson 18 JUNE 63
APPROVAL D. A. Test 28 JUN 63
APPROVAL
NASA APPROVAL W. S. Savage 7/1/63
MIT APPROVAL W. Kupfer 2 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

H 1010250

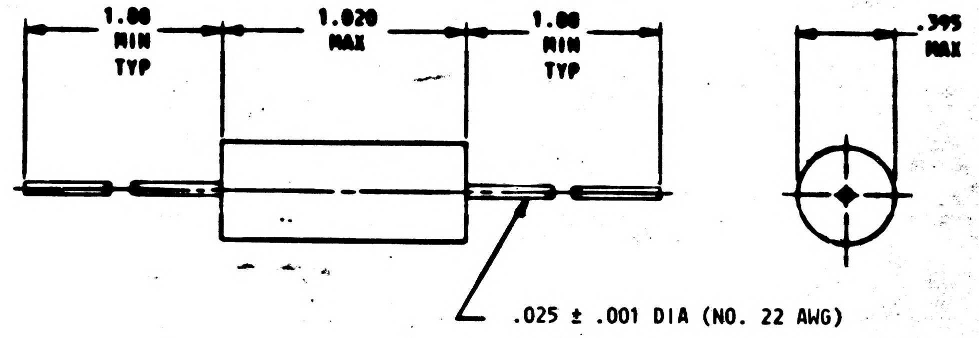
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
E	REPLACES REV D WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 01693	7-2-63	JJM WK
F	REVISED PER TDRR 03700	8 Oct 63	WK
G	REVISED PER TDRR 07103	24 Mar 64	WK
H	REVISED PER TDRR 22820	10/1/65	WK

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING PER MIL-R-93, LEVEL A
     UNITS SHALL BE CAPABLE OF MEETING ALL REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, EXCEPT AS MODIFIED HERE-IN.
2. **INSPECTION AND ACCEPTANCE:**
   - A. **MECHANICAL REQUIREMENTS:**
     1. **LEAD MATERIAL:** WELDABLE GOLD PLATED GRADE A NICKEL, PER ND PS 1015400. A CERTIFICATE OF COMPLIANCE TO THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.
     2. MARKING: (PER ND 1002019 — EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER AND REVISION LETTER.
   - B. ELECTRICAL REQUIREMENTS:
     1. TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C, 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.
     2. RESISTANCE AND TOLERANCE @ 25°C; PER TABLE
3. **DESIGN REQUIREMENTS:**
   - A. **PER MIL-R-93/10, CHARACTERISTIC C, MODIFIED PER THIS DRAWING**
   - B. **LEAD STRENGTH:** EACH LEAD SHALL BE CAPABLE OF WITHSTANDING TWO (2) BENDS UNDER A TWO (2) POUND VERTICAL PULL (LEAD VERTICAL WITH RESPECT TO BODY). TWO (2) BENDS SHALL BE ACCOMPLISHED BY MOVING THE BODY OF THE UNIT, WHILE IN THE SAME PLANE, THROUGH 90° IN ONE DIRECTION, THEN BACK 180° TO THE OPPOSITE DIRECTION AND BACK 90° TO THE ORIGINAL POSITION. NO PHYSICAL DAMAGE TO THE BODY OR DEGRADATION IN ELECTRICAL PERFORMANCE SHALL BE EVIDENT AFTER THE TEST.
   - C. POWER RATING: 0.7 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
   - D. OPERATING TEMPERATURE RANGE: -65°C TO +125°C
   - E. MAXIMUM VOLTAGE RATING: $E = \sqrt{PR}$ UP TO A 600 VDC MAX
   - F. STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER
4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE AC OR DC. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	680	1.0
-2	712	1.0



THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓔ REPLACES REV(D)WITH CHANGE

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± — DECIMALS ± — ANGLES ± —
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE MASS
DWG NO
CONTRACT NAS9-497
DRAWN Foro DATE 10 JUN 63
CHECKED Ostrum 18 JUNE 63
APPROVAL D. A. Test 28 JUN 63
APPROVAL
NASA APPROVAL W. S. Sweeney 7/1/63
MIT APPROVAL W. Kupfer 2 July 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO 80230
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

1010250

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318836		

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

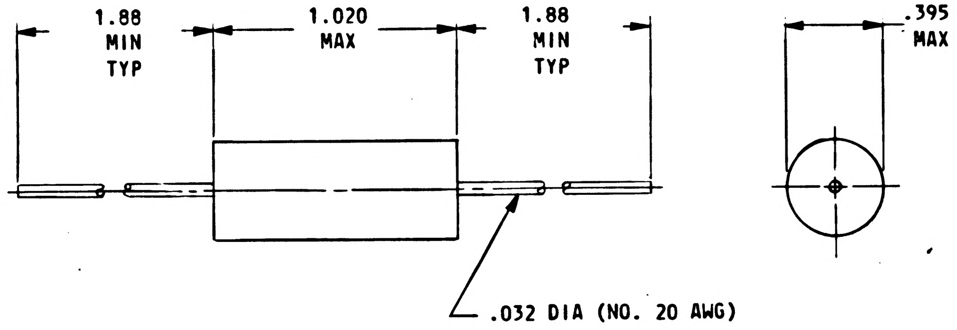
1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/10, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.
   - B. EXCEPTIONS:
     - (1) POWER RATING: .70 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
     - (2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.
     - (3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.
     - (4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.
     - (5) QUALIFICATION APPROVAL: NOT REQUIRED.
   - C. ADDITIONS:
     - (1) MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 600 VDC MAX.
     - (2) STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER.
     - (3) LEAD MATERIAL: WELDABLE, GRADE A NICKEL (ALLOY 200) IN ACCORDANCE WITH ND PS 1015400. MATERIAL SHALL BE CERTIFIED WITH EACH SHIPMENT.
     - (4) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
     - (5) QUALITY ASSURANCE: VENDOR SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS II AND MIL-R-93.
     - (6) BURN-IN: 100 HOURS AT 125°C AND RATED WATTAGE. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.5%.

2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE VALUE OHMS	TOL ± %
-1	680	1.0

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963



ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 310A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Ray Wheeler DATE 21 Dec 62
CHECKED D. M. Sleeper 10 Jan 63
APPROVAL John S. Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W A Koppen 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010250
SCALE NONE
WT
SHEET 1 OF 1

1010251

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
-	ORIGINATED		
A	ADDED PROCUREMENT NOTE 3 PER TDRR: 00433	2-20-63	WJB WK

NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.
   - B. EXCEPTIONS:
     - (1) POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
     - (2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.
     - (3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.
     - (4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.
     - (5) QUALIFICATION APPROVAL: NOT REQUIRED.
   - C. ADDITIONS:
     - (1) MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 150 VDC MAX.
     - (2) STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER.
     - (3) LEAD MATERIAL: WELDABLE, GRADE A NICKEL (ALLOY 200) IN ACCORDANCE WITH ND PS 1015400. MATERIAL SHALL BE CERTIFIED WITH EACH SHIPMENT.
     - (4) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
     - (5) QUALITY ASSURANCE: VENDOR SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS II AND MIL-R-93.
     - (6) BURN-IN: 100 HOURS AT 125°C AND RATED WATTAGE. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.5%.

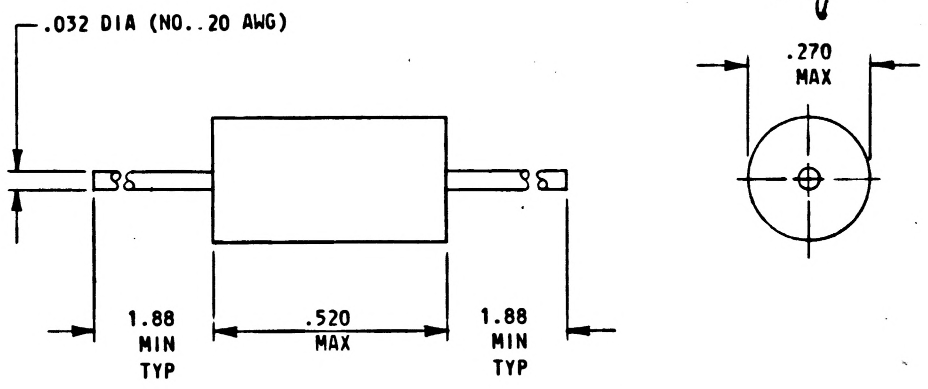
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

3. A WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPEC. & PHYSICAL DIMENSIONS.
   B UPON SPECIFIC INSTRUCTION BY (TD) TECHNICAL DIRECTIVE PROCURE THIS PART AS CHANGE LETTER A BY ODERING TO VENDOR CATALOG NO. & SPECIFICATIONS. REFERENCE ND 1002034.
   C DISREGARD THIS NOTE IN ITS ENTIRETY IF REFERENCE IS MADE TO THIS DRAWING BY OTHER THAN REVISION LETTER A.

DASH NO.	RESISTANCE VALUE OHMS	TOL ± %
-1	31.9K	1.0
-2	36.0K	
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	
-9	292.4K	1.0

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963



MASTER

ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 205A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS . ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN D Bergman DATE 2 Jan 63
CHECKED D. M. Slupe 10 Jan 63
APPROVAL John E Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010251
SCALE NONE WT SHEET 1 OF 1

1010251

1010251 B

REVISIONS

SYM	DESCRIPTION	DATE	APPROVAL
(M) -	ORIGINATED		
(M) A	ADDED PROCUREMENT NOTE 3 PER TDRR 00433	2-20-63	WJB WK
B	REPLACED WITH CHANGE BY REV C PER TDRR 00513	–	WR

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

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DASH NO.	RESISTANCE VALUE OHMS	TOL ± %
-1	31.9K	1.0
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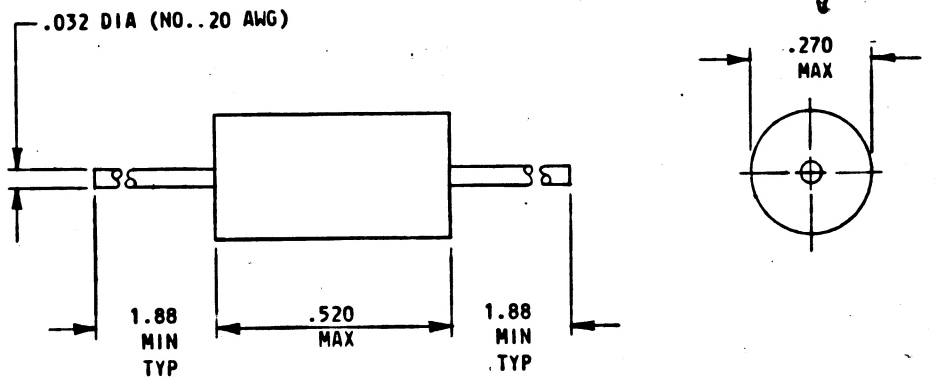
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	
-9	292.4K	1.0

[redacted]

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963



Ⓒ REPLACED WITH CHANGE BY REV C

MASTER

ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 205A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN D Bergman DATE 2 Jan 63
CHECKED D. M. Slupe 10 Jan 63
APPROVAL John E. Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1010251
SCALE NONE | WT | SHEET 1 OF 1

1010251 C

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			
C	REPLACES REV C WITH CHANGE PER TDRR 00513		WR

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NOTES:

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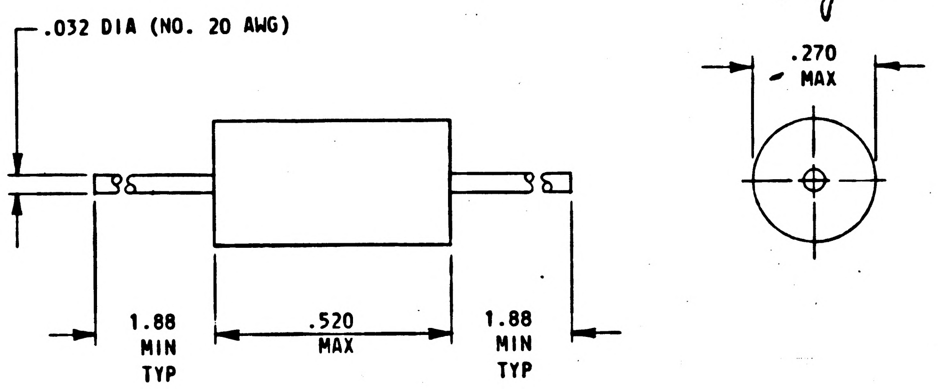
-6	72.6K	
-7	97.1K	
-8	146.0K	↓
-9	292.4K	1.0

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963



Ⓒ REPLACES REV B WITH CHANGE

MASTER

MASTER

ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 205A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN D Bergman DATE 2 Jan 63
CHECKED D. M. Slaper 10 Jan 63
APPROVAL John E Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010251
SCALE NONE
WT
SHEET 1 OF 1

1010251 D

SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV C WITH CHANGE PER TDRR 00513		WR
D	REVISED PER TDRR 01108	5-1-63	WK

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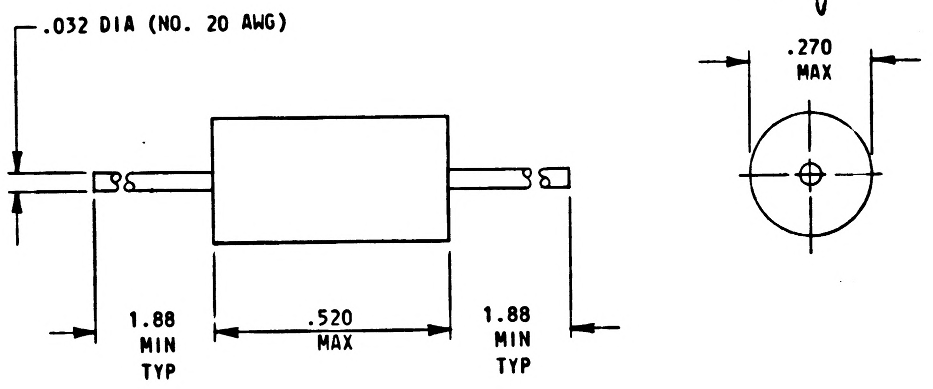
-8	146.0K	
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	
-12	36.8K	
-13	38.8K	
-14	41.0K	
-15	43.4K	
-16	46.2K	
-17	49.3K	
-18	52.9K	
-19	57.0K	
-20	61.8K	
-21	67.4K	
-22	74.2K	
-23	82.6K	
-24	92.9K	
-25	106K	
-26	124K	
-27	149K	
-28	187K	
-29	249K	
-30	373K	
-31	746K	

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 **DATE** 23 Jan 1963



Ⓒ REPLACES REV B WITH CHANGE

MASTER

~~PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002036 FOR THIS DRAWING.~~

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTES

HEAT TREATMENT NONE

FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN D Bergman DATE 2 Jan 63
CHECKED D. M. Slayton 10 Jan 63
APPROVAL John E Miller 23 Jan 63
APPROVAL

NASA APPROVAL W J Rhine 1-23-63

MIT APPROVAL W Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010251

SCALE NONE WT SHEET 1 OF 1

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

1010251 E

SYM	DESCRIPTION	DATE	APPROVAL
REVISIONS			
C	REPLACES REV C WITH CHANGE PER TDRR 00513		WK
D	REVISED PER TDRR 01108	6-1-63	WK.
E	REVISED PER TDRR 01340	6/24/63	WK.

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-7	97.1K	
-8	146.0K	↓
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	
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-14	41.0K	
-15	43.4K	
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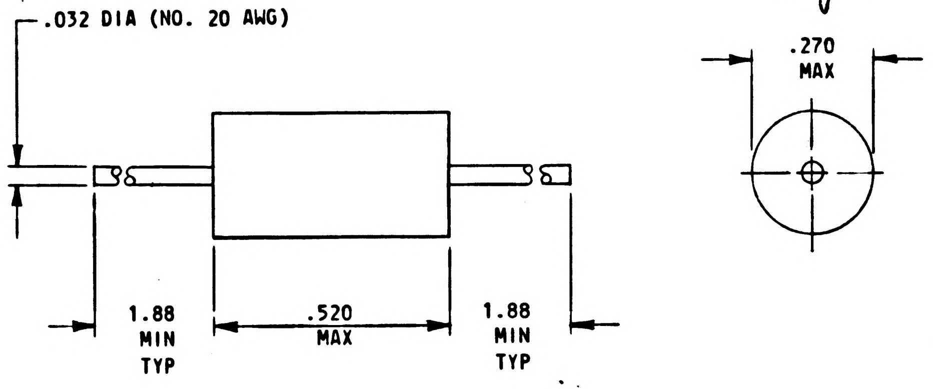
-23	82.6K	
-24	92.9K	
-25	106K	
-26	124K	
-27	149K	
-28	187K	
-29	249K	
-30	373K	
-31	746K	↓
-32	16.5 OHMS	1%
-33	21.4 OHMS	
-34	27 OHMS	
-35	33.7 OHMS	
-36	42 OHMS	
-37	20.7 OHMS	↓

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963



Ⓒ REPLACES REV B WITH CHANGE

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

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FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN E Bergman DATE 2 Jan 63
CHECKED D. M. Slaker 10 Jan 63
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APPROVAL
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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010251
SCALE NONE WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010251 E

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1010251 F

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
C	REPLACES REV C WITH CHANGE PER TDRR 00513		WK
D	REVISED PER TDRR 01108	5-1-63	WK.
E	REVISED PER TDRR 01340	5/24/63	WK.
F	REPLACED BY REV G WITH CHANGES PER TDRR 02110	7/17/63	

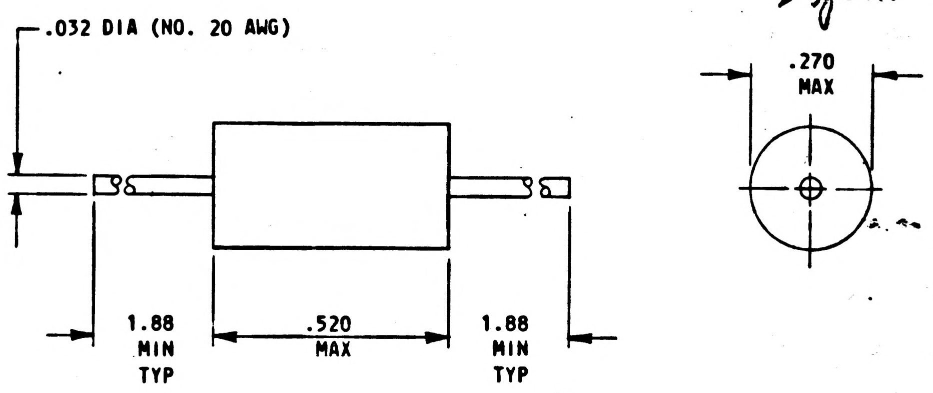
NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.
   - B. EXCEPTIONS:
     - (1) POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
     - (2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.
     - (3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.
     - (4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.
     - (5) QUALIFICATION APPROVAL: NOT REQUIRED.
   - C. ADDITIONS:
     - (1) MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 150 VDC MAX.
     - (2) STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER.
     - (3) LEAD MATERIAL: WELDABLE, GRADE A NICKEL (ALLOY 200) IN ACCORDANCE WITH ND PS 1015400. MATERIAL SHALL BE CERTIFIED WITH EACH SHIPMENT.
     - (4) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
     - (5) QUALITY ASSURANCE: VENDOR SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS II AND MIL-R-93.
     - (6) BURN-IN: 100 HOURS AT 125°C AND RATED WATTAGE. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.5%.
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE VALUE OHMS	TOL ±_%
-1	31.9K	1.0
-2	36.0K	
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	
-12	36.8K	
-13	38.8K	
-14	41.0K	
-15	43.4K	
-16	46.2K	
-17	49.3K	
-18	52.9K	
-19	57.0K	
-20	61.8K	
-21	67.4K	
-22	74.2K	
-23	82.6K	
-24	92.9K	
-25	106K	
-26	124K	
-27	149K	
-28	187K	
-29	249K	
-30	373K	
-31	746K	
-32	16.5 OHMS	1%
-33	21.4 OHMS	
-34	27 OHMS	
-35	33.7 OHMS	
-36	42 OHMS	
-37	20.7 OHMS	

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 DATE 23 Jan 1963



Ⓕ REPLACED BY REV (G) WITH CHANGES

Ⓒ REPLACES REV B WITH CHANGE

MASTER

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DRAWING.

MASTER

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN D Bergman DATE 2 Jan 63
CHECKED D. M. Slaper 10 Jan 63
APPROVAL John E Miller 23 Jan 63
APPROVAL
NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010251
SCALE NONE WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010251 E

1010251 G

REV	DESCRIPTION	DATE	APPROVAL
G	REPLACES REV F WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 52110	7/12	

REQUIREMENTS:

GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.

SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

PACKAGING PER MIL-R-93, LEVEL A

UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH EXCEPTIONS AND ADDITIONS STATED BELOW.

INSPECTION AND ACCEPTANCE:

MECHANICAL REQUIREMENTS:

LEAD MATERIAL: WELDABLE, GRADE A NICKEL IN ACCORDANCE WITH ND 1015400. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

MARKING: (PER MIL-STD-130) EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER, AND REVISION LETTER.

ELECTRICAL REQUIREMENTS:

TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C. 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.

DESIGN REQUIREMENTS:

PER MIL-R-93/13, CHARACTERISTIC C, MODIFIED PER THIS DRAWING

POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.

OPERATING TEMPERATURE RANGE: -65°C TO +125°C

MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 150 VDC MAX

STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

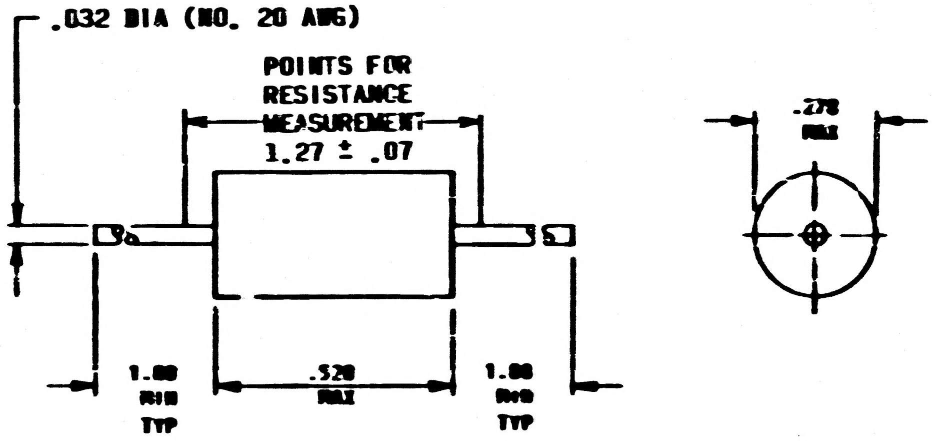
SPECIAL CONDITIONING BY SUPPLIER:

BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE (AC OR DC). THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	31.9K	1.0
-2	36.0K	↓
-3	41.2K	↓
-4	48.2K	↓
-5	58.01K	↓
-6	72.6K	↓
-7	97.1K	↓
-8	146.0K	↓
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	↓
-12	36.8K	↓
-13	38.8K	↓
-14	41.0K	↓
-15	43.4K	↓
-16	46.2K	↓
-17	49.3K	↓
-18	52.9K	↓
-19	57.0K	↓
-20	61.8K	↓
-21	67.4K	↓
-22	74.2K	↓
-23	82.6K	↓
-24	92.9K	↓
-25	106K	↓
-26	124K	↓
-27	149K	↓
-28	187K	↓
-29	249K	↓
-30	373K	↓
-31	746K	
-32	16.5 OHMS	1%
-33	21.4 OHMS	↓
-34	27 OHMS	↓
-35	33.7 OHMS	↓
-36	42 OHMS	↓
-37	20.7 OHMS	↓

NOTES: 1. RESISTANCE VALUES OVER 85K ARE NOT AVAILABLE PER THE REQUIREMENTS OF THIS DRAWING AND MIL-R-93 USING .001 MIN. DIA. WIRE.



THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓖ REPLACES REV(F)WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

M I T
INSTRUMENTATION LAB
DRAWN DATE
CHECKED 11 Jul 63
APPROVAL 12 Jul 63
APPROVAL
NASA APPROVAL 7/1/63
MIT APPROVAL

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO
SIZE C
NASA DRAWING NO. 1010251
SCALE NONE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

H	1010251

REVISIONS B Released 00295 23 Jan 63			
SYM	DESCRIPTION	DATE	APPROVAL
G	REPLACES REV F WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02110	7/17/63	
H	REVISED PER TDRR 03701	8 Oct 63	WK.

Ⓐ

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

GENERAL:

INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.

SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.

PACKAGING PER MIL-R-93, LEVEL A

UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH EXCEPTIONS AND ADDITIONS STATED BELOW.

INSPECTION AND ACCEPTANCE:

MECHANICAL REQUIREMENTS:

LEAD MATERIAL: WELDABLE, GOLD PLATED GRADE A NICKEL, PER ND PS 1015400. A CERTIFICATE OF COMPLIANCD TO THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.

LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

MARKING: (PER MIL-STD-130) EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER, AND REVISION LETTER.

ELECTRICAL REQUIREMENTS:

TEMPERATURE COEFFICIENT: ABOVE 10Ω = 15 PPM/°C, 10Ω TO 1Ω = 30 PPM/°C, 1Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.

DESIGN REQUIREMENTS:

PER MIL-R-93/13, CHARACTERISTIC C, MODIFIED PER THIS DRAWING

POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.

OPERATING TEMPERATURE RANGE: -65°C TO +125°C

MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 150 VDC MAX

STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

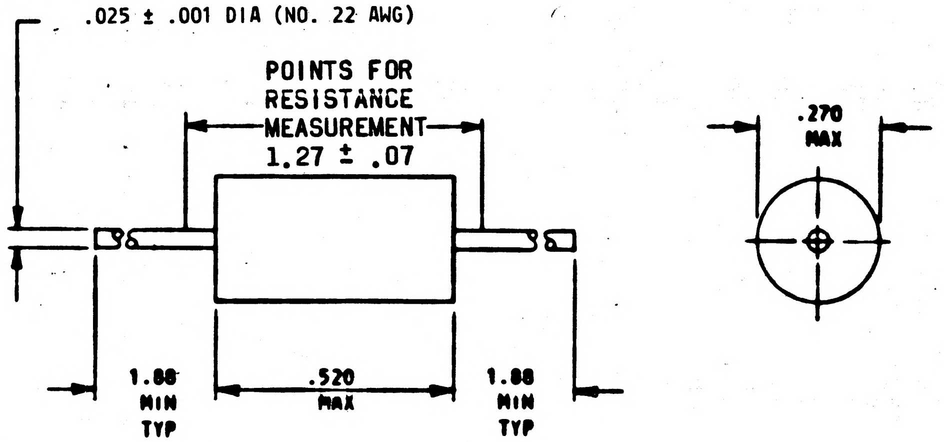
SPECIAL CONDITIONING BY SUPPLIER:

BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE (AC OR DC). THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	31.9K	1.0
-2	36.0K	↑
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	↓
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	
-12	36.8K	
-13	38.8K	
-14	41.0K	
-15	43.4K	
-16	46.2K	
-17	49.3K	
-18	52.9K	
-19	57.0K	
-20	61.8K	
-21	67.4K	
-22	74.2K	
-23	82.6K	
-24	92.9K	
-25	106K	
-26	124K	
-27	149K	
-28	187K	
-29	249K	
-30	373K	↓
-31	746K	
-32	16.5 OHMS	1%
-33	21.4 OHMS	
-34	27 OHMS	
-35	33.7 OHMS	
-36	42 OHMS	↓
-37	20.7 OHMS	

NOTES: 1. RESISTANCE VALUES OVER 85K ARE NOT AVAILABLE PER THE REQUIREMENTS OF THIS DRAWING AND MIL-R-93 USING .001 MIN. DIA. WIRE.


.025 ± .001 DIA (NO. 22 AWG)
POINTS FOR RESISTANCE MEASUREMENT
1.27 ± .07
.270 MAX
1.88 MIN TYP
.520 MAX
1.88 MIN TYP

THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓖ **REPLACES REV(F)WITH CHANGE**

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES

HEAT TREATMENT: NONE

FINAL FINISH: NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT NAS9-497

DRAWN J. Robinson DATE 10 June 63
CHECKED Peterson 11-JUNE-63
APPROVAL D.B. Test 12 JUN 63
APPROVAL
NASA APPROVAL W. S. Seigs 7/17/63
MIT APPROVAL 7/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1010251

SCALE NONE | WT | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

J | 1010251

REVISIONS B Released 00295 23 Jan 63			
SYM	DESCRIPTION	DATE	APPROVAL
G	REPLACES REV F WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02110	7/17/63	
H	REVISED PER TDRR 03701	8 Oct 63	W.K.
J	REVISED PER TDRR 04222	24 Oct 63	W.K.

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

1. **GENERAL:**
   A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   C. PACKAGING PER MIL-R-93, LEVEL A
   D. UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH EXCEPTIONS AND ADDITIONS STATED BELOW.

2. **INSPECTION AND ACCEPTANCE:**
   A. **MECHANICAL REQUIREMENTS:**
      (1) **LEAD MATERIAL:** WELDABLE, GOLD PLATED GRADE A NICKEL, PER ND PS 1015400. A CERTIFICATE OF COMPLIANCD TO THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.
      (2) **LEAD STRENGTH:** LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
      (3) **MARKING:** (PER MIL-STD-130) EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER, AND REVISION LETTER.
   B. ELECTRICAL REQUIREMENTS:
      (1) TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C, 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.

3. **DESIGN REQUIREMENTS:**
   A. PER MIL-R-93/13, CHARACTERISTIC C, MODIFIED PER THIS DRAWING
   B. POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
   C. OPERATING TEMPERATURE RANGE: -65°C TO +125°C
   D. MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 150 VDC MAX
   E. STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

4. **SPECIAL CONDITIONING BY SUPPLIER:**
   A. BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE (AC OR DC). THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	31.9K	1.0
-2	36.0K	↑
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	↓
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	
-12	36.8K	
-13	38.8K	
-14	41.0K	
-15	43.4K	
-16	46.2K	
-17	49.3K	
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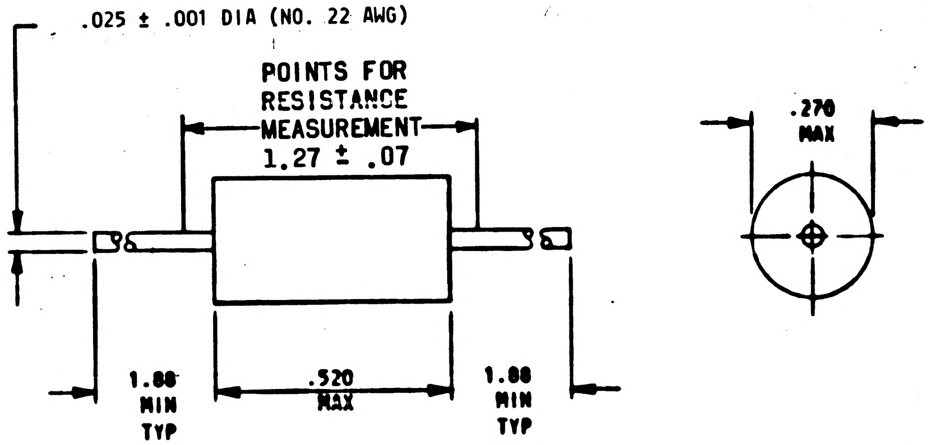
-23	82.6K	
-24	92.9K	
-25	106K	
-26	124K	
-27	149K	
-28	187K	
-29	249K	
-30	373K	↓
-31	746K	
-32	16.5 OHMS	1%
-33	21.4 OHMS	
-34	27 OHMS	
-35	33.7 OHMS	
-36	42 OHMS	↓
-37	20.7 OHMS	

DASH NO	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-38	18.8 OHMS	1.0
-39	44.0 OHMS	1.0

NOTES: 1. RESISTANCE VALUES OVER 85K ARE NOT AVAILABLE PER THE REQUIREMENTS OF THIS DRAWING AND MIL-R-93 USING .001 MIN. DIA. WIRE.


.025 ± .001 DIA (NO. 22 AWG)
POINTS FOR RESISTANCE MEASUREMENT 1.27 ± .07
.270 MAX
1.88 MIN TYP
.520 MAX
1.88 MIN TYP

THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓖ **REPLACES REV(F)WITH CHANGE**

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT NAS9-497
DRAWN DATE 10 June 63
CHECKED 11-JUNE 63
APPROVAL D.R. Test 12 JUN 63
APPROVAL
NASA APPROVAL 7/17/63
MIT APPROVAL 7/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1010251
SCALE NONE | WT | SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

K 1010251

REVISIONS B Released 00295 23 Jan 63

SYM	DESCRIPTION	DATE	APPROVAL
G	REPLACES REV F WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02110	7/17/63	
H	REVISED PER TDRR 03701	8 Oct 63	WK.
J	REVISED PER TDRR 04222	24 Oct 63	WK.
K	REVISED PER TDRR 13296	10/Mar	

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING SYMBOLS, ABBREVIATIONS AND REFERENCE DESIGNATIONS IN ACCORDANCE WITH GOVERNMENT STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING PER MIL-R-93, LEVEL A
   - D. UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH EXCEPTIONS AND ADDITIONS STATED BELOW.

2. **INSPECTION AND ACCEPTANCE:**
   - A. MECHANICAL REQUIREMENTS:
     - (1) **LEAD MATERIAL:** WELDABLE, GOLD PLATED GRADE A NICKEL, PER ND PS 1015400. A CERTIFICATE OF COMPLIANCD TO THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.
     - (2) **LEAD STRENGTH:** LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.
     - (3) **MARKING:** (ND1002019) EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER, AND REVISION LETTER PER MIL-STD-129
   - B. ELECTRICAL REQUIREMENTS:
     - (1) TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C, 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.

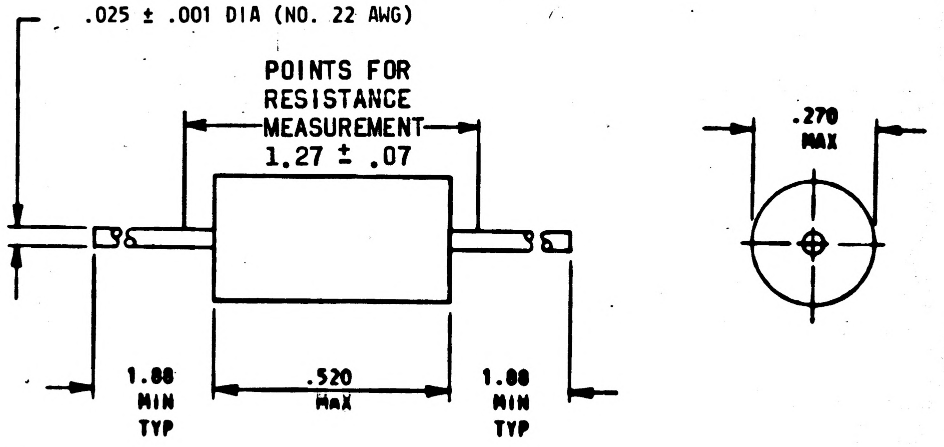
3. **DESIGN REQUIREMENTS:**
   - A. PER MIL-R-93/13, CHARACTERISTIC C, MODIFIED PER THIS DRAWING
   - B. POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
   - C. OPERATING TEMPERATURE RANGE: -65°C TO +125°C
   - D. MAXIMUM VOLTAGE RATING: YPR UP TO A 150 VDC MAX
   - E. STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE (AC OR DC). THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	31.9K	1.0
-2	36.0K	
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	
-12	36.8K	
-13	38.8K	
-14	41.0K	
-15	43.4K	
-16	46.2K	
-17	49.3K	
-18	52.9K	
-19	57.0K	
-20	61.8K	
-21	67.4K	
-22	74.2K	
-23	82.6K	
-24	92.9K	
-25	106K	
-26	124 K	
-27	149 K	
-28	187K	
-29	249K	
-30	373K	
-31	746K	
-32	16.5 OHMS	1%
-33	21.4 OHMS	
-34	27 OHMS	
-35	33.7 OHMS	
-36	42 OHMS	
-37	20.7 OHMS	

DASH NO	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-38	18.8 OHMS	1.0
-39	44.0 OHMS	1.0
-40	102K	1.0
-41	205K	1.0

NOTES: 1. RESISTANCE VALUES OVER 85K ARE NOT AVAILABLE PER THE REQUIREMENTS OF THIS DRAWING AND MIL-R-93 USING .001 MIN. DIA. WIRE.


.025 ± .001 DIA (NO. 22 AWG)
POINTS FOR RESISTANCE MEASUREMENT
1.27 ± .07
.270 MAX
1.88 MIN TYP
.520 MAX
1.88 MIN TYP

THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓖ REPLACES REV(F)WITH CHANGE

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

NEXT ASSY | USED ON
APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT NAS9-497
DRAWN J. Robinson DATE 10 June 63
CHECKED Peterson 11-JUNE 63
APPROVAL D.B. Test 12 JUN 63
APPROVAL
NASA APPROVAL 7/17/63
MIT APPROVAL 7/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | NASA DRAWING NO. 1010251
SCALE NONE | WT | SHEET 1 OF 1

INCHES 0 1 2
PHOTOGRAPHIC SCALE ONLY

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1010251 M

REVISIONS B Released 00295 23 Jan 63

SYM	DESCRIPTION	DATE	APPROVAL
G	REPLACES REV F WITH CHANGES AND UPGRADED TO CLASS A RELEASE PER TDRR 02110	7/17/63	[illegible]
H	REVISED PER TDRR 03701	8 Oct 63	WK.
J	REVISED PER TDRR 04222	24 Oct 63	WK.
K	REVISED PER TDRR 13296	[illegible]	[illegible]
L	REVISED PER TDRR 22822	10/5/65	WK
M	REVISED PER TDRR 25139	1/18/66	WK

REQUIREMENTS:

1. **GENERAL:**
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED IN MIL-D-70327.
   - B. SUPPLIER SHALL CONFORM TO QUALITY ASSURANCE PROVISIONS SPECIFIED IN ND 1015404, CLASS 2.
   - C. PACKAGING PER MIL-R-93, LEVEL A
   - D. UNITS SHALL BE CAPABLE OF MEETING ALL THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH EXCEPTIONS AND ADDITIONS STATED BELOW.

2. **INSPECTION AND ACCEPTANCE:**
   - A. MECHANICAL REQUIREMENTS:
     - (1) **LEAD MATERIAL:** WELDABLE, GOLD PLATED GRADE A NICKEL, PER ND PS 1015400. A CERTIFICATE OF COMPLIANCD TO THIS REQUIREMENT SHALL ACCOMPANY EACH LOT SHIPPED.
     - (2) LEAD STRENGTH: EACH LEAD SHALL BE CAPABLE OF WITHSTANDING TWO (2) BENDS UNDER A TWO (2) POUND VERTICAL PULL (LEAD VERTICAL WITH RESPECT TO BODY). TWO (2) BENDS SHALL BE ACCOMPLISHED BY MOVING THE BODY OF THE UNIT, WHILE IN THE SAME PLANE, THROUGH 90° IN ONE DIRECTION THEN BACK 180° TO THE OPPOSITE DIRECTION AND BACK 90° TO THE ORIGINAL POSITION. NO PHYSICAL DAMAGE TO THE RESISTOR BODY OR DEGRADATION IN ELECTRICAL PERFORMANCE SHALL BE EVIDENT AFTER THE TEST.
     - (3) **MARKING:** (ND1002019) EACH UNIT SHALL BE MARKED WITH THE NASA PART NUMBER AND REVISION LETTER, AND THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE AND WATTAGE RATING. THE MANUFACTURER'S PART NUMBER MAY APPEAR ON THE PART OR PACKAGE. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA PART NUMBER, AND REVISION LETTER PER MIL-STD-129
   - B. ELECTRICAL REQUIREMENTS:
     - (1) TEMPERATURE COEFFICIENT: ABOVE 10 Ω = 15 PPM/°C, 10 Ω TO 1 Ω = 30 PPM/°C, 1 Ω AND BELOW = 40 PPM/°C OVER THE TEMPERATURE RANGE.

3. **DESIGN REQUIREMENTS:**
   - A. PER MIL-R-93/13, CHARACTERISTIC C, MODIFIED PER THIS DRAWING
   - B. POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.
   - C. OPERATING TEMPERATURE RANGE: -65°C TO +125°C
   - D. MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 150 VDC MAX
   - E. STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER

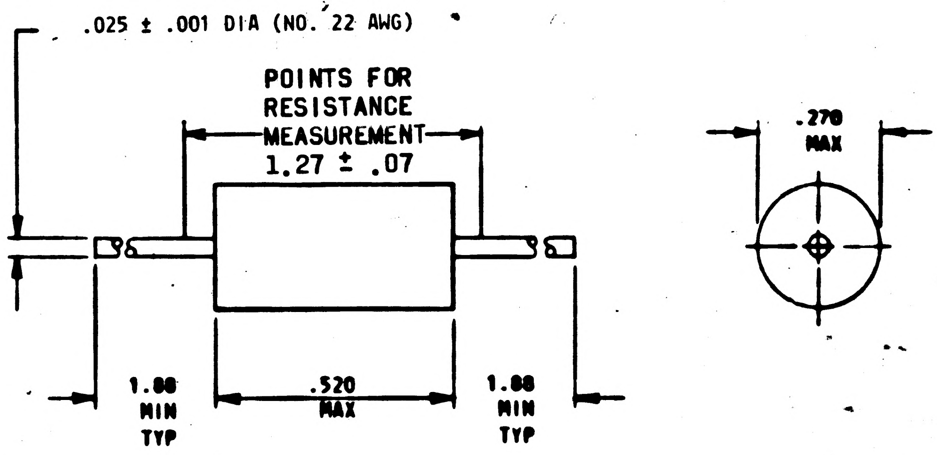
4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: 100 HOURS AT 125° AND RATED WATTAGE (AC OR DC). THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.1% AND THE PARTS SHALL MEET ALL INITIAL REQUIREMENTS.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

DASH NO.	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-1	31.9K	1.0
-2	36.0K	
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	
-9	292.4K	1.0
-10	33.4K	1.0
-11	35.0K	
-12	36.8K	
-13	38.8K	
-14	41.0K	
-15	43.4K	
-16	46.2K	
-17	49.3K	
-18	52.9K	
-19	57.0K	
-20	61.8K	
-21	67.4K	
-22	74.2K	
-23	82.6K	
-24	92.9K	
-25	106K	
-26	124 K	
-27	149 K	
-28	187K	
-29	249K	
-30	373K	
-31	746K	
-32	16.5 OHMS	1%
-33	21.4 OHMS	
-34	27 OHMS	
-35	33.7 OHMS	
-36	42 OHMS	
-37	20.7 OHMS	

DASH NO	RESISTANCE VALUE OHMS SEE NOTE 1	TOL ± %
-38	18.8 OHMS	1.0
-39	44.0 OHMS	1.0
-40	102K	1.0
-41	205K	1.0
-42	1 OHM	1.0

NOTES: 1. RESISTANCE VALUES OVER 85K ARE NOT AVAILABLE PER THE REQUIREMENTS OF THIS DRAWING AND MIL-R-93 USING .001 MIN. DIA. WIRE.


.025 ± .001 DIA (NO. 22 AWG)
POINTS FOR RESISTANCE MEASUREMENT
1.27 ± .07
.270 MAX
1.88 MIN TYP
.520 MAX
1.88 MIN TYP

THE COMPLETE PART NUMBER IS THE DRAWING NUMBER PLUS THE APPLICABLE DASH NUMBER.

Ⓖ REPLACES REV(F)WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO CONTRACT NAS9-497
DRAWN [illegible] DATE 10 Jun 63
CHECKED Peterson 11-JUNE-63
APPROVAL D.B. Test 12 JUN 63
APPROVAL
NASA APPROVAL [illegible] 7/17/63
MIT APPROVAL [illegible] 7/17/63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1010251
SCALE NONE
WT
SHEET 1 OF 1

1010251

SYM	DESCRIPTION	DATE	APPROVAL
-	ORIGINATED		

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. REQUIREMENTS:

A. THESE RESISTORS SHALL MEET THE REQUIREMENTS OF MIL-R-93/13, CHARACTERISTIC C, WITH THE EXCEPTIONS AND ADDITIONS STATED BELOW.

B. EXCEPTIONS:

(1) POWER RATING: 1/4 WATT AT 125°C DERATED TO 0 WATT AT 145°C.

(2) TEMPERATURE COEFFICIENT: ± 15 PPM/°C OVER THE TEMPERATURE RANGE.

(3) OPERATING TEMPERATURE RANGE: -65°C TO +125°C.

(4) MARKING: EACH RESISTOR SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, RESISTANCE VALUE, TOLERANCE, WATTAGE RATING, AND TYPE NUMBER. EACH INTERIOR AND EXTERIOR PACKAGE SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER.

(5) QUALIFICATION APPROVAL: NOT REQUIRED.

C. ADDITIONS:

(1) MAXIMUM VOLTAGE RATING: $\sqrt{PR}$ UP TO A 150 VDC MAX.

(2) STABILITY: 100 PPM/YEAR AT 25°C AND 1/2 RATED POWER.

(3) LEAD MATERIAL: WELDABLE, GRADE A NICKEL (ALLOY 200) IN ACCORDANCE WITH ND PS 1015400. MATERIAL SHALL BE CERTIFIED WITH EACH SHIPMENT.

(4) LEAD STRENGTH: LEADS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING TEST TWICE - WITH A 2 POUND LOAD SUSPENDED FROM A LEAD IN THE VERTICAL AXIAL POSITION, MOVE THE RESISTOR BODY SMOOTHLY IN A PLANE 90° TO ONE SIDE, THEN 180° BACK TO THE OPPOSITE EXTREME, AND THEN BACK 90° TO THE STARTING POSITION. THERE SHALL BE NO PHYSICAL DAMAGE OR LOSS OF ELECTRICAL PERFORMANCE.

(5) QUALITY ASSURANCE: VENDOR SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS II AND MIL-R-93.

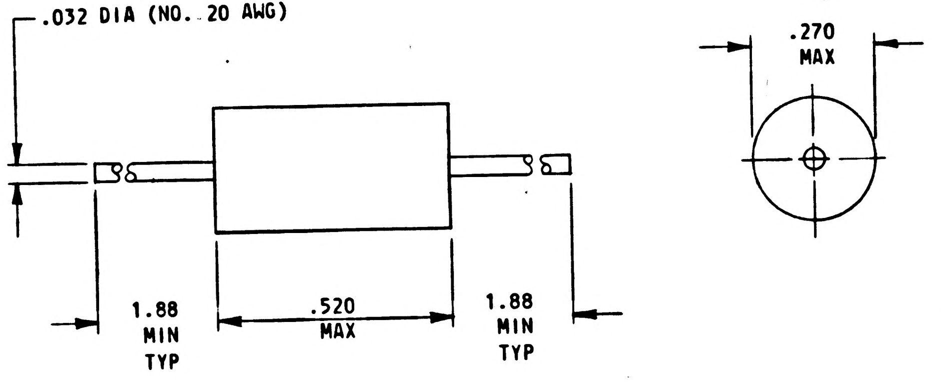
(6) BURN-IN: 100 HOURS AT 125°C AND RATED WATTAGE. THERE SHALL BE NO RESISTANCE CHANGE GREATER THAN 0.5%.

2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE VALUE OHMS	TOL ± %
-1	31.9K	1.0
-2	36.0K	
-3	41.2K	
-4	48.2K	
-5	58.01K	
-6	72.6K	
-7	97.1K	
-8	146.0K	
-9	292.4K	1.0

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00295 **DATE** 23 Jan 1963



ORIGINAL SOURCE OF SUPPLY:

ULTRONIX, INC.
111 EAST 20TH AVE.
SAN MATEO, CALIF.
CODE IDENT NO. 05347
TYPE 205A

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN D Bugman DATE 2 Jan 63
CHECKED D. M. Slupe 10 Jan 63
APPROVAL John E Miller 23 Jan 63
APPROVAL

NASA APPROVAL W J Rhine 1-23-63
MIT APPROVAL W Kupfer 23 Jan 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WIREWOUND

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010251
SCALE NONE
WT
SHEET 1 OF 1

REQUIREMENTS:

GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: KOVAR WITH GOLD PLATING PER NASA DOCUMENT 1015402
A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
MATCHING REQUIREMENTS PER TABLE III
ELECTRICAL CHARACTERISTICS: PER TABLE II
STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE})
COLLECTOR CUTOFF CURRENT (I_{CBO})
SATURATION VOLTAGE ($V_{CE(SAT)}$)
SWITCHBACK VOLTAGE (LV_{CEO})
INPUT VOLTAGE (V_{BE})
NOISE VOLTAGE
EMITTER CUTOFF CURRENT (I_{EBO})
MARKING: THE MANUFACTURERS NAME, TRADEMARK, OR CODE: TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, IN ACCORDANCE WITH MIL-STD-130.

GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE: -65°C TO +175°C
ELECTRICAL RATING: PER TABLE I
ELECTRICAL SPECIFICATION: PER TABLE II & III
POWER DISSIPATION (EACH ELEMENT)
AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
POWER DISSIPATION (DUAL DEVICE)
AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX
AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX
UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002051.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS I

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P -19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

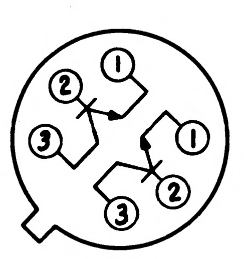
BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
1. AMBIENT TEMPERATURE: 65° ±10°C.
2. COLLECTOR VOLTAGE V_{CB}: 30V ±5% PER UNIT.
3. POWER DISSIPATION: 150 MW ±10% PER UNIT.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
a. EMITTER CUTOFF CURRENT, I_{EBO}.
b. COLLECTOR CUTOFF CURRENT, I_{CBO}.
c. COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$.
d. STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE}.

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 10% IN h_{FE} SHALL NOT BE ACCEPTABLE.

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DWG.



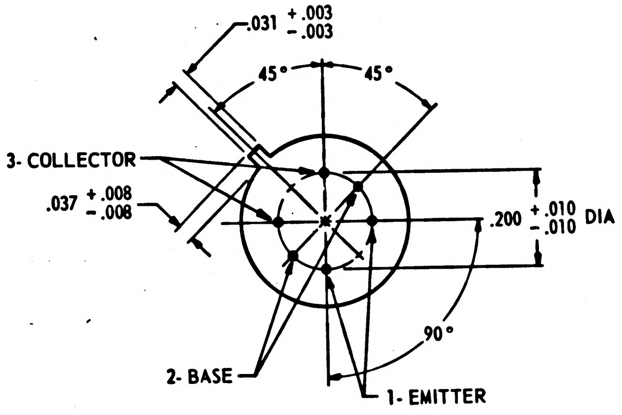
GRAPHICAL SYMBOL
TERMINAL NUMBERS ARE FOR REF. ONLY

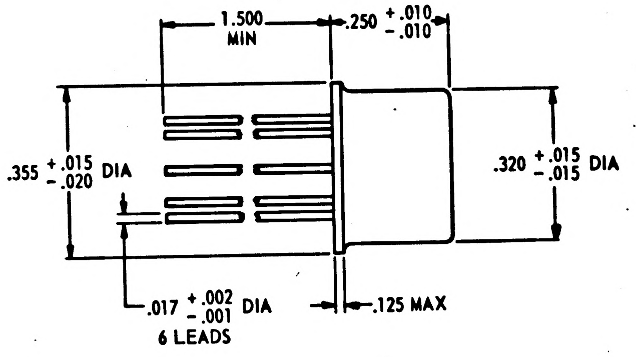
REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
—		SEE PROCUREMENT NOTE			
A		REVISED PER TDRR 00513			WK

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63





A	—
—	—
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE 8 Jan 63
CHECKED 9 JAN 63
APPROVAL W J Beaton
APPROVAL
NASA APPROVAL Jack Barnal 2/20/63
MIT APPROVAL 20 Feb 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT,
MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C 1010252
SCALE None SHEET 1 OF 2

MIL 1077C—P

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
(M) —		SEE PROCUREMENT NOTE			
(M) A		REVISED PER TDRR 00513			WK
B		REPLACED BY REV C WITH CHANGE PER TDRR 01787		6.26.63	WK.

REQUIREMENTS:

GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: KOVAR WITH GOLD PLATING PER NASA DOCUMENT 1015402
A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
MATCHING REQUIREMENTS PER TABLE III
ELECTRICAL CHARACTERISTICS: PER TABLE II
- STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE})
- COLLECTOR CUTOFF CURRENT (I_{CBO})
- SATURATION VOLTAGE ($V_{CE(SAT)}$)
- SWITCHBACK VOLTAGE (LV_{CEO})
- INPUT VOLTAGE (V_{BE})
- NOISE VOLTAGE
- EMITTER CUTOFF CURRENT (I_{EBO})

MARKING: THE MANUFACTURERS NAME, TRADEMARK, OR CODE: TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, IN ACCORDANCE WITH MIL-STD-130.

GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE: -65°C TO +175°C
ELECTRICAL RATING: PER TABLE I
ELECTRICAL SPECIFICATION: PER TABLE II & III
POWER DISSIPATION (EACH ELEMENT)
AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
POWER DISSIPATION (DUAL DEVICE)
AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX
AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX
UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002051.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS I

- PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P -19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

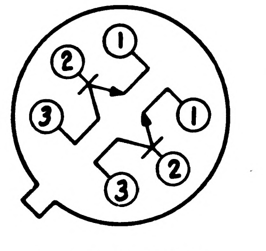
BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
1. AMBIENT TEMPERATURE: 65° ±10°C.
2. COLLECTOR VOLTAGE V_{CB}: 30V ±5% PER UNIT.
3. POWER DISSIPATION: 150 MW ±10% PER UNIT.

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
a. EMITTER CUTOFF CURRENT, I_{EBO}.
b. COLLECTOR CUTOFF CURRENT, I_{CBO}.
c. COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$.
d. STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE}.

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 10% IN h_{FE} SHALL NOT BE ACCEPTABLE.

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

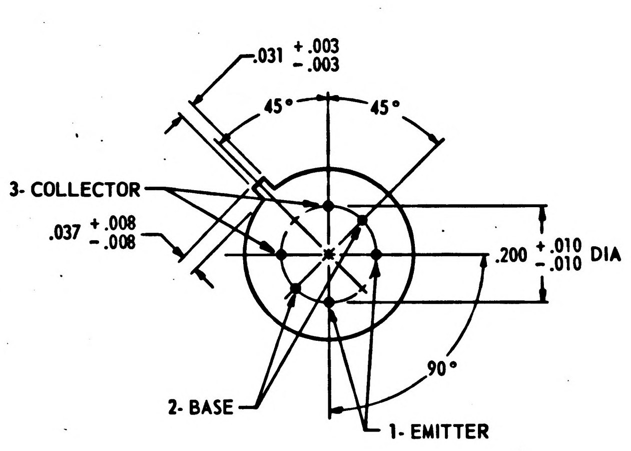
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DWG.

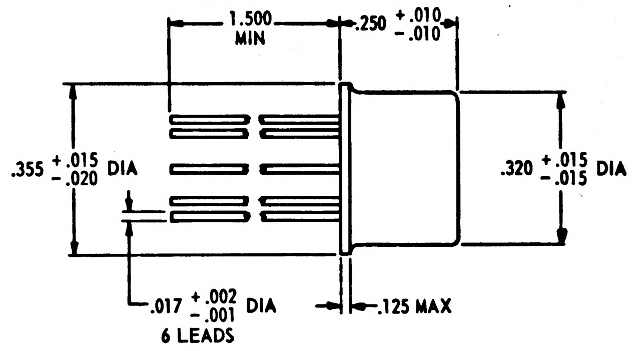


GRAPHICAL SYMBOL
TERMINAL NUMBERS ARE FOR REF. ONLY

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63





A	—
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SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

MASTER

(B) REPLACED BY REV C WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN DATE 8 Jan 63
CHECKED 9 JAN 63
APPROVAL W J Beaton
APPROVAL
NASA APPROVAL Jack Barnard 2/20/63
MIT APPROVAL 20 Feb 63

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HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C 1010252
SCALE NONE SHEET 1 OF 2

MASTER

MIL 1077C—P

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

TABLE I

NASA PART NUMBER	MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REFERENCE)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-001	45	5	45	30	1.2	2N2642

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
—					
B		REPLACED BY REV C WITH CHANGE PER TDRR 01787		62663	WK

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C =10MA I_B =0	LV_{CEO}	45	–	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} =45VDC I_E =0	I_{CBO}		10	NA
	V_{CB} = 45VDC T_C =100°C	I_{CBO}	–	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C =0	I_{EBO}	–	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C =10UA	h_{FE}	100	300	–
	V_{CE} =5VDC I_C = 100UA	h_{FE}	110	350	–
	V_{CE} =5VDC I_C = 1MA	h_{FE}	130	400	–
BASE SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{CE(SAT)}$	–	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} =5V f = 1mc	C_{ob}	–	8	pf
$\left\lvert\frac{\Delta(V_{BE_1} - V_{BE_2})}{\Delta T}\right\rvert$	V_{CE} =5VDC I_C =10UA ΔT = [25°C −(−55°C)] and ΔT = [125°C − 25°C]	–	–	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} =5V I_C =1MA f =1KC	h_{fe}	130	600	–
INPUT IMPEDANCE	V_{CB} =5V I_E = −1MA f =1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} =5V I_E = −1MA f =1KC	h_{cb}	–	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} =5V I_E = −1MA f =1KC	h_{ob}	–	1	μ mhos
NOISE FIGURE ▷1	R_{BE} =34.8K,Ω 1% WW I_C =100UA f =100CPS	N.F.	–	0.4	$E_n/\sqrt{\sim}$
	R_{BE} =34.8KΩ, 1%WW, I_C =100UA f =1KC	N.F.	–	0.123	$E_n/\sqrt{\sim}$

▷1 MEASURED WITH A QUAN. TECH MODEL 310 OR 311
NOISE ANALYZER OR EQUIVALENT.

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 DATE 2-20-63

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	INDIVIDUAL MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C =100 UA V_{CE} =5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	
STATIC FORWARD CURRENT TRANSFER RATIO	I_C =10 UA V_{CE} =5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	2

MASTER

Ⓑ REPLACED BY REV C WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

M I T
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CAMBRIDGE, MASS

DRAWN DATE 8 Jan 63
CHECKED B L Hirt 9 JAN 63
APPROVAL W J Bolton
APPROVAL
NASA APPROVAL 2/20/63
MIT APPROVAL 2/26/63

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TRANSISTOR, DUAL ELEMENT,
MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
1010252
SCALE
SHEET 2

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010252 C

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6-26-63	EVL

REQUIREMENTS:

GENERAL:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051 LIFE TEST CONDITIONS SHALL BE SAME AS BURN IN CONDITIONS.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES. MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

INSPECTION AND ACCEPTANCE:

MECHANICAL REQUIREMENTS:

LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402

A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; TYPE DESIGNATION; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER MIL-STD-130.

ELECTRICAL REQUIREMENTS: PER TABLE II

COLLECTOR CUTOFF CURRENT (I_{CBO}). AT T_C=100°C

EMITTER CUTOFF CURRENT (I_{EBO}).

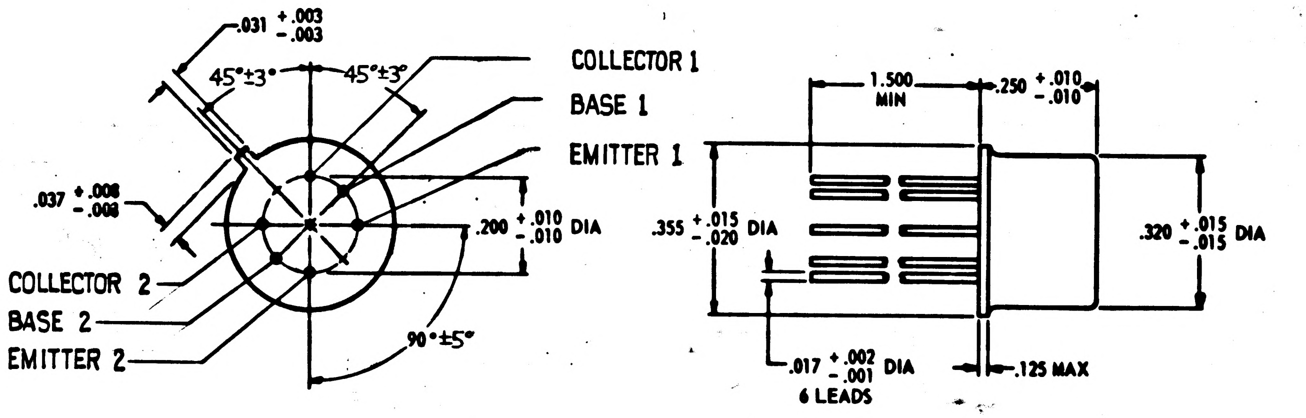
SWITCHBACK VOLTAGE (LV_{CEO}).

COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).

~~NOISE~~ FIGURE. (NF)

STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).

MATCHING REQUIREMENTS PER TABLE III



DESIGN REQUIREMENTS:

ELECTRICAL RATINGS: PER TABLE 1

ELECTRICAL SPECIFICATION: PER TABLE 11 & 111

STORAGE TEMPERATURE: -65°C TO +175°C

POWER DISSIPATION (EACH ELEMENT)

AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX

AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX

POWER DISSIPATION (DUAL DEVICE)

AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.

AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

SHEET 1	SHEET 2	SHEET 3
REVISION STATUS OF SHEETS		

MASTER

Ⓒ REPLACES REV (B) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+	+
–	–	–

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

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INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Fore DATE 22 MAY 63
CHECKED WILSON 28MAY63
APPROVAL D. R. Kurt 24JUN63
APPROVAL
NASA APPROVAL
MIT APPROVAL 26 Jun 63

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SPACECRAFT CENTER
HOUSTON TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C 1010252

SCALE NONE SHEET 1 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010252 | C

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6/26/63	WR

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-001	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C =10MA I_B =0	LV_{CEO}	45	-	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} = 45VDC I_E = 0	I_{CBO}		10	NA
	V_{CB} = 45VDC I_E = 0 T_C = 100°C	I_{CBO}	-	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C = 0	I_{EBO}	-	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C = 10UA	h_{FE}	100	300	-
	V_{CE} = 5VDC I_C = 100UA	h_{FE}	110	350	-
	V_{CE} = 5VDC I_C = 1MA	h_{FE}	130	400	-
BASE SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{CE(SAT)}$	-	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} = 5V f = 1mc	C_{ob}	-	8	pf
$\left\lvert \frac{\Delta(V_{BE_1} - V_{BE_2})}{\Delta T} \right\rvert$	V_{CE} = 5VDC I_C = 10UA ΔT = [25°C -(-55°C)] and ΔT = [125°C - 25°C]	-	-	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5V I_C = 1MA f = 1KC	h_{fe}	130	600	-
INPUT IMPEDANCE	V_{CB} = 5V I_E = -1MA f = 1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} = 5V I_E = -1MA f = 1KC	h_{rb}	-	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} = 5V I_E = -1MA f = 1KC	h_{ob}	-	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} = 34.8K,Ω 1% WW I_C = 100UA f = 100CPS	N.F.	-	0.4	$E_n/\surd\sim$
	R_{BE} = 34.8K Ω, 1%WW, I_C = 100UA f = 1KC	N.F.	-	0.123	$E_n/\surd\sim$

NOTE : MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C = 100 UA V_{CE} = 5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	2
STATIC FORWARD CURRENT TRANSFER RATIO	I_C = 10 UA V_{CE} = 5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	

MASTER

Ⓒ REPLACES REV(B) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+	+
-	-	-

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CONTRACT

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INSTRUMENTATION LAB
CAMBRIDGE, MASS

DRAWN Toro DATE 22 MAY 63
CHECKED Wilson 28 MAY 63
APPROVAL D. G. Fest 24 JUN 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 26 Jun 63

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HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
	C	1010252
SCALE		SHEET 2 OF 3

1010252 | C

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010252 C

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		THIS SHEET ADDED PER TDRR 01787	6-26-63	WJL

SPECIAL CONDITIONING BY SUPPLIER:

BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

1. AMBIENT TEMPERATURE: 25° ±5°C
2. COLLECTOR VOLTAGE: 30 VDC ±5% PER UNIT
3. POWER DISSIPATION: 150 MW ±10% PER UNIT

THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:

- a. EMITTER CUTOFF CURRENT (I_{EBO}).
- b. COLLECTOR CUTOFF CURRENT, I_{CBO}
- c. COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$
- d. STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE} (AT LOWEST SPECIFIED COLLECTOR CURRENT)

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 15% IN h_{FE}, OR HAVING INCREASED MORE THAN 3 TIMES IN I_{CBO} (THE ABSOLUTE INCREASE MUST BE GREATER THAN 5 NANOAMPERE) SHALL NOT BE ACCEPTABLE.

THIS SHEET ADDED

MASTER

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES ± ± ± DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT DRAWN Foro DATE 22 MAY 63 CHECKED WILSON 28 MAY 63 APPROVAL D.A. Test 24 JUN 63 APPROVAL
APPLICATION		MATERIAL	NASA APPROVAL Jack Barnard
		CONTRACT	MIT APPROVAL W Ruffa 26 Jun 63

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TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
	C	1010252
SCALE		SHEET 3 OF 3

D.O. 42782

INCHES 0 1 2 PHOTOGRAPHIC SCALE ONLY

1010252 D

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6-26-63	EVL
D		REVISED PER TDRR 03031	10/9/63	WK

REQUIREMENTS:

GENERAL:

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.

UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051 LIFE TEST CONDITIONS SHALL BE SAME AS BURN IN CONDITIONS.

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P-19491 LEVEL A IN BOTH INSTANCES. MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

INSPECTION AND ACCEPTANCE:

MECHANICAL REQUIREMENTS:

LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402

A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; TYPE DESIGNATION; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER MIL-STD-130.

ELECTRICAL REQUIREMENTS: PER TABLE II

COLLECTOR CUTOFF CURRENT (I_{CBO}). AT $T_C=100°C$

EMITTER CUTOFF CURRENT (I_{EBO}).

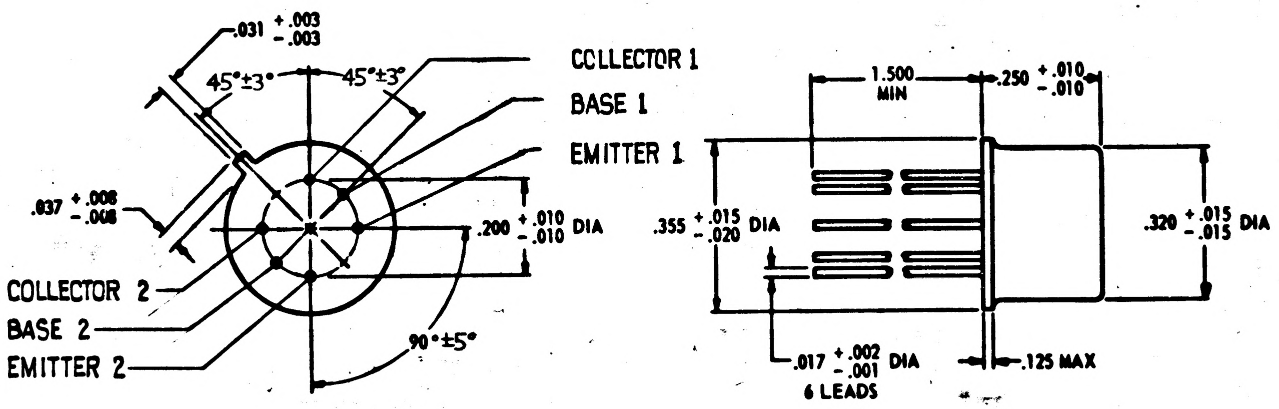
SWITCHBACK VOLTAGE (LV_{CEO}).

COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).

NOISE FIGURE. (NF)

STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).

MATCHING REQUIREMENTS PER TABLE III



D	D	C
SHEET 1	SHEET 2	SHEET 3
REVISION STATUS OF SHEETS		

MASTER

DESIGN REQUIREMENTS:

ELECTRICAL RATINGS: PER TABLE 1

ELECTRICAL SPECIFICATION: PER TABLE II & III

STORAGE TEMPERATURE: -65°C TO +175°C

POWER DISSIPATION (EACH ELEMENT).

AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX

AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX

POWER DISSIPATION (DUAL DEVICE)

AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.

AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

Ⓒ REPLACES REV (B) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Tom DATE 22 MAY 63
CHECKED WILSON 28 MAY 63
APPROVAL D. A. Tost 24 JUN 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 26 Jun 63

MANNED
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HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C 1010252

SCALE None SHEET 1 OF 3

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010252 D

D 1010252

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6/26/63	WR
D		REVISED PER TDRR 03031	10 Sep 63	WR.

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-1	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C =10MA I_B =0	LV_{CEO}	45	-	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} =45VDC I_E =0	I_{CBO}		10	NA
	V_{CB} = 45VDC I_E=0 T_C =100°C	I_{CBO}	-	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C =0	I_{EBO}	-	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C =10UA	h_{FE}	100	300	-
	V_{CE} =5VDC I_C = 100UA	h_{FE}	110	350	-
	V_{CE} =5VDC I_C = 1MA	h_{FE}	130	400	-
BASE SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{CE(SAT)}$	-	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} =5V f = 1mc	C_{ob}	-	8	pf
$\left\lvert\frac{\Delta(V_{BE_1} - V_{BE_2})}{\Delta T}\right\rvert$	V_{CE} =5VDC I_C =10UA ΔT = [25°C -(-55°C)] and ΔT = [125°C - 25°C]	-	-	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} =5V I_C =1MA f =1KC	h_{fe}	130	600	-
INPUT IMPEDANCE	V_{CB} =5V I_E = -1MA f =1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} =5V I_E = -1MA f =1KC	h_{rb}	-	500×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} =5V I_E =-1MA f =1KC	h_{ob}	-	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} =34.8K,Ω 1% WW I_C =100UA f =100CPS	N.F.	-	0.4	$E_n/\sqrt{\sim}$
	R_{BE} =34.8K Ω, 1%WW, I_C =100UA f =1KC	N.F.	-	0.123	$E_n/\sqrt{\sim}$

NOTE : MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C =100 UA V_{CE} =5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	2
STATIC FORWARD CURRENT TRANSFER RATIO	I_C =10 UA V_{CE} =5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	

MASTER

© REPLACES REV (B) WITH CHANGE

NEXT ASSY	USED ON
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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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CHECKED WILSON 28 MAY 63
APPROVAL D. B. Test 24 JUN 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 26 June 63

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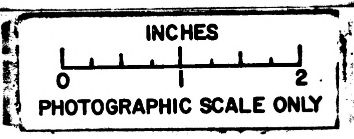
SPECIFICATION CONTROL DRAWING

CODE IDENT NO. | SIZE C | 1010252
SCALE | SHEET 2 OF 3



1010252 E

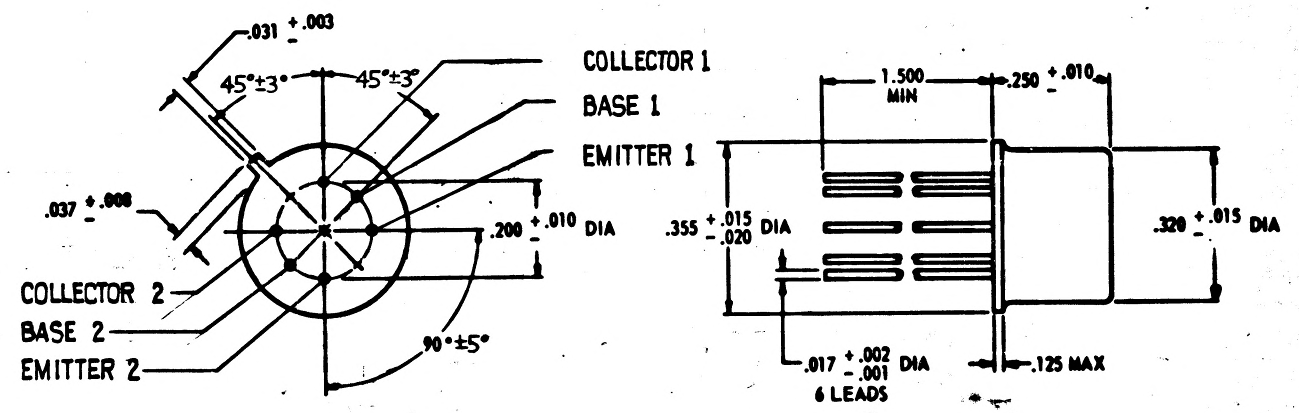
REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR	6-26-63	EVC
D		REVISED PER TDRR 03031 01787	10/9/63	WR
E		REVISED PER TDRR 10369	6/24/68	WR

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051 LIFE TEST CONDITIONS SHALL BE SAME AS BURN IN CONDITIONS.
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-S-19491 LEVEL A IN BOTH INSTANCES. MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-S-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402 A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; THE NASA DRAWING NUMBER WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER ND1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO}). AT T_C=100°C
     - (2) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (3) SWITCHBACK VOLTAGE (LV_{CEO}).
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).
     - (5) NOISE FIGURE. (NF)
     - (6) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).
   - C. MATCHING REQUIREMENTS PER TABLE III



3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL RATINGS: PER TABLE 1
   - B. ELECTRICAL SPECIFICATION: PER TABLE II & III
   - C. STORAGE TEMPERATURE: -65°C TO +175°C
   - D. POWER DISSIPATION (EACH ELEMENT).
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
     - (2) AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
   - E. POWER DISSIPATION (DUAL DEVICE)
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.
     - (2) AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

Ⓒ REPLACES REV (B) WITH CHANGE

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APPROVAL
NASA APPROVAL
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C 1010252
SCALE None SHEET 1 OF 3

INCHES
0 1 2
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1010252 E

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6/?/63	WR
D		REVISED PER TDRR 03031	10/Aug/63	WR.
E		REVISED PER TDRR 10369	6/2/64	WR

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-1	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
~~SWITCH BACK VOLTAGE~~	I_C = 10MA I_B = 0	LV_{CEO}	45	-	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} = 45VDC I_E = 0	I_{CBO}		10	NA
	~~V_{CB} = 45VDC I_E = 0~~ T_C = 100°C	~~I_{CBO}~~	-	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C = 0	I_{EBO}	-	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C = 10UA	h_{FE}	100	300	-
	V_{CE} = 5VDC I_C = 100UA	h_{FE}	110	350	-
	V_{CE} = 5VDC I_C = 1MA	h_{FE}	130	400	-
BASE SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{CE(SAT)}$	-	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} = 5V f = 1mc	C_{ob}	-	8	pf
$\left\lvert \frac{\Delta (V_{BE_1} - V_{BE_2})}{\Delta T} \right\rvert$	V_{CE} = 5VDC I_C = 10UA ΔT = [25°C -(-55°C)] and ΔT = [125°C - 25°C]	-	-	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5V I_C = 1MA f = 1KC	h_{fe}	130	600	-
INPUT IMPEDANCE	V_{CB} = 5V I_E = -1MA f = 1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} = 5V I_E = -1MA f = 1KC	h_{rb}	-	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} = 5V I_E = -1MA f = 1KC	h_{ob}	-	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} = 34.8K,Ω 1% WW I_C = 100UA f = 100CPS V_{CE} = 4V	N.F.	-	0.4	$E_n/\sqrt{\sim}$
	R_{BE} = 34.8K Ω, 1%WW, I_C = 100UA f = 1KC V_{CE} = 4V	N.F.	-	0.123	$E_n/\sqrt{\sim}$

NOTE: MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C = 100 UA V_{CE} = 5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	2
STATIC FORWARD CURRENT TRANSFER RATIO	I_C = 10 UA V_{CE} = 5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	

MASTER

Ⓒ REPLACES REV (B) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+	+
−	−	−

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CHECKED WILSON 28 MAY 63
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APPROVAL
NASA APPROVAL Jack Barnes
MIT APPROVAL 26 June 63

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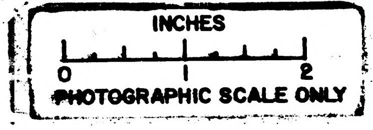
SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
	C	1010252
SCALE		SHEET 2 OF 3



1010252 E

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		THIS SHEET ADDED PER TDRR 01787	6-26-63	WL
E		REVISED PER TDRR 10369	6/24/64	WL

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE: $25^{\circ} \pm 5^{\circ}C$
     - (2) COLLECTOR VOLTAGE: 30 VDC ±5% PER UNIT
     - (3) POWER DISSIPATION: 150 MW ±10% PER UNIT
   - B. THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
     - (1) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (2) COLLECTOR CUTOFF CURRENT, I_{CBO}
     - (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE} (AT LOWEST SPECIFIED COLLECTOR CURRENT)
   - C. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 15% IN h_{FE}, OR HAVING INCREASED MORE THAN 3 TIMES IN I_{CBO} (THE ABSOLUTE INCREASE MUST BE GREATER THAN 5 NANOAMPERE) SHALL NOT BE ACCEPTABLE.

THIS SHEET ADDED

MASTER

NEXT ASSY / USED ON APPLICATION	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + − DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT DRAWN Foro DATE 22 MAY 63 CHECKED WILSON 28 MAY 63 APPROVAL [illegible] 24 JUN 63 APPROVAL	MANNED SPACECRAFT CENTER HOUSTON, TEXAS TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN SPECIFICATION CONTROL DRAWING
	MATERIAL CONTRACT	NASA APPROVAL [illegible] MIT APPROVAL [illegible] 26 Jun 63	CODE IDENT NO. / SIZE C / 1010252 SCALE / SHEET 3 OF 3

D.O. 42782

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010252 F

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR	6-26-63	EVL
D		REVISED PER TDRR 03031 01787	10/9/63	WK
E		REVISED PER TDRR 10369	6/24/64	WK
F		REVISED PER TDRR 20394	7/7/65	WK

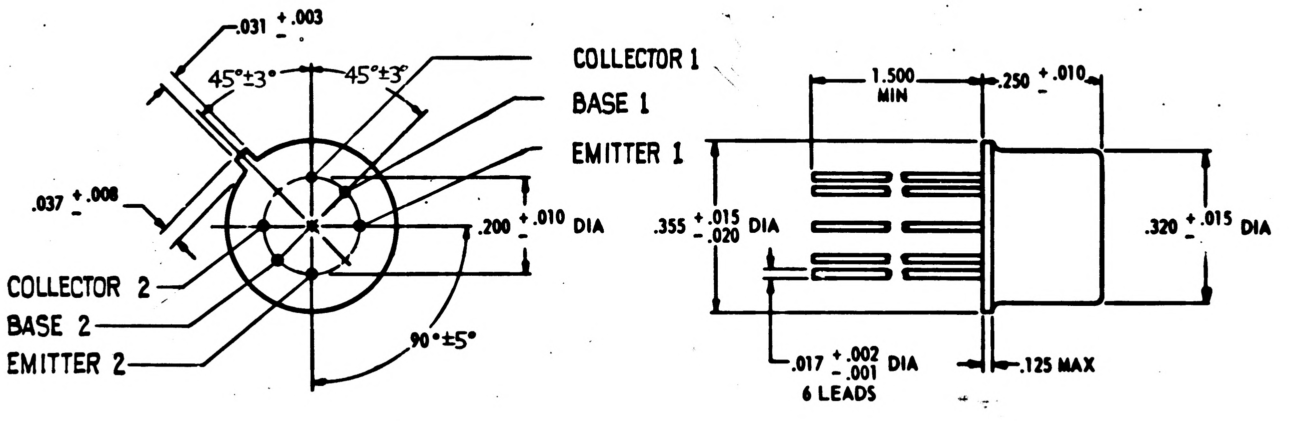
REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING AND CONTAINER MARKING SHALL BE IN ACCORDANCE WITH ND 1002215 CLASS I, CODE 2

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402 A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; THE NASA DRAWING NUMBER WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER ND1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO}). AT T_C=100°C
     - (2) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (3) SWITCHBACK VOLTAGE (LV_{CEO}).
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).
     - (5) NOISE FIGURE. (NF)
     - (6) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).
   - C. MATCHING REQUIREMENTS PER TABLE III

3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL RATINGS: PER TABLE 1
   - B. ELECTRICAL SPECIFICATION: PER TABLE 11 & 111
   - C. STORAGE TEMPERATURE: -65°C TO +175°C
   - D. POWER DISSIPATION (EACH ELEMENT).
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
     - (2) AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
   - E. POWER DISSIPATION (DUAL DEVICE)
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.
     - (2) AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.



MASTER

(F) REPLACES REV (E) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
1010252
SCALE None
SHEET 1 OF 3

1010252 F

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6/26/63	WR
D		REVISED PER TDRR 03031	10 Sep 63	WR.
E		REVISED PER TDRR 10369	6/24/64	WR
F		REVISED PER TDRR 20394	7/7/65	WR

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25 °C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-1	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25 °C (UNLESS OTHERWISE SPECIFIED)

PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C = 10MA I_B = 0	LV_{CEO}	45	-	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} = 45VDC I_E = 0	I_{CBO}		10	NA
	V_{CB} = 45VDC I_E = 0 T_C = 100 °C	I_{CBO}	-	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C = 0	I_{EBO}	-	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C = 10UA	h_{FE}	100	300	-
	V_{CE} = 5VDC I_C = 100UA	h_{FE}	110	350	-
	V_{CE} = 5VDC I_C = 1MA	h_{FE}	130	400	-
BASE SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{CE(SAT)}$	-	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} = 5V f = 1mc	C_{ob}	-	8	pf
$\left\lvert \frac{\Delta (V_{BE_1} - V_{BE_2})}{\Delta T} \right\rvert$	V_{CE} = 5VDC I_C = 10UA ΔT = [25 °C − (−55 °C)] and ΔT = [125 °C − 25 °C]	-	-	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5V I_C = 1MA f = 1KC	h_{fe}	130	600	-
INPUT IMPEDANCE	V_{CB} = 5V I_E = −1MA f = 1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} = 5V I_E = −1MA f = 1KC	h_{rb}	-	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} = 5V I_E = −1MA f = 1KC	h_{ob}	-	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} = 34.8K Ω 1% WW I_C = 100UA f = 100CPS V_{CE} = 4V	N.F.	-	0.4	$E_n/\sqrt{\sim}$
	R_{BE} = 34.8K Ω, 1% WW, I_C = 100UA f = 1KC V_{CE} = 4V	N.F.	-	0.123	$E_n/\sqrt{\sim}$

NOTE: MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25 °C

PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C = 100 UA V_{CE} = 5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	
STATIC FORWARD CURRENT TRANSFER RATIO	I_C = 10 UA V_{CE} = 5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	2

Ⓕ REPLACES REV(E) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+	+
−	−	−

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APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 26 Jun 63

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CODE IDENT NO.	SIZE	
	C	1010252
SCALE		SHEET 2 OF 3

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MASTER

1010252 F

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		THIS SHEET ADDED PER TDRR 01787	6.26.63	WJL
E		REVISED PER TDRR 10369	6/24/64	WJL
F		REVISED PER TDRR 20394	7/7/65	WJL

4. SPECIAL CONDITIONING BY SUPPLIER:
   A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
      (1) AMBIENT TEMPERATURE: 25° ±5°C
      (2) COLLECTOR VOLTAGE: 30 VDC ±5% PER UNIT
      (3) POWER DISSIPATION: 150 MW ±10% PER UNIT
   B. THE MANUFACTURER SHALL RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO BURN-IN AND FOLLOWING CENTRIFUGE TEST.
      (1) EMITTER CUTOFF CURRENT (I_{EBO}).
      (2) COLLECTOR CUTOFF CURRENT, I_{CBO}
      (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$
      (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE} (AT LOWEST SPECIFIED COLLECTOR CURRENT)
   C. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

      UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 15% IN h_{FE}, OR HAVING INCREASED MORE THAN 3 TIMES IN I_{CBO} (THE ABSOLUTE INCREASE MUST BE GREATER THAN 5 NANOAMPERE) SHALL NOT BE ACCEPTABLE.

   D. CENTRIFUGE: ALL DEVICES 100% PER MIL-STD-750, METHOD 2006,Y, ORENTATION, 20,000 G'S FOR A MINIMUM OF 30 SECONDS. TO BE PERFORMED FOLLOWING BURN-IN BUT PRIOR TO FINAL ELECTRICAL MEASUREMENTS
   E. PROCESSING RESTRICTION: DEVICES UTILIZING AN INTERNAL GOLD-ALUMINUM BONDING SYSTEM SHALL NOT BE PROCESSED IN EXCESS OF 200°C FOR PERIODS GREATER THAN 3 HOURS AFTER THE INTERNAL LEAD BONDING OPERATION HAS BEEN COMPLETED

1010252 E

THIS SHEET ADDED

MASTER

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
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DWG. NO. CONTRACT
DRAWN Foro DATE 22 MAY 63
CHECKED Wilson 28 MAY 63
APPROVAL 24 JUN 63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 26 Jun 63

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HOUSTON, TEXAS

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
1010252
SCALE
SHEET 3 OF 3

D.O. 42782

1010252 | G

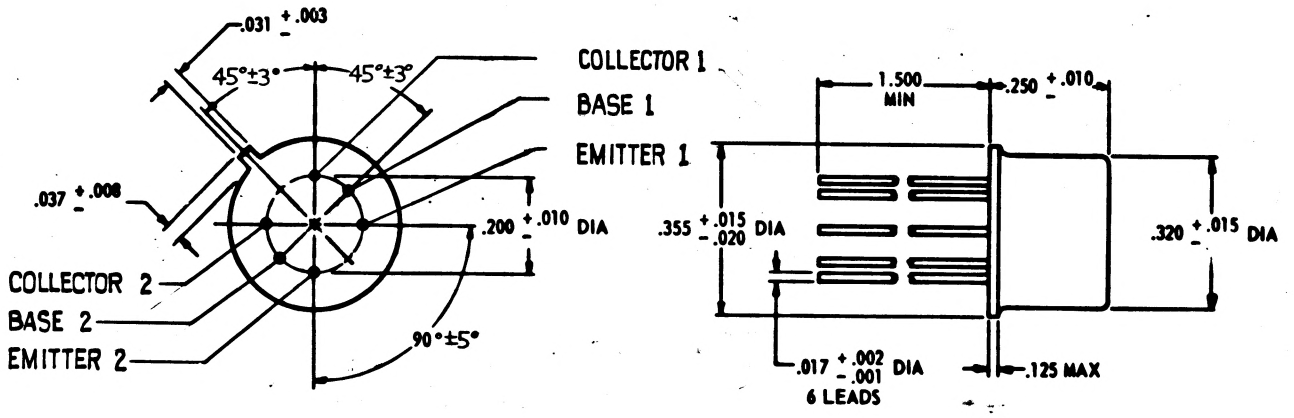
REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR	6-26-63	EWL
D		REVISED PER TDRR 03031 (01787)	10/29/63	WH
E		REVISED PER TDRR 10369	6/24/64	WR
F		REVISED PER TDRR 20394	7/7/65	WR
6		REVISED PER TDRR 22045	9/7/65	[illegible] 9/14

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051
   - D. PACKAGING AND PACKING: UNIT PACKAGING AND PACKING AND CONTAINER MARKING SHALL BE IN ACCORDANCE WITH ND 1002215 CLASS I, CODE 2

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402 A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; THE NASA DRAWING NUMBER WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER ND1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO}). AT T_C=100°C
     - (2) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (3) SWITCHBACK VOLTAGE (LV_{CEO}).
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).
     - (5) NOISE FIGURE. (NF)
     - (6) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).
     - (7) BASE VOLTAGE TEMPERATURE COEFFICIENT MATCHING FROM +25°C TO +125°C
   - C. MATCHING REQUIREMENTS PER TABLE III



3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL RATINGS: PER TABLE 1
   - B. ELECTRICAL SPECIFICATION: PER TABLE II & III
   - C. STORAGE TEMPERATURE: -65°C TO +175°C
   - D. POWER DISSIPATION (EACH ELEMENT).
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
     - (2) AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
   - E. POWER DISSIPATION (DUAL DEVICE)
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.
     - (2) AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

MASTER

Ⓕ REPLACES REV (E) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.

DRAWN Toro DATE 22 MAY 63
CHECKED WILSON 28MAY63
APPROVAL D. B. Test 24JUN63
APPROVAL
NASA APPROVAL Jack [illegible]
MIT APPROVAL [illegible] 24 Jun 63

MANNED
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HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 SIZE C 1010252
SCALE None SHEET 1 OF 3

1010252 G

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR	6-26-63	WR
D		REVISED PER TDRR 03031 01787	10-9-63	WR.
E		REVISED PER TDRR 10369	6/24/64	WR
F		REVISED PER TDRR 20394	7/7/65	WR
G		REVISED PER TDRR 22045	9/7/65	9/14

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-1	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C =10MA I_B =0	LV_{CEO}	45	–	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} =45VDC I_E =0	I_{CBO}		10	NA
	V_{CB} = 45VDC I_E=0 T_C =100°C	I_{CBO}	–	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C =0	I_{EBO}	–	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C =10UA	h_{FE}	100	300	–
	V_{CE} =5VDC I_C = 100UA	h_{FE}	110	350	–
	V_{CE} =5VDC I_C = 1MA	h_{FE}	130	400	–
BASE SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{CE(SAT)}$	–	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} =5V f = 1mc	C_{ob}	–	8	pf
$\left\lvert\frac{\Delta(V_{BE_1} - V_{BE_2})}{\Delta T}\right\rvert$	V_{CE} =5VDC I_C =10UA ΔT = [25°C –(–55°C)] and ΔT = [125°C – 25°C]	–	–	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} =5V I_C =1MA f =1KC	h_{fe}	130	600	–
INPUT IMPEDANCE	V_{CB} =5V I_E = –1MA f =1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} =5V I_E = –1MA f =1KC	h_{cb}	–	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} =5V I_E = –1MA f =1KC	h_{ob}	–	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} =34.8K,Ω 1% WW I_C =100UA f =100CPS V_{CE} = 4V	N.F.	–	0.4	$E_n/\sqrt{\sim}$
	R_{BE} =34.8KΩ, 1%WW, I_C =100UA f =1KC V_{CE} = 4V	N.F.	–	0.123	$E_n/\sqrt{\sim}$

NOTE : MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C =100 UA V_{CE} =5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	
STATIC FORWARD CURRENT TRANSFER RATIO	I_C =10 UA V_{CE} =5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	2

Ⓕ REPLACES REV(E) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+	+
–	–	–

DO NOT SCALE THIS DRAWING

MATERIAL

CONTRACT

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DRAWN TORO DATE 22 MAY 63
CHECKED WILSON 28 MAY 63
APPROVAL D. G. Test 24 JUN 63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 26 June 63

MANNED
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HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT,
MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
80230	C	1010252
SCALE		SHEET 2 OF 3

1010252 G

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		THIS SHEET ADDED PER TDRR 01787	6.26.63	WK
E		REVISED PER TDRR 10369	6/24/64	WK
F		REVISED PER TDRR 20394	7/7/65	WK
G		REVISED PER TDRR 22045	9/7/65	9/14

4. SPECIAL CONDITIONING BY SUPPLIER:
   - A. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
     - (1) AMBIENT TEMPERATURE: 25° ±5°C
     - (2) COLLECTOR VOLTAGE: 30 VDC ±5% PER UNIT
     - (3) POWER DISSIPATION: 150 MW ±10% PER UNIT
   - B. THE MANUFACTURER SHALL RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO BURN-IN AND FOLLOWING CENTRIFUGE TEST.
     - (1) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (2) COLLECTOR CUTOFF CURRENT, I_{CBO}
     - (3) COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$
     - (4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE} (AT LOWEST SPECIFIED COLLECTOR CURRENT)
   - C. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

     UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 15% IN h_{FE}, OR HAVING INCREASED MORE THAN 3 TIMES IN I_{CBO} (THE ABSOLUTE INCREASE MUST BE GREATER THAN 5 NANOAMPERE) SHALL NOT BE ACCEPTABLE.
   - D. CENTRIFUGE: ALL DEVICES 100% PER MIL-STD-750, METHOD 2006,Y, ORENTATION, 20,000 G'S FOR A MINIMUM OF 30 SECONDS. TO BE PERFORMED FOLLOWING BURN-IN BUT PRIOR TO FINAL ELECTRICAL MEASUREMENTS
   - E. PROCESSING RESTRICTION: DEVICES UTILIZING AN INTERNAL GOLD-ALUMINUM BONDING SYSTEM SHALL NOT BE PROCESSED IN EXCESS OF 200°C FOR PERIODS GREATER THAN 3 HOURS AFTER THE INTERNAL LEAD BONDING OPERATION HAS BEEN COMPLETED

THIS SHEET ADDED

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN DATE 22 MAY 63
CHECKED WILSON 28 MAY 63
APPROVAL 24 JUN 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
1010252
SCALE
SHEET 3 OF 3

D.O. 42782

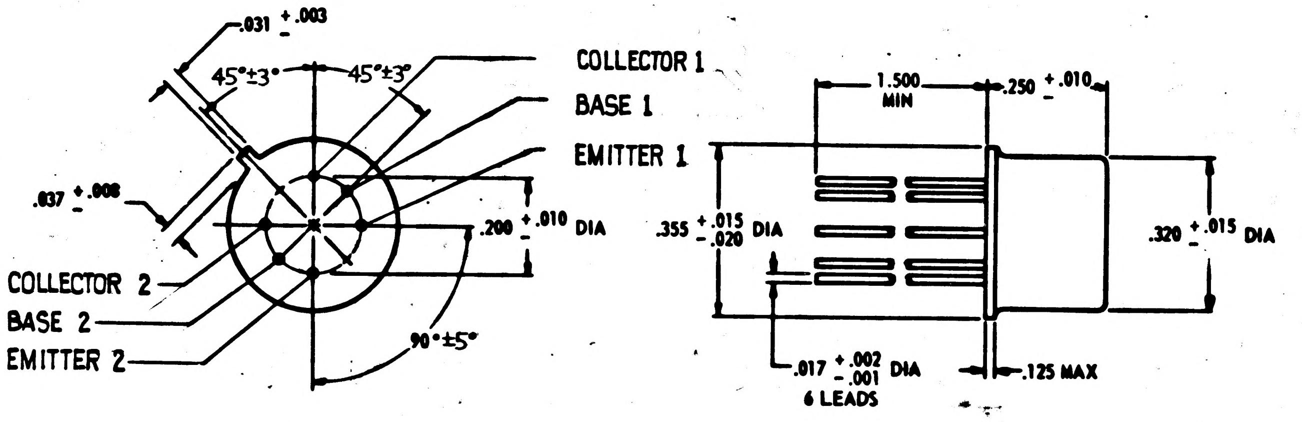
1010252 H

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6-26-63	EWC
D		REVISED PER TDRR 03031	10/4/62	WR
E		REVISED PER TDRR 10369	12/4/63	WR
F		REVISED PER TDRR 20394	7/7/65	WR.
6		REVISED PER TDRR 22045	9/7/65	EGP 9/14
H		REVISED PER TDRR 23647	11/30/65	WR

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND1002215, CLASS I, CODE 2.

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402 A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; THE NASA DRAWING NUMBER WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER ND1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO}). AT $T_C=100^\circ C$
     - (2) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (3) SWITCHBACK VOLTAGE (LV_{CEO}).
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).
     - (5) NOISE FIGURE. (NF)
     - (6) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).
     - (7) BASE VOLTAGE TEMPERATURE COEFFICIENT MATCHING FROM +25°C TO +125°C
   - C. MATCHING REQUIREMENTS PER TABLE III



3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL RATINGS: PER TABLE 1
   - B. ELECTRICAL SPECIFICATION: PER TABLE 11 & 111
   - C. STORAGE TEMPERATURE: -65°C TO +175°C
   - D. POWER DISSIPATION (EACH ELEMENT).
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
     - (2) AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
   - E. POWER DISSIPATION (DUAL DEVICE)
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.
     - (2) AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

MASTER

Ⓕ REPLACES REV (E) WITH CHANGE

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + −	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.	MANNED SPACECRAFT CENTER HOUSTON, TEXAS
APPLICATION		DO NOT SCALE THIS DRAWING	DRAWN Tore DATE 22 MAY 63 CHECKED WILSON 28 MAY 63 APPROVAL O. Stat 24 JUN 63 APPROVAL	TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN SPECIFICATION CONTROL DRAWING
		MATERIAL	NASA APPROVAL	CODE IDENT NO. 80230 · SIZE C · 1010252
		CONTRACT	MIT APPROVAL 20 Jun 63	SCALE None · SHEET 1 OF 3

H	1010252

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6/26/63	WR
D		REVISED PER TDRR 03031	[illegible] 63	WR.
E		REVISED PER TDRR 10369	[illegible]	WR
F		REVISED PER TDRR 20394	7/7/65	WR
G		REVISED PER TDRR 22045	9/7/65	[illegible] 9/14
H		REVISED PER TDRR 23647	11/30/65	WR

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-1	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C = 10MA I_B = 0	LV_{CEO}	45	-	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} = 45VDC I_E = 0	I_{CBO}		10	NA
	V_{CB} = 45VDC I_E = 0 T_C = 100°C	I_{CBO}	-	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C = 0	I_{EBO}	-	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C = 10UA	h_{FE}	100	300	-
	V_{CE} = 5VDC I_C = 100UA	h_{FE}	110	350	-
	V_{CE} = 5VDC I_C = 1MA	h_{FE}	130	400	-
BASE SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C = 10MA I_B = 0.5MA	$V_{CE(SAT)}$	-	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} = 5V f = 1mc	C_{ob}	-	8	pf
$\left\lvert \frac{\Delta (V_{BE_1} - V_{BE_2})}{\Delta T} \right\rvert$	V_{CE} = 5VDC I_C = 10UA ΔT = [25°C - (-55°C)] and ΔT = [125°C - 25°C]	-	-	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5V I_C = 1MA f = 1KC	h_{fe}	130	600	-
INPUT IMPEDANCE	V_{CB} = 5V I_E = -1MA f = 1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} = 5V I_E = -1MA f = 1KC	h_{rb}	-	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} = 5V I_E = -1MA f = 1KC	h_{ob}	-	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} = 34.8K,Ω 1% WW I_C = 100UA f = 100CPS V_{CE} = 4V	N.F.	-	0.4	$E_n/\sqrt{\sim}$
	R_{BE} = 34.8KΩ, 1%WW, I_C = 100UA f = 1KC V_{CE} = 4V	N.F.	-	0.123	$E_n/\sqrt{\sim}$

NOTE : MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C = 100 UA V_{CE} = 5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	
STATIC FORWARD CURRENT TRANSFER RATIO	I_C = 10 UA V_{CE} = 5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	2

Ⓕ REPLACES REV (E) WITH CHANGE

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + − DO NOT SCALE THIS DRAWING	M I T INSTRUMENTATION LAB CAMBRIDGE, MASS
APPLICATION		MATERIAL	DRAWN TORO DATE 22 MAY 63 CHECKED WILSON 28 MAY 63 APPROVAL [illegible] 24 JUN 63 APPROVAL
		CONTRACT	NASA APPROVAL [illegible] MIT APPROVAL [illegible] 26 Jun 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
80230	C	1010252
SCALE		SHEET 2 OF 3

MASTER

1010252 H

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		THIS SHEET ADDED PER TDRR 01787	6-26-63	WK
E		REVISED PER TDRR 10369	6/24/64	WK
F		REVISED PER TDRR 20394	7/7/65	WK
G		REVISED PER TDRR 22045	9/7/65	EJP 9/14
H		REVISED PER TDRR 23647	11/30/65	WK

4. SPECIAL CONDITIONING BY SUPPLIER:

A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240-HOUR BURN-IN.

(1) ACCELERATION AT 20,000G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750, METHOD 2006, OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.

(2) FINE LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III a OR b. A LEAK RATE OF 1 X 10^{-8} ATM CC/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

(3) GROSS LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION A. GLYCERIN MAY BE USED IN LIEU OF MINERAL OIL.

B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

(1) AMBIENT TEMPERATURE: 25° ± 5°C

(2) COLLECTOR VOLTAGE: 30 VDC ±5% PER UNIT

(3) POWER DISSIPATION: 150 MW ±10% PER UNIT

C. THE MANUFACTURER SHALL RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO BURN-IN AND FOLLOWING CENTRIFUGE TEST.

(1) EMITTER CUTOFF CURRENT (I_{EBO}).

(2) COLLECTOR CUTOFF CURRENT, I_{CBO}

(3) COLLECTOR SATURATION VOLTAGE V_{CE} (SAT)

(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE} (AT LOWEST SPECIFIED COLLECTOR CURRENT)

D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 15% IN h_{FE}, OR HAVING INCREASED MORE THAN 3 TIMES IN I_{CBO} (THE ABSOLUTE INCREASE MUST BE GREATER THAN 5 NANOAMPERE) SHALL NOT BE ACCEPTABLE.

E. CENTRIFUGE: ALL DEVICES 100% PER MIL-STD-750, METHOD 2006,Y, ORENTATION, 20,000 G'S FOR A MINIMUM OF 30 SECONDS. TO BE PERFORMED FOLLOWING BURN-IN BUT PRIOR TO FINAL ELECTRICAL MEASUREMENTS

F. PROCESSING RESTRICTION: DEVICES UTILIZING AN INTERNAL GOLD-ALUMINUM BONDING SYSTEM SHALL NOT BE PROCESSED IN EXCESS OF 200°C FOR PERIODS GREATER THAN 3 HOURS AFTER THE INTERNAL LEAD BONDING OPERATION HAS BEEN COMPLETED

THIS SHEET ADDED

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN Foro DATE 22 MAY 63
CHECKED WILSON 28 MAY 63
APPROVAL D.R. Test 24 JUN 63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL 26 Jun 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 SIZE C 1010252
SCALE SHEET 3 OF 3

D.O. 42782

MASTER

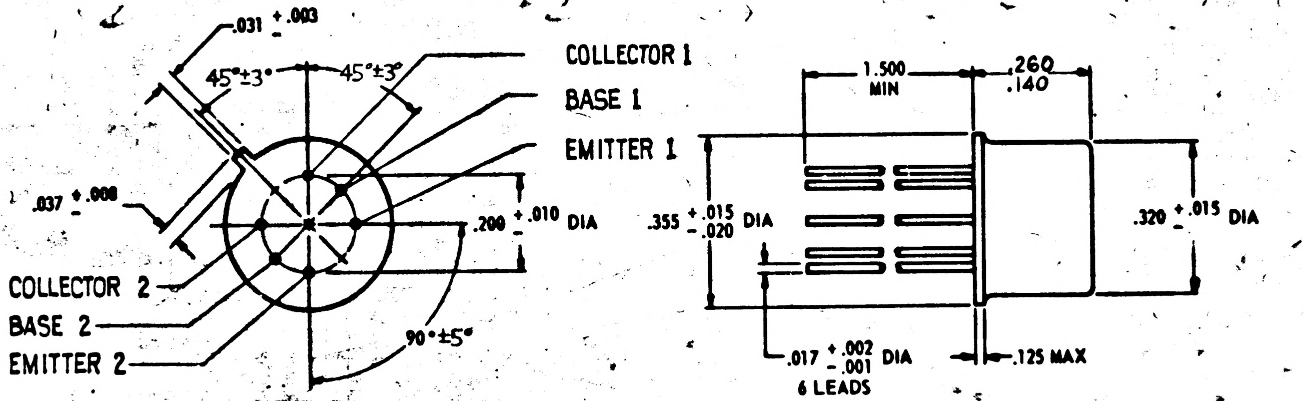
1010252 J

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 787	6-26-63	[illegible]
D		REVISED PER TDRR 03031	[illegible]	[illegible]
E		REVISED PER TDRR 10369	[illegible]	WK
F		REVISED PER TDRR 20394	[illegible]	WK.
G		REVISED PER TDRR 22045	[illegible]	9/14
H		REVISED PER TDRR 23647	[illegible]	[illegible]
J		REVISED PER TDRR 31738	4-NOV 66	JJB / SC

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND1002215, CLASS I, CODE 2

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402 A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; THE NASA DRAWING NUMBER WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER ND1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO}). AT T_C=100°C
     - (2) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (3) SWITCHBACK VOLTAGE (LV_{CEO}).
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).
     - (5) NOISE FIGURE. (NF)
     - (6) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).
     - (7) BASE VOLTAGE TEMPERATURE COEFFICIENT MATCHING FROM +25°C TO +125°C
   - C. MATCHING REQUIREMENTS PER TABLE III



LOW PROFILE TO-5

3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL RATINGS: PER TABLE I
   - B. ELECTRICAL SPECIFICATION: PER TABLE II & III
   - C. STORAGE TEMPERATURE: -65°C TO +175°C
   - D. POWER DISSIPATION (EACH ELEMENT)
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
     - (2) AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
   - E. POWER DISSIPATION (DUAL DEVICE)
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.
     - (2) AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

Ⓕ REPLACES REV (E) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 SIZE C 1010252
SCALE None SHEET 1 OF 3

MIL-1077C-F

1010252 J

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-1	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)

PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C =10MA I_B =0	LV_{CEO}	45	-	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} = 45VDC I_E =0	I_{CBO}		10	NA
	V_{CB} = 45VDC I_E=0 T_C =100°C	I_{CBO}	-	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C =0	I_{EBO}	-	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C =10UA	h_{FE}	100	300	-
	V_{CE} =5VDC I_C = 100UA	h_{FE}	110	350	-
	V_{CE} =5VDC I_C = 1MA	h_{FE}	130	400	-
BASE SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{CE(SAT)}$	-	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} =5V f = 1mc	C_{ob}	-	8	pf
$\left\lvert\frac{\Delta(V_{BE_1} - V_{BE_2})}{\Delta T}\right\rvert$	V_{CE} =5VDC I_C =10UA ΔT = [25°C -(-55°C)] and ΔT = [125°C - 25°C]	-	-	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} =5V I_C =1MA f =1KC	h_{fe}	130	600	-
INPUT IMPEDANCE	V_{CB} =5V I_E = -1MA f =1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} = 5V I_E = -1MA f =1KC	h_{rb}	-	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} =5V I_E = -1MA f =1KC	h_{ob}	-	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} =34.8K,Ω 1% WW I_C =100UA f =100CPS V_{CE} = 4V	N.F.	-	0.4	$E_n/\sqrt{\sim}$
	R_{BE} =34.8K Ω, 1%WW, I_C =100UA f =1KC V_{CE} = 4V	N.F.	-	0.123	$E_n/\sqrt{\sim}$

NOTE : MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C

PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C =100 UA V_{CE} =5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	
STATIC FORWARD CURRENT TRANSFER RATIO	I_C =10 UA V_{CE} =5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	2

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	[illegible] 63	WR
D		REVISED PER TDRR 03031	[illegible] 63	WR.
E		REVISED PER TDRR 10369	[illegible]	WR
F		REVISED PER TDRR 20394	7/7/65	WR
G		REVISED PER TDRR 22045	9/7/65	[illegible] 9/14
H		REVISED PER TDRR 23647	[illegible] 30/65	R
J		REVISION STATUS CHANGED	4 NOV 66	JJB SC

Ⓕ REPLACES REV (E) WITH CHANGE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON	FRACTIONS ± DECIMALS ± ANGLES ±
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MATERIAL	
CONTRACT	
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APPROVAL
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
80230	C	1010252
SCALE		SHEET 2 OF 3

J 1010252

1010252 J

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		THIS SHEET ADDED PER TDRR [illegible]	6.26.63	WK
E		REVISED PER TDRR 10369	[illegible]24/64	WK
F		REVISED PER TDRR 20394	[illegible]	WK
G		REVISED PER TDRR 22045	[illegible]	9/14
H		REVISED PER TDRR 23647	[illegible]30[illegible]	WK
J		REVISION STATUS CHANGED	4 NOV 66	JJB SC

4. SPECIAL CONDITIONING BY SUPPLIER:

A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240-HOUR BURN-IN.

(1) ACCELERATION AT 20,000G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750, METHOD 2006, OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.

(2) FINE LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III a OR b. A LEAK RATE OF 1×10^{-8} ATM CC/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

(3) GROSS LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION A. GLYCERIN MAY BE USED IN LIEU OF MINERAL OIL.

B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

(1) AMBIENT TEMPERATURE: 25° ± 5°C

(2) COLLECTOR VOLTAGE: 30 VDC ±5% PER UNIT

(3) POWER DISSIPATION: 150 MW ±10% PER UNIT

C. THE MANUFACTURER SHALL RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO BURN-IN AND FOLLOWING CENTRIFUGE TEST.

(1) EMITTER CUTOFF CURRENT (I_{EBO}).

(2) COLLECTOR CUTOFF CURRENT, I_{CBO}

(3) COLLECTOR SATURATION VOLTAGE V_{CE} (SAT)

(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE} (AT LOWEST SPECIFIED COLLECTOR CURRENT)

D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 15% IN h_{FE}, OR HAVING INCREASED MORE THAN 3 TIMES IN I_{CBO} (THE ABSOLUTE INCREASE MUST BE GREATER THAN 5 NANOAMPERE) SHALL NOT BE ACCEPTABLE.

E. CENTRIFUGE: ALL DEVICES 100% PER MIL-STD-750, METHOD 2006,Y, ORENTATION, 20,000 G'S FOR A MINIMUM OF 30 SECONDS. TO BE PERFORMED FOLLOWING BURN-IN BUT PRIOR TO FINAL ELECTRICAL MEASUREMENTS

F. PROCESSING RESTRICTION: DEVICES UTILIZING AN INTERNAL GOLD-ALUMINUM BONDING SYSTEM SHALL NOT BE PROCESSED IN EXCESS OF 200°C FOR PERIODS GREATER THAN 3 HOURS AFTER THE INTERNAL LEAD BONDING OPERATION HAS BEEN COMPLETED

THIS SHEET ADDED

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
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TOLERANCES ON
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DRAWN Foro DATE 22 MAY 63
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APPROVAL [illegible] 24 JUN 63
APPROVAL
NASA APPROVAL
MIT APPROVAL 26 [illegible] 63

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230 SIZE C 1010252
SCALE SHEET 3 OF 3

D.O. 42782

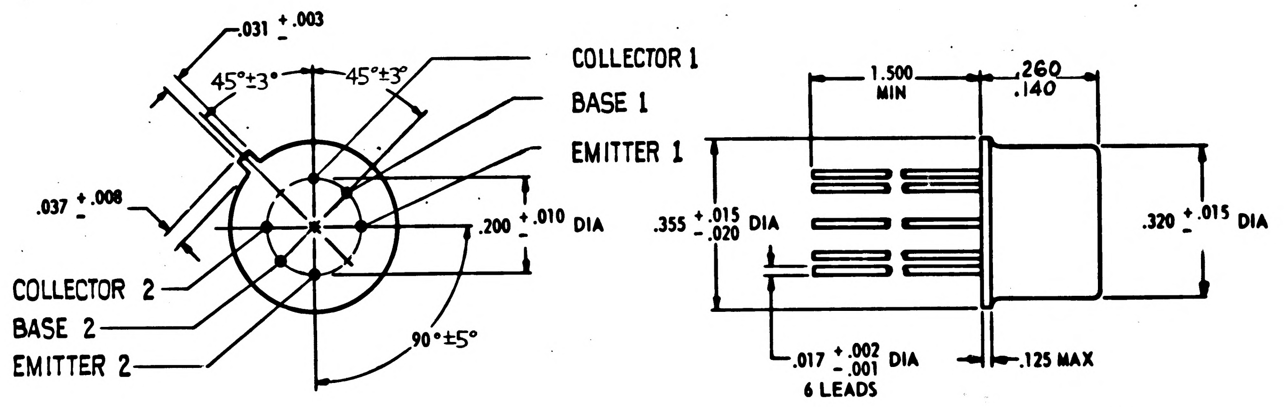
1010252 J

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 787	6-26-63	ENC
D		REVISED PER TDRR 03031	10/4/63	W.H
E		REVISED PER TDRR 10369	1/24/64	WK
F		REVISED PER TDRR 20394	7/7/65	WK
6		REVISED PER TDRR 22045	[illegible]	9/14
H		REVISED PER TDRR 23647	11/30/	WK
J		REVISED PER TDRR 31738	4 NOV 66	JJB SC
K		REVISION STATUS CHANGED	4 NOV 66	JJB SC

REQUIREMENTS:

1. GENERAL:
   - A. INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
   - B. SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER ND1015404, CLASS 1.
   - C. UNITS SHALL BE CAPABLE OF MEETING THE QUALIFICATION REQUIREMENTS OF ND1002051 UNLESS MODIFIED OR AMENDED BY THE DESIGN REQUIREMENTS SECTION OF THIS DRAWING
   - D. PRESERVATION, PACKAGING, PACKING AND CONTAINER MARKING PER ND1002215, CLASS I, CODE 2

2. INSPECTION AND ACCEPTANCE:
   - A. MECHANICAL REQUIREMENTS:
     - (1) LEAD DATA: KOVAR WITH GOLD PLATING PER ND 1015402 A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
     - (2) MARKING: THE MANUFACTURER'S NAME; TRADEMARK OR CODE; THE NASA DRAWING NUMBER WHICH SHALL CONSIST OF AT LEAST THE LAST THREE DIGITS; DATE CODE; LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, PER ND1002019.
   - B. ELECTRICAL REQUIREMENTS: PER TABLE II
     - (1) COLLECTOR CUTOFF CURRENT (I_{CBO}). AT T_C=100°C
     - (2) EMITTER CUTOFF CURRENT (I_{EBO}).
     - (3) SWITCHBACK VOLTAGE (LV_{CEO}).
     - (4) COLLECTOR SATURATION VOLTAGE ($V_{CE(SAT)}$).
     - (5) NOISE FIGURE. (NF)
     - (6) STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE}).
     - (7) BASE VOLTAGE TEMPERATURE COEFFICIENT MATCHING FROM +25°C TO +125°C
   - C. MATCHING REQUIREMENTS PER TABLE III



LOW PROFILE TO-5

3. DESIGN REQUIREMENTS:
   - A. ELECTRICAL RATINGS: PER TABLE 1
   - B. ELECTRICAL SPECIFICATION: PER TABLE II & III
   - C. STORAGE TEMPERATURE: -65°C TO +175°C
   - D. POWER DISSIPATION (EACH ELEMENT).
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
     - (2) AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX
   - E. POWER DISSIPATION (DUAL DEVICE)
     - (1) AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX.
     - (2) AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX.

PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND 1002034 FOR THIS DRAWING.

Ⓕ REPLACES REV (E) WITH CHANGE

NEXT ASSY	USED ON
APPLICATION	

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DIMENSIONS ARE IN INCHES
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FRACTIONS + − DECIMALS + − ANGLES + −
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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
80230	C	1010252
SCALE None		SHEET 1 of 3

1010252 K

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		REPLACES REV B WITH CHANGE AND UPGRADED TO CLASS A RELEASE PER TDRR 01787	6-26-63	wk
D		REVISED PER TDRR 03031	10 Sep 63	wk.
E		REVISED PER TDRR 10369	[illegible]	wk
F		REVISED PER TDRR 20394	7/7/65	wk
G		REVISED PER TDRR 22045	9/7/65	[illegible] 9/17
H		REVISED PER TDRR 23647	[illegible]/30/65	[illegible]
J		REVISION STATUS CHANGED	4 NOV 66	JJB
K		REVISED PER TDRR 31740	4 NOV 66	JJB SC

TABLE I

NASA PART NUMBER	MAXIMUM RATINGS TC-25°C					
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	EIA TYPE DESIGNATION (FOR REF ONLY)
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-1	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C =10MA I_B =0	LV_{CEO}	45	–	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} =45VDC I_E =0	I_{CBO}		10	NA
	V_{CB} = 45VDC I_E=0 T_C =100°C	I_{CBO}	–	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C =0	I_{EBO}	–	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C =10UA	h_{FE}	100	300	–
	V_{CE} =5VDC I_C = 100UA	h_{FE}	110	350	–
	V_{CE} =5VDC I_C = 1MA	h_{FE}	130	400	–
BASE SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{CE(SAT)}$	–	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} =5V f = 1mc	C_{ob}	–	8	pf
$\left\lvert \frac{\Delta (V_{BE_1} - V_{BE_2})}{\Delta T} \right\rvert$ NOTE 2	V_{CE} =5VDC I_C =10UA ΔT = [25°C −(−55°C)] and ΔT = [125°C − 25°C]	–	–	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} =5V I_C =1MA f =1KC	h_{fe}	130	600	–
INPUT IMPEDANCE	V_{CB} =5V I_E = −1MA f =1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} =5V I_E = −1MA f =1KC	h_{rb}	–	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} =5V I_E = −1MA f =1KC	h_{ob}	–	1	μ mhos
NOISE FIGURE SEE NOTE BELOW	R_{BE} =34.8K,Ω 1% WW I_C =100UA f =100CPS V_{CE} = 4V	N.F.	–	0.4	$E_n/\sqrt{\sim}$
	R_{BE} =34.8K Ω, 1%WW, I_C =100UA f =1KC V_{CE} = 4V	N.F.	–	0.123	$E_n/\sqrt{\sim}$

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C =100 UA V_{CE} =5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	2
STATIC FORWARD CURRENT TRANSFER RATIO	I_C =10 UA V_{CE} =5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	

NOTES:

1. MEASURE WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT
2. $V_{BE1} = V_{BE}$ SIDE 1
   $V_{BE2} = V_{BE}$ SIDE 2
   $\Delta (V_{BE1} - V_{BE2}) = (V_{BE1} - V_{BE2})$ AT T_1 - $(V_{BE1} - V_{BE2})$ AT T_2
   $\Delta T = T_2 - T_1$

Ⓕ **REPLACES REV(E)WITH CHANGE**

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON

FRACTIONS	DECIMALS	ANGLES
+	+	+
−	−	−

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APPROVAL D. B. Test 24 JUN 63
APPROVAL
NASA APPROVAL Jack Barnard
MIT APPROVAL [illegible] 26 Jun. 63

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SPECIFICATION CONTROL DRAWING

CODE IDENT NO.	SIZE	
80230	C	1010252
SCALE		SHEET 2 OF 3

4. SPECIAL CONDITIONING BY SUPPLIER:

A. ALL UNITS SHALL HAVE SUCCESSFULLY PASSED THE FOLLOWING SCREENING TESTS PERFORMED DURING THE TIME INTERVAL BETWEEN FINAL SEAL AND THE 240-HOUR BURN-IN.

(1) ACCELERATION AT 20,000G MINIMUM IN THE Y_1 ORIENTATION PER MIL-STD-750, METHOD 2006, OR IMPACT SHOCK AT 28K G MINIMUM IN THE Y_1 ORIENTATION.

(2) FINE LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION C, PROCEDURE III a OR b. A LEAK RATE OF 1×10^{-8} ATM CC/SEC OR GREATER SHALL CONSTITUTE A FAILURE.

(3) GROSS LEAK PER MIL-STD-202, METHOD 112, TEST CONDITION A. GLYCERIN MAY BE USED IN LIEU OF MINERAL OIL.

B. BURN-IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:

(1) AMBIENT TEMPERATURE: 25° ± 5°C

(2) COLLECTOR VOLTAGE: 30 VDC ±5% PER UNIT

(3) POWER DISSIPATION: 150 MW ±10% PER UNIT

C. THE MANUFACTURER SHALL RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO BURN-IN AND FOLLOWING CENTRIFUGE TEST.

(1) EMITTER CUTOFF CURRENT (I_{EBO}).

(2) COLLECTOR CUTOFF CURRENT, I_{CBO}

(3) COLLECTOR SATURATION VOLTAGE V_{CE} (SAT)

(4) STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE} (AT LOWEST SPECIFIED COLLECTOR CURRENT)

D. THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS.

UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVING CHANGED MORE THAN 15% IN h_{FE}, OR HAVING INCREASED MORE THAN 3 TIMES IN I_{CBO} (THE ABSOLUTE INCREASE MUST BE GREATER THAN 5 NANOAMPERE) SHALL NOT BE ACCEPTABLE.

E. CENTRIFUGE: ALL DEVICES 100% PER MIL-STD-750, METHOD 2006, Y, ORENTATION, 20,000 G'S FOR A MINIMUM OF 30 SECONDS. TO BE PERFORMED FOLLOWING BURN-IN BUT PRIOR TO FINAL ELECTRICAL MEASUREMENTS

F. PROCESSING RESTRICTION: DEVICES UTILIZING AN INTERNAL GOLD-ALUMINUM BONDING SYSTEM SHALL NOT BE PROCESSED IN EXCESS OF 200°C FOR PERIODS GREATER THAN 3 HOURS AFTER THE INTERNAL LEAD BONDING OPERATION HAS BEEN COMPLETED

REVISIONS

SYM	ZONE	DESCRIPTION	DATE	APPD.
C		THIS SHEET ADDED PER TDRR 01787	6.26.63	WL
E		REVISED PER TDRR 10369	4/24/64	WL
F		REVISED PER TDRR 20394	7/7/65	JK
G		REVISED PER TDRR 22045	7/7/65	9/14
H		REVISED PER TDRR 23647	11/30/65	WK
J		REVISION STATUS CHANGED	4 NOV 66	JJB
K		REVISION STATUS CHANGED	4 NOV 66	JJB SC

THIS SHEET ADDED

NEXT ASSY / USED ON APPLICATION	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS + − DECIMALS + − ANGLES + − DO NOT SCALE THIS DRAWING	MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWG. NO. CONTRACT	MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
	MATERIAL	DRAWN Foro DATE 22 MAY 63 CHECKED WILSON 28 MAY 63 APPROVAL 24 JUN 63 APPROVAL	TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN SPECIFICATION CONTROL DRAWING	
	CONTRACT	NASA APPROVAL MIT APPROVAL 26 Jul 63	CODE IDENT NO. 80230	SIZE C 1010252
			SCALE	SHEET 3 OF 3

D.O. 42782

REVISIONS

SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
—		SEE PROCUREMENT NOTE			

REQUIREMENTS:

GROUP I (INSPECTION BY SUPPLIER AND USER):

LEAD DATA: KOVAR WITH GOLD PLATING PER NASA DOCUMENT 1015402
A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
MATCHING REQUIREMENTS PER TABLE III
ELECTRICAL CHARACTERISTICS: PER TABLE II
- STATIC FORWARD CURRENT TRANSFER RATIO (h_{FE})
- COLLECTOR CUTOFF CURRENT (I_{CBO})
- SATURATION VOLTAGE ($V_{CE(SAT)}$)
- SWITCHBACK VOLTAGE (LV_{CEO})
- INPUT VOLTAGE (V_{BE})
- NOISE VOLTAGE
- EMITTER CUTOFF CURRENT (I_{EBO})

MARKING: THE MANUFACTURERS NAME, TRADEMARK, OR CODE: TYPE DESIGNATION, DATE CODE, LOT CODE AND SERIAL NUMBER SHALL BE PERMANENTLY AND LEGIBLY MARKED ON THE PART, IN ACCORDANCE WITH MIL-STD-130.

GROUP II (DESIGN REQUIREMENTS):

STORAGE TEMPERATURE: -65°C TO +175°C
ELECTRICAL RATING: PER TABLE I
ELECTRICAL SPECIFICATION: PER TABLE II & III
POWER DISSIPATION (EACH ELEMENT)
- AT 25°C AMBIENT TEMPERATURE: 0.3 WATTS MAX
- AT 25°C CASE TEMPERATURE: 0.6 WATTS MAX

POWER DISSIPATION (DUAL DEVICE)
- AT 25°C AMBIENT TEMPERATURE: 0.6 WATTS MAX
- AT 25°C CASE TEMPERATURE: 1.2 WATTS MAX

UNITS SHALL MEET THE QUALIFICATION REQUIREMENTS OF ND1002051.

SUPPLIERS SHALL CONFORM TO THE QUALITY ASSURANCE PER NASA DOCUMENT 1015404, CLASS I

PACKAGING AND PACKING: UNIT PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-P -19491 LEVEL A IN BOTH INSTANCES.

(1) MARKING OF UNIT PACKAGES AND EXTERIOR SHIPPING CONTAINERS SHALL BE IN ACCORDANCE WITH MIL-P-19491 AND SHALL INCLUDE THE NASA DRAWING NUMBER AND REVISION LETTER.

GROUP III (SPECIAL CONDITIONING BY SUPPLIER):

BURN IN: UNITS SHALL BE BURNED-IN FOR 240 HOURS AT THE FOLLOWING CONDITIONS:
1. AMBIENT TEMPERATURE: 65° ±10°C.
2. COLLECTOR VOLTAGE V_{CB}: 30V ±5% PER UNIT.
3. POWER DISSIPATION: 150 MW ±10% PER UNIT.

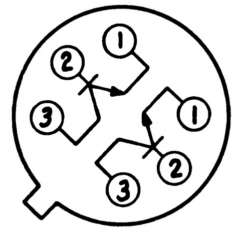
THE MANUFACTURER SHALL DETERMINE AND RECORD THE FOLLOWING ELECTRICAL CHARACTERISTICS PRIOR TO AND FOLLOWING BURN-IN:
- a. EMITTER CUTOFF CURRENT, I_{EBO}.
- b. COLLECTOR CUTOFF CURRENT, I_{CBO}.
- c. COLLECTOR SATURATION VOLTAGE, $V_{CE(SAT)}$.
- d. STATIC FORWARD CURRENT TRANSFER RATIO, h_{FE}.

THE DATA SHALL BE PRESENTED IN A MANNER THAT PROVIDES POSITIVE IDENTIFICATION OF EACH INDIVIDUAL TRANSISTOR WITH THE INITIAL TEST READING, THE FINAL READING, AND THE PERCENT CHANGE BETWEEN THE FINAL AND INITIAL READING. THE TEST DATA SUBMITTED SHALL ALSO IDENTIFY PARTS THAT FAIL TO MEET THE SPECIFIED REQUIREMENTS. HISTOGRAMS SHALL BE PLOTTED TO SHOW THE FREQUENCY DISTRIBUTION OF THE ABSOLUTE VALUE OF EACH CHARACTERISTIC AND TO SHOW THE FREQUENCY DISTRIBUTION OF THE PERCENT CHANGE OF EACH CHARACTERISTIC FROM ITS INITIAL READING. UNITS FAILING TO MEET INITIAL DRAWING REQUIREMENTS OR HAVE CHANGED MORE THAN 10% IN h_{FE} SHALL NOT BE ACCEPTABLE.

INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.

PROCUREMENT NOTE:
- A. WAIVE AS REQUIRED ALL INFORMATION PRESENTED ON THIS DRAWING EXCEPT LEAD MATERIAL SPECIFICATION & PHYSICAL DIMENSIONS
- B. UPON SPECIFIC INSTRUCTION BY TECHNICAL DIRECTIVE (TD) PROCURE THIS PART AS CHANGE SYMBOL (-) BY ORDERING TO VENDOR CATALOGUE NUMBER & SPECIFICATIONS. REF ND1002034
- C. DISREGARD THIS NOTE IN ITS ENTIRETY IF REF IS MADE TO THIS DRAWING BY OTHER THAN REV SYMBOL (-)

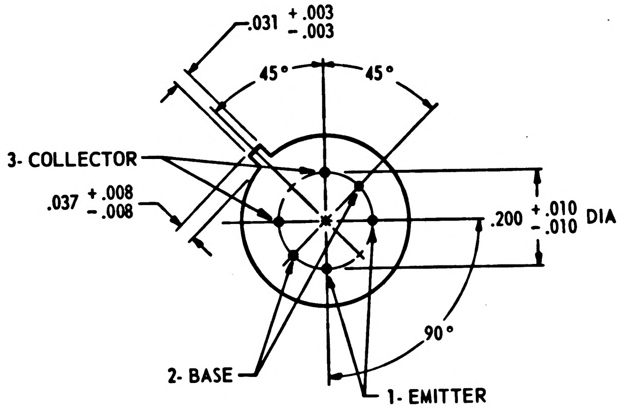
PROCURE ONLY FROM APPROVED SOURCES LISTED ON ND1002034 FOR THIS DWG.

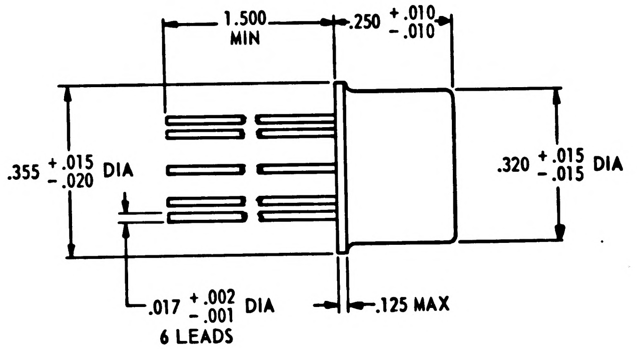


GRAPHICAL SYMBOL
TERMINAL NUMBERS ARE FOR REF. ONLY

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 **DATE** 2-20-63





—	—
SHEET 1	SHEET 2
REVISION STATUS OF SHEETS	

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS + − DECIMALS + − ANGLES + −
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DRAWN Cozzaguin DATE 8 Jan 63
CHECKED E.L. Hintz 9 JAN 63
APPROVAL W.J. Beaton
APPROVAL
NASA APPROVAL Jack Barnard 2/20/63
MIT APPROVAL W. Wupper 20 Feb 63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
1010252
SCALE NONE
SHEET 1 OF 2

MIL 1077C—P

REVISIONS					
SYM	ZONE	DESCRIPTION	CHG NO.	DATE	APPD.
—					

TABLE I

NASA PART NUMBER	MANUFACTURER'S ABSOLUTE MAXIMUM RATINGS TC-25°C					EIA TYPE DESIGNATION (FOR REFERENCE)
	COLLECTOR VOLTAGE (V_{CB})	EMITTER VOLTAGE (V_{EB})	COLLECTOR VOLTAGE (V_{CE})	COLLECTOR CURRENT I_C	COLLECTOR POWER DISSIPATION	
	V_{DC}	V_{DC}	V_{DC}	MA_{DC}	W	
1010252-001	45	5	45	30	1.2	2N2642

TABLE II

ELECTRICAL CHARACTERISTICS AT TC-25°C (UNLESS OTHERWISE SPECIFIED)					
PARAMETER	CONDITIONS	SYMBOL	SPECIFICATION LIMITS		
			MIN	MAX	UNITS
SWITCH BACK VOLTAGE	I_C =10MA I_B =0	LV_{CEO}	45	–	VOLTS
COLLECTOR CUTOFF CURRENT	V_{CB} =45VDC I_E =0	I_{CBO}		10	NA
	V_{CB} = 45VDC T_C =100°C	I_{CBO}	–	1.0	UA
EMITTER CUTOFF CURRENT	V_{EB} = 5VDC I_C =0	I_{EBO}	–	10	NA
STATIC FORWARD CURRENT TRANSFER RATIO	V_{CE} = 5VDC I_C =10UA	h_{FE}	100	300	–
	V_{CE} =5VDC I_C = 100UA	h_{FE}	110	350	–
	V_{CE} =5VDC I_C = 1MA	h_{FE}	130	400	–
BASE SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{BE(SAT)}$	.6	.8	VOLTS
COLLECTOR SATURATION VOLTAGE	I_C =10MA I_B =0.5MA	$V_{CE(SAT)}$	–	1.0	VOLTS
COLLECTOR CAPACITANCE	V_{CB} =5V f = 1mc	C_{ob}	–	8	pf
$\left\lvert \frac{\Delta (V_{BE_1} - V_{BE_2})}{\Delta T} \right\rvert$	V_{CE} =5VDC I_C =10UA ΔT = [25°C –(–55°C)] and ΔT = [125°C – 25°C]	–	–	10	UV/°C
SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO	V_{CE} =5V I_C =1MA f =1KC	h_{fe}	130	600	–
INPUT IMPEDANCE	V_{CB} =5V I_E = –1MA f =1KC	h_{ib}	25	32	OHMS
REVERSE VOLTAGE TRANSFER RATIO	V_{CB} =5V I_E = –1MA f =1KC	h_{cb}	–	600×10^{-6}	
OUTPUT ADMITTANCE	V_{CB} =5V I_E = –1MA f =1KC	h_{ob}	–	1	μ mhos
NOISE FIGURE ▷1	R_{BE} =34.8K,Ω 1% WW I_C =100UA f =100CPS	N.F.	–	0.4	$E_n/\sqrt{\sim}$
	R_{BE} =34.8K Ω, 1%WW, I_C =100UA f =1KC	N.F.	–	0.123	$E_n/\sqrt{\sim}$

▷1 MEASURED WITH A QUAN. TECH MODEL 310 OR 311 NOISE ANALYZER OR EQUIVALENT.

TABLE III

SPECIAL MATCHING REQUIREMENTS AT TC-25°C				
PARAMETER	CONDITIONS	SYMBOL	INDIVIDUAL MATCHING REQUIREMENTS	NO. OF ELEMENTS PER PACKAGE
BASE VOLTAGE	I_C =100 UA V_{CE} =5VDC	V_{BE}	WITHIN 5 MILLIVOLTS	2
STATIC FORWARD CURRENT TRANSFER RATIO	I_C =10 UA V_{CE} =5VDC	h_{FE}	WITHIN 10% OF LOWEST UNIT	

FOR INFORMATION ONLY

CLASS B RELEASE TDR No. 00434 **DATE** 2-20-63

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL
CONTRACT

M I T
INSTRUMENTATION LAB
CAMBRIDGE, MASS
DRAWN DATE 8 Jan 63
CHECKED 9 JAN 63
APPROVAL
APPROVAL
NASA APPROVAL 2/20/63
MIT APPROVAL 2/20/63

MANNED
SPACECRAFT CENTER
HOUSTON, TEXAS

TRANSISTOR, DUAL ELEMENT, MATCHED, SILICON, NPN

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
1010252
SCALE
SHEET 2

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1010253 A

REVISIONS TDRR00386

SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318983		
A	REVISED PER TDRR 00867	17Apr63	WK

NOTES:

1. REQUIREMENTS:

A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.

B. EXCEPTIONS:

(1) RATINGS: ALL REQUIREMENTS AT 25 ± 2°C WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.

(2) QUALIFICATION: UNITS SHALL MEET THE REQUIREMENTS OF ND1002057.

(3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE 6.000 ± 0.001 VDC FOR -1 THRU -11 AND 1.000 ± 0.001 VDC FOR -12

(4) RESISTANCE TOLERANCE: ± 0.01% (100 PPM).

(5) TEMPERATURE CYCLING: BETWEEN 0°C AND +50°C WITH NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(8) SALT WATER IMMERSION: NOT APPLICABLE.

(9) LIFE (STABILITY): 30 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE, DESIGN REQUIREMENT.

(10) RESISTANCE TEMPERATURE COEFFICIENT: ±3.5 PPM/°C BETWEEN 25°C AND 45°C. SAME CONDITIONS AS DC RESISTANCE.

(11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.

(12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.

(13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.

(14) SHOCK: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(15) VIBRATION: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(16) POINTS OF MEASUREMENT: MEASURE ABSOLUTE RESISTANCE BETWEEN POINTS ON LEADS 1.687 ±.020 INCHES APART. LEADS MUST BE STRAIGHT.

C. ADDITIONS:

(1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.

(2) POWER RATING: 1/3 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT +50°C.

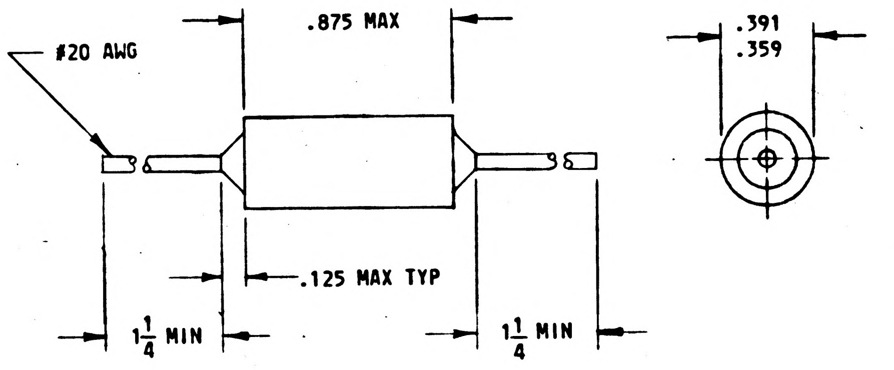
(3) LEAD MATERIAL: TINNED COPPER.

(4) MARKING: RESISTORS SHALL BE MARKED PER MIL-STD-130 WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, ABSOLUTE RESISTANCE VALUE AND TOLERANCE, WATTAGE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.

(5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.

2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	NOM ABSOLUTE RESISTANCE-ABHOMS	GROUP CODE
-1	61.556	D1
-2	60.934	D2
-3	60.326	D3
-4	59.729	D4
-5	59.144	D5
-6	58.570	D6
-7	58.008	D7
-8	57.456	D8
-9	56.914	D9
-10	56.383	D10
-11	55.861	D11
-12	10.000	
-13	49.001	
-14	49.581	
-15	50.175	
-16	50.784	
-17	51.407	
-18	52.046	
-19	52.701	
-20	53.373	



MASTER

PURCHASE TO QUALIFICATION STATUS
LIST ND1002034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN D Bergman DATE 31 DEC 62
CHECKED D. M. Sleeper 23 Jan 63
APPROVAL J L Sitomer 2/7/63
APPROVAL

NASA APPROVAL W J Rhine 2-13-63
MIT APPROVAL W Kupfer 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010253
SCALE NONE
WT
SHEET 1 OF 1

1010253 A

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

1010253 B

SYM	DESCRIPTION	DATE	APPROVAL
	REVISIONS TDRR00386		
-	TAKEN FROM BUWEPS SCD 2318983		
A	REVISED PER TDRR 00867	17Jun63	WK.
B	REVISED PER TDRR 03979	15Oct63	WK

(M)

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. REQUIREMENTS:

A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.

B. EXCEPTIONS:

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(2) QUALIFICATION: UNITS SHALL MEET THE REQUIREMENTS OF ND1002057.

(3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE 6.000 ± 0.001 VDC FOR -1 THRU -11 AND 1.000 ± 0.001 VDC FOR -12

(4) RESISTANCE TOLERANCE: ± 0.01% (100 PPM).

(5) TEMPERATURE CYCLING: BETWEEN 0°C AND +50°C WITH NO RESISTANCE CHANGE, GREATER THAN 10PPM.

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C. ADDITIONS:

(1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.

(2) POWER RATING: 1/5 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT +50°C.

(3) LEAD MATERIAL: TINNED COPPER.

(4) MARKING: RESISTORS SHALL BE MARKED PER MIL-STD-130 WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, ABSOLUTE RESISTANCE VALUE AND TOLERANCE, WATTAGE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.

(5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.

2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

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-1	61.556	D1
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-10	56.383	D10
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-17	51.407	
-18	52.046	
-19	52.701	
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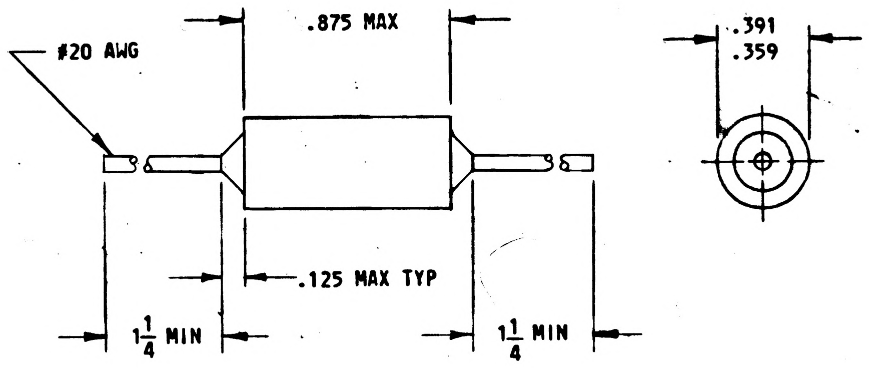
-22	54.770	



MASTER

PURCHASE TO QUALIFICATION STATUS LIST ND1002034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

HEAT TREATMENT
NONE

FINAL FINISH
NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN D. Bergman DATE 31 DEC 62
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APPROVAL J. L. Sitomer 2/7/63
APPROVAL

NASA APPROVAL W J Rhine 2-13-63

MIT APPROVAL W Hoffman 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010253

SCALE NONE WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

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REVISIONS TDRR00386

SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318983		
A	REVISED PER TDRR 00867	17Apr63	WK
B	REVISED PER TDRR 03979	15Oct63	WK
C	REVISED PER TDRR 04248	5Nov63	WK

NOTES:

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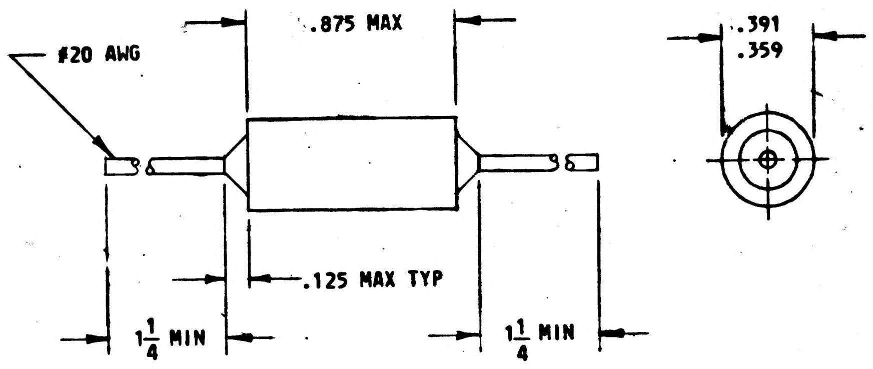
-11	55.861	D11
-12	10.000	
-13	49.001	
-14	49.581	
-15	50.175	
-16	50.784	
-17	51.407	
-18	52.046	
-19	52.701	
-20	53.373	
-21	54.062	
-22	54.770	



MASTER

PURCHASE TO QUALIFICATION STATUS LIST ND1002036

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL SEE NOTES
HEAT TREATMENT NONE
FINAL FINISH NONE

MIT INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN D. Bergman DATE 31 DEC 62
CHECKED 23 Jan 63
APPROVAL 2/7/63
APPROVAL
NASA APPROVAL W J Rhine 2-13-63
MIT APPROVAL 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. SIZE C NASA DRAWING NO. 1010253
SCALE NONE WT SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

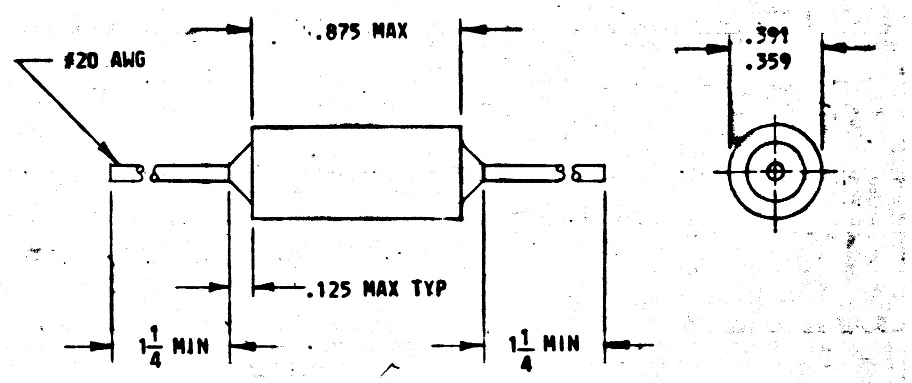
REVISIONS TDRR00386			
SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318983		
A	REVISED PER TDRR 00867	17Jan63	WK.
B	REVISED PER TDRR 03977	15Oct63	WK.
C	REVISED PER TDRR 04248	5Nov63	WK.
D	REVISED PER TDRR 07313	3/31/64	WK

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.
   - B. EXCEPTIONS:
     - (1) RATINGS: ALL REQUIREMENTS AT 25 ± 2°C WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.
     - (2) QUALIFICATION: UNITS SHALL MEET THE REQUIREMENTS OF ND1002057.
     - (3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE 6.000 ± 0.001 VDC FOR -1 THRU -11 AND 1.000 ± 0.001 VDC FOR -12
     - (4) RESISTANCE TOLERANCE: ± 0.01% (100 PPM).
     - (5) TEMPERATURE CYCLING: BETWEEN 0°C AND +50°C WITH NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (8) SALT WATER IMMERSION: NOT APPLICABLE.
     - (9) LIFE (STABILITY): 30 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE, DESIGN REQUIREMENT.
     - (10) RESISTANCE TEMPERATURE COEFFICIENT: ±3.5 PPM/°C BETWEEN 25°C AND 45°C. SAME CONDITIONS AS DC RESISTANCE.
     - (11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.
     - (12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.
     - (13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.
     - (14) SHOCK: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (15) VIBRATION: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (16) POINTS OF MEASUREMENT: MEASURE RESISTANCE BETWEEN POINTS ON LEADS 1.687 ± .020 INCHES APART. LEADS MUST BE STRAIGHT.
   - C. ADDITIONS:
     - (1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.
     - (2) POWER RATING: 1/5 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT +50°C.
     - (3) LEAD MATERIAL: TINNED COPPER.
     - (4) MARKING: RESISTORS SHALL BE MARKED PER ND1002019 WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, RESISTANCE VALUE AND TOLERANCE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.
     - (5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE-OHMS	GROUP CODE
-1	61.556	D1
-2	60.934	D2
-3	60.326	D3
-4	59.729	D4
-5	59.144	D5
-6	58.570	D6
-7	58.008	D7
-8	57.456	D8
-9	56.914	D9
-10	56.383	D10
-11	55.861	D11
-12	10.000	
-13	49.001	
-14	49.581	
-15	50.175	
-16	50.784	
-17	51.407	
-18	52.046	
-19	52.701	
-20	53.373	
-21	54.062	
-22	54.770	
-23	15	
-24	72.816	



MASTER

PURCHASE TO QUALIFICATION STATUS
LIST ND1002034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING
MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT
DRAWN D Bergman DATE 31 DEC 62
CHECKED D. M. 23 Jan 63
APPROVAL 2/7/63
APPROVAL
NASA APPROVAL W J 2-13-63
MIT APPROVAL 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010253
SCALE NONE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

E 1010253

REVISIONS TDRR00386

SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318983		
A	REVISED PER TDRR 00867	17Jan63	WK
B	REVISED PER TDRR 03979	15Oct63	WK
C	REVISED PER TDRR 04248	5Nov63	WK
D	REVISED PER TDRR 07313	3/31/64	WK
E	REVISED PER TDRR 13294	10/14/64	

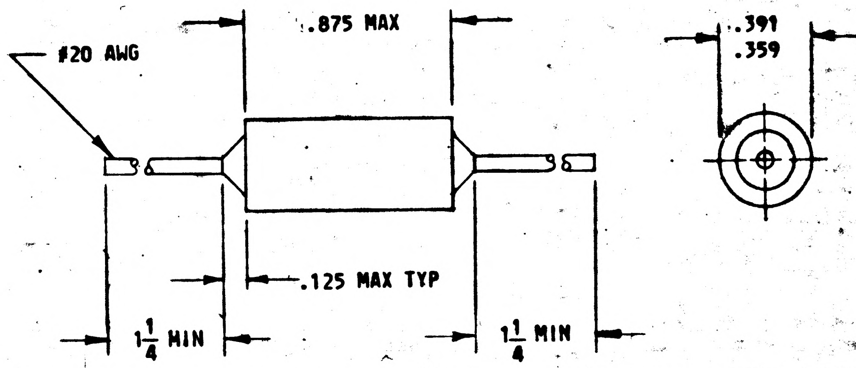
Ⓜ

NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.
   - B. EXCEPTIONS:
     - (1) RATINGS: ALL REQUIREMENTS AT 25 ± 2°C WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.
     - (2) QUALIFICATION: UNITS SHALL MEET THE REQUIREMENTS OF ND1002057.
     - (3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE 6.000 ± 0.001 VDC FOR -1 THRU -11 AND 1.000 ± 0.001 VDC FOR -12
     - (4) RESISTANCE TOLERANCE: ± 0.01% (100 PPM).
     - (5) TEMPERATURE CYCLING: BETWEEN 0°C AND +50°C WITH NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (8) SALT WATER IMMERSION: NOT APPLICABLE.
     - (9) LIFE (STABILITY): 30 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE, DESIGN REQUIREMENT.
     - (10) RESISTANCE TEMPERATURE COEFFICIENT: ±3.5 PPM/°C BETWEEN 25°C AND 45°C. SAME CONDITIONS AS DC RESISTANCE.
     - (11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.
     - (12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.
     - (13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.
     - (14) SHOCK: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (15) VIBRATION: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (16) POINTS OF MEASUREMENT: MEASURE RESISTANCE BETWEEN POINTS ON LEADS 1.687 ± .020 INCHES APART. LEADS MUST BE STRAIGHT.
   - C. ADDITIONS:
     - (1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.
     - (2) POWER RATING: 1/3 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT +50°C.
     - (3) LEAD MATERIAL: TINNED COPPER.
     - (4) MARKING: RESISTORS SHALL BE MARKED PER ND1002019 WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, RESISTANCE VALUE AND TOLERANCE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.
     - (5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE-OHMS	GROUP CODE
-1	61.556	D1
-2	60.934	D2
-3	60.326	D3
-4	59.729	D4
-5	59.144	D5
-6	58.570	D6
-7	58.008	D7
-8	57.456	D8
-9	56.914	D9
-10	56.383	D10
-11	55.861	D11
-12	10.000	
-13	49.001	
-14	49.581	
-15	50.175	
-16	50.784	
-17	51.407	
-18	52.046	
-19	52.701	
-20	53.373	
-21	54.062	
-22	54.770	
-23	15	
-24	72.816	
-25	20.000	

MASTER



DASH NO.	RESISTANCE-OHMS	GR CODE
-26	135.561	
-27	136.816	
-28	138.095	
-29	139.397	
-30	140.725	
-31	142.078	
-32	143.457	
-33	144.864	

DASH NO.	RESISTANCE-OHMS	GR CODE
-34	146.298	
-35	147.761	
-36	149.253	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

PURCHASE TO QUALIFICATION STATUS
LIST ND1002034

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN D Bergman DATE 31DEC62
CHECKED D. M. Sluper 23 Jan 63
APPROVAL J L Sitomer 2/7/63
APPROVAL
NASA APPROVAL W J Rhine 2-13-63
MIT APPROVAL 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010253
SCALE NONE
WT
SHEET 1 OF 1

INCHES
0 1 2
PHOTOGRAPHIC SCALE ONLY

F 1010253

SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318983		
A	REVISED PER TDRR 00867	17Apr63	WK
B	REVISED PER TDRR 03979	15Oct63	WK
C	REVISED PER TDRR 04248	5Nov63	WK
D	REVISED PER TDRR 07313	3/31/64	WK
E	REVISED PER TDRR 13294	10/14/64	
F	REVISED PER TDRR 18523	4/27/65	WK

REVISIONS TDRR00386

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

NOTES:

1. REQUIREMENTS:

A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.

B. EXCEPTIONS:

(1) RATINGS: ALL REQUIREMENTS AT 25 ± 2°C WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.

(2) QUALIFICATION: UNITS SHALL MEET THE REQUIREMENTS OF ND1002057.

(3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE 6.000 ± 0.001 VDC FOR -1 THRU -11 AND 1.000 ± 0.001 VDC FOR -12

(4) RESISTANCE TOLERANCE: ± 0.01% (100 PPM).

(5) TEMPERATURE CYCLING: BETWEEN 0°C AND +50°C WITH NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(8) SALT WATER IMMERSION: NOT APPLICABLE.

(9) LIFE (STABILITY): 30 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE, DESIGN REQUIREMENT.

(10) RESISTANCE TEMPERATURE COEFFICIENT: ±3.5 PPM/°C BETWEEN 25°C AND 45°C. SAME CONDITIONS AS DC RESISTANCE.

(11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.

(12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.

(13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.

(14) SHOCK: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(15) VIBRATION: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(16) POINTS OF MEASUREMENT: MEASURE RESISTANCE BETWEEN POINTS ON LEADS 1.687 ±.020 INCHES APART. LEADS MUST BE STRAIGHT.

C. ADDITIONS:

(1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.

(2) POWER RATING: 1/3 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT +50°C.

(3) LEAD MATERIAL: TINNED COPPER.

(4) MARKING: RESISTORS SHALL BE MARKED PER ND1002019 WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, RESISTANCE VALUE AND TOLERANCE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.

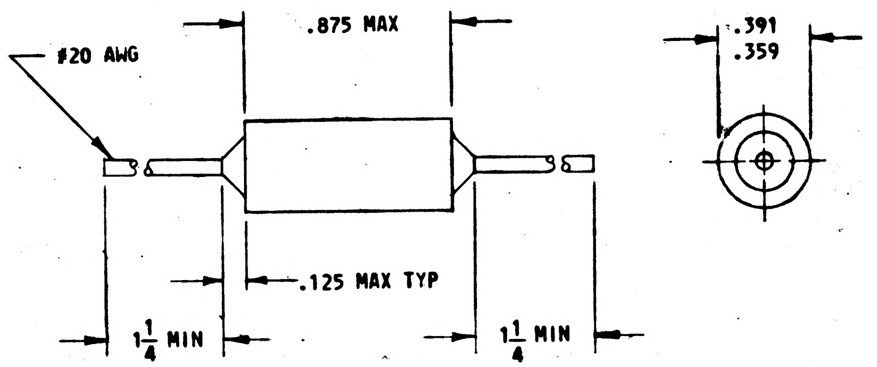
(5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404. CLASS 2.

2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

PURCHASE TO QUALIFICATION STATUS
LIST ND1002034

DASH NO.	RESISTANCE-OHMS	GROUP CODE
-1	61.556	D1
-2	60.934	D2
-3	60.326	D3
-4	59.729	D4
-5	59.144	D5
-6	58.570	D6
-7	58.008	D7
-8	57.456	D8
-9	56.914	D9
-10	56.383	D10
-11	55.861	D11
-12	10.000	
-13	49.001	
-14	49.581	
-15	50.175	
-16	50.784	
-17	51.407	
-18	52.046	
-19	52.701	
-20	53.373	
-21	54.062	
-22	54.770	
-23	15	
-24	72.816	
-25	20.000	

MASTER



DASH NO.	RESISTANCE-OHMS	GR CODE
-26	135.561	
-27	136.816	
-28	138.095	
-29	139.397	
-30	140.725	
-31	142.078	
-32	143.457	
-33	144.864	

DASH NO.	RESISTANCE-OHMS	GR CODE
-34	146.298	
-35	147.761	
-36	149.253	
-37	12.500	
-38	25.000	
-39	71.565	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

HEAT TREATMENT
NONE

FINAL FINISH
NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN D Bergman DATE 31 DEC 62
CHECKED D. M. Sleeper 23 Jan 63
APPROVAL J L Sitomer 2/7/63
APPROVAL

NASA APPROVAL W J Rhine 2-13-63

MIT APPROVAL W Tuffer 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1010253
SCALE NONE
WT
SHEET 1 OF 1

NOTICE — WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER; AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

1010253 | G

REVISIONS TDRR00386			
SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318983		
A	REVISED PER TDRR 00867	17Apr63	WK
B	REVISED PER TDRR 03979	15Oct63	WK
C	REVISED PER TDRR 04248	5Nov63	WK
D	REVISED PER TDRR 07313	3/31/64	WK
E	REVISED PER TDRR 13294	10/14/64	[illegible]
F	REVISED PER TDRR 18523	4/27/65	LK WK
G	REVISED PER TDRR 19920	6/15/65	WK

NOTES:

1. REQUIREMENTS:
   - A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.
   - B. EXCEPTIONS:
     - (1) RATINGS: ALL REQUIREMENTS AT 25 ± 2°C WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.
     - (2) QUALIFICATION: UNITS SHALL MEET THE REQUIREMENTS OF ND1002057.
     - (3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE 6.000 ± 0.001 VDC FOR ALL DASH NUMBERS EXCEPT -12,-23,-25 AND -38 FOR WHICH TEST VOLTAGE SHALL BE 1.000 ± 0.001 VDC.
     - (4) RESISTANCE TOLERANCE: ± 0.01% (100 PPM).
     - (5) TEMPERATURE CYCLING: BETWEEN 0°C AND +50°C WITH NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (8) SALT WATER IMMERSION: NOT APPLICABLE.
     - (9) LIFE (STABILITY): 30 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE, DESIGN REQUIREMENT.
     - (10) RESISTANCE TEMPERATURE COEFFICIENT: ±3.5 PPM/°C BETWEEN 25°C AND 45°C. SAME CONDITIONS AS DC RESISTANCE.
     - (11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.
     - (12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.
     - (13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.
     - (14) SHOCK: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (15) VIBRATION: NO RESISTANCE CHANGE, GREATER THAN 10PPM.
     - (16) POINTS OF MEASUREMENT: MEASURE (RESISTANCE BETWEEN POINTS ON LEADS 1.687 ±.020 INCHES APART. LEADS MUST BE STRAIGHT.
   - C. ADDITIONS:
     - (1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.
     - (2) POWER RATING: 1/3 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT +50°C.
     - (3) LEAD MATERIAL: TINNED COPPER.
     - (4) MARKING: RESISTORS SHALL BE MARKED PER ND1002019 WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, RESISTANCE VALUE AND TOLERANCE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.
     - (5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015404, CLASS 2.
2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	RESISTANCE-OHMS	GROUP CODE
-1	61.556	D1
-2	60.934	D2
-3	60.326	D3
-4	59.729	D4
-5	59.144	D5
-6	58.570	D6
-7	58.008	D7
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-10	56.383	D10
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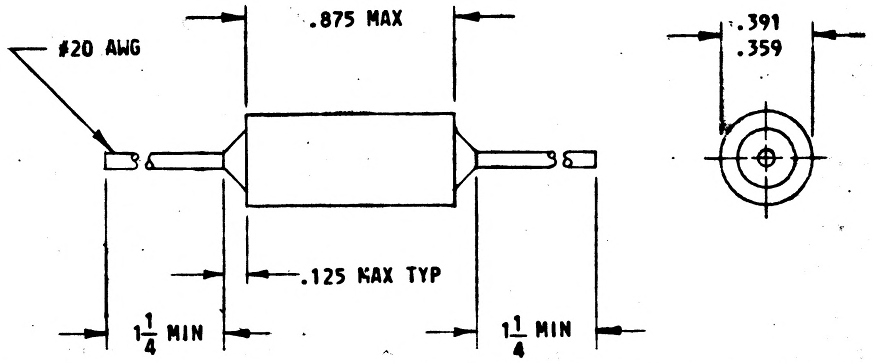
-20	53.373	
-21	54.062	
-22	54.770	
-23	15	
-24	72.816	
-25	20.000	

MASTER



DASH NO.	RESISTANCE-OHMS	GR CODE
-26	135.561	
-27	136.816	
-28	138.095	
-29	139.397	
-30	140.725	
-31	142.078	
-32	143.457	
-33	144.864	

DASH NO.	RESISTANCE-OHMS	GR CODE
-34	146.298	
-35	147.761	
-36	149.253	
-37	12.500	
-38	25.000	
-39	71.565	
-40	70.588	

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

PURCHASE TO QUALIFICATION STATUS
LIST ND1002034

NEXT ASSY	USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL
SEE NOTES

HEAT TREATMENT
NONE

FINAL FINISH
NONE

MIT
INSTRUMENTATION LAB
CAMBRIDGE, MASS.
DWG. NO. CONTRACT

DRAWN D Bergman DATE 31 DEC 62
CHECKED D. M. Sleeper 23 Jan 63
APPROVAL J L Sitomer 2/7/63
APPROVAL

NASA APPROVAL W J Rhine 2-13-63
MIT APPROVAL W Kupfer 13 Feb 63

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO. 80230
SIZE C
NASA DRAWING NO. 1010253
SCALE NONE
WT
SHEET 1 OF 1

1010253

REVISIONS TDRR00386

SYM	DESCRIPTION	DATE	APPROVAL
-	TAKEN FROM BUWEPS SCD 2318983		

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NOTES:

1. REQUIREMENTS:

A. THESE RESISTORS SHALL MEET THE GENERAL REQUIREMENTS OF MIL-R-93 WITH THE EXCEPTIONS AND ADDITIONS BELOW.

B. EXCEPTIONS:

(1) RATINGS: ALL REQUIREMENTS AT 25 ± 2°C WITH INFINITE HEATSINK OR OIL UNLESS SPECIFIED.

(2) QUALIFICATION: UNITS SHALL MEET THE REQUIREMENTS OF ND1002057.

(3) DC RESISTANCE: AS SPECIFIED EXCEPT TEST VOLTAGE TO BE 6.000 ± 0.001 VDC FOR -1 THRU -11 AND 1.000 ± 0.001 VDC FOR -12

(4) RESISTANCE TOLERANCE: ± 0.01% (100 PPM).

(5) TEMPERATURE CYCLING: BETWEEN 0°C AND +50°C WITH NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(6) SHORT TERM OVERLOAD: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(7) DIELECTRIC WITHSTANDING VOLTAGE: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(8) SALT WATER IMMERSION: NOT APPLICABLE.

(9) LIFE (STABILITY): 30 PPM/YEAR AT 2 HOURS PER DAY OPERATION AT LEAST 10 HOURS BETWEEN OPERATIONS, SAME CONDITIONS AS DC RESISTANCE, DESIGN REQUIREMENT.

(10) RESISTANCE TEMPERATURE COEFFICIENT: ±3.5 PPM/°C BETWEEN 25°C AND 45°C. SAME CONDITIONS AS DC RESISTANCE.

(11) LOW TEMPERATURE STORAGE: NOT APPLICABLE.

(12) LOW TEMPERATURE OPERATION: NOT APPLICABLE.

(13) HIGH TEMPERATURE EXPOSURE: NOT APPLICABLE.

(14) SHOCK: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(15) VIBRATION: NO RESISTANCE CHANGE, GREATER THAN 10PPM.

(16) POINTS OF MEASUREMENT: MEASURE ABSOLUTE RESISTANCE BETWEEN POINTS ON LEADS 1.687 ±.020 INCHES APART. LEADS MUST BE STRAIGHT.

C. ADDITIONS:

(1) SERIES INDUCTANCE: 100 MICROHENRIES MAX WHEN MEASURED AT 1000 CPS AND 1.000 VRMS.

(2) POWER RATING: 1/3 WATT IN FREE AIR; 1 WATT WITH AN INFINITE HEAT SINK OR IN OIL DERATED TO 0 WATTS AT +50°C.

(3) LEAD MATERIAL: TINNED COPPER.

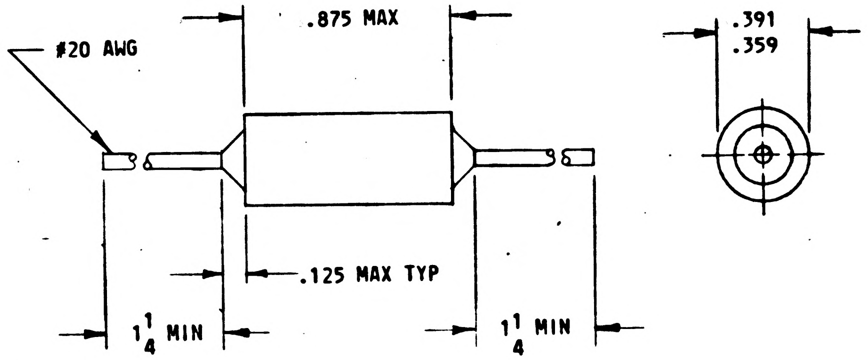
(4) MARKING: EACH RESISTOR AND CONTAINER SHALL BE MARKED WITH THE MANUFACTURER'S NAME OR SYMBOL, TYPE NUMBER, ABSOLUTE RESISTANCE VALUE AND TOLERANCE, WATTAGE, AND GROUP CODE NUMBER. EACH CONTAINER SHALL ALSO CONTAIN THE NASA DRAWING NUMBER, DASH NUMBER, AND REVISION LETTER IF ANY.

(5) QUALITY ASSURANCE: VENDORS SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS CONTAINED IN ND 1015400, CLASS II.

2. INTERPRET DRAWING IN ACCORDANCE WITH THE STANDARDS PRESCRIBED BY MIL-D-70327.

DASH NO.	NOM ABSOLUTE RESISTANCE-ABOHMS	GROUP CODE
-1	61.556	D1
-2	60.934	D2
-3	60.326	D3
-4	59.729	D4
-5	59.144	D5
-6	58.570	D6
-7	58.008	D7
-8	57.456	D8
-9	56.914	D9
-10	56.383	D10
-11	55.861	D11
-12	10.000	--

MASTER



PURCHASE TO QUALIFICATION STATUS LIST ND1002034

QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.

LIST OF MATERIALS

NEXT ASSY	USED ON

APPLICATION

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TOLERANCES ON
FRACTIONS ± DECIMALS ± ANGLES ±
DO NOT SCALE THIS DRAWING

MATERIAL: SEE NOTES
HEAT TREATMENT: NONE
FINAL FINISH: NONE

MIT INSTRUMENTATION LAB
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DRAWN D Bergman DATE 31 DEC 62
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MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

RESISTOR, FIXED, WW, PRECISION

SPECIFICATION CONTROL DRAWING

CODE IDENT NO.
SIZE C
NASA DRAWING NO. 1010253
SCALE NONE
WT
SHEET 1 OF 1

1010253